

CogLab: Research Design

SEP 8, 2022

recap: Sep 6, 2022

- what we covered:
 - open science & reproducibility
 - Frank & Saxe (2012)
- your to-dos were:
 - *prep* : QALMRI/SPARK tutorial
 - *prep* : Savic paper

today's agenda

- project check-in
- research methods review
- your reflections and your data

project groups & milestone #1

- groups:
 - Jennifer, Jess, Dyana ([group folder link](#))
 - Uma, Gia, Kavya ([group folder link](#))
 - Stephen, Nick, Ella ([group folder link](#))
- milestone #1: **bookmark** [project document](#)
 - due Sep 10
 - group name
 - APA-style citation to review article + 250-word reflection
 - self-assessment
 - accountability contract

project meet & greet [5 minutes]

- sit with your group
- locate and explore your group folder
- come up with a plan for milestone #1
- ask any questions that are coming up

key research methods concepts

- variables
 - independent variable
 - dependent variable
 - confounding variable
 - control variable
- types of designs
 - within-subject / repeated-measures
 - between-subject / independent
 - factorial designs / quasi designs

within / repeated vs. between / independent

- advantages of within-participant designs
 - higher power to find true effects (if they exist)
 - more control over participant noise across conditions
 - need lower N
- advantages of between-participant designs
 - avoid order/practice effects
 - reduced #trials => fatigue/boredom
 - lower likelihood of demand characteristics
- controlling for order effects => counterbalancing!

activity

- groups of 3 (activity document)
- read a **short abstract** and **identify key concepts**:
 - independent/ dependent variable(s)
 - control / confounding variable(s)
 - design (within/between participant)
 - order/practice effects
 - what would the stimuli file look like for this experiment?
 - counterbalancing? try to come up with a table!

experiment review

- think back to the language experiment you did
- what kinds of **tasks** did you perform?
- what do you think the experiment was about?

exercise: QALMRI of experiments

- a tool to glean important information from empirical papers in psychology
- in groups of 2-3, sketch out a basic QALMRI on Padlet
 - [padlet link](#)
- group 1: experiment 1
- group 2: experiment 2
- group 3: experiment 3
- group 4: experiment 4

Q_{uestion}

A_{lternatives}

L_{ogic}

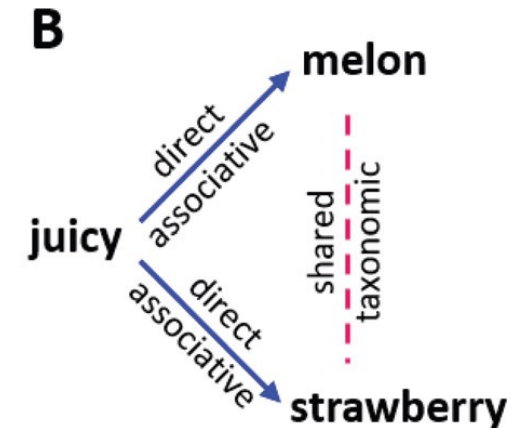
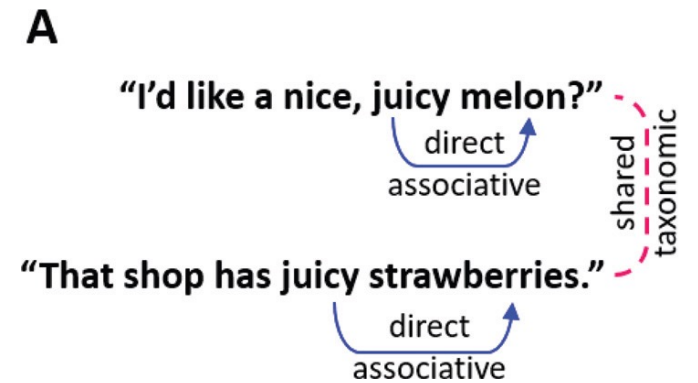
M_{ethods}

R_{esults}

I_{nferences}

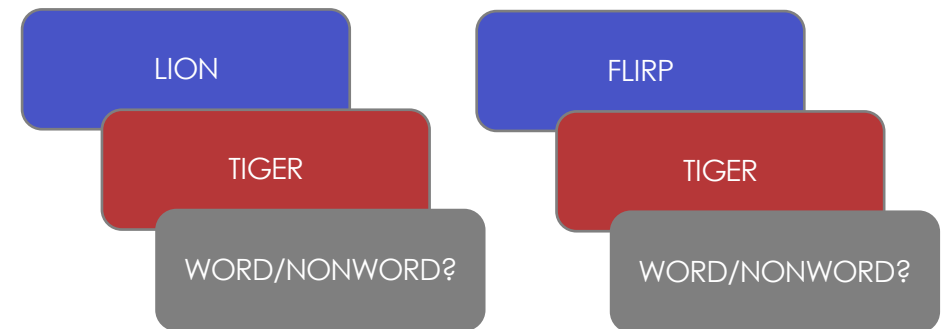
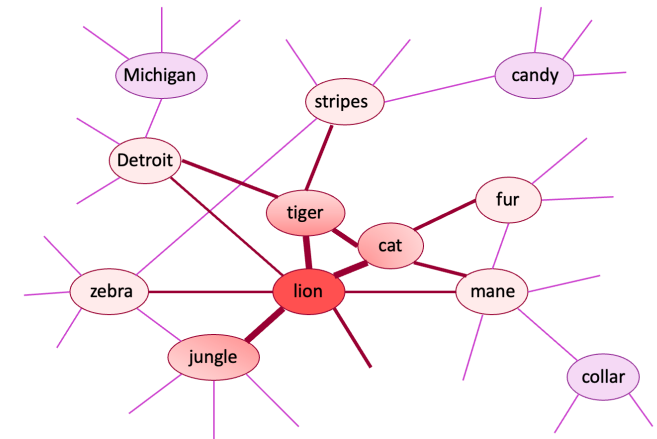
learning from co-occurrence

- a prominent view in language research is that the meaning of words is learned based on **which words it co-occurs with** in natural language
 - “you shall know a word by the company it keeps” (Firth, 1957)
- co-occurrence can be defined in two ways:
 - **direct**: if words occur together in the **same** context (e.g., eat-food, sit-chair, etc.)
 - **indirect/shared**: if words occur in **similar** contexts (e.g., strawberries are red, apples are red)
- co-occurrences are statistical regularities and can extend to any type of input (tones, figures, words, etc.)



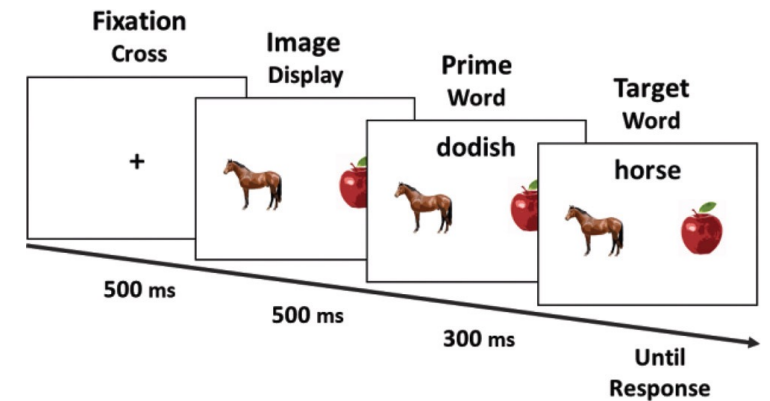
semantic priming

- **priming** refers to the phenomenon where presenting a stimulus influences processing of a subsequent stimulus
 - many types!
- semantic priming tasks are widely used to study how concepts influence the processing of other concepts (**spreading activation** theory) through meaningful relationships
- a key finding from **priming tasks** is that **related words are responded to faster than unrelated words**



learning new words

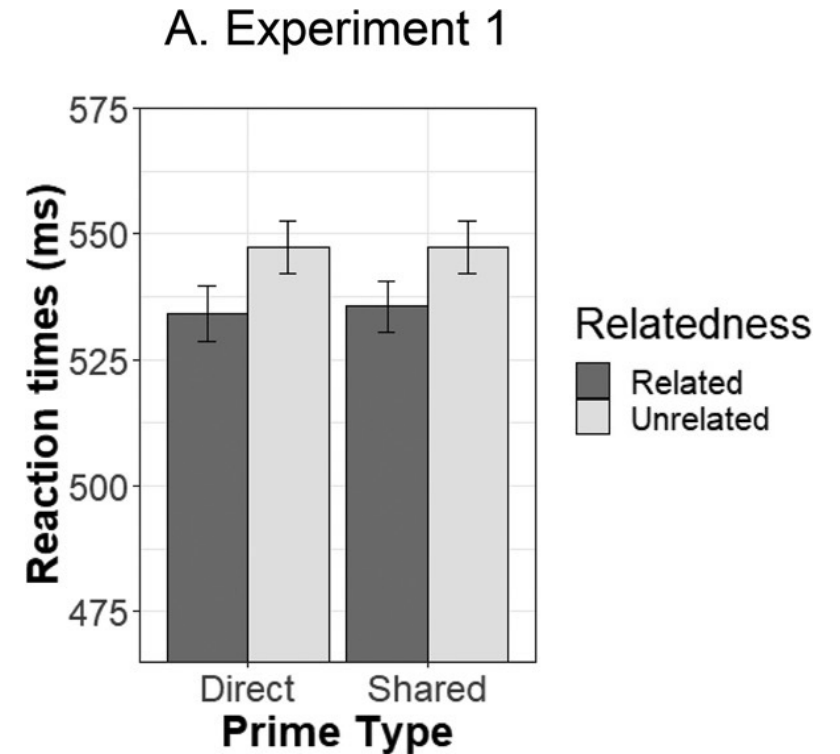
- Savic et al. (2022) had participants read sentences with novel and familiar words
 - novel words co-occurred with familiar words (directly or indirectly)
- participants tested in a semantic priming experiment
- novel – familiar words were paired based on whether the pairs were **related or unrelated** and whether there was **direct/indirect co-occurrence**



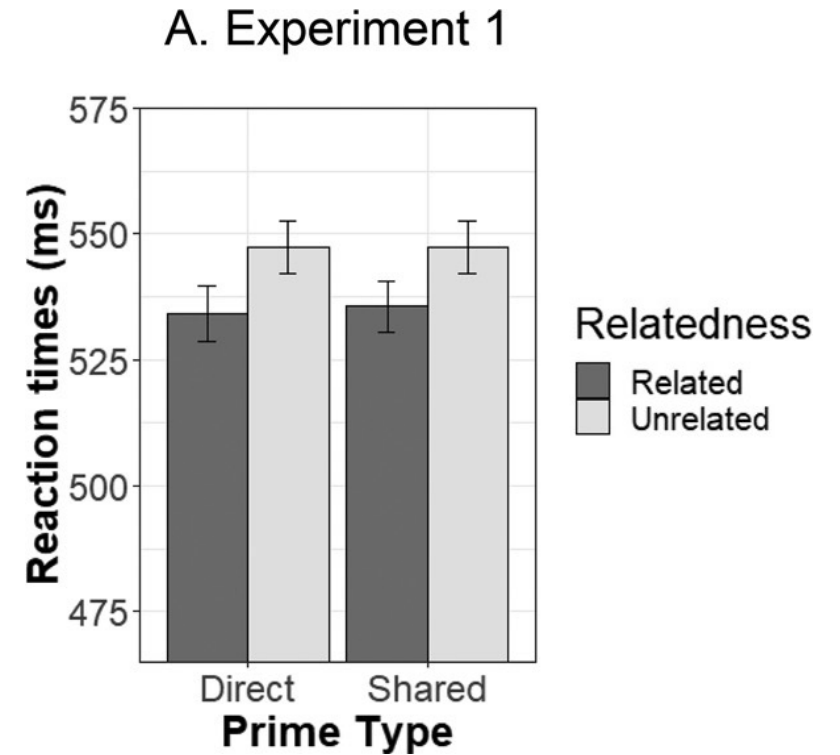
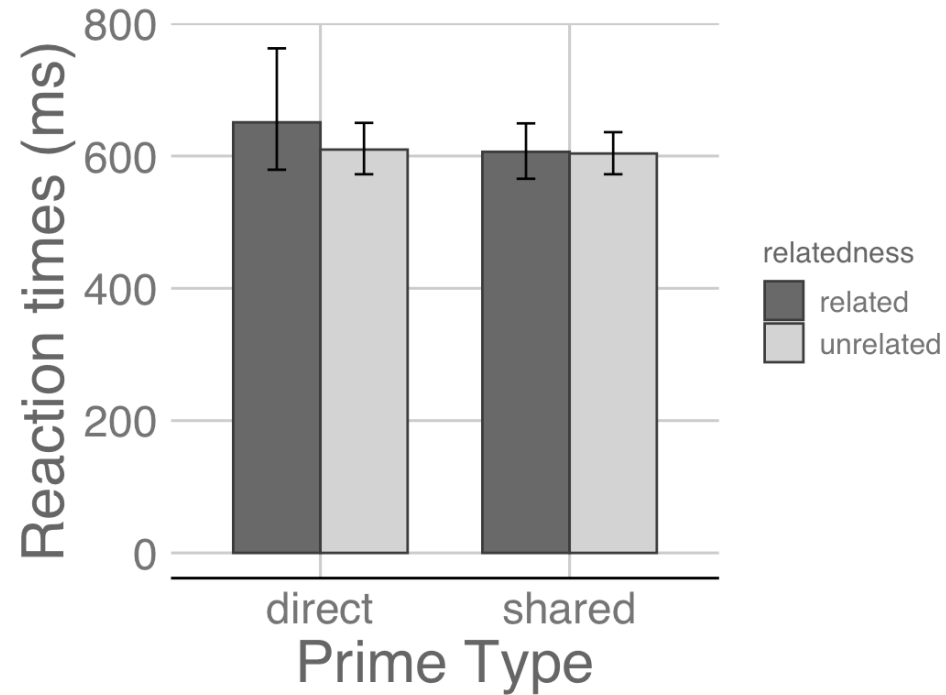
	related	unrelated
direct	dodish-horse	foobly-horse
indirect/shared	geck-horse	mipp-horse

semantic priming and co-occurrences

- **reaction time** to identify targets was faster when they were preceded by novel pseudowords/primers with which they directly co-occurred or shared co-occurrence in training
- pattern did not differ for direct and indirect co-occurrences
- **inference**: co-occurrences in natural language can drive semantic integration of new words



pilot data (N = 19) vs. Savic et al.'s data





questions/thoughts

possible questions to explore

- what is the **core idea** being tested?
- which **parts of the experiment** test this core idea?
- **how many repetitions** does it take for integration?
- is there something special about the **pairings**?
 - dodish-horse and foobly-apple
- is association the same as meaning?

the experiment

- put on your “researcher” hat
- what does it take to conduct this study?

next class

- **before** class

- *prep*: Barnes, N. Publish your computer code: it is good enough. *Nature* 467, 753 (2010). <https://doi.org/10.1038/467753a>
- *try*: week 2 quiz
- *apply*: project milestone 1 (team plan + review article)
- *apply*: optional meme

- **during** class

- understanding experiment anatomy
- setting up a project workflow via Github
- building your first webpage!