

Predictive Coding and Neural Communication Delays Produce Alpha-Band Oscillatory Impulse Response Functions

Submission ID 3000059
Submission Type Oral Presentation
Topic Cognitive Science
Status Submitted
Submitter Rufin VanRullen
Affiliation CNRS CerCo

SUBMISSION DETAILS

Presentation Type Either Poster or Oral Presentation

Presentation Abstract Summary Alpha (8-12Hz) oscillations are ubiquitous in the human brain. For example, the cross-correlation between temporally modulated white-noise visual stimuli and EEG waveforms reveals an impulse-response function (IRF) that reverberates at alpha frequency for several cycles. Yet the exact functional role of alpha rhythms in visual perception is still unknown. Here, I show that in a simplified model of visual cortex where neurons at one level seek to “explain away” the neuronal activation pattern at the previous level (i.e. “predictive coding”), alpha-band oscillatory IRFs naturally arise when neural communication delays between the two levels are taken into account. In fact, alpha oscillations are most robust when neuronal time constants and inter-areal delays are chosen with biologically plausible values –around 15-25ms and 10-15ms, respectively. The pervasive correlation between alpha rhythms and visual perception reported in numerous experimental studies could thus represent, in part, the signature of a basic computational principle: predictive coding.

Paper Upload (PDF) [CCN_VanRullen.pdf](#)

Co-author Information

* Presenting Author

First Name	Last Name	Affiliation	E-mail
Rufin *	VanRullen *	CNRS CerCo	rufin.vanrullen@cncs.fr

Keywords

Keywords
alpha rhythm
oscillations

predictive coding
neural delays
time constants
impulse-response function
EEG