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Combining rules and simulation to explain infant physical learning

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Abstract

Two very different kinds of views exist of how infants learn about physics: on the one hand, through domain-specific rules, on the other, through general purpose simulation. We attempt to reconcile these two views through a model that uses simulation to bootstrap rule learning. This model makes a variety of predictions about rapid concept acquisition in young infants which are consistent with experiments performed by developmental cognitive scientists. Consistent with the developmental literature, our model learns physical rules from just a few examples, but only when those examples are consistent with general physical principles. A model without simulation shows no such biases. Our approach provides a general mechanism for explaining how simulation and rule learning might bootstrap off of each other throughout development, and opens up a number of new questions about how children learn physical representations.