

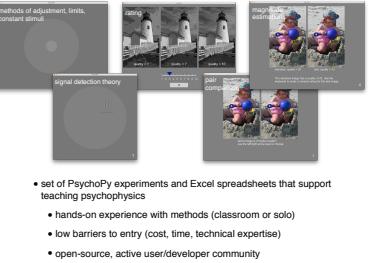
PsychoPhysics

A suite of tools for teaching psychophysics using PsychoPy

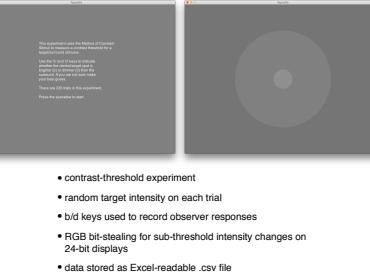
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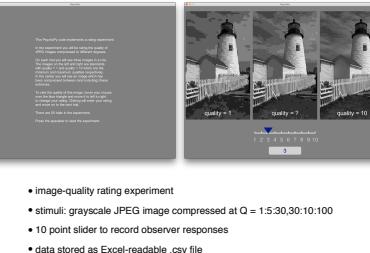
PsychoPhysics



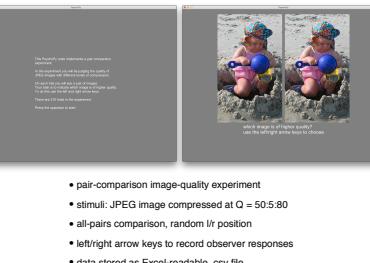
Thresholds: method of constant stimuli



Scaling: rating method



Scaling: pair comparison method



Abstract: Teaching psychophysics is challenging, because hands-on experience offers the best training, but easy-to-use platforms for developing psychophysical experiments are limited. PsychoPhysics (Ferwerda, 2007; J. Neuro. Meth., 162(1-2):8-13), is an open-source, multi-system, computer-based platform for experimental psychology, that facilitates experimentation through both graphical and code-based interfaces. The focus of this project, PsychoPhysics, is a suite of PsychoPy experiments and related analysis tools for teaching computer-based psychophysics. The current suite includes experiments for perceptual standard methods (method of adjustment, method of constant stimuli), scaling methods (rating, pair comparison, magnitude estimation), and issues in signal detection. The data from the experiments can then be analyzed and visualized using the Excel spreadsheets provided with each experiment. Students with or without coding experience, can explore the PsychoPy/PsychoPhysics environment and run, analyze and modify the experiments to gain further understanding, and confidence as experimental psychologists.

Psychophysics

- goal: objective measurement of subjective experience
- outer world
 - physical properties (volume, mass, intensity)
 - measure with instruments
- inner world
 - perceptual attributes (size, heft, brightness)
 - infer from observer's responses
- psychophysics: experimental methods to quantify the relationships between physical stimulation and perceptual experience
- basic measures: thresholds and scales

Classical psychophysical methods

- thresholds
 - method of adjustment
 - method of limits
 - method of constant stimuli
 - signal detection theory
- scales
 - rating
 - fractionation
 - pair comparison
 - successive categories
 - magnitude estimation



- PsychoPy - free, Python-based, OS-independent platform for experimental psychology
- Peirce, J.W. (2007) PsychoPy - Psychophysics software in Python. J. Neurosci. Methods, 162(1-2):8-13
- GUI and code-based development, easy integration with external hardware/software

Method of adjustment analysis

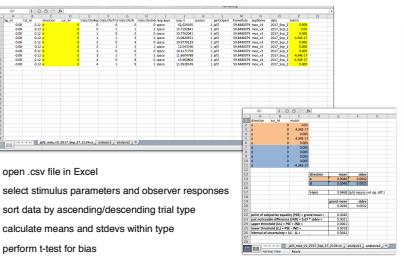


- contrast-threshold experiment
- alternating ascending and descending trial type
- b/d keys used to record observer responses
- RGB bit-stealing for sub-threshold intensity changes on 24-bit displays
- data stored as Excel-readable .csv file

Thresholds: method of limits



Method of adjustment analysis



Signal detection theory



Method of limits analysis



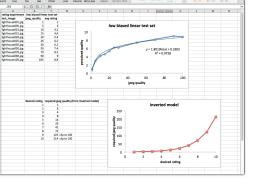
Method of constant stimuli analysis



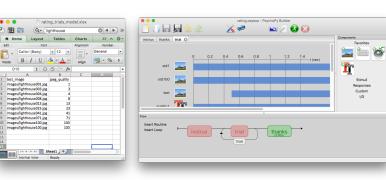
Signal detection theory analysis



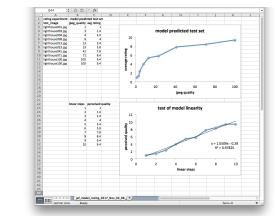
Modeling



Model testing



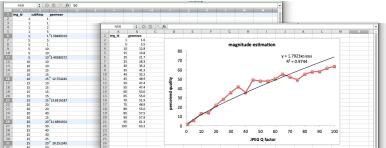
Model validation



Scaling: magnitude estimation method



Magnitude estimation analysis



Conclusions

- PsychoPhysics: toolkit for teaching psychophysics
- PsychoPy experiments, Excel analysis spreadsheets
- implements classical threshold and scaling methods
- provides hands-on experience with methods
- low barriers to entry
- current distribution available at

<https://github.com/jamesferwerda/PsychoPhysics>