



FACULTY OF ARTS
Charles University

Computers and Cognitive Sciences I

Assignment 2020/2021

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Outline

Preparation

Running the experiment

Analysis

Report

Preparation

Reading

- this assignment is about **simultaneous contrast**
- try to find some resources about it (examples below)
 - https://en.wikipedia.org/wiki/Contrast_effect
 - https://en.wikipedia.org/wiki/Psychometric_function
 - Kaneko, S., & Murakami, I. (2012). Flashed stimulation produces strong simultaneous brightness and color contrast. *Journal of Vision*, 12(12), 1–1.
<https://doi.org/10.1167/12.12.1>
 - Kaneko, S., Murakami, I., Kuriki, I., & Peterzell, D. H. (2018). Individual Variability in Simultaneous Contrast for Color and Brightness: Small Sample Factor Analyses Reveal Separate Induction Processes for Short and Long Flashes. *I-Perception*, 9(5), 2041669518800507.
<https://doi.org/10.1177/2041669518800507>

PsychoPy

- Download and install PsychoPy (<http://www.psychopy.org/>)
- Familiarize yourself with the environment
 - Getting started (<http://www.psychopy.org/gettingStarted.html>)
 - Check the tutorial video (<https://youtu.be/VV6qhuQgsil>)
- Download all assignment files (<https://osf.io/d42v3/>) and open `contrast.psyexp` in PsychoPy, give it a test run (you can terminate experiments with Esc)

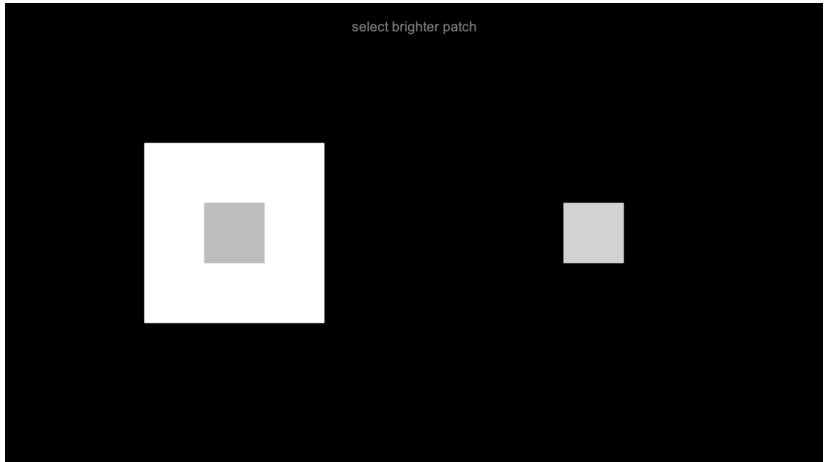
What is in the experiment

In this experiment,

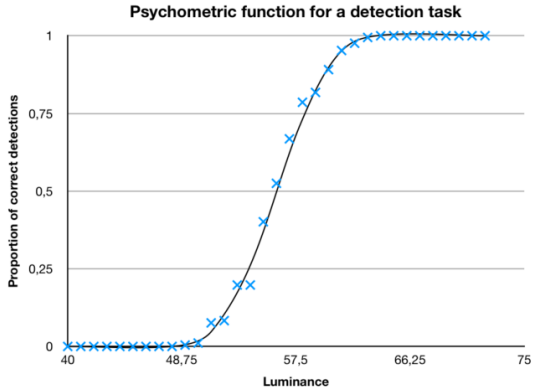
...
...

Press [space] to start

What is in the experiment II.



Psychometric curve



Colours in PsychoPy

- Colours are represented as arrays [red,green,blue]
- Each component has range [-1; +1]
- i.e., [1,1,1] is white, [-1,-1,-1] is black, [1,-1,-1] is red
- In our experiment
 - patch-background [1,1,1] or white
 - patch-foreground [0.5,0.5,0.5] or 75% luminance
 - screen background [-1,-1,-1] or black

Goal

- measure simultaneous contrast (what test-patch brightness appears to match the inner part of the standard patch on left)
- $N=3$ (you and 2 other people)
- 2 conditions
 - gray version
 - colour version (e.g., red)

Preparing your experiment

- Open `design.xlsx` and learn about variables used in the experiment
- There is only one variable `rgb_luminance`, think about possible values and what it changes in the experiment
- You need to select fewer values than current 21
- In the end, you want something like 9 values, covering the interval of reasonable values
 - Lower/upper bounds should yield 0% or 100% preference for one alternative
 - Values distributed symmetrically in the interval
 - Either equally-spaced or better with few extra values around the suspected 50% threshold
- In PsychoPy adjust `nReps` to 30 (each luminance value repeated 30×)
- Update the instruction text to something informative

Prepare the alternative version

- Duplicate the `contrast.psyexp` file
- Decide about colour (red, blue, green). Your task is to measure simultaneous contrast for one selected colour component.
- For colour version, the remaining colour components should be -1, i.e. $[1, -1, -1]$ or $[0.5, -1, -1]$ for red
- Update the colours of `patch_background`, `patch_foreground` and `patch_test`
- Test if the values you selected in `design.xlsx` are reasonable for the alternative version as well

Running the experiment

Collect data

- Measure yourself and 2 more people
- Check on yourself the duration of experiment

When measuring

- Find a calm place where you can collect the data. Turn off the phone, turn off computer notifications.
- Sometimes people are tired/ill (work definition: if able to drive, you can collect data)
- Choose experiment ID (string, no spaces), remove any names in analysis/report
- Explain experiment in your own words, explain there will be two parts
- Training: Start the gray version experiment, let the person to practice for 1-2 minutes. When fluent with the task, terminate the experiment with Esc.
- **Main part: Run the gray version again, wait until finished**
- **Make a short break and run the colour version**

Analysis

Import

- Import the data to R (or other SW)
- Recode responses to 0 and 1 (e.g., 1 for selected test or right patch as brighter, 0 for left patch)
- Install quickpsy package
 - Check <http://dlinares.org/basics.html>

Analyse

- You have collected 6 datasets (3 people \times 2 versions)
- For each dataset
 - Inspect the data (more less monotonic function, averages from 0 to 1, possible to fit with psychometric function)
 - Possible problems: Was the person paying attention to the task or responding randomly?
 - **Fit with psychometric function**
 - **Measure the threshold and its confidence interval**
 - i.e. for which luminance the person is 50% likely to say test patch is brighter (point of subjective equality)

Report

Write a brief report about what you measured and how

- What is simultaneous contrast (ca. $\frac{1}{2}$ page)
- Describe the experiment ($\frac{1}{2}$ -1 page) - describe the task, describe your setup (screen size and resolution), describe colour values you used
- Results (ca. 1 page) – what you found out, descriptive statistics, pick suitable charts (e.g., 3 charts)
- Conclusions ($\frac{1}{2}$ -1 page) – your interpretation (what you found and what is expected), your explanation/suggestion why this happened? Do gray/colour versions lead to different results? What could be done differently? What would be an interesting extension of this experiment?
- Keep the report below 4 pages

When finished

- At least 7 days before the exam date send your **report** (pdf) and **zipped data** and **code** to jiri.lukavsky@ff.cuni.cz

What contributes to your grade

- Performing the experiment correctly
- Clarity of your report and figures
- Appropriate statistical calculations
- Timeliness