Verb particle predictability determines facilitation effect of pre-particle material

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1. Background

- Increasing **distance** within a separable complex predicate should **sharpen expectation** for a resolution to the dependency, **speeding up** its reading (see Levy, 2008).
- However, expectation **may only be sharpened** if the dependency resolution is **highly predictable** (Husain et al., 2014).
- If the resolution is **less predictable**, **increased distance** may **negatively affect** maintenance of the weaker prediction, **slowing down** its reading (Husain et al., 2014).
- The effect of intervening material may differ by **individual working memory capacity (WMC)** (Nicenboim et al., 2016).
- German particle verbs are **complex predicates** (Müller, 2002) formed with a base verb (e.g. *sperren*, "to lock") and separable particle (e.g. *zu*; → *zusperren*, "to lock up").
- German particle verbs are a good test case for the factors that influence expectation because:
  1. the verb and particle can be **separated by long distances**;
  2. some verbs license only a **few particles** (making the particle more predictable), while others license **many** (particle less predictable).

2. Research questions

- Does the expectation account of reading **speed-up** with **increased distance** hold only if the dependency resolution is **highly predictable**?
- Are **lower** WMC readers **more** affected by the predictability/distance interaction?

3. Experiment design

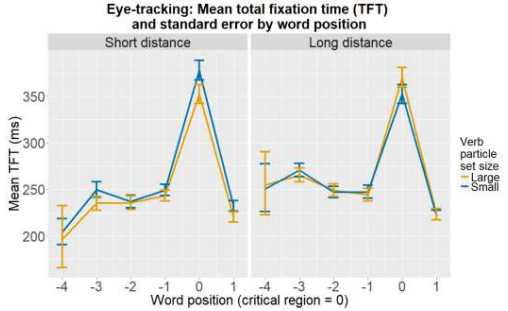
- 2 x 2 fully crossed:
  1. Verb particle set size: **Small** or **large**
  2. Distance: **Short** or **long**
- **Eye-tracking** and **self-paced reading (SPR).**

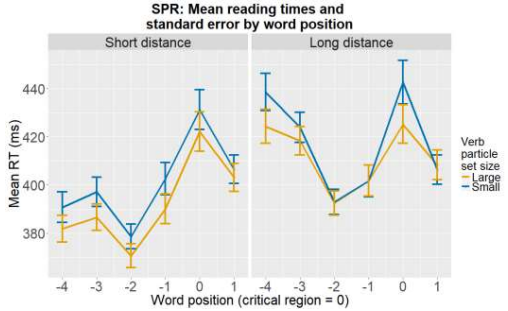
4. Reading time predictions

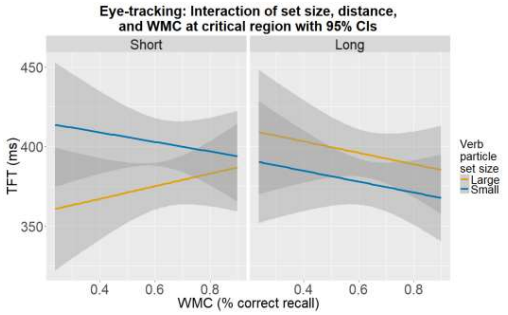
		Verb particle set size: Small	Verb particle set size: Large
Distance	Short	faster	fast
	Long	slow	slower

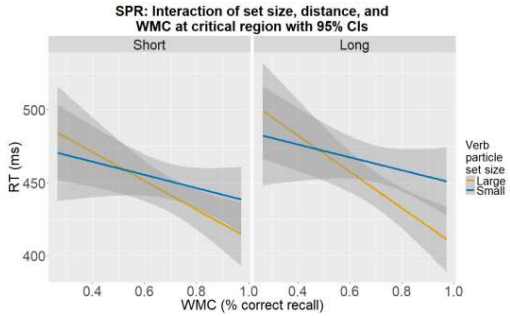
5. Example item

Condition				Verb		Intervener		Critical region (ET)	Critical region (SPR)	Spillover
Small/Short	An diesem	unerwartet schweren	Tag	sperrte	sie die		Tür des	Büros	zu,	um…
Small/Long	An diesem		Tag	sperrte	sie die	unerwartet schwere	Tür des	Büros	zu,	um…
Large/Short	An diesem	unerwartet schweren	Tag	haute	sie die		Tür des	Büros	zu,	um…
Large/Long	An diesem		Tag	haute	sie die	unerwartet schwere	Tür des	Büros	zu,	um…
Gloss	*On this*	*unexpectedly difficult*	*day*	*locked/ slammed*	*she the*	*unexpectedly heavy*	*door to the*	*office*	*[PARTICLE]*	*so that…*









6. Results

Predictor	Eye-tracking $\hat{\beta}$	Eye-tracking SE	Eye-tracking t	SPR $\hat{\beta}$	SPR SE	SPR t
Set size	−0.004	0.01	−0.38	Large set faster		
				−0.02	0.01	**−2.25**
Distance	−0.003	0.01	−0.22	0.01	0.01	1.22
Set size x Distance	Large set faster at short distance, slower at long distance			−0.01	0.01	−0.72
	0.03	0.01	**2.50**			
Set size x Distance x WMC	Large set speed-up at short distance *possibly* mainly in low WMC readers			Large set speed-up *possibly* limited to higher WMC readers		
	−0.12	0.07	−1.69	−0.07	0.04	−1.73

7. Conclusions

- The **eye-tracking** results were **consistent** with Husain et al.'s (2014) finding that strong expectation cancels locality effects: **Increased distance** led to **faster** reading of **more predictable particles** (small set), but **slowed** reading **less predictable particles** (large set).
- The **SPR** results were **not consistent** with the predictions of Levy (2008) or Husain et al. (2014).
- There was only weak evidence for a **WMC effect**.

6. References. Levy (2008) *Cognition*; Husain et al. (2014) *Plos One*; Nicenboim et al. (2016) *Frontiers in Psychology*; Müller (2002) *Complex Predicates*; von der Malsburg (2015) doi:10.5281/zenodo.18238.