

POSTER PRESENTATION

Open Access

# Percept strength at the onset of bistable perception

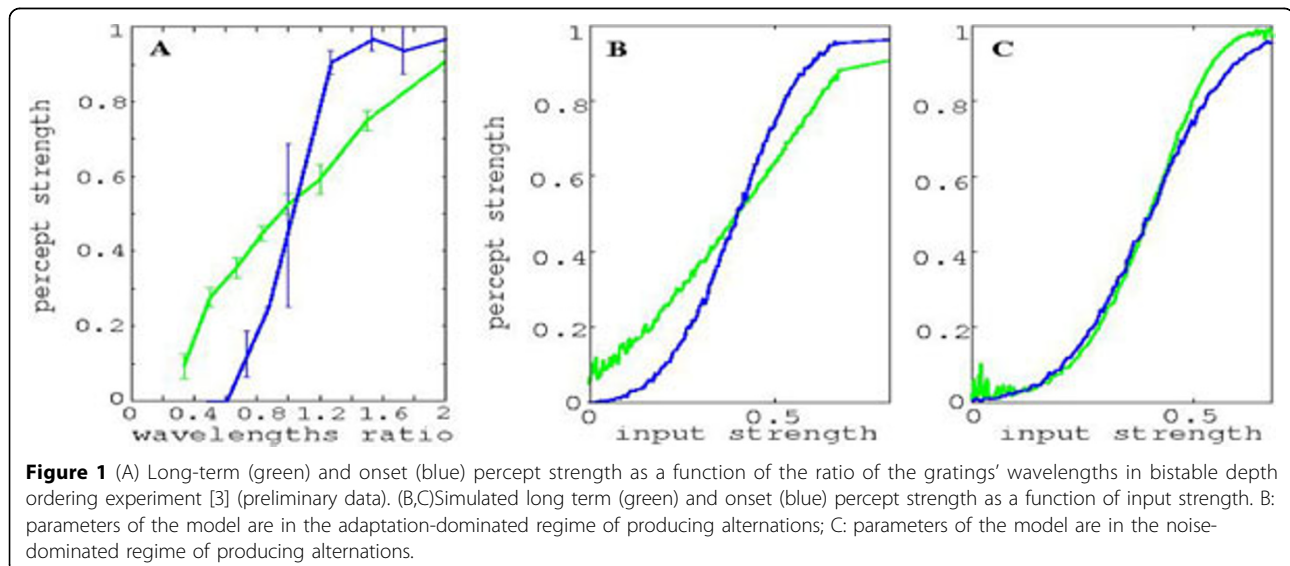
Asya Shpiro<sup>1\*</sup>, John Rinzel<sup>2,3</sup>, Nava Rubin<sup>2</sup>

From Nineteenth Annual Computational Neuroscience Meeting: CNS\*2010  
San Antonio, TX, USA. 24-30 July 2010

When presented with a stimulus that allows for two distinct interpretations, observers perceive one interpretation exclusively at any moment, and perception switches between the alternatives. Dynamics of the alternations is governed by the parameters of the stimulus. Varying the parameters, it is possible to affect both absolute and relative amount of time spent perceiving each interpretation ("percept"). Theoretical and experimental studies of bistable perception have been focused on its long term dynamics. We consider the transitional stage of bistable perception, right after the onset of the stimulus for binocular rivalry, ambiguous plaid motion, and bistable depth ordering phenomena. We compare the long term percept strength (relative amount of time spent in

this percept), and its strength at the onset of rivalry (probability to be the first to dominate after the stimulus is presented).

We find that the percept strength at the onset of rivalry is a steeper function of the stimulus parameters than the long term percept strength (Fig. 1A). In the case of binocular rivalry and bistable depth ordering, there exist a set of parameters such that the onset and long term percept strengths are the same. For other parameters' values, if one of the stimulus interpretations is more probable to be observed during the course of perception, it is even more probable to be the first one to be observed. In the case of ambiguous plaid motion, we confirm the observation [1] that there exist a range



\* Correspondence: ashpiro@mcc.cuny.edu

<sup>1</sup>Department of Mathematics, Medgar Evers College/CUNY, Brooklyn, NY 11225, USA

of the plaid's parameters such that one of the interpretations is stronger at the onset of rivalry even if it is weaker in the long term.

We investigate whether competition models describing bistable perception [2] can account for the difference between the early and long term strength of the percept. Simulations show that adaptation-dominated, rather than noise-dominated regime of producing alternations in the models is better suited to provide agreement with experiments. (Fig.1B,1C) Other features of bistable perception, such as the similar lengths of the first few and long term dominance durations, and the mean and shape of the dominance durations distributions favor noise as a switching mechanism [1,2]. These observations support the conclusion that the models must operate within a balance between the noise and adaptation in order to reproduce experimentally observed statistics of bistable perception. Our results also suggest that the relative contribution of noise and adaptation in producing perceptual alternations may change over time.

#### Author details

<sup>1</sup>Department of Mathematics, Medgar Evers College/CUNY, Brooklyn, NY 11225, USA. <sup>2</sup>Center for Neuroscience, New York University, New York, NY 10003 USA. <sup>3</sup>Courant Institute of Mathematical Sciences, New York University, NY 10003, USA.

Published: 20 July 2010

#### References

1. Rubin N, Hupe JM: **Dynamics of perceptual bistability: Plaids and binocular rivalry compared.** *Binocular rivalry* Cambridge: MITD. Alais, & R. Blake 2004.
2. Shapiro A, Moreno-Bote R, Rubin N, Rinzel J: **Balance between noise and adaptation in competition models of perceptual bistability.** *J Comput Neurosci* 2009, **27**(1):37-54.
3. MorenoBote R, Shapiro A, Rinzel J, Rubin N: **Bistable depth ordering of superimposed moving gratings.** *Vis* **8**(7):20.1-13.

doi:10.1186/1471-2202-11-S1-P37

**Cite this article as:** Shapiro et al.: Percept strength at the onset of bistable perception. *BMC Neuroscience* 2010 **11**(Suppl 1):P37.

**Submit your next manuscript to BioMed Central and take full advantage of:**

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at  
www.biomedcentral.com/submit

