

# Effects of Word Predictability are Mediated by Language Register and Inter-Individual Variation in Working Memory Capacity

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A substantial body of research has demonstrated that children and adults (both native and non-native speakers) are sensitive to the statistics of multiword sequences (MWS) and rely on knowledge of such statistics to facilitate their language processing and boost their acquisition [1]. Sensitivity to such statistics facilitates chunking - enabling predictive language processing and the integration of the greatest possible amount of available information as fast as possible to overcome the fleeting nature of linguistic input and the limited nature of human memory (Now-or-Never bottleneck, [2]). However, previous studies on the effects of language statistics on MWS processing have focused on group-level analyses, leaving open questions of whether they are affected by individual differences (IDs) in cognitive factors and to what extent they are contingent on language registers. Here we report on a study that examined the effect of word predictability in adult second language (L2) processing in four MWS decision tasks comprising experimental items constructed from four language registers (spoken, fiction, news, and academic language). Specifically, using a within-subject design embedded in an individual differences framework, the study addressed three research questions: (1) whether online L2 processing of MWS is affected by word predictability, as quantified by the Shannon entropy of the distribution of the probabilities of the sequence-final words [3], (2) whether the word predictability effect is perturbed by language register, and (3) to what extent interindividual variability in the effect is related to working memory capacity (WMC). WMC was assessed using a complex span task (RSPAN) in combination with three tasks measuring executive-control (Simon, Flanker, Stroop colorword). Linear mixed effects modeling of the reaction time data from the MWS decision tasks revealed that participants were significantly faster in responding to MWS from the spoken register than to any of the three written registers (with RT being slowest in the academic register) and that MWS processing was facilitated by higher RSPAN scores. No correlations were observed among the four WMC variables. Importantly, we found that the word predictability effect was mediated by both register (with larger effects in news and fiction) and all WMC-related variables (best-fitting model included all four WMC indicators, register and their two-way interactions with entropy). The implications of the results for current models of language processing are discussed.

**References:** [1] Arnon, I. & Christiansen, M. H. (2017). The role of multiword building blocks in explaining L1-L2 differences. *Topics in Cognitive Science*, 9(3), 621–636. [2] Christiansen, M. H. & Chater, N. (2016). The now-or-never bottleneck: A fundamental constraint on language. *Behavioral and Brain Sciences*, 39. [3] Willems, R. M., Frank, S. L., Nijhof, A. D., Hagoort, P. & Van den Bosch, A. (2015). Prediction during natural language comprehension. *Cerebral Cortex*, 26(6), 2506–2516.