

How much visual field loss can you tolerate on the road?

Impact of central and peripheral scotomas on road hazard localization

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Introduction

Both central and peripheral vision contribute to hazard detection in dynamic road scenes¹

It's unclear, however, how much we rely on peripheral or central vision, and how much field loss is tolerable

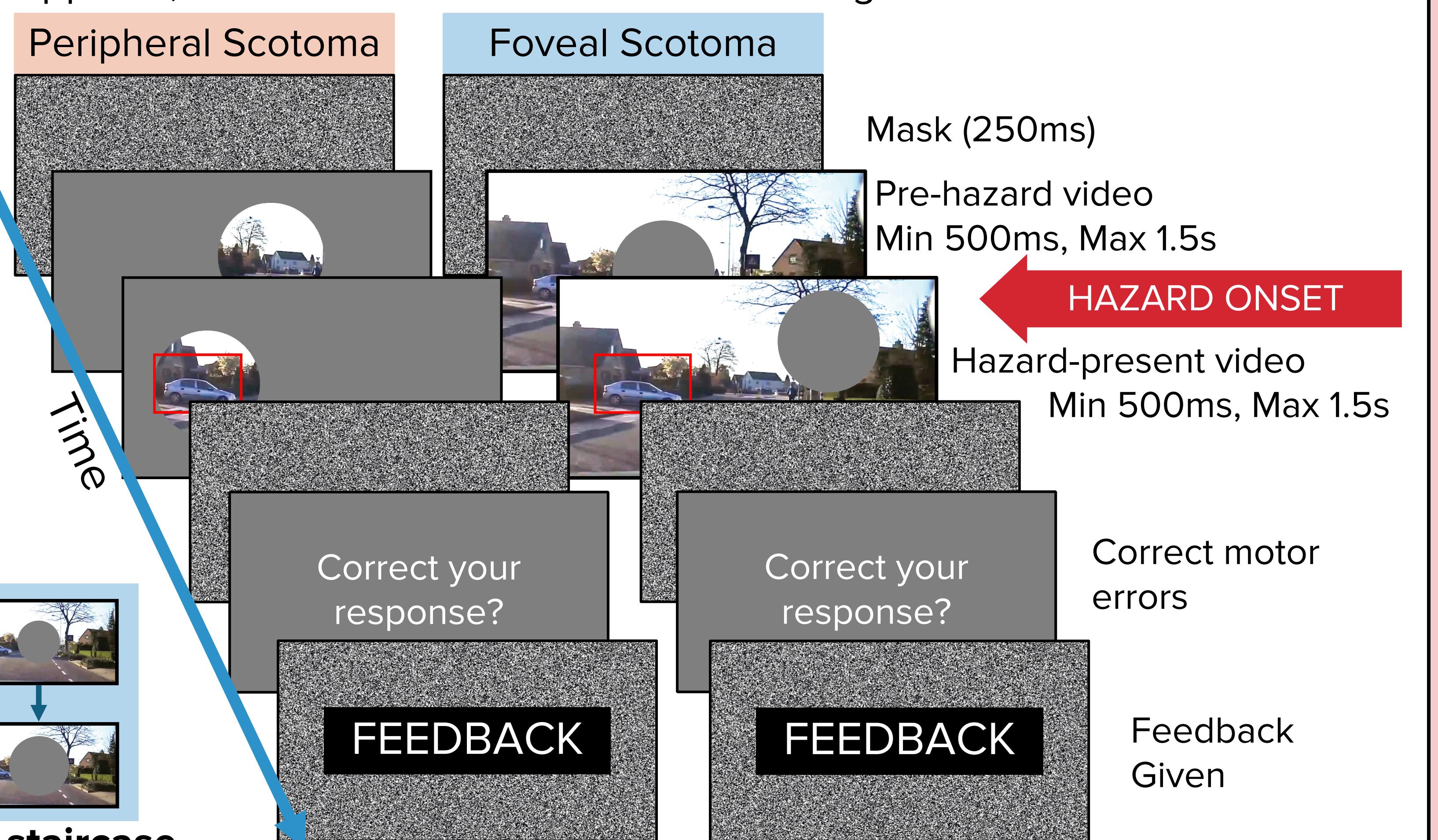
Research Question

Can drivers detect hazards using peripheral or central vision alone?
How much of the visual field can they lose and still detect hazards?

Method

Task – 270 road videos 2s long

If a hazard appears, indicate whether it is on the left or right of frame



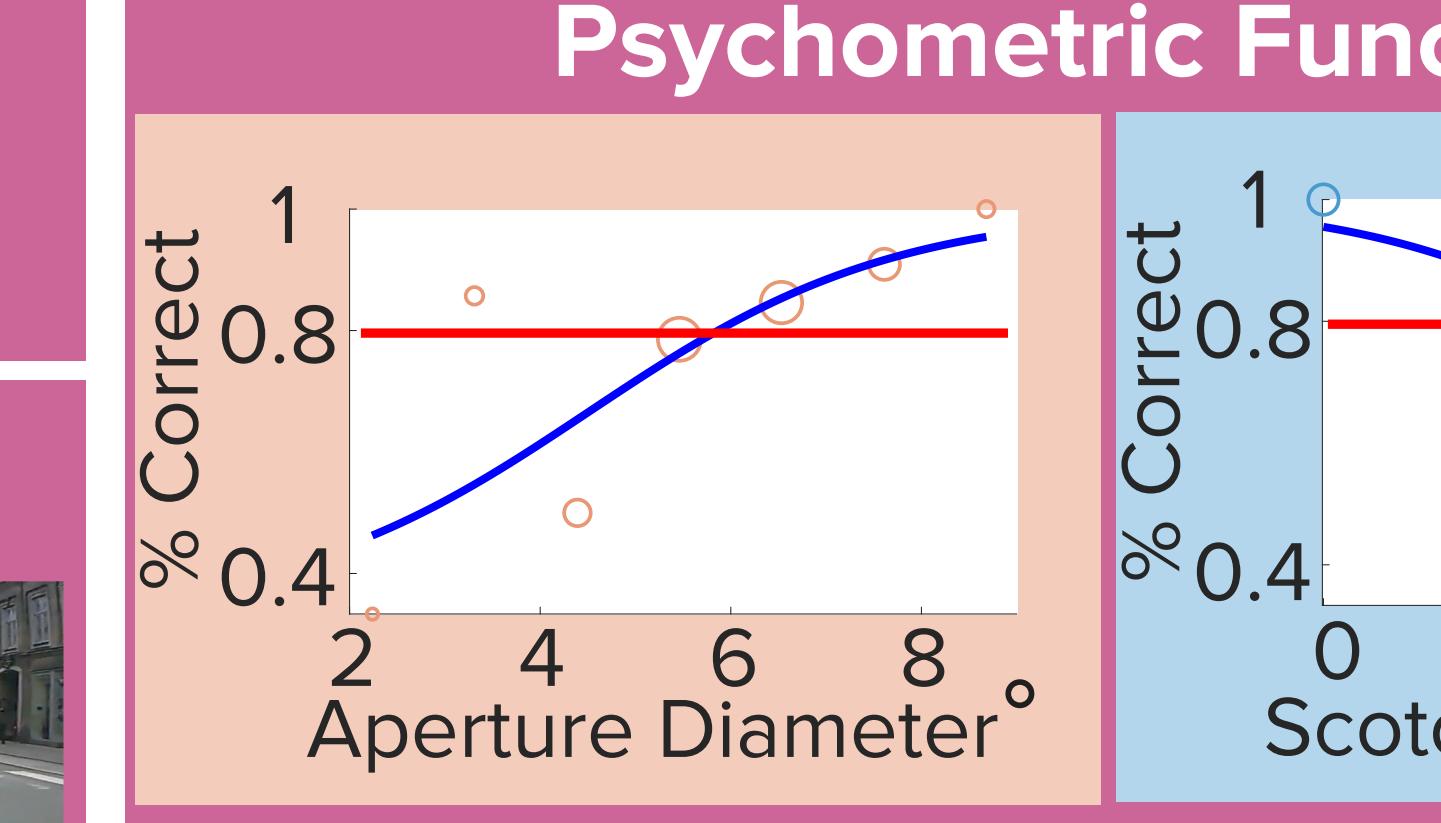
3 up 1 down staircase

Road Hazard Stimuli²

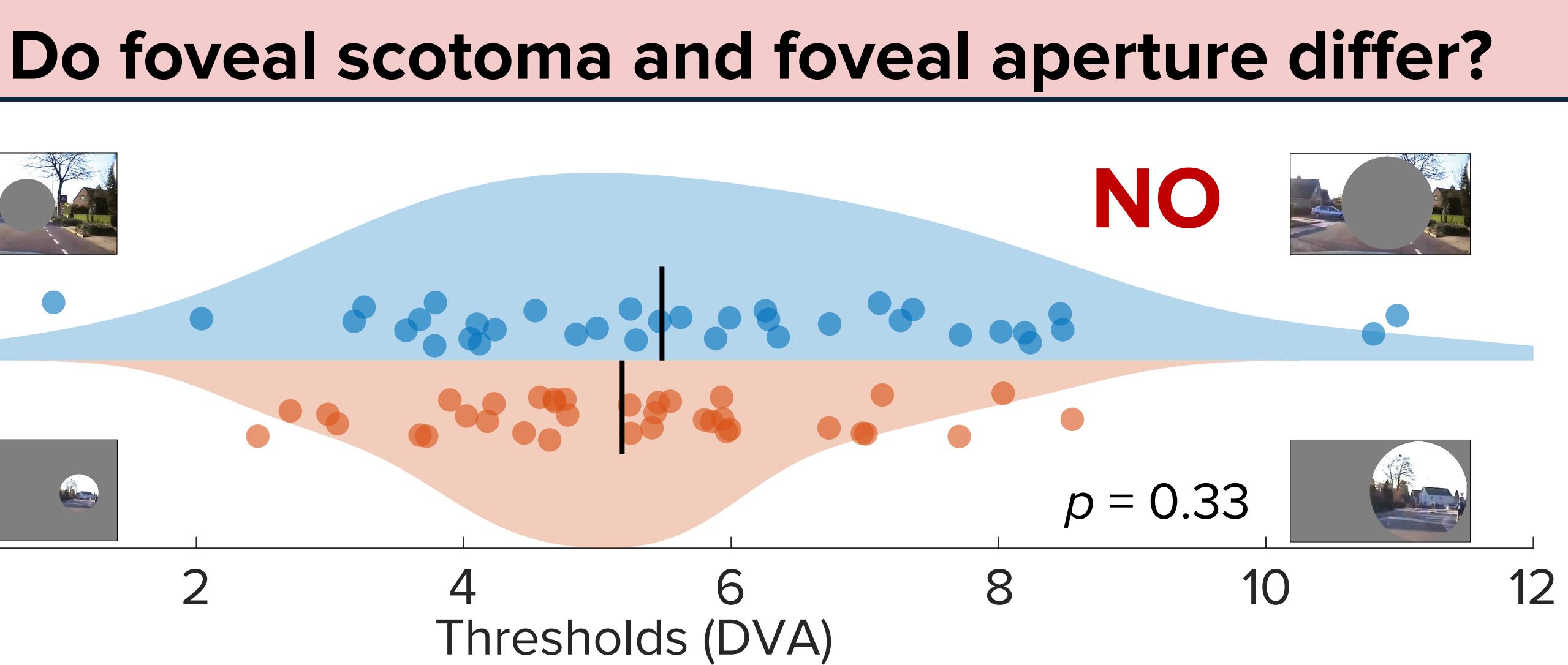
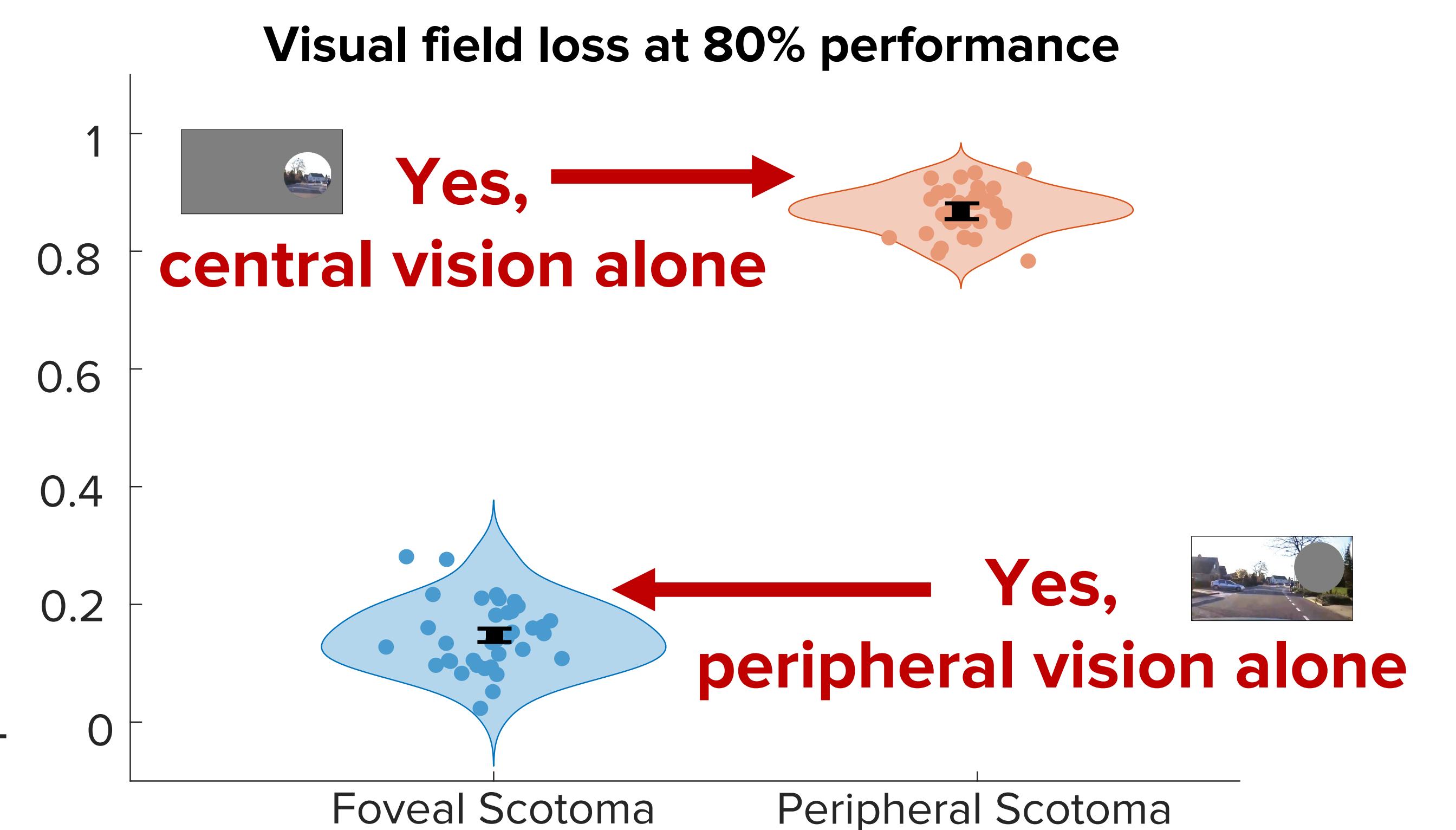


Sample
36 licensed drivers
Age 18-35

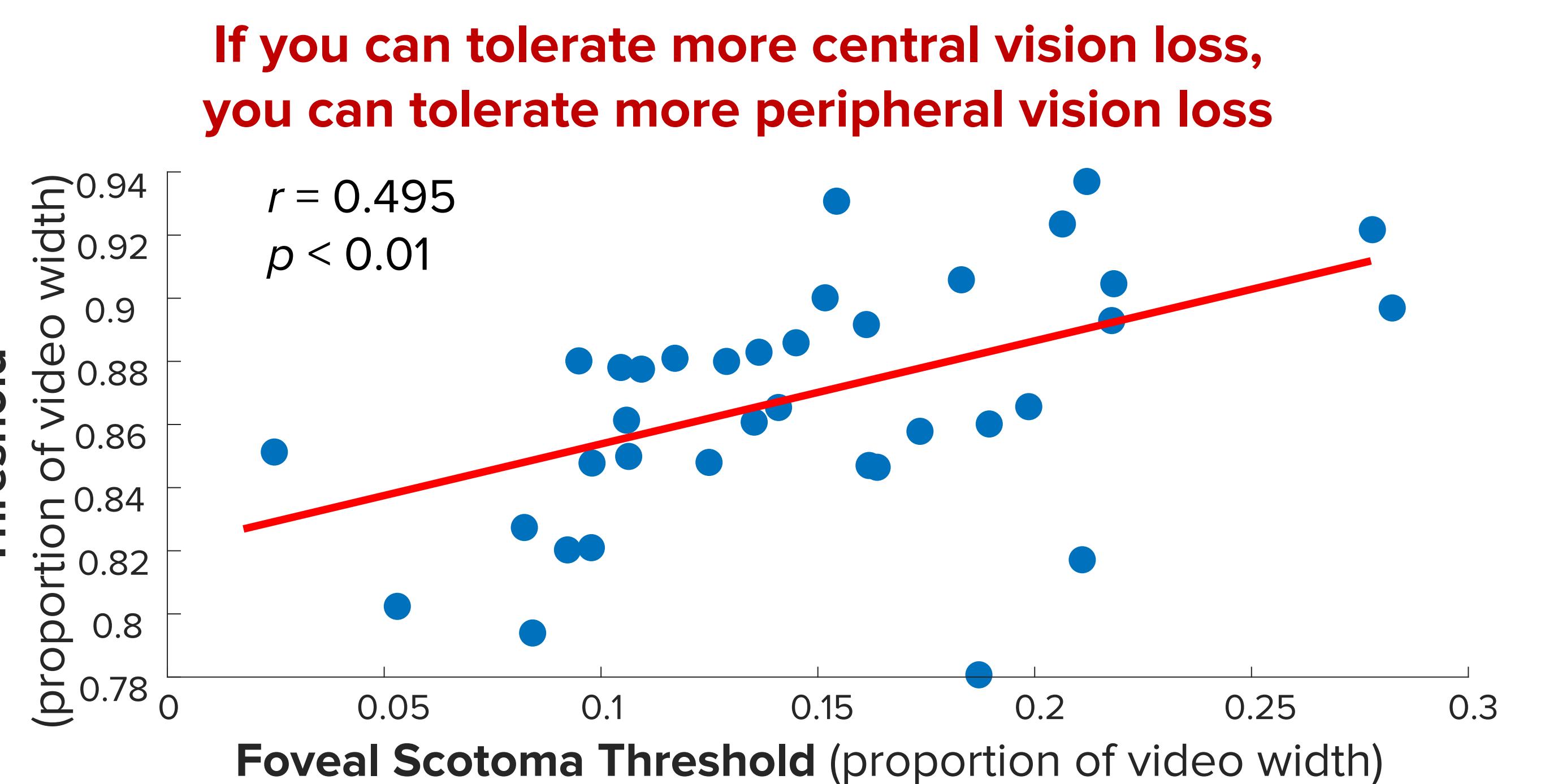
Hazard Examples



Can we tolerate peripheral or central field loss?

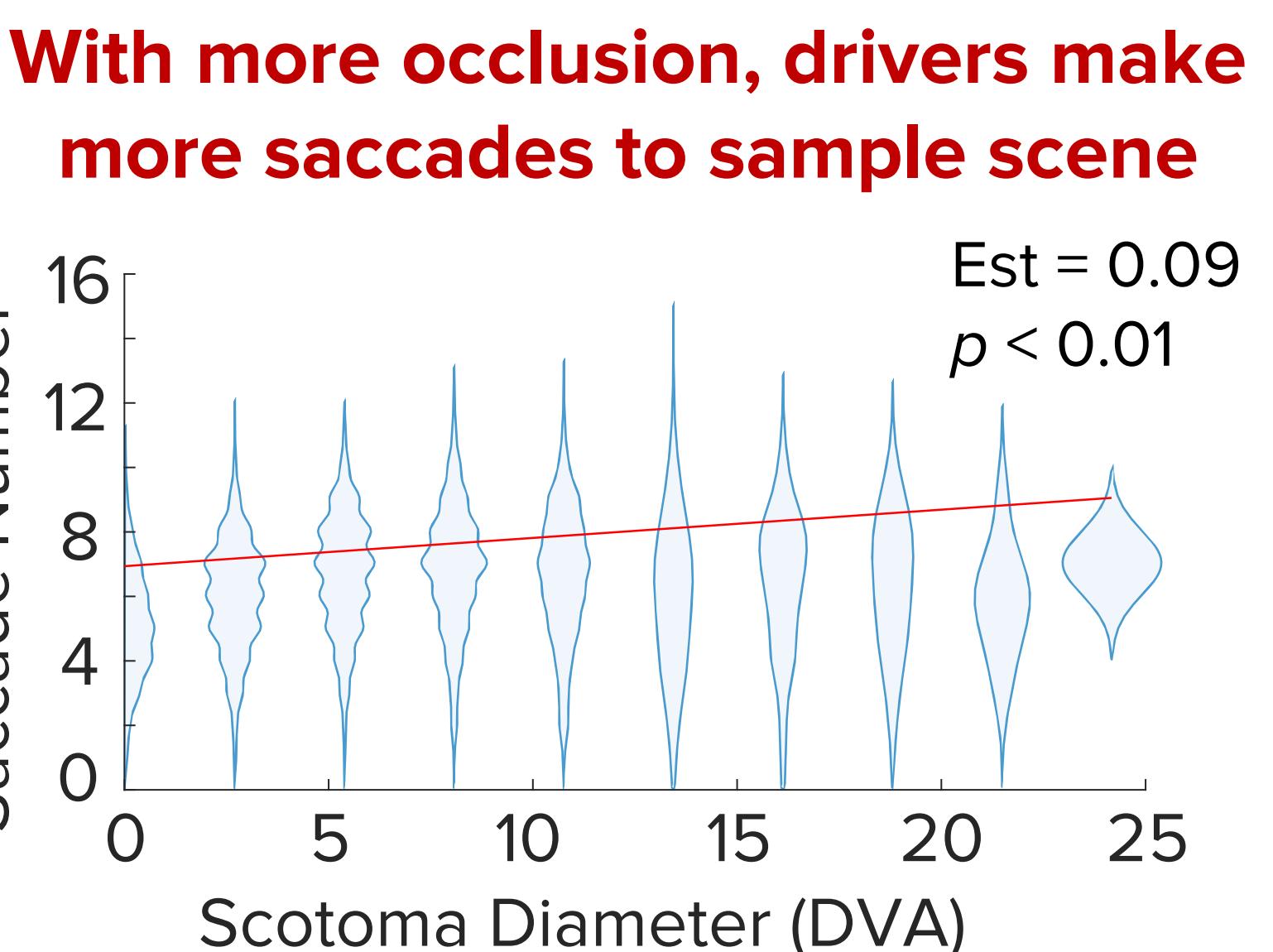
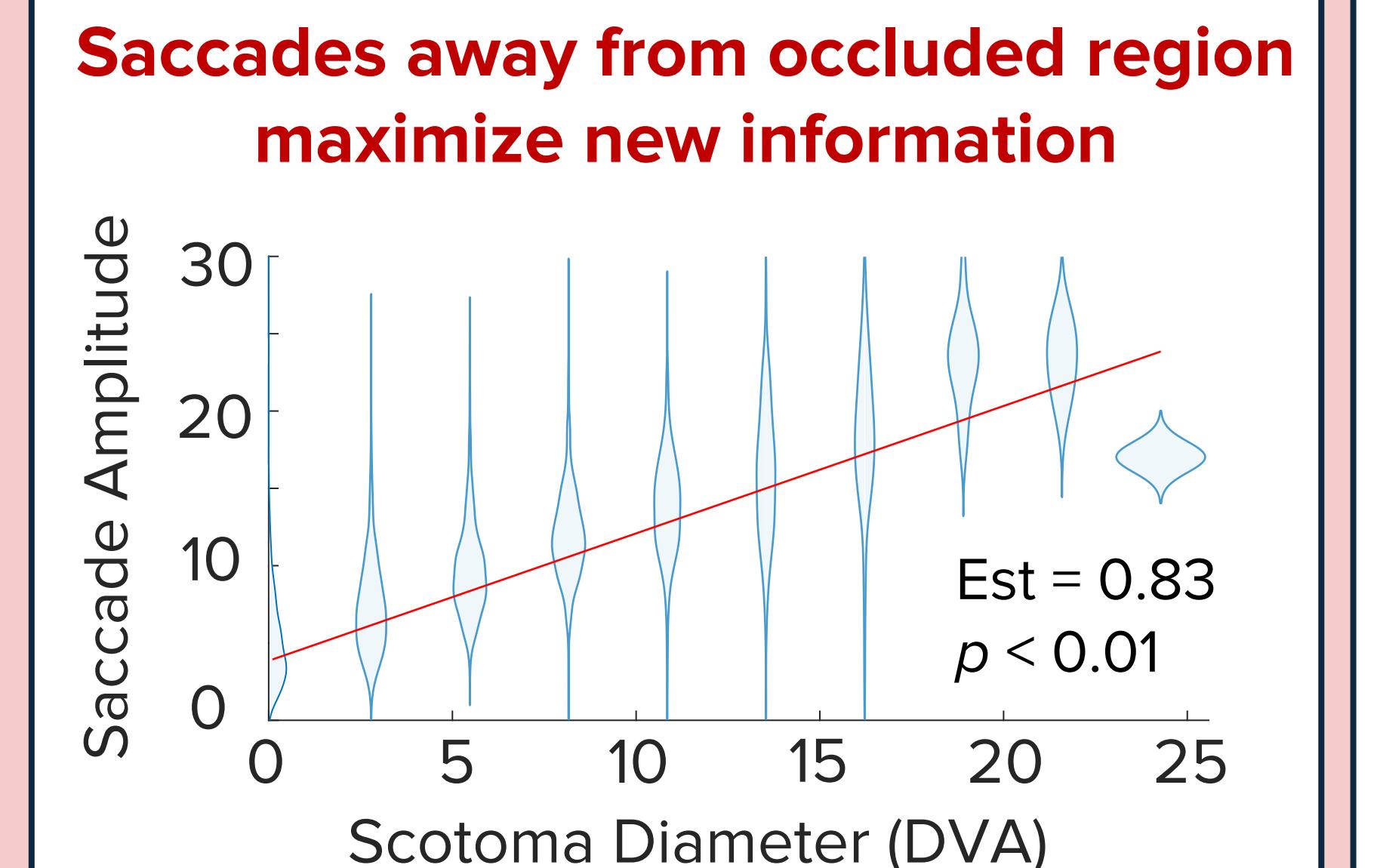


Are foveal and peripheral thresholds correlated?

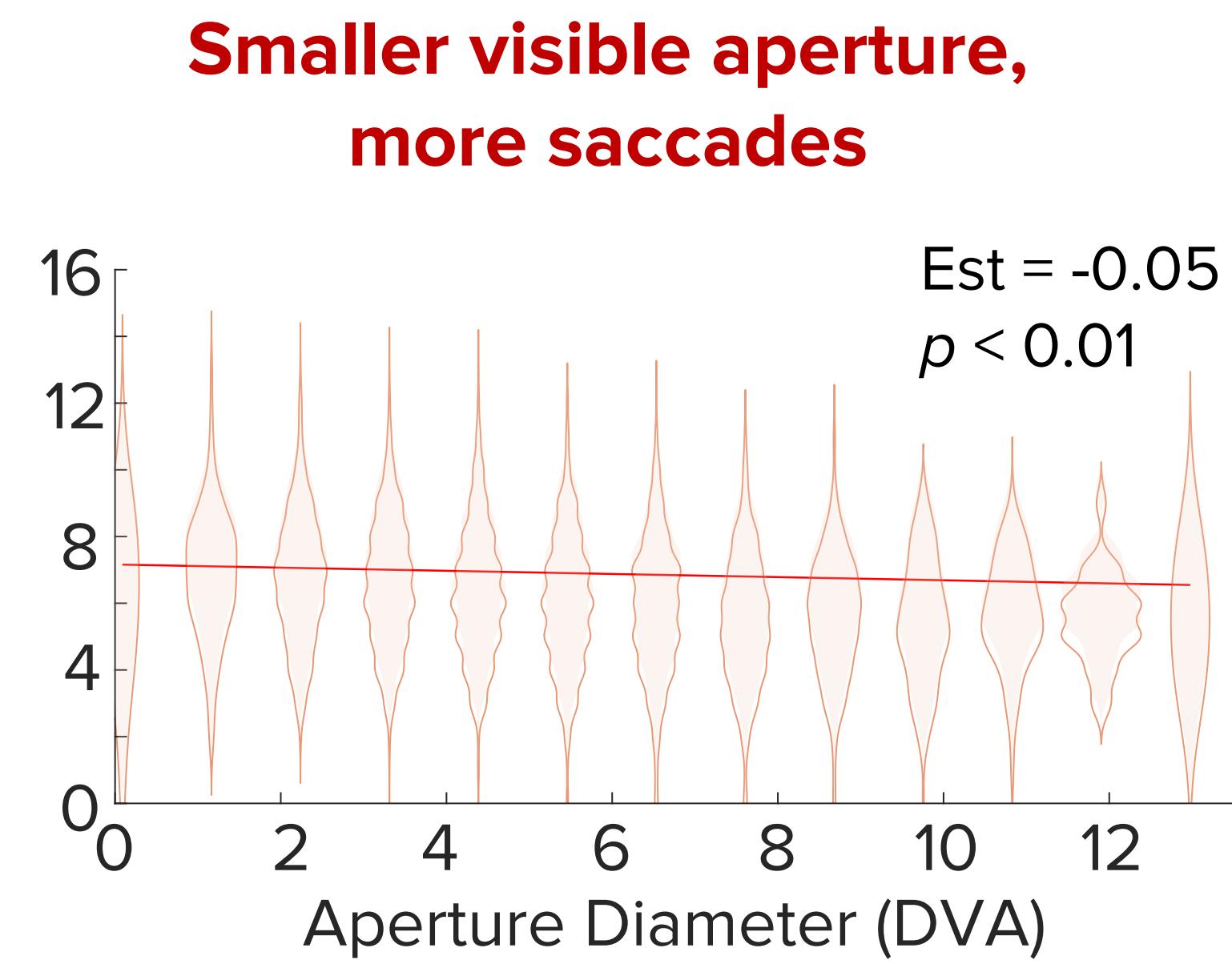
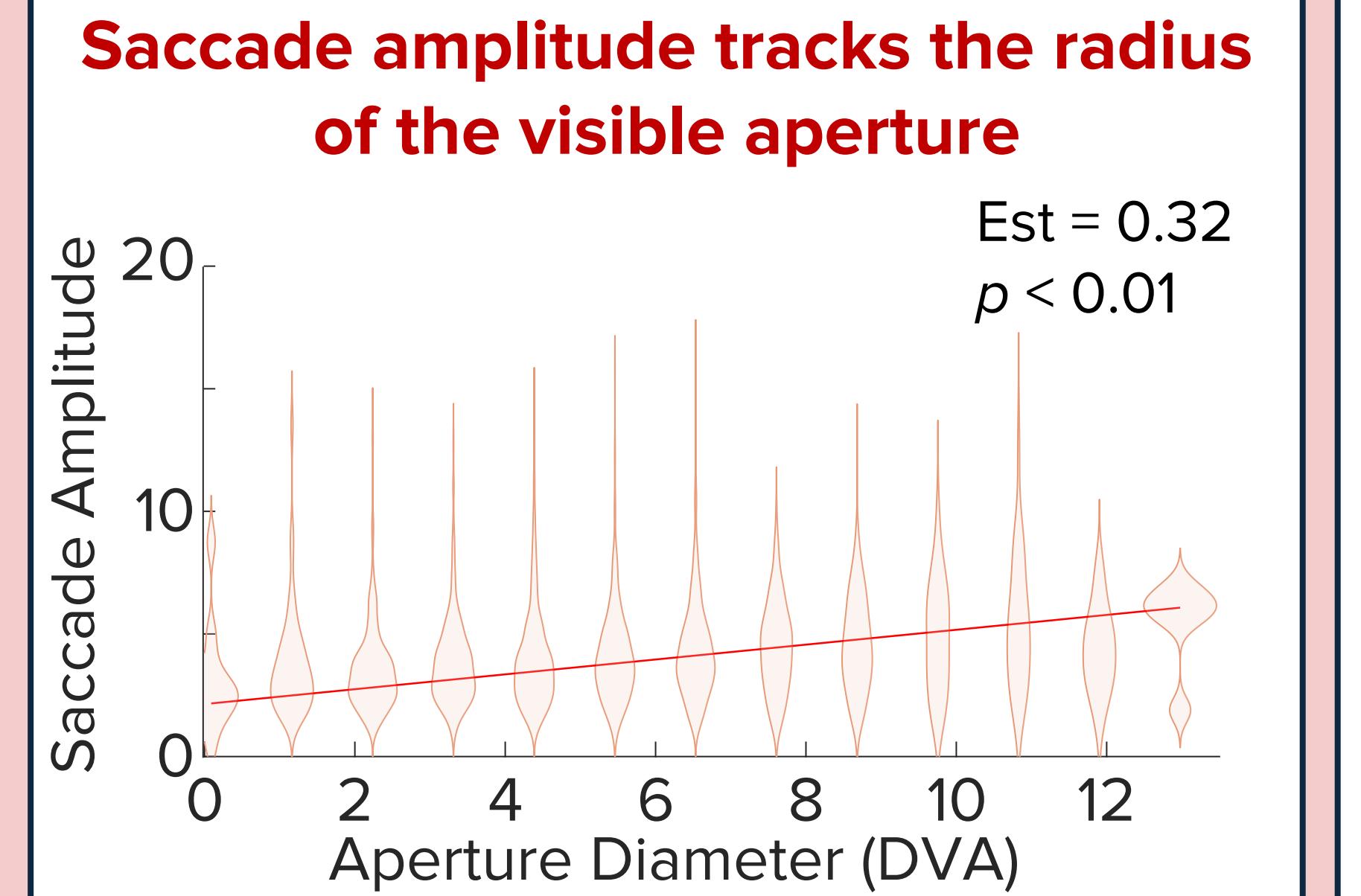


What's the relation between gaze strategy and scotoma type?

Gaze strategy in the foveal scotoma task



Gaze strategy in the peripheral scotoma task



Conclusion

Hazard detection in road scenes is **highly resistant to visual field loss**

Either central or peripheral vision alone can support hazard detection

Drivers adopt different strategies to cope with what they can't see

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References [1] Wolfe, B. et al., *J. Exp. Psychol.* (2020)

[2] Song, J., Kosovicheva, A., Wolfe, B., *Behav Res* (2024).

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