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Temporal Evolution Of Information In Neural Networks With Feedback[1] ARAM GIAHI SARAVANI, Baylor College of Medicine, XAQ PITKOW, Baylor College of Medicine/Rice University — Recurrent neural networks are pivotal for information processing in the brain. Here we analyze how the information content of a neural population is altered by dynamic feedback of a stimulus estimated from the network activity. We find that the temporal evolution of the Fisher information in the model with feedback is bounded by the Fisher information in a network of pure integrators. The available information in the feedback model saturates with a time constant and to a final level both determined by the match between the estimator weights and the feedback weights. This network then encodes signals specifically from either the beginning or the end of the stimulus presentation, depending on this match. These results are relevant to recent experimental measurements of psychophysical kernels indicating that earlier stimuli have a stronger influence on perceptual discriminations than more recent stimuli. We discuss consequences of this description for choice correlations, a measure of how individual neuronal responses relate to perceptual estimates.

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