What cues should malaria parasites use to make resource-allocation decisions?

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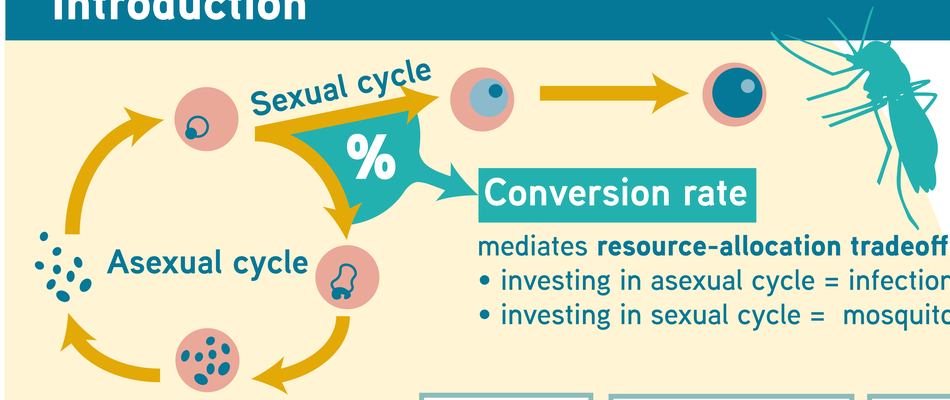
Introduction

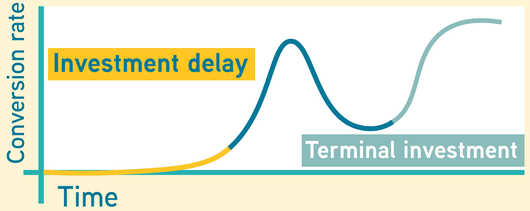


Conversion rate

mediates **resource-allocation tradeoff** in malaria.

- investing in asexual cycle = infection maintenance
- investing in sexual cycle = mosquito transmission

Conversion rate shows **plasticity, responding to:**



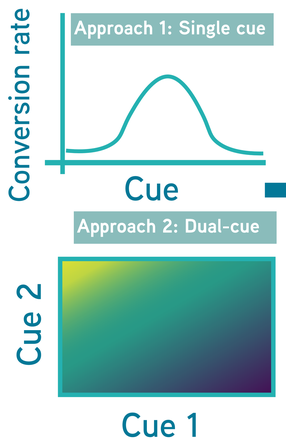
Ideal conversion rate strategy is underlied by:

1. investment delay: needed for population expansion
2. terminal investment: maximize current transmission

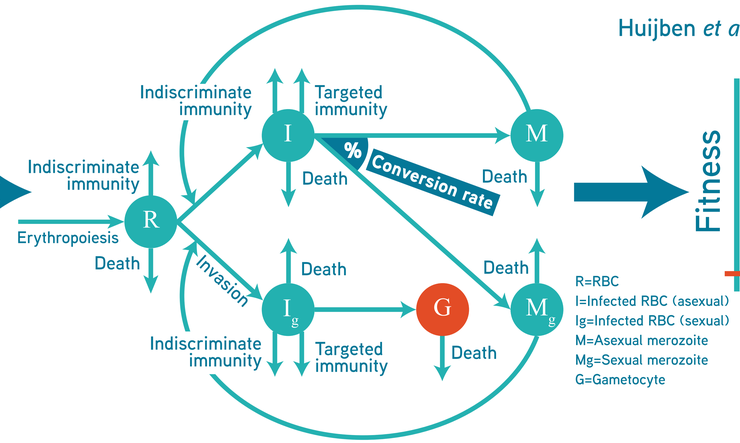
(Greischar *et al.*, 2016, Evolution)

Methodology

Reaction norms

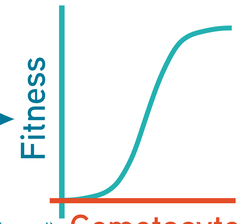


Intrahost *P. chabaudi* model (DDE)



Quantify fitness

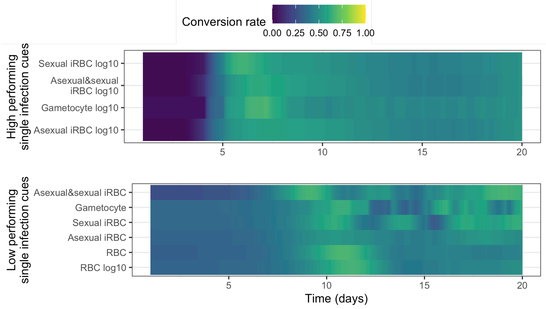
Huijben *et al.*, 2010, Evolution



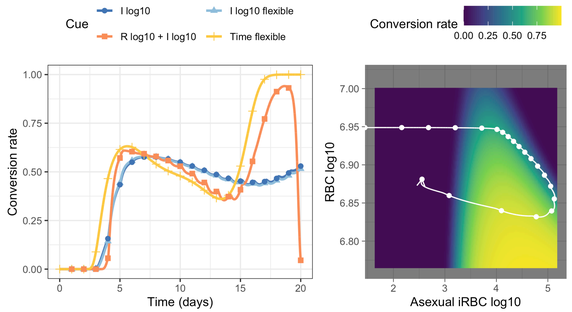
Numerical optimization (L-BFGS/Genetic algorithm) of single infection/co-infection to maximize fitness

Results

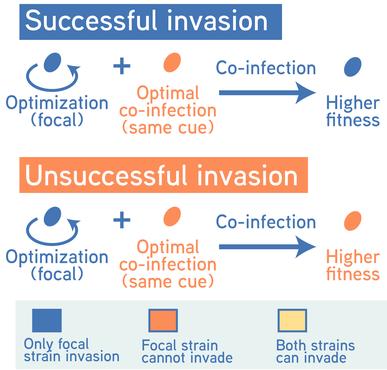
Logged parasite cues facilitate investment delay

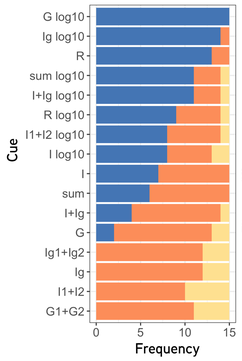


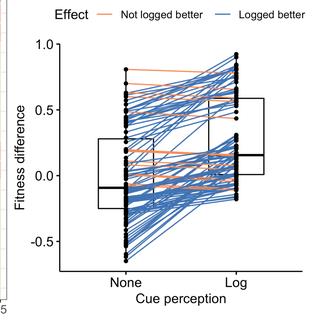
Dual-cues allow for terminal investment

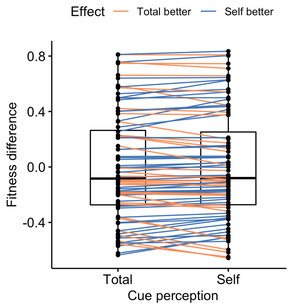


Sexual, logged parasite cues facilitate parasite invasion



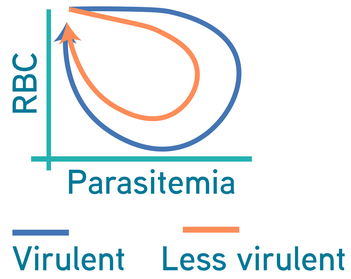


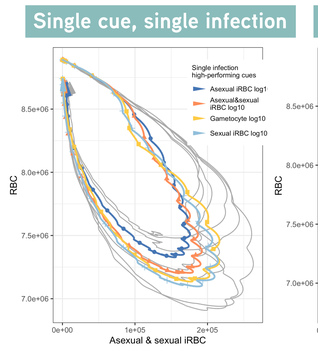


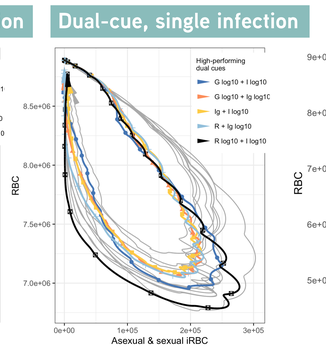


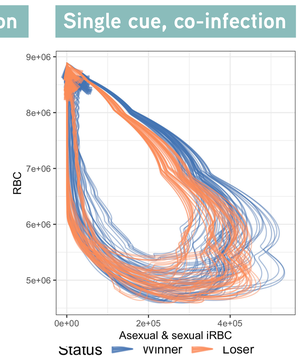
Virulent strains are selected against in single infection but favoured in co-infection

Larger disease curve area indicates more virulence









Let's talk science!

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