Advances in Visual Perception
PSYC 526

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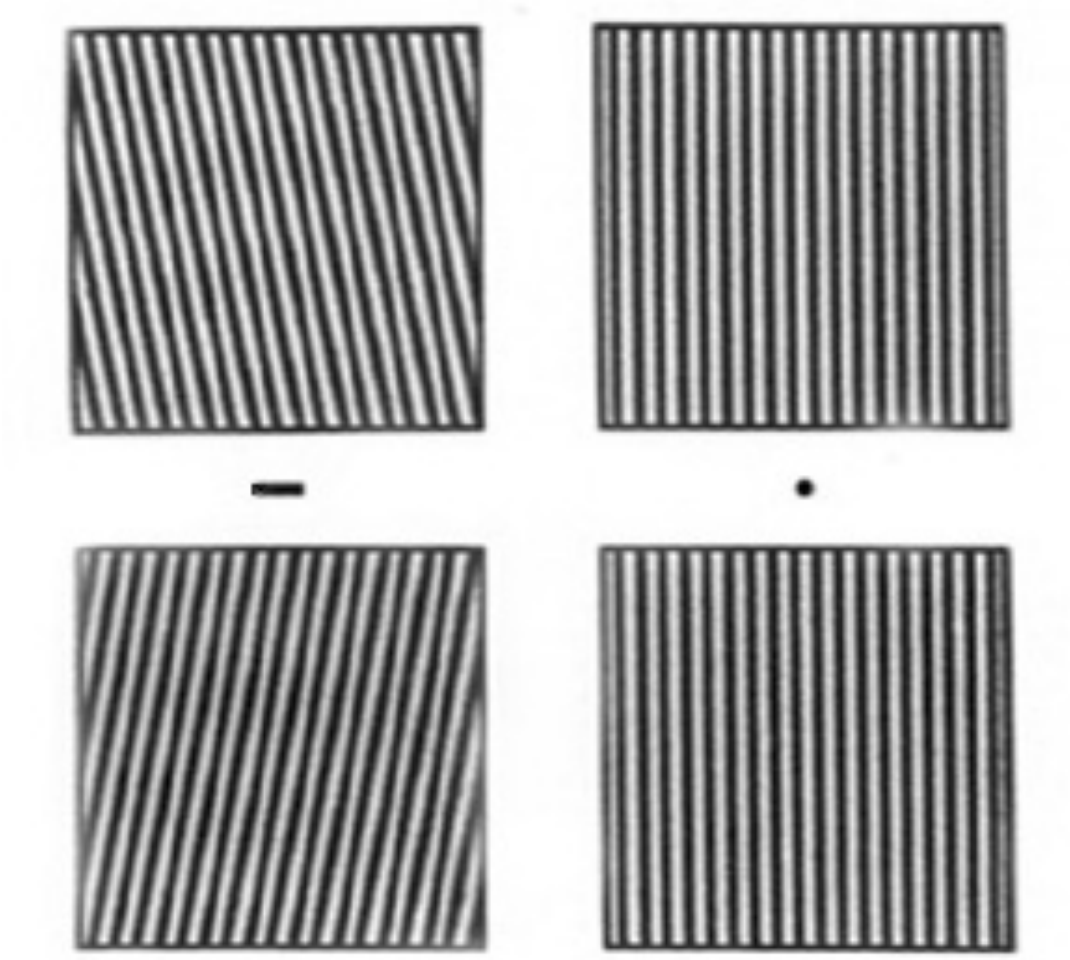
McGill
Vision Research

Lecture

Topic 2
Seeing Patterns II

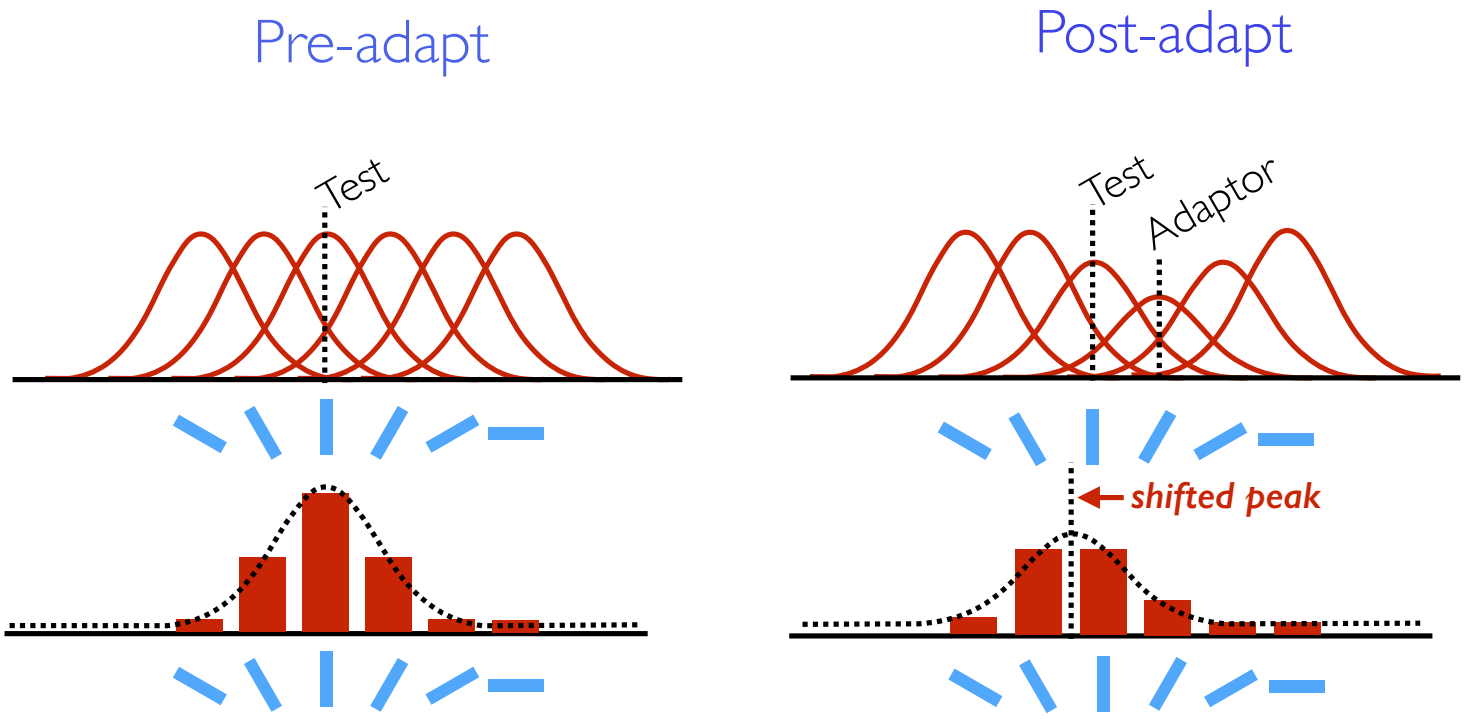
Reading: Basic Vision, Ch. 4

Tilt aftereffect



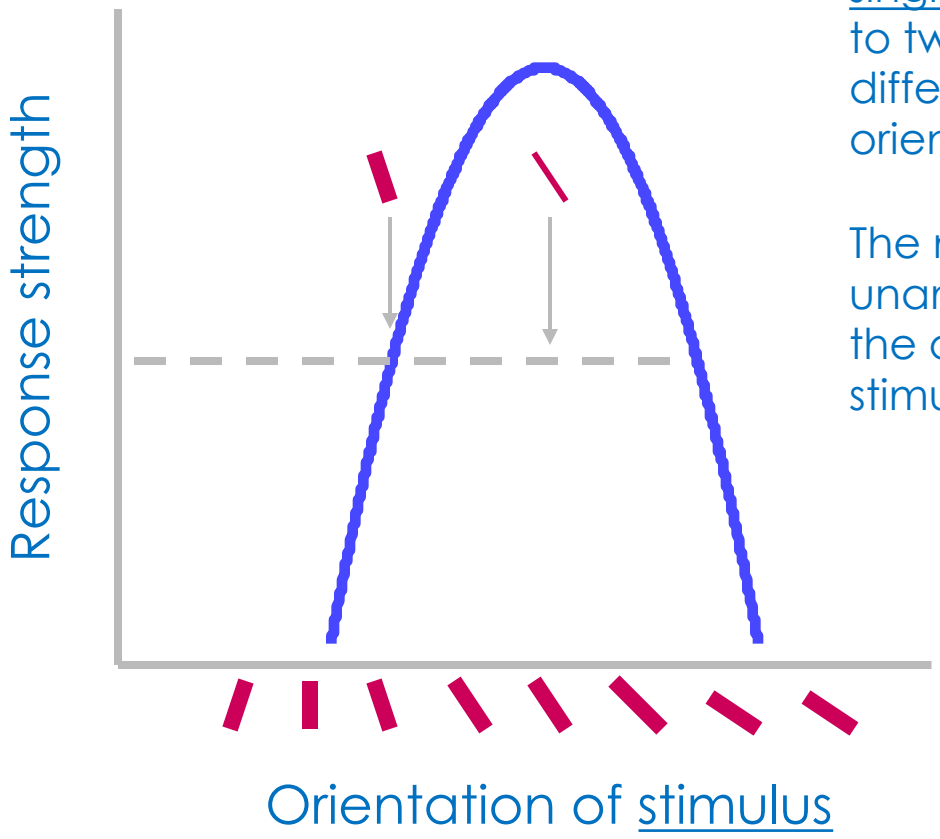
Tilt aftereffect

- Subsequent dissimilar orientations appear repulsed away
- Produces a shift in the peak response away from the adaptor
- Suggests population coding of orientation (Blakemore et al., 1971)



Simultaneous tilt contrast

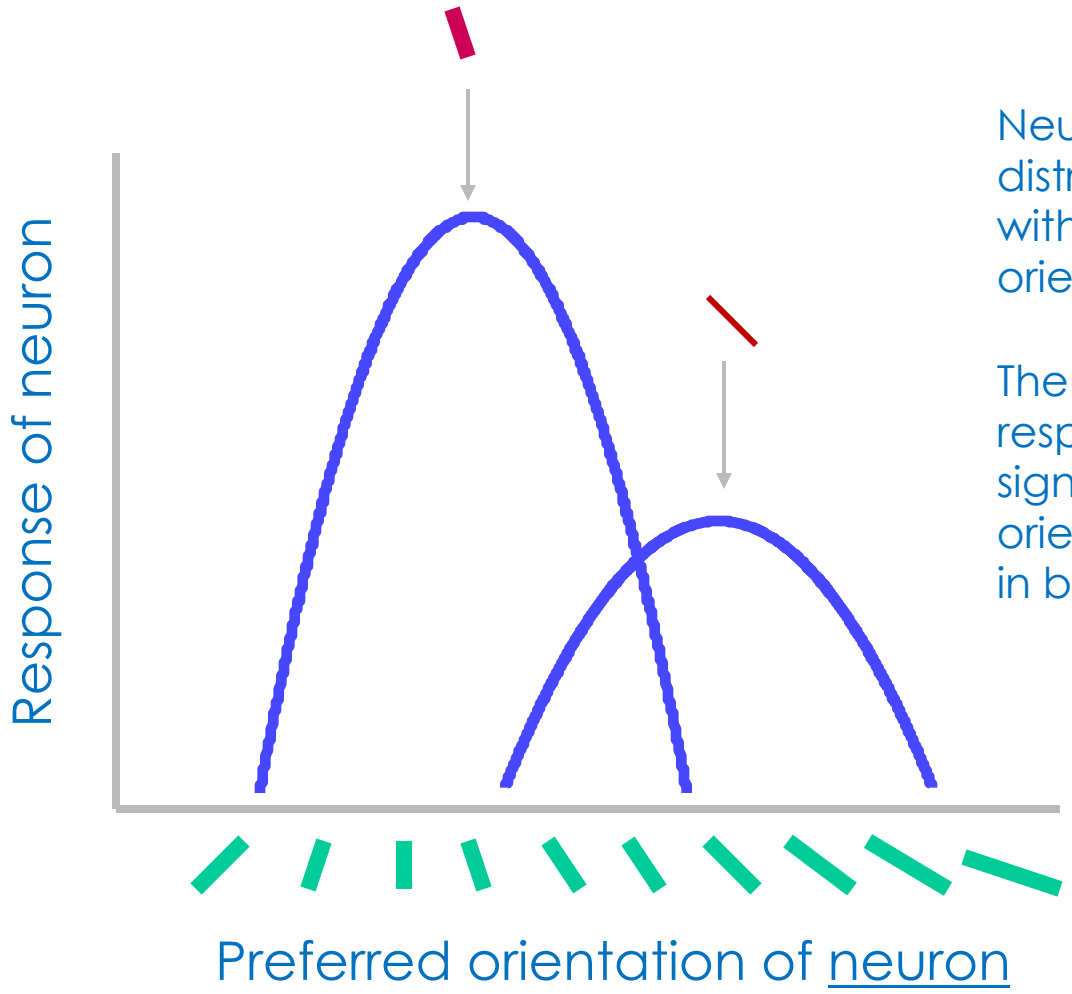
Principle of univariance I



Response of a single neuron to two stimuli with different strengths and orientations.

The neuron cannot unambiguously signal the orientation of the stimulus

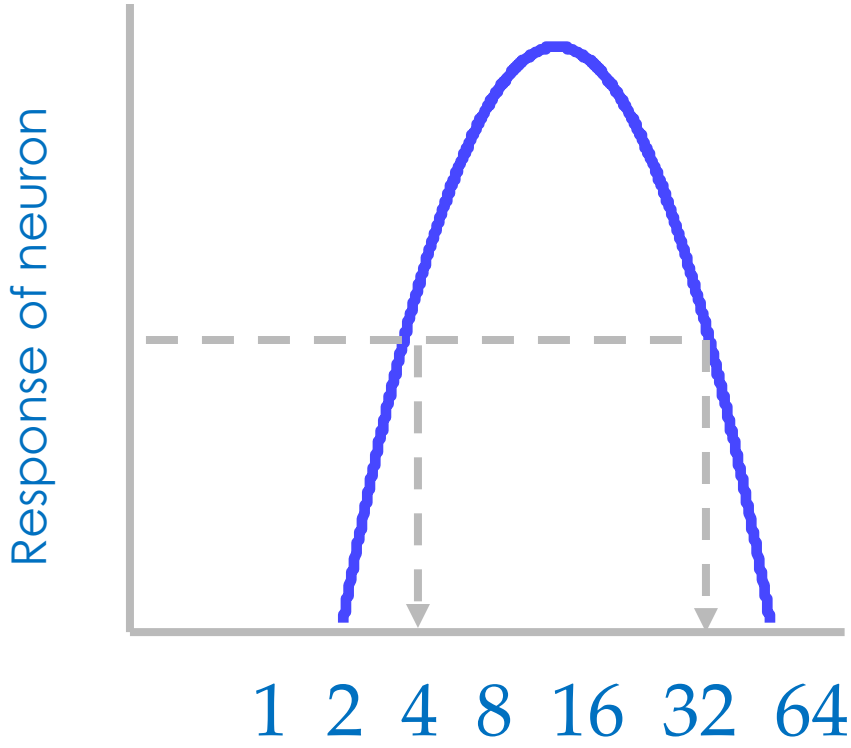
Principle of univariance II



Neural response distributions to two stimuli with different strengths and orientations.

The peak or average response to each stimulus signals the stimulus orientation unambiguously in both cases..

Measuring spatial-frequency bandwidth

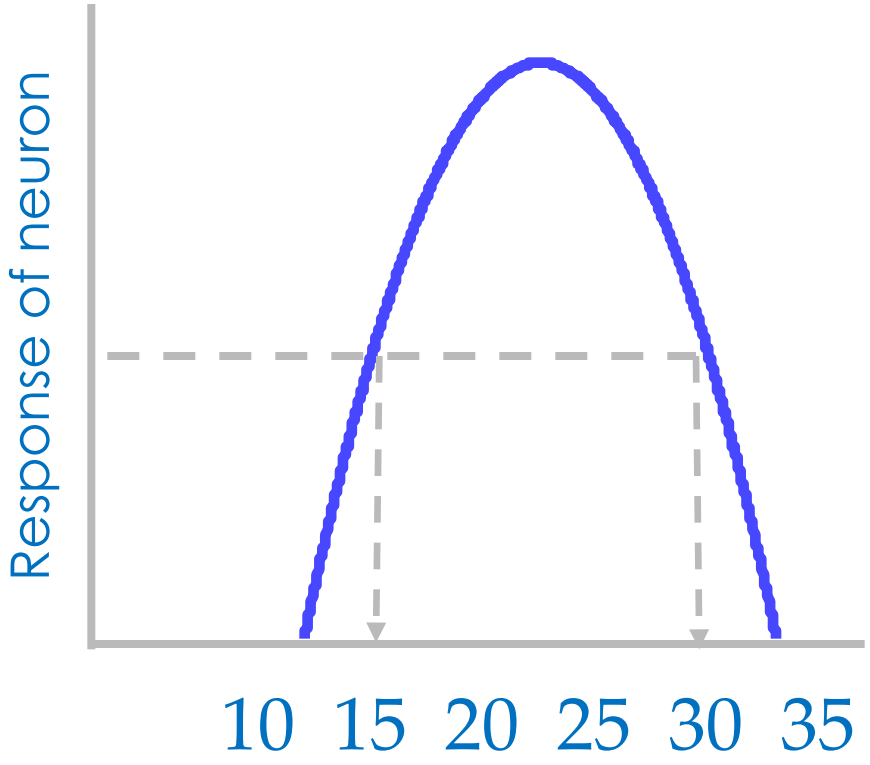


Spatial Frequency (SF) bandwidth in octaves

1 octave = 1 doubling of SF at half the response height

What is the bandwidth, i.e. how many doublings of SF?

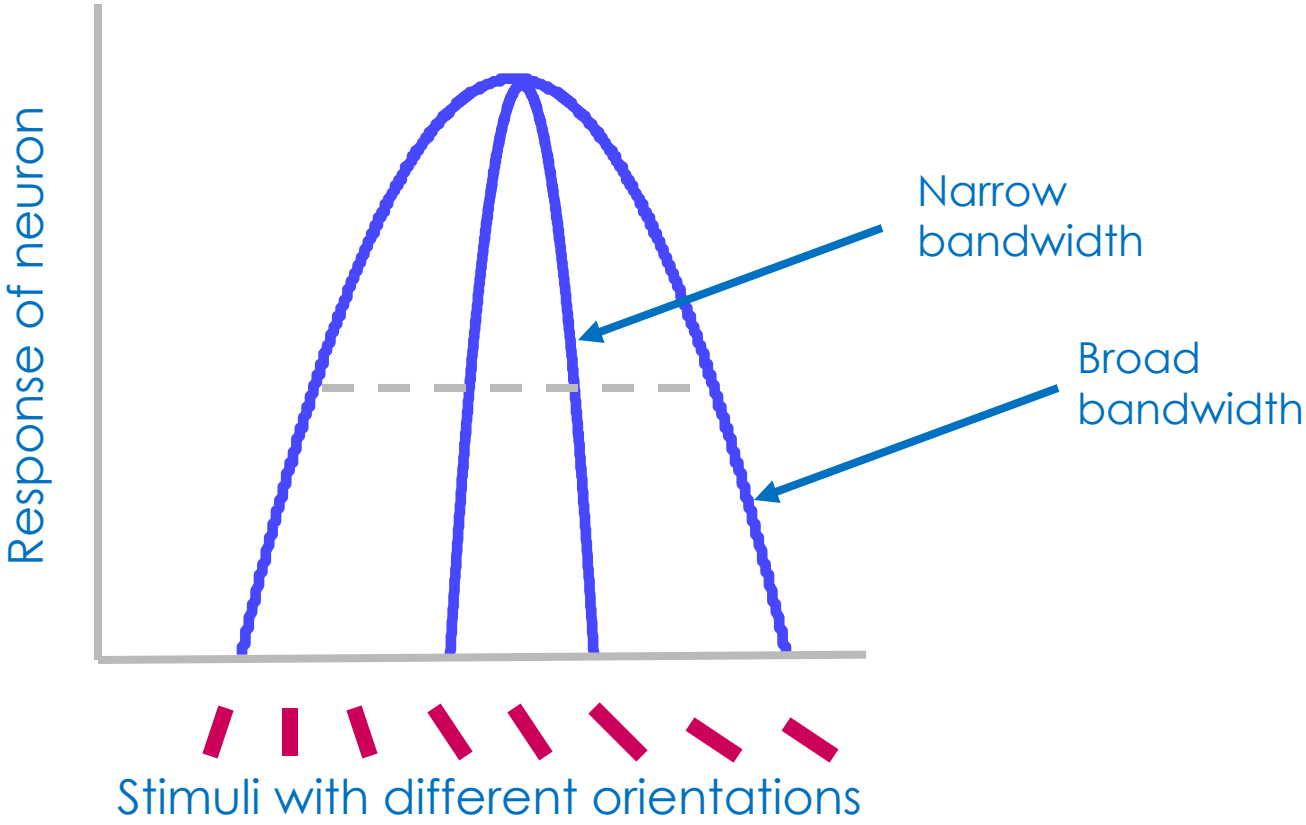
Measuring orientation bandwidth



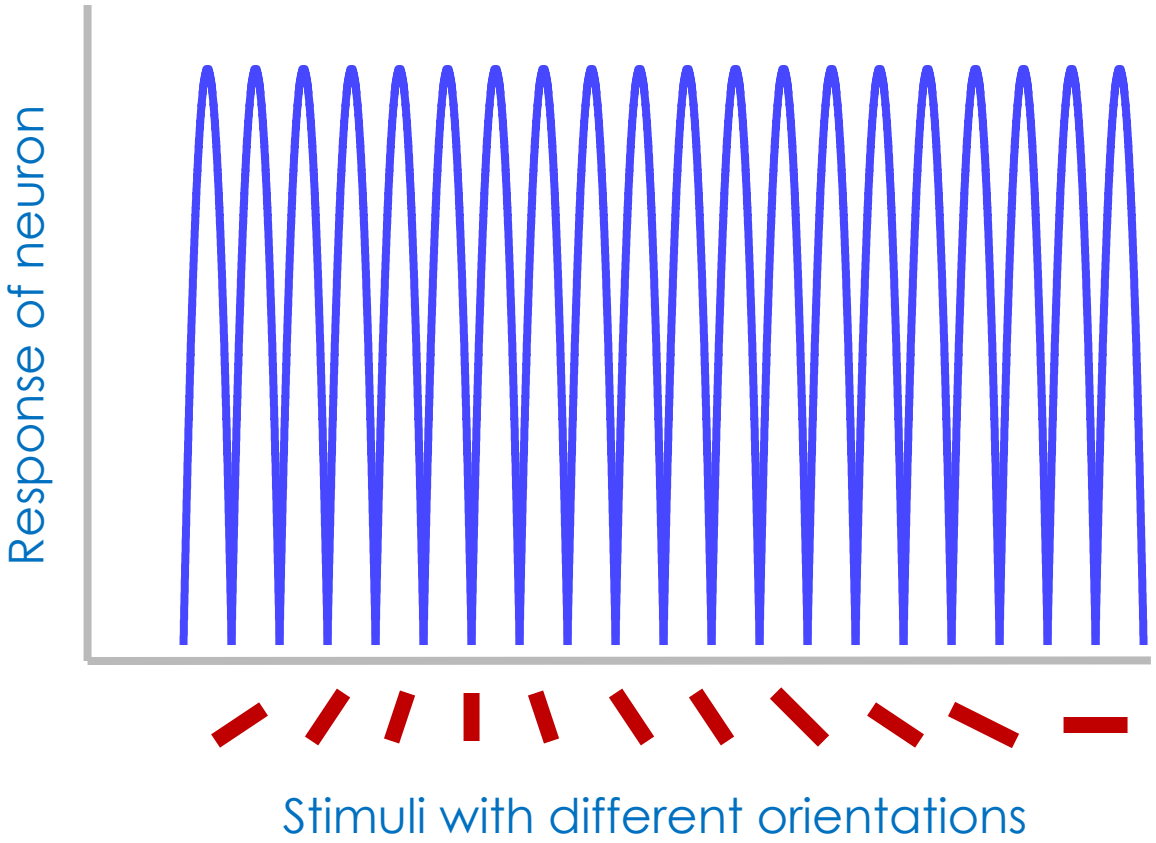
Orientation bandwidth given in degrees at half response height

What is the bandwidth?

Significance of Bandwidth I



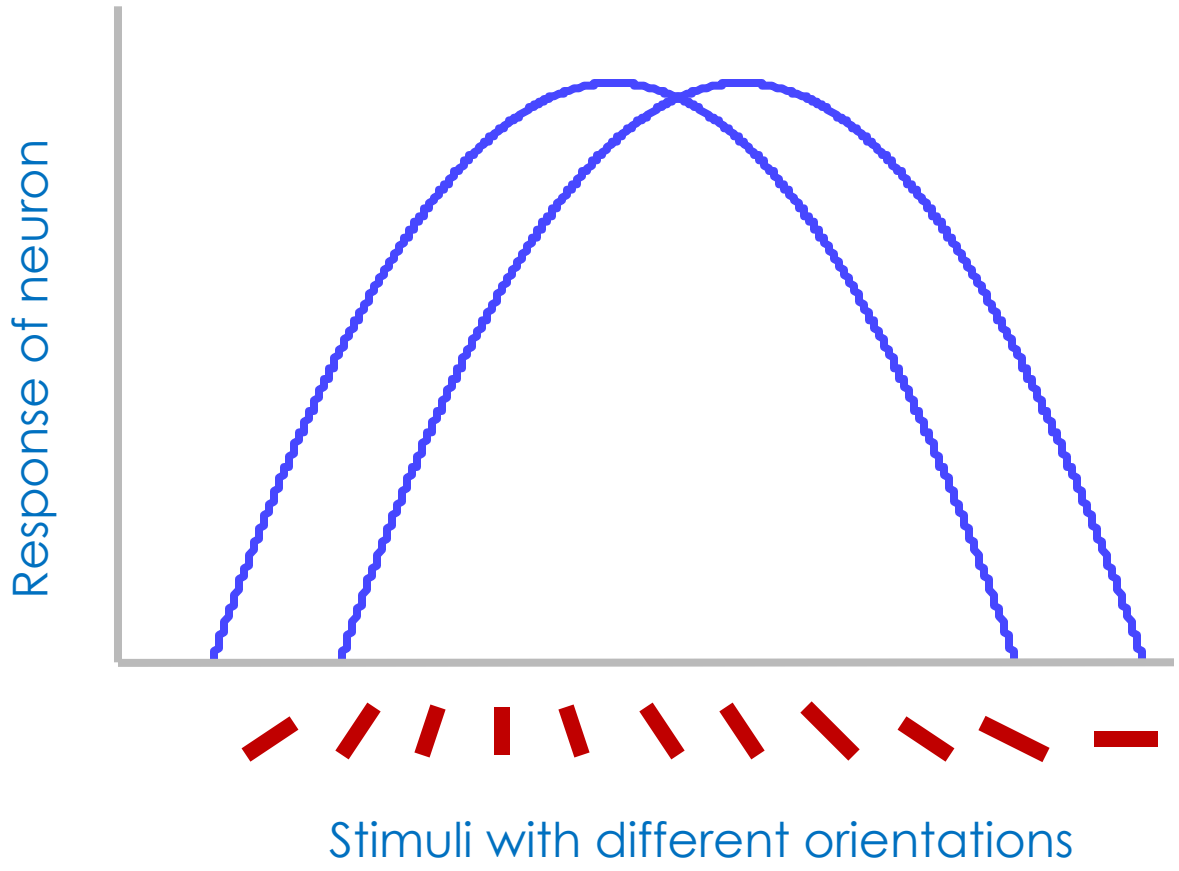
Significance of Bandwidth II



Many neurons with narrow bandwidths

What are the advantages and disadvantages of this arrangement?

Significance of Bandwidth III

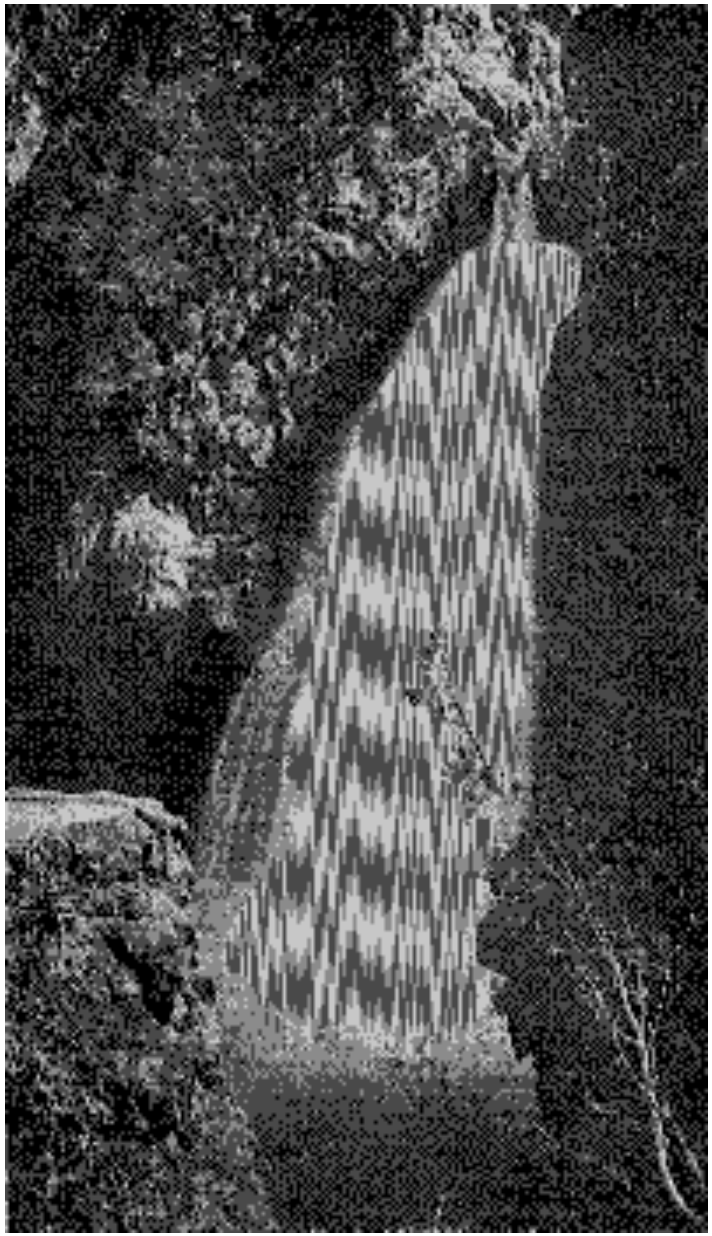


Few neurons with broad bandwidths

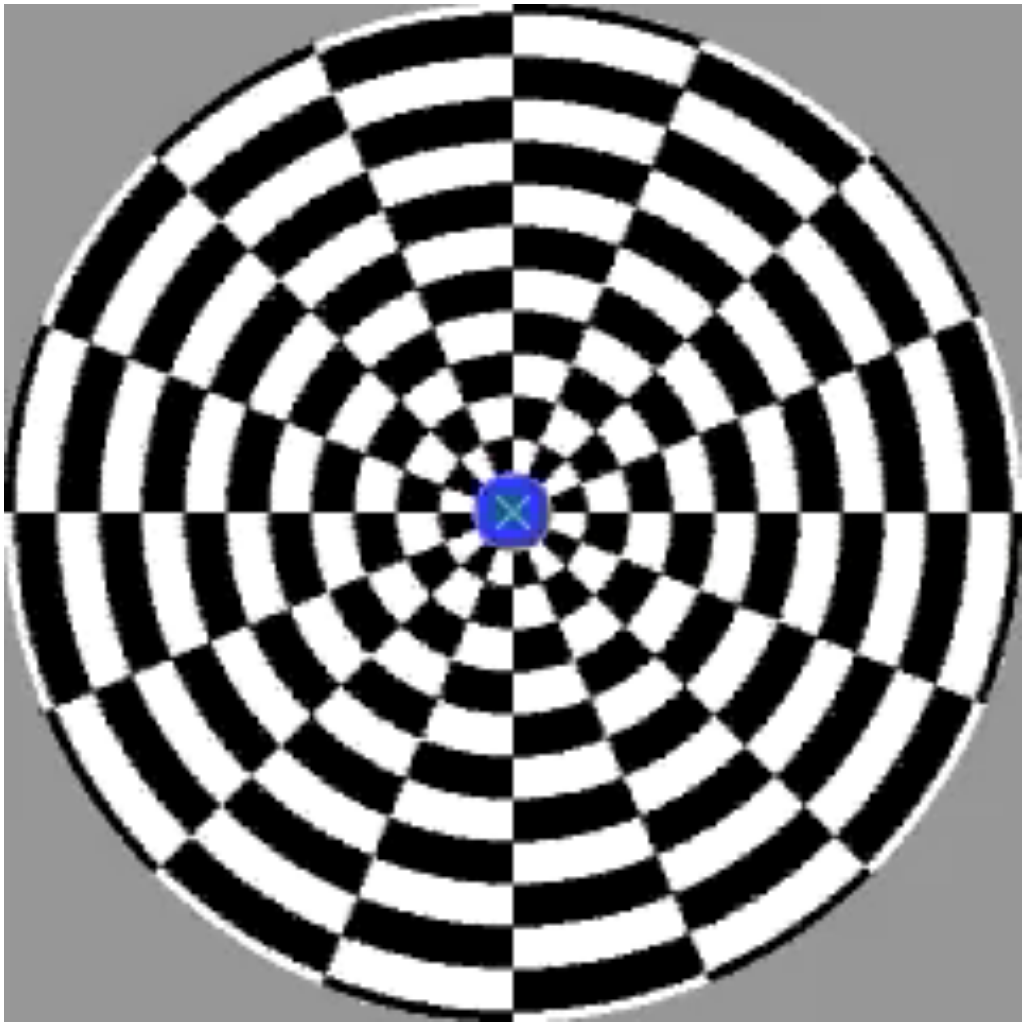
What are the advantages and disadvantages of this arrangement?

More after-effects!!

Motion after-effect



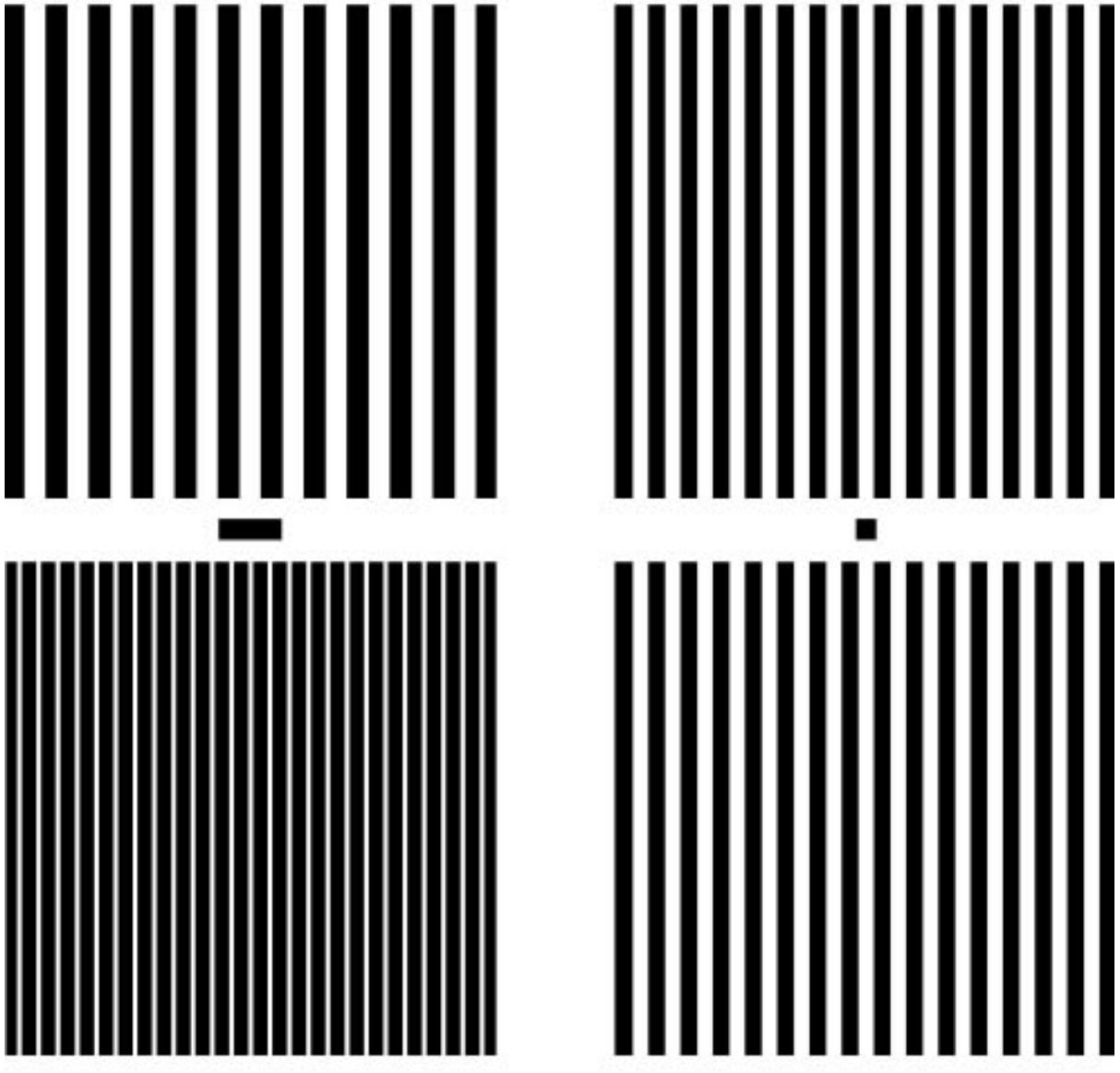
Motion after-effect



Spatial frequency after-effect

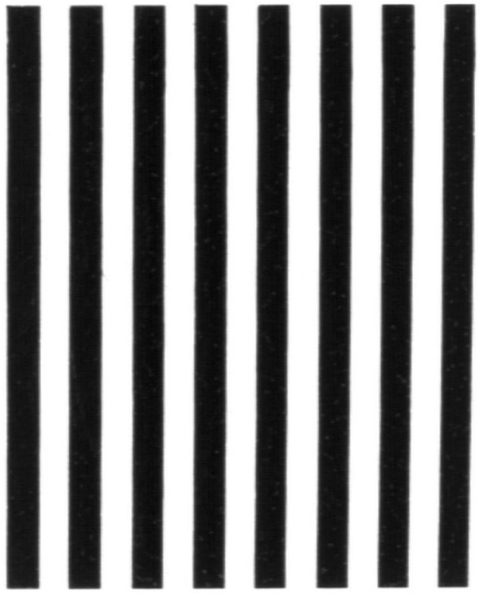
Move your eyes back and forth along the horizontal fixation line on the left for a minute, then transfer your gaze to the square spot on the right.

Do the two gratings Above and below appear different in spatial frequency?



Curvature after-effect

Adapt for a minute..

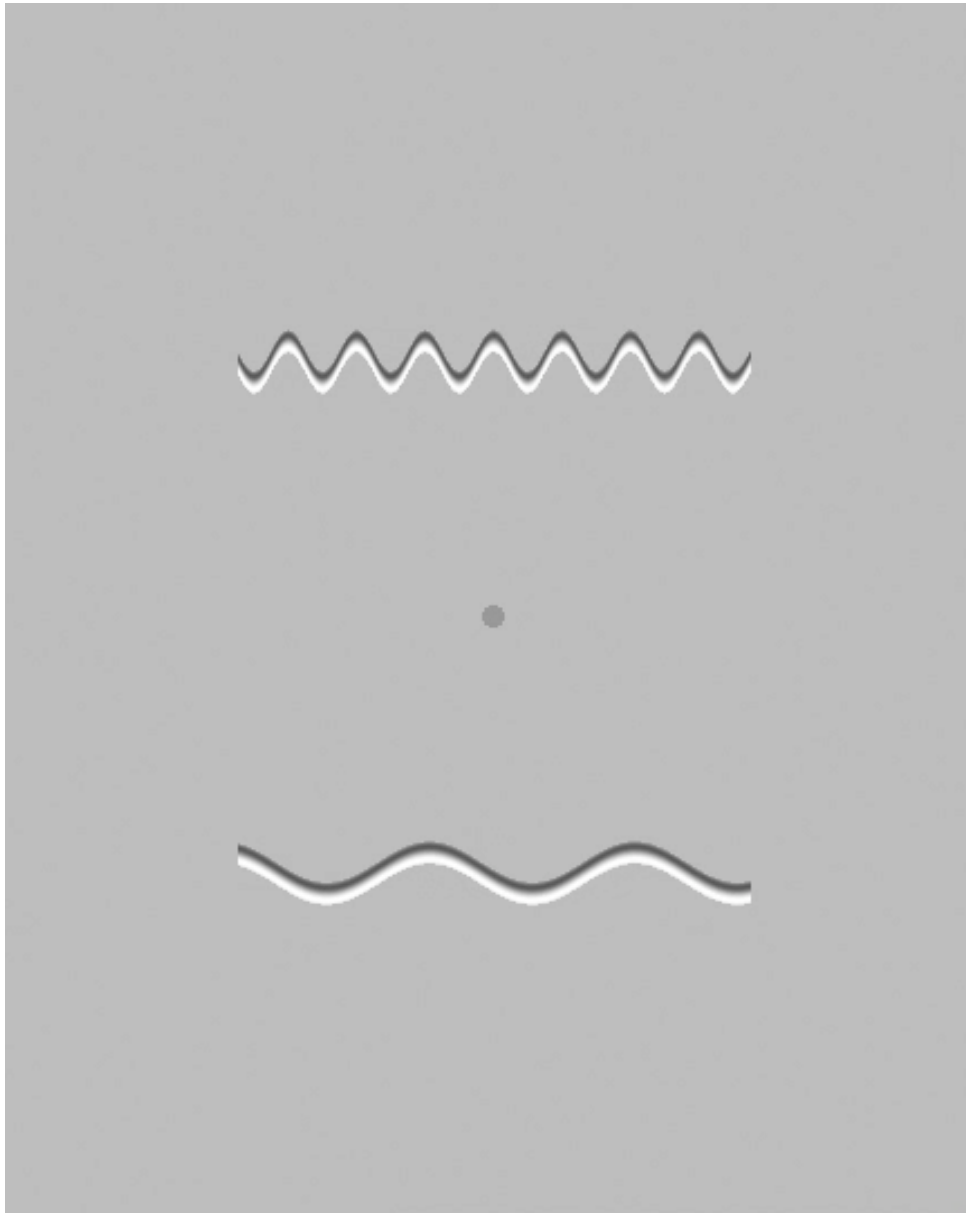


Test: do you see curvature?

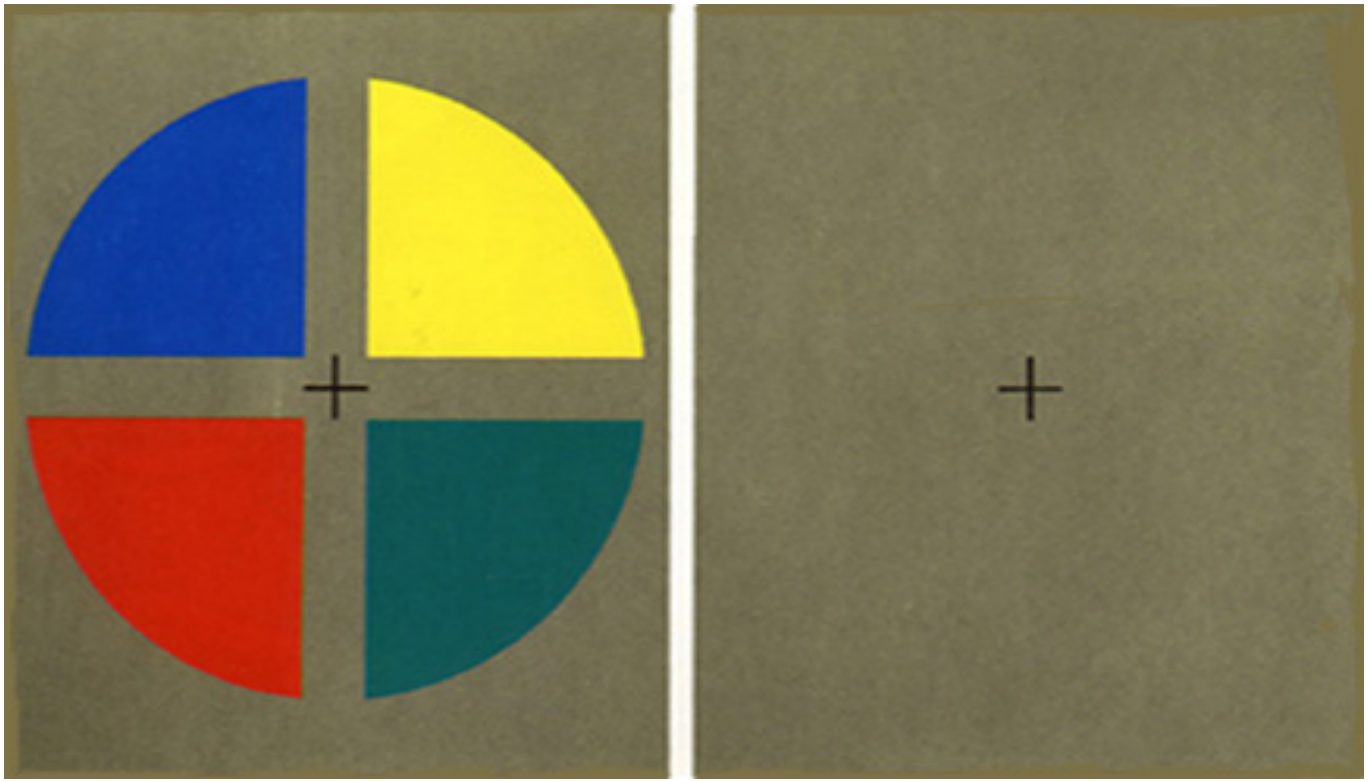
..or just the tilt after-effect?

Shape-frequency after-effect (Gheorghiu & Kingdom, 2006)

Fixate the middle spot for about a minute. The video will then stop, showing two stationary contours with the same shape frequency. Do they look different in shape frequency?



Colour after-effect



Adapt
stimulus

Test
stimulus

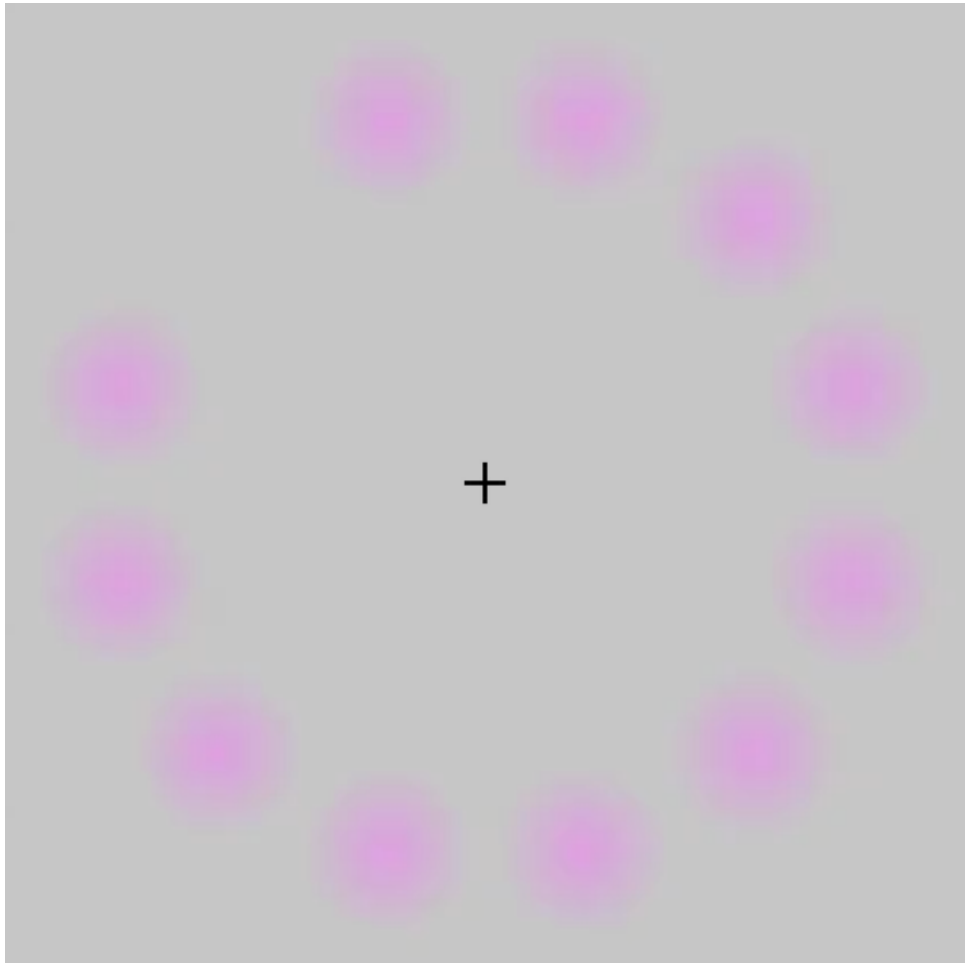
Colour after-effect

Adaptation stimulus

Colour after-effect

Test stimulus - what do you see?

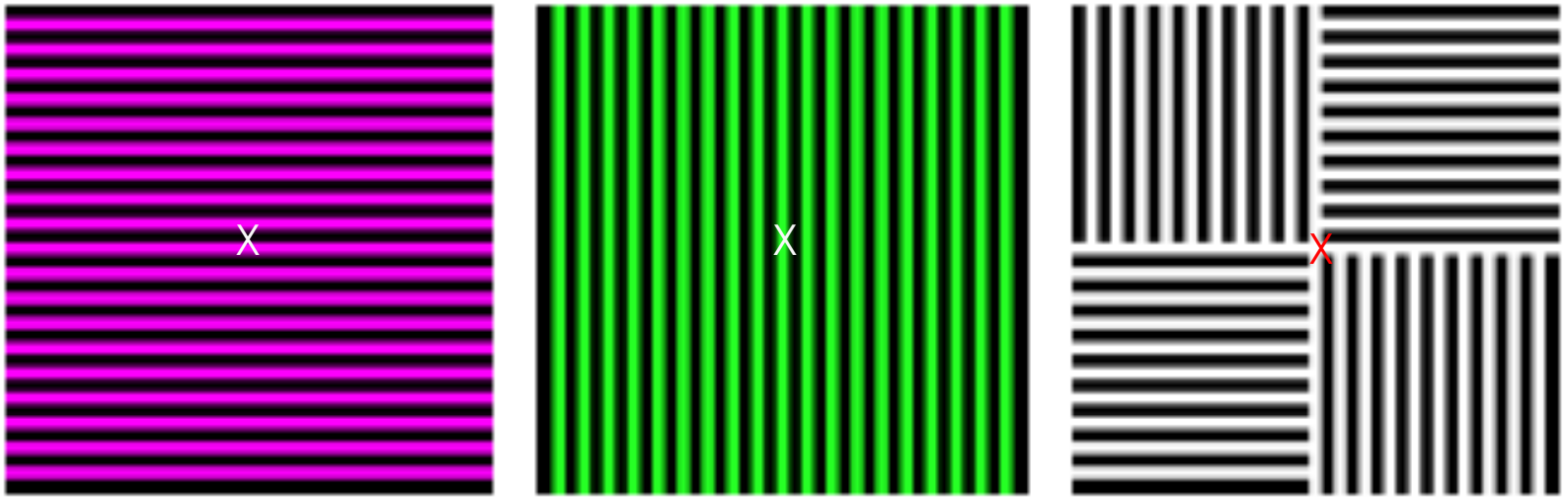
The “Lilac chaser”



The circulating green dot is not physically there – it’s an after-image!

Courtesy of Katsuaki Sakata

McCollough effect

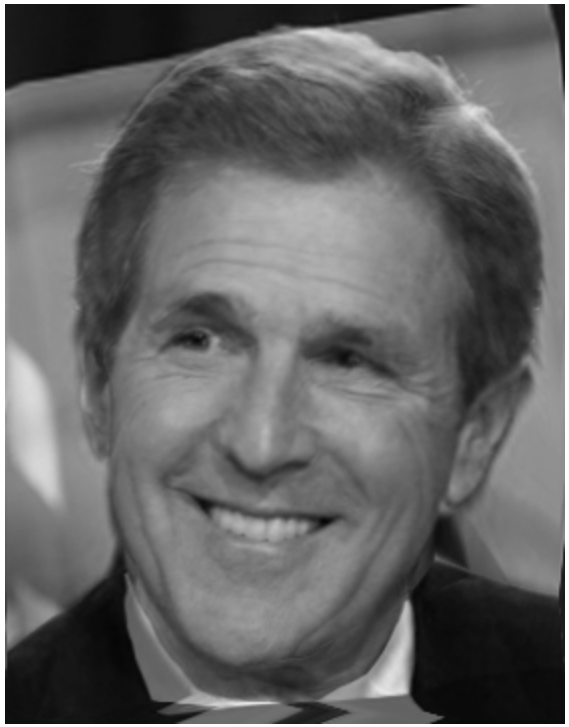
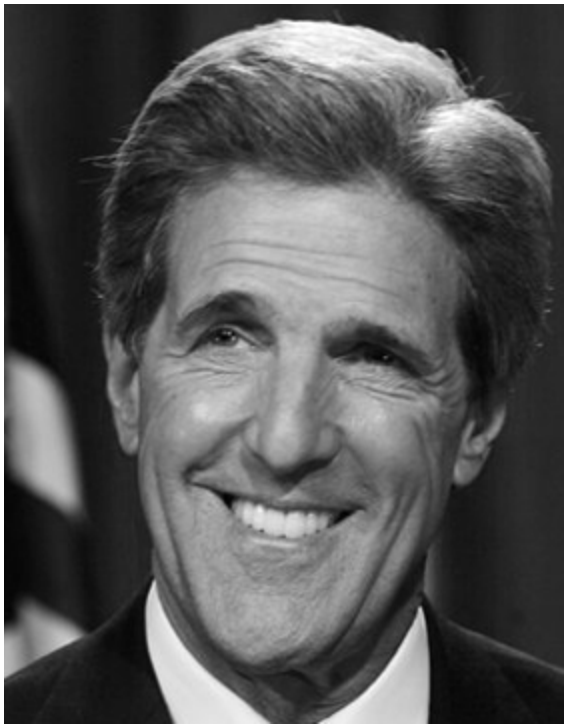


Adapt stimuli:
move eyes back and forth between the crosses for 1 min

Test stimulus:
Do you notice different faint colors for the horizontal and vertical stripes?

Face Aftereffects

The identity of the middle image is ambiguous, but after adapting to either Bush, or to Kerry, the choice is clear.

Courtesy of Mike Webster, University of Reno.