Phonological Memory Predicts Second Language Oral Gains in Adults

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Recent research has stressed the importance of phonological short-term memory (PSTM) in children's first (L1) and second (L2) language acquisition (Baddeley, Gathercole, & Papagno, 1998). Indeed, Baddeley et al. (1998) have called PSTM a language learning device. Although PSTM has also been shown to be implicated in L2 learning by adults, adult studies have tended to look at experimental word learning in the laboratory over one or two sessions (see Baddeley et al., 1998). The goal of the present study was to examine the role of PSTM in other areas of L2 learning, namely gains in oral proficiency and fluency made by adults outside the laboratory and over a longer time period.

Method

Participants were 25 L1 English speakers studying Spanish in Spain (aged from 19-25, M = 20.68). PSTM was assessed in English at the start and end of a 13-week semester (Time-1, Time-2) using serial non-word recognition. Participants were interviewed at both times and four-minute extracts from the interviews were analyzed for pre- and post-test measures of proficiency and fluency in Spanish. Proficiency (overall evaluation of oral ability) included the following two measures -- number of words spoken in the extract (TotalWords), and number of words in the longest turn (Turn) reflecting ability to "hold the floor" while speaking. Fluency (fluidity, smoothness of speech) included the following four measures -- speech rate in words per minute (Rate), absence of hesitations (HesitFree) expressed as the mean run length in words containing no silent pauses longer than 400 ms, absence of filled pauses (FillerFree) expressed as the mean run length containing no filled pauses (ah, um, etc), and longest run containing no silent or filled pauses (FluentRun) (Freed, 1995).

Results

Table 1 shows cross-lagged correlations between PSTM and oral performance. PSTM-1 (PSTM at Time-1) was significantly correlated with two oral proficiency measures at Time-2 (TotalWords and Turn) and two out of four oral fluency measures at Time-2 (FillerFree and FluentRun). Moreover, three of these correlations (TotalWords, Turn and Filler-Free) were significantly greater than the nonsignificant reverse correlations between PSTM-2 (PSTM at Time-2) and these measures at Time-1. To see if PSTM-1 predicted oral *gains*, partial correlations between PSTM-1 and oral performance at Time 2 were calculated controlling for oral performance at Time 1 (shown in parentheses in Table 1). PSTM-1 predicted *gains* in 5 out of 6 oral measures. The reverse partial correlations were not significant.

Table 1: Simple and partial correlations (controlling for Time-1 performance; shown in parentheses)

Oral measures	PSTM-1 & Oral-2	PSTM-2 & Oral-1
TotalWords	.400* (.434*)	-.026^{+} (-.097)
Turn	.461* (.501*)	-.073^{+} (-.009)
Rate	.298 (.414*)	-.053 (-.004)
HesitFree	.155 (.215)	.163 (.230)
FillerFree	.434* (.476*)	.022^{+}(.046)
FluentRun	.390* (.379*)	.116 (.040)

*$p < 0.05$ (1-tailed); $^{+}p < 0.05$ (2-tailed), significantly different from the corresponding PSTM1-Oral2 correlation.

Discussion

This study found that phonological short-term memory predicted gains in L2 oral proficiency and fluency over a 13 week period. These results speak to the role of PSTM as a language learning mechanism by providing evidence that, in addition to vocabulary acquisition (Baddeley et al., 1998), it plays a role in fluency-related oral gains by adults over the long-term. The cross-lagged correlations suggest that PSTM may play a causal role in L2 oral skill acquisition.

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