

Automaticity, fluency and second language task performance

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Tavakoli, P. ORCID: <https://orcid.org/0000-0003-0807-3709>
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Chapter 3

Automaticity, Fluency and Second Language Task Performance

Parvaneh Tavakoli

University of Reading

Abstract

Research in second language (L2) task performance has been interested in examining fluency not only as a key aspect of language performance but also as a construct that can demonstrate L2 processing and development in concrete and measurable ways. Speech fluency has been particularly important in second language acquisition (SLA) research as it helps shed light on significant aspects of language processing, such as attention, noticing, and automaticity. This chapter will provide a brief overview of the literature on the relationship between automaticity and L2 fluency. It will then highlight the extent to which research in this area has moved beyond a simple and inadequately-defined concept of fluency to characterising fluency as a multidimensional and complex construct that is defined rigorously and measured objectively and systematically. After discussing the significance of fluency in language acquisition, language teaching and language assessment, the chapter evaluates the existing frameworks for defining and measuring fluency. It will also outline how operationalisation and measurement of fluency have changed to become more robust in nature and more methodical in operation. In doing so, Skehan's influential contribution to the development of the current understanding of fluency and its measurement will be highlighted. The paper will conclude by underlining the need for expanding the existing framework to include other factors, such as individual, social, and cultural factors that affect fluency in task performance.

Introduction

As the interest in researching fluency is increasing in a number of sub-disciplines of applied linguistics, such as SLA, language assessment, and clinical language sciences, it is noticeable that interest is often driven by somewhat different, although interconnected, underlying rationales in each discipline. Researchers in second language acquisition, for example, are interested in researching fluency to develop a more in-depth understanding of how it develops from earlier stages of SLA to more advanced and native-like uses of the L2. Such knowledge can help develop a model of L2 fluency and shed light on the relationship between fluency, automaticity and acquisition. SLA researchers are also keen to learn more about fluency as it can capture reaction time and provide an insight into how attentional

resources are allocated during L2 processing and production (Skehan, 2003, 2009, 2014). Ultimately, researchers in this area hope that developing a full understanding of fluency and its relationship to automaticity can help with the development of a model of L2 production. From a pedagogic perspective, researchers in L2 teaching are keen to examine the extent to which effective teaching methodologies and/or supportive learning environments can promote fluency (Kormos & Denes, 2004; de Jong & Perfetti, 2011). For example, researchers investigating fluency from a pedagogic perspective have suggested that study-abroad contexts enhance fluency (Freed, Segalowitz & Dewey, 2004; Mora & Valls-Ferrer, 2012), and fluency-focused instruction promotes fluency even over a short period of time (Tavakoli, Campbell, & McCormack, 2016; Tavakoli, 2018). In language testing and assessment, fluency is believed to reflect the degree of proficiency in an L2, that is, a higher level of mastery is reflected through a more fluent use of language. In addition, language testing researchers are interested in fluency not only as a key construct of L2 ability, but also because it can predict communicative adequacy (de Jong, Steinel, Florijn, Schoonen, & Hulstijn, 2012; Révész, Ekiert, & Torgersen, 2016; Tavakoli, Nakatsuhara, & Hunter, 2017). Despite the differences in their motivation in researching fluency, research in these different disciplines has made a major contribution to developing our current understanding of fluency and has offered applied linguistics a more comprehensive and robust conceptualisation of fluency. In this chapter, I will focus on fluency from an SLA perspective and discuss Skehan's contribution to the leading developments in conceptualising, defining, operationalising and measuring L2 fluency.

Fluency: A multifaceted construct

Defining fluency in detail goes beyond the scope of this chapter. However, a brief definition is needed before discussing its relationship to automaticity. Fluency is known as a complex and multifaceted construct that is difficult to define, measure and operationalize (Kahng, 2014; Segalowitz, 2010). As a concept, fluency spans a continuum from a very broad sense of a speaker's general language proficiency to a very narrow sense of flow and fluidity of the speaker's speech. To expand on Lennon's (1990) dichotomy of broad versus narrow senses of fluency, Tavakoli and Hunter (2017) proposed that fluency should be considered at four levels of very broad, broad, narrow, and very narrow. Drawing on data from 84 L2 teachers in England and comparing them with the available fluency research in SLA, Tavakoli and Hunter argued that definitions of fluency can be divided into four levels:

- Very broad: fluency as a means of reflecting the overall 'proficiency' or 'mastery' of the L2
- Broad: fluency referring to and representing L2 speaking ability
- Narrow: fluency indicating flow and continuity of speech
- Very narrow: fluency in objective and measurable aspects of speech, for example speech rate and length of pause

Highlighting the misconceptions of fluency and the emerging need for a more accessible understanding of fluency, Tavakoli and Hunter (2017) contend that defining fluency across these four levels will help prevent confusion and develop a more comprehensible definition of fluency among researchers, teachers and language practitioners. Figure 1 below displays the four levels of fluency.

Insert figure 1 here.

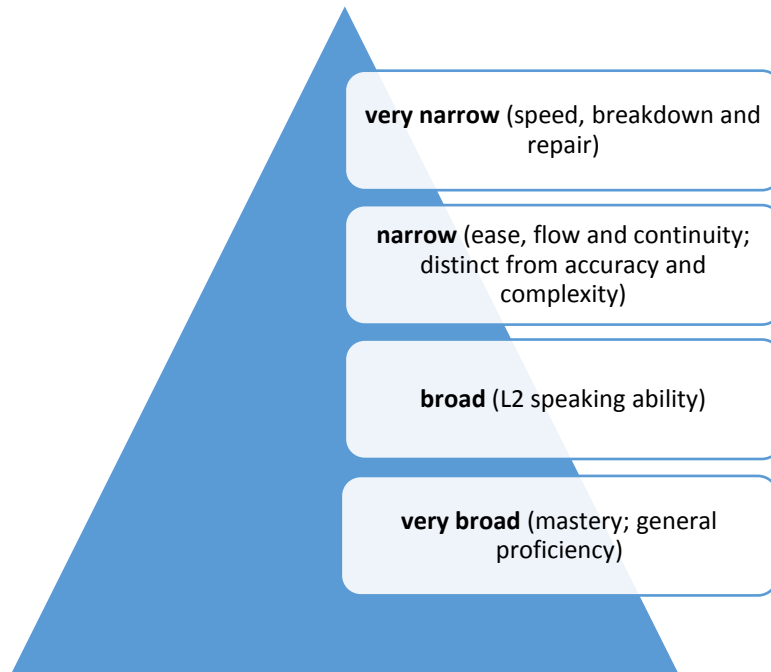


Figure 1: Four levels of defining L2 fluency (adopted from Tavakoli & Hunter, 2017)

Segalowitz (2010), revisiting the definitions of L2 fluency, suggested that L2 fluency comprises three distinct but inter-related concepts of cognitive fluency, utterance fluency, and perceived fluency. In Segalowitz’s framework, cognitive fluency refers to the speaker’s “ability to efficiently mobilize and integrate the underlying cognitive processes responsible for producing utterances” (Segalowitz, 2010: 48); utterance fluency refers to those aspects of fluency that can be measured, for example speed, pausing, and hesitation; and perceived fluency represents the inferences listeners make about the speaker’s cognitive fluency, that is whether the speaker is fluent and what characteristics of fluency are more salient to the listeners.

Before moving to the next section, it is necessary to point out that although fluency primarily represents how efficiently the underlying processes of speech planning and production are functioning (Segalowitz, 2010), it also reflects the cognitive demands of the task and the performance conditions under which the task is performed (Skehan, 1998). In addition, the existing research evidence suggests that fluency interacts with other aspects of performance, for example the lexical demands. De Jong (2016), for example, reports that both L1 and L2 speakers pause longer before producing low frequency lexical items. In line

with this, a growing body of research suggests that fluency is, at least to some extent, related to individual variations and personal styles (Derwing, Munro, Thomson, & Rossiter, 2009; de Jong et al., 2015) implying that certain features of fluency are present in a given speaker's speech regardless of whether they are speaking in their L1 or L2. The results of de Jong et al. (2015), for example, clearly showed that several L2 fluency measures were linked with L1 fluency measures. To develop a more overarching understanding of fluency, it is necessary to discuss automaticity first, while noting that this chapter is interested in automaticity specifically as it relates to fluency (for a more detailed discussion of automaticity and automatization see DeKeyser, 2001, 2015).

Automaticity

Automaticity, in the field of psychology, is the ability to perform things without conscious effort, monitoring or occupying the mental capacity and attentional resources that are typically available for processing information. Automatic processes are known to function largely independently of the resources available to a person's mental capacity (Schiffrin & Schneider, 1977; Schneider & Schiffrin, 1977), require little attention, and are "accomplished through single-step memory retrieval" (DeKeyser, 2001: 130).

Building on the findings from research in automatic and controlled processes, Schiffrin and Schneider (1984) defined automaticity as "a fast, parallel, fairly effortless process that is not limited by short term memory (STM) capacity, is not under direct subject control, and is responsible for the performance of well-developed skill behaviours" (p. 269). More recent research in the field of psychology strongly suggests that it is more appropriate to define automaticity along different levels, for example strong, partial, and occasional, rather than considering it as a controlled versus automatic dichotomy (DeKeyser, 2001). In addition, other researchers argue that automatization, that is the gradual process through which an activity becomes automatic, is more important than automaticity since the change, both qualitative and quantitative, occurring during this process is more important than the automaticity that results (Segalowitz, 2003).

While there is diversity in the way researchers define and interpret automaticity including "ballistic processing, parallel processing, attention-free processing, effortless processing, unconscious processing, and fast processing" (Hulstijn et al. 2009: 556) and "automatic performance that draws on implicit-procedural knowledge" (Ortega, 2009: 85), there is common agreement in both psychology and SLA that automaticity is important "for the acquisition of all complex skills, including L2 skills" (DeKeyser, 2001: 126). Despite this consensus, researchers disagree about a number of underlying principles and/or assumptions on how fluency works. An important debate in this topic is how automatization takes place. Some researchers (Logan, 1988, 1992) perceive automatization as a process of gradual improvement resulting from faster retrieval from memory or speeding up the process of executing and performing the same task, whereas others (Anderson, 1983, 1993) consider automaticity as a process of qualitative change where components of the task are restructured and a more efficient use of the rules is achieved. This debate is often referred to as the qualitative versus quantitative interpretation of automatization processes.

Whether automaticity is perceived as a qualitative or quantitative change in the execution of the task, the concept of automaticity is often associated with the acquisition of cognitive and psychomotor skills ranging from language learning to swimming and driving a car. DeKeyser (2015: 94) argues that the basic principles common to the acquisition of all skills include “development from initial representation of knowledge through initial changes in behaviour to eventual fluent, spontaneous, largely effortless, and highly skilled behaviour”. A good example of automatic skills is driving a car after it is sufficiently practiced without having to think about which mirror to look at or how to change the gear. It is commonly agreed that once a process is learnt and practiced repeatedly and sufficiently, it is likely to become automatic, that **is it requires little attention so** that there would be no interference with other competing tasks such as listening to the radio while driving a car. Some researchers (e.g. Gass, , Behney and Plonsky, 2013) argue that extensive practice may not be sufficient for the development of automatic processes.

Among the many characteristics of automaticity, DeKeyser (2001) highlights several of its features that have been frequently researched since the 1970s. These include fast, parallel, effortless, free capacity, unintentional, unconscious behaviours emerging from consistent practice. Notwithstanding the applicability of these characteristics in researching automaticity in different contexts and for varying purposes, Gass et al. (2013) argue that the most central of these characteristics in SLA is that automatic L2 performance involves “fast, unconscious and effortless processing” (p. 256). If we take these three characteristics as central to understanding and evaluating automaticity, then we will need a set of concrete and observable means that allow researchers to examine and evaluate automaticity in a more objective and observable manner. Studying fluency is one way of evaluating to what extent L2 speaking skill has become automatic.

Automaticity and SLA

In SLA, automaticity is studied in relation to a range of different L2 skills including lexical retrieval, reading comprehension and speaking ability. Given our interest in oral fluency in this chapter, automaticity in speaking skill is the focus of the discussion that follows. Levelt (1989: 20), in his L1 oral production model, argued that automatic processes are faster as they are executed without intention or awareness, and run on their own resources without relying excessively on other resources and processes (consistent with the views of DeKeyser and Gass et al. above). He also argued that although pauses and hesitations are natural characteristics of speech, in fluent speech they do not disrupt the flow of the message. In L2 learning, however, particularly in earlier stages of acquisition where language processes are still largely controlled, it is difficult to run different processes simultaneously without placing some kind of pressure on other resources and/or processes (Skehan, 1998). This is where the concept of automaticity becomes central to the acquisition and development of L2 speaking skill where the initial representations of knowledge can gradually change, as a result of practice, to become more fluent and effortless language skills.

Anderson's (1983) Adaptive Control of Thought model has been particularly useful for SLA research, offering the field significant implications for L2 learning particularly in instructional settings. According to Anderson (1983), automaticity in L2 acquisition is a process of development that starts from the controlled processing of declarative knowledge which with the help of repeated practice moves towards rapid and effortless processing of language. The gradual transformation of performance, from controlled to automatic processing, emerges from repeated practice and experience in terms of converting declarative knowledge to procedural knowledge over time. Gass et al. (2013) argue that although power of practice is central to the automatization process, other processes such as planning and monitoring also play an important role in facilitating automatization. Skehan (1998: 18) argues that the effective use of language, whether recognizing an alphabet letter, retrieving a word or producing long stretches of language, is naturally associated "with some ease and speed", and leads to automaticity. In similar vein, Segalowitz (2013) argues that the key differences between automatic and non-automatic processes are that a) automatic processes proceed faster, b) they consume little or no attentional resources, c) they occur in parallel with other processes, and d) they are ballistic in that once initiated they are unstoppable. To examine automaticity in SLA, researchers examine the underlying cognitive processing by considering criteria such as speed of processing in terms of reaction time, ballistic processing under dual task conditions, accuracy of response, and efficiency.

It is necessary to point out that automaticity is not simply an accelerated behaviour of faster performance of the same task after some practice. Skilled performance, also, reflects a qualitative change in a process which is performed effortlessly in time. Researchers often use two measures to evaluate automaticity: reaction time, that is, time required to execute the task, and error rate, namely the percentage of errors. In fact, researchers interpret a faster, and expectedly more accurate, response in task performance as a sign of automaticity. Hulstijn et al. (2009), however, warn researchers that fast processing should be distinguished from automatic processing. They argue that:

Fast processing is the speeding up of essentially all component processes that make up the execution of a task in the earliest stage of skill acquisition. Automatic processing, in contrast, is characterized by a reorganization, routinization, or bypassing of serial execution of component processes (p. 557).

Given the focus on oral fluency in this chapter, it is necessary to emphasize that automaticity in L2 speaking skill is often reflected through both *fluent* production and comprehension of L2 spoken language. Observing, evaluating and measuring fluency, in fact, provides researchers with an indication of the degree to which the underlying processes of speech production have become automatic; therefore, our interest in researching fluency in SLA is intertwined with automaticity as studying one would lead us to a better understanding of the other.

Skehan's influential contribution to conceptualising and measuring fluency

With the growing research interest in TBLT during the 1980s and 1990s, Skehan's research was central in helping develop a framework for measuring task performance in terms of syntactic complexity, accuracy, lexical complexity and fluency, what was later called the *CALF framework*. Indeed, Skehan was arguably the earliest proponent of an approach to examining and measuring language performance in which L2 output was evaluated in terms of how accurate, fluent and complex it was (Skehan, 1996, 1998, 2001, 2003). Skehan (2003: 8) argued that:

The complexity-accuracy-fluency dimensions of task performance have been justified both theoretically and empirically. Theoretically, the sequence implies the three stages of change in the underlying system (i.e., greater complexity, as more complex interlanguage systems are developed), acquisition of greater control over the emerging system (i.e., greater accuracy, as new interlanguage elements are used not simply haltingly and incorrectly, but instead with some reduction in error), and development of performance control, as elements are routinized and lexicalized (i.e., fluency).

Skehan (2009) argues that given the salience of meaning and the importance of getting the message across in communication, fluency is a priority although it competes with aspects of form, i.e., complexity and accuracy. He also assumes that by focusing on meaning speakers have more opportunities to practice fluency and become fluent. Although Skehan's work has been seminal in different areas in the field of task-based language teaching (TBLT), the focus here is his influential contribution in shaping the current understandings of fluency, leading researchers towards a more systematic measurement of fluency, and developing a framework for modelling L2 performance. For reasons of space Skehan's contribution is discussed in two different but interrelated dimensions linked with fluency: a) developing a more reliable framework for measuring fluency, and b) **understanding the** effects of task design on fluency.

A reliable framework for understanding and measuring fluency. Evaluating the representations of the concept of fluency in different theoretical perspectives, Skehan (1998) concluded that regardless of the theoretical approach taken, fluency needed to be carefully studied if a more reliable understanding and accurate measurement of L2 production and acquisitional processes was to be achieved. Arguing that a "comprehensive picture of performance in this area" (Skehan, 2003: 9) was needed, Skehan called for a finer-grained analysis of fluency so that different and what he referred to as "separate measures of fluency" can be examined. He also emphasized the need for a more reliable understanding of the relationship between fluency and other qualities of proficiency, such as syntactic complexity and accuracy. He contended that such measures should cover (a) silence (breakdown fluency), (b) reformulation, replacement, false starts, and repetition (repair fluency), (c) speech rate (e.g., words/syllables per minute), and (d) automatization, through measures of length of run. This initial proposal was in due course adopted and investigated by numerous researchers with the aim of finding out which measures captured the nature of fluency more clearly and consistently, how such measures related to one another, and in what ways they were linked with other aspects of

performance (e.g. accuracy, complexity and lexis). Tavakoli and Skehan (2005), for example, used 19 measures of fluency to examine the relationship between different aspects of fluency. Drawing on the data from 140 L2 learners performing four narrative tasks, they analysed fluency in terms of speed, break down, and repair measures highlighting robust and characteristic measures of fluency. In particular, Tavakoli and Skehan's (2005) factor analyses confirmed the presence of three distinct factors representing speed, breakdown, and repair aspects of fluency, adding support to Skehan's (2003) three-way distinction:

- Speed fluency, namely, the speed of performance in terms of number of words or syllables per minute
- Breakdown fluency, that is, pauses occurring in the speech stream
- Repair fluency, seen in terms of speaker's attempts to deal with processing problems such as repetition and reformulation

Discussing development of a model of L2 performance, Skehan (2009) continued to argue that "fluency needs to be rethought if it is to be measured effectively". In his further work on utterance fluency (2014), he made a distinction between the disturbances made to the flow of speech, for instance pausing and reformulations, and those made to the speed with which language is produced, such as speech rate. This distinction, in effect, groups breakdown and repair fluency measures under flow, and distinguishes them from speed measures. He based his argument on the emerging evidence that suggests some measures of fluency are inter-related, and as such can potentially cause an overlap among different measures of fluency (Kormos, 2006; Skehan, 2014; Tavakoli & Skehan, 2005). Another important contribution from Skehan's (2014) study was highlighting the implications of examining composite measures, that is those that blend speed and flow, for instance mean length of run. Skehan maintains that while composite measures are necessary to provide a full picture of fluency, researchers should be cautious when using composite measures as they combine pausing and speed aspects of fluency, and therefore a change observed in composite measures might have been caused either by pausing or by speed features of performance. In other words, composite measures can run the risk of introducing a confound into the analysis.

More recently, Skehan and Shum (2017) and Skehan, Foster, and Shum (2016) have proposed a realignment of the different aspects of fluency by making a distinction between measures of discourse fluency (i.e., pauses at clause boundary), clause fluency (i.e., pauses in mid-clause positions and repair fluency), and speed fluency. Skehan et al. (2016) report that while discourse fluency measures represent macroplanning processes, clause fluency indicates microplanning and is often linked to lexical problems encountered during L2 speech production processes. That is to say pauses occurring at AS-Unit boundaries are likely related to the processes involved in the conceptualization phase of language production, whereas pauses occurring within the AS-Units are implicated by the need for lexical choices and are therefore linked to the processes activated in the formulation stage of production. Clearly, while Skehan's work on these constructs is central to future research

in this area, more research is needed to shed light on the complex nature of L2 learners' pausing behaviour and repair processes. In the next section, Skehan's contribution to understanding the effects of task design on fluency will be discussed.

Understanding the effects of task design on fluency.

Over the past two decades, a growing body of research evidence suggests that fluency is a reliable measure of language performance, predicts language proficiency, and indicates communicative adequacy (de Jong et al., 2012; Révész et al., 2016). Drawing on such research findings, researchers and professionals show more interest to use fluency as a representation of language proficiency. However, researchers need to note that fluency is affected by a range of factors including task design, task conditions, and contextual factors. In this regard, Skehan argued that task design influences language performance and language learning as it potentially interacts with both the cognitive processes required during task performance and attentional resources available to individual learners. Drawing on a number of studies he conducted during the 1990s and 2000s, Skehan suggested that the inter-relationship between cognitive demands of the task, attentional resources available to L2 learners and task design has predictable effects on fluency (Skehan, 2003, 2009, 2014, 2015). In particular, when a task is more demanding, for instance in terms of its cognitive load, linguistic demand, or time pressure, it directs learners' attentional resources in specific ways that promote performance and/or the learning that emerges from it in one or more of the CALF dimensions. By the same token Skehan argued that task design could equally limit opportunities for learning and have a negative impact on task performance and/or the learning that is associated with it. For instance, when a task is cognitively demanding or perceived as too complex and/or difficult, this will also impact on learners' perceptions of task difficulty. Task design may be particularly important for learners at lower levels of proficiency whose language processing is still not automatic and therefore have less attentional resources available for attending to L2 form and meaning simultaneously. Skehan (2014) argued that while learners' priority is to communicate meaning, they need to develop speech skills for gaining control over their output, that is the skills they need to produce "correct language fluently, without excessive interruptions to flow" (Skehan, 2014: 2). The bottom line in Skehan's argument is that in order to achieve learners' optimal capacity and to promote their potential in developing automatic language skills, task design plays a central role. To give more specific information about task design features that affect fluency, Skehan (2014) contends that fluency improves when tasks:

- are based on familiar or personal information
- are performed when pre-task planning time is available
- have a clear structure

For similar reasons, according to Skehan (2014) fluency is negatively affected when tasks:

- impose high cognitive demands, for example by imposing dual task conditions, on the learners

- impose high linguistic demands, such as a need for low frequency lexical items, on the learners
- include time pressure or communicative stress

An important corollary of the above discussion for second language teaching and learning is that it is possible to design, develop and implement tasks that can channel learners' attention in specific ways and different directions during language processing and production that are deemed to promote acquisition. The key claim here is that task design encourages learners to prioritize different aspects of language production during the process of real-time task performance (Ellis, 2009; Skehan, 2001). Skehan (2003) contended that manipulating task design features can help develop tasks at an appropriate level of difficulty so that they lead learners to produce language of higher accuracy, fluency or complexity. He maintained that use of carefully designed tasks helps teachers prevent learners from focusing on forms, encouraging them to extend their use of language to express their intended message in a meaningful and communicative way (Skehan, 2001).

Directions for future fluency research

As indicated above, Skehan's work on fluency has expanded our understanding of the construct of fluency, broadened our views on how to measure fluency, directed our attention to the relationship between fluency and other aspects of performance, and raised our awareness of how fluency is affected by task type and task design. Therefore, it seems plausible to claim that the contribution of Skehan's work goes beyond SLA research to inform research in areas such as second language teaching, syllabus design and language testing, among others. While underlining the contribution of Skehan's work and the impact it has had on shaping the current conceptualisation of fluency, it seems appropriate to assert that research in fluency still needs to develop further if a thorough understanding of the complex nature of fluency is to be arrived at. What we have observed in researching fluency so far, although highly valid and extremely valuable, is limited to a cognitive and psycholinguistic perspective in which fluency is examined mainly with regard to L2 processing and L2 production perspectives. Research into fluency will however need investment of time and effort to investigate fluency in new directions including the social and cultural aspects of language use. For instance, our knowledge of whether fluency is affected by the type of speech acts or the communicative functions of a task is still rather restricted. We need to know whether similar patterns of behaviour are observed in speech acts of varying functions, or whether speakers' patterns of fluency change when involved in a rather different social setting. From L1 experience, for example, we know that expressing apology or condolence may be inherently slower in pace and more repetitive in nature than introducing a speaker at a conference. **Future research should also consider the possible effects of group relations and social expectations on fluency.** The other area fluency research needs to focus on is examining the cultural norms for what is perceived as fluent by different discourse communities. Research has shown that in English a pause of longer than 0.25 a second is considered as disruptive to the flow of speech (de Jong et al., 2012), but we do not know if the same pause-length is universally acceptable across different languages and cultures. It would also be useful to know if speakers from different language

backgrounds, age groups, and social classes have the same fluency norms. Thus in conclusion, the constructs Skehan has done so much to reveal and establish would be enriched by further applying testing them in relation to these broader directions and across a range of different languages and cultures

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