

**Phonic variation in L2 Spanish fluency:
Exploring the connection between oral production and cognitive abilities**

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Research on second language (L2) oral production, and specifically on L2 *fluency*, investigates the factors that influence the way speech is produced by speakers and perceived by listeners, including temporal variables of speech such as syllable duration (e.g., Lennon 1990), as well as perturbations in the speech chain, such as filled pauses (*uh, um*) and silent pauses (stretches of time without linguistic content or vocalizations of any kind). Segalowitz (2010) distinguishes three types of fluency for second language learners: utterance fluency (acoustic measures of speech); cognitive fluency (the efficiency of a speaker's planning process); and perceptual fluency (inferences about cognitive fluency based on the perception of the different components of utterance fluency). A central question in L2 fluency research is the extent to which a connection exists between utterance fluency and cognitive fluency, in order to understand how efficiently learners can plan and articulate speech (e.g., Segalowitz & Freed 2004). One approach for understanding the underlying mechanisms behind a learner's fluency development is to study working memory (WM), which is the combination of attentional resources necessary to process and store a learner's metalinguistic insights into an L2. Previous research suggests a positive relationship between high WM and L2 development (Kormos & Trebits 2011), especially for study abroad learners (e.g., Sunderman & Kroll 2009). In this presentation I explore the extent to which WM abilities predict variation and development in second language fluency patterns.

I collected data from 40 English-speaking L2 learners of Spanish (34 female, 6 male) who participated in a 6-week study abroad program in Salamanca, Spain. All learners completed a video retell task at the beginning (Time 1) and end (Time 2) of their experience abroad, as well as five WM tasks at Time 1. The automated WM tasks were: operation span (1); reading span (2); listening span (3); digit span (backward and forward) (4) and running span (5). To measure utterance fluency, I calculated a series of metrics (based on acoustic analysis of learner data) to account for two aspects of utterance fluency distinguished by Tavakoli & Skehan (2005): *speed fluency*, for which I calculated articulation rate (1) and mean syllable duration (2); and *breakdown fluency*, for which I calculated the duration of silent pauses (3) and filled pauses (4), as well as the rates of silent pauses and filled pauses per second (5). In addition I calculated three global measures, including speech rate in syllables/second (6), phonation time ratio (7), and mean length of run (8). For each measure, I then calculated a normalized score to account for fluency development over time: $(T2-T1)/T1$.

The findings show that, first, fluency development was apparent for learners in *speed* and *breakdown* fluency over the course of the abroad experience. Second, I found 12 (of 40) significant correlations between the fluency metrics and the WM scores. For example, I found positive correlations between operation span and the normalized differences for speech rate and mean length of run. I also found negative correlations between reading span and the normalized differences for speech rate and articulation rate. All in all, these findings suggest that although WM is a complementary aspect of L2 cognitive fluency (given the competing sources of information in L2 acquisition), it shows important significant correlations with longitudinal differences in learners' oral production. The results therefore support the notion that WM resources represent a cognitive factor that affects the phonic variation in L2 speech related to utterance fluency.

Selected references

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