LOOKING AHEAD IN L1 AND L2

Kristina Cergol[*1,4], **Ana Matić**[2,4], **Eva Pavlinušić Vilus**[3,4], **Marijan Palmović**[2,4]

[1]English Teaching Department, Faculty of Teacher Education, University of Zagreb
[2]Department of Speech and Language Pathology, Faculty of Education and Rehabilitation Sciences, University of Zagreb
[3]Department of Computational Linguistics, University of Zurich
[4]Laboratory for Psycholinguistics Research, University of Zagreb

*contact: kristina.cergol@ufzg.hr

How does the brain generate predictions during reading, and does this process work the same way in a first and a second language? This study addresses these questions by examining the effects of surprisal and contextual entropy on eye movements during naturalistic reading in L1 Croatian and L2 English, using a within-subject design with 45 proficient Croatian-English bilingual readers. Surprisal — the information-theoretic measure of how unexpected a word is given its context — and contextual entropy — the degree of uncertainty about what word will be presented next — capture distinct, complementary aspects of predictive processing, and their dissociation in bilingual reading reveals something that neither of these two measures could separately show. Surprisal was computed using a hybrid 5-gram language model interpolating local contextual probabilities from the text with corpus-based unigram frequencies (weighted 30/70 respectively), while contextual entropy was estimated at each word position as the Shannon entropy over the distribution of possible continuations derived from the same model, with add-k smoothing applied to handle sparse contexts. The results of the present study reveal a clear L1–L2 asymmetry. In L1 Croatian, readers slowed down for less predictable words, replicating the classic surprisal effect and confirming that fluent native reading is guided by active, anticipatory prediction. In L2 English, this effect was absent or even reversed: the same readers showed no sensitivity to word predictability on first fixation, suggesting that predictive processing does not operate as a default strategy in the non-native language — even if readers are of a relatively high proficiency. Critically, entropy effects diverged even more sharply: contextual uncertainty seemed to bear no influence on L1 reading, while higher entropy in L2 was associated with faster reading. This counterintuitive finding points to a qualitative shift in the processing strategy: when the linguistic context is uninformative and predictions are unlikely to be accurate, L2 readers appear to abandon predictive attempts altogether and fall back to the more efficient bottom-up, word-by-word processing. These findings seem to speak to fundamental questions in bilingualism research. They demonstrate that the architecture of predictive language comprehension is not simply scaled down in the second language — it is reorganised. Surprisal and entropy dissociate across languages in a way that reveals the strategic, resource-sensitive nature of prediction: L2 readers do not merely predict less, they predict differently, adapting when and how much they invest in anticipation based on the expected payoff. The present findings thus have implications for theories of L2 sentence processing, for understanding how individual differences in proficiency shape predictive capacity, and more broadly for predictive coding accounts of language that assume a single hierarchical generative model operates across all languages a speaker knows.