Week 6
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The authors want to find out how neurons in LIP might encode information about an upcoming binary decision, when the evidence for a decision is building over time. To address this question they had monkeys perform a task in which evidence accumulates in discrete units of log evidence for either decision. Their goal was to match the behavior and neural recordings with a bounded diffusion model in which a decision is marked by a specific threshold on neural evidence for a decision. They show that behavior appears to match their task design: shapes are used to build evidence, decisions occur after a consistent amount of accumulated evidence, and the monkeys "weight" more recent evidence more strongly. Their physiological recordings also reflected their task design: neurons in LIP appear to show a graded response to the current accumulated evidence (when the evidence favors a movement into their target receptive field) and overall a gradual increase to a decision boundary followed by a drop-off immediately prior to a saccade. When the target was outside of the neuron receptive field no changes were observed. They fit a bounded accumulator model in which discrete information packets caused an increase in firing followed by a leaky reduction over time and find that it correctly predicts the behavior results (RT distribution, proportion of choices based on cumulative evidence, relative weighting of evidences in time). In short, the overall results support the sequential probability ratio test, implemented by a bounded accumulator model. I'm particularly interested in the differences that they observed in the monkeys, which they largely attribute to differences in training regimes. It would be particularly interesting to understand how the differences in learning altered the structure of networks in LIP to achieve both the differences in behavior and in neural firing. This would likely require a different structure of task to achieve, but would be quite interesting to investigate.