

**THE ROLE OF LOOKBACK IN THE WRITTEN PRODUCTION OF MULTI-SENTENCE TEXTS**

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Written production of continuous text is a semi-parallel, cascaded, just-in-time process. As a result output can be remarkably fluent. But this fluency is fragile. Writers frequently pause, briefly, and glance back at text they have just produced. One possible function of this lookback is to cue retrieval of the message (or language) of the next sentence. We summarise findings from two studies. In the first adults (N = 39) wrote argumentative essays in their first language (L1) and in a language that they were learning (L2). We tracked eye movements. Lookback was more common and of longer duration at sentence boundaries, with no effect of L1/L2. Lookback from between and within words was more common and further into the preceding text in L2 than in L1. This is consistent reduced parallelism in L2, hence greater need for external cuing of what to say next. As a stronger test of the cuing hypothesis (new sample of 30 adults, L1 only, data analysis currently in progress) we look in detail at lookback that occurs between sentences. We examine the semantic and syntactic relationships between words fixated in the previous sentence and the meaning and syntax of the sentence that follows.

1998), and landing positions of saccades (e.g., Vitu et al., 1990). We present findings from a study that recorded readers' eye movements during reading at different sampling rates. In the study, we aim to replicate these classic effects with data collected at different sampling rates. The results of this study have important implications for the design of eye-tracking studies, particularly those using cheaper equipment, and may shed light on the underlying cognitive processes involved in reading.

**POPEYE - AN R PACKAGE TO ANALYSE EYE MOVEMENT DATA FROM READING EXPERIMENTS**

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popEye is an R package to analyse eye movement data from reading experiments (Schroeder, 2019; freely available at <https://github.com/sascha2schroeder/popEye>). popEye allows to analyse data collected using different eye tracking devices (SR research, GazePoint, etc.) and software packages (Experiment Builder, EyeTrack, PsychoPy, etc.) within the same workflow. A unique feature of popEye is that it allows semi-automatic analysis of text-level experiments. To this end, popEye implements a wide selection of state-of-the-art line assignment algorithms and sentence-level measures. In addition, popEye has been designed to be used in cross-linguistic studies and thus supports a wide variety of languages including Hebrew, Korean, and Chinese. In this talk, I will demonstrate how popEye is used and present newly implemented features, including new options for data pre-processing, line-assignment, and automated cleaning that make the analysis process more flexible, transparent, and reproducible.

TALKS & BLITZ-TALKS – 12h00 to 13h20

TALKS 1  
**READING AND EYE TRACKING**

**HOW LOW CAN YOU GO? EYE MOVEMENTS DURING READING AT DIFFERENT SAMPLING RATES**

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Modern eye trackers used in language and reading research offer remarkable temporal resolution with sampling rates of 1000 Hz and more. However, such eye tracking equipment is expensive, limiting its use outside of the laboratory. Inexpensive eye tracking solutions are available, but their sampling rate is generally much lower than the one offered by research-grade eye trackers. So far, it has not been tested so far whether and how data collection at lower sampling rates affects common eye movement phenomena observed in reading, such as the frequency effect (e.g., Inhoff & Rayner, 1986; Rayner, 1998), the word length effect (e.g., Rayner,

**EFFICIENT EYE MOVEMENTS IN VISUAL WORD RECOGNITION: SENSITIVITY TO THE STRUCTURE OF THE LEXICON**

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Languages are teeming with statistical cues for the cognitive system to capitalize on, and at least some aspects of language processing might be explained by sensitivity to such cues via general-purpose cognitive machinery. One cue relevant to the task of reading is the way in which information about word identity is typically distributed within a given lexicon. Previous research on visual word recognition has struggled to disentangle information distribution from perceptual factors because they are unavoidably interconnected in language processing. To tackle this issue, we first constructed a Bayesian cognitive model that explicitly teases apart information and perception. We then used this model to inform two experiments with artificial lexicons, including one experiment with eye tracking.

Our results suggest that readers are sensitive to the distribution of information, targeting different letter positions depending on whether the language they learned is more informative on the left or right. This provides a causal demonstration that the way in which the lexicon distributes information affects how readers visually explore words, thus revealing the use of a probabilistic cue based simply on efficient information gathering.

**THE USE OF SPECIFIC SEGMENTATION CUES IN READING UNSPACED FINNISH TEXT**

Raymond Bertram<sup>1</sup>; <sup>1</sup>*University of Turku*

In alphabetic languages, spaces are functional segmentation cues allowing for faster word recognition. Rayner and Pollatsek (1996) found that reading English text without spacing is 30% slower than reading with spaces. The current eye movement experiment compares reading Finnish sentences in spaced and unspaced format. As readers can make sense of reading normally spaced text in unspaced format, the main question was what cues readers use to detect words in unspaced text. The experiment included 50 participants who read 138 target sentences for comprehension, while eye movements were recorded with EyeLink 1000. The results showed that unspacing text in Finnish increases sentence reading times with 35%, in line with what was reported earlier for English. More importantly, the results showed that unspaced text reading is facilitated by reduced word length and higher word frequency, but also affected by position of the word in the sentence and average bigram frequency at word boundaries. It thus seems that readers without much experience in reading unspaced text are equipped to make use of specific word segmentation cues, some of them similar to segmentation cues in speech recognition or in typically unspaced languages like Chinese.

**TALKS 2  
BILINGUALISM I**

**LANGUAGE CONTEXT MODULATES THE ASYMMETRY OF SWITCH COSTS AND REVERSE DOMINANCE EFFECTS IN THE LANGUAGE SWITCHING PARADIGM**

Agata Wolna<sup>1</sup>, Kalinka Timmer<sup>2</sup>, Jakub Szewczyk<sup>3</sup>, Zofia Wodniecka<sup>1</sup>; <sup>1</sup>*Jagiellonian University in Krakow*, <sup>2</sup>*University of Warsaw*, <sup>3</sup>*Donders Institute for Brain, Cognition and Behaviour, Nijmegen*

Does language environment, dominantly L1 or L2, modulate the way bilinguals implement the control mechanisms in speech production? In the language-switching (LS) task, two indices of control are typically studied: asymmetric switch costs (switch to L1

larger than to L2) and the reversed dominance effect (L1 is slower than L2). Here we ask if these measures of control are affected by the language context (L1-dominant vs. L2-dominant). 82 Polish-English unbalanced bilinguals performed the LS task under two different language contexts introduced in two ways: 1) by assigning the 67% majority of trials in the LS task to the context-dominant language (L1 or L2); 2) by preceding the LS task with a block of naming in L1 or L2. In the L1 context, we replicated the effects typical for unbalanced bilinguals: asymmetric switch costs and reversed language dominance. However, in the L2 context, the asymmetry of switch costs was reversed, and the reversed dominance effect was increased. Our findings show that 1) immediate language context qualitatively determines the nature of bilingual control; 2) reversed dominance and asymmetric switch costs dissociate and likely reflect two different aspects of bilingual control.

**HOW DOES ORTHOGRAPHIC SIMILARITY IMPACT LANGUAGE SWITCHING?**

Tanja Römbke<sup>1</sup>; <sup>1</sup>*RWTH Aachen University*

Previous research has shown that it is easier to switch between languages when using cognates (e.g., FISH/FISCH [English/German]) than non-cognates (e.g., DRESS/KLEID), suggesting that cross-language similarity of translation-equivalent words impacts how easy it is to access them. Yet, this research has concentrated on the impact of words' phonological similarity and ignored orthographic similarity. Further, cognates and non-cognates were treated as distinct categories not as a continuum. Thus, in this study, we explored how orthographic similarity impacts language switching. 52 unbalanced German-English bilinguals completed a cued picture naming task where they typed or spoke responses in mixed language blocks. To-be-named pictures referred to translation-equivalent words that differed continuously in their orthographic similarity. We found that it was easier to name and switch between orthographically similar word pairs than dissimilar ones. These effects were observed for both written and spoken responses, but were reduced for the latter. Our results are consistent with translation-equivalent words existing on a continuum of orthographic similarity, which can facilitate lexical access through cross-language activation.

**(AFTER-)EFFECTS OF LANGUAGE SWITCHING: EVIDENCE FOR PROACTIVE INHIBITION?**

Andrea M. Philipp<sup>1</sup>, Tanja Roembke<sup>1</sup>, Chiara Koch<sup>1</sup>, Mathieu Declerck<sup>2</sup>, Iring Koch<sup>1</sup>; <sup>1</sup>*RWTH Aachen University*, <sup>2</sup>*Vrije Universiteit Brussel*