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Abstract

The main goal of many students of English as a foreign language (EFL) is to be fluent in the target language, i.e. to be capable to transfer their thoughts smoothly and easily in different contexts. The present study examines the effect of pedagogic intervention on enhancing speech fluency in EFL using a pretest – immediate posttest – delayed posttest design. Two groups of 32 EFL students at a University in Iran took part in the study, receiving the same amount of instruction (18 hours over 18 weeks). The Control group listened to / viewed authentic audio recordings and movies in English, discussed their contents, and completed a variety of speaking skills tasks but received no fluency training. The Experimental group spent part of the time on fluency strategy training, encouraging the memorization, repetition, and retelling of the audio and video materials. Systematic interviews were run to assess the EFL learners' speech fluency. The findings revealed that the fluency training significantly enhanced the EFL students' speech fluency. The findings also show that students' second language speech fluency development can be partly predicted by the fluency in their first language. These results have pedagogical implications for practitioners in EFL settings, material designers, and EFL instructors.

Keywords

EFL students, fluency assessment, fluency development, fluency training, L1 speech fluency, L2 speech fluency, pedagogic intervention

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I Introduction

Speech fluency in second language (L2) studies generally refers to ease or automaticity in the learner's speech and is manifested in flow, continuity, and smoothness of speech (Segalowitz, 2010; Skehan, 2014). In spite of this apparently simple definition, speech fluency is a complicated issue that is interwoven with other aspects of performance and includes a multitude of linguistic, psycholinguistic, and sociolinguistic factors involved in speech formulation and production (Kormos, 2006; Segalowitz, 2010). Fluency has been looked upon as a difficult construct to define (Freed, 2000) and a complicated aspect to measure (e.g. De Jong et al., 2012; Witton-Davies, 2014). Fluency is sometimes used as a holistic notion of language proficiency encompassing all different aspects of successful performance, for instance, syntactically complex, lexically diverse, and communicatively adequate speech, to name a few features of such performance. In a narrower sense of the term, fluency is predominantly associated with the ability to communicate one's intended meaning effortlessly, smoothly, and with little or no disruption (e.g. Yenkimaleki & Van Heuven, 2023a). Segalowitz (2012) states that for most, the qualities that make speech fluent include speed as well as the absence of undue hesitations, pausing, repetition, and repairs. A fundamental question in the study of L2 fluency is the extent to which temporal characteristics of speakers' first (i.e. native) language (L1) productions predict the same characteristics in the L2. Systematic studies on the relationship between L1 and L2 fluency are scarce. One systematic study which examined the relationship between a speaker's L1 and L2 temporal characteristics suggested that fluency is governed by an underlying trait (Derwing et al., 2009). Therefore, exploring the relationship between L1 and L2 speech fluency in other aspects would be of importance on the future agenda.

Scholars of Second Language Acquisition (SLA) have frequently noticed that students rarely reach the same fluency level in their L2 as in their (L1) (De Jong et al., 2015; Duran-Karaoz & Tavakoli, 2020). Studies have identified a number of factors that may explain this discrepancy, such as learning context (type, duration, intensity of L2 exposure), willingness to communicate, communication anxiety or behavioral inhibition, age of onset, or aptitude (Foster, 2020; Zabihi et al., 2021). Individual learner factors, such as motivation, attitude, and language learning strategies play an additional role in the achievement of L2 fluency (Gardner & Lambert, 1972; Oxford, 1990). Learning context could be another main factor. The type of exposure to the L2, whether it is through immersion in a native-speaking environment or in a classroom setting, may significantly impact the development of fluency (Botezatu et al., 2022). Duration and intensity of L2 exposure also play a role, with longer and more intensive exposure generally leading to higher levels of fluency. Language learning strategies, such as setting goals, using mnemonic devices, or seeking opportunities for language practice, can also affect the development of fluency. Learners who employ effective strategies are more likely to make progress and achieve higher levels of fluency in their L2 (Oxford, 1990).

Examining fluency contributes researchers to perceive how an L2 is processed, produced, and acquired (Yenkimaleki & Van Heuven, 2023b). Moreover, investigating fluency enables them to examine some abstract dimensions of SLA, including implicit knowledge, proceduralization of newly learned structures, and automatization of the

processes of speech production (e.g. Loewen & Sato, 2018). Because of this, fluency is often investigated in relation to other aspects of language processing and performance (Yenkimaleki & Van Heuven, accepted). L2 fluency development has been previously studied using short-term interventions in classroom settings (e.g. Lambert et al., 2017; Yenkimaleki & Van Heuven, 2023a) as well as in the study abroad context (e.g. Freed et al., 2004). However, L2 utterance fluency is multifaceted. For example, it may take 10 or more years for different aspects of fluency, such as articulation rate and pause phenomena, to be developed (Saito et al., 2018), and it can involve multiple facets such as turn-taking behavior (Van Os et al., 2020), collocation (Saito, 2020), and multiword sequences (Tavakoli & Uchihara, 2020).

In the current study, students of English as a foreign language (EFL) participated in a one-semester fluency-training program. The aim of this intervention was, therefore, long-term development of L2 utterance fluency. Our review of the relevant literature suggests that not much research has investigated the effects of pedagogic intervention on the development of speech fluency when learners are studying the English language in the EFL context. Therefore, it behooves us to investigate a developmental perspective on fluency through pedagogic intervention in a one-semester study in the EFL context. Furthermore, we investigate whether L2 fluency development can be predicted from students' L1 speech fluency or not (De Jong et al., 2012). The results of the study will help instructors in EFL settings, where only limited curricular time is available for instruction and practice, to use the instruction time in the classroom more constructively in EFL fluency training. The present study begins by introducing the effect of pedagogic intervention in enhancing EFL speech fluency. Next, we review different studies on the fluency development. We address the issue of fluency training through pedagogic intervention longitudinally, and prediction of EFL students' L2 speech fluency development from their L1 fluency. In doing so, we offer suggestions that policy makers and practitioners should observe and understand in the choice of effective methods for EFL speech fluency training.

II Literature review

Segalowitz (2010) offers a well-documented theoretical model to study L2 fluency. Within this cognitive model, fluency is perceived as how efficiently the speaker is able to mobilize and temporarily integrate, in a nearly simultaneous way, the underlying processes of planning and assembling an utterance in order to perform a communicatively acceptable speech act. Fluency of speech could have a profound effect on ease of communication, such that disfluent speakers may have difficulty keeping the attention of their interlocutors, which may in turn negatively impact on communicative success (Rossiter, 2009). Furthermore, as stated by Derwing et al. (2008), fluency problems can be exasperating for L2 speakers. Disfluencies are often produced by speakers when they are looking for a word, deciding what to say, and/or to indicate a desire to keep or cede the floor (Clark & Fox Tree, 2002).

Measuring fluency is complicated for a range of theoretical and empirical reasons, including the difficulty of deciding which measures best specify oral proficiency (Tavakoli et al., 2020). Tavakoli et al. (2020) suggested a triadic framework in which

three distinct aspects of fluency are measured: (a) speed, i.e. the flow and continuity of speech; (b) breakdown, i.e. pauses and silences that break the flow of speech; and (c) repairs, such as false starts, repetitions, corrections and reformulations. Scholars have found the triadic structure useful in explaining different issues of the speech production process. For instance, speed fluency is hypothesized to mirror the degree of automaticity (e.g. Skehan, 2014); breakdown fluency indicates difficulties at the conceptualization and formulation stages of Levelt's model (Kormos, 2006), and repair fluency reflects the monitoring processes of the L2 production process (Ahmadian, 2011).

Most of the studies investigating utterance fluency have primarily drawn on cross-sectional data by focusing on learner performance at one point in time (De Jong et al., 2012). These types of studies have mainly tried to examine whether proceduralization and automatization of L2 speech can be facilitated through manipulating task design, performance conditions, and/or instructional setting. Studies that have investigated the impact of task design and performance conditions on fluency of task performance have reported that specific aspects of task design (e.g. task structure) significantly impact on improving the fluency of L2 performance (e.g. Tavakoli & Foster, 2008). Furthermore, studies that have operationalized L2 learning or performance through adding planning time or task repetition in order to boost proceduralization of task performance strongly suggest that such interventions are beneficial in improving L2 fluency, at least in the short term (e.g. Seifoori & Vahidi, 2012). Manipulating task repetition as a means of improving learner fluency, De Jong and Perfetti (2011) asked two groups of learners to repeat the same task three times: one group spoke about the same topic three times, and the other group spoke about three different topics once each. The findings of their study show that, whereas task repetition has an impact on gains in different measures of fluency for both groups in the short term, the long-term gains in fluency were perceived only for the group who spoke about the same topic three times. The latter result was also found for the fluency of consecutive interpreting from English to Mandarin (Yu & Van Heuven, 2013, 2017, 2021).

A number of studies have investigated the development of fluency with students in the target language context. Lennon (1990), working with a small sample of four advanced German learners of English during 6 months of their stay in the United Kingdom, reported improvement in three aspects of the participants' fluency: speech rate, frequency of filled pauses, and number of pauses per T-units. Considering the small sample size and the questionable statistical analysis in Lennon's study, it has been difficult to generalize the findings. Freed et al. (2004) examined the development of fluency among three groups of students over the course of one semester in different settings. The students studied (a) at home (AH), (b) in an immersion summer program (IM), or (c) abroad (SA). The findings revealed that the IM group improved significantly in terms of the total number of words, length of the longest turn, rate of speech, and speech fluidity. Compared to the AH group, the SA group improved only in terms of speech fluidity but made fewer gains than the IM group. The AH group saw no significant gains. Segalowitz and Freed (2004) also reported that learner fluency in a study abroad context improved significantly over a semester in terms of temporal aspects (e.g. speech rate) and hesitation aspects of performance (e.g. repetitions).

Saito and Hanzawa's (2018) study is relevant to the current study, as they examined the potential benefits and limits of FL classroom education from a long-term perspective. They tracked various aspects of L2 oral production (fluency, lexicogrammar, prosody, and segmental aspects) of 40 Japanese students over a 12-month period using a human rating method. Their findings showed that the Japanese students made a gradual improvement over the course of one academic year.

1 L1 and L2 fluency

Some studies show the initial L2 fluency level as an individual predictor of L2 outcomes (e.g. Valls-Ferrer & Mora, 2014) and, with increasing frequency, L1 fluency as a predictor of L2 fluency development (De Jong et al., 2015; Duran-Karaoz & Tavakoli, 2020; Peltonen, 2018).

Several studies have recognized a relationship between L1 and L2 fluency using monologic tasks. In a 4-year longitudinal study of adult English-speaking students who studied abroad in France, Towell and Dewaele (2005) found a positive correlation between L1 and L2 fluency. Derwing et al. (2009) also examined the relationship between fluency in L1 and L2 in a 2-year longitudinal study with adult learners of English who had typologically distinct L1s (Chinese and Russian). They found correlations between L1 temporal measures and the same L2 measures.

Riazantseva (2001) reported that intermediate adult learners' pause patterns resembled their L1 (Russian), while more advanced adult learners' production paralleled L2 (US English) pause duration. This shows that L2 students may better inhibit certain aspects of L1 transfer at more advanced levels. Some scholars have also used picture narrative tasks to investigate whether L1 fluency relates to L2 fluency. For instance, Huensch and Tracy-Ventura (2017) investigated the extent to which L1 (English) fluency predicted L2 (Spanish) fluency in adult learners who participated in a 5-month study-abroad program. They showed that L1 fluency measures contributed significantly to variation in L2 fluency development. They also suggest that cross-linguistic differences in temporal measures of L1 fluency may predict L2 fluency. Duran-Karaoz and Tavakoli (2020), examined whether different proficiency levels mediated the relationship between L1 (Turkish) and L2 (English) fluency in adult learners. They reported that, after controlling for proficiency levels, the relationship between L1 and L2 fluency was maintained, implying that the relationship was not mediated by proficiency level. They also reported that L1 fluency behaviors such as mid-clause filled and silent pauses, the total number of repairs and speech rate (SR) predicted L2 fluency behavior, with SR in the L1 being the best predictor of L2 fluency behavior. These findings suggest a relationship between L1 and L2 temporal fluency measures. Nevertheless, methodological differences in fluency assessment and task type(s) may confound cross-study comparisons.

2 Strategy training and awareness raising

Training students is a popular method of facilitating L2 acquisition and enhancing student independence. It is argued that it helps students make the most of their learning opportunities and promotes their autonomy (Cohen, 2003; Yenkimaleki & Van Heuven,

2018, 2022, 2023b). Ellis and Shintani (2014) state that strategy training and awareness raising are the two most frequently used methods of student training activities in L2 classrooms and that combining the two is often the preferred approach to students training (Cohen, 2003; Seifoori & Vahidi, 2012; Yenkimaleki, 2021). Strategy training including both explicit instruction and practice has been employed in a number of research projects (Lee & Muncie, 2012; Yenkimaleki et al., 2023) and is reported to positively impact on L2 learning. Based on the findings of studies in learner strategies, strategy training claims that successful students have a wide range of effective strategies at their disposal (Macaro, 2001) and that strategies should be taught in L2 classrooms (Yenkimaleki & Van Heuven, 2018, 2022, 2023b). Awareness raising (e.g. getting students to 'notice' specific aspects of language) has also been reported to contribute to the development of autonomy in learning and enhance L2 development (Fotos, 1994). For teaching speaking skills, direct awareness-raising activities (e.g. engaging learners in description and analysis of examples) are employed to enhance accuracy, and indirect awareness raising activities (e.g. exposing learners to examples) are often used to enhance fluency of speech (Barraja-Rohan, 2011). In the current study, we employ both kinds of awareness-raising activities to enhance students' fluency.

Seifoori and Vahidi (2012), by examining the effects of pre-task planning on fluency and accuracy of performance, trained students over a course of 16 grammar-based conversation sessions to use pre-task planning as an instrument of improving their fluency and accuracy. During the 30-minute training sessions over the course of a semester, the learners were exposed to awareness-raising activities and form-focused instruction in order to improve the correct use of tenses. They reported that the trained online planners produced more fluent speech, but with limited evidence of improvement in their accuracy. Considering that the fluency instruction was embedded in the context of form-focused and accuracy-oriented language teaching, and that the training was primarily addressed at a more effective use of planning, it is difficult to identify whether these results appeared from the effects of successful use of planning time (Tavakoli & Skehan, 2005), proceduralization of the language rules (DeKeyser, 2007), or development of learner awareness of different aspects of fluency. This could be a methodological limitation that future studies need to address.

3 Current study

Researchers (e.g. Foster, 2020; Saito, 2021; Yenkimaleki & Van Heuven, 2023a) stated that fluency is a vital element of speaking proficiency. Moreover, scholars (e.g. De Jong et al., 2012; Saito, 2021; Suzuki, 2020; Yenkimaleki & Van Heuven, 2023a) encourage future studies that investigate optimal fluency instruction, and that examine the extent to which L2 fluency can be predicted from L1 fluency. Therefore, the present study was set up to shed more light on these issues by investigating systematically the effect of fluency training on EFL students' speech fluency. We also examine the relationship of L1 language fluency on L2 fluency development. We hypothesize that fluency training enhances the speech fluency of EFL learners (e.g. De Jong & Perfetti, 2011; Foster, 2020; Thomson, 2015; Yenkimaleki & Van Heuven, 2023a). Moreover, we also hypothesize that L2 fluency can be predicted from L1 fluency (see also N. De Jong et al., 2012).

III Method

I Design of the study

We set up an experimental study in which we quantified the speech fluency of our participants in their L1 and L2. L1 fluency of the participants was tested at the beginning of the study. Later, L2 speech fluency was tested within participants at three points in time, i.e. a pretest immediately before the start of the treatment, a posttest immediately after the completion of the treatment, and a delayed posttest one month after the previous test. The independent variable in this study was the pedagogic intervention, i.e. providing fluency training (Experimental group) or not (Control group). The dependent variable was the speech fluency rating score obtained by the EFL students.

2 Participants

The participants in this study were 64 Persian-speaking undergraduate students at Bu-Ali Sina University, Iran. None of them had studied or lived abroad. They had learned English in secondary school for four years, with two hours of lessons per week. In university, they had studied English language for five semesters before participating in the program. The mean age of students was 20 years, and their age range was between 19 and 21 years, $SD=1.31$. They had passed the entrance exam for university admission in Industrial Engineering. The general TOEFL (paper based) proficiency mean score for the participants was 557. Their general oral proficiency mean score was 14.50 out of 20, $SD=1.69$. The students were quasi-randomly grouped into two classes of 32 with an equal division between male and female students, i.e. 16 male and 16 female students per group. One group was assigned to fluency training, while the second group served as a control group.

3 Ethical considerations

Ethical approval to involve these participants in the experiments was obtained. All the participants agreed to take part in the research project by signing a form indicating their written informed consent.

4 Materials

The students watched parts of the Friends comedy series 2002–2004 in training sessions. For audio files, the students listened to Zapp English Podcasts (upper intermediate level).¹ *Interchange*, fifth edition (2017), also provided material for training the Control and Experimental groups. In fluency training, *English short stories* (Richards, 2016) was used to make the students read and retell stories. The phonological phenomena to be demonstrated and explained were chosen on the basis of the authors' earlier experience and studies. The types of training were also based on the authors' previous studies (e.g. Yenkimaleki & Van Heuven, 2018, 2023c).

Sixty-four speech fragments in L1 of approximately five minutes (i.e. 320 minutes total) were recorded at one moment of testing. The participants' speech was recorded

Table 1. List of the main activities and the time spent (minutes) for each activity by two groups of participants in the study.

Activity	Group	
	Control	Experimental
Listening to instructor explanations/guidance	270	270
Audio tracks / movies and discussion	810	450
Dedicated fluency training		360
Total time spent	1080	1080

directly onto a digital computer (44,100 Hz; 16 bit) on separate tracks through individual, table-mounted microphones. Altogether, 192 L2 speech fragments of approximately five minutes (e.g. 960 minutes in all) were recorded over the three moments of testing. From these fragments, only the initial parts (of approximately 60 seconds each) were later presented to raters.

5 Procedure

The participants took part in the program for 18 sessions (60 minutes per session) during 18 weeks, i.e. 18 hours in all. The general organization of the teaching program is shown in Table 1, separately for the Control group and the Experimental group.

Students in each of the two groups listened to the instructor's explanations about the contents of the materials before listening to audio tracks and/or movies. This was the pre-speaking stage, in which the instructor prepared the students to speak, e.g. by talking about the topic of the materials in audio tracks/movies, creating motivation for the listening materials, elaborating on the specific critical vocabularies and the language structure of the materials. The students also received guidance in doing speaking skills tasks/exercises. The speaking tasks were the following:

1. Role-play: The instructor assigned students different roles and scenarios to act out. These included everyday situations like ordering food at a restaurant or more complex ones like negotiating a business deal.
2. Debate: The instructor divided the class into two teams and assigned them opposing viewpoints on a given topic. Students were encouraged to prepare arguments, after which they engaged in a structured debate.
3. Picture description: The instructor provided students with pictures or images and asked them to describe what they saw in detail. This helped develop their ability to provide clear descriptions and use descriptive language.
4. Discussion questions: The instructor posed open-ended questions for students to discuss in pairs or small groups. The questions were related to current events, controversial topics, or personal experiences.
5. Interview practice: The instructor assigned students the role of interviewer and interviewee, providing them with a list of questions or topics to cover. This helped develop their ability to ask and answer questions effectively.

6. Describing objects: The instructor brought in various objects and had students take turns describing them without using their names. The rest of the class guessed what object was being described, based on the description alone.
7. Problem-solving: The instructor presented students with real-life problems that required discussion and decision-making skills, such as planning an event or resolving conflicts between characters in a hypothetical situation.

In all sessions, the instructor monitored the students and explained problematic issues raised during practicing and doing the exercises.

The control group received routine exercises, asking them to listen to authentic movies/audio tracks in American English and to discuss issues brought up in the movies/audio tracks for a total of 540 minutes. Students practiced speaking tasks. The movies the students watched, were not subtitled or captioned.² To help prepare students' expectations about what they are going to listen/watch and to aid in their comprehension, the instructor used warm-up questions, and brainstormed relevant vocabulary. The instructor introduced the topic, and got the students thinking about it. If felt necessary, the instructor presented a short list of keywords occurring in the movie/audio file that students might be unfamiliar with. The meaning of such keywords was illustrated by using them in disambiguating sentences before the audio file was started. The instructor played the movie clip/audio file for general comprehension – to allow students to get the main idea and asked the students to talk about the content in pairs/individually. Next, students were asked to complete an exercise on the corresponding speaking tasks. Interesting, and in some cases, humoristic movies/audio files were chosen, covering a variety of topics such as politics, social issues, and scientific findings. Only good quality audio files with clear-voiced speakers were presented. The same procedure was followed in each of the 18 lessons.

The Experimental group spent 360 minutes less time on these tasks; during the time freed-up this way, they received fluency strategy training, and practical exercises in memorizing short stories, retelling them, and repeating phrases and sentences. The goal of this strategy training, based on Cohen (1998), is to strengthen students and allow them to take control of the learning process. The goals of strategy training are to develop learners' strategy systems, autonomy, and self-direction and self-evaluation (Cohen, 1998), which all underlie the process of language learning. The fluency strategy training comprised the following components:

1. Chunking: Students practiced breaking down longer sentences into smaller, more manageable chunks. For example, instead of saying 'I went to the store and bought some groceries,' they said 'I went to the store. I bought some groceries.'
2. Pausing and planning: Students practiced pausing briefly before speaking, to gather their thoughts and plan their utterance. This allowed them to speak more fluently and avoid hesitations after the pause. For example, they might pause before responding to a question or before starting a new topic in a conversation.
3. Shadowing: Students listened to the authentic speech fragments and tried to simultaneously repeat what they heard. This helped them improve their pronunciation, intonation, and overall fluency.

4. Speed drill: Students practiced speaking at a faster pace than they were comfortable with, gradually increasing their speed over time. This helped them improve their ability to think and respond quickly, leading to greater fluency.
5. Storytelling: The instructor had students tell/retell stories or anecdotes to the class.

The students received explicit explanations as to how different strategies can be employed to improve speech fluency. Disfluency features, including repetition, false starts, reformulation, and replacement were briefly introduced to the learners by providing explicit definitions of each feature and examples, showing how these phenomena make their speech disfluent. The students were subsequently informed how to avoid such features. The students also became familiar with common fillers used by native speakers in their pauses during the speech, e.g. ‘you know’, ‘and that sort of thing’, ‘as far as I can see’, ‘something you might call . . .’, etc. The following stages were completed:

1. Students received instructions on how to avoid repeating previously produced speech (i.e. repetition) and how to use fillers when they had to pause during their short story telling.
2. The students were taught how to avoid producing incomplete sentences and leaving a word or phrase unfinished (i.e. false starts).
3. The students’ attention was drawn to the deteriorating effect on the fluency of their speech by replacing one word or phrase with another word; they were instructed to use fillers instead of pausing and to avoid replacement in their task-based narration, except if it could lead to more accurate speech.
4. The students did some practical tasks and were reminded of disfluency features.
5. The negative effect of repetition and reformulation on the fluency of speech was explained once more, and the need to use fillers was re-emphasized.

6 Assessment

Three raters evaluated the L1 speech fluency of the students. Later, the same raters evaluated the L2 speech fluency of the students in pretest (one week before the treatment), immediate posttest (one week after the program ended), and delayed posttest (one month after the program ended). The raters were instructed to pay attention to aspects of fluency (as in Bosker et al., 2013; Derwing et al., 2004; Rossiter, 2009). When no instructions are given prior to the rating, raters will use their own definition of what constitutes fluency to judge the speaking samples (Cucchiaroni et al., 2002; Kormos & Dénes, 2004). The raters were instructed to pay attention to these aspects in one session before the evaluation of the students’ speech. Raters used a 9-point scale to evaluate the student’s fluency. We employed the same procedure as in Yenkimaleki and Van Heuven (2023a). The scale positions were given verbal labels: 9=outstanding, 8=excellent, 7=very good, 6=good, 5=satisfactory, 4=minimally acceptable, 3-2-1=unsatisfactory. Strong correlations between the objective measures of fluency and subjective ratings of fluency have been found (De Jong, 2016; Yenkimaleki, 2017; Yenkimaleki & Van Heuven, 2023b).

The first rater has been specialized in pronunciation training for EFL learners. He has some 10 years' experience in teaching and research in this area. He wrote his PhD dissertation on this topic in The Netherlands but never lived in an English-speaking country. The second rater was Iranian who had the same professional qualifications as the first rater. She has completed her PhD project at the University of Essex, United Kingdom, and successfully defended her doctoral dissertation there. The third rater completed his PhD in applied Linguistic in Iran, and had nine years of teaching experience at a University in Iran.

The pretest, immediate posttest, and delayed posttest consisted of five questions. Raters, by consulting with each other, wrote 15 questions for the pretest, immediate posttest, and delayed posttest of the study before the program started. Five questions (out of 15) were randomly chosen for the pretest, five for immediate posttest, and five for the delayed posttest. Questions were open ended and descriptive in nature, so that world knowledge on the part of the students was not involved in answering the questions, e.g. *describe the university campus*. Students had 1 minute to answer each question. The questions were pre-recorded by a (female) native speaker of American English. Then, the questions were played to the participants in each round of interview. Recordings of the students' responses were made directly onto a digital computer through individual, table-mounted microphones. The questions in the pretest, immediate posttest, and delayed posttest were different so that students would not remember any point from the previous test (to control the test effect). To evaluate students' L1 speech fluency, raters used five pre-recorded descriptive questions. The students' L1 speech fluency was rated by employing the same procedure as was used to rate their L2 speech fluency, using a different selection from the 15 descriptive questions.

IV Results

1 Preliminaries

In a preliminary analysis of the data, we established the agreement among the three raters in their judgments of the students' fluency. We computed Cronbach's alpha for the raters for each of the tests separately but with Experimental and Control groups combined. We also computed alpha for the aggregated scores across all four tests. The results are summarized in Table 2. Alphas ranged between .934 and .972, which values are normally taken to signal excellent agreement among the raters (Nunnally, 1978).

Moreover, the three raters proved equally lenient in their judgments, with a maximum discrepancy in mean rating between any two raters $\leq .1$ on the 9-point rating scale. The differences between the raters were tested by Friedman's non-parametric alternative for the one-way Analysis of Variance (see Table 2). We used this alternative as a safety precaution, since the rating scores were not normally distributed in six out of eight conditions and because the rating scale is not necessarily at the interval level of measurement.

Given the excellent agreement among the raters we decided to perform all subsequent analyses on the mean scores aggregated over the three raters. Our next preliminary step was then to check whether the data satisfy the requirements for parametric statistical

Table 2. Reliability (Cronbach’s alpha) and leniency (mean rating) for the three expert raters (R1, R2, R3) in four different tests, and for all tests combined.

Test	Alpha	R1	R2	R3	Friedman test	<i>p</i>
First language (L1)	.972	8.3	8.3	8.3	$\chi^2(2) = 1.2$	.545
Second language (L2) pretest	.957	6.5	6.5	6.5	$\chi^2(2) = 2.8$	.252
L2 immediate posttest	.955	7.6	7.5	7.5	$\chi^2(2) = 4.1$	.127
L2 delayed posttest	.934	7.4	7.3	7.4	$\chi^2(2) = 1.3$	.510
All	.972	7.4	7.4	7.4	$\chi^2(2) = 1.5$	.485

Note. Differences between rater means were tested.

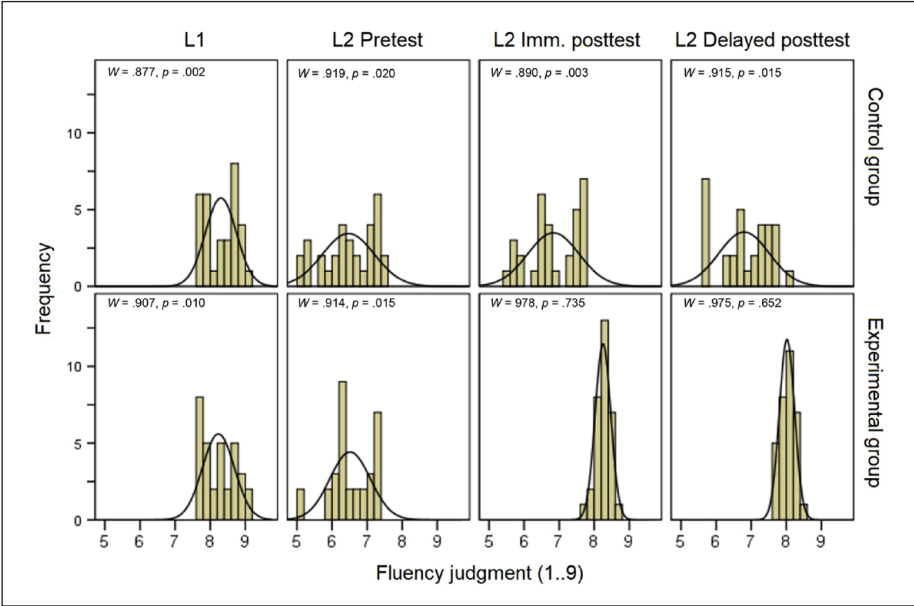


Figure 1. Histograms (with normal curves superimposed) of fluency scores obtained by Control (upper) and Experimental (bottom) groups in four different tests (for details, see text). Notes. *N* = 32 for each panel. Distributions deviate significantly from normalcy, except for the posttests (immediate and delayed) of the Experimental group. Normalcy was tested by the Shapiro–Wilk statistic (*W* and *p* are indicated in each panel).

tests. Figure 1 shows the histograms of the scores for each of the eight conditions defined by Group (Experimental, Control) and Moment of testing (L1, L2-pretest, L2-posttest, L2-delayed posttest). Deviation from normalcy was tested by the Shapiro–Wilk statistic, since *N* < 50. We assume normalcy of the distribution when *W* has a probability > .05 (for the relevant statistics, see the panels of Figure 1).

In light of the above results, we decided to use non-parametric alternatives in all subsequent inferential statistical analyses. Our first step will be to verify that the Control and

Experimental groups were equal at the beginning of the treatment using the Mann–Whitney test for two independent samples with the fluency rating as the dependent. The second step will be to test whether the fluency scores in the posttest are better than those of the pretest, and whether the delayed test yield poorer scores than the posttest but still better than in the pretest. We will do this separately for the Experimental and Control groups by Friedman’s non-parametric alternative to the Repeated Measures Analysis of Variance, followed by post-hoc pair-wise Wilcoxon tests with Bonferroni correction for multiple comparisons. To test the hypothesis that the treatment is more beneficial to the Experimental group than to the controls we compute the gain from pretest to posttest, i.e. the difference between the posttest and pretest scores. The prediction is that the gain will be larger for the Experimental group, which is tested by a Mann–Whitney U-test for independent samples. Similarly, we will check whether the difference in gain remains even in the delayed test.

In a separate stage of the analysis, we will consider the relationship between the fluency judgments obtained in the student’s L1 (Persian) and in the L2 pretest. We hypothesize that as EFL speakers are more fluent in their L1 they will also be more fluent in the L2. The relationship between the fluency scores can be expressed in terms of the non-parametric correlation coefficient, i.e. Spearman’s rho. Moreover, we hypothesize that as students are more fluent in the L1, they will be more highly motivated to improve their fluency in the L2, so that the gain in L2 fluency will be larger for students with high L1 fluency than for less fluent EFL learners. This can be tested by examining the correlation between the student’s L1 fluency score and the gain in L2 fluency. The correlation should be positive and significant for the prediction to be confirmed.

2 Effect of treatment

Figure 2 shows the L2 English fluency scores obtained by the two groups of participants in the pretest, posttest and delayed test. It also shows the participants’ fluency scores in their performance of the same task in their native language, i.e. Persian. In this subsection, however, we will be concerned with the students’ performance in the L2 only. Means, SDs, gain from pretest to posttest, subsequent loss from posttest to delayed test (one month later) and associated inferential statistics are listed in Table 3.

Before the start of the treatment, the two groups receive virtually the same fluency scores. The .04 difference on the 9-point fluency scale is insignificant ($p = .941$, two-tailed). Immediately after the treatment, both groups have improved their fluency significantly but the gain is significantly larger for the Experimental group ($\Delta = 1.7$) than for the Control group ($\Delta = .4$). One month after the treatment the Experimental group is still significantly more fluent than before, even though it sustained a small but significant loss during the month. The small fluency loss incurred during the month by the Control group was insignificant.

3 Predicting L2 fluency from L1 fluency

In this subsection we will first test the hypothesis that (Persian) EFL learners will be more fluent in English as they are more fluent in their native language, on the

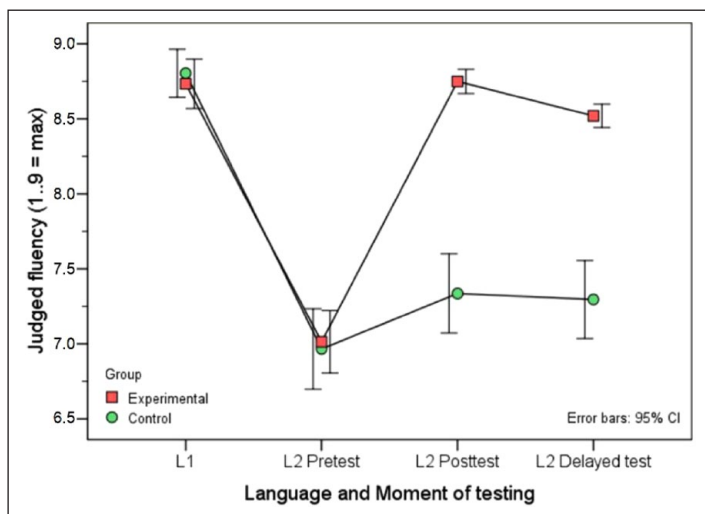


Figure 2. Judged fluency obtained by Experimental and Control groups for one test in the L1 (Persian) and three tests at different points in time in EFL (pretest, immediate posttest, delayed posttest).

assumption that speaking fluently is considered a characteristic property that is part of the self-image of the speaker, a property the speaker wants to project irrespective of the language that they speak. Figure 3A plots the judged fluency in English (the speaker's L2) obtained in the pretest as a function of the speaker's judged fluency in their native language, i.e. Persian. The individuals in the Experimental and Control groups are plotted separately even though there is no significant difference between these two groups (see Section IV.2).

Figure 3A shows quite clearly that the (judged) fluency in the L1 and L2 are strongly correlated at $\rho = .901$ ($p < .001$, two tailed). This means that – without any specific training or instruction – speakers who are (dis)fluent in their L1 are also (relatively) (dis)fluent in the L2.

The second hypothesis to be tested is that highly fluent speakers in the L1 will be more intent on improving their fluency in the L2 than language learners who are less fluent in their L1. This hypothesis can be checked in Figure 3B, which plots the improvement (gain) in L2 fluency from pretest to posttest as a function of the learner's native fluency. As before, the members of the Experimental and of the Control group are plotted with separate markers. It is clearly seen in the figure that the gain in fluency is roughly the same (i.e. .37) for all 32 participants in the Control group, irrespective of their L1 fluency. The Spearman rank correlation is practically zero, with $\rho = .005$ ($p = .979$, n.s.). For the members of the Experimental group, however, the results are very different. Here we find a strong, negative correlation between the learner's native fluency and the gain in EFL fluency, with $\rho = -.915$ ($p < .001$). This result runs counter to our prediction, which suggested that good native fluency would motivate the EFL learner to become equally fluent in the foreign language. We will return to this issue in the next section.

Table 3. Judged fluency (averaged over raters) for Experimental and Control groups speaking native Persian (pretest only) or non-native English (pretest, immediate posttest, delayed posttest).

Group	Dependents						Friedman test		Post-hoc
	L1	L2_Pre	L2_Pos	L2_Del	Gain1	Gain2	Loss	$\chi^2(2)$	
Experimental	Mean	8.23	6.51	8.25	8.02	1.74	1.51	.23	Pre<Del<Pos
	SD	.46	.58	.22	.22	.52	.49	.19	
Control	Mean	8.30	6.47	6.84	6.80	.37	.33	.04	Pre<Del=Pos
	SD	.44	.74	.73	.72	.21	.29	.30	
Δ mean		-.07	.04	1.41	1.22	1.37	1.18	.19	
Mann-Whitney	z	-.747	.074	6.877	6.643	6.878	6.757	3.280	
U-test	p	.455	.941	< .001	< .001	< .001	< .001	.001	

Notes. Post-hoc comparisons: ‘<’ indicates significantly smaller, ‘=’ indicates no significant difference. For details, see text. Bold indicates statistical significance.

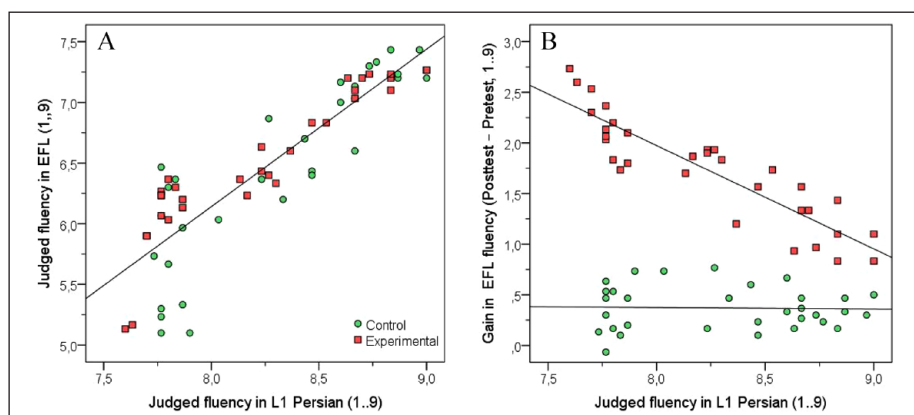


Figure 3. (A) Judged fluency in English as a foreign language (EFL) (pretest) as a function of judged fluency in the learner's L1 (Persian), for Experimental and Control groups separately (A single regression line is drawn for both groups combined). (B) Gain in judged EFL fluency from pretest to immediate posttest, with separate regression lines per group.

V Discussion

The results of the study revealed that the fluency training significantly enhanced the EFL learners' speech fluency. Our findings also showed that the EFL students' L2 speech fluency development could be predicted from their L1 fluency. The results of the study are consistent with Yenkimaleki and Van Heuven (2023a).

The participants in this study, apart from performing practical tasks to enhance their speech fluency, also received fluency strategy training. Procedural knowledge (i.e. knowledge of how) is different from declarative knowledge (i.e. knowledge of what). Declarative knowledge covers knowledge of word forms and encyclopedic knowledge, and of explicit grammatical or phonological rules, and it is commonly slower to apply. It needs more attention and cognitive resources than procedural knowledge. As procedural knowledge is processed fast and in parallel with other mechanisms, and since it puts less of a burden on the limited resources of working memory, it is more appropriate for fluent speech. The declarative/procedural categorization is widely agreed in cognitive psychology and neuroscience (e.g. Anderson et al., 2004) and has been useful in L2 acquisition (e.g. De Jong, 2005; Ferman et al., 2009). The argument is that in fluent L2 speech, procedural knowledge is mostly employed in the encoding phases of language production and in articulation, while declarative knowledge deals with retrieval of lexical items and their syntactic information, as well as with conceptualizing and monitoring the utterances (Kormos, 2006).

The pedagogic intervention used in this study helped the students to improve their speech fluency in terms of successfully managing the discourse flow. Its interpretation as an aspect of proceduralization remains an issue for future studies to investigate. Considering Anderson's (1983) adaptive control of thought theory, it is also feasible to argue that automatization was facilitated in the experimental group by giving the students

communicatively oriented declarative knowledge (i.e. the awareness-raising activities) and by creating useful opportunities for practice (i.e. fluency strategy training). To see whether awareness-raising activities could provide students with declarative knowledge, metalinguistic awareness (Yenkimaleki & Van Heuven, 2018), or both would raise an interesting issue to elaborate, which, however, is beyond the scope of this study.

The retrieval speed of words and phrases increases with repeated practice. Formulaic sequences emerge because of the creation and strengthening of new chunks. Language use may also cause the construction of new production rules and the collapsing of production rules into larger ones. It is necessary to have repeated practice for these collapsed production rules, so that these will compete with, and ultimately replace, their parent production rules (De Jong & Perfetti, 2011).

Seifoori and Vahidi (2012) stated that consciousness as awareness is helpful in that it emphasizes the crucial role of noticing the important aspects and thereby better appreciating the instructional opportunities (Schmidt, 1994). Karmiloff-Smith (1986) acknowledges the facilitative role of awareness in enhancing restructuring by making the newly learned materials more available, which facilitates their transformation and recombination. The employment of fluency strategy training accompanied by practical tasks in memorizing short stories, retelling them, and repeating phrases and sentences for fluency training, boosted the speech fluency of EFL learners. The fluency strategy training in the present study can be associated with the facilitative role of training awareness (Schmidt, 1994; Yenkimaleki & Van Heuven, 2018, 2021, 2022).

Research on the assessment of L2 fluency has examined how ratings of speech fluency can be correlated with physical properties of the speech produced (e.g. Bosker et al., 2013; Derwing et al., 2004; Lennon, 1990). Although perfect prediction proved not feasible, moderate to strong correlations have been reported for many physical properties, such as Speech rate (number of syllables per second including pauses; e.g. Derwing & Munro, 1997), Articulation rate (number of syllables per second excluding pauses; e.g. Bosker et al., 2013; Neri et al., 2002; Yu & Van Heuven, 2013), Mean length of run (number of syllables produced between pauses; e.g. Cucchiari et al., 2002; Lennon, 1990; Kormos & Dénes, 2004; Yu & Van Heuven, 2013, 2017, 2021), aspects of pausing (e.g. Bosker et al., 2013; Derwing & Munro, 1997; Derwing & Munro, 1997; Granena & Long, 2013; Lennon, 1990), and repetitions and repairs (e.g. Bosker et al., 2013; Isaacs & Trofimovich, 2012; Yenkimaleki, 2017, Chapter 7; Yenkimaleki & Van Heuven, 2023b). Consequently, fluency is a complex perceptual construct that cannot be captured by any single factor. Different studies have focused on different aspects of fluency assessment. It is necessary, therefore, to consider multiple factors in order to obtain a comprehensive understanding of an individual's fluency level.

We found that the (judged) fluency in the L1 (Persian) and L2 (English), as established before the treatment, are very strongly correlated. This means that – without any specific training or instruction – speakers who are (dis)fluent in their L1 are also (relatively) (dis)fluent in the L2, which finding replicates earlier studies (see Section II.1). What is new in our study is that the relationship between L1 and L2 fluency developed along different paths depending on the treatment. Participants in the Control group gained a relatively small increase (.37 on the scale from 1 to 9) in L2 fluency, while the individual gain did not correlate with the participant's L1 fluency. The dedicated fluency

training received by the members of the Experimental group generally boosted their judged fluency in English (by 1.74 points), which is almost five times the gain found for the Control group. Crucially, students with low fluency (in the L1 and in the L2 pretest alike), benefited more from the fluency training than the naturally more fluent students, so that all learners in the Experimental group end up being (roughly) equally fluent in the foreign language. This would also explain the very narrow score distribution of the fluency judgments for the Experimental group in the posttests (see Figure 1, bottom right). This finding, however, runs counter to our prediction, which suggested that native fluency would motivate the EFL learner to become equally fluent in the foreign language. Instead, it seems that habitually fluent speakers in the L1 are also fluent in the L2 and feel no need to become (even) more fluent in their L2, while less fluent learners benefit more from the explicit instruction and practice provided by the fluency training program. This explanation might also apply to findings reported by De Jong et al. (2015) and Huensch and Tracy-Ventura (2017). However, these studies did not report the students' fluency (in L1 and L2) as a gestalt percept but analyse a dozen or more acoustic and textual correlates, so that it is not possible to compare their results with ours.

Finally, it would be interesting to investigate the extent to which the improved fluency in English as a foreign language, which was found especially for our Experimental group, and which must be due to the dedicated fluency training during the treatment, generalizes to the speaker's fluency overall, i.e. whether the EFL learner's native language use will also be characterized by a more fluent delivery. A positive effect is expected here, since the learner has been taught that speaking slowly and hesitantly, with filled or silent pauses, false starts, interruptions, repetitions and corrections is undesirable. This principle should apply to speech in any language, whether foreign or native. This hypothesis could have been tested if the participants had also done a fluency post-test in Persian.

VI Conclusions

Overall, the results of the study showed that the fluency training significantly improved the EFL learners' speech fluency. The findings also revealed that the EFL students' L2 fluency development could be predicted from their L1 fluency. Mora and Valls-Ferrer (2012) argue that the conditions of the target language context enhance automatization of already proceduralized linguistic knowledge because they would give opportunities for meaningful interaction and rich exposure to L2 input. We add to this argument by emphasizing the effectiveness of classroom-based student training which boosts learner awareness and independent practice. Our findings are in line with DeKeyser (2007) that automatization is one of the problematic phases of learning in the classroom context. Nevertheless, an important finding of the present study is that, though the classroom context often gives limited and insufficient opportunities for L2 practice, tailor-made training addressed at improving fluency can have long-term positive effects.

To enhance students' speech fluency, training awareness about the crucial role of fluency, practical tasks on the production and perception skills in EFL settings should be emphasized. However, this does not imply that students must mimic native-language accents. L2 speech can be intelligible even if L2 speakers have a (mild) non-native accent. Training programs should help students to understand a wider ranges of

non-native of Englishes as well (Rose, 2020). Improvement in speech fluency requires eclectic and holistic instruction sensitive to the variety of speakers' L1 backgrounds and their major targeted listener groups (Yenkimaleki & Van Heuven, 2023b).

We argue that to develop utterance fluency, EFL learners need ample opportunity for speaking practice. Engaging in conversations, participating in discussions, and giving presentations can help improve fluency. Regular practice can help learners become more comfortable with the language and develop automaticity in their speech production.

Instructors can also incorporate activities that focus on developing fluency into their lessons. These activities may include role-plays, debates, storytelling, or even simply encouraging students to speak spontaneously on various topics. In addition to practice, exposure to authentic spoken English through listening activities such as watching movies or TV shows, listening to podcasts or songs can also contribute to improving utterance fluency. This exposure helps learners become familiar with natural speech patterns, intonation, and rhythm (Yenkimaleki et al., 2023).

It is crucial to consider various dimensions of fluency when designing instructional interventions and assessing learners' progress. Moreover, our results highlight the importance of considering individual learner differences, such as L1 background and intended listener group, in order to tailor instruction effectively.

Our findings emphasize the importance of training and instruction in improving speech fluency in EFL learners. It highlights the role of L1 fluency, individual learner differences, and the development of procedural and declarative knowledge in fluency development. By raising awareness about the importance of fluency, providing practical tasks, and tailoring instruction to learners' needs, educators can support long-term positive effects on fluency development.

The limitation of this study was that we did not have access to a large number of the students to have a robust sample for this study. Future studies could be set up with larger numbers of EFL students with different language pairs to confirm the results of this study. Further research is needed to delve deeper into the specific aspects of fluency and the effects of instructional interventions on different dimensions of fluency.

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Notes

1. <https://zappenglish.com/audio/english-audio/zapp-english-listening>
2. Captioning refers to the process by which the audio content of a video, such as speech and other sounds, is converted into texts and are displayed on the screen (Hayati & Mohmedi, 2011).

References

- Ahmadian, M.J. (2011). The effect of ‘massed’ task repetitions on complexity, accuracy and fluency: Does it transfer to a new task? *The Language Learning Journal*, 39, 269–280.
- Anderson, J. (1983). *The architecture of cognition*. Harvard University Press.
- Anderson, J.R., Bothell, D., Byrne, M.D., et al. (2004). An integrated theory of the mind. *Psychological Review*, 111, 1036–1060.
- Barraja-Rohan, A.-M. (2011). Using conversation analysis in the second language classroom to teach interactional competence. *Language Teaching Research*, 15, 479–507.
- Bosker, H.R., Pinget, A.-F., Quen , H., Sanders, T., & De Jong, N.H. (2013). What makes speech sound fluent? The contributions of pauses, speed and repairs. *Language Testing*, 30, 159–175.
- Botezatu, M.R., Kroll, J.F., Trachsel, M.I., & Guo, T. (2022). Second language immersion impacts native language lexical production and comprehension. *Linguistic Approaches to Bilingualism*, 12, 347–376.
- Clark, H.H., & Fox Tree, J.E. (2002). Using uh and um in spontaneous speaking. *Cognition*, 84, 73–111.
- Cohen, A.D. (1998). *Strategies in learning and using a second language*. Longman.
- Cohen, A.D. (2003). The learner’s side of foreign language learning: Where do styles, strategies, and tasks meet? *International Review of Applied Linguistics in Language Teaching*, 41, 279–291.
- Cucchiari , C., Strik, H., & Boves, L. (2002). Quantitative assessment of second language learners’ fluency: Comparisons between read and spontaneous speech. *Journal of the Acoustical Society of America*, 111, 2862–2873.
- De Jong, N. (2005). *Learning second language grammar by listening*. LOT. Available at: https://www.lotpublications.nl/Documents/106_fulltext.pdf (accessed October 2023).
- De Jong, N. (2016). Fluency in second language assessment. In D. Tsagari & J. Banerjee (Eds.), *Handbook of Second Language Assessment* (pp. 203–218). De Gruyter Mouton. <https://doi.org/10.1515/9781614513827-015>
- De Jong, N., & Perfetti, C.A. (2011). Fluency training in the ESL classroom: An experimental study of fluency development and proceduralization. *Language Learning*, 61, 533–568.
- De Jong, N., Steinel, M., Florijn, A., Schoonen, R., & Hulstijn, J. (2012). Facets of speaking proficiency. *Studies in Second Language Acquisition*, 34, 5–34.
- De Jong, N.H., Groenhout, R., Schoonen, R., & Hulstijn, J.H. (2015). Second language fluency: Speaking style or proficiency? Correcting measures of second language fluency for first language behavior. *Applied Psycholinguistics*, 36, 223–243.
- DeKeyser, R. (2007). Situating the concept of practice. In DeKeyser, R. (Ed.), *Practicing in a second language: Perspectives from applied linguistics and cognitive psychology* (pp. 1–18). Cambridge University Press.
- Derwing, T.M., Munro, M.J., & Thomson, R.I. (2008). A longitudinal study of ESL learners’ fluency and comprehensibility development. *Applied Linguistics*, 29, 359–380.
- Derwing, T.M., & Munro, M.J. (1997). Accent, intelligibility, and comprehensibility: Evidence from four L1s. *Studies in Second Language Acquisition*, 19(1), 1–16.
- Derwing, T.M., Munro, M.J., Thomson, R.I., & Rossiter, M.J. (2009). The relationship between L1 fluency and L2 fluency development. *Studies in Second Language Acquisition*, 31, 533–557.
- Derwing, T.M., Rossiter, M.J., Munro, M.J., & Thomson, R.I. (2004). Second language fluency: Judgments on different tasks. *Language Learning*, 54, 655–679. <https://doi.org/10.1111/j.1467-9922.2004.00282.x>
- Duran-Karaoz, Z., & Tavakoli, P. (2020). Predicting L2 fluency from L1 fluency behavior: The case of L1 Turkish and L2 English speakers. *Studies in Second Language Acquisition*, 42, 671–695.

- Ellis, R., & Shintani, N. (2014). *Exploring language pedagogy through second language acquisition research*. Routledge.
- Ferman, S., Olshtain, E., Schechtman, E., & Karni, A. (2009). The acquisition of a linguistic skill by adults: Procedural and declarative memory interact in the learning of an artificial morphological rule. *Journal of Neurolinguistics*, 22, 384–412.
- Freed, B.F. (2000). Is fluency, like beauty, in the eyes (and ears) of the beholder? In H. Riggenbach (Ed.), *Perspectives on fluency* (pp. 243–265). University of Michigan Press.
- Foster, P. (2020). Oral fluency in a second language: A research agenda for the next ten years. *Language Teaching*, 53, 446–461.
- Fotos, S.S. (1994). Integrating grammar instruction and communicative language use through grammar consciousness-raising tasks. *TESOL Quarterly*, 28, 323–351.
- Freed, B., Segalowitz, N., & Dewey, D. (2004). Context of learning and second language fluency in French: Comparing regular classroom, study abroad, and intensive domestic immersion programs. *Studies in Second Language Acquisition*, 26, 275–301.
- Gardner, R.C., & Lambert, W.E. (1972). *Attitudes and motivation in second language learning*. Newbury House.
- Granena, G., & Long, M.H. (2013). Age of onset, length of residence, language aptitude, and ultimate L2 attainment in three linguistic domains. *Second Language Research*, 29, 311–343.
- Hayati, A., & Mohmedi, F. (2011). The effect of films with and without subtitles on listening comprehension of EFL learners. *British Journal of Educational Technology*, 42(1), 181–192. <https://doi.org/10.1111/j.1467-8535.2009.01004.x>
- Huensch, A., & Tracy-Ventura, N. (2017). Understanding second language fluency behavior: The effects of individual differences in first language fluency, cross-linguistic differences, and proficiency over time. *Applied Psycholinguistics*, 38, 755–785.
- Isaacs, T., & Trofimovich, P. (2012). Deconstructing comprehensibility: Identifying the linguistic influences on listeners' L2 comprehensibility ratings. *Studies in Second Language Acquisition*, 34, 475–505.
- Karmiloff-Smith, A. (1986). From meta-processes to conscious access: Evidence from children's metalinguistic and repair data. *Cognition*, 23, 95–147.
- Kormos, J. (2006). *Speech production and second language acquisition*. Erlbaum.
- Kormos, J., & Dénes, M. (2004). Exploring measures and perceptions of fluency in the speech of second language learners. *System*, 32, 145–164.
- Lambert, C., Kormos, J., & Minn, D. (2017). Task repetition and second language speech processing. *Studies in Second Language Acquisition*, 39, 167–196.
- Lee, S. H., & Muncie, J. (2012). From receptive to productive: Improving ESL learners' use of vocabulary in a post-reading composition task. *TESOL Quarterly*, 40, 295–320.
- Lennon, P. (1990). Investigating fluency in EFL: A quantitative approach. *Language Learning*, 40, 387–417.
- Loewen, S., & Sato, M. (2018). State of the art article: Interaction and instructed second language acquisition. *Language Teaching*, 51, 285–329.
- Macaro, E. (2001). *Learning strategies in second and foreign language classrooms*. Continuum.
- Mora, J.C., & Valls-Ferrer, M. (2012). Oral fluency, accuracy, and complexity in formal instruction and study abroad learning contexts. *TESOL Quarterly*, 46, 610–641.
- Neri, A., Cucchiari, C., Strik, H., & Boves, L. 2002. The pedagogy–technology interface in computer assisted pronunciation training. *Computer Assisted Language Learning*, 15, 441–467.
- Nunnally, J. (1978). *Psychometric theory: Volume 2*. McGraw-Hill.
- Oxford, R.L. (1990). *Language learning strategies: What every teacher should know*. Newbury House.

- Peltonen, P. (2018). Exploring connections between first and second language fluency: A mixed methods approach. *The Modern Language Journal*, 102, 676–692.
- Riazantseva, A. (2001). Second language proficiency and pausing: A study of Russian speakers of English. *Studies in Second Language Acquisition*, 23, 497–526.
- Richards, O. (2016). *English short stories for intermediate learners*. Olly Richards. Available at: <https://rafieienglishclinic.com/upload/blog/behtarin%20ketab%20hay%20baraye%20yadgiri%20english-short-stories-for-intermediate-learners-8-unconventional-short-stories-to-grow-your-vocabulary-and-learn-english-the-fun-way-by-olly-richards-pdf-free.pdf> (accessed September 2023).
- Rose, H. (2020). Language variation and intelligibility [PowerPoint slides]. *Canvas*. Available at: <https://canvas.ox.ac.uk/courses/26789> (accessed September 2023).
- Rossiter, M.J. (2009). Perceptions of L2 fluency by native and non-native speakers of English. *Canadian Modern Language Review*, 65, 395–412.
- Saito, K. (2020). Multi- or single-word units? The role of collocation use in comprehensible and contextually appropriate second language speech. *Language Learning*, 70, 548–588.
- Saito, K. (2021). What characterizes comprehensible and native-like pronunciation among English-as-a-second-language speakers? Meta-analyses of phonological, rater, and instructional factors. *TESOL Quarterly*, 55(3), 866–900. <https://doi.org/10.1002/tesq.3027>
- Saito, K., & Hanzawa, K. (2018). The role of input in second language oral ability development in foreign language classrooms: A longitudinal study. *Language Teaching Research*, 22, 398–417.
- Saito, K., Ilkan, M., Magne, V., Tran, M.N., & Suzuki, S. (2018). Acoustic characteristics and learner profiles of low-, mid- and high-level second language fluency. *Applied Psycholinguistics*, 39, 593–617.
- Schmidt, R.W. (1994). Deconstructing consciousness in search of useful definitions for applied linguistics. *AILA Review*, 11, 11–26.
- Segalowitz, N. (2010). *The cognitive bases of second language fluency*. Routledge.
- Segalowitz, N. (2012). Fluency. In Robinson, P. (Ed.), *The Routledge encyclopedia of second language acquisition* (pp. 240–244). Routledge.
- Segalowitz, N., & Freed, B.F. (2004). Context, contact, and cognition in oral fluency acquisition: Learning Spanish in at home and study abroad contexts. *Studies in Second Language Acquisition*, 26, 173–199.
- Seifoori, Z., & Vahidi, Z. (2012). The impact of fluency strategy training on Iranian EFL learners' speech under online planning conditions. *Language Awareness*, 21, 101–112.
- Skehan, P. (2014). *Processing perspectives on task performance*. John Benjamins.
- Suzuki, Y. (2020). Optimizing fluency training for speaking skills transfer: Comparing the effects of blocked and interleaved task repetition. *Language Learning*, 71(2), 285–320. <https://doi.org/110.1111/lang.12433>
- Tavakoli, P., & Foster, P. (2008). Task design and second language performance: The effect of narrative type on learner output. *Language Learning*, 58, 439–473.
- Tavakoli, P., Nakatsuhara, F., & Hunter, A.-M. (2020). Aspects of fluency across assessed levels of speaking proficiency. *The Modern Language Journal*, 104, 169–191.
- Tavakoli, P., & Skehan, P. (2005). Strategic planning, task structure and performance testing. In Ellis, R. (Ed.), *Planning and task performance in a second language* (pp. 239–277). John Benjamins.
- Tavakoli, P., & Uchihara, T. (2020). To what extent are multiword sequences associated with oral fluency? *Language Learning*, 70, 506–547.
- Thomson, R. I. (2015) Fluency. In Reed, M. & Levis, J. (Eds.), *The handbook of pronunciation* (pp. 209–226). Wiley.

- Towell, R., & Dewaele, J.-M. (2005). The role of psycholinguistic factors in the development of fluency amongst advanced learners of French. In Dewaele, J.-M. (Ed.), *Focus on French as a foreign language: Multidisciplinary approaches* (pp. 210–239). Multilingual Matters. Available at: <https://www.researchgate.net/profile/Jean-Marc-Dewaele/publication/329063782> (accessed September 2023).
- Valls-Ferrer, M., & Mora, J.C. (2014). L2 fluency development in formal instruction and study abroad. In Pérez-Vidal, C. (Ed.) *Language acquisition in study abroad and formal instruction contexts* (pp. 111–136). John Benjamins.
- Van Os, M., De Jong, N.H., & Bosker, H.R. (2020). Fluency in dialogue: Turn-taking behavior shapes perceived fluency in native and nonnative speech. *Language Learning*, 70, 1183–1217.
- Witton-Davies, G. (2014). The study of fluency and its development in monologue and dialogue. Unpublished doctoral dissertation, University of Lancaster, Lancaster, UK. Available at: <https://taiwan.academia.edu/GilesWittonDavies/Thesis-Chapters> (accessed September 2023).
- Yenkimaleki, M. (2017). *Effect of prosody awareness training on the quality of consecutive interpreting between English and Farsi*. LOT. Available at: https://www.lotpublications.nl/Documents/459_fulltext.pdf (accessed September 2023).
- Yenkimaleki, M. (2021). Prosody training benefits in perception vs. production skills in simultaneous interpreting: An experimental study. *Dutch Journal of Applied Linguistics*, 10, 1–15.
- Yenkimaleki, M., & Van Heuven, V.J. (2018). The effect of teaching prosody awareness on interpreting performance: An experimental study of consecutive interpreting from English into Farsi. Perspectives. *Studies in Translation Theory and Practice*, 26(1), 84–99. <https://doi.org/10.1080/0907676X.2017.1315824>
- Yenkimaleki, M., & Van Heuven, V.J. (2021). Effects of attention to segmental vs. suprasegmental features on the speech intelligibility and comprehensibility of the EFL learners targeting the perception or production-focused practice. *System*, 100, 1–12.
- Yenkimaleki, M., & Van Heuven, V.J. (2022). Comparing the nativeness vs. intelligibility approach in prosody instruction for developing speaking skills by interpreter trainees: An experimental study. *Speech Communication*, 137, 92–102.
- Yenkimaleki, M., & Van Heuven, V.J. (2023a). The effect of fluency strategy training on interpreter trainees' speech fluency: Does content familiarity matter? *Speech Communication*, 146, 1–10.
- Yenkimaleki, M., & Van Heuven, V.J. (2023b). Objective assessment of students' interpreting performance: An experimental study. *Teaching English Language*, 17, 227–267.
- Yenkimaleki, M., & Van Heuven, V.J. (2023c). Prosody instruction in developing listening comprehension skills by interpreter trainees: Does methodology matter? *Computer Assisted Language Learning*, 36(5–6), 968–1004.
- Yenkimaleki, M., Van Heuven, V.J., & Moradimokhes, H. (2023). The effect of prosody instruction in developing listening comprehension skills by interpreter trainees: Does methodology matter? *Computer Assisted Language Learning*, 36, 968–1004.
- Yenkimaleki, M., & Van Heuven, V.J. (accepted). The effect of fluency training on interpreter trainees' speech fluency, comprehensibility, and accentedness: An experimental study. *Spanish Journal of Applied Linguistics*.
- Yu, W., & Van Heuven, V.J. (2013). Effects of immediate repetition at different stages of consecutive interpreting training. An experimental study. In Aalberse, S., & A. Auer (Eds.), *Linguistics in the Netherlands 2013* (pp. 201–213). John Benjamins.
- Yu, W., & Van Heuven, V.J. (2017). Predicting judged fluency of consecutive interpreting from acoustic measures: Potential for automatic assessment and pedagogy. *Interpreting: International Journal of Research and Practice in Interpreting*, 19, 47–68.

- Yu, W., & Van Heuven, V.J. (2021). Quantitative correlates as predictors of judged fluency in consecutive interpreting: Implications for automatic assessment and pedagogy. In Chen, J., & C. Han (Eds.), *Testing and assessment of interpreting* (pp. 117–142). Springer Nature.
- Zabihi, R., Ghominejad, S., & Javad Ahmadian, M. (2021). Can willingness to communicate, communication in English anxiety, behavioural inhibition and behavioural action predict perceived L2 fluency? *Language Teaching Research*. Advance online publication. <https://doi.org/10.1177/13621688211044071>