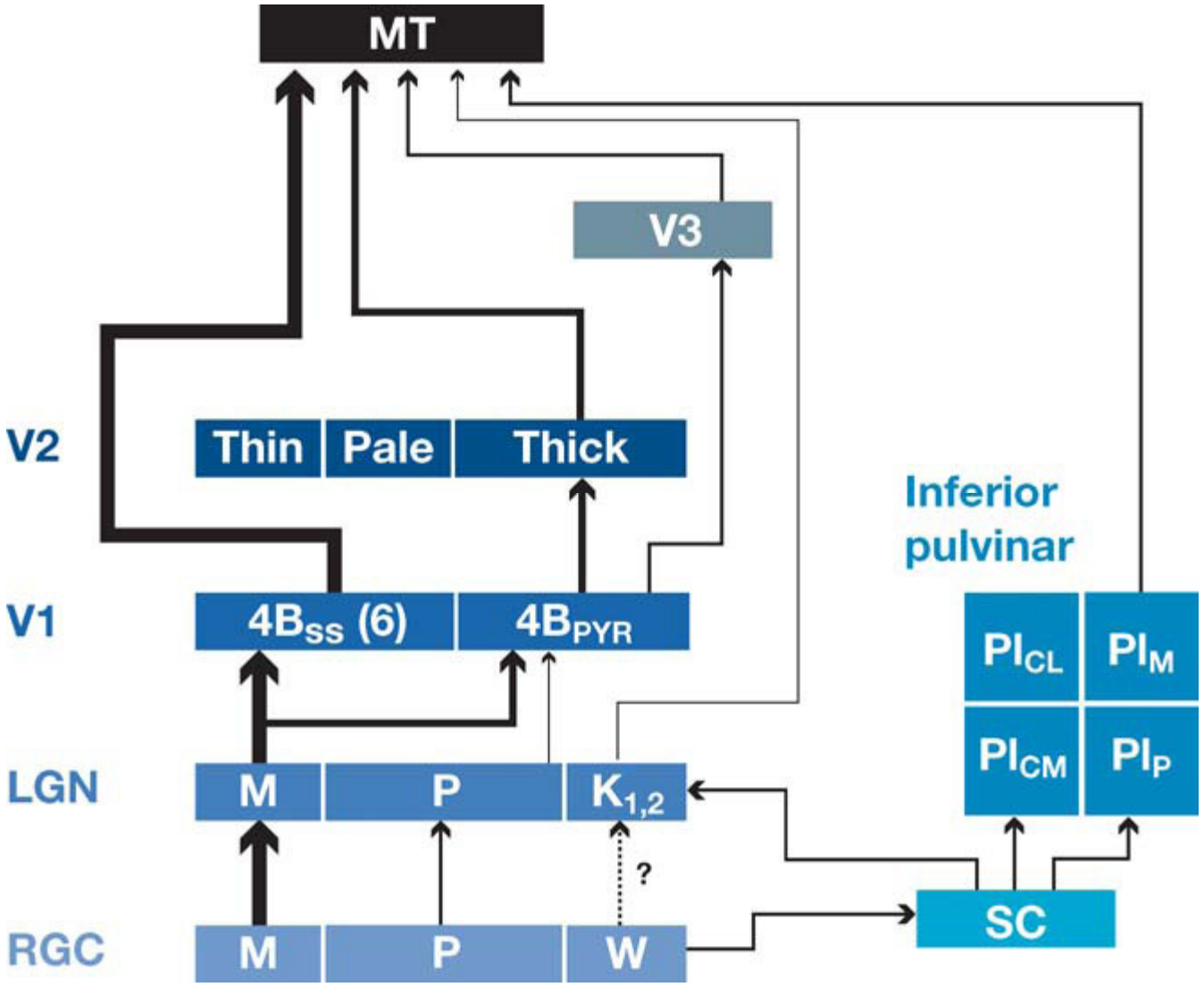

MT
V3
V2
Thin
Pale
Thick
Inferior
pulvinar
V1
4Bss (6)
4BPYR
PICL
PIM
PICM
PIP
LGN
M
P
K1,2
?
SC
RGC
M
P
W

Basic properties of MT neurons:

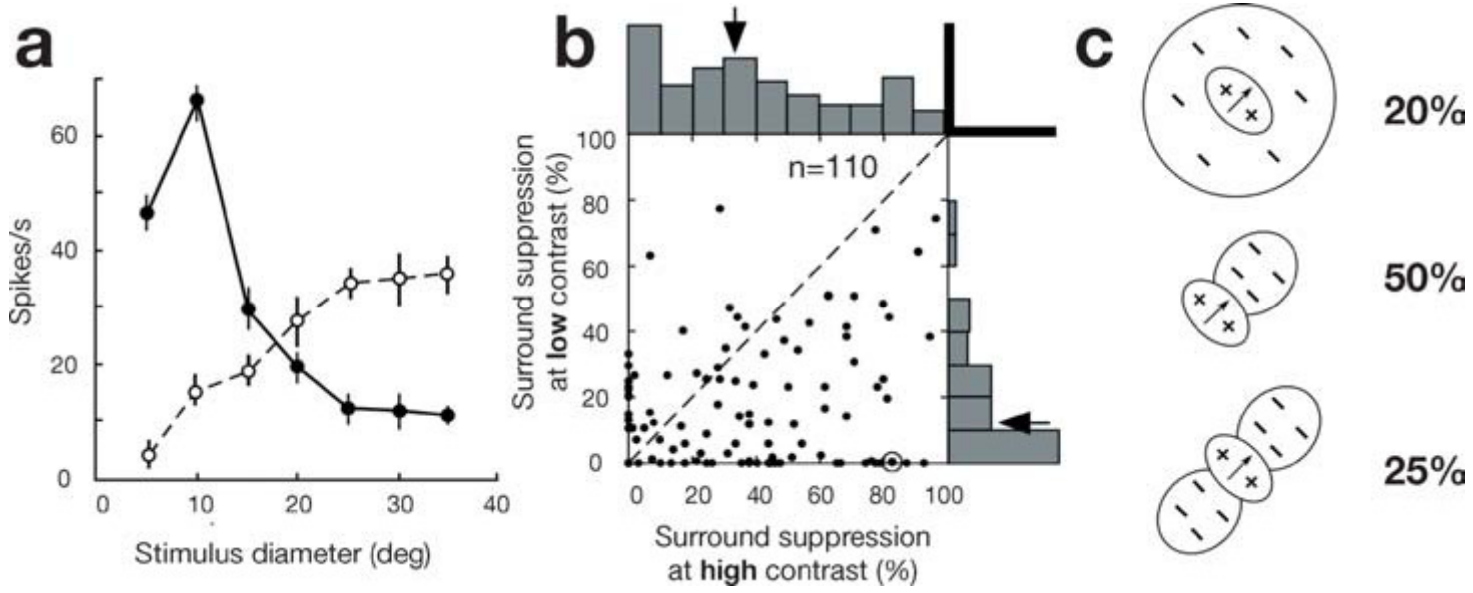
Selective to direction of motion
Selective to binocular disparity
Selective to speed

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

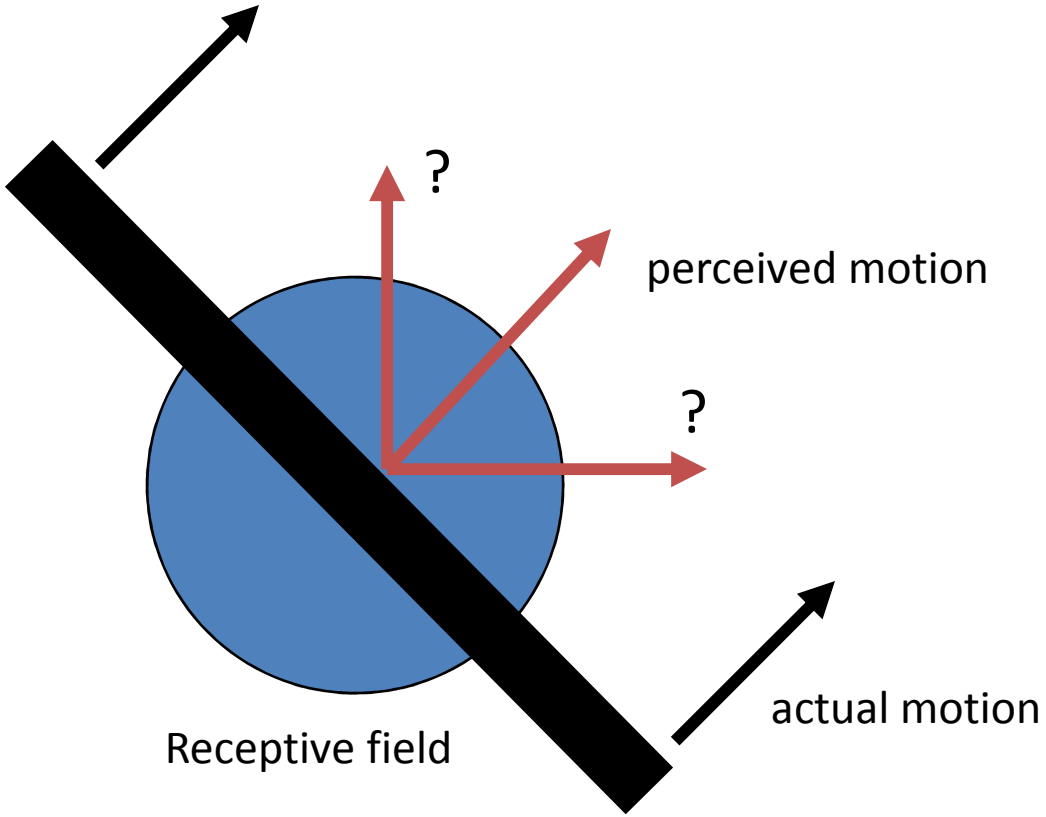


Differences between V1 and MT:

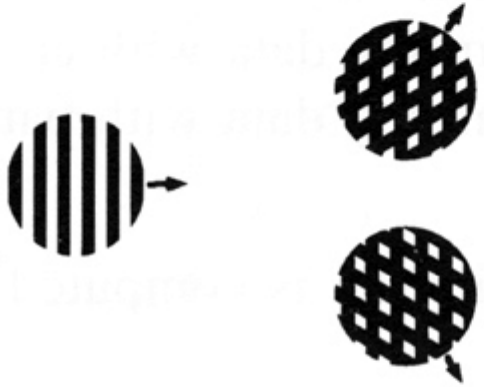
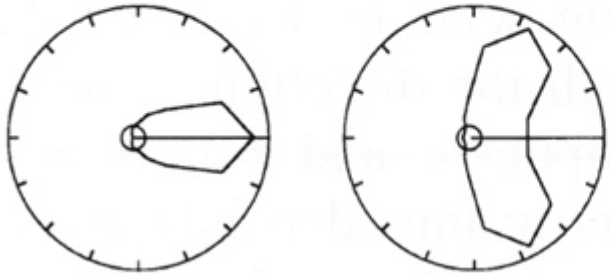
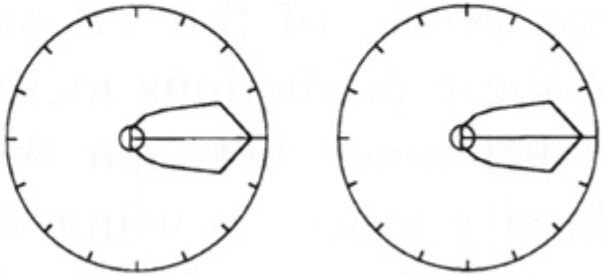
V1 neurons are selective for spatial and temporal frequency, but MT neurons are selective for velocity, regardless of spatial frequency.

$$\text{Velocity (deg/sec)} = \frac{\text{Spatial frequency (cycles/deg)}}{\text{Temporal frequency (cycles/sec)}}$$

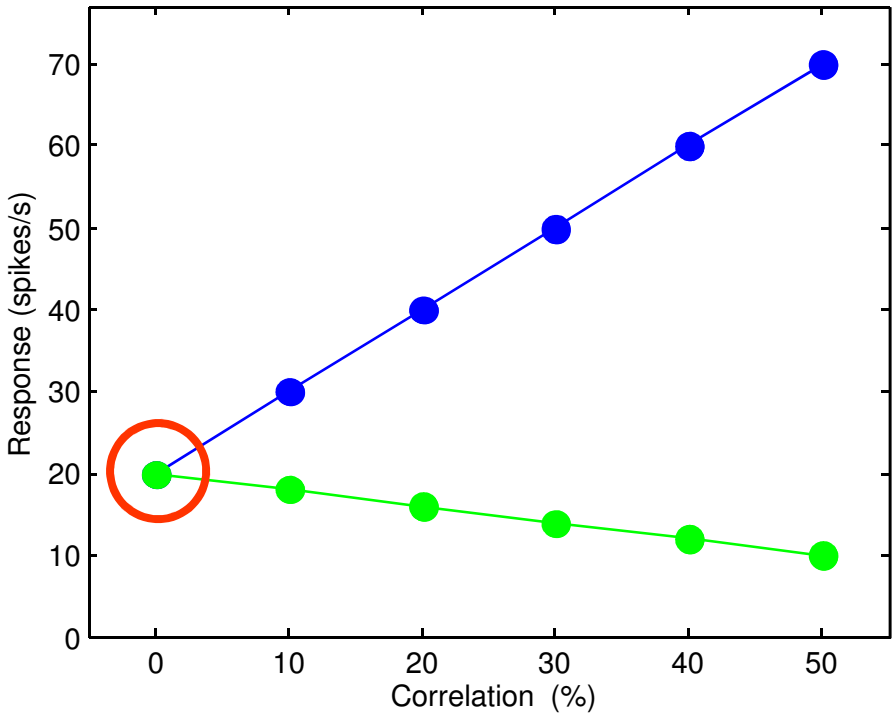
Most importantly, MT neurons deal with the ‘aperture problem’



PREDICTIONS

	COMPONENT RESPONSE	PATTERN RESPONSE
OPTIMAL STIMULI		
DIRECTION TUNING		

MT neurons increase their firing rate with increasing correlation of dots in the neuron's preferred direction.

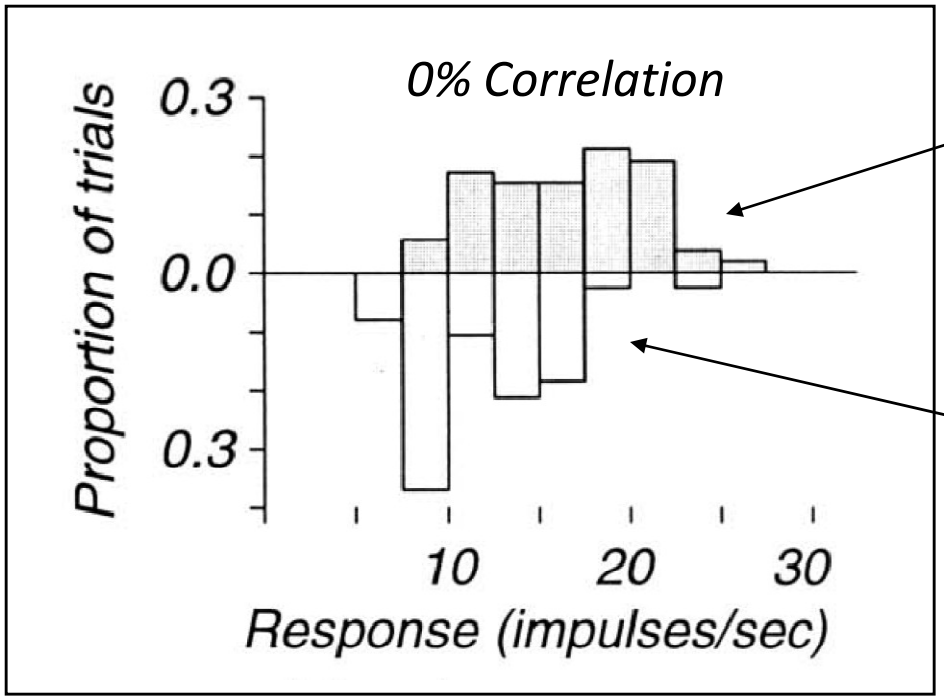


MT neurons decrease their firing rate with increasing correlation of dots in the opposite of the neuron's preferred direction.

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.