Modeling Synctactic Aquisition

Structure Dependence

Presented by Soleil

HIERARCHICAL STRUCTURE

a. $[_{CP}$ Can the penguin $[_{CP}$ who is on the iceberg] t_{can} find a fish]?
b. $[_{CP}$ The penguin $[_{CP}$ who is on the iceberg] can find a fish].

STRUCTURE-DEPENDENT

- Moving the “main clause”
- Known innately by children even thuogh rarely encountered

STRUCTURE-INDEPENDENT

- Moving the last auxilary
- Cannot account for full range complex yes/no questions

PEICES TO STUCTURE DEPENDENT KNOWLEDGE

Linguistic representations are hierarchically structured

Rules manipulating linguistic elements utilize hierarchical structure

HYPOTHESIS 1

"... described as children innately knowing to only consider structure-dependent representations and to only hypothesize structure-dependent rules"

HYPOTHESIS 2

"children can converge on this knowledge – in particular, the nature of the correct rules...without an innate bias for structure-dependence"

PROOF?

HYPOTHESIS 2

“children can converge on this knowledge – in particular, the nature of the correct rules…without an innate bias for structure-dependence”

“a probabilistic learning model sensitive only to bigram and trigram word frequencies in English child-directed speech seems to distinguish between grammatical and ungrammatical forms of complex yes/no questions. That is, without a bias for structure dependent rules (and in fact without relying on structure-dependent representations at all), this algorithmic-level model can distinguish between grammatical yes/no questions like Is the boy who is watching Mickey Mouse happy? and ungrammatical variants like *Is the boy who watching Mickey Mouse is happy?

THE COUNTERARGUMENT

"the modeled learner of Reali and Christiansen (2005) benefited from a "lucky fluke" in the particular corpus used as input and the particular sentences chosen as test sentences. More specifically, bigram information irrelevant to complex yes/no question formation in general was used to distinguish the tested complex yes/no questions. When tested on a wider range of complex yes/no questions in English (such as discriminating the grammatical *Is the wagon your sister is pushing red?* from the ungrammatical **Is the wagon your sister pushing is red?*), this modeled learner did not succeed. So, this potential structure-independent learning strategy does not in fact work

PROOF?

HYPOTHESIS 1

"... described as children innately knowing to only consider structure-dependent representations and to only hypothesize structure-dependent rules"

"children's innate bias is about considering structure-dependent representations as one of the potential representations at all. This is a less specific innate bias than one which requires children to only allow structure-dependent representations in their hypothesis space"

THE BAYESIAN MODEL

Evidence in favor of structure-dependent representations also comes from other structure-dependent utterances as indirect positive evidence in addition to complex yes/no questions

"using the specific structure-dependent representations the modeled learner converged on, it would be able to parse certain grammatical complex yes/no questions and be unable to parse other ungrammatical ones"

"this model demonstrates that it's in principle possible to have innate knowledge that is more general about the structure-dependence of linguistic representations, yet which still allows acquisition to proceed successfully from the data English children typically encounter"

. "**This hierarchical Bayesian model demonstrates that these assumptions about structure-dependence will in fact do that if children are capable of doing optimal inference to identify the optimal representational hypothesis. However, this type of model abstracts away from some of the cognitive limitations children have – such as memory and processing limitations – which potentially impact children's ability to do optimal inference."**