

Chapter 5

Connectionist Explorations of Multiple-Cue Integration in Syntax Acquisition

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Among the many feats of learning that children showcase in their development, syntactic abilities appear long before many other skills, such as riding bikes, tying shoes, or playing a musical instrument. This is achieved with little or no direct instruction, making it both impressive and even puzzling, because mastering natural language syntax is one of the most difficult learning tasks that humans face. One reason for this difficulty is a “chicken-and-egg” problem involved in acquiring syntax. Syntactic knowledge can be characterized by constraints governing the relationship between grammatical categories of words (such as noun and verb) in a sentence. At the same time, the syntactic constraints presuppose the grammatical categories in terms of which they are defined; and the validity of grammatical categories depends on how they support those same syntactic constraints. A similar “bootstrapping” problem faces a student learning an academic subject such as physics: understanding momentum or force presupposes some understanding of the physical laws in which they figure; yet these laws presuppose these very concepts. The bootstrapping problem solved by very young children seems much more daunting, both because the constraints governing natural language are so intricate, and because these children do not have the intellectual capacity or explicit instruction present in conventional academic settings. Determining how children accomplish the astonishing feat of language acquisition remains a key question in cognitive science.