Prediction and Locality in Language and Language Models

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I argue that human language is shaped by constraints on memory in online language comprehension and production. One way the bottleneck shows up as a preference for locality in the order of elements. Using cross-linguistic corpora of 55+ languages, I show evidence for dependency locality, a pressure for syntactically related words in sentences to be close to each other. I show how a more sophisticated model of language processing, based on incremental probabilistic prediction under resource constraints, yields a generalization of dependency locality called information locality, which I show correctly predicts adjective order across languages. Next, I formulate a general information-theoretic measure of the complexity of sequential prediction, and show cross-linguistic corpus evidence that phonological forms and morphological paradigms are structured in a way that minimizes this complexity. Finally, I present evidence that modern large language models also have a bias towards information locality, and that this may partially explain their successes in learning human language.