Background

Binocular rivalry has been measured for over 100 years by Alternative-Forced-Choice (AFC) tasks that monitor 2 to 4 perceptual states (exclusive OS/OD and piecemeal/superimposition) (Stone 1838, Breese 1909; Skerswetat et al. 2018) to provide insights into the dynamics of visual consciousness and excitation-inhibition in neurological impairments. These methods lack: validated individual introspection, dynamic transition measurements between within experimenter-defined AFC-states, resolution within mixed states, weighted transition-probabilities.

Method

Demographics

30 people, including Northeastern students and author JS, participated. 28 normally-sighted participants were eligible (age[years][min-max]): 18.6 (17.34); sex (male/female): 13/15; Handedness [Left/Right]: 2/25*.

*data for one participant missing

Optometric screening

Eye dominance-Miles test [Left/Right]: 9/18**

Exclusion criteria: visual acuity <=40m (ETDRS computer-based test equal or better than 20/20 Snellen acuity (mean OS/OD/OU 20/15.6/15.5/14.2); stereo acuity (Titmus <=60°); no central suppression (4 lights seen in Worth-4-dot); no known ocular disorder/disease; no diagnosis of ADD, dyslexia, migraine, autism, epilepsy; no impairments. These methods lack: validated individual introspection, dynamic transition measurements between within experimenter-defined AFC-states, resolution within mixed states, weighted transition-probabilities.

Psychophysics

Customized MATLAB code in combination with Psychotoolbox (Brainard, 1997) used to conduct experiment and data analysis.

Gaussian Mixture Model was used for the perceptual state classification. 3D monitor (LG-polarised) was used with polarised glasses throughout each phase to leave the participant task blind. A right-handed formed joystick was used to generate 2D xy data and were connected to the physical changes on the monitor during phase 1, 2, and 4 and the indication for perceptual changes during phase 3.

Key messages

i. InFoRM: Rivalry generates validated maps of perceptual states
ii. InFoRM: Rivalry generates and extends findings comparable with conventional methods
iii. Markov models reveal new insights about the probabilistic nature of rivalry

More about InFoRM: Rivalry @ VSS2021 student poster session

May 25 at 8 am EDT

Acknowledgements

This research was supported by an ROI grant ROI EY029713. InFoRM: Rivalry is provisionally patented (P201850700-INV-21075) and owned by Northeastern University, Boston, USA.