Learning to read with a machine teacher: Discovering efficient procedures for training the orth-to-phon relationships in English

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Abstract

Neural network models of reading provide a good account of many aspects of normal and disordered performance, but the training procedures are unrealistically comprehensive. Unlike models, child learners have limited instructional time and are explicitly taught only a small subset of the words they will regularly encounter. To address this discrepancy we investigated alternative learning procedures in a standard orthography-to-phonology multilayer network, to identify ones which involve a small, teachable subset of words that facilitate learning untrained words with less effort. We also asked, for any such set, whether the procedure can be improved by optimizing the training sequence. Candidate training sets and sequences were derived using a model-based procedure and from elementary reading curricula. The results indicate tradeoffs between the size and composition of the training set and generalization. These procedures suggest pedagogical solutions to the problem of learning more than there is time to teach.