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How do we get negation without symbols?

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Abstract: Traditionally, negation has been viewed as a symbolic process. In this two-step account, a negation operator is applied to the affirmative version of a sentence to construct the negated form. However, a recent model (Huette and Anderson 2012) has demonstrated that negation can be processed by a simple recurrent network trained to simulate sensory information when given linguistic input. While the model serves as an existence proof that shows the ability of negation to be processed without symbols, the exact behavior of negation within the network remains relatively unexplored. We extend the analysis of the model and pay particular attention to how information from the negation word 'not' integrates with other information in the network to convey particular sensory features. Further, we show how the model is consistent with the current body of experimental work on negation.