visual perception of orientation

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Master thesis defense

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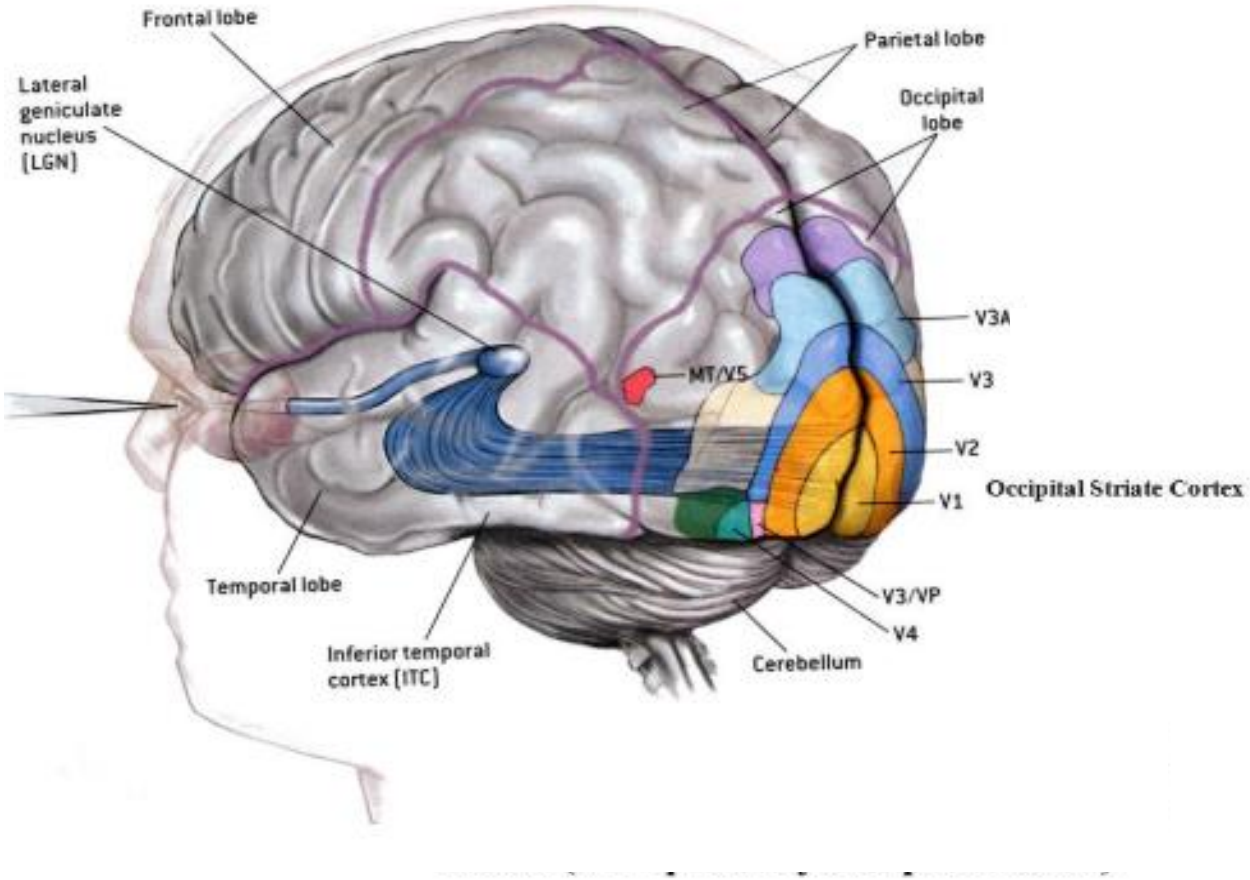
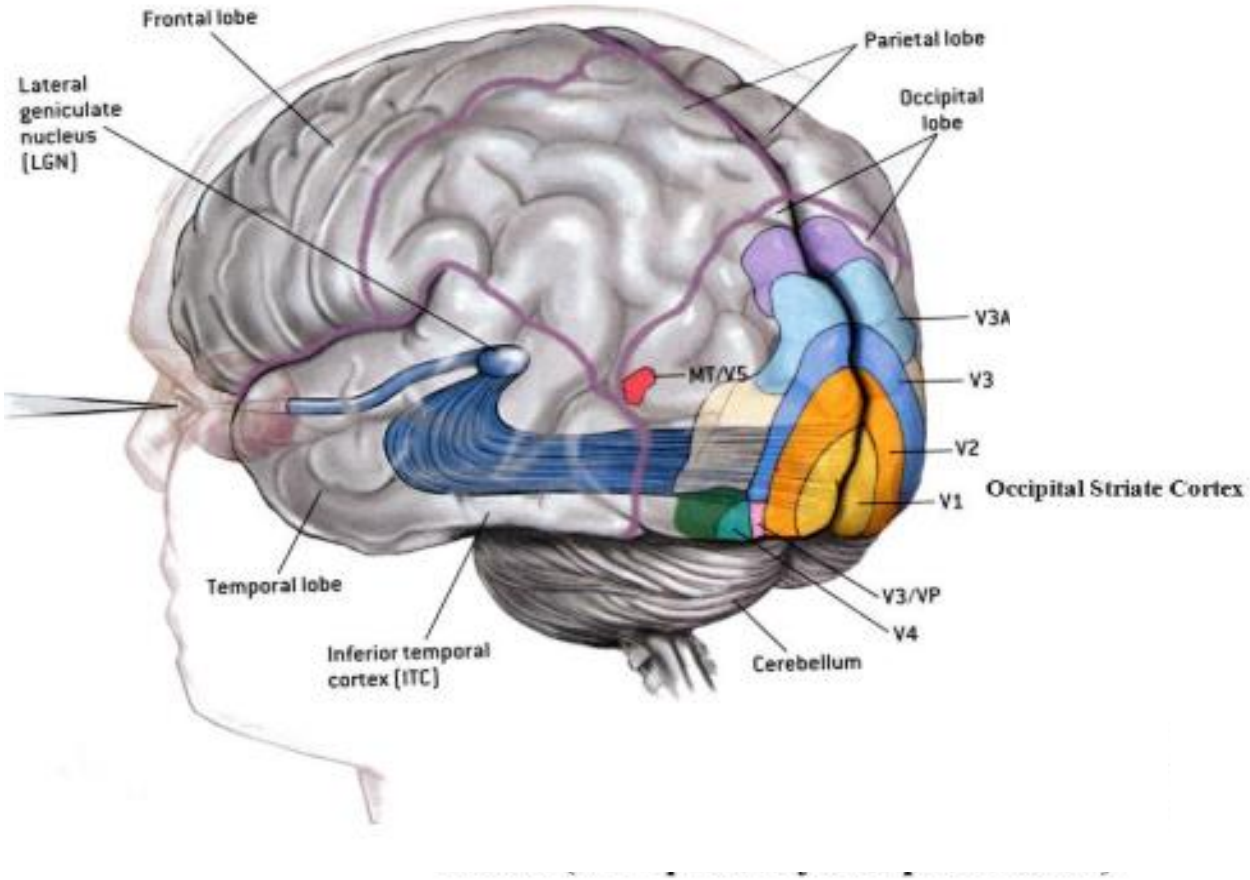

Frontal lobe
Parietal lobe
Lateral geniculate nucleus (LGN)
Occipital lobe
V3A
MT/V5
V3
V2
V1
Occipital Striate Cortex
Temporal lobe
V3/VP
V4
Inferior temporal cortex (ITC)
Cerebellum

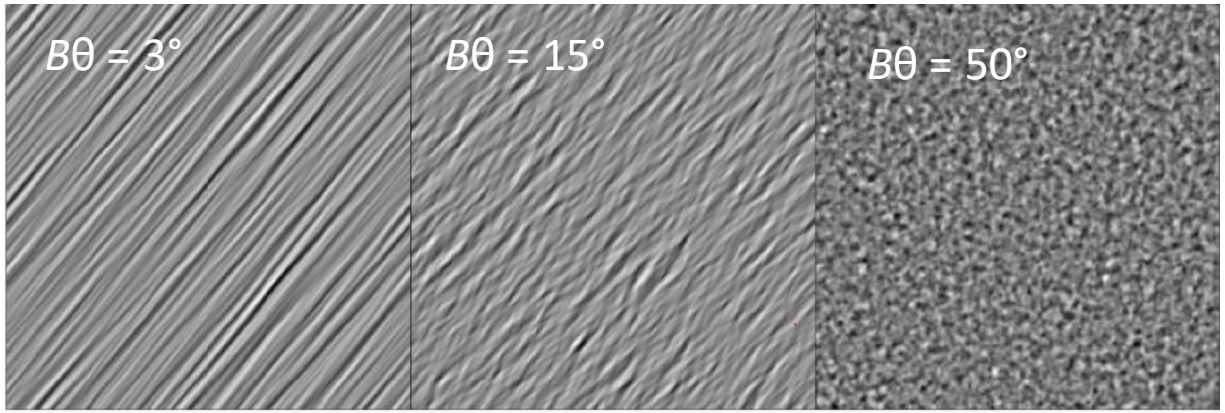


What is the effect of this parameters on **orientation selectivity ?**

Psychophysics

- Stimuli : **MotionClouds**

Example with same **θ** (15°)



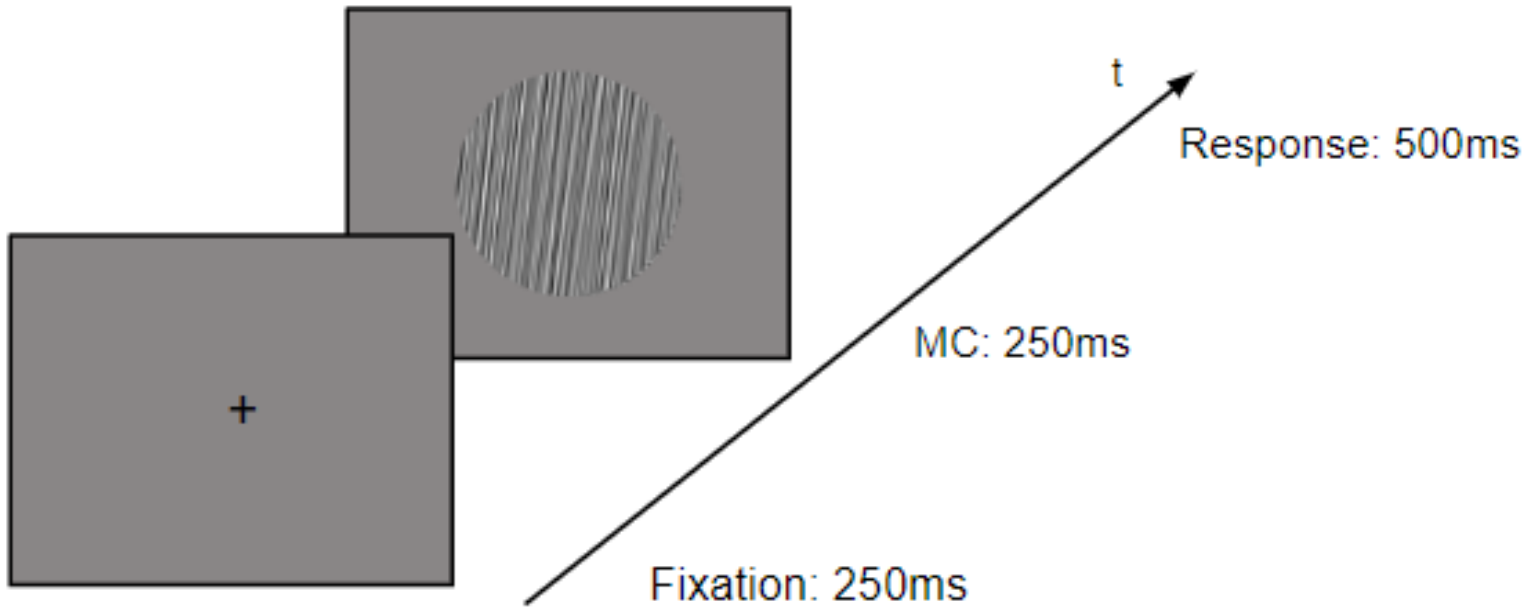
Leon et al., *Neurophysiology,* 2012

Parameters:

Orientation angle **θ**	Orientation bandwidth ***Bθ***
Spatial frequency ***Sf***	Spatial-frequency bandwidth $\boldsymbol{B_{sf}}$

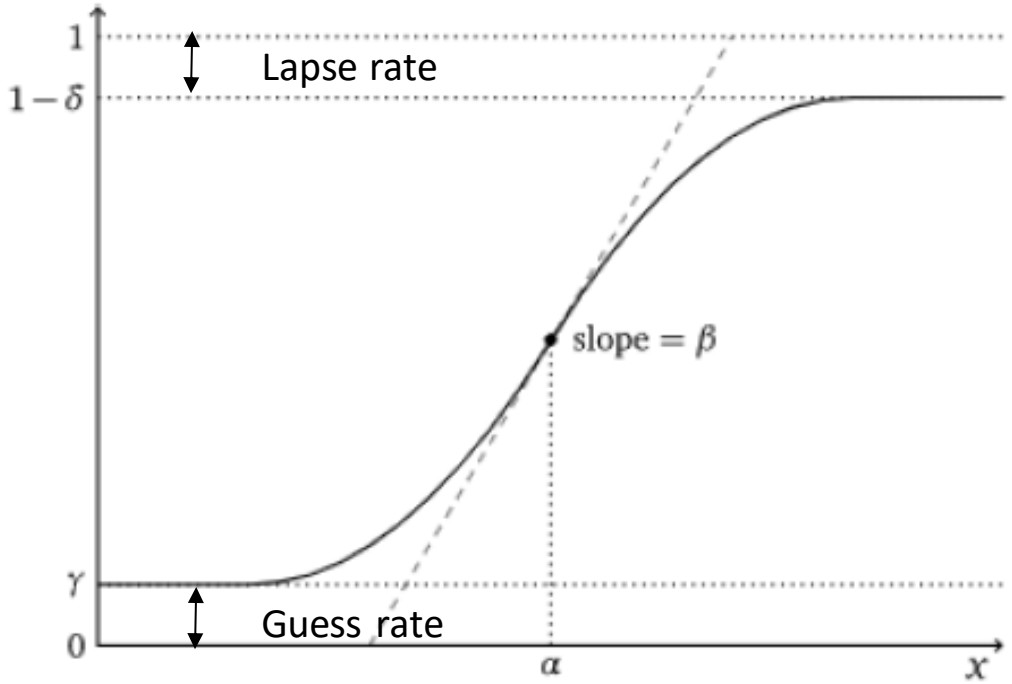
Psychophysics

- Experiment

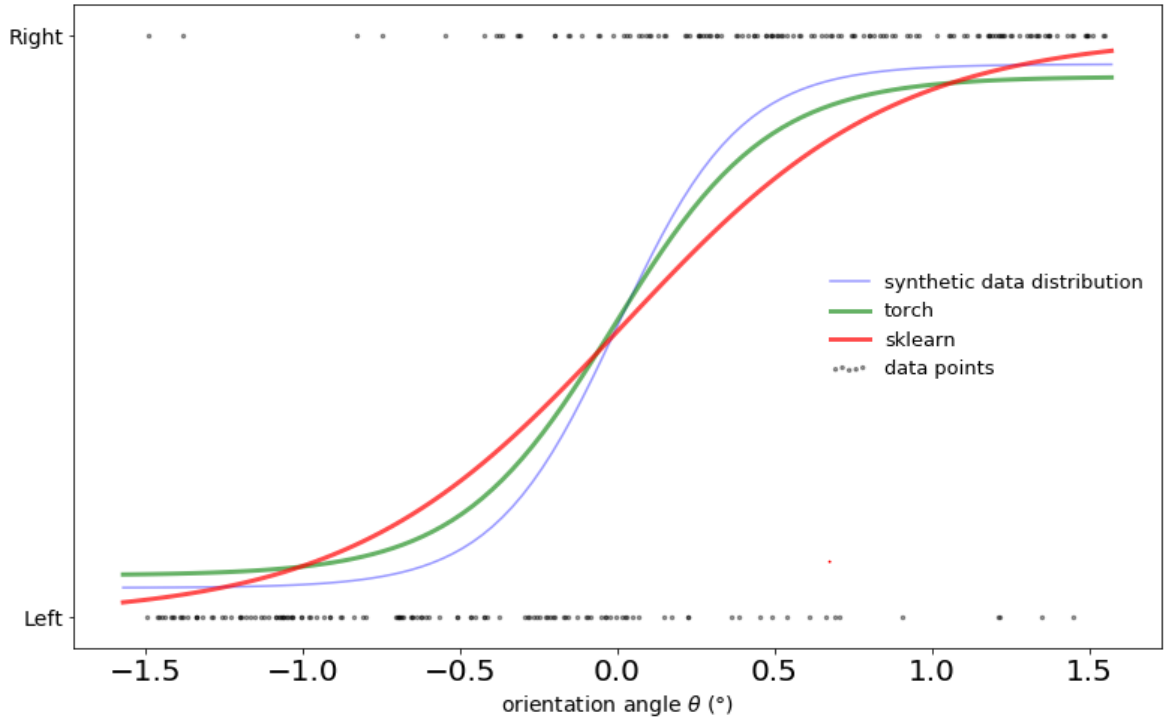


Psychophysics

- Fitting

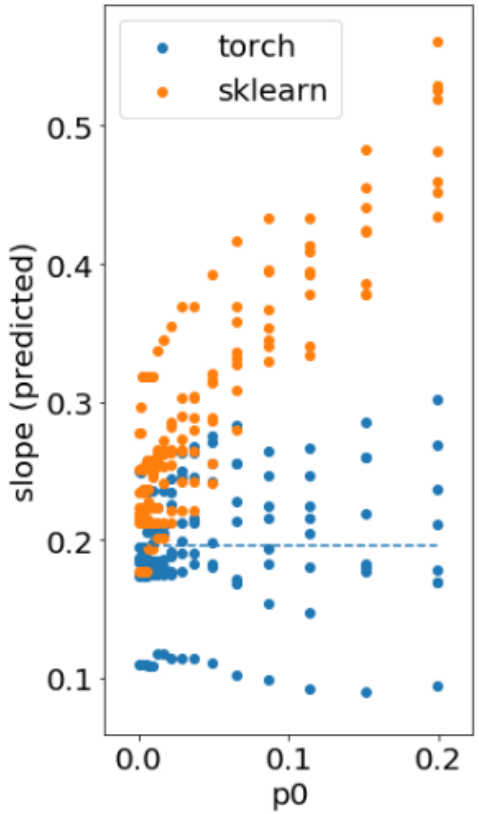


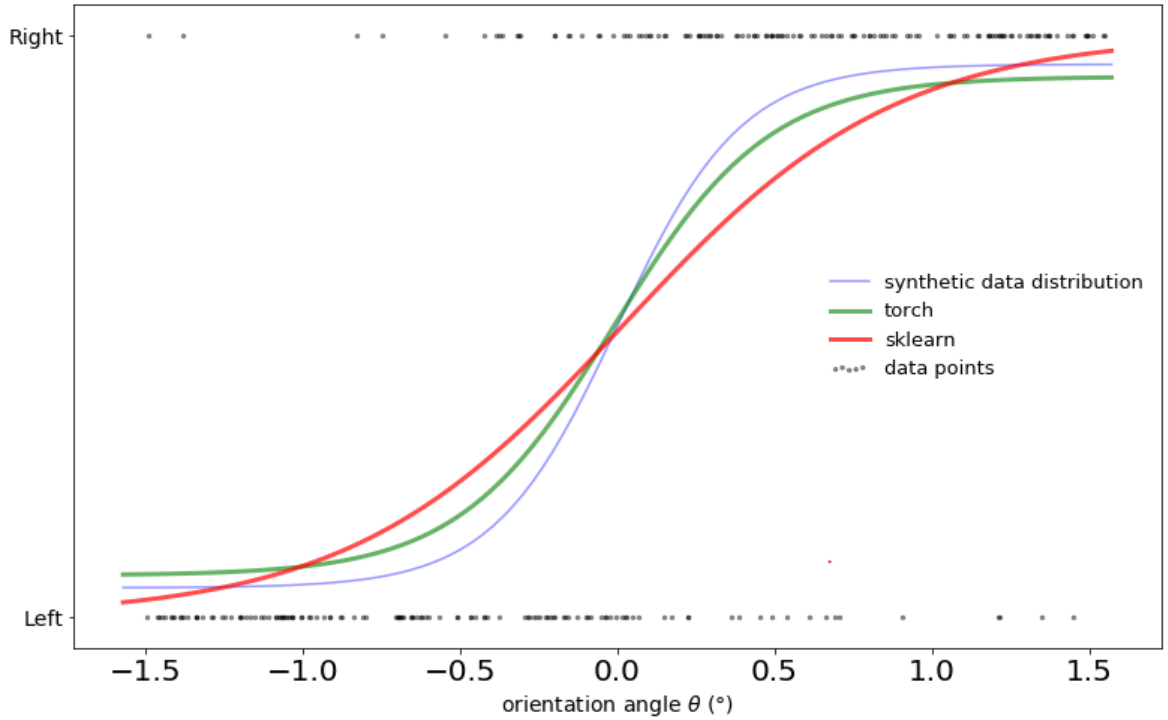
Threshold



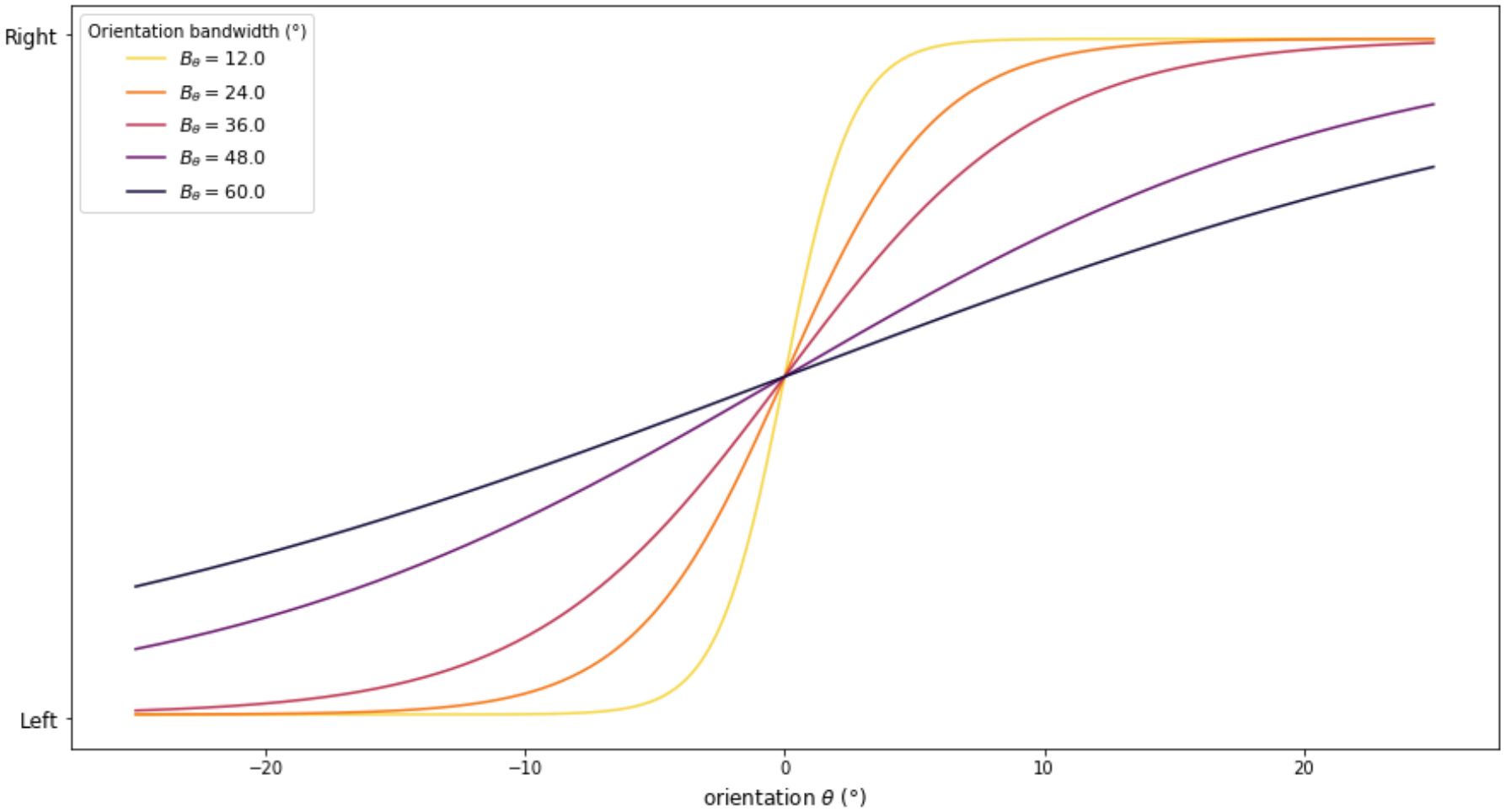
Psychophysics

- Fitting

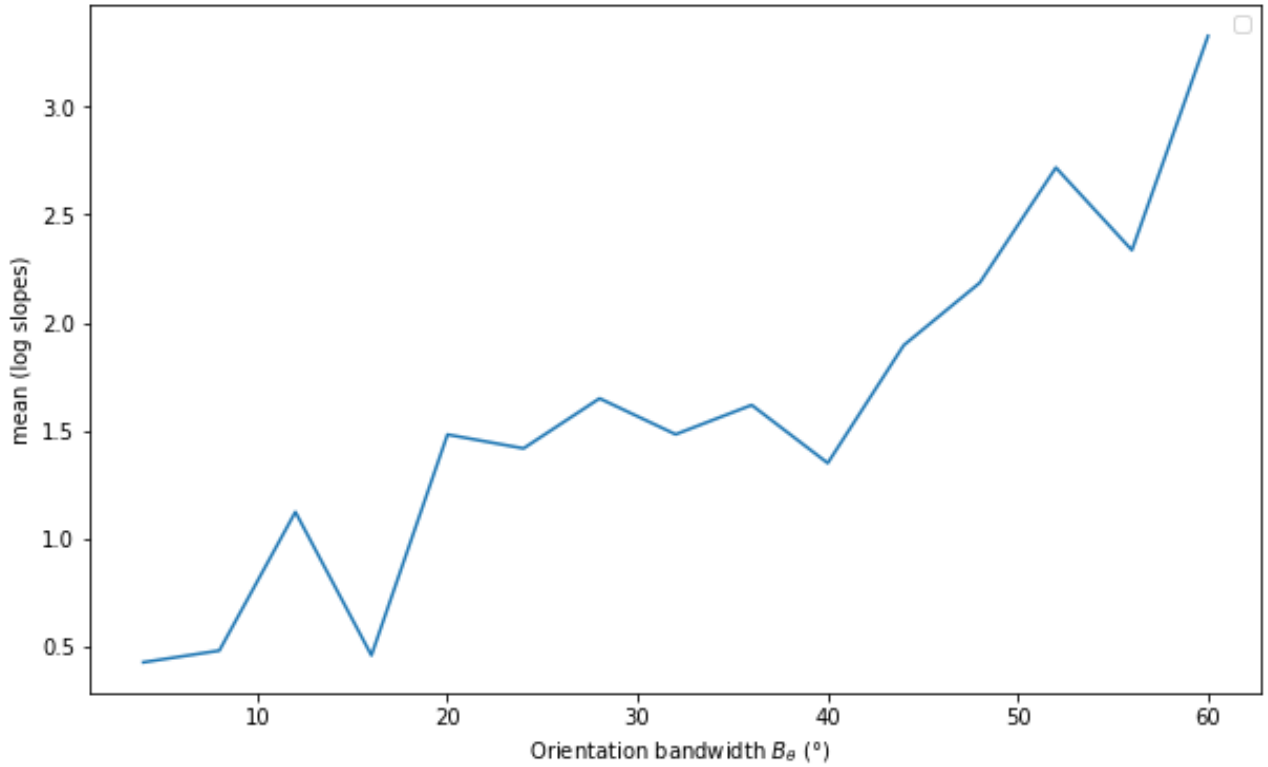




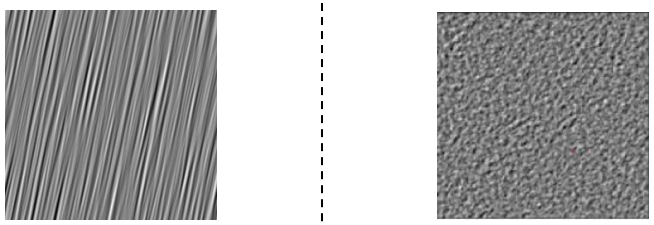
- Effect of the **Orientation Bandwidth**



- Effect of the **Orientation Bandwidth**

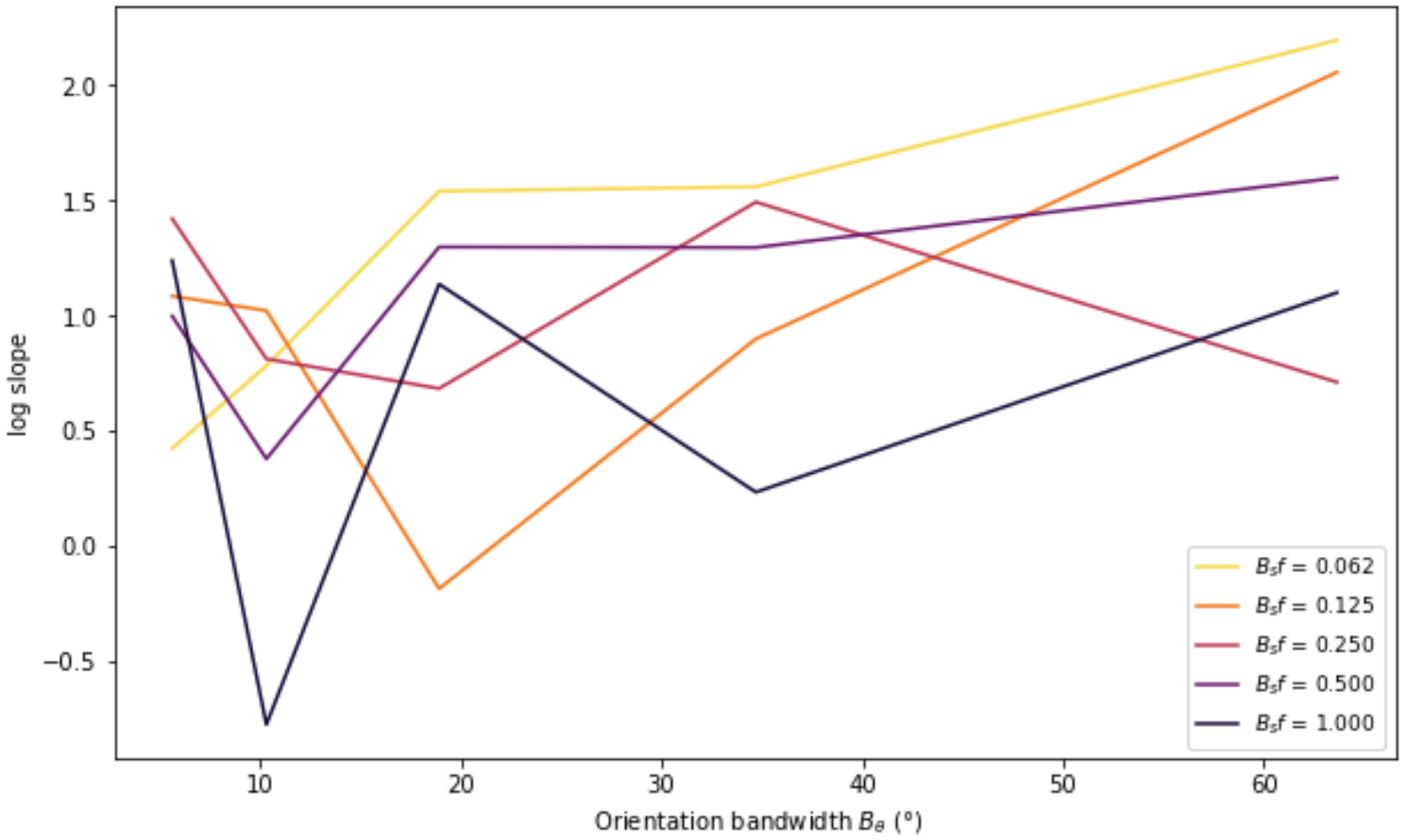


Stimuli: ***Bθ*** < 30°



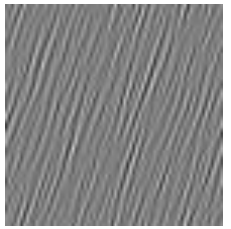
Bθ > 30°

- Effect of the **spatial-frequency bandwidth**

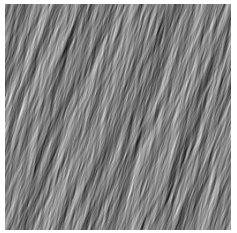


Stimuli:

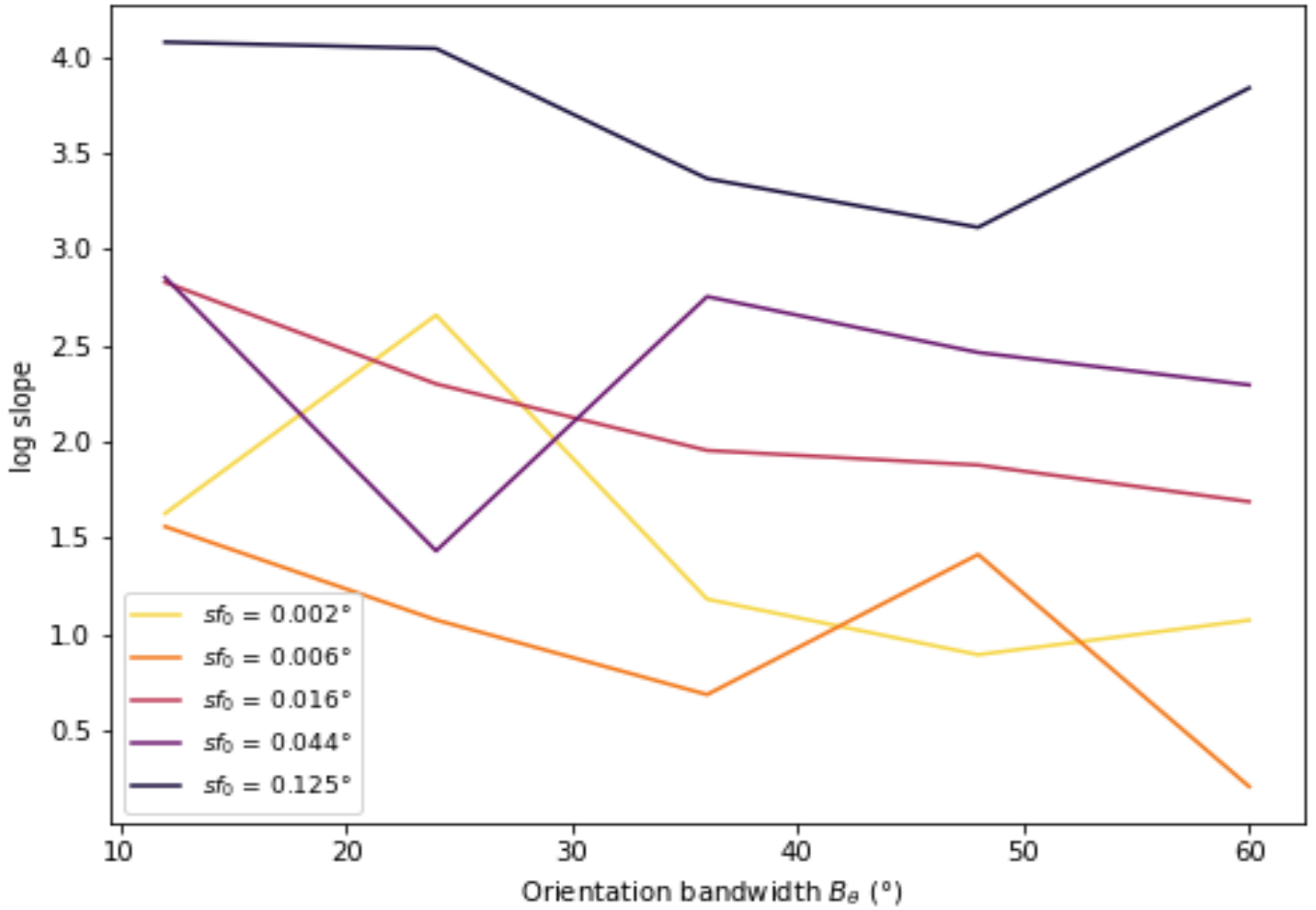
B_{sf} < 0.250



B_{sf} > 0.250

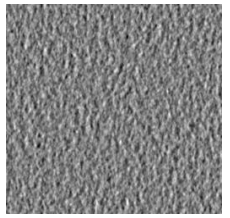


- Effect of the **spatial-frequency**

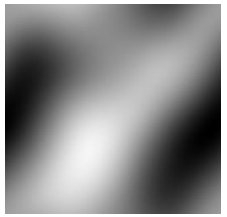


Stimuli:

Sf < 0.016

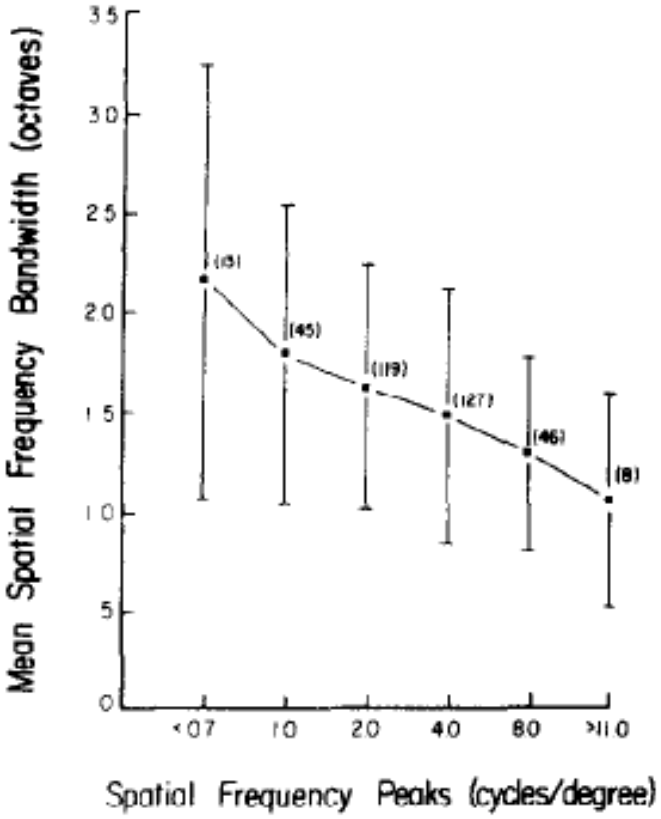


Sf > 0.016



This parameters seem to **have an effect** on the ability to discriminate orientation:

- $B\theta$ ($\sim$ external noise) decreases the acuity
- *Sf* decreases the acuity
- relationship between *Sf* / $B\theta$
- B_{sf} also affects the orientation discrimination

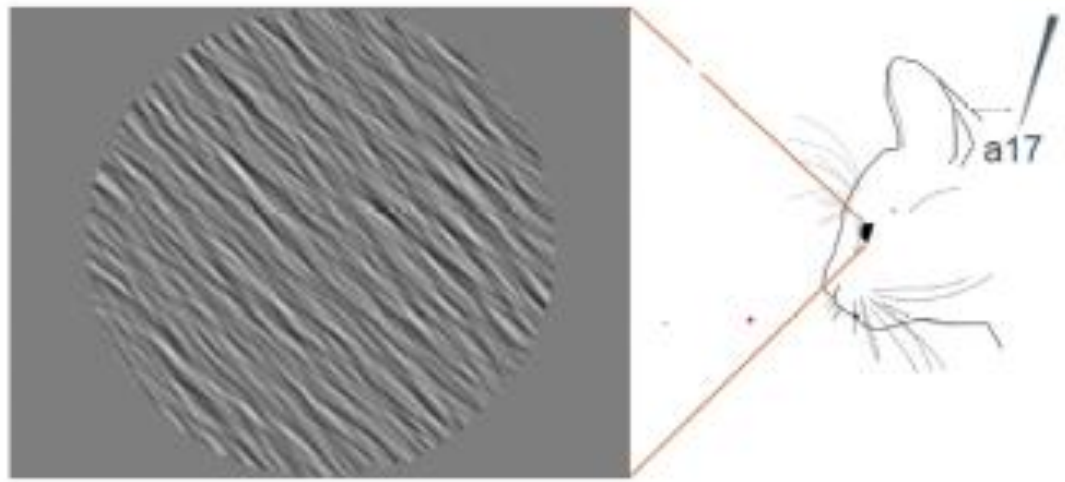


Devalois et al., *Vision research*, 1982

! Serious Bias

Perspectives

- Preliminary works that could serve as **basis** for a larger study on orientation discrimination:
  - psychophysics/electrophysiology
  - psychophysics/computational model



H.Ladret