Basic properties of MT neurons:

- Selective to direction of motion
- Selective to binocular disparity
- Selective to speed

But V1 neurons also have these properties, and the tuning to these three properties in V1 aren’t that different from MT.

So what does MT do?
Differences between V1 and MT:

Surround Suppression

(a) Sontes/s vs. Stimulus diameter (deg)
(b) Surround suppression at low contrast (%)
(c) Diagram showing different surround suppression percentages: 20%, 50%, 25%
Differences between V1 and MT:

V1 neurons are selective for spatial and temporal frequency, but MT neurons are selective for velocity, regardless of spatial frequency.

Velocity (deg/sec) = \( \frac{\text{Spatial frequency (cycles/deg)}}{\text{Temporal frequency (cycles/sec)}} \)
Most importantly, MT neurons deal with the ‘aperture problem’
### Predictions

#### Optimal Stimuli

<table>
<thead>
<tr>
<th>Component Response</th>
<th>Pattern Response</th>
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</thead>
<tbody>
<tr>
<td><img src="image1" alt="Component Response Diagram" /></td>
<td><img src="image2" alt="Pattern Response Diagram" /></td>
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</table>

#### Direction Tuning

<table>
<thead>
<tr>
<th><img src="image3" alt="Direction Tuning Diagram" /></th>
<th><img src="image4" alt="Direction Tuning Diagram" /></th>
<th><img src="image5" alt="Direction Tuning Diagram" /></th>
<th><img src="image6" alt="Direction Tuning Diagram" /></th>
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</table>
MT neurons increase their firing rate with increasing correlation of dots in the neuron’s preferred direction.

MT neurons decrease their firing rate with increasing correlation of dots in the opposite of the neuron’s preferred direction.

Something interesting happens at 0% correlation.
Neurons responses vary slightly on a trial by trial basis.

Newsome et al. divided up the trials of a 0% coherence stimulus

Histogram of firing rates for trials where the monkey thought the motion was in the neuron’s preferred direction.

Histogram of firing rates for trials where the monkey thought the motion was in the opposite direction.

Firing rates were slightly higher on average for trials where the monkey guessed that the motion was in the preferred direction of the neuron.

This trial-by-trial variability was reflected in the monkey’s perception of motion.