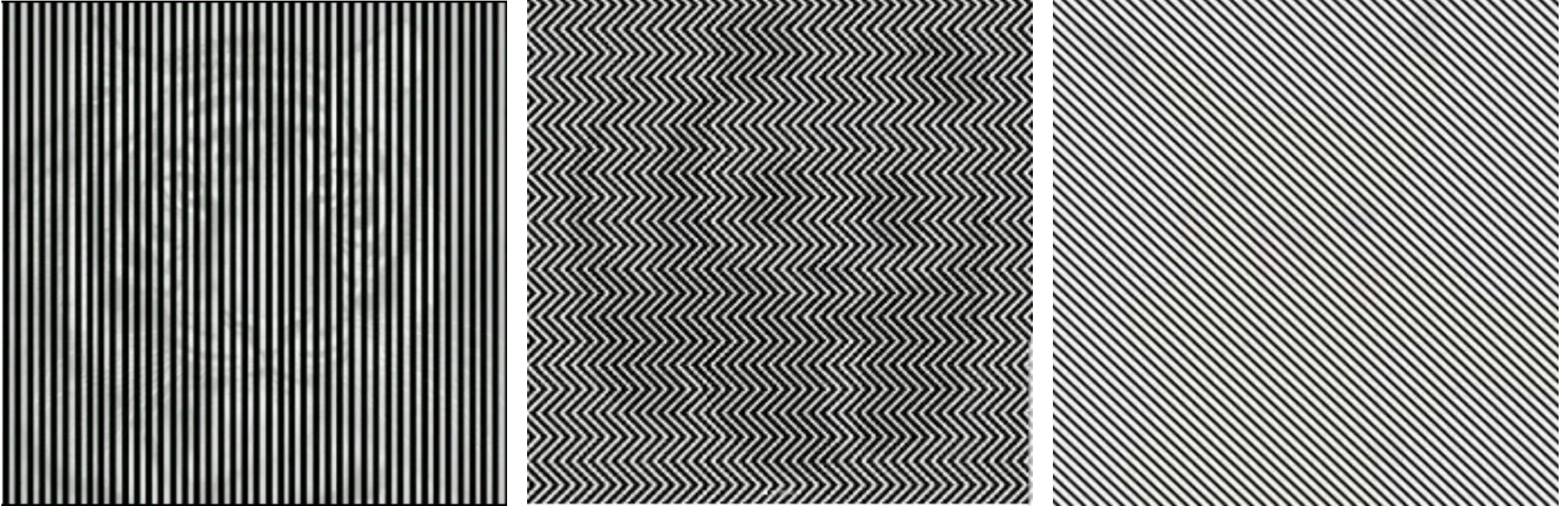


Automatic adjustment of the neural orientation space in astigmatic vision

Sangkyu Son

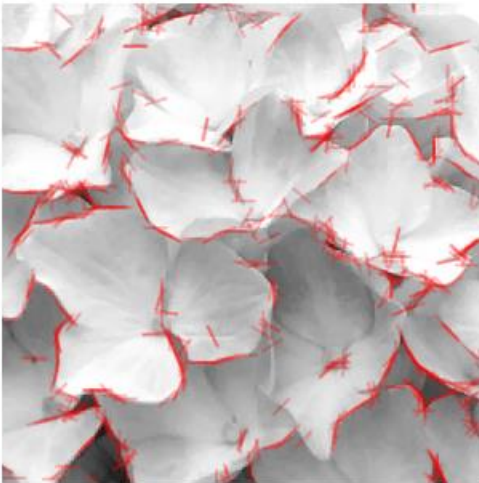
You probably have unnoticed astigmatism



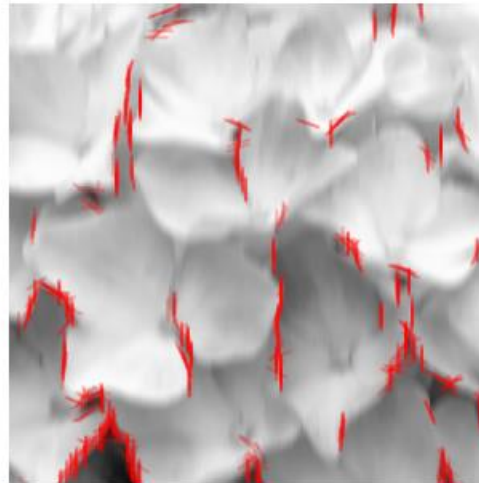
Prevalent (Attebo et al., 1999; Sorsby, 1960)
but unnoticed...

You probably have unnoticed astigmatism

Normal vision

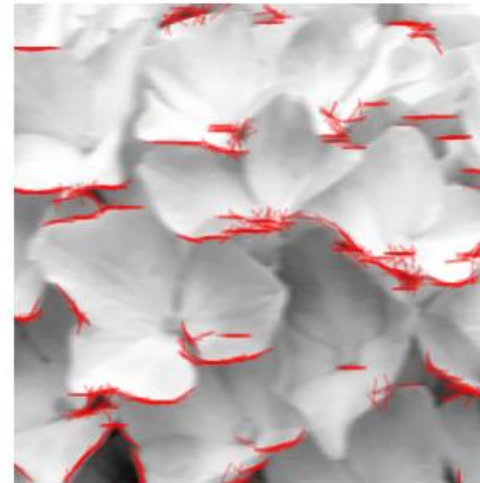


Retinal Distortion



+

Auto-compensation



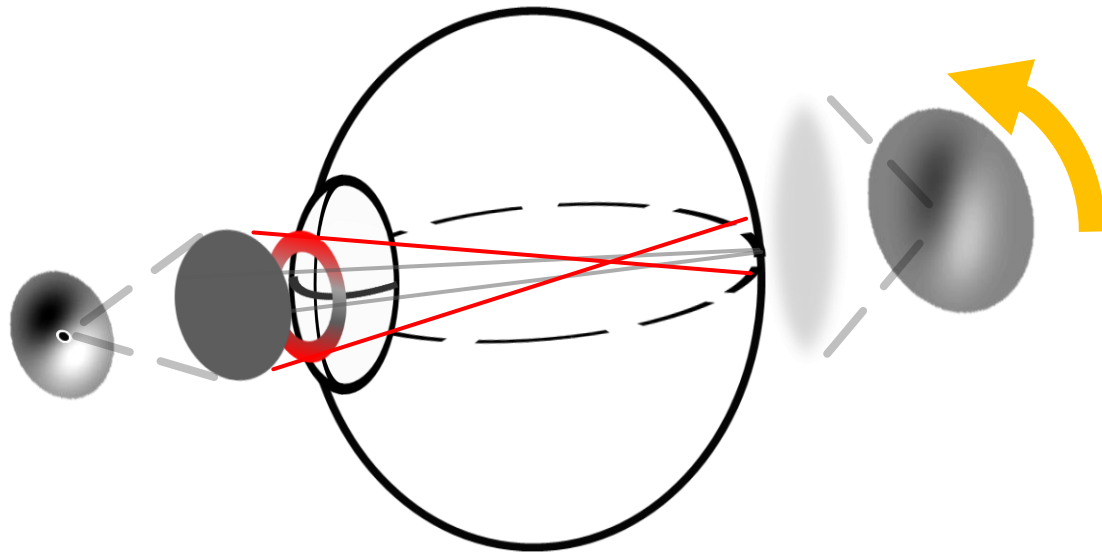
=

Modified
astigmatic vision

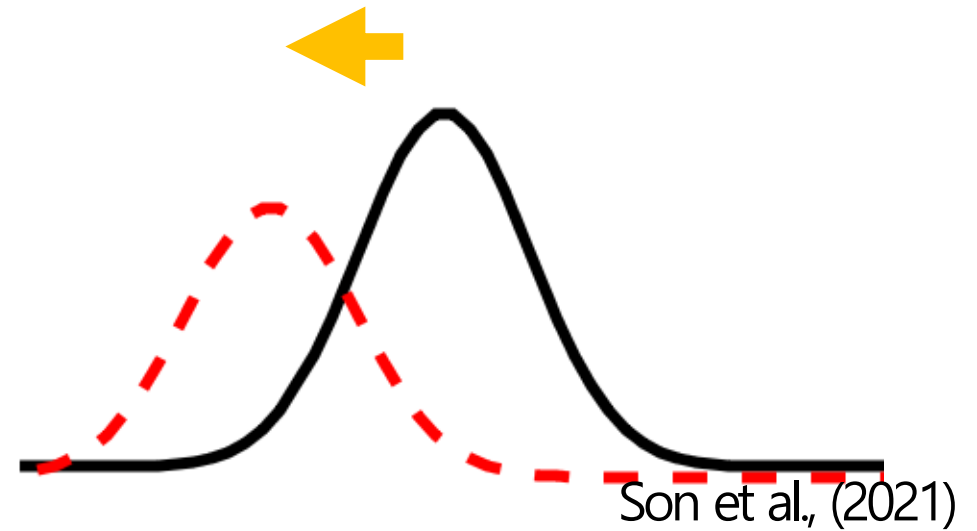


Adopted from Son et al. (under review)

Astigmatism and orientation perception

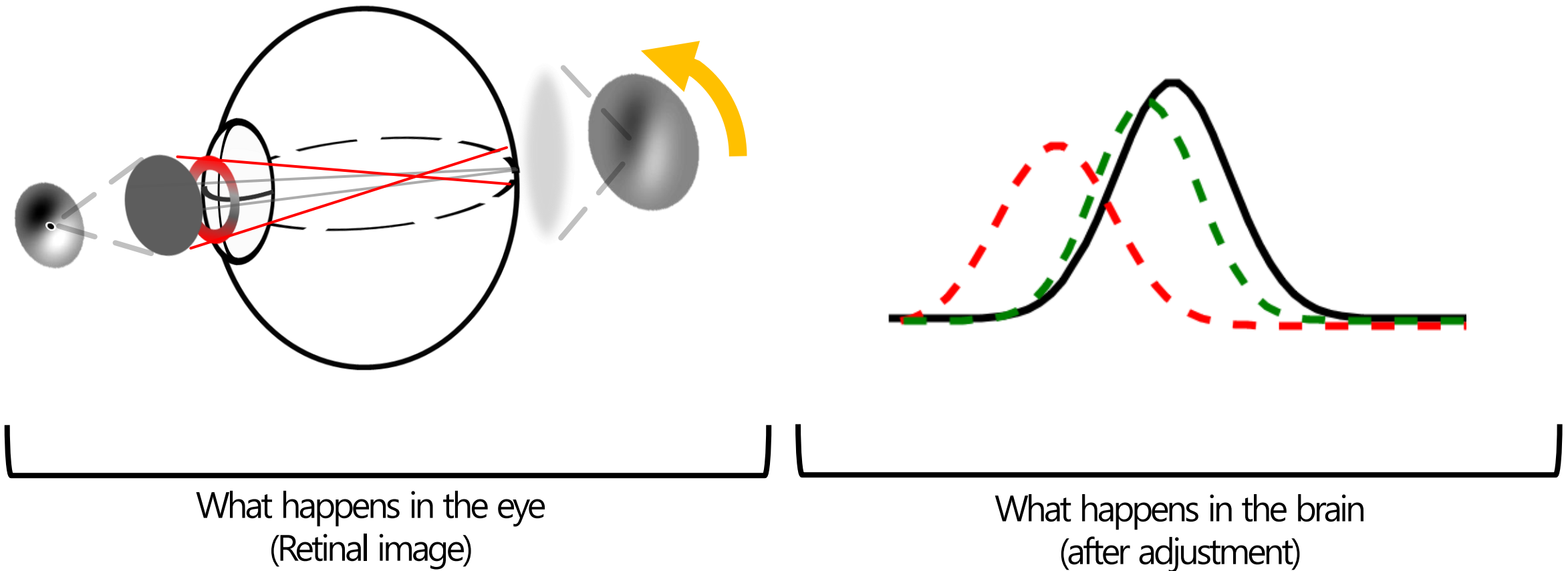


What happens in the eye
(Retinal image)

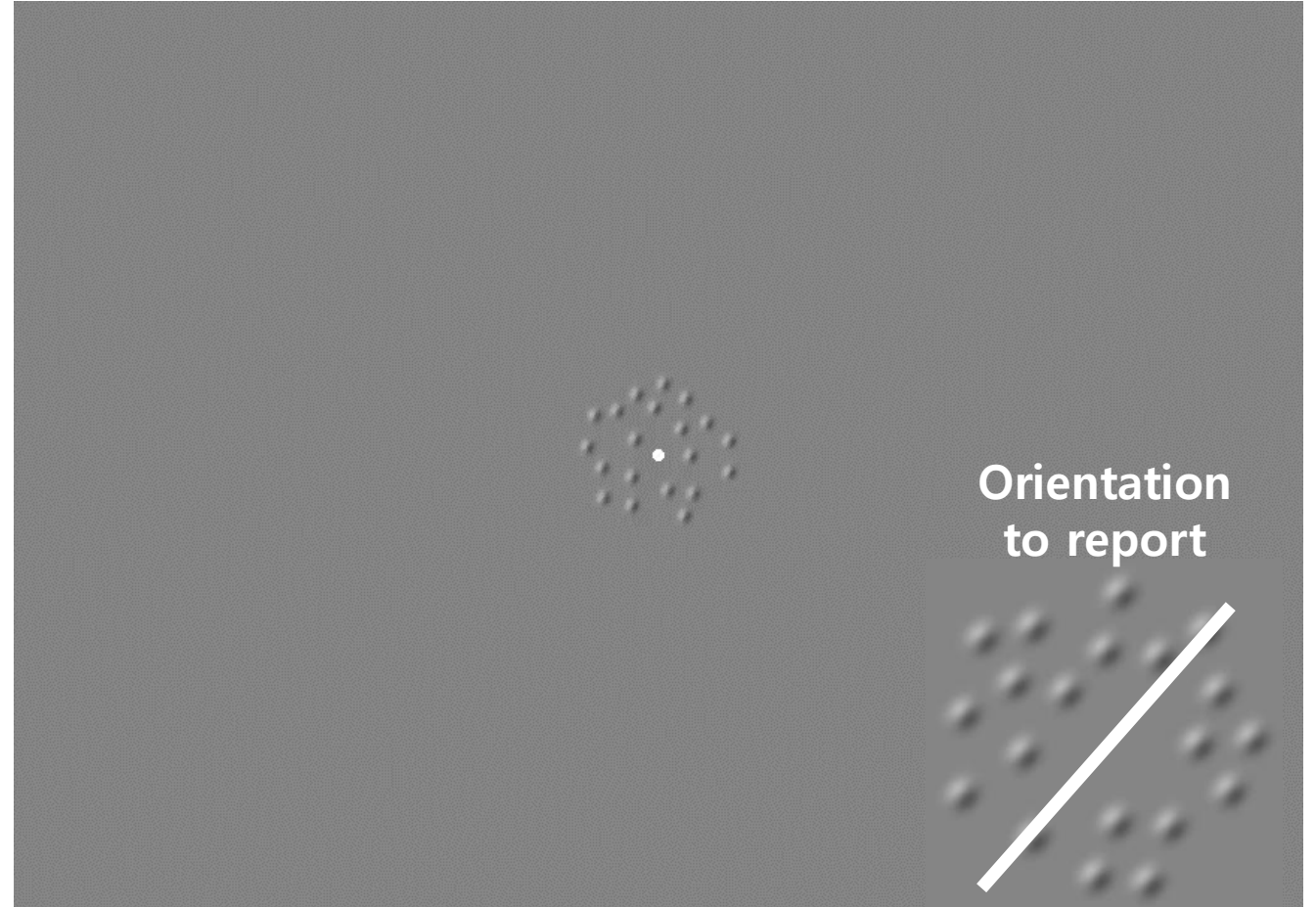
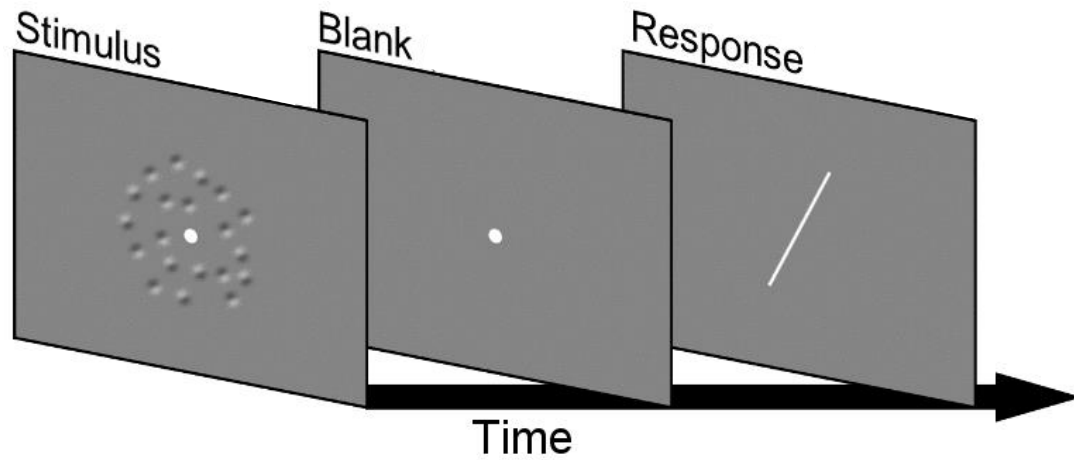


What happens in the brain
(before adjustment)

Astigmatism and orientation perception

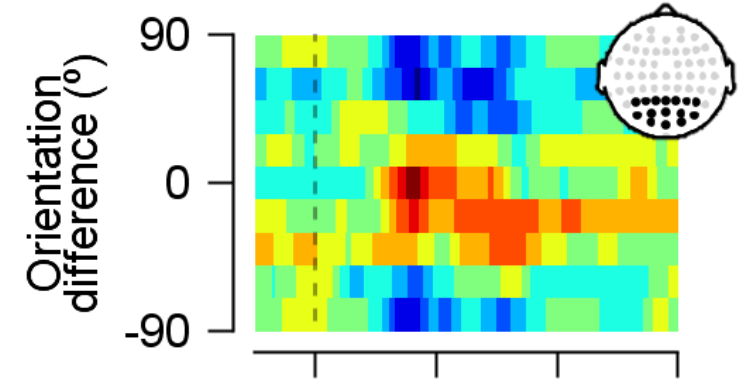
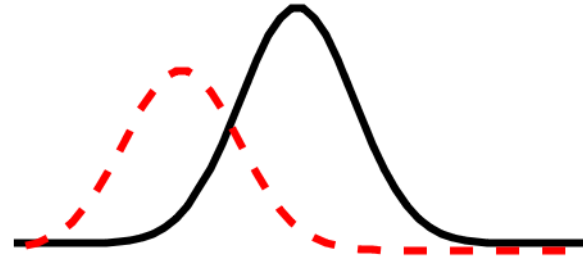


Experimental design

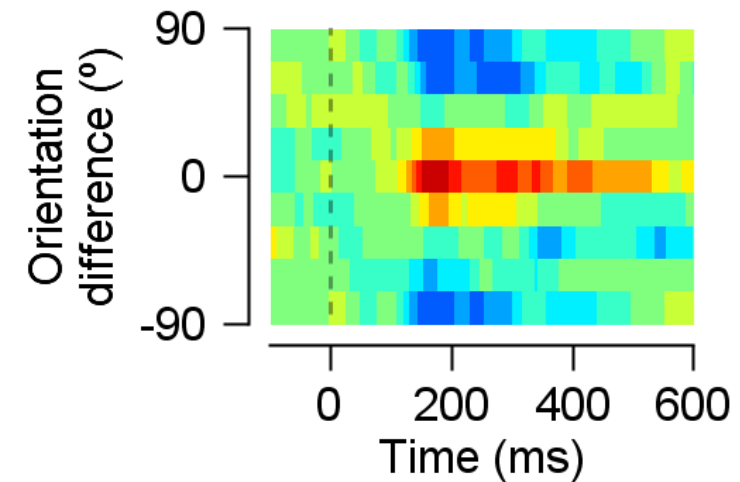
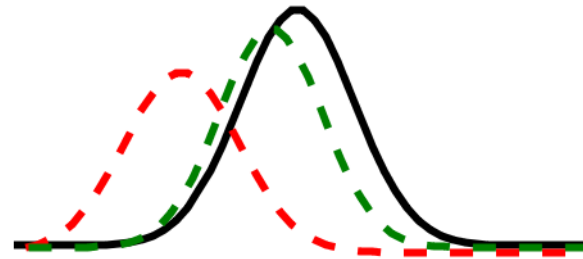


Result: less distortion in the chronic condition

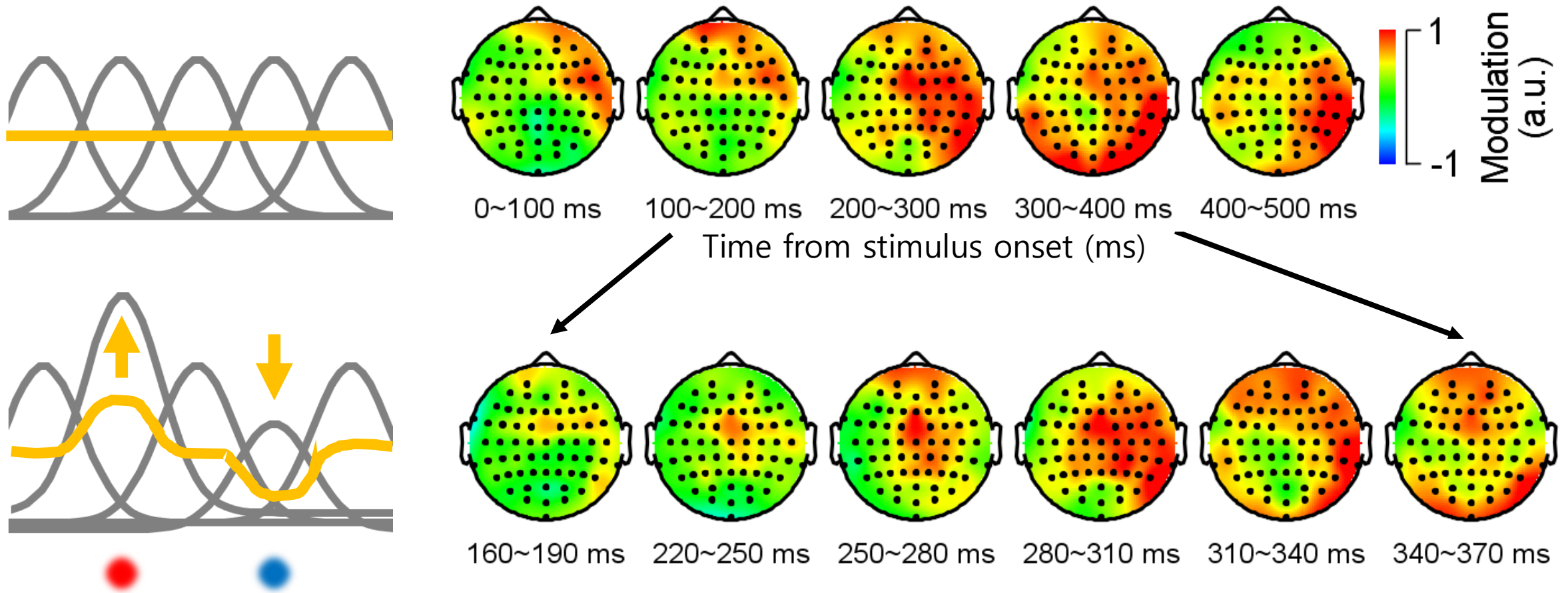
Control
(induced)



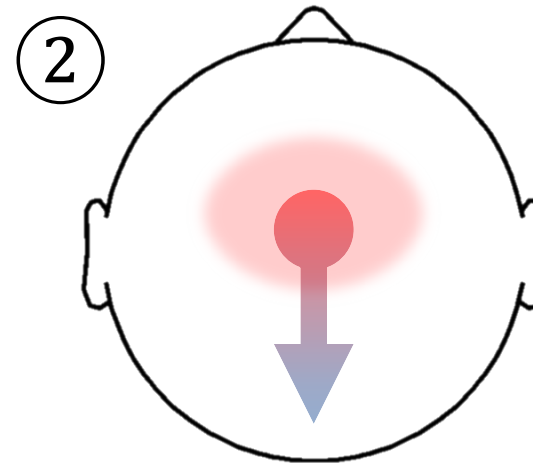
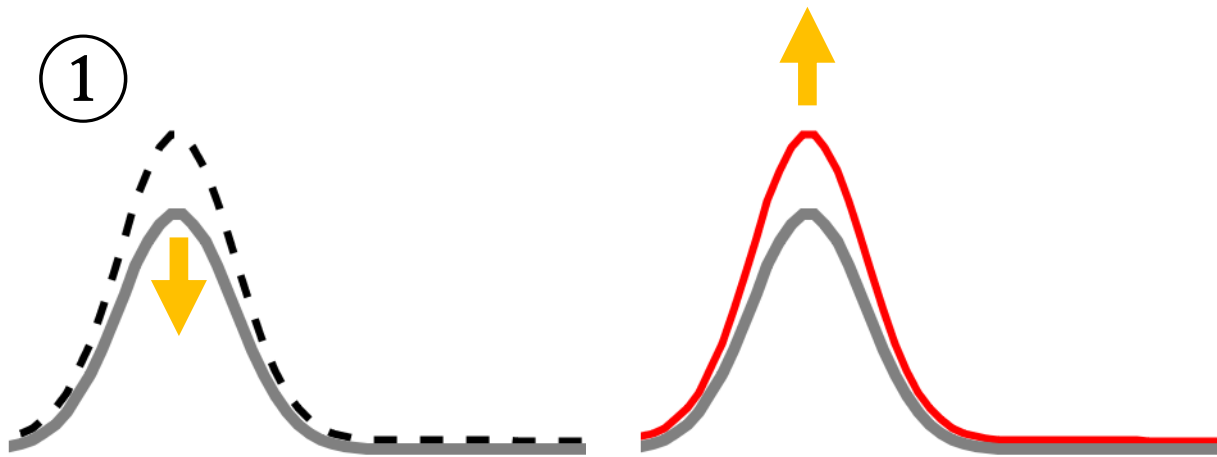
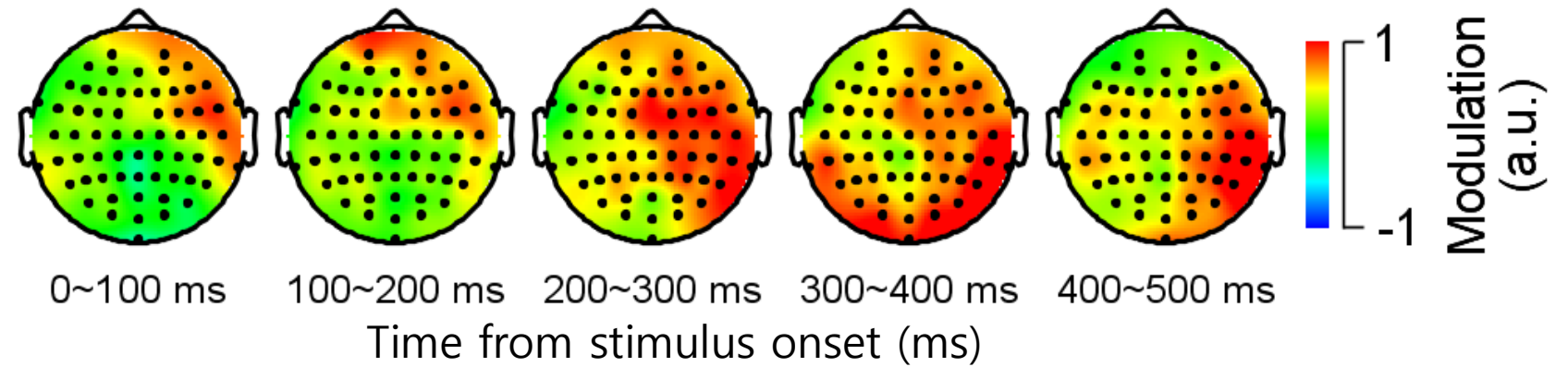
Chronic
(innate)



Result: gain modulation in the chronic condition



Result: gain modulation in the chronic condition



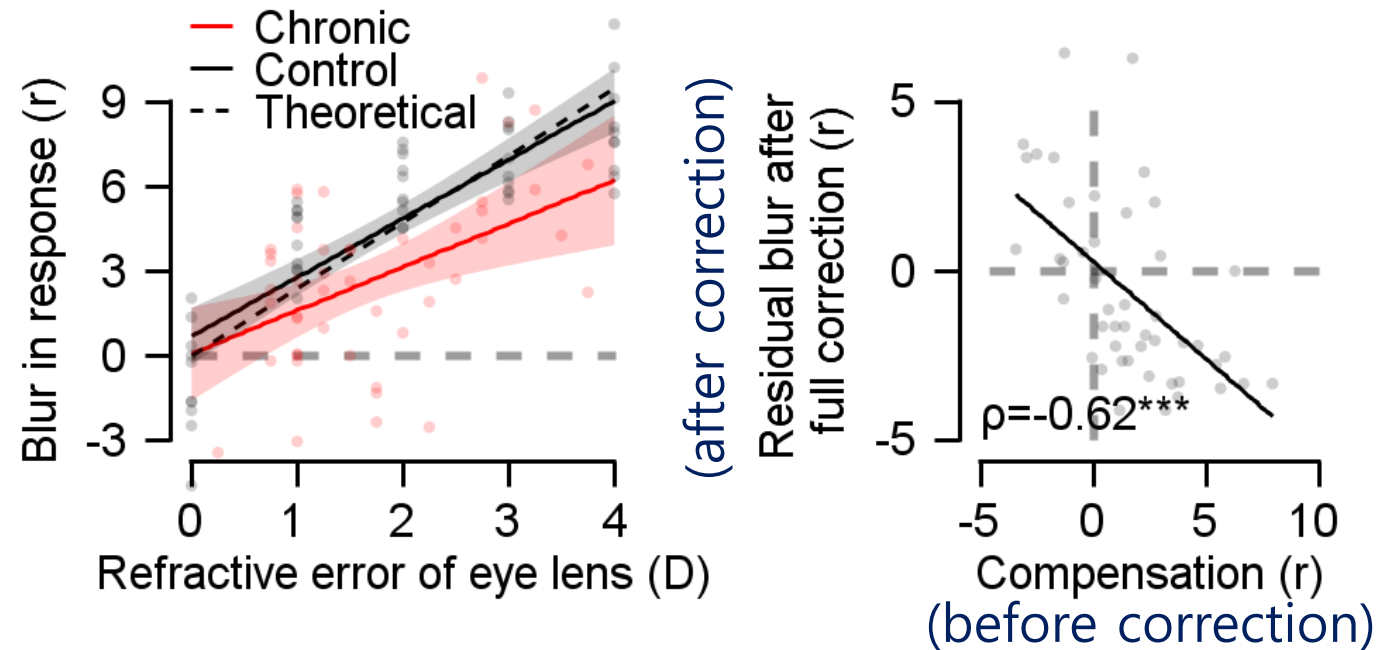
Result: Automatic compensation

(additional behavioral experiment)

Control
(induced)

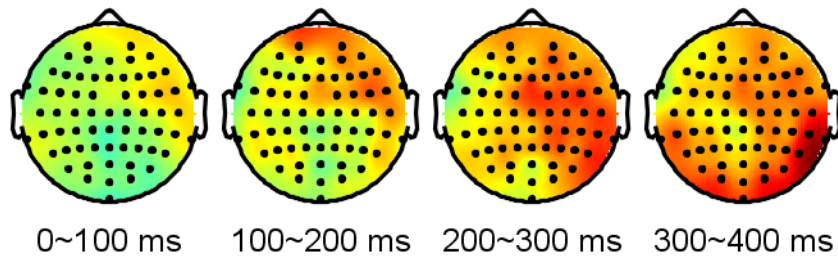


Chronic
(innate)

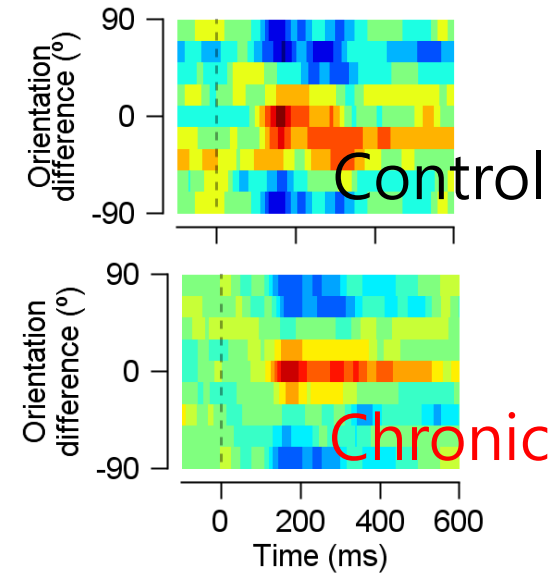


Summary

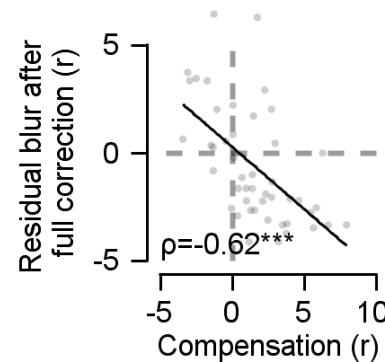
Orientation tuning responses were less distorted after long-term exposure to astigmatism.



The compensation is automatic.



Increased gain responses may work as a compensatory system.



Thank you for your attention



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Photo from



Chan-Ung Park
SKIA model
XR specialist

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