INDIVIDUAL DIFFERENCES IN LANGUAGE ATTAINMENT AND IMPLICIT LEARNING ABILITIES: EVIDENCE FROM MINIATURE LANGUAGE LEARNING

Tianqi Wu (Xi'an Jiaotong University), Zhenguang Cai (The Chinese University of Hong Kong) & Min Wang (Xi'an Jiaotong University)
wtq199639@stu.xjtu.edu.cn

A good deal of second language (L2) acquisition happens incidentally and L2 learners vary enormously in their ability to pick up different linguistic features (VanPatten & Williams, 2007). While numerous studies have suggested that such variation is associated with individual differences in implicit learning, it still remains unclear whether implicit learning ability plays a predictive role in L2 learning (Conway et al., 2010). Moreover, recent work has argued that the commonly used instrument (e.g., statistical learning tasks) for assessing implicit learning ability may not reliably measure the individual differences (Arnon, 2019). This study adopted priming paradigm, which is regarded as a form of implicit learning, to assess implicit learning ability.

We investigated whether implicit learning ability as measured by lexical and syntactic priming can predict corresponding performances (i.e., vocabulary and syntax) in learning an artificial language. 61 native Chinese speakers (aged 17–21, M=19.1, SD= .8) were recruited, who were first- or second-year non-language majors with no knowledge of Uygur language (the language our miniature language system was based on). The whole experiment comprised three sections including (1) a cognitive test, (2) a priming test, and (3) an artificial language training session followed by a test.

In (1) cognitive test, participants were tested for working memory, using the complex operation span task (Unsworth et al., 2005), a mouse driven and self-scored task measuring working memory capacity; nonverbal IQ, using Raven's progressive standard matrices (Raven, 1998), a 60-item test measuring abstract reasoning for ages 5.5 upward. In (2) priming test, participants alternated between matching (i.e., deciding whether a recorded description matched a picture) and describing pictures in mandarin (i.e., their L1). For lexical priming, experimental items comprised a target that could be named with both a favored and a disfavored description–the scripted recordings consisted of disfavored names exclusively; for syntactic priming, the experimental item was either a prepositional-object (PO) or dative-object (DO) construction. Participants were primed if they repeated the prime word or syntactic structure of the prime sentence.

In (3) artificial language learning and testing, participants took a 5-day online training on 20 artificial words (e.g., *axpaz* [CHEF]) and 2 alternating transitive constructions referred to as TE and TL respectively (**Table 1**). Participants were randomly assigned to two learning groups with TE-group (N=30) receiving TE dominant input (64% TE) while TL-group (N=31) receiving TL dominant input (64% TL). In testing session, participants were provided with Chinese meanings of the 20 artificial words and 25 event pictures that could be described using either TE or TL, and were asked to orally produce the words and describe the pictures using the artificial language. Lexical learning performance was assessed based on lexical accuracy (proportion of correct lexical items). Syntactic learning performance was measured based on syntactic accuracy (proportion of grammatically correct syntactic items) and fidelity (i.e., TE proportion difference between input and output).

There was a significant correlation between lexical priming and lexical accuracy (r = .54, p < .001), but no significant correlation between syntactic priming and syntactic accuracy or fidelity. Multiple linear regression results (see **Table 2** and **3**) indicated that both lexical priming (p < .001) and syntactic priming (p < .05) could significantly predict lexical accuracy, but only lexical priming could significantly predict syntactic accuracy (p < .01). As for cognitive capacities (WM and IQ), only WM could marginally predict lexical accuracy, whereas neither IQ nor WM could predict syntactic learning performance. Overall, these results indicated that individuals who were more susceptible to lexical priming tended to exhibit a better performance in learning both vocabulary and syntax of a new language.

Table 1. TE and TL construction

Tool-Early (TE)	**Agent Tool-ni Patient-da Verb** e.g., axpaz miwa-ni ogri-da toryuk (chef banana-with burglar poke) The chef poked the burglar with a banana.
Tool-Late (TL)	**Agent Patient-da Tool-ni Verb** e.g., axpaz ogri-da miwa-ni toryuk (chef burglar banana-with poke) The chef poked the burglar with a banana.

Table 2. Regression results for lexical accuracy

Variable	Unstandardized coefficients		Standardized coefficients	t	*p*
	B	SE	Beta (β)		
Working memory	.002	.001	.212	2.000	.050
IQ	.00004	.003	.001	.012	.990
Lexical priming	.532	.114	.497	4.682	1.85e-05
Syntactic priming	.230	.110	.228	2.097	.041

Note: Constant= -.185, F (4, 56) = 8.805, p<.001, R^2 =.386

Table 3. Regression results for syntactic accuracy

Variable	Unstandardized coefficients		Standardized coefficients	t	*p*
	B	SE	Beta (β)		
Working memory	.006	.003	.215	1.817	.075
IQ	.017	.010	.211	1.751	.085
Lexical priming	.976	.327	.353	2.984	.004
Syntactic priming	.087	.316	.033	0.277	.783

Note: Constant= -1.262, F (4, 56) =4.356, p<.01, R^2 =.237

References

[1] Arnon (2019). *Topics in cognitive science*; [2] Conway et al. (2010). *Cognition*; [3] Raven. (1998). Oxford Psychologists Press; [4] Unsworth et al. (2005). Behavior research methods; [5] VanPatten (2007). New York: Routledge.