Syntactically-constrained semantic prediction in L1 and L2 speakers

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Background

- L2 speakers use semantic cues to predict upcoming input during language comprehension (e.g., Chambers & Cooke, 2009; Chun et al., 2021; Dijkgraaf et al., 2017; Hopp, 2015; Ito et al., 2018)
- Is semantic prediction due to:
  - **Prediction-by-Association** (automatic and shallow, "bag of arguments"; Chow et al. 2016)
  - **Prediction-by-Production** (involving structural representations; Pickering & Garrod, 2013)

RQ: Does syntax constrain L2 semantic prediction or is it guided purely by semantic association?

→ SVO vs Verb-Second word order in German in intransitive and transitive sentences

Materials

SVO sentences

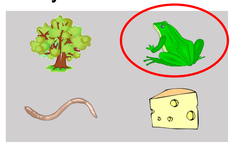
Simone$_{SUB}$ füttert$_{V}$ täglich den Hund$_{OBJ}$ im Garten.(constraining-vb)
Simone feeds daily the dog in the garden

Simone$_{SUB}$ soll$_{Vmod}$ täglich den Hund$_{OBJ}$ im Garten füttern$_{V}$.(neutral-vb)
Simone should daily the dog in the garden feed
"Simone feeds/should feed the dog daily in the garden."

AdvVS sentences

Im Sommer springt$_{V}$ täglich der Frosch$_{SUB}$ ins Wasser.(constraining-vb)
In summer jumps daily the frog into the water

Im Sommer wird$_{Vmod}$ täglich der Frosch$_{SUB}$ ins Wasser springen$_{V}$.(neutral-vb)
In summer will daily the frog into.the water jump
"In summer the frog will jump/jumps into the water daily."



AdvVSO-transitive sentences

In der Nacht erschießt$_{V}$ plötzlich der Jäger$_{SUB}$ einen Tiger im Dschungel.(const.-vb)
In the night shoots suddenly the hunter the tiger in.the jungle

In der Nacht muss$_{Vmod}$ plötzlich der Jäger$_{SUB}$ einen Tiger im Dschungel erschießen$_{V}$.
In the night must suddenly the hunter the tiger in.the jungle shoot
"At night the hunter shoots/must shoot the tiger suddenly."

Experiment 1

Experiment 2

EXPERIMENT 1

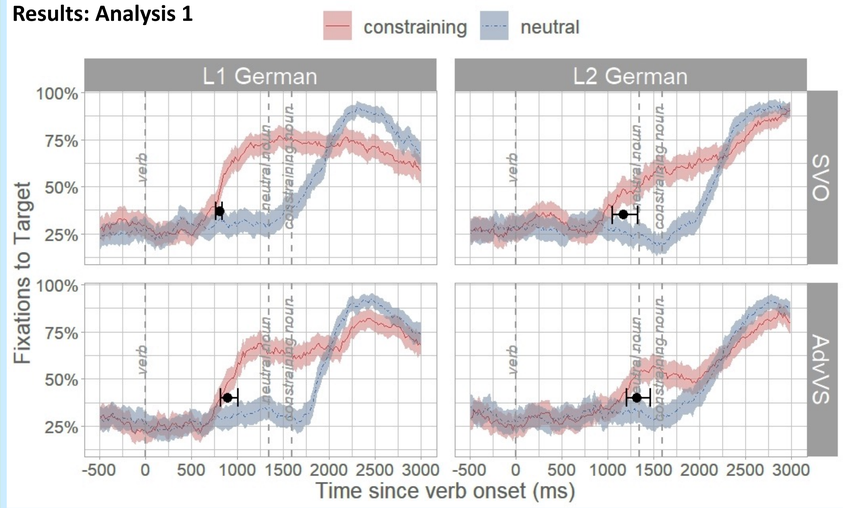
Semantic prediction in non-canonical sentence contexts (intransitive verbs):

RQ: Do L2 learners make semantic predictions even in L2-specific word order contexts , i.e. AdvVS sentences with Verb Second?

Participants

- **32 L1 German speakers**
  - Age: *M* = 22.4 (range: 20-26)
- **32 intermediate to advanced L2 German speakers**
  - 27 L1 English; 5 L1 other (Mandarin, Span., Russian)
  - Age: *M* = 21.7 (range: 18-31)
  - L2 prof. score (out of 30): *M* = 17 (range: 9-28)

Results: Analysis 1



Divergence Point Analysis (Stone et al., 2021):

- L1 and L2 speakers: Divergence points reliably before target noun onset for both word orders
- L1 vs L2 difference in divergence points similar for both word orders:
  - L1 minus L2: SVO: -362ms [CI: -510, -255]
  - L1 minus L2: AdvVS: -424ms [CI: -595, -272]
- L2 speakers engage in semantic prediction regardless of word order, even when this word order does not exist in their L1

- **Open questions:**
  - Are anticipatory looks in AdvVS sentences driven primarily by semantic association (Chow et al., 2016; Kukona et al. 2011) or
  - Are L1 and L2 speakers engaging in structure-based prediction?

→ **Experiment 2**

Conclusions

- Experiment 1: L2 learners semantically predict in L2-specific non-canonical sentence contexts
- Experiment 2: Evidence to suggest semantic prediction is syntactically constrained

→ L2 speakers can engage in syntactically-constrained semantic prediction that goes beyond prediction-by-association

Open questions:

- Does semantic prediction proceed via semantic roles (i.e. agent before patient) or syntactic function (i.e. subject before object)?
  (1) At Halloween frightened/feared the witch/the girl the girl/the witch.

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EXPERIMENT 2

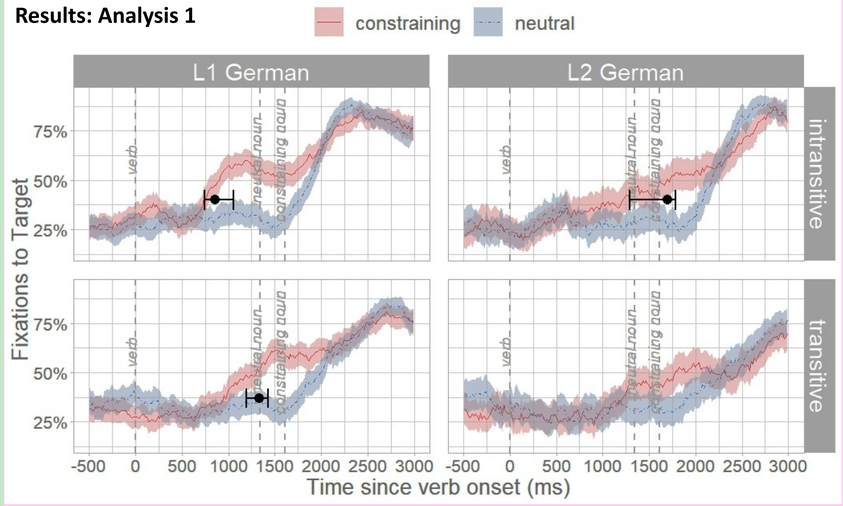
Associative vs. structurally-constrained semantic prediction with transitive verbs:

RQ: Do L2 learners predict the syntactically required referent or any semantically related referent?

Participants

- **34 L1 German speakers**
  - Age: *M* = 22.1 (range: 20-27)
- **22 intermediate to advanced L2 German speakers (so far)**
  - 18 L1 English; 4 L1 other (Arabic, Port., Konkani, Span.)
  - Age: *M* = 22.4 (range: 18-34)
  - L2 prof. score (out of 30): *M* = 18.6 (range: 10-26)

Results: Analysis 1



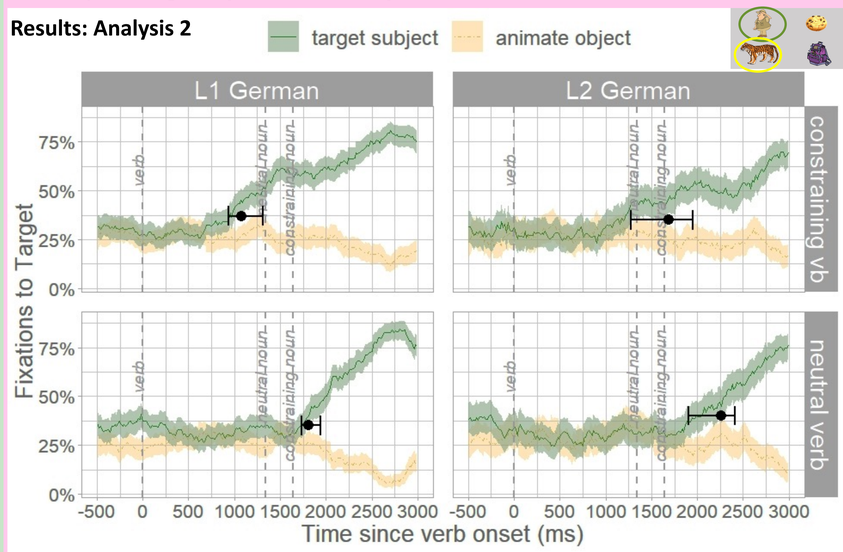
Divergence Point Analysis:

- L1 speakers: Divergence points similar to Exp. 1
- L2 speakers in intransitive sentences: Divergence point later than in Exp. 1, but within range of 200ms of target noun onset in constraining sentences
- L2 speakers in transitive sentences: No reliable divergence point

- Is this evidence of associative ("bag of arguments") processing in L2 speakers?
  - Analysis 1: Looks to target noun in constraining vs. neutral sentences. This cannot tease apart looks to target subject vs. animate object noun.

→ Analysis 2: Target subject vs. animate object noun in AdvVSO sentences

Results: Analysis 2



Divergence Point Analysis:

- L1 and L2 divergence points earlier for constraining vs neutral verb sentences
- L1 vs L2 difference in divergence points similar for constraining vs neutral verbs:
  - L1 minus L2: constraining: -612ms [CI: -952, -187]
  - L1 minus L2: neutral: -454ms [CI: -629, -85]

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