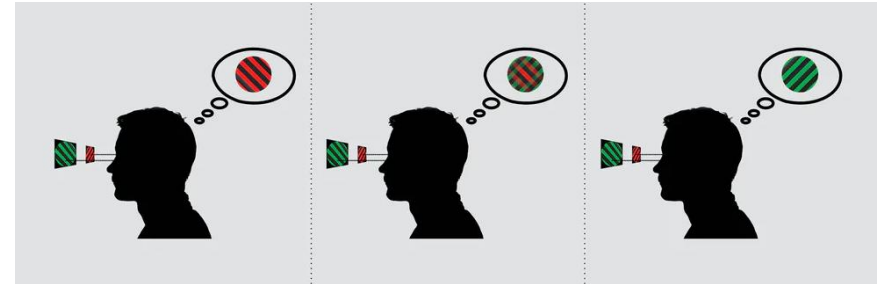


The role of attention in a computational model of binocular rivalry

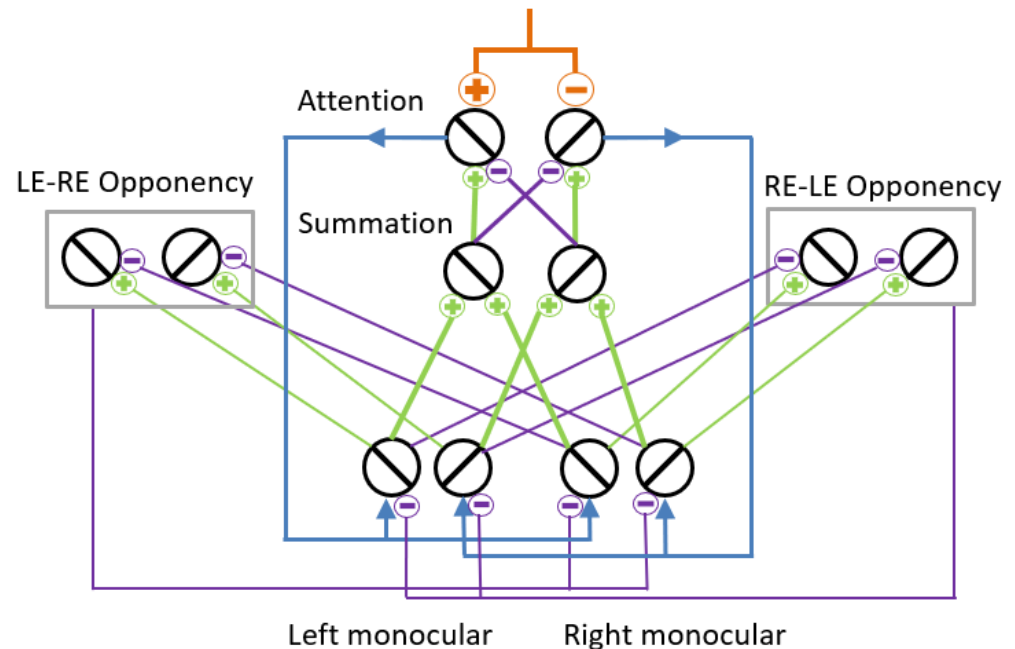
- **Binocular rivalry** is the alternation between incompatible monocular images presented to the two eyes.
- Binocular rivalry depends on attention.



Luke Smillie (2017): People with creative personalities really do see the world differently

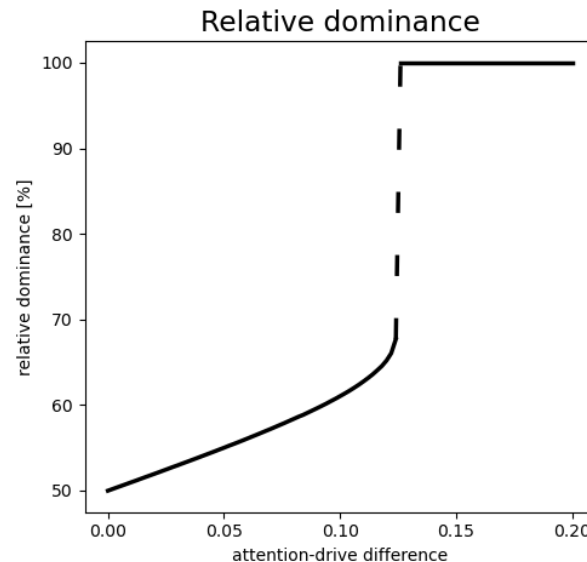
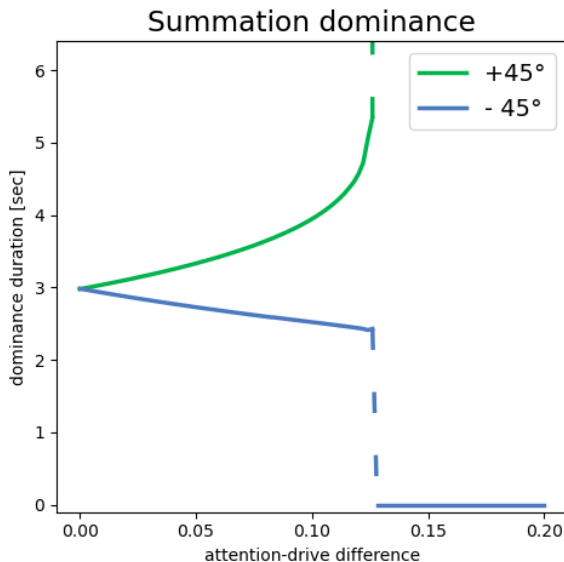
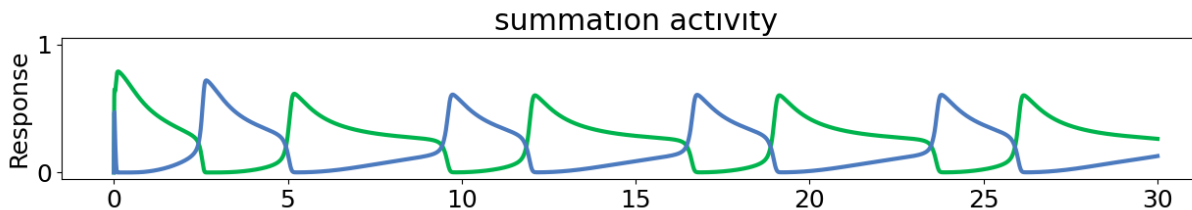
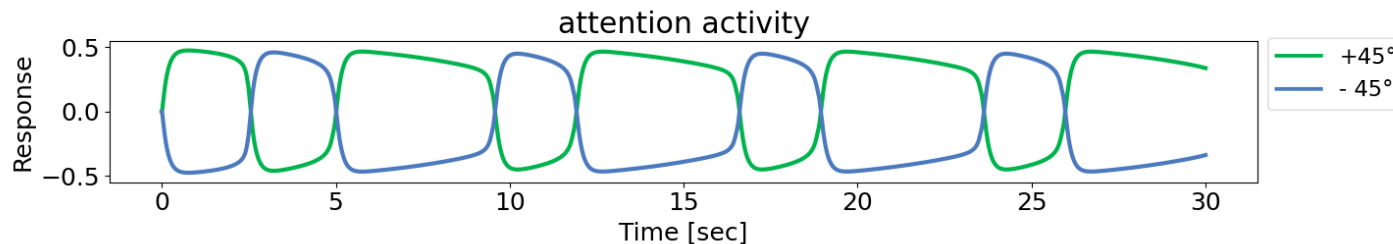
- Li et al. (2016) modelled binocular rivalry as an interplay of mutual inhibition and saliency driven attention.

- **Can voluntary attention be incorporated into this model?**



Model Alteration: External input to attention population

Change in the excitatory drive of the attention population: $E_{a1} = (Rb_1 - Rb_2 + \text{external drive})^n$
 $E_{a2} = (Rb_2 - Rb_1 - \text{external drive})^n$



Results

Adding external input to attention neurons **prolonged** dominance periods of the **excited representation** and **shortened** periods of the **suppressed ones**.

Conclusion

General:

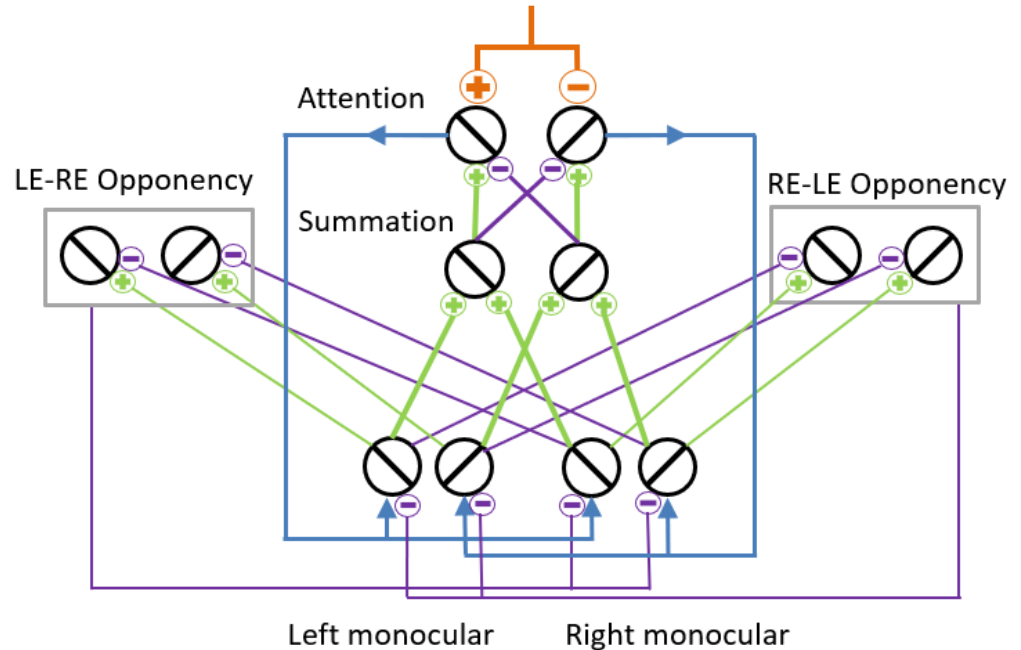
- We were able to reimplement the model in an object-oriented framework in python

Model alteration:

- Direct excitatory input to attention neurons prolongs dominance durations
- For input strengths of $> \sim 12.4\%$ of normal excitatory drive leads to a **Winner-takes-all** condition

Outlook:

- Compare the observed changes in dominance duration to experimental findings
- Test alternative alteration by weight changes



Neuromatch summer school project TEAM:

“We’re usually modelling for Victoria’s secret”

I really enjoyed this project work. It took use some time to find a project everyone was interested in, but once we had a plan it was pretty straight forward.



The project work was an inspiring adventure for me with the exploration how to implement object-based programming in python and how a well-defined scope of a project improves motivation and success. It was fun working in an interdisciplinary team and in the end, my dream to explore a cortical mechanism without data became true.



While it has been really interesting to implement a model that goes a lot deeper than I’m used to as a cognitive neuroscientist, the most helpful aspect for me has been the project-based work in a team. It’s been a really enjoyable journey and I take a lot away from it.



We would like to thank our mentor, Xaq Pitkow for his time and his great explanations and drawings to bifurcation.