# Different rules for binocular combination of luminance in cortical and subcortical pathways

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## 1 Abstract

## 2 Introduction

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### 3.1 Participants

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Baker (2021)

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### 4.4 Computational modelling

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## References

Baker DH. 2021. Statistical analysis of periodic data in neuroscience. *Neurons, Behavior, Data analysis, and Theory* **5**. doi:10.51628/001c.27680

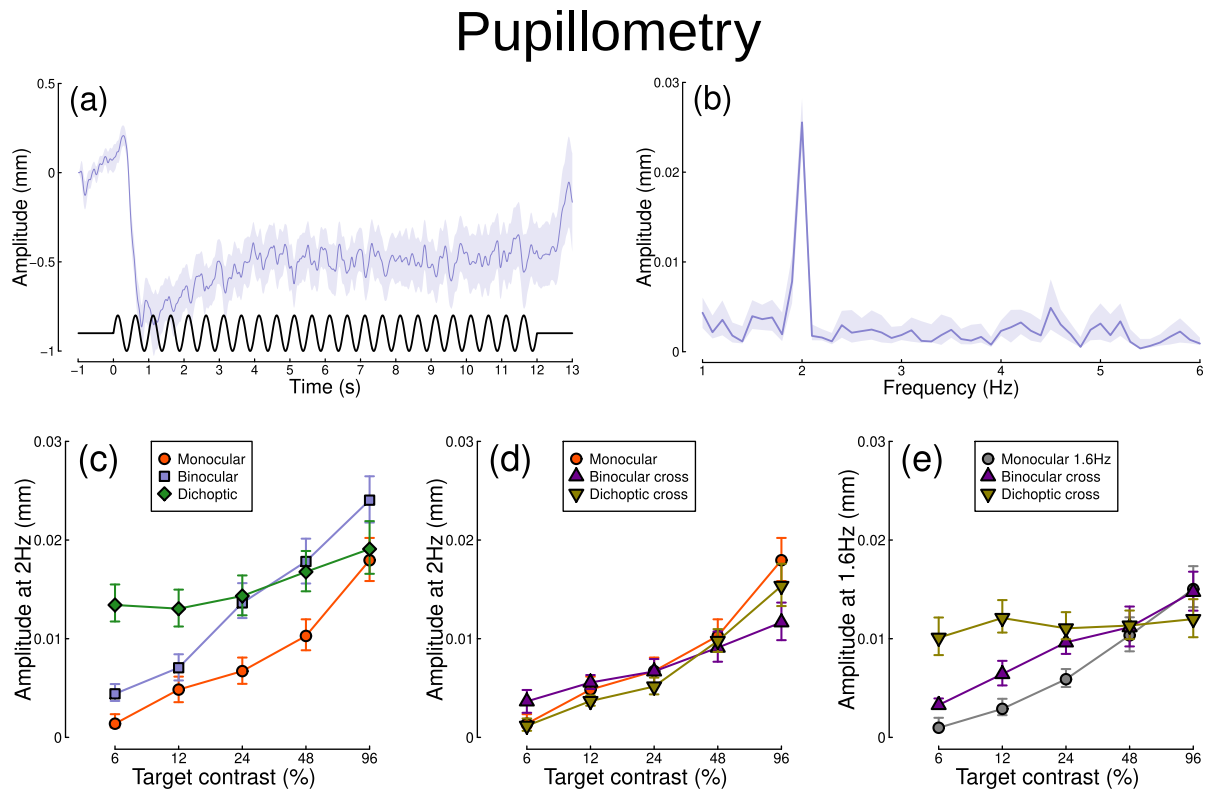


Figure 1: Summary of pupillometry results for N=30 participants. Panel (a) shows a group average waveform for binocular presentation (low pass filtered at 5Hz), with the driving signal plotted at the foot. Panel (b) shows the average Fourier spectrum. Panels (c,d) show contrast response functions at 2Hz for different conditions. Panel (e) shows contrast response functions at 1.6Hz for three conditions. Shaded regions and error bars indicate bootstrapped standard errors.

Table 1: Summary of median parameter values.

| Data set | Z | k | w | Rmax |
|---|---|---|---|---|
| Pupillometry | 2.73 | 0.01 | 0.60 | 0.00022 |
| EEG 1F | 2.09 | 0.15 | 0.02 | 0.00336 |
| EEG 2F | 3.39 | 0.07 | 0.02 | 0.00312 |
| Matching | 0.22 | 5.06 | 0.09 | - |

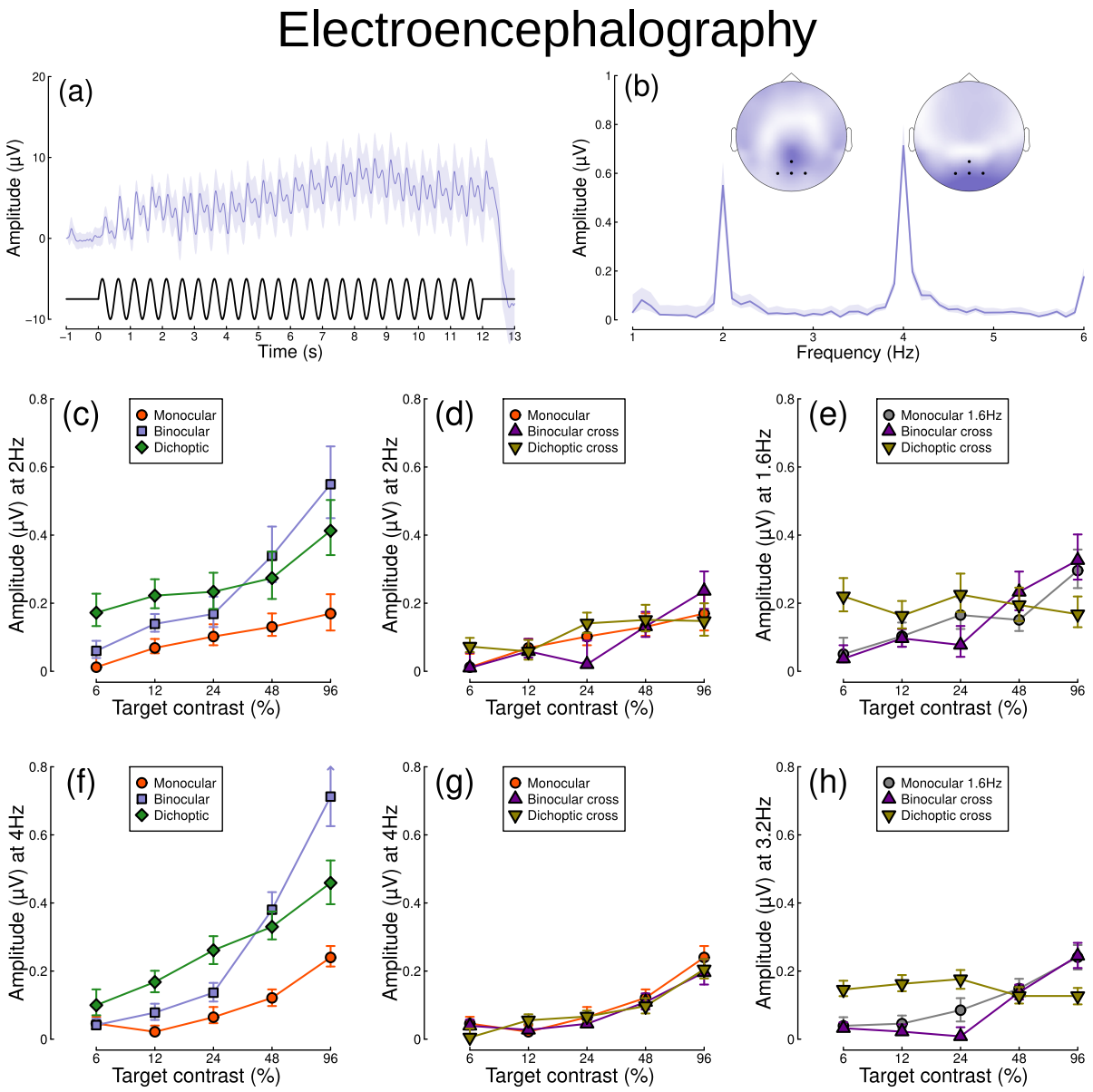


Figure 2: Summary of EEG results for N=30 participants. Panel (a) shows a group average waveform for binocular presentation (low pass filtered at 5Hz), with the driving signal plotted at the foot. Panel (b) shows the average Fourier spectrum, and inset scalp distributions. Black dots on the scalp plots indicate electrodes Oz, POz, O1 and O2. Panels (c,d) show contrast response functions at 2Hz for different conditions. Panel (e) shows contrast response functions at 1.6Hz for three conditions. Panels (f-h) are in the same format but for the second harmonic responses. Shaded regions and error bars indicate bootstrapped standard errors.

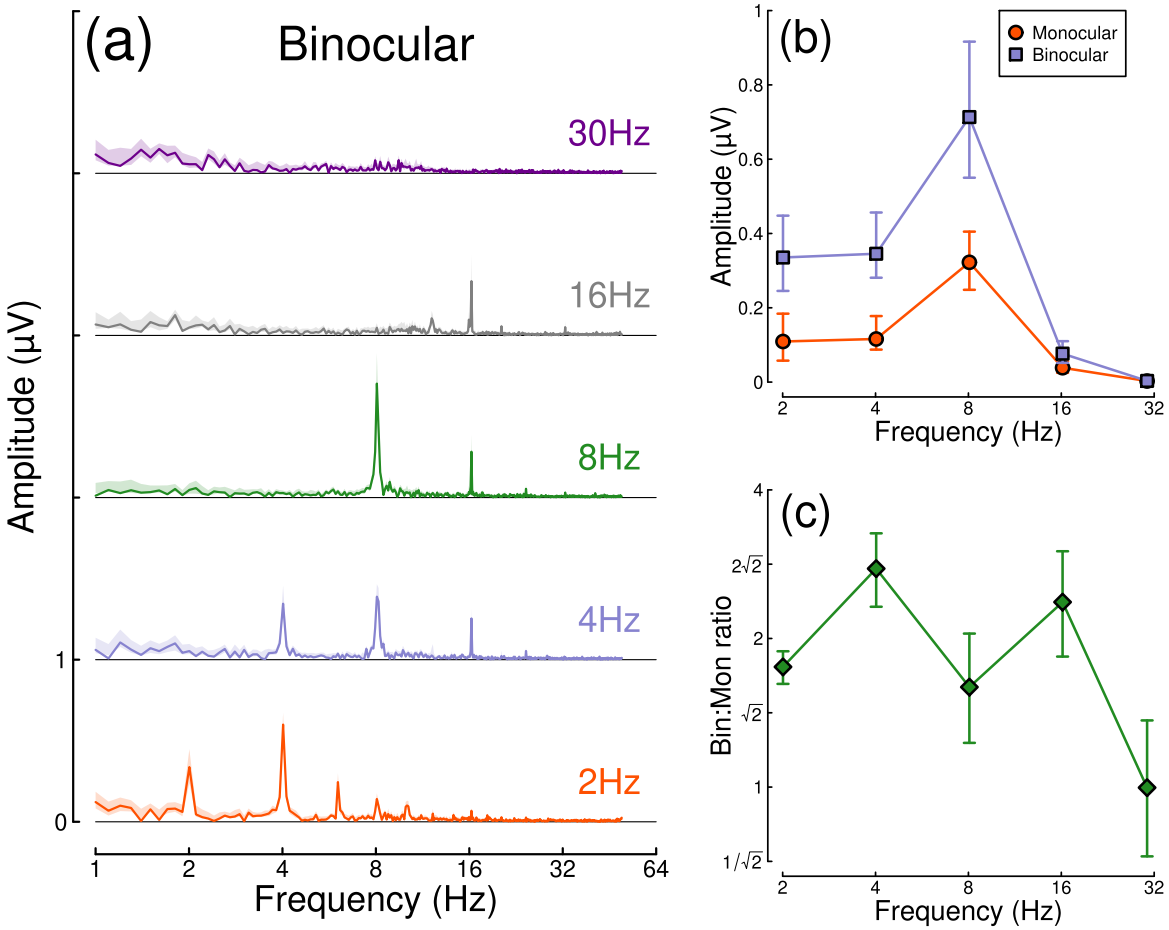


Figure 3: Binocular facilitation at different temporal frequencies. Panel (a) shows Fourier spectra for responses to binocular flicker at 5 different frequencies (offset vertically for clarity). Panel (b) shows the response at each stimulation frequency for monocular (red) and binocular (blue) presentation. Panel (c) shows the ratio of binocular to monocular responses. Error bars and shaded regions indicate bootstrapped standard errors.

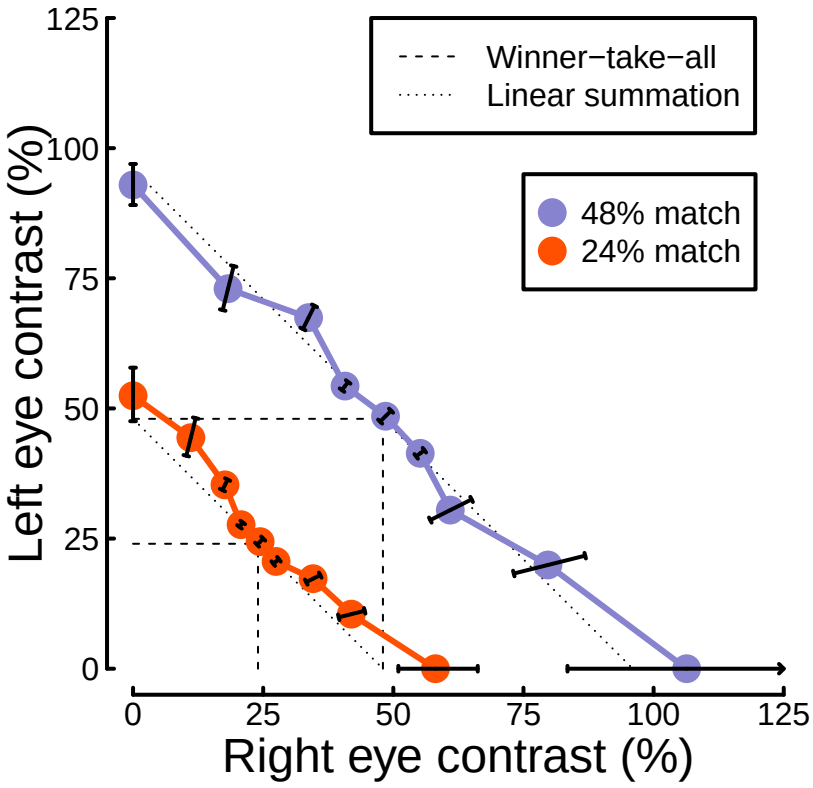


Figure 4: Contrast matching functions. Dotted and dashed lines are predictions of canonical summation models with a linear exponent (dotted) or an infinite exponent (dashed). Error bars indicate the standard error across participants (N=10), and are constrained along radial lines converging at the origin.

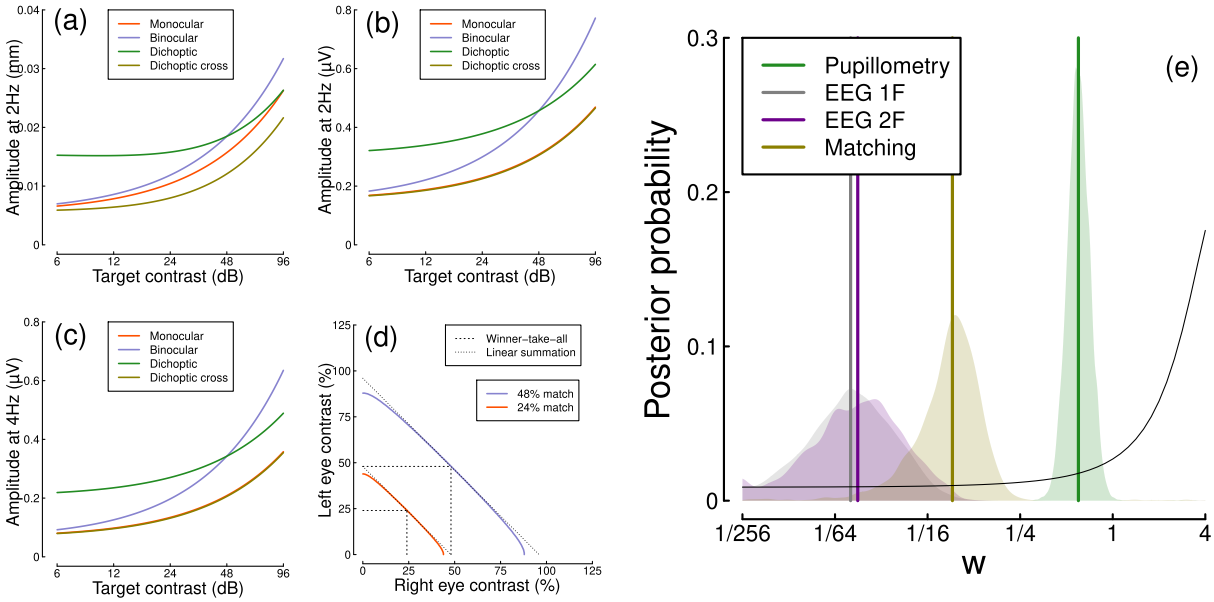


Figure 5: Summary of computational modelling. Panels (a-d) show model behaviour for our four main data set, pupillometry (a), first harmonic EEG responses (b), second harmonic EEG responses (c) and contrast matching (d). Panel (e) shows the posterior probability distributions of the interocular suppression parameter for each of the four model fits. The pupillometry distribution (green) is centred about a substantially higher suppressive weight than for the other data types (note the logarithmic x-axis). The black curve shows the (scaled) prior distribution for the weight parameter.