

On How General Learning Processes Create Language-Specific Learning Biases

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There is growing recognition that general learning processes serve as a crucial entry into language learning. The research to be presented in this talk shows how general mechanisms of attentional learning may create learning biases that specific to the task of learning language and specific to the language being learned.

The talk focuses specifically on a phenomenon sometimes known as “fast mapping” in early word learning and on differences between English and Japanese children in these artificial word learning tasks. The phenomenon is this: Upon hearing a single novel object named with a novel noun, children generalize that name to a coherent category of things. For example, if told the name of a novel solid and complexly shaped thing children interpret that name as referring to any object with that same shape. The language difference is this: English speaking children generalize novel names by shape when objects are complexly shaped and solid, simply shaped and solid, and also remarkably often when they are nonsolid. In contrast, Japanese children restrict attention to shape to the interpretation of names for solid and complexly shaped things and attend to them material of the named item when it is simply shaped or nonsolid.

We argue that the processes that make fast mappings and the language differences emerge from general processes of attentional learning. Briefly, a hundred years of experimental psychology has shown that whenever one perceptible cue reliably predicts the relevance of a second, the presence of the first will come to automatically direct attention to the other. The present hypothesis is that statistical regularities (and irregularities) among linguistic cues (e.g., syntactic frames count nouns), object properties (e.g., solidity), and category organization in words learned creates contextual shifts in attention that reflect those statistical regularities.

We present evidence of three kinds to support this proposal:

1. We show that statistical regularities exist among the first several hundred words that children learn early that could create such learning biases.
2. We show that there are differences between early English and Japanese vocabularies sufficient to explain the observed differences in fast-mapping.
3. We demonstrate the plausibility of this account by modeling the emergence of fast mapping and language differences in a neural network via quite general learning processes.