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Individual differences in adults' second language fluency development: Motivation and language use

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Utterance fluency (UF) in a second language (L2) has been found to be associated with L2 proficiency. Nevertheless, the longitudinal development of UF has been underexamined and its relationship with individual differences such as motivation and L2 use has rarely been investigated simultaneously. The current study investigated L1-Chinese L2-English speakers' changes in UF (speed, pausing, and repair phenomena) before and after 5-month study-abroad and related UF changes to L2 use and motivation. The results showed that participants improved in mean syllable duration and end-clause silent pausing. Individuals' changes in certain UF measures, such as mean syllable duration and mid-clause pause frequency, were positively correlated with daily use of L2. Motivation measures largely did not exhibit significant correlations with UF changes, whereas ideal L2 self and intended effort/commitment demonstrated significant positive relationships with daily L2 use.

KEYWORDS

second language (L2) acquisition, utterance fluency, L2 use, L2 motivation, individual differences

Introduction

Speaking is a skill under time pressure and delivering one's message in a timely manner constitutes an essential part of having a conversation. Compared to their first language (L1), second language (L2) speakers often have less L2 knowledge, and are also considerably less fluent using the L2 knowledge they possess (Segalowitz, 2010). This highlights the importance of investigating L2 fluency. The current study explores the longitudinal development of adults' L2 fluency and its relationships with individual differences such as motivation and L2 use. In what follows previous studies on L2 utterance fluency and its development, and the role of motivation in L2 acquisition are discussed in turn.

L2 utterance fluency and its development

According to Segalowitz (2010), fluency has three distinct facets—utterance, cognitive, and perceived fluency. Utterance fluency (UF), the focus of this study, refers to the temporal and hesitation phenomena in speech and can be further categorized into speed, breakdown (pausing), and repair aspects (Skehan, 2003).

Previous studies have demonstrated significant differences between L1 and L2 speech in speed, the frequency of pauses and repairs, and pause distribution, where L2 speech has more pauses within a clause or utterance (e.g., Kahng, 2014; De Jong, 2016). UF measures such as articulation rate and mid-clause pause frequency have also exhibited moderate to strong correlations with L2 proficiency (e.g., Ginther et al., 2010; Kahng, 2014).

Although L2 UF has been widely researched, much fewer studies have tracked L2 learners' fluency development longitudinally. In their seminal study, which examined the role of learning context, language contact, and cognition in oral fluency development, Segalowitz and Freed (2004) found that the L1-English L2-Spanish learners improved speech rate and mean length of run without fillers after a semester of study-abroad; however, the amount of language contact could not explain fluency gains. Huensch and Tracy-Ventura (2017) investigated L2 UF development before, during, and after a 9-months residence-abroad and showed that reported gains in mean syllable duration appeared quickly and were maintained after return from study-abroad whereas gains in pause frequency appeared later and were sensitive to attrition after return home. Huensch et al. (2019) further explored the maintenance of L2 fluency 4 years after study-abroad and found that those who had intense L2 exposure after study-abroad maintained fluency gains made during study-abroad 4 years later but there was a lot of individual variation among those who had limited L2 exposure.

One more study worth discussing in line with L2 UF development is Saito et al. (2018). They found significant differences between low- vs. mid/high/native fluency in end-clause pause frequency, differences between low- vs. mid- vs. high/native fluency in mid-clause pause frequency, and differences between all groups for articulation rate. Although the findings stemmed from cross-sectional data, based on their distinctive length of residence (LOR) profile of the three fluency groups (CIs: 0.0–0.8, 3.7–7.1, and 8.8–12.4 years for low-, mid-, and high-fluency groups, respectively), they inferred that L2 fluency development could be observed in different aspects in the order of end-clause pausing, mid-clause pausing, and articulation rate.

Motivation and L2 acquisition

The role of motivation in L2 acquisition has been researched for several decades and the framing of motivation has evolved from a construct that is static, product-oriented into one that is more dynamic, situated, and process-oriented (Ushioda and Dörnyei, 2012). Throughout L2 motivation research, one of the most influential concepts has been integrativeness (Gardner, 1985), which refers to the desire to learn an L2 in order to come closer to the other language community. Integrativeness/integrative motivation has been widely researched through the 1970s and 1980s (e.g., Gardner and MacIntyre, 1993). However, its limitations have been recognized; the concept is not compatible with newly emerged cognitive motivational concepts such as goal theories or self-determination theory and it was often limiting and not applicable to many language learning environments, such as learning a foreign language as a school subject where the language is not spoken (Dörnyei, 2009).

Dörnyei (2005, 2009) proposed the "L2 Motivational Self System (L2MSS)" in order to overcome the limitations of integrativeness/integrative motivation and to broaden the scope of L2 motivation research. The L2MSS consists of the following three components. *Ideal L2 self* refers to the L2-specific aspect of one's ideal self. If our ideal self is one who speaks an L2, the ideal L2 self can motivate us to learn the L2 because we desire to reduce the discrepancy between our actual and ideal selves. *Ought-to L2 self* concerns "the attributes that one believes one ought to possess to meet expectations and to avoid possible negative outcomes" Dörnyei (2009, p. 29). *L2 learning experience* "concerns situated, "executive" motives related to the immediate learning environment and experience" Dörnyei (2009, p. 29). The L2MSS has been empirically supported by various groups of learners in different contexts. For instance, the empirical findings (Dörnyei, 2009) collected from China, Hungary, Iran, Japan, and Saudi Arabia, involving over 6,000 learners in four different learner types (i.e., secondary students, English-major and non-English-major university students, adult learners) supported the L2MSS and the ideal L2 self, in particular, was consistently highly correlated with the criterion measure (i.e., intended effort).

One final point to note in understanding the role of motivation in L2 acquisition is on what motivation has a direct impact. Traditionally the examined relationship was between motivation and L2 achievement. However, "motivation is a concept that explains *why* people behave as they do rather than how successful their behavior will be" (Csizér and Dörnyei, 2005, p. 20) and recently there has been the recognition that beyond L2 achievement we need to investigate what changes in L2 learners' *behavior* motivation can cause. And in a meta-analysis, Al-Hoorie (2018) did find that ideal L2 self exhibited stronger correlations with intended effort ($r = 0.61$) than with L2 achievement ($r = 0.17$). On the other hand, the role of motivation in UF fluency development has not yet been examined.

Current study

Taken together, although L2 UF has been extensively researched, its longitudinal development has been underexamined. In addition, the role of motivation and L2 use on its development has rarely been explored simultaneously. The current study aims to fill the gap in the literature and address the following research questions:

RQ1: Are there changes in L2 utterance fluency (speed, pausing, and repair phenomena) of L1-Chinese L2-English speakers before and after 5-month study-abroad?
RQ2: What are the relationships between motivation, L2 use, and changes in L2 utterance fluency?

Method

Participants

Forty-four Chinese learners of English participated in the project through an informed consent process and received $50 per session for their participation. This study focuses on the data of 31 learners (17 m/14 f) who participated in both sessions, before and after 5-month study-abroad, while taking undergraduate or graduate courses at a university in the US. Their mean age was 28 ($SD_{age} = 6$; $range_{age} = 21–46$) mean length of residence in the US was 2 months ($SD_{LOR} = 1$ month; $range_{LOR} < 6$ months) at the beginning of the study. They started to learn English around the age of 11 ($SD_{AO} = 2.0$). Based on the grammar and vocabulary sections of DIALANG, a diagnostic test developed by Lancaster University, they were mostly intermediate learners (3 A2; 26 Bs; 2 C1s), according to the Common European Framework of Reference (CEFR; Council of Europe., 2001).

Speaking tasks

Materials

Two types of questions were used as prompts (see Supplementary materials)—one on personal preference from a category such as important time or people (e.g., Who is your best friend? Describe this person and say why he/she is your best friend), and the other on personal choice between two options (e.g., Some people prefer to live in a small town. Others prefer to live in a big city. Which place would you prefer to live in? Use details and examples in your decision). For each type, six comparable prompts on daily life were developed to avoid practice effects of using the same prompts before and after study-abroad. In each session, one of six prompts from each type was randomly selected for each participant. Participants answered in total four different prompts across two sessions.

Procedure

In each session, participants answered the two questions described above. For each question, they had 15 s to prepare for their answer and were asked to talk for about a minute. Their speech was recorded using Praat (Boersma and Weenink, 2018), with a Blue Snowball USB microphone (frequency response 40 Hz−18 KHz) at a 44 KHz sampling rate (16-bit resolution; 1 channel).

Utterance fluency measures

All speech samples were transcribed and included information about silent and filled pauses, repetitions, corrections, and clause boundaries (Foster et al., 2000). Silent pauses (>250 ms; De Jong and Bosker, 2013) and filled pauses were identified and their length was measured in milliseconds (ms) using Praat (Boersma and Weenink, 2018). Pauses were further categorized into mid-clause or end-clause pauses based on the identified clause boundaries to examine their differential developmental patterns suggested by Saito et al. (2018). Following Skehan (2003), speed, breakdown, and repair fluency were measured. For speed fluency, mean syllable duration was calculated by dividing speech time excluding pause time by total number of syllables. For breakdown fluency, in addition to mean silent pause duration, the number of silent and filled pauses in the middle and at the end of clauses per 100 syllables were calculated. For repair fluency, the number of repetitions and corrections per 100 syllables were calculated.

Questionnaire on L2 motivation

A questionnaire was designed to measure participants' motivation and attitudes in L2 learning (see Supplementary materials). The questionnaire consisted of 29 Likert-scale items (on a scale of "1: strongly disagree" to "6: strongly agree") encompassing several attitudinal/motivational variables. The selected variables were those which have been shown to play an important role in determining L2 learning behaviors and effort, including integrativeness and the components of the L2MSS (Dörnyei, 2005). The items were adopted or adapted from Schmitt et al. (2004) and Dörnyei (2010). All the variables were comprised of multiple items. Table 1 describes the attitudinal/motivational variables measured in the study (Schmitt et al., 2004, p. 60; Dörnyei, 2005, p. 106) and reports the reliability measures—Cronbach's alpha in Time1 and Time2. The reliability of the motivation questionnaire was satisfactory.

Questionnaire on L2 use

In order to estimate participants' use of English, a questionnaire on L2 use was developed. The questionnaire (see Supplementary materials) included items on the hours of daily L2 listening, speaking, reading, and writing (on a scale of "less than 1 h", "about 1 h", "about 2 h", "about 3 h", or "more than 3 h"), and the percentages of time spent on L2 listening, speaking, reading, and writing, in comparison with the use of corresponding L1 language skills. It also had items on the number of close American friends, and the number of friends to speak in English with. In addition, an item on the frequency of having a long conversation (more than 10 min) in English (on

TABLE 1 The attitudinal/motivational variables measured in the current study.

Variables	Description	Number of items	α Time1	α Time2
Attitudes toward L2 learning	Subjective appraisal of the enjoyment of learning English	3	0.86	0.91
Ideal L2 self	L2-specific facet of one's ideal self	6	0.74	0.83
Ought-to L2 self	The attributes that one believes one ought to possess in order to avoid possible negative outcomes	6	0.74	0.76
Integrativeness	A broad positive disposition toward the L2 speaker community, including an interest in their life and culture	6	0.77	0.82
Language anxiety	Anxiety experienced while using English	2	0.67	0.76
Intended effort/commitment	The perceived importance of mastering a high level of English and the amount of effort the learner is willing to put into learning English	6	0.67	0.73

TABLE 2 Utterance fluency in Time1 and Time2.

	Time1		Time2		*F*	*df*	p^c	η^2
	M	*SD*	*M*	*SD*				
Mean syllable duration (ms)	310	48	290	42	8.183	1	0.035	0.214
Mean silent pause duration[a] (ms)	589	136	579	148	0.246	1	0.713	0.008
Number of[b]								
Mid-clause silent pauses[a]	8.25	4.53	8.32	4.34	0.055	1	0.816	0.002
End-clause silent pauses[a]	8.68	3.02	7.67	3.06	7.870	1	0.035	0.208
Mid-clause filled pauses[a]	3.49	2.83	3.75	2.76	0.597	1	0.668	0.020
End-clause filled pauses	3.30	2.20	2.52	1.79	6.916	1	0.035	0.187
Repetitions[a]	1.89	1.77	1.97	1.60	0.464	1	0.668	0.015
Corrections	1.21	0.96	1.37	0.95	1.429	1	0.482	0.045

[a]Log-transformed; [b]per 100 syllables; [c]p-values corrected using false discovery rate (FDR).

a scale of "never", "one to three times a week", "four to six times a week", "once a day", to "several times a day") was included as the measure was found to be useful in explaining the development of perceived comprehensibility and fluency (Derwing et al., 2008).

Analysis

The recordings of speaking tasks were transcribed, annotated, and measured by two native English-speaking research assistants. Once the recordings were annotated and measured by the first research assistant, their accuracy was checked by a second research assistant and corrections were made, when necessary, by the author.

In order to examine differences in the measures of fluency and motivation between Time1 and Time2, a series of repeated measures ANOVAs was performed and the *p*-values were corrected using false discovery rate (FDR). The variables that violated the assumptions of the repeated measures ANOVA (e.g., mean silent pause duration, number of silent pauses) were log-transformed. All the transformed data improved in terms of normality after the transformation. In examining the relationships between motivation, L2 use, and changes in UF, Pearson correlation was used for the variables that satisfied its assumptions (i.e., variables on motivation and fluency measures) and Spearman's rank order correlation was used when the analysis included ordinal variables (i.e., measures on L2 use).

Results

Changes in utterance fluency

Table 2 shows descriptive statistics and differences of UF measures in Time1 and Time2. The results of repeated-measures ANOVAs show that participants improved in mean syllable duration and the number of silent and filled pauses between clauses, whereas the rest of the measures demonstrated no significant changes before and after study-abroad.

Relationships between motivation, L2 use, and changes in L2 utterance fluency

Participants' responses to the motivation questionnaire in Time1 and Time2 were compared. Table 3 shows that

TABLE 3 Motivation and attitudes in L2 learning in Time1 and Time2 (scale: 1–6).

	Time1		Time2		*F*	*df*	p^a	η^2
	M	*SD*	*M*	*SD*				
Attitudes	4.60	0.73	4.70	0.87	0.58	1	0.542	0.021
Intended effort/commitment	4.93	0.50	4.80	0.69	1.09	1	0.456	0.039
Ideal L2 self	5.21	0.58	5.04	0.71	4.07	1	0.162	0.131
Ought-to L2 self	4.27	0.71	4.25	0.85	0.02	1	0.887	0.001
Integrativeness	4.68	0.58	4.35	0.78	12.60	1	0.006	0.318
Anxiety	3.29	1.10	3.48	1.06	1.35	1	0.456	0.047

[a]p-values corrected using false discovery rate (FDR).

TABLE 4 Participants' L2 use ($N = 30$).

	<1 h	About 1 h	About 2 h	About 3 h	More than 3 h
Daily L2 use on					
Listening	23%	17%	23%	17%	20%
Speaking	47%	37%	10%	3%	3%
Reading	13%	27%	13%	3%	43%
Writing	40%	27%	10%	13%	10%
	Never	**1–3 times a week**	**4–6 times a week**	**Once a day**	**Several times a day**
Frequency of having a long (more than 10 min) conversation in English	13%	53%	23%	3%	7%

their responses on motivation largely did not change between Time1 and Time2 except for integrativeness, which exhibited a significant decrease.

Table 4 presents participants' responses to the questionnaire on L2 use. The results show that the majority of participants spent 3 or more hours on reading, whereas spent no more than 1 h on speaking or writing. It is particularly noteworthy that half of them spent <1 h on speaking. On the frequency of having a long English conversation, only 10% reported to have it at least once a day, whereas 13% reported never to have it, and half of them reported to have it 1–3 times a week.

On the number of close American friends they have, 73% of the participants reported to have none and 13% reported to have one. Regarding the number of friends to speak in English with, 40% reported to have one to three, whereas 17% reported to have none. On the percentages of the time they use English in comparison with L1, they reported to use English 40 (95% CI = 31–50), 26 (95% CI = 17–35), 50 (95% CI = 38–62), 42% (95% CI = 29–55) of the time for listening, speaking, reading, and writing, respectively.

In order to examine the relationships between motivation, L2 use and changes in L2 UF measures, differences in UF measures were calculated by subtracting Time1 measures from Time2 measures. First, Pearson correlations were performed to examine the relationship between attitudinal/motivational variables and changes in UF measures (see Supplementary Table A1). There was a positive correlation between ought-to L2 self and changes in the number of repetitions, $r = 0.42$, $p = 0.022$, and an unexpected negative relationship between intended effort/commitment and the number of corrections, $r = -0.47$, $p = 0.01$.

Next, the relationship between L2 use and changes in UF measures was examined using Spearman correlations (see Supplementary Table A2). The results showed a few significant positive relationships between L2 use in Time2 and UF changes; between the number of friends to speak in English with and changes in mean syllable duration, $r = 0.42$, $p = 0.021$, between the percentage of English speaking and changes in the number of mid-clause silent pause, $r = 0.41$, $p = 0.024$, and between the percentage of English reading and changes in the number of end-clause silent pauses, $r = 0.38$, $p = 0.041$.

Lastly, the relationship between motivation (Time1 and Time2) and L2 use (Time2) was investigated using Spearman correlations (see Supplementary Table A3). Intended effort/commitment exhibited positive correlations in Time1 with daily hours of listening, $r = 0.38$, $p = 0.039$, and in Time2 with daily hours of reading, $r = 0.39$, $p = 0.038$, and those of writing, $r = 0.50$, $p = 0.006$. Ideal L2 self was also positively correlated with daily hours of listening in Time1, $r = 0.42$, $p = 0.022$, and in Time2, $r = 0.40$, $p = 0.03$. The rest of the motivation/attitude variables did not demonstrate significant relationships with any of the L2 use measures.

Discussion and conclusion

The current study investigated changes in L2 UF measures before and after 5-month study-abroad and their relationships with motivation and L2 use. The participants made significant gains in mean syllable duration, the number of end-clause silent and filled pauses. The findings are in line with the significant correlations found in previous studies between articulation rate (inverse of mean syllable duration) and L2 proficiency (e.g., Ginther et al., 2010; Kahng, 2014). The improvement in end-clause pausing is also compatible with Saito et al. (2018), in which development in end-clause pausing was proposed to develop before that in mid-clause pausing.

In terms of the relationships between changes in UF measures, motivation, and L2 use, attitudinal/motivational variables had few significant correlations with changes in UF measures, whereas ideal L2 self and intended effort/commitment exhibited significant positive correlations with L2 use, including daily hours of L2 listening, reading, and writing. The findings highlight the role of ideal L2 self in L2 use and also accord with the recent recognition that the power of motivation needs to be examined in terms of learners' behavior (e.g., Csizér and Dörnyei, 2005).

Changes in UF measures were found to have significant positive correlations with measures of L2 use. For instance, positive correlations were found between the number of friends to speak in English with and changes in mean syllable duration, and between the percentages of daily speaking in English and changes in the number of mid-clause silent pauses.

The current study is one of the first to demonstrate the complex associations between motivation and L2 use, and between various types of L2 use and different aspects of L2 UF development. Some of the novel findings are that, overall, motivation measures were not significantly correlated with UF development; however, they were positively correlated with daily L2 use. Measures of L2 use, in turn, were positively associated with adults' UF development. While this study has provided insights about the relationship between motivation, L2 use, and fluency development, there were some limitations, such as the small sample size and the relatively short-term (5 months) investigation. Future studies can overcome the limitations of the current study by tracking more participants' changes in L2 UF for a longer period, which will further enhance our understanding of L2 UF developmental patterns and its complex relationships with individual differences.

Data availability statement

The datasets presented in this article are not readily available because only the author and her collaborators have access to the dataset. Requests to access the datasets should be directed to JK, jkahng@olemiss.edu.

Ethics statement

The studies involving human participants were reviewed and approved by IRB at Northeastern Illinois University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

JK has designed and conducted research and written the manuscript.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2022.1012811/full#supplementary-material

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