Programming Psychology Experiments: Overview

Barbu Revencu & Maxime Cauté

Lecture 0 | 5 September 2025

What will you get from this course?

Learn to **build psychology experiments** (Python & JavaScript):

- Instruct the computer to present what you want when you want it

- Record participant responses to a datafile

Learn the **basics of data analysis** (R):

- Clean up the collected data for tidy analysis

- Basic statistical analysis and plotting

Improve your **programming skills** through hands-on practical tutorials

Why should you learn all this?

Programming experiments, **analyzing** data, and computational **modeling** are central to contemporary research in cognitive science (and beyond)

Understanding how computers work is **foundational to cognitive science**

Learning to **automate repetitive tasks** saves time and energy

LLMs are still too unreliable to automate coding itself—for now, you are better off using them *minimally* in the beginning and *collaboratively* later on, once you are in a good position to evaluate their outputs

What is expected of you?

Regular attendance (Wednesdays, 6–7.30 pm): Let us know in advance via email if you cannot attend the lectures for a good reason

Working during and outside the lectures: At the end of each lecture, we will ask you for a copy of your work folder for that session

Grading: PASS/FAIL

The plan for the course

Weeks 1–6: Building experiments in Python (Python review, expyriment libraries, presentation of audiovisual stimuli, recording responses, counterbalancing)

Weeks 7–9: Working with data in R (tidy data, ggplot, statistical tests)
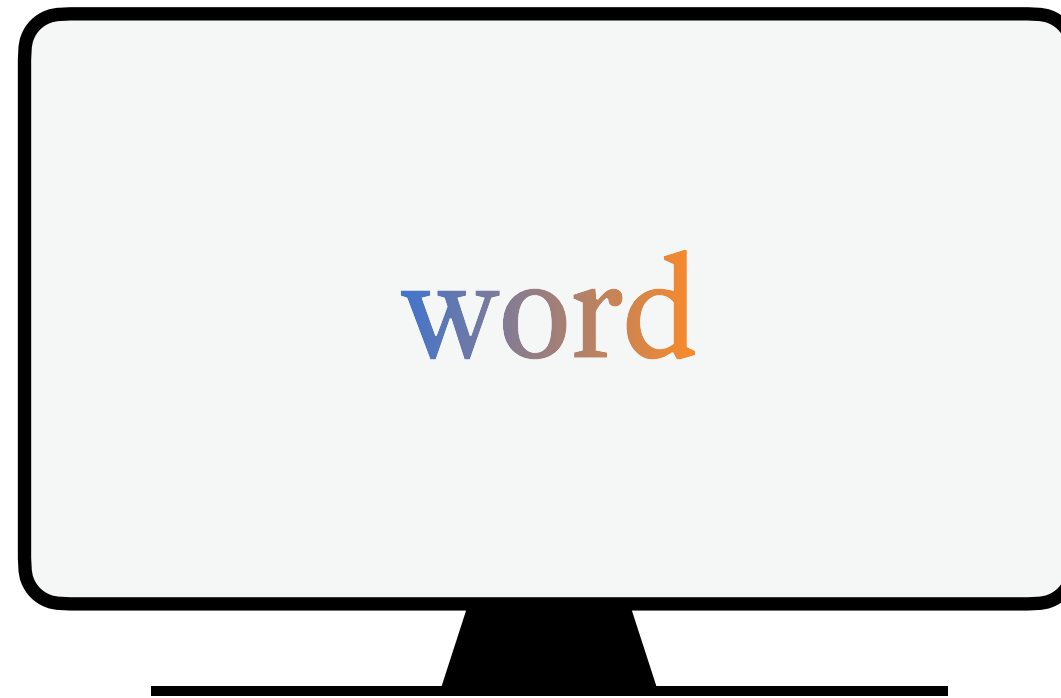
Weeks 10–12: Online experiments (jsPsych), w/ Maxime Cauté

Week 13: Wrap-up
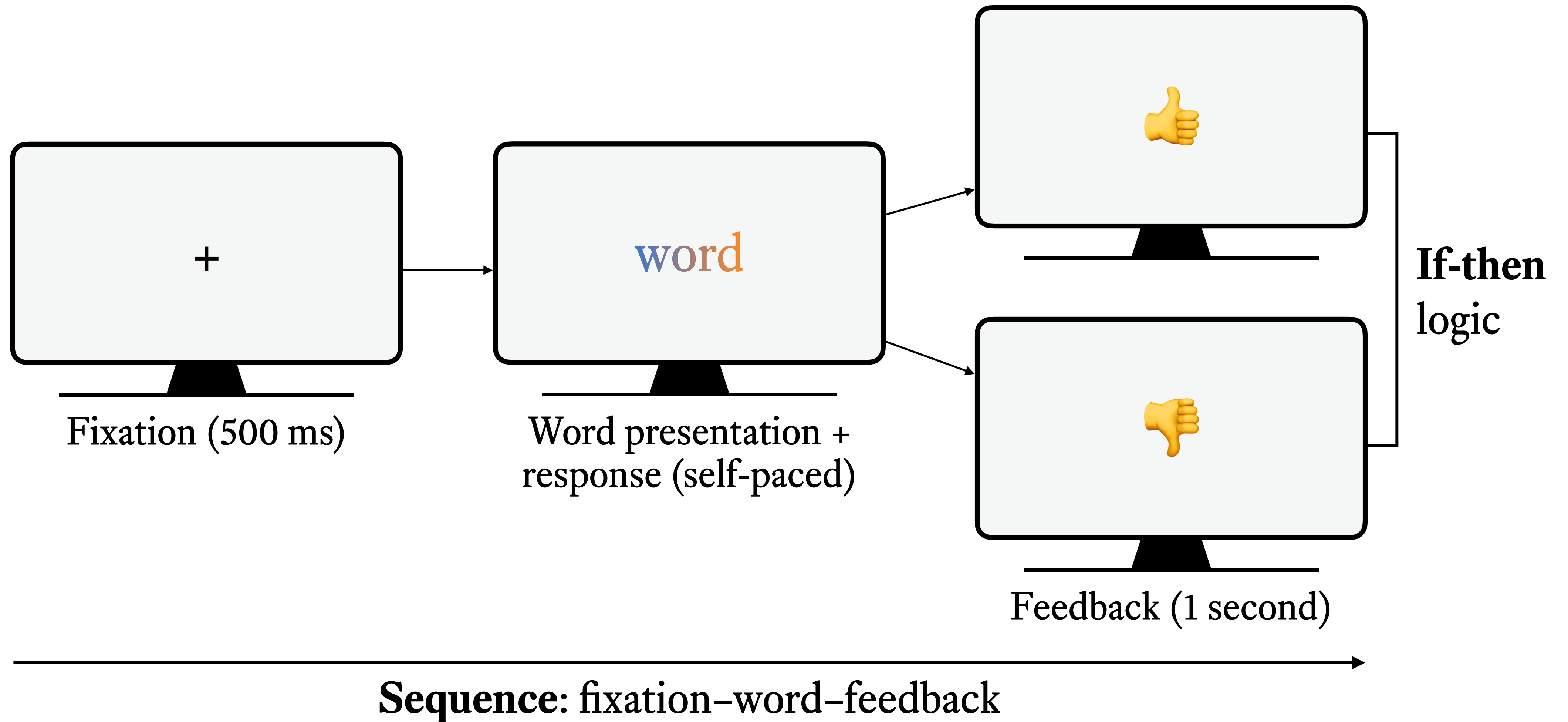
Example: Stroop effect

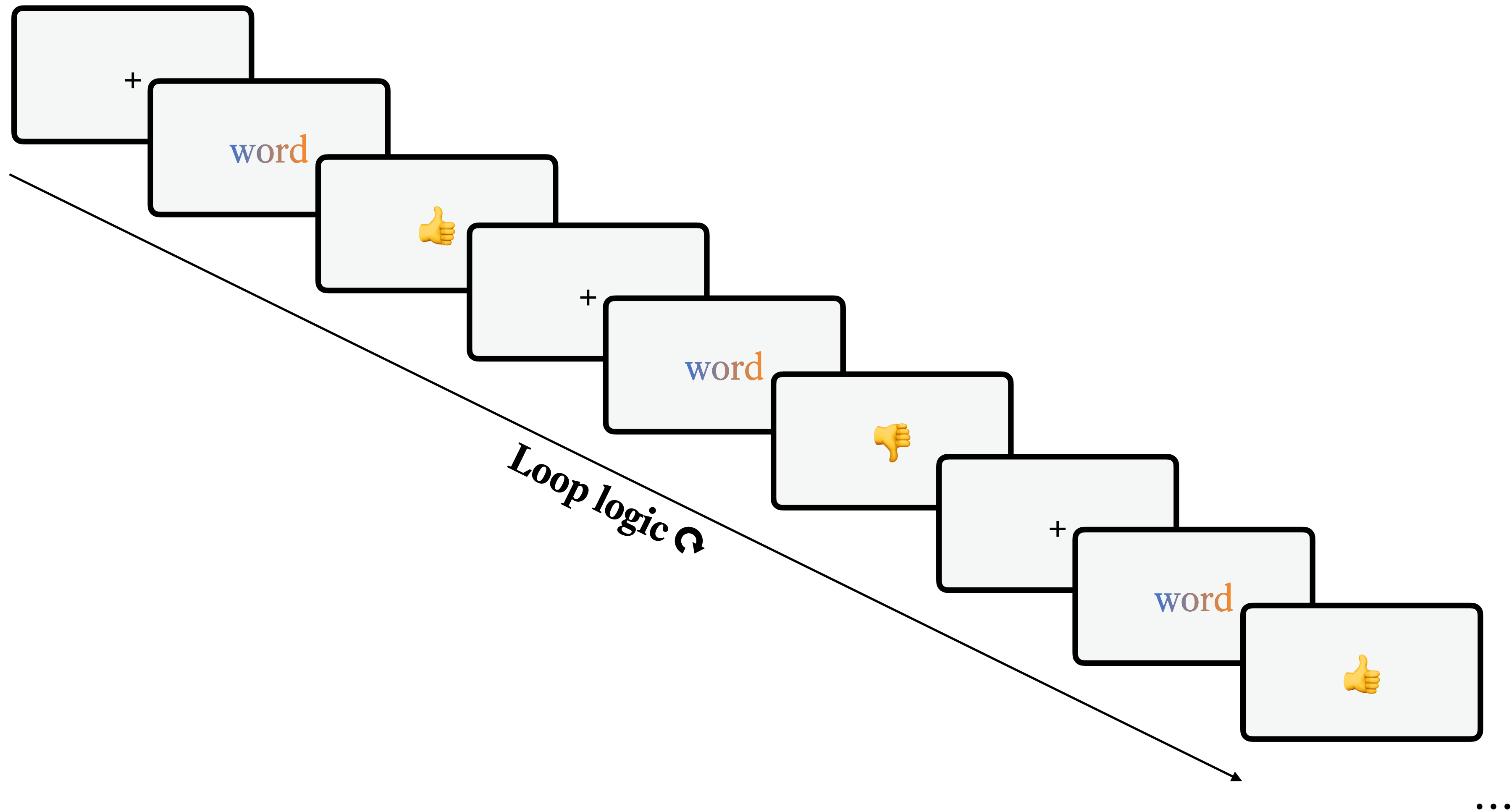*Name the color of the ink.*

green

Example: Stimulus structure

2 variables: word & ink color
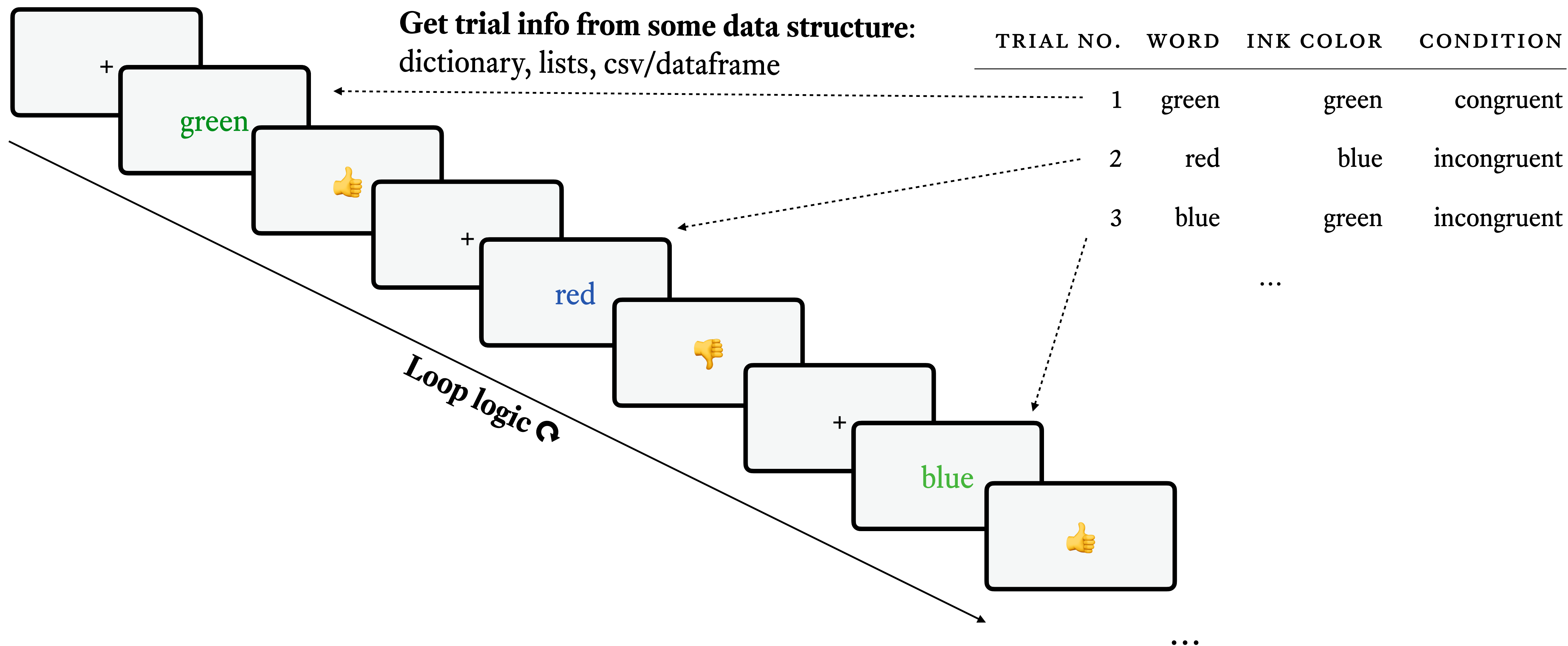**2 constants**: position & size

Example: Trial timeline

Fixation (500 ms)

Word presentation +
response (self-paced)

Feedback (1 second)

If-then
logic

Sequence: fixation–word–feedback

Example: Experiment timeline

Loop logic ↻

Example: Experiment timeline

Get trial info from some data structure: dictionary, lists, csv/dataframe

Loop logic ↻

TRIAL NO.	WORD	INK COLOR	CONDITION
1	green	green	congruent
2	red	blue	incongruent
3	blue	green	incongruent
...			

Example: Plotting data

SUBJECT	TRIAL NO.	WORD	INK COLOR	CONDITION	RESPONSE TIME	CORRECT
1	1	green	green	congruent	732	1
1	2	red	blue	incongruent	951	0
1	3	blue	green	incongruent	812	1

...

average by subject and condition

SUBJECT NO.	CONDITION	RESPONSE TIME	CORRECT
1	congruent	732	0.9
1	incongruent	800	0.8
2	congruent	812	1

...

Response Times by Condition (ms)
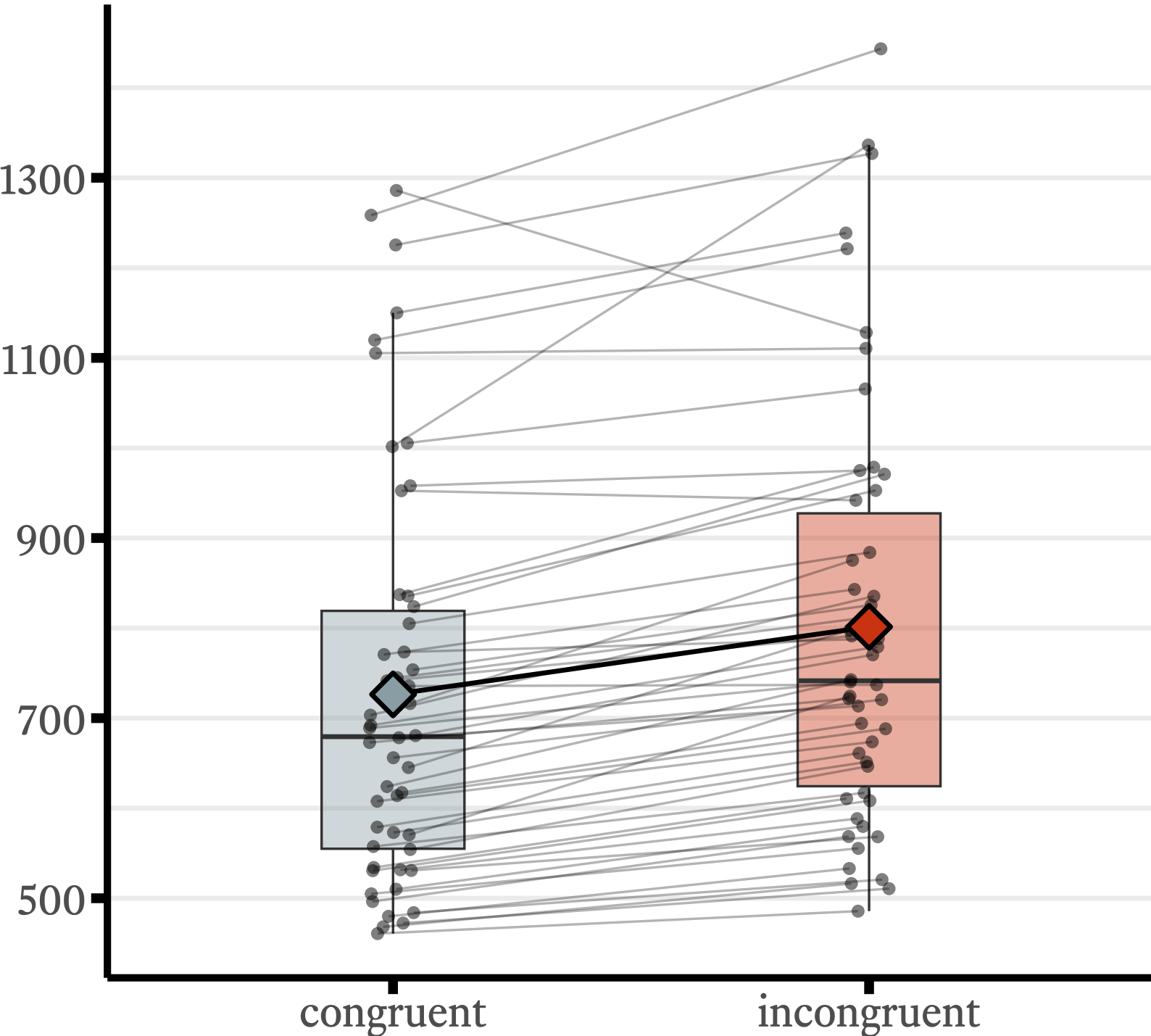
Resources

GitHub repository: https://github.com/barburevencu/PPE

  This will be updated with lecture slides and exercises as we go along

Python cheatsheet: https://www.pythoncheatsheet.org/

Expyriment documentation: https://docs.expyriment.org/

R Tidyverse cheatsheet: https://media.datacamp.com/legacy/image/upload/v1676302697/Marketing/Blog/Tidyverse_Cheat_Sheet.pdf

Installation party

Basic Python quiz: https://forms.gle/Lf6qD4rH1dB42kQW7

Installation guide: https://github.com/barburevencu/PPE/blob/main/Installation/installation-guide.md

Installation tests: https://github.com/barburevencu/PPE/blob/main/Installation/installation-test.md