

Linguistic Analysis of Chinese Language Usage in Face-to-Face versus Virtual Communication: Insights from Non-native and Native Chinese Speakers

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Abstract

In the contemporary educational landscape, the prevalence of online and face-to-face (F2F) teaching, along with the advancement of blended teaching as a pivotal force in educational reform, has transformed the learning environment. However, the nuances between these two instructional modes remain insufficiently explored. This study employs an experimental task, leveraging certain linguistic parameters from narrative analysis, to quantitatively assess the oral expression abilities of 40 learners of Chinese as a second language and 40 native Chinese speakers, both in online settings and in F2F settings. The study compares oral performance in online versus F2F interactions and investigates how varying linguistic backgrounds influence language parameters. Findings indicate that different communication styles have varying impacts on diverse language parameters, and the influence of communication mode on performance is more pronounced among native speakers. F2F interviews exhibit superior oral performance compared to online interviews, as evidenced by fewer repetitions and hesitations, a lower total number of characters and sentences, and greater communicative efficiency. The implications of this study are far-reaching, including the optimization of teaching by effectively integrating online and F2F methods, emphasizing practical and contextually relevant instruction for non-native learners, and incorporating communication efficiency as a crucial metric in teaching evaluation frameworks.

1. Introduction

In the contemporary post-digital era, where both online and face-to-face (F2F) teaching have become ubiquitous, the rapid advancement of artificial intelligence (AI) has propelled blended teaching to the forefront of educational reform (Kim, 2024; Wang & Canagarajah, 2024; Yu & Xu, 2022; Zhao et al., 2021). Despite widespread adoption, there remains a lack of awareness regarding the nuanced differences between online and face-to-face teaching (Bikowski et al, 2022; Dong et al., 2022; Lu et al., 2020; Scheg, 2014). Educators must adapt their approaches to interact with students effectively in these distinct environments (Chen & Cui, 2022; Hsiao et al., 2023; Hsieh et al., 2022; Khan & Zhuang, 2024; Meng et al., 2022). To address this, a study was conducted involving 40 Chinese second language learners and 40 native Chinese speakers, focusing on the quantitative analysis of linguistic data. The research aimed to delineate the distinctions between online and F2F teaching methodologies, providing recommendations to enhance online teaching and guide students in digital learning environments. International students benefit from online learning, which allows them to commence their studies in their home countries, reducing costs and travel. Understanding the characteristics and challenges of oral performance differences in online environments aids in fostering cross-cultural communication and enhancing language learning experiences (Giannikas, 2022; Guo & Möllering, 2016; Stickler & Shi, 2013; Zhao et al., 2020). This paper addresses a gap in the literature, particularly the scarcity of empirical research on international Chinese online oral learning. Most prior research has focused on the effectiveness of short-term online teaching versus traditional F2F teaching, but there is a paucity of studies comparing online and F2F Chinese usage by advanced learners (Liu, 2023; Wu, Pang & Sun, 2025).

The specific research questions of this study are as follows:

1. What are the differences in oral performance between Chinese second language learners and native speakers in online versus F2F contexts?
2. What are the underlying reasons for these differences?

The hypothesis of this study is: There are significant differences ($p \leq 0.05$) in oral performance between online and F2F settings. Specifically, the online setting is expected to show higher error rates and lower communicative efficiency compared to the F2F setting.

Through an in-depth analysis of oral performance differences, this study seeks to understand the process of non-native speakers learning Chinese and their performance in varied environments. Factors affecting oral performance, including proficiency levels and environmental influences, are examined to provide practical suggestions for combining online and F2F teaching methods. The goal is to enhance the oral proficiency of Chinese second language learners and contribute to the development of effective online language education strategies. By addressing these research questions, this paper aims to provide empirical evidence and practical recommendations for educators, contributing to a better understanding of the language acquisition process and promoting the development of oral skills among Chinese second language learners.

2. Theoretical background

2.1. Narrative Analysis

Quantitative narrative analysis (QNA) is grounded in the language characteristics of texts, rooted in longstanding literary and linguistic traditions that strive to uncover these features (Clandinin & Connelly, 2000; Franzosi, 2010). Andrade and Andersen (2020) introduced Digital Story Grammar (DSG), a methodology that integrates narrative theory with digital text analysis, employing algorithms to identify units consisting of subjects, predicates, and objects. Güngör (2021) discussed the implementation of online language ability tests during the COVID-19 pandemic through a narrative inquiry of the test designer. Poole (2021), drawing on narrative inquiry and relational ethics, explored the life experiences and identities of teachers at an international school in Shanghai through interviews and email correspondence, demonstrated how narrative exploration drives the research process from data collection to transcription and analysis. Another study conducted from a developmental perspective by Rohrer, Florit-Pons, Vilà-Giménez et al. (2021), exploring the relationship between information structure and the referentiality of gestures in children's narrative speech. Through the coding analysis of a children's narrative database, the study revealed that non-referential gestures play a crucial role in marking discourse elements and updating common ground, thus offering a novel perspective and research approach for narrative speech analysis. Menn, Ramsberger, and Helm Estabrooks (1994) proposed the Linguistic Communication Measure (LCM), a rapid method for analyzing language narratives. LCM was later adapted into the Cantonese Linguistic Communication Measure (CLCM) by Kong and Law (2005). The CLCM uses image narration as a medium to reflect changes in language narrative over time, employing eight parameters that assess the efficiency of information transmission, as well as sentence grammar, clarity, and lexical diversity. The primary aim of CLCM is to document or evaluate language proficiency rather than communicative or social skills (Kong & Law, 2009). To further validate CLCM, researchers used discriminant function analysis (DFA) to reanalyze language data and understand whether the selected parameters could classify experimental participants and predict their groupings, which also provides a reference for interdisciplinary researchers in Chinese education, including those in cognitive psychology and linguistics (Law et al., 2008). Based on the QNA and other researches mentioned above, our study selects some of the language parameters to analyze the language.

2.2 Online and F2F Learning

Researchers claimed that increased use of electronic learning materials by college students significantly improves their academic performance (Firat et al., 2019; Li et al., 2024; Rajendram & Shi, 2022). Wu (2023) noted that online

oral practice lacks the social attributes of face-to-face interaction, leading teachers to rely heavily on media such as audio and video for interaction, while neglecting the development of topic diversity due to environmental changes. Therefore, in second language learning, online oral communication should be student-centered and focus on enhancing interactivity, students need more opportunities to speak and practice (Ashton, 2022; Behl et al., 2022; Chen & Hu, 2021; Endris & Molla, 2023; Ji et al., 2022). Lu, Li and Jia (2020) discovered that for some Japanese learners of Chinese, the interactivity of online classes surpasses that of F2F classrooms, as students are more willing to engage in online interactions. This is because online communication offers characteristics do not present in F2F settings, such as text, facial expressions and voice, which reduce the hesitation of introverted students and boost their confidence in self-expression. However, Na (2022), Renqiang and Wende (2022) argues that online teaching suffers from poor interactivity. Even with more personalized one-on-one online Chinese learning, the absence of a real communication space compared to F2F learning can result in a less conducive learning atmosphere, making teachers more passive in their teaching approach. Apparently, researches pertaining to online and F2F learning manifest considerable discrepancies, it is hoped that the results of this paper can contribute to the formation of a unified perspective.

2.3 Language Parameters

In recent years, researchers continuously investigated the structure of complexity, accuracy, and fluency (CAF) in order to propose more precise definitions and more advanced measurement criteria (Larsen-Freeman, 2009; Michel, 2015; Mizumoto, 2025). Shewan (1988) proposed a quantitative language analysis system (SSLA: Shewan Spontaneous Language Analysis), in which language data are obtained through a picture description task, used 12 SSLA parameters to analyze the data mainly from semantic, phonetic, and syntactic perspectives. Narrative description based on picture presentation is a complex task. Experimental participants need to extract information from pictures and convert visual information into a language narrative structure output (Holmqvist et al., 2005). Smith and Wheeldon (1999) also adopted an online picture description task and designed five experiments to study the conceptual and grammatical encoding in the process of oral sentence generation. Another language study investigated the language situations of children with language disorders but from different native languages (Chinese, English, Swedish and Greek) (Hao et al., 2018). This study used six key measurement parameters to evaluate specific Chinese language features, including classifiers, particles, adverbs, active "ba" sentences, and passive "bei" sentences. The research of Berman and Slobin (1994) focused on how the structural attributes and rhetorical preferences of different native languages affect the development of narrative ability, narrative data in Berman's research were obtained based on the same picture book "Frog, Where Are You?" (Mayer, 1969). Our research selected the Chinese version of the English picture book "Frog, Where Are You?" as the basic corpus. The principle of using a single picture storybook is to provide a common content that can span ages and languages and represent a typical children's story: there are characters (a boy and his dog), a problem (the boy's pet frog runs away), a series of actions triggered by this problem (the boy and the dog search for the missing frog), and a happy ending (the boy finds his frog or exchanges it for another frog). This particular picture book has been proven suitable for narrative analysis because it describes a series of rather long and complex events and allows narrators to cover a variety of topics. These include: (1) expressing the relationship between time and successive events, in sequence (the frog comes out of the jar and then runs away), events related to previous situations (the jar in which the frog was kept is empty), and events related to simultaneous or concurrent events (while the boy is looking in the hole in the tree, the dog is being chased by bees); (2) descriptions of location trajectories (the deer pushing the boy off the cliff into the swamp below); (3) the possibility of taking different perspectives on events (the dog is being chased by bees, or the bees are chasing the dog); and (4) the story has two main protagonists, the boy and the dog, providing opportunities for expressing the temporal relationships of talking about simultaneous events, as

well as maintaining and shifting references from one character to another. Another characteristic of the frog story is that it allows for different levels of cognitive reasoning between events. For example, it is easy to recognize from the picture that the frog has come out of the jar because the jar is empty; however, it is not easy to understand what the boy climbing the rock has grasped that looks like a branch. It is only by observing the subsequent pictures that one discovers that what he accidentally grasped was the antlers of the deer standing behind the rock. These different levels of interpretation can trigger different types of and levels of language expressions.

In summary, previous research on online and F2F learning, narrative analysis, and language parameters has provided valuable insights. However, these studies often lack in-depth exploration of the oral performance differences of Chinese language learners in online and F2F contexts, especially among advanced nonnative speakers with HSK 5 and above proficiency. Many existing works either focus on short term teaching effectiveness comparisons or analyze language disorders in specific populations, leaving a gap in understanding the nuances of language use in real world bilingual educational settings. Given the current trends of widespread adoption of online teaching, the push for blended teaching reform, and the increasing importance of cross-cultural communication in language learning, this study is poised to make a meaningful contribution. By quantitatively analyzing the oral performance of both native and nonnative Chinese speakers in different communication modes using carefully selected linguistic parameters from narrative analysis, it will not only fill the research void but also offer practical implications for teaching methodology optimization and assessment improvement. This research can help educators better adapt to diverse teaching environments, enhance the oral proficiency of nonnative learners, and ultimately contribute to the development of more effective online language education strategies, thus making a significant and timely addition to the existing body of literature.

3. Materials and Methods

3.1 Participants Selection

This study prioritized ethical considerations and was conducted in accordance with the Declaration of Helsinki (World Medical Association, 2013). Informed consent was obtained from all participants, who were fully informed about the study's purpose and procedures. All research was performed in accordance with Declaration of Helsinki when human participants are involved. Data collection was respectful and minimized potential harm. All data were anonymized, securely stored, and used solely for research purposes. The study obtained ethical approval from the Human Research Ethics Committee (HREC) of the author's university, ensuring compliance with ethical standards and regulatory requirements. The participants were sourced from two distinct sites. The experimental group of 40 nonnative Chinese speakers was recruited from Ningxia University (mostly African students) and Sun Yat-sen University Zhuhai Branch (mostly Southeast Asian students). These two universities were chosen as they have well-established international student programs in Chinese language learning, attracting students from diverse cultural and linguistic backgrounds. This diversity is representative of the global population of nonnative Chinese learners, enabling a comprehensive exploration of how different language backgrounds influence oral performance in various communication modes. The control group consisted of 40 native Chinese speakers, all residents of Ningxia. Selecting native speakers from a single region helps to control for regional language variations among native speakers, allowing for a more focused comparison with the nonnative group. The inclusion factors for the study were as follows. For nonnative speakers, they must have reached a Chinese proficiency level of HSK 5 or higher, ensuring a certain baseline of language ability for valid comparison. All participants, both native and nonnative, were required to be able to communicate orally in Chinese without significant physical impairments that could affect speech production. Exclusion factors included any history of severe language related disorders that

might distort normal language performance. Participants were recruited through a combination of methods. For nonnative speakers, announcements were made through the international student offices at the two universities, inviting eligible students to participate. Informed consent was obtained from all participants before the start of the study. Throughout the study, no participants were eliminated, as all met the initial inclusion criteria and completed both the online and F2F interviews. This sample selection process, with its clear inclusion and exclusion criteria and diverse sourcing, ensures that the sample is representative of the study's aims to compare oral performance between native and nonnative speakers in different communication settings.

3.2 Interview Design

A structured approach was employed to collect and analyze data from both international students and native Chinese speakers. Initially, a simple questionnaire was administered to gather basic background information from the participants, including their names, ages, language backgrounds, and years of language study. Subsequently, audio data were collected from 40 international students and 40 native Chinese speakers through both online and F2F interviews. The interviews were structured in a semi-structured manner, begin with the same question asked in Chinese: "Please tell the story according to the pictures". Each participant underwent two interviews, one online and one F2F, with a minimum interval of 48 hours between sessions to minimize the impact of familiarity on the interviews. This interview structure was chosen for several reasons. The picture description task provides a standardized and controlled stimulus, allowing for a fair comparison of language performance across participants. The semi-structured nature, encourages participants to expand on their initial narrative, revealing more about their language use, reasoning, and communication skills. The minimal prompt approach ensures that the participants' natural language abilities are captured without excessive guidance from the interviewer.

Upon completion of the recording process, the audio data were transcribed into text using machine recognition followed by human verification. Interviews were conducted with the explicit consent of the participants, and the entire process was recorded. The M4A files were converted to WAV format, and the audio was then transcribed using web-based speech recognition tools. The textual information was organized numerically into an Excel spreadsheet. Statistical analysis was performed using SPSS. Paired sample *t*-test were utilized to assess the impact of different communication modes (F2F and online) on language performance. One-way ANOVA was applied to analyze different language backgrounds (L1 and L2) serving as independent variables and language parameters as the dependent variable. Specific measurement parameters selected for language analysis included:

- Number of Characters (NC)
- Number of Sentences (NS)
- Duration
- Sentence Final Particles (SFPs)
- Repetitions
- Information Words (IW)
- Function Words (FW)
- Errors

- Nouns
- Verbs
- Hesitation: more than three seconds
- Sentence Length (SL): total number of characters divided by the total number of sentences
- Communication Efficiency (CE): total number of information words divided by the duration in seconds

These parameters were used in the story description task to provide a comprehensive assessment of the participants' language proficiency and performance in both online and F2F settings. An individual's multilingual development process is not linear (Chang, 2024; Darvin & Norton, 2015; Kong, 2021; Yan & Wang, 2022). The fluency of language expression is correlated with parameters such as the error frequency, the hesitation count, and the repetition frequency. A lack of fluency begets an augmentation in errors, hesitations, and repetitions. Conversely, an abundance of errors, hesitations, and repetitions will also curtail the fluency. The communication efficiency is intimately associated with multiple indices such as language organization and planning capacity, vocabulary retrieval and application ability, grammar mastery and application ability, and mental agility and logical aptitude (Bialystok & Craik, 2010; Segalowitz, 2010; MacIntyre, 2011; Pollard-Durodola et al., 2024; Kyle et al., 2020). Through a comprehensive analysis of the above parameters, a more holistic comprehension of the oral performance of the test subjects and the developmental status of their underlying language capabilities can be achieved, thereby furnishing targeted guidance and feedback for teaching and learning.

4. Result

4.1 Online and F2F modes

Table 1 shows the data of various language measurement parameters for the story description task in online and F2F modes. There are two measurement parameters that show differences: the number of hesitations $t(df = 79) = -4.38, p < 0.001$, and the communication efficiency $t(df = 79) = 2.9, p < 0.05$. The data shows that the number of hesitations in F2F interviews is less than that in online interviews, and the communication efficiency in F2F interviews is higher than that in online interviews.

Table 1 Paired sample *t*-test for online and F2F interview data on story task

1:F2F group (N=80)	Mean	SD	Standard Error of the Mean	2:Online group (N=80)	Mean	SD	Standard Error of the Mean
NC(F2F)	434.55	160.669	17.963	NC(online)	439.23	145.525	16.27
NS(F2F)	40.16	14.447	1.615	NS(online)	40.85	11.581	1.295
SFPs(F2F)	7.51	4.003	0.448	SFPs(online)	7	4.311	0.482
repetitions(F2F)	3.41	3.61	0.404	repetitions(online)	3.43	3.662	0.409
IW(F2F)	93.55	30.098	3.365	IW(online)	95.93	30.365	3.395
FW(F2F)	76.01	29.994	3.353	FW(online)	76.71	28.825	3.223
errors(F2F)	6.18	7.341	0.821	errors(online)	6.4	7.228	0.808
nouns(F2F)	55.95	23.181	2.592	nouns(online)	55.49	19.483	2.178
verbs(F2F)	36.46	12.065	1.349	verbs(online)	37.36	10.772	1.204
hesitations(F2F)	4.31	4.108	0.459	hesitations(online)	6.39	5.015	0.561
SL(F2F)	10.847	1.396	0.156	SL(online)	10.692	1.287	0.144
CE(F2F)	0.6444	0.208	0.023	CE(online)	0.584	0.228	0.026

	<i>t</i>	Degrees of Freedom	Two-tailed <i>p</i> -value
NC(F2F) - NC(online)	-0.317	79	0.752
NS(F2F) - NS(online)	-0.509	79	0.612
SFPs(F2F) - SFPs(online)	1.014	79	0.314
repetitions(F2F) - repetitions (online)	-0.031	79	0.976
IW(F2F) - IW(online)	-0.786	79	0.434
FW(F2F) - FW(online)	-0.252	79	0.802
errors(F2F) - errors(online)	-0.487	79	0.628
nouns(F2F) - nouns(online)	0.271	79	0.787
verbs(F2F) - verbs(online)	-0.726	79	0.470
hesitations(F2F) - hesitations(online)	-4.378	79	<0.001
SL(F2F) - SL(online)	1.147	79	0.255
CE(F2F) - CE(online)	2.899	79	0.005

4.2 First and Second Language Group

Next, we analyze the obtained data from the perspective of different language backgrounds. As can be seen from Table 2, there are significant differences in nine parameters, namely, NC $F(1, 158) = 8.8, p < 0.05$; the IW $F(1, 158) = 26.26, p < 0.001$; FW $F(1, 158) = 9.47, p < 0.05$; errors $F(1, 158) = 119.41, p < 0.001$; nouns $F(1, 158) = 19.06, p < 0.001$; verbs $F(1, 158) = 24.1, p < 0.001$; hesitations $F(1, 158) = 17.17, p < 0.001$; SL $F(1, 158) = 40.21, p < 0.001$; and CE $F(1, 158) = 150.71, p < 0.001$. After comparing the average values of these nine measurement parameters, the conclusion is drawn that the data on the total number of characters, information words, function words, nouns, verbs, sentence length, and communication efficiency in the first language group are greater than those in the second language group, while the data on the number of errors and hesitations in the first language group are smaller than those in the second language group.

Table 2 ANOVA in story description task for different language backgrounds

		NC	IW	FW	errors	nouns	verbs	hesitations	SL	CE
L1	Mean	471.88	106.09	83.31	1.54	62.70	41.05	3.89	11.371	0.767
	Cases	80	80	80	80	80	80	80	80	80
	SD	169.420	30.808	30.179	1.622	21.899	11.706	3.611	1.173	0.178
L2	Mean	401.90	83.39	69.41	11.04	48.74	32.78	6.81	10.167	0.461
	Cases	80	80	80	80	80	80	80	80	80
	SD	125.780	24.914	26.873	7.605	18.406	9.503	5.181	1.228	0.134
All	Mean	436.89	94.74	76.36	6.29	55.72	36.91	5.35	10.769	0.614
	Cases	160	160	160	160	160	160	160	160	160
	SD	152.819	30.160	29.325	7.263	21.346	11.410	4.687	1.341	0.220

		Degrees of Freedom	Mean Square	<i>F</i>	Significance
NC	between groups	1	195860.025	8.798	0.003
	within groups	158	22261.936		
	all	159			
IW	between groups	1	20611.600	26.259	<0.001
	within groups	158	784.920		
	all	159			
FW	between groups	1	7728.400	9.465	0.002
	within groups	158	816.485		
	all	159			
errors	between groups	1	3610.000	119.407	<0.001
	within groups	158	30.233		
	all	159			
nouns	between groups	1	7798.056	19.058	<0.001
	within groups	158	409.166		
	all	159			
verbs	between groups	1	2739.025	24.096	<0.001
	within groups	158	113.669		
	all	159			
hesitations	between groups	1	342.225	17.165	<0.001
	within groups	158	19.938		
	all	159			
SL	between groups	1	57.990	40.209	<0.001
	within groups	158	1.442		
	all	159			
CE	between groups	1	3.749	150.710	<0.001
	within groups	158	0.025		
	all	159			

In terms of language background, native speakers can utilize more complex sentence structures, including multiple clauses and modifiers. This explains the longer sentence lengths observed in the native language group in the story task. Given that native speakers do not need to allocate excessive cognitive resources to language processing, they can focus more on how to organize and convey information. Native speakers typically have a

better grasp of how to effectively express meaning in their language, often using more concise and comprehensible colloquial language to describe situations. Second language learners may use more function words or redundant language when attempting to find suitable expressions, which may explain the higher communication efficiency of native speakers in frog story tasks. For native speakers, language processing is largely automated, enabling them to describe more quickly and naturally. In contrast, second language learners may require more cognitive effort to plan, organize, and formulate their descriptions, leading to more hesitation and errors. In summary, the differences in performance between native and second language speakers in language tasks can be explained from multiple perspectives, including cognitive processing, language proficiency, vocabulary knowledge, and sentence structure. These differences are not confined to image description tasks but are similarly observable in other language tasks.

To understand which group, L1 or L2, has a greater difference between online and F2F interviews, this study conducted paired sample *t*-tests on the online and F2F data of both groups. In the story description task, the hesitations of group L1 showed a difference $t(df=39)=-3.537, p<0.05$, the hesitations of group L2 showed a difference $t(df=39)=-2.758, p<0.05$, duration $t(df=39)=-2.779, p<0.05$, and CE $t(df=39)=4.479, p<0.001$. Multiple parameters of group L1 showed differences: NC $t(df=39)=-4.239, p<0.001$, NS $t(df=39)=-4.115, p<0.001$, IW $t(df=39)=-3.552, p<0.05$, FW $t(df=39)=-3.901, p<0.001$, errors $t(df=39)=-2.554, p<0.05$, nouns $t(df=39)=-2.894, p<0.05$, and CE $t(df=39)=2.830, p<0.05$, there was no parameter difference in group L2. Based on the above data, the conclusion is that the difference in oral performance between online and F2F interviews in group L1 is greater. That is, the closer the language level is to that of native speakers, the more they will be affected by different interview modes. Native speakers usually use their native language frequently for F2F communication in daily life, so they may be more adapted to the environment of F2F interviews. Native speakers have a higher degree of mastery of the language, so they are more able to perceive and utilize the subtle differences of non-verbal communication, such as facial expressions, body language, and intonation changes, which are not as obvious or easy to convey in online interviews as in F2F interviews. It is easier to establish social connections and intimacy in an F2F environment, and these factors are not as strong in online communication, thus affecting the language performance of participants. Therefore, when assessing the oral performance of Chinese second language learners at elementary and intermediate levels, online communication can be an effective alternative. When advanced Chinese second language learners conduct oral practice, it is best to use an F2F method.

4.3 Test of Between-subjects Effects

In addition to analyzing the differences in oral performance between online and F2F environments, we are also concerned about whether there are significant interaction effects and main effects between different oral production environments and language backgrounds. Therefore, we conducted a univariate analysis under the general linear model and carried out a test of between-subjects effects. Table 3 shows the test results of some data that exhibit statistically significant differences in the task.

Table 3 Test of the between-subject effects of language parameters

NC	Degrees of Freedom	<i>F</i>	<i>p</i>
Adjusted Model	15	1.278	0.223
Intercept	1	1324.833	<0.001
Online/F2F	1	0.043	0.835
Language Background	1	8.583	0.004

Repetitions	Degrees of Freedom	<i>F</i>	<i>p</i>
Adjusted Model	15	1.665	0.064
Intercept	1	147.944	<0.001
Online/F2F	1	0.008	0.931

IW	Degrees of Freedom	<i>F</i>	<i>p</i>
Adjusted Model	15	3.534	<0.001
Intercept	1	1935.617	<0.001
Online/F2F	1	0.322	0.571
Language Background	1	27.969	<0.001

FW	Degrees of Freedom	<i>F</i>	<i>p</i>
Adjusted Model	15	1.490	0.116
Intercept	1	1117.777	<0.001
Online/F2F	1	0.039	0.844
Language Background	1	9.550	0.002

Errors	Degrees of Freedom	<i>F</i>	<i>p</i>
Adjusted Model	15	10.848	<0.001
Intercept	1	227.184	<0.001
Online/F2F	1	0.118	0.732
Language Background	1	129.261	<0.001

Nouns	Degrees of Freedom	<i>F</i>	<i>p</i>
Adjusted Model	15	2.649	0.001
Intercept	1	1249.663	<0.001
Online/F2F	1	0.021	0.885
Language Background	1	19.636	<0.001

CE	Degrees of Freedom	<i>F</i>	<i>p</i>
Adjusted Model	15	13.371	<0.001
Intercept	1	2674.561	<0.001
Online/F2F	1	6.287	0.013
Language Background	1	168.063	<0.001

The data show that the relationship between NC and language background reached a significant level, with $F (df = 1) = 8.583, p < 0.05$. Figure 1 indicates that native speakers had a larger NC in online tasks than in F2F tasks, while for second language speakers, there was little difference in NC between online and offline tasks. Figure 2 shows that native speakers had a greater NS in online tasks than in offline tasks, whereas for second language speakers, NS was consistent between online and offline tasks. Due to the lack of non-verbal communication elements in online communication, native speakers may compensate for this by increasing their language output (NC and NS) to ensure that their messages are accurately understood. Second language speakers have limited language proficiency, and their language production is relatively stable and is not greatly affected by either online or offline environments. Their language proficiency restricts their flexibility in language production. Second language speakers face a relatively high cognitive load when producing language. Whether it is online or offline, they may have already reached their maximum capacity in language expression, so there is little difference in their language performance in the two environments.

As shown in Figure 3, both native speakers and second language speakers used more SFPs offline than online, and the difference between online and offline for native speakers was even greater. Figure 4 shows that the number of repetitions in the second language group was greater online than offline, while the situation was the opposite for the native language group. For native speakers, offline communication is the most relaxed and natural way of communication. When communicating online, they are more cautious and purposeful, and their language output is more formal. For non-native speakers, offline communication may bring greater pressure. They may worry about their inaccurate pronunciation or improper use of vocabulary, and thus repeat sentences less frequently to avoid exposing their deficiencies. However, online, due to the lack of immediate face-to-face feedback, they may be unsure whether they are understood, so they repeat sentences more often to ensure the accuracy of information transmission.

The relationship between information words and language background reached a significant level, with $F (df = 1) = 27.969, p < 0.001$. Figure 5 indicates that native speakers had slightly more IW online than offline, while for second language speakers, the number of information words was roughly the same both online and offline.

The relationship between function words and language background reached a significant level, with $F(df = 1) = 9.55, p < 0.05$. Figure 6 shows that the native language group had more FW online than offline, while the second language group had more FW offline than online.

The relationship between the number of errors and language background reached a significant level, with $F(df = 1) = 129.261, p < 0.001$. Both the native language group and the second language group had slightly more errors online than offline. The relationship between the number of nouns and language background reached a significant level, with $F(df = 1) = 19.636, p < 0.001$. Figure 7 shows that the L1 group had more nouns online than offline, while the situation was the opposite for the L2 group.

The relationship between the number of verbs and language background reached a significant level, with $F(df = 1) = 23.767, p < 0.001$. As shown in Figure 8, native speakers had more verbs online than offline, while for the second language group, the number of verbs was roughly the same both online and offline.

The relationship between the number of hesitations and language background reached a significant level, with $F(df = 1) = 18.335, p < 0.001$; and the relationship between it and the oral production environment also reached a significant level, with $F(df = 1) = 8.753, p < 0.05$. Both L1 and L2 group had more hesitations online than offline. The relationship between communication efficiency and language background reached a significant level, with $F(df = 1) = 168.063, p < 0.001$; and the relationship between it and environments also reached a significant level, with $F(df = 1) = 6.287, p < 0.05$. Both the L1 group and the L2 group had higher CE offline than online. The relationship between sentence length and language background reached a significant level, with $F(df = 1) = 38.606, p < 0.001$. Figure 9 shows that the sentence length of the L1 group was the same both online and offline, while the L2 group had a longer sentence length offline than online.

Table 4 Simple main effect of story description task

		Degrees of Freedom	F	Significance
Language Background	NC	1	8.472	0.004
	IW	1	25.654	0.000
	FW	1	9.382	0.003
	errors	1	123.288	0.000
	nouns	1	18.495	0.000
	verbs	1	23.653	0.000
	hesitations	1	18.978	0.000
	SL	1	39.454	0.000
	CE	1	163.775	0.000
F2F/Online	hesitations	1	8.921	0.003
	CE	1	6.039	0.015

Our research has discovered a large number of interaction effects. Therefore, a simple main effect analysis was conducted to further clarify the relationships among variables. Table 4 presents the results of the simple main effect analysis of the data from the task. The data shows that language background had a significant impact on

NC ($F = 8.472, p < 0.01$), IW ($F = 25.654, p < 0.001$), FW ($F = 9.382, p < 0.01$), errors ($F = 123.288, p < 0.001$), nouns ($F = 18.495, p < 0.001$), verbs ($F = 23.653, p < 0.001$), hesitations ($F = 18.978, p < 0.001$), SL ($F = 39.454, p < 0.001$) and CE ($F = 163.775, p < 0.001$). The production environment had a significant impact on hesitations ($F = 8.921, p < 0.01$) and CE ($F = 6.039, p < 0.05$).

5. Discussion

From the language data derived from the frog's story task, it is evident that online interviews involve more hesitation, and the communication efficiency of F2F interviews surpasses that of online interviews. F2F communication often carries higher social expectations and norms, compelling participants to respond more promptly to avoid prolonged awkward silences (Schiller & Cui, 2010). F2F interviews typically foster a more natural communication rhythm, allowing both parties to adjust their speaking speed and content based on each other's reactions and linguistic cues, thereby facilitating smoother and more efficient information output. In F2F interviews, the interviewer and participant's F2F interaction is more conducive to capturing and interpreting non-verbal information, such as body language, facial expressions, and eye contact. These non-verbal cues provide immediate feedback, making it easier and quicker for the participant to understand the questions, thereby reducing the number of hesitations. A comprehensive communication channel enriches and enhances the accuracy of information transmission, thereby improving the efficiency of information output. Interviewers can use body language, such as nodding, smiling, or shaking their heads to provide feedback, which may be less evident or noticeable in online interviews. Consequently, F2F participants may use fewer words to bridge these communication gaps. Real-life interpersonal interaction, as opposed to virtual interactions, can provide a stronger sense of connection and communication, aiding in building and maintaining trust within interpersonal relationships. Such emotional connections encourage respondents to express their thoughts more directly and concisely, reducing hesitation. Moreover, online interviews, particularly video interviews, are often hampered by technical issues. Research by Budianto (2023) indicates that in certain regions of Indonesia, the network infrastructure and environment are relatively underdeveloped, which hampers the effectiveness of teaching and complicates the establishment of an ideal online Chinese language teaching model. Network delays, audio interruptions, or blurred visuals can cause respondents to require additional time to process and comprehend the questions, thereby increasing the number of pauses and hesitations. Participants are also more likely to repeat their words when attempting to maintain a smooth conversation.

The SFPs, along with various measurement parameters, also did not reach statistical significance, and thus their data descriptions are not presented here. In F2F communication, SFPs can be combined with non-verbal signals (such as body language, facial expressions, and intonation) to enhance the speaker's intention and emotional expression. The more frequent use of SFPs in offline communication may be to strengthen the effect of this immediate interaction. Online communication makes speakers rely more on text or concise language expressions. Especially in communication where only voice is transmitted without video, SFPs may be regarded as unnecessary additional elements, thus reducing their usage. Secondly, due to network latency or limitations of communication tools, the interaction in online communication is not as immediate as that in offline communication, thereby reducing the necessity or frequency of using SFPs. Online communication may prompt participants to adopt a more direct or formal communication style. In contrast, offline communication is more casual, and subjects are more inclined to use SFPs. Native speakers are more capable of using various nuances of language, including the use of SFPs, while second language speakers may focus more on basic grammar and vocabulary to ensure the clear conveyance of information. Native speakers have deeper intuitions and acquisition in language learning. They can more sensitively perceive the differences in communication methods in online and offline environments and

adjust their language use accordingly, which leads to a greater difference in the use of SFPs between online and offline for native speakers. All these explanations point out that the offline environment tends to encourage more natural and rich language expressions, including the frequent use of modal particles, while the online environment may facilitate a more concise and direct communication style. For the design of language teaching and communication strategies, understanding these differences is of great importance and can help teachers better adapt to and optimize teaching in different environments.

The data results answered the research questions and confirmed the research hypothesis: from a linguistic perspective, communication modes and language background affect the oral performance of interview participants. Chi (2001) conducted a study on students with general reading proficiency and students with low reading proficiency, one of the conclusions is that students with general reading proficiency have more different vocabulary than students with low reading proficiency, but the average sentence length between the two groups is not significantly different. This conclusion shares similarities with the findings of this study: the native language group used fewer nouns when describing short image tasks, and overall, there was not much difference in average sentence length between the second language group and the native language group during interviews. This indicates that average sentence length is not a very important indicator for evaluating students' language proficiency. In Kong's (2009) study on Chinese language expression among individuals with aphasia, the two most useful parameters for distinguishing their fluency in language expression are Index of Communication Efficiency (ICE) and Index of Grammar Support (IGS), while Index of Error (IEr) can be used to distinguish between the aphasia group and the general group. Among the multiple language measurement parameters in this study, the most important language parameters were the number of informative words, communication efficiency, and number of errors. The number of information words is closely related to the vocabulary of the participant, and the difference between the number of information words and the efficiency of information output is the largest in the comparison between online and F2F interviews. The difference in error frequency is greatest between the native language group and the second language group. The specific analysis and reasons for the differences in oral performance among respondents in different tasks are as follows.

This study provides in-depth insights into understanding the structure and language characteristics of narratives. In addition, the study also conducts a detailed analysis of how language forms are used for narrative functions, such as expressing temporal relationships, perspectives on events, and text connectivity. The language parameters selected for measurement in this study play a central role in narrative construction. They are systematic parts of language expressions that can locate narrative events in time and space and relate to each other. Language parameters cover a range of grammatical morphological morphemes and construction types: (1) bound derivational morphemes, such as various forms of verbs, such as the past tense, the present tense, and the progressive tense; (2) free grammatical morphemes, such as prepositions, adverbs and conjunctions; (3) syntactic constructions, such as relative clauses and complement clauses; and (4) systematic changes in word order, such as left-dislocation. The study also includes some words or expressions that appear in short sentences and interact with narrative discourse in special ways, such as temporal adverbs and phrases. The text is analyzed from five perspectives: tense (distinguished by the tense of verbs), narrative integration (the use of prepositions and adverbs, etc.), narrative perspective (the perspective of the boy or the frog, etc.), coherence (syntactic conjunctions and clauses, etc.), and narrative style (stylistic coloring, etc.).

6. Implications and Limitations

Firstly, online interviews generally generate a higher volume of words, including the total number of characters and sentences. However, the communication efficiency of F2F interviews surpasses that of online interviews. Second language anxiety is also a problem that can not be ignored (Sun & Teng, 2021; Teimouri et al., 2019). Students experience a higher level of anxiety during F2F interviews, yet more students opt for F2F interviews (Chen & Chew, 2021; Luo, 2014). Analyzing the data in conjunction with this research, it appears that participants may feel more relaxed and less anxious during online interviews, resulting in greater oral output. Nevertheless, when assessing oral performance through the lens of communication efficiency, F2F interviews outperform online interviews. In F2F interviews, communication is more direct and immediate, requiring participants to respond promptly to questions. This immediacy enhances the communication efficiency of F2F interviews, as information is conveyed more swiftly, and it is easier for researcher and participants to establish connections and avoid misunderstandings or delays in information transmission. Although online teaching may generate more written content records, the direct interaction inherent in F2F teaching holds an advantage in terms of communication efficiency.

Under these two distinct communication modes, there is no huge difference in the oral Chinese expressions of participants. Therefore, when F2F teaching is impractical, the online teaching mode can serve as an effective alternative, posing minimal obstacles to the oral Chinese expression of second language learners. Simultaneously, when designing courses, educators can integrate the strengths of both online and F2F teaching, arranging diverse instructional activities appropriately, and exploring an efficient hybrid teaching model. For instance, online platforms can be utilized for explaining and practicing basic vocabulary and grammar, ensuring students have ample time to assimilate and absorb the material. For content requiring in-depth communication, such as complex dialogues and cultural understanding, F2F methods can be prioritized. Modern information technology can be leveraged to provide personalized learning resources while maintaining efficient interaction in F2F classrooms, thereby enhancing both the effectiveness and appeal of foreign language teaching. The advantage of real-time feedback in F2F interviews also underscores the importance of immediate communication in the teaching process. Teachers are encouraged to foster activities like F2F discussions and role-playing, allowing for prompt correction of pronunciation and grammar errors, and deepening students' understanding of language structure and contextual usage. Additionally, teaching and research staff can investigate ways to enhance the communication efficiency of online teaching, such as improving the functionality of online teaching tools to support real-time interaction and simulate authentic dialogue scenarios. When evaluating teaching quality, attention should not solely focus on students' knowledge acquisition but also consider communication efficiency as a critical metric, aiming to develop a more comprehensive evaluation system for teaching effectiveness.

A notable distinction is that the oral performance of L1 group is stronger than that of L2 group, as evidenced by higher numbers of information words and communication efficiency, alongside fewer errors and hesitations compared to the L2 group. This finding aligns with the research hypothesis. For the L2 group, beyond mastering the language itself, they must also adapt to the cultural background and context of Chinese, impacting their oral performance. Instruction for L2 learners should emphasize practicality and contextualization. By simulating real-life scenarios and providing numerous interactive practice opportunities, educators can assist students in improving their information processing speed, reducing error rates, and gradually minimizing hesitation in expression. Evaluating students' learning progress should encompass not only grammatical correctness and vocabulary breadth but also dimensions such as communication efficiency, error correction ability, and expression fluency. Timely and targeted constructive feedback should be provided to promote the enhancement of students' comprehensive language skills.

This study has several limitations. Firstly, the sample size was relatively small, with only 40 nonnative and 40 native Chinese speakers. A larger and more diverse sample, including participants from a wider range of cultural and linguistic backgrounds, could provide more comprehensive and generalizable results. Secondly, the study focused on a single picture description task. Using multiple types of tasks, such as spontaneous conversations or debates, would offer a more holistic assessment of oral performance in different communicative scenarios. Additionally, the study was conducted in a specific educational context, and the findings may not be directly applicable to other settings with different teaching models or student populations. To address these limitations, future research should aim to recruit a larger and more diverse sample of participants. This could involve collaborating with multiple institutions across different regions. Employing a variety of language tasks, including real life communication scenarios, would enhance the validity of the research. Moreover, conducting comparative studies in different educational contexts, such as different countries or types of language programs, would help determine the generalizability of the findings. Longitudinal studies could also be considered to track the development of oral performance over time, providing deeper insights into the impact of online and F2F communication on language learning.

Declarations

Declaration of Interest Statement

The authors report there are no competing interests to declare.

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Figures

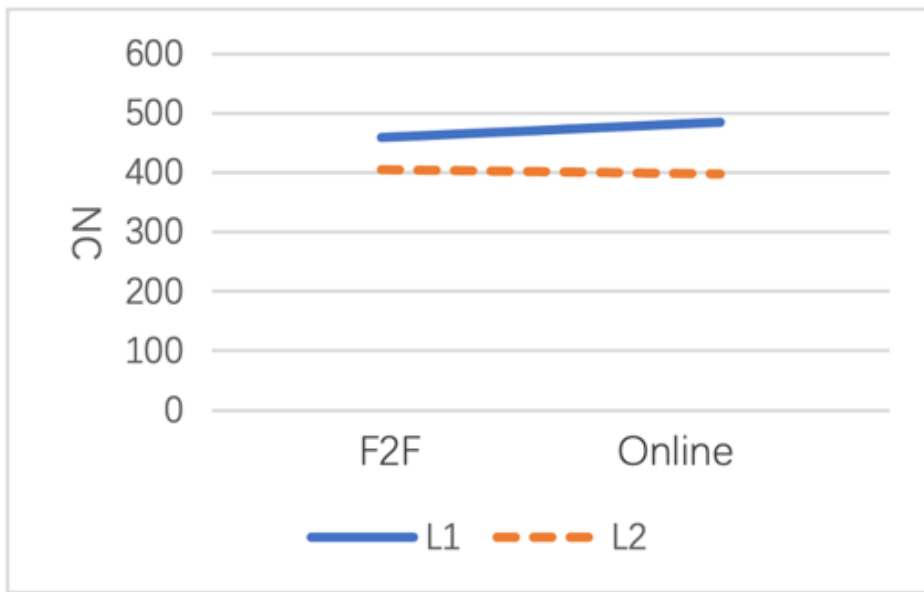


Figure 1

Caption: The interaction between two environments and language backgrounds on NC.

Alt Text: A line graph comparing number of characters (NC) between face-to-face (F2F) and online interviews for L1 and L2 speakers. The L1 group shows higher characters in online (~500) than F2F (~450), while the L2 group remains stable (~400 in both). Overall, L1 speakers produce more characters than L2 speakers in both settings.

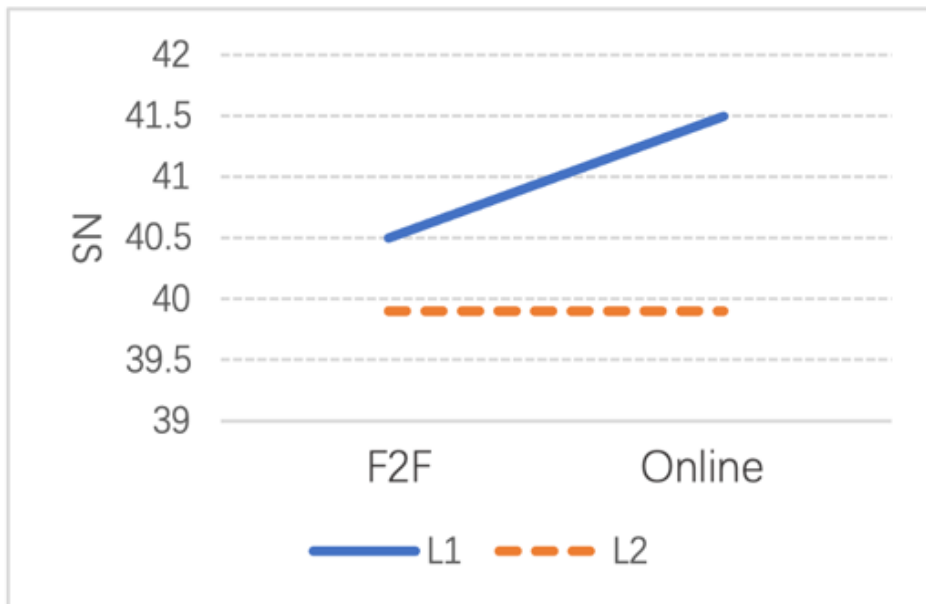


Figure 2

Caption: The interaction between two environments and language backgrounds on NS.

Alt Text: A line graph comparing number of sentences (NS) between F2F and online interviews for L1 and L2 speakers. L1 speakers show slightly more sentences online (~41.5) than F2F (~40.5), while L2 speakers remain steady (~40). L1 speakers use more sentences than L2 speakers in both modes.



Figure 3

Caption: The interaction between two environments and language backgrounds on SFPs.

Alt Text: A line graph comparing sentence-final particles (SFPs) between F2F and online interviews. L1 speakers use more SFPs in F2F (≈ 7.5) than online (≈ 6.6), while L2 speakers show minimal decline (≈ 7.5 to ≈ 7.3). The L1 group's decrease contrasts with the L2 group's stability.



Figure 4

Caption: The interaction between two environments and language backgrounds on repetitions.

Alt Text: A line graph comparing repetitions between F2F and online interviews. L1 speakers decrease repetitions online (≈ 2.75 vs. ≈ 3.2 in F2F), while L2 speakers increase slightly (≈ 4.1 vs. ≈ 3.6). L1 speakers consistently use

fewer repetitions than L2 speakers.

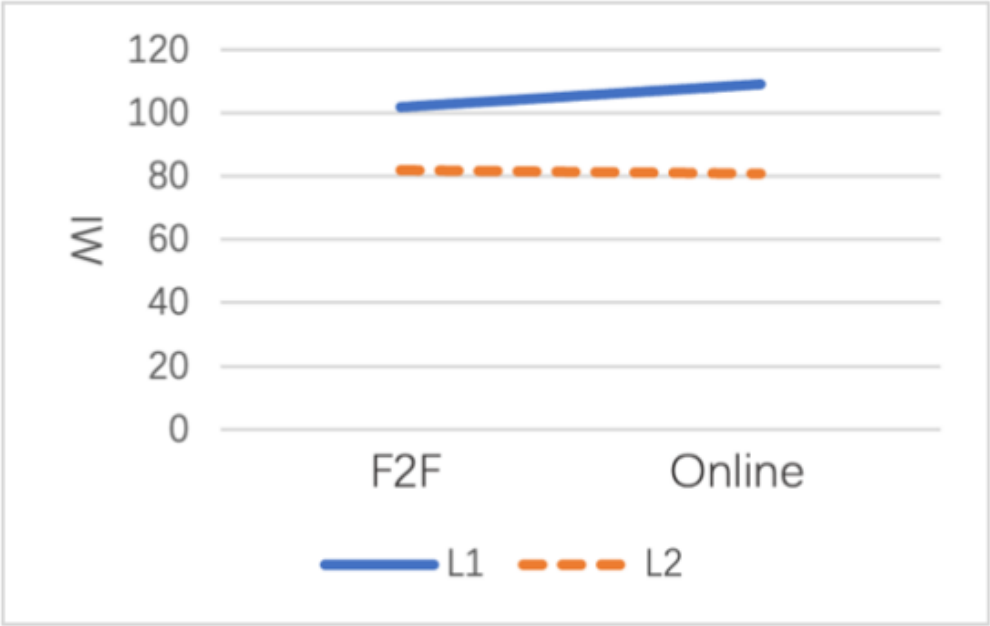


Figure 5

Caption: The interaction between two environments and language backgrounds on IW.

Alt Text: A line graph comparing information words (IW) between F2F and online interviews. L1 speakers increase IWs online (≈ 110 vs. ≈ 100 in F2F), while L2 speakers remain stable (≈ 80). L1 speakers use more IWs than L2 speakers in both modes.

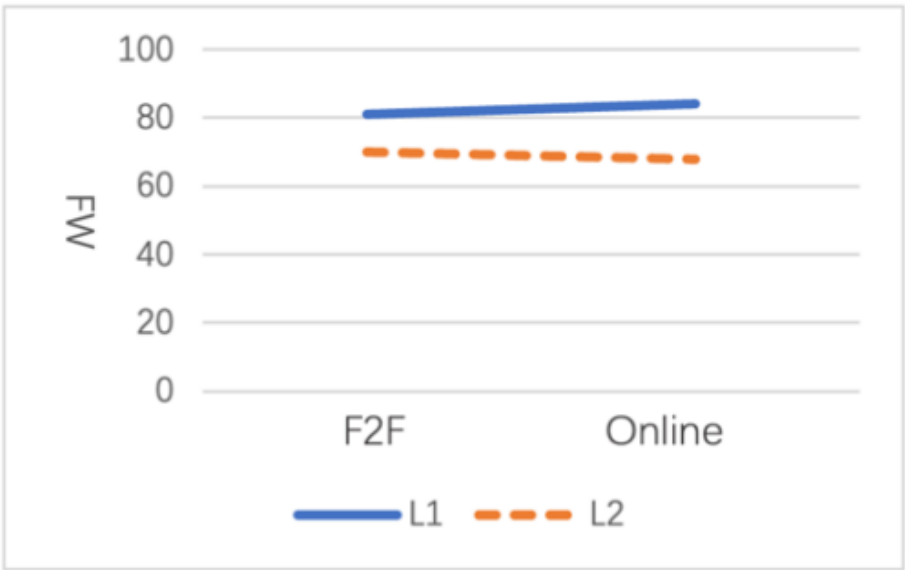


Figure 6

Caption: The interaction between two environments and language backgrounds on FW.

Alt Text: A line graph comparing function words (FW) between F2F and online interviews. Both groups show minimal change (L1: ~80; L2: ~65). L1 speakers consistently use more FWs than L2 speakers.



Figure 7

Caption: The interaction between two environments and language backgrounds on nouns.

Alt Text: A line graph comparing noun counts between F2F and online interviews. Both groups remain stable (L1: ~60; L2: ~50). L1 speakers use more nouns than L2 speakers in both modes.



Figure 8

Caption: The interaction between two environments and language backgrounds on verbs.

Alt Text: A line graph comparing verb counts between F2F and online interviews. L1 speakers slightly increase verbs online (~42 vs. ~40 in F2F), while L2 speakers remain steady (~32). L1 speakers use more verbs than L2 speakers in both modes.

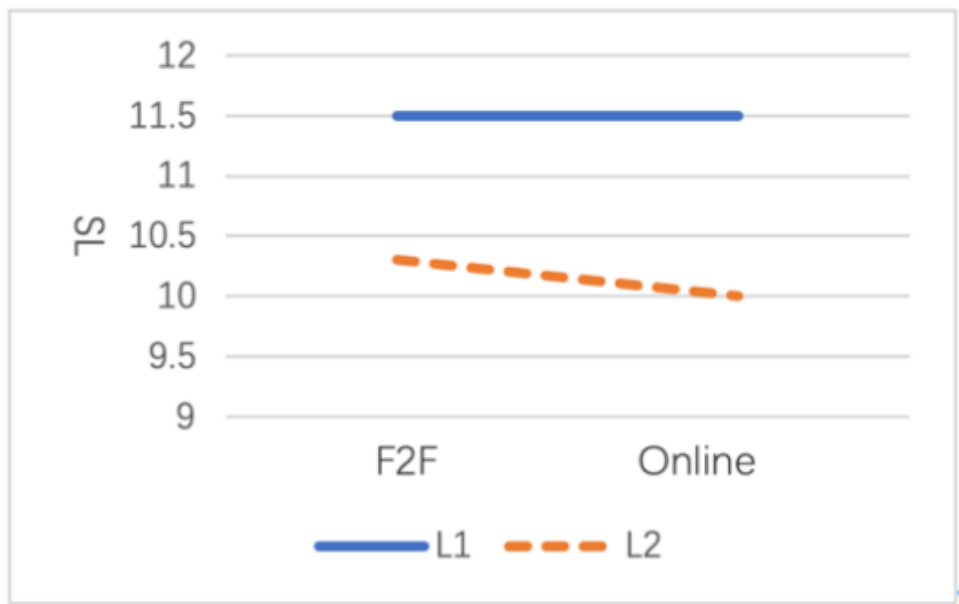


Figure 9
The interaction between two environments and language backgrounds on SL

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Appendices.docx](#)