

Age of acquisition effects on automatic magnitude estimation in ASL

Number Stroop Effect (NSE)¹ - Which number is larger?

COMPARISON REQUIRED	TYPE OF STIMULUS	
	SEMANTIC	PHYSICAL
CONGRUENT	5 3	3 3
NEUTRAL	5 3	5 5
INCONGRUENT	3 5	3 5

- **Facilitation:** faster reaction times (RT) for congruent stimuli
- **Interference:** slower RT for incongruent stimuli
- Size comparison usually faster.

NSE in digits: strong, present in adults & children of various backgrounds and cultures, but facilitation depends on experience with numbers.

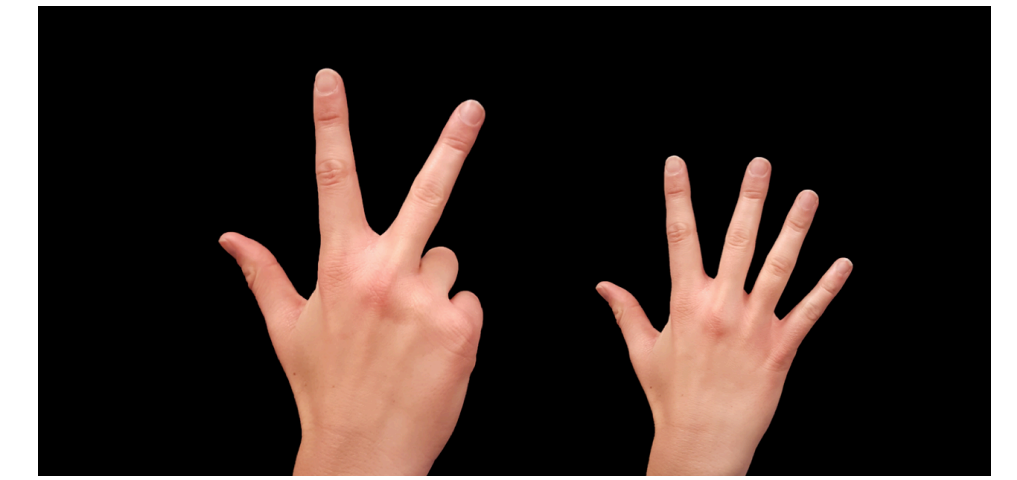
NSE with number words: language-specific, depends on the phonological transparency of a language²⁻⁴. NSE in phonologically opaque or ideographic systems. No effect in transparent system.

NSE in ASL : mixed results
NSE was found in the study using only not iconic number signs (6 – 9) presented sequentially⁵, wasn't found in a study using only not iconic number signs (1 – 5)⁶ presented simultaneously.

- Why?**
- Impact of iconicity?
 - Impact of age first language of acquisition (AoA)?
 - Study design difference?

OUR STUDY:

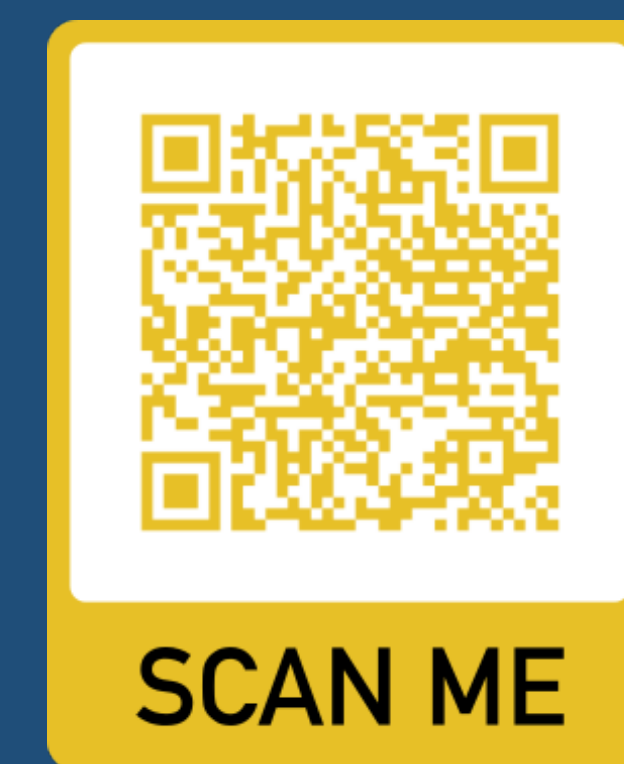
- Iconic & non-iconic number signs
 - 3 groups of participants: native (L1, N = 7), second language learners (L2, N = 12, mean AoA = 16), late first language learners (LL1, N = 11, mean AoA = 17.7)
- Conditions:** number & size
2 blocks: ASL & digits (136 trials each block; randomized)
Distance between numbers = 2 (for example, 3 5, 4 6); numbers 2 – 9.



Number Stroop Effect patterns in ASL are different from those of Arabic digits.

Delayed 1st language acquisition impacts processing of both number signs and digits:

- Slower RT
- Late learners are more affected by task switch cost
- Stronger interference of irrelevant information.

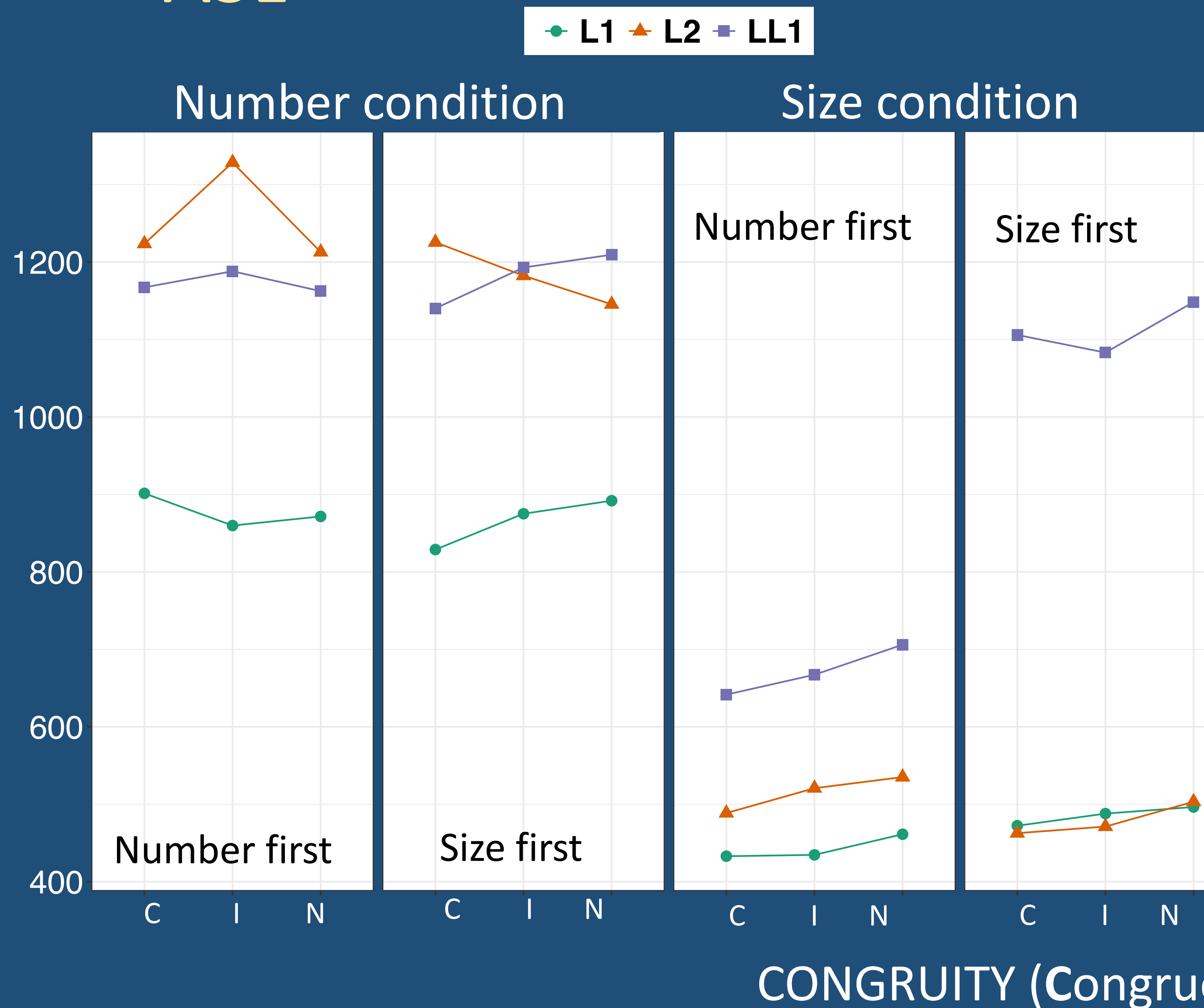


QR/link to the video presentation (English w/ CC or ASL)

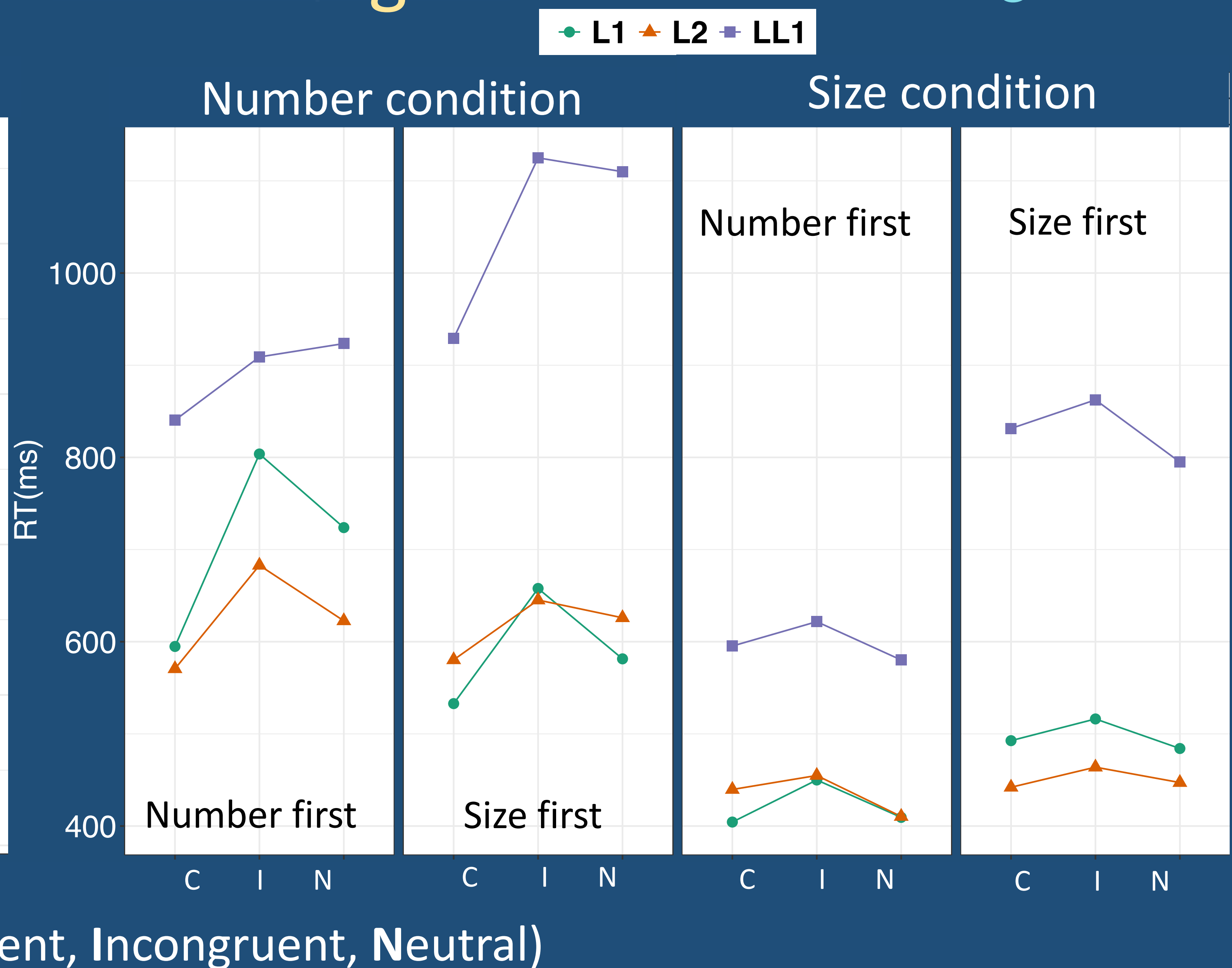
<https://bit.ly/36562a2>

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ASL



Arabic digits



Digits

- NSE significant in all groups
- L1 and L2 are similar in RT and RT patterns
 - LL1 are significantly slower
 - Task order effect significant in all groups, but most prominent in LL1, suggesting task switch cost in number condition.
 - Number interference in size task is especially prominent in LL1, when size condition goes first.

ASL

- Congruity effect significant, but different from classic NSE:
- neutral pairs tend to show longest RTs in size condition.
 - varied patterns in number condition, when it goes first.
 - In number condition, L2 pattern differently from L1 and LL1.
 - Number interference is especially prominent in LL1, when size comparison goes first.
 - Significant variation between subjects in all groups.

DISCUSSION

- No canonical NSE in ASL: due to phonological component in processing of ASL number signs?
- High individual difference: different strategies of ASL number processing?
- Impacted automatic number processing in LL1 (linguistic and by digits) → mathematic underachievement of LL1 signers?

References:

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Icons: <https://thenounproject.com>

