Language, memory, and brain:
The role of learning and memory brain systems in first and second language

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Increasing evidence suggests that language learning, knowledge, and use crucially depend on two learning and memory systems in the brain: declarative memory and procedural memory. These systems, which also exist in other vertebrate species, appear to have been co-opted for language – whether or not they subsequently became further specialized for this domain, either evolutionarily or developmentally.

Because the behavioral, anatomical, physiological, molecular and genetic correlates of these two systems are quite well-studied in animals and humans, they lead to numerous specific predictions about language that would not likely be made in the more circumscribed study of language alone. This approach is thus very powerful in being able to generate a wide range of novel predictions for language – including for first and second language, in various healthy and disordered populations.

In the talk I will first provide some background on the two memory systems, and then discuss the manner in which language is predicted to depend on them. One of the key concepts is that to some extent the two systems can underlie the same functions (e.g., for navigation, grammar, etc.), and thus they play at least partly redundant roles for these functions. This has important consequences for first and second language, as well as for language disorders.

Following the background, I will present multidisciplinary evidence (behavioral, neurological, neuroimaging, electrophysiological) that basic aspects of language do indeed depend on the two memory systems, though in different ways across different populations. I will discuss normal first and second language, individual and group differences (e.g., sex differences), and language in disorders, focusing on developmental disorders (e.g., Specific Language Impairment, dyslexia, autism, and Tourette syndrome). However, I will focus primarily on normal first language, second language, and Specific Language Impairment.