

The Role of Language in Human and Machine Intelligence



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Dr. Gary Lupyan is a Professor of Psychology and Chair of the Perception, Cognition, and Cognitive Neuroscience (PCCN) Area Group at the University of Wisconsin–Madison. His research investigates how language shapes human cognition, perception, and thought—asking whether language merely communicates pre-existing ideas or fundamentally structures mental representations. He explores how verbal labels influence categorization, perception, and memory, and whether certain ideas may be unthinkable without language. Beyond individual cognition, his work examines how social and communicative needs shape grammatical and semantic structures across languages. More broadly, he studies how neural, perceptual, and conceptual representations dynamically adapt to goals, expectations, and task contexts.

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ABSTRACT

A common view in cognitive science views language as a system for expressing our thoughts with the thoughts themselves being the products of other, nonlinguistic systems. On this view, one might expect that developing a human-like intelligence would require instantiating those nonlinguistic systems. What does it mean then, that most significant advances in developing domain-general artificial intelligence have come from training general-purpose neural networks on language? Exposure to (large) amounts of language appears to be sufficient to instantiate many core aspects of human intelligence. One response is that these developments show us that it is possible to reverse-engineer some aspects of our world from language, but tell us nothing about the role of language in human cognition. I will argue instead that there are compelling reasons to think that human minds are structured by exposure to language in some of the same ways that large language models are. The reason that language proves to be such a powerful type of training is that it provides learners with ready-made abstractions that allow both humans and artificial systems to learn highly compressed representations of the world. Adopting this perspective helps demystify some of the successes of large language models and points to the critical role that language plays in enabling human-like intelligence.