Individual Differences In Learning Foreign Language Words

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What affects our ability to learn foreign language words?

With globalization processes, the need to learn a foreign language becomes relevant to more and more individuals. For some, the learning process may be more challenging than for others. Previous research has indicated that both learner and word characteristics might account for such differences in learning difficulty.

Word characteristics

- Some word-types are easier to learn than others (e.g., concrete words, de Groot & van Hell, 2005, for review see Degani & Tokowicz, 2010).
- Critically, translation-ambiguous words create difficulty in learning over translation-unambiguous words (e.g., Degani & Tokowicz, 2010)

Learner characteristics

- Phonological Short Term Memory (Phonological STM) as well as Working Memory (WM) modulate learning of words and grammar of an artificial language (Martin & Ellis, 2012).
- Enhanced abilities of visual Statistical Learning (SL) are linked to improved visual word recognition in a second language (Frost et al., 2013).

The Current Study

Does the mapping across languages influence learning of foreign language words?

Do individual differences in cognitive abilities make a difference?

Word characteristics

Four different word types were included:

	DT	ST	JT	SPT
Arabic Lexical Form	زهرة	شوكة	كسر	قنبلة رمان
Meaning Representation	🌼		½ ⅓ ¼	
Hebrew Lexical Form	פרח	מזלג קוץ	שבר	רימון

- **Different Translation** (**DT** condition): unambiguous Arabic words with a single translation in Hebrew
- **Shared Translation** (**ST** condition): ambiguous Arabic words with two Hebrew translations, each corresponding to a different meaning
- **Joint Translation** (**JT** condition): ambiguous Arabic words with a single translation in Hebrew that encompasses the same two meanings
- **Split Translation** (**SPT** condition): ambiguous Hebrew words with two Arabic translations, each corresponding to a different meaning

Learner characteristics

Four different individual difference measures were collected:

- **Phonological STM:** Non Word Repetition (e.g., Yoo & Kaushanskaya, 2012)
- **Verbal WM:** Number-Letter Sequencing (e.g., Crowe, 2000)
- **SL abilities:** Auditory Statistical Learning (Frost et al., 2013)
- **Hebrew (L1) Proficiency:** Phonemic and Semantic Fluency (Kave, 2005)

Method

Participants

30 native Hebrew speakers

Stimuli

96 Arabic words:
- **48** DT condition words
- **12** ST condition words
- **12** JT condition words
- **24** SPT condition words

Each participant learned **64** Arabic words

Training Cycle 1.

Arabic word learning

Learning took place in 2 sessions using two types of learning trials
Cycle 1: repeat Arabic word after hearing it (see procedure above)
Cycle 2: attempt to produce Arabic word before hearing it (Kang, Gollan & Pashler, 2013)

Overall Procedure

Session 1	Session 2	Session 3	Session 4
Hebrew Semantic Relatedness	Training Cycle 2	L2-L1 Translation Production	L2-L1 Translation Production
Training Cycle 1	Ravens	Auditory SL	Number-Letter Sequencing
Training Cycle 2	L2-L1 Translation Production	Translation Recognition	Translation Recognition
Non-word repetition	Phonemic & Semantic Fluency	L1-L2 Translation Production	L1-L2 Translation Production
L2-L1 Translation Production			Hebrew Semantic Relatedness
Language History Questionnaire			Arabic Meaning Recognition

Tests

Arabic Learning:

Translation Recognition - timed judgment whether a Hebrew word is a correct translation of an Arabic word (yes/no).

Translation Production - timed production of an Arabic translation to a Hebrew word (L1->L2), or of a Hebrew translation to an Arabic word (L2->L1).

Translation Recognition

L2-L1 Translation Production

L1-L2 Translation Production
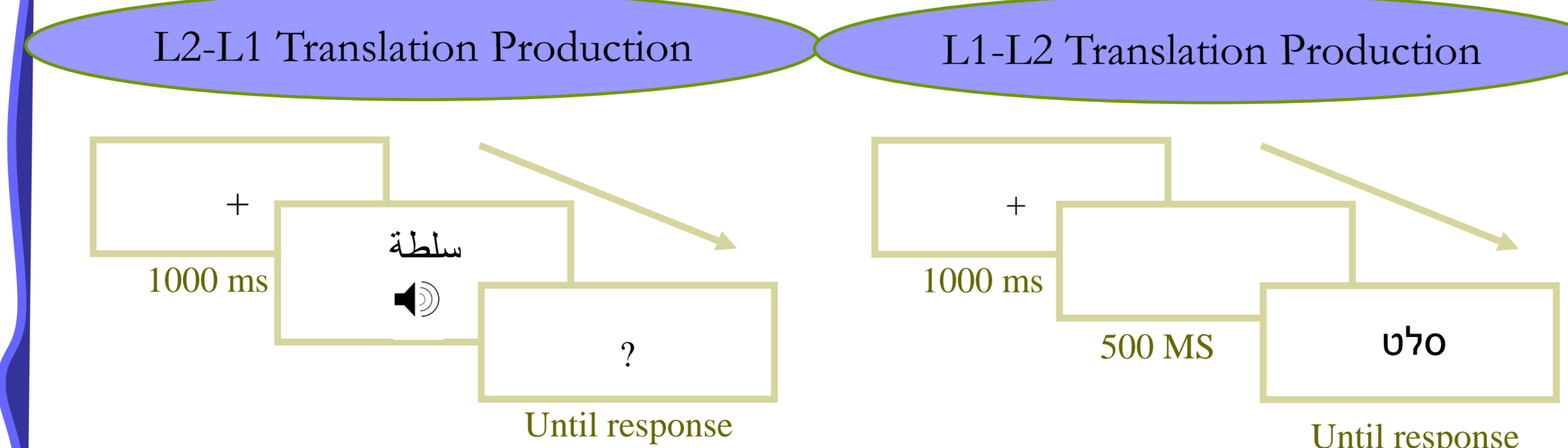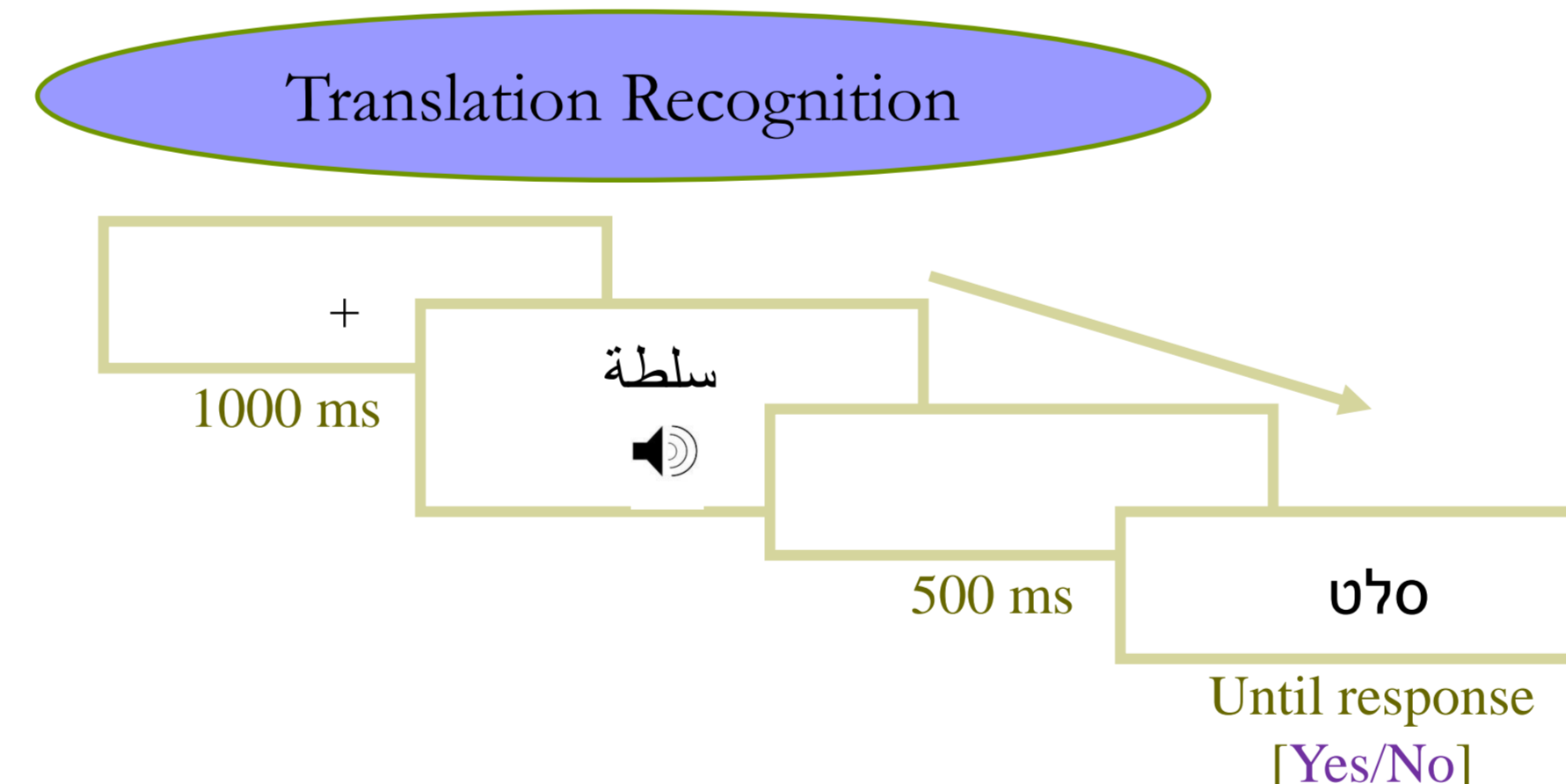
Individual Differences [examples]:

Task	Instructions	Expected Response
Non-Word Repetition	"דוז-מל"	"דוז-מל"
Number-Letter Sequencing	"1-מ-7-ג"	"7-1-ג-מ"
Auditory SL	"אי-מה-פה-דו / אה-נו-אי-רה"	ראשון / שני
Phonemic Fluency	מילים המתחילות ב"ג"	"גינה, גולם, גר, גור, גיר....."
Semantic Fluency	מילים בקטגוריית "בעלי חיים"	"ארנב, כלב, חתול, פיל..."

Results

- **Correlations among individual differences in cognitive abilities:**
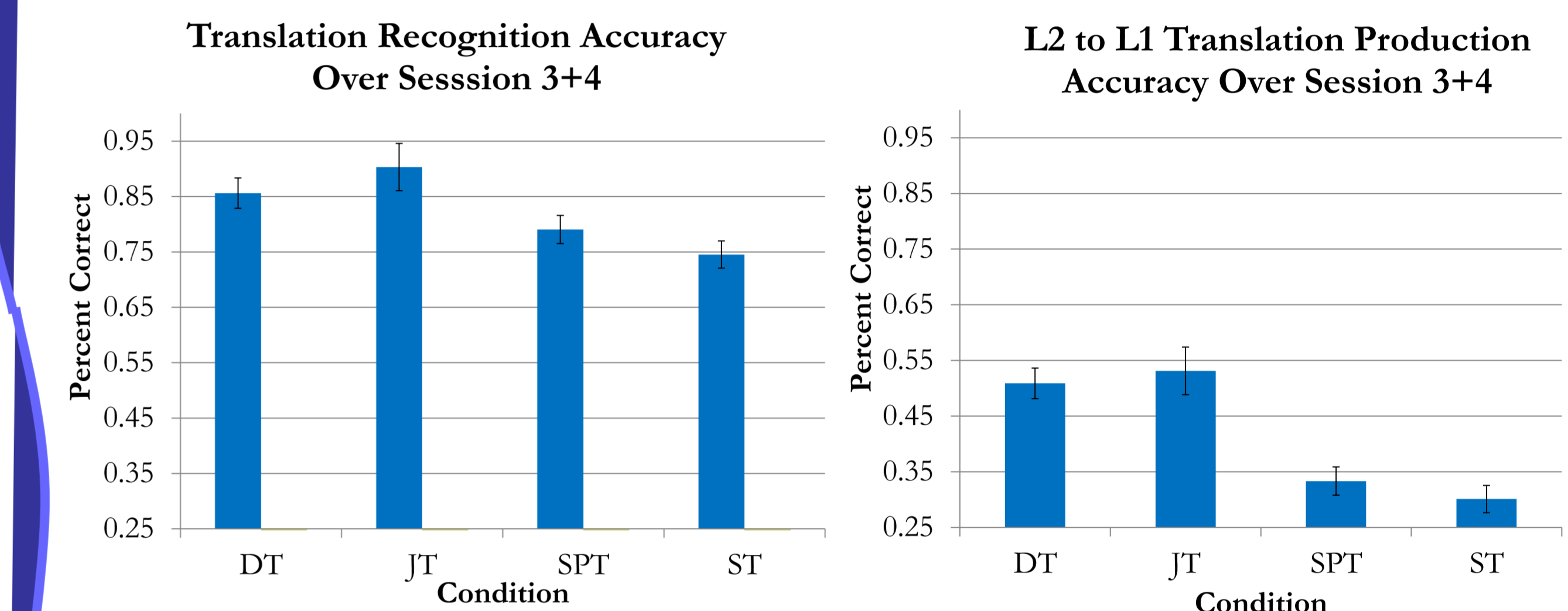 - Memory measures: Phonological STM correlated with WM span (r=.431)
  - Proficiency in the L1 (Hebrew) correlated with WM span (r=.414)
  - Statistical Learning abilities correlated with age (r=.408)

- **Learning over time (across sessions):**
  - Marginal improvement in total Accuracy for L2->L1 production ($M_{Session3}$=.42, $M_{Session4}$=.43)
  - Significant improvement in total RT for L2->L1 production ($M_{Session3}$=988ms, $M_{Session4}$=909ms)

- **A condition effect:**
  - Accuracy in DT and JT was higher than Accuracy in ST and SPT, in all learning measures

Translation Recognition Accuracy Over Session 3+4

L2 to L1 Translation Production Accuracy Over Session 3+4

- **Modulations of condition effect by individual differences:**
  - Session 4, L2->L1 Production: WM span with RT of SPT (r=-.378)
  - Session 4, Translation Recognition: Phon. STM with d prime (r=.397)
  - Session 4, L1->L2 Production: Phon. STM with Acc. of DT (r=.421)

Summary

- Various individual difference measures tap non-overlapping constructs, because only few correlations emerged across measures (e.g., memory tasks)
- Successful learning of Arabic words, improvement over time, from Session 3 (1 week after learning) to Session 4 (3 weeks after learning).
- Translation mapping across languages influenced learning. Specifically, items in the DT and JT were learned more successfully than items in the ST and SPT conditions. Thus, a one-to-one mapping between Hebrew (L1) and Arabic (L2) words resulted in better learning than one-to-many or many-to-one mappings.
- Individuals with larger phonological STM exhibited better learning as measured by their accuracy and sensitivity (d prime) after a delay.
- Further, individuals with larger WM span exhibited some learning advantages for translation ambiguous items.

Future Directions

- Examine whether individual differences in cognitive abilities modulate the trajectory (speed) of learning by looking at performance during Sessions 1&2.
- Examine whether multilingual Russian-Hebrew speakers perform differently from the native Hebrew speakers?

References

De Groot, A. M. B., & Van Hell, J. G. (2005). The learning of foreign language vocabulary. In Kroll & De Groot (eds.), pp. 9–29.

Degani, T, & Tokowicz, N. (2010). Ambiguous words are harder to learn. *Bilingualism: Language and Cognition, 13*, 299– 314.

Martin, K. I., & Ellis, N. C. (2012). The roles of phonological short-term memory and working memory in L2 grammar and vocabulary learning. *Studies in Second Language Acquisition, 34*, 379-413.

Frost, R., Siegelman, N, Narkiss, A., & Afek, L. (2013). What predicts successful literacy acquisition in a second language? *Psychological Science, 24*, 1243-1252.

Yoo, J., & Kaushanskaya, M. (2012) Phonological memory in bilinguals and monolinguals. *Memory and Cognition, 40*, 1314-1330.

Crowe, S. F. (2000). Does the letter number sequencing task measure anything more than digit span? *Assessment, 7*, 113-117.

Kavé, G. (2005). Phonemic fluency, semantic fluency, and difference scores: Normative data for adult Hebrew speakers. *Journal of Clinical and Experimental Neuropsychology, 27*, 690- 699.

Kang, S. H. K., Gollan, T. H., & Pashler, H. (2013). Don't just repeat after me: Retrieval practice is better than imitation in foreign vocabulary learning. *Psychonomic Bulletin & Review, 20*, 1259-1265.