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Modeling syntactic acquisition
Section 1

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Why model

"…an informative model of syntactic acquisition is the embodiment of a specific theory about syntactic acquisition. So, to build an informative syntactic acquisition model, you need to first have a theory about how syntactic acquisition works. Then, the model can be used to (1) make all the components of that acquisition theory explicit, (2) evaluate whether it actually works, and (3) determine precisely what makes it work (or not work)."

Making the components explicit

"It often turns out that the acquisition theories that seem explicit to humans don't actually specify all the details necessary to implement the strategies these theories describe."

- example: *wh*-movement learned via triggers
  - open questions: what do children need to already know or be able to do, are there triggers for all possible options, are there default options, etc…

Evaluating the theory and explaining what happened

Interpreting model results: “There are two basic outcomes:
(1) the model predictions match children’s data, or
(2) they don’t.”

Evaluating the theory and explaining what happened

"If the predictions match, this is an existence proof that the acquisition theory, as implemented by the computational model, is a way that acquisition *could* proceed."

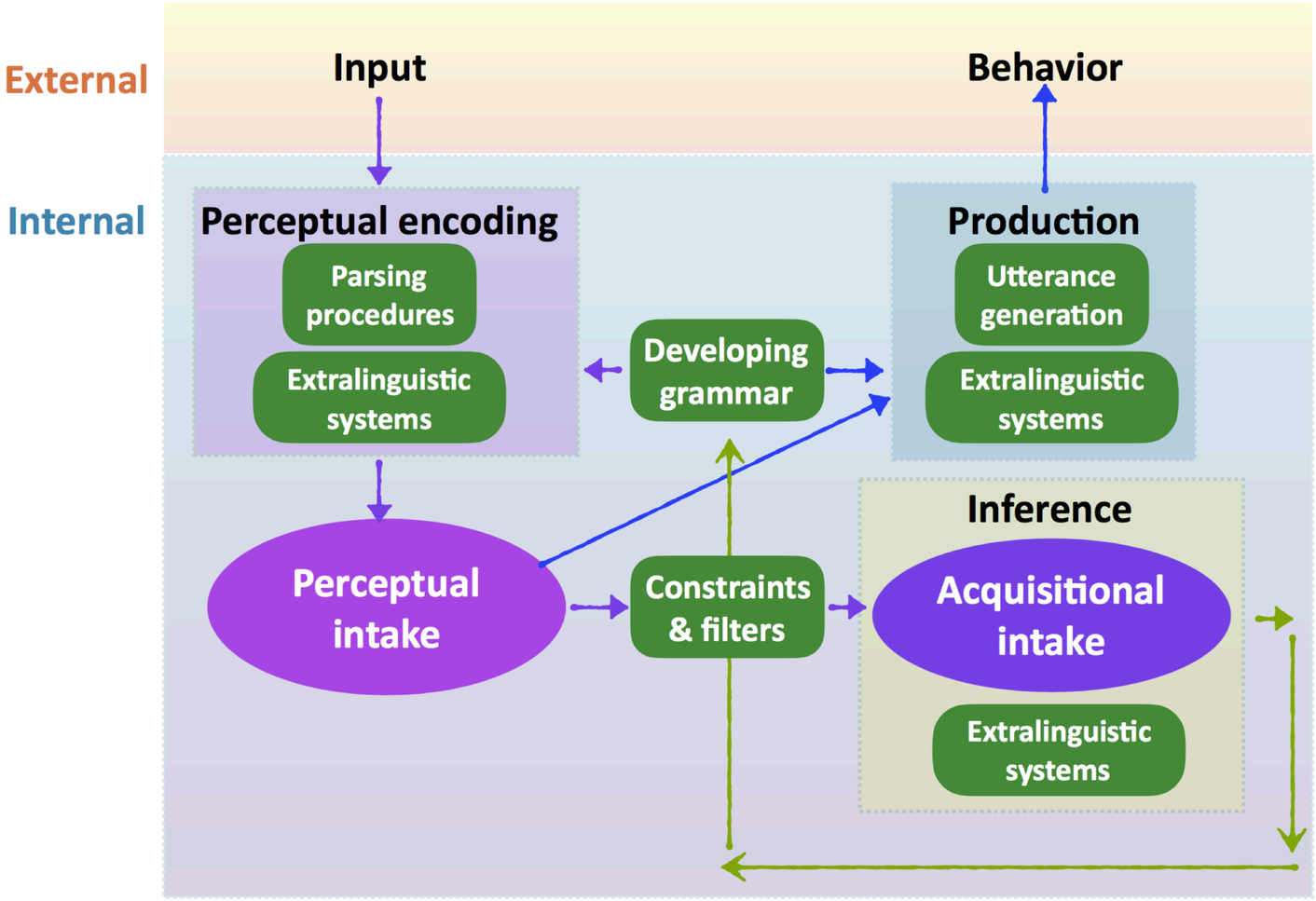
Evaluating the theory and explaining what happened

"…sometimes the model predictions don't match children's data. What then? This is then evidence against that acquisition theory, *as implemented by the model*."

Evaluating the theory and explaining what happened

"…if you have an implemented model (whether it succeeds or fails), a very useful benefit is that you can look inside it to determine what exactly makes it work or not work. This is something that's much more difficult to do with children's minds. That is, we can sift through the components of the implemented acquisition theory to see which ones are important for acquisition success…without them, the model's predictions don't match children's behavior."

Characterizing the acquisition task



"Model of the acquisition process adapted from Lidz & Gagliardi (2015), highlighting the contributions of several key components. Observable components are external to the child (input signal and the child's behavior). Internal components include the pieces used to perceptually encode information from the input signal (developing grammar, perceptual encoding), the pieces used to produce the observable behavior (perceptual intake, developing grammar, and production systems), and the pieces used for inference over the perceptually encoded intake (inference). These yield the next stage of the developing grammar, which itself is used in subsequent perceptual encoding and production."

Characterizing the acquisition task

Five pieces: Initial state, Data intake, Inference, Learning period, Target state

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Initial state: “What knowledge, abilities, and learning biases does the modeled child already have?”

Characterizing the acquisition task

Five pieces: Initial state, Data intake, Inference, Learning period, Target state

Data intake: “What data is the modeled child learning from?”

Characterizing the acquisition task

Five pieces: Initial state, Data intake, Inference, Learning period, Target state

Inference: “How are updates to the modeled child’s internal representations made?”

Characterizing the acquisition task

Five pieces: Initial state, Data intake, Inference, Learning period, Target state

Learning period: “How long does the modeled child have to learn?”

Characterizing the acquisition task

Five pieces: Initial state, Data intake, Inference, Learning period, Target state

Target state: “What does it mean for the modeled child to succeed at learning?”

Five pieces: Initial state, Data intake, Inference, Learning period, Target state

Characterizing the acquisition task

"…an acquisition theory consists of specifying each component according to a theory of developing representations and a theory of developing processing abilities."