A Computational Model of Arousal Dynamics in Autism Spectrum Disorder using the Pupillary Light Response Function

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Background

A criteria of developmental conditions like Autism Spectrum Disorder (ASD) experience hyper or hypo reactivity or arousal states to sensory stimuli

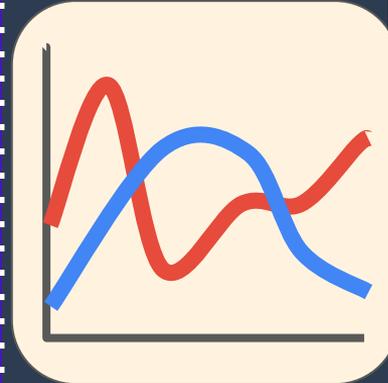DILATED PUPIL

CONSTRICTED PUPIL

Conclusion

This model was able to demonstrate how dramatically a system reacts with changing parameter values that translate to the external drive, sensitivity, and internal gain within a system and their influence on pupil dynamics, which are used as a proxy for arousal system activity

Objective

to model a mechanism for the shifted arousal dynamics seen in different developmental conditions

Methods

Using the pupillary light response function as a proxy for arousal system activity, integrating the modified Naka-Rushton Equation (Pan et. al, 2022) into the modified shunting equation (Grossberg, 1993) while accounting for the parasympathetic force of constriction