Evaluation, use, and refinement of knowledge representations through acquisition modeling

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A working premise of generative approaches to language acquisition is that the knowledge representation provided by Universal Grammar is what makes acquisition happen so fast and so well. This is because the representation enables children to very effectively leverage their available linguistic data. Put simply, if the hypothesis space of possible grammars is helpfully constrained and the relationships between linguistic variables are established, it's far easier to determine what's relevant in the data. Children's acquisitional intake becomes a filtered subset of the input, based on that perceived relevance.

So what happens when we have multiple theories for how grammatical knowledge is represented — for example, parameters vs. violable constraints, or different implementations of subjacency? One answer is that we evaluate these representation variants by using them for acquisition, and seeing if they make acquisition possible from the available data. Is the hypothesis space actually helpfully constrained? Are the appropriate relationships defined for linguistic variables? Is the requisite acquisitional intake sufficient to get the job done?

Computational models of the acquisition process are an effective tool for determining this, since they allow us to incorporate the assumptions of a representation into a cognitively plausible learning scenario and see what happens. We can then identify which representations work for acquisition, and what those representations need to work. This in turn allows us to refine our theories of how grammatical knowledge is represented as well as how those representations are used by children during acquisition.

I will discuss two case studies of this approach for representations in metrical phonology and syntax, and consider what we learn from this computational acquisition evaluation in each domain.