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# Individual Differences in Planning Strategies Among French, German, and English Speakers

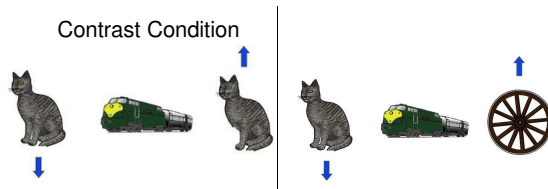
Benjamin Swets (Grand Valley State University), Caterina Petrone (Laboratoire Parole et Langage), Susanne Fuchs (Leibniz-Zentrum Allgemeine Sprachwissenschaft), & Jelena Krivokapić (University of Michigan & Haskins Laboratories)

## BACKGROUND

- Previous studies have found associations between WM (working memory) and planning scope in language production (Swets et al., 2014, Petrone et al., 2011) such that high-span speakers plan in larger increments than low-span speakers. Although these studies each found these effects in different languages, no studies have assessed such individual differences cross-linguistically in the same study.
- In addition, previous research did not distinguish WM effects from processing speed. On one hand, it is possible that WM and processing speed account for similar variability in planning scope. On the other, they might each account for unique variance in planning tendencies.
- **RESEARCH QUESTIONS:** Across languages, do planning strategies vary? Do individual differences in

## METHOD

French (n = 32), German (n = 31) and English (n = 30) speakers described 3-object arrays with similar-looking (contrast) or different (control) objects in Positions 1 and 3.



### Target utterances

**CONTRAST:** "The **four-legged cat** moves below the train and the **three-legged cat** moves above the train."

**CONTROL:** "The cat moves below the train and the wheel moves above the train."

Experimenter served as addressee: Moved objects around in Powerpoint to match descriptions.

### VARIABLES

- Sentence type (contrast vs. control)
- Language spoken: German, English, French
- Individual differences measures (left as continuous in analyses using linear mixed effects models):

**WM** assessed by reading span variant (Swets et al., 2007)

**Processing speed** assessed by letter comparison task (Salthouse, 1996). Task: To accurately complete as many "same" or "different" judgments as possible in 30 s. Task executed twice, and average scores were

## MEASURES AND PREDICTIONS

**MEASURES:** Speech initiation time, gaze time (percent of initiation time looking at Region 3 of image), number of pauses per utterance (defined as 70 ms or more between vocalizations).

### HYPOTHESES AND PREDICTIONS

- Hypothesis 1: Individual differences in WM and processing speed account for overlapping (shared) variance in speech planning. If so, they will show similar patterns of association with planning, i.e., that higher levels show larger planning scope.
- Hypothesis 2: Individual differences in WM and processing speed will show effects that are robust to cross-grammatical structures.

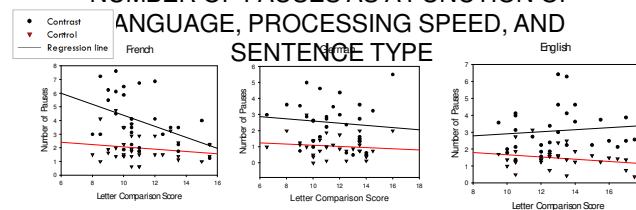
## RESULTS

Mean speech onset time varied across languages and condition, but not as a function of WM (SE in parentheses):

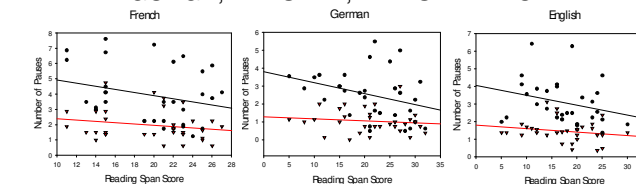
		French	German	English
Speech onset time in seconds	Contrast	2.15 (.26)	3.36 (.27)	2.97 (.27)
	Control	1.45 (.08)	1.82 (.09)	1.60 (.09)

French speakers initiated speech and paused more often than Speakers of English and German, indicating a more incremental strategy. Speed of processing predicted initiation time and pause frequency only in French, whereas WM showed similar non-significant patterns across all 3 languages for pauses.

### NUMBER OF PAUSES AS A FUNCTION OF LANGUAGE, PROCESSING SPEED, AND SENTENCE TYPE

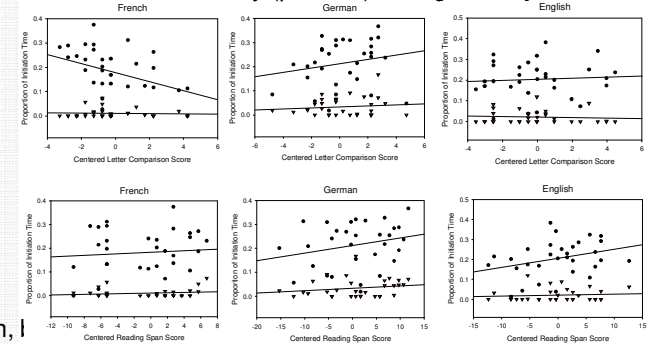


### MEAN NUMBER OF PAUSES AS A FUNCTION OF LANGUAGE, WM SPAN, AND SENTENCE TYPE



## RESULTS CONTINUED

- Proportion of initiation time spent gazing at Region 3 was negatively correlated with processing speed only in French. WM correlated weakly (positive) in English only.



### SUMMARY OF RESULTS

- French speakers began their speech more quickly, but paused more often than German and English speakers, suggesting a narrower planning scope for French speakers, and a longer scope of planning for English and German speakers.
- French speakers only modified the initial noun phrase post-nominally, unlike English and German speakers, who used both prenominal and postnominal modifiers.
- Processing speed significantly accounted for unique variance in planning tendencies, over and above variance due to WM.
- Processing speed accounted for variance in initiation time, pauses and gaze patterns only in French, and did so in a direction that was opposite that of previously found WM effects: Speakers with high processing speed tended to adopt more efficient incremental strategies in that they required less

## CONCLUSIONS

- Working memory and processing speed may serve different functions under different languages.
- Processing speed may be more useful in more incremental languages in which speakers begin speech more quickly and create smaller prosodic chunks, e.g. French, while WM might be more useful in languages that tend to be planned in larger

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