



HAL
open science

Variation in prosodic planning among individuals and across languages

Benjamin Swets, Caterina Petrone, Susanne Fuchs, Jelena Krivokapić

► **To cite this version:**

Benjamin Swets, Caterina Petrone, Susanne Fuchs, Jelena Krivokapić. Variation in prosodic planning among individuals and across languages. CUNY, 2016, Gainesville, United States. halshs-01459819

HAL Id: halshs-01459819

<https://shs.hal.science/halshs-01459819>

Submitted on 8 Feb 2017

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Variation in prosodic planning among individuals and across languages

Benjamin Swets (Grand Valley State University)

Caterina Petrone (Laboratoire Parole et Langage)

Susanne Fuchs (Zentrum fuer Allgemeine Sprachwissenschaft)

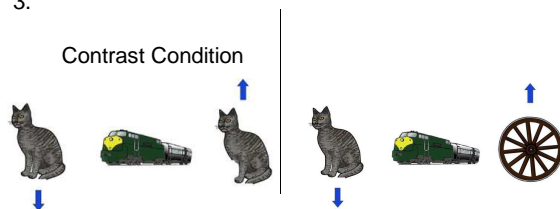
Jelena Krivokapić (University of Michigan & Haskins Laboratories)

BACKGROUND

- Previous research (Swets et al., 2007; Petrone et al., 2011) found associations between working memory (WM) and the amount of prosodic material readers and speakers package together for comprehension and production.
 - Larger WM capacity seems to lead to larger prosodic packages during speech planning: Petrone et al. (2011) showed that the scope of incremental prosodic planning increased along with WM.
 - However, Petrone et al. did not distinguish WM effects from processing speed, and had participants read prepared utterances rather than plan their own speech.
 - Although previous studies have found associations between WM and planning scope in language production (Swets et al., 2014, Petrone et al., 2011) in different languages, no studies have assessed such effects cross-linguistically in the same study.
- **RESEARCH QUESTIONS:** Is the size of prosodic increments during language production, as measured by the occurrence of pauses, associated with individual differences in WM and speed of processing?

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."

PROCEDURE

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

DESIGN AND PREDICTIONS

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 (e.g., 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

YCX _____ YMX
e used.
HTRBDP _____ HTRBDP
LNDPRSKQB _____ LNDPRSJQB

MEASURES: Speech initiation time and number of pauses per utterance (defined as 70 ms or more between vocalizations).

HYPOTHESES AND PREDICTIONS

- If WM and processing speed underlie prosodic planning chunks both variables should predict unique variance in the number of pauses speakers make during articulation. In addition, the "incremental" planning hypothesis predicts that

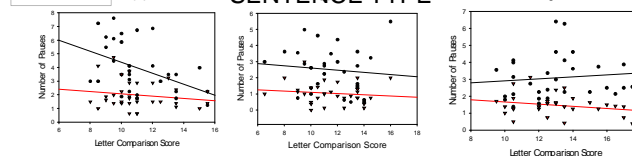
RESULTS

Mean speech onset time varied across languages, but did not vary beyond variance due to processing speed: As WM increases, the number of pauses speakers produce per utterance decreases. This effect was stronger in the higher-load contrast sentences.

		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)

Although speed of processing was associated with contrast sentence pauses in French, this pattern did not hold in German or English:

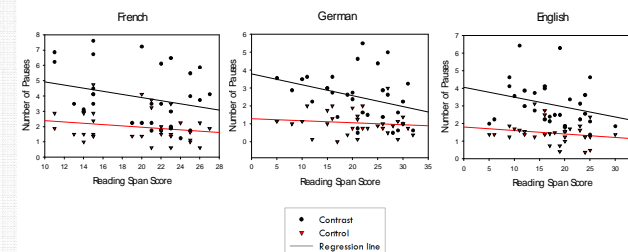
NUMBER OF PAUSES AS A FUNCTION OF LANGUAGE, PROCESSING SPEED, AND SENTENCE TYPE



RESULTS CONTINUED

- Pause occurrences varied across languages, and this mean was associated with WM span in all of them:

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



SUMMARY OF RESULTS

- Neither WM nor processing speed predicted variability in speech onset time in any languages tested.
- French speakers began their speech more quickly, but paused more often than German and English speakers, suggesting a greater degree of "incremental" planning for French speakers, and a longer scope of planning for English and German speakers.
- WM explains unique variance in pause frequency above and beyond variance due to processing speed: As WM increases, the number of pauses speakers produce per utterance decreases. This effect was stronger in the higher-load contrast sentences.

CONCLUSIONS

- Individual differences in WM lead to differences in planning processes, such that higher WM supports the planning of larger prosodic "chunks".
- 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.

REFERENCES

- Petrone, C., Fuchs, S. & Krivokapić, J. (2011). Consequences of working memory differences and phrasal length on pause duration and fundamental frequency. Paper presented at the Proceedings of the 9th International Seminar on Speech Production (ISSP), 393-400. Montréal, Canada.
- Swets, B., Desmet, T., Hambrick, D. Z., & Ferreira, F. (2007). The role of working memory in syntactic ambiguity resolution: A psychometric approach. *Journal of Experimental Psychology: General*, 136, 64-81.
- Salthouse, T. A. (1996). The processing-speed theory of adult age differences in cognition. *Psychological Review*, 103, 403 – 428.
- Swets, B., Jacovina, M. E., & Gerrig, R. J. (2014). Individual differences in the scope of speech planning: Evidence from eye movements. *Language and Cognition*, 6, 12-44.