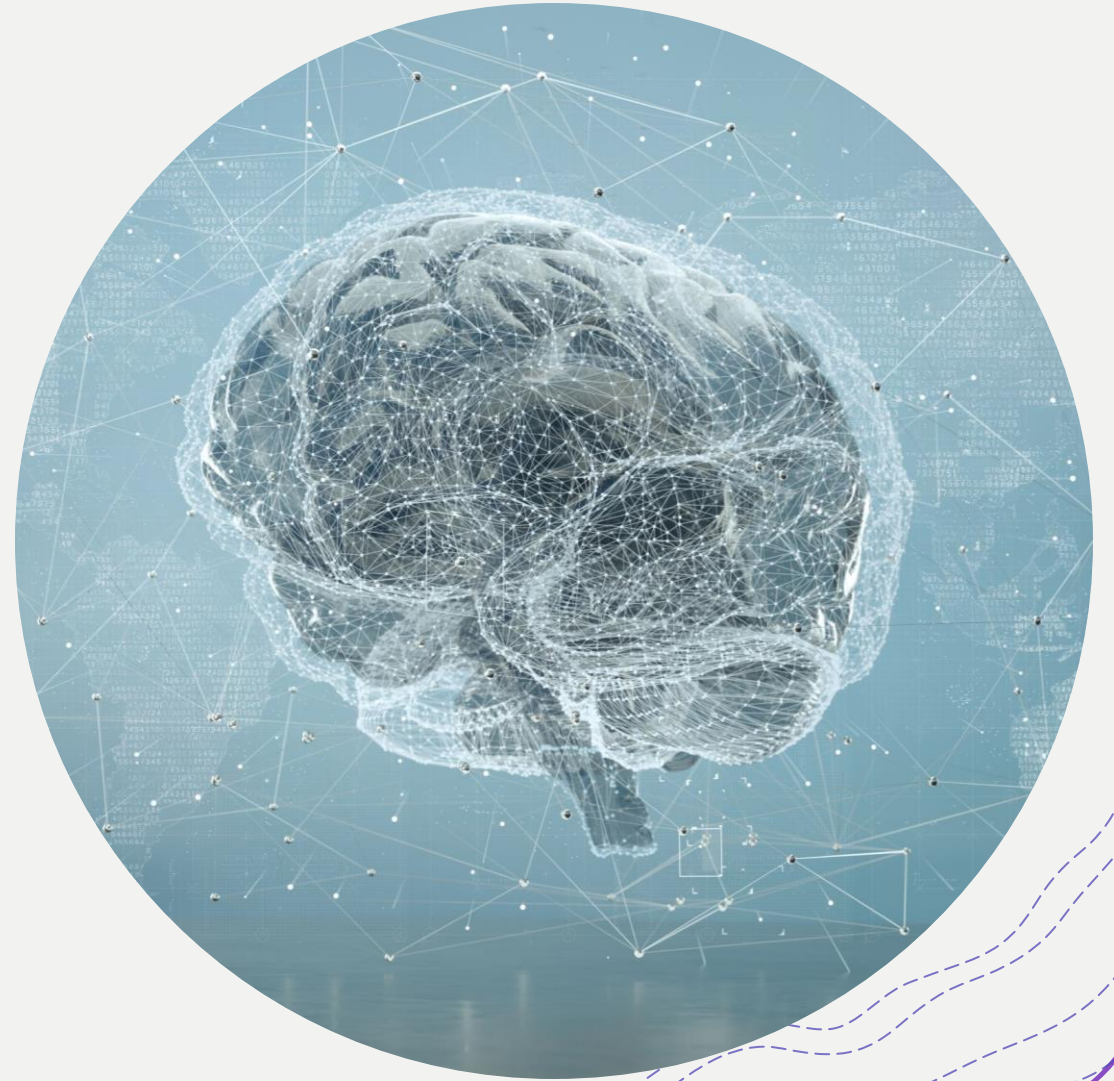# Intelligent Minds and Machines

PSYC 3043

Week 3: Statistical learning

logistics: office hours

+ Friday, 10-12 pm

+ Friday, 1-3 pm (need advance notice, by appointment only)

logistics: group discussion reflections

Week 3: Statistical Learning

Tuesday, September 17, 2024: Learning patterns from data

- Saffran, J. R., Aslin, R. N., & Newport, E. L. (1996). Statistical learning by 8-month-old infants. *Science, 274*(5294), 1926-1928. [ANNOTATE]
- Saffran, J. R., & Kirkham, N. Z. (2018). Infant statistical learning. *Annual Review of Psychology, 69*, 181-203.[ANNOTATE]

Thursday, September 19, 2024: From patterns to knowledge

- Unger, L., & Fisher, A. V. (2021). The emergence of richly organized semantic knowledge from simple statistics: A synthetic review. *Developmental Review*, 60, 100949. [ANNOTATE]

Sunday, September 22, 2024, 2024: Week 3 Assignments

- Submit Week 3's Reflection
- Submit Week 3's Meme
- Submit a Discussion Leader Reflection (ONLY if you led a GROUP discussion this week!)

today's agenda

+ co-occurrence to knowledge

+ QALMRI/SPARK frameworks

+ project discussion

learning from co-occurrence

+ 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.)

an experiment

+ https://d6yyq8o1o3.cognition.run/
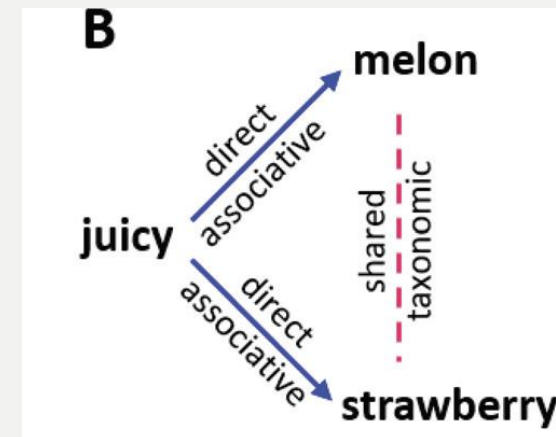
learning new words

+Savic et al. (2022) had participants read sentences with novel (*dodish*) and familiar (*horse*) 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
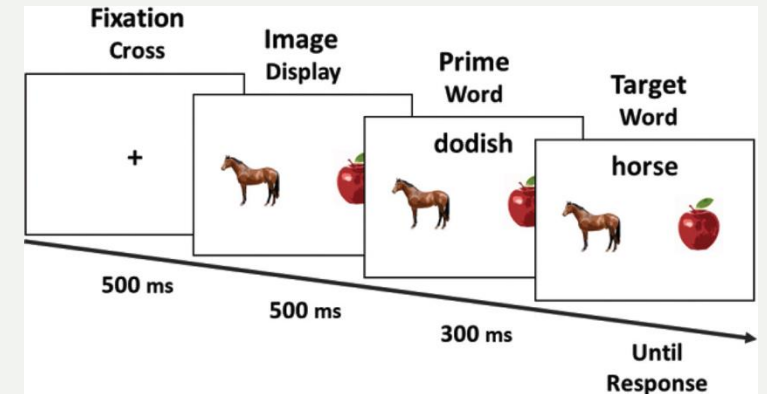
semantic priming and co-occurrences

+ reaction time to identify targets was faster when they were preceded by novel pseudowords/primes 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
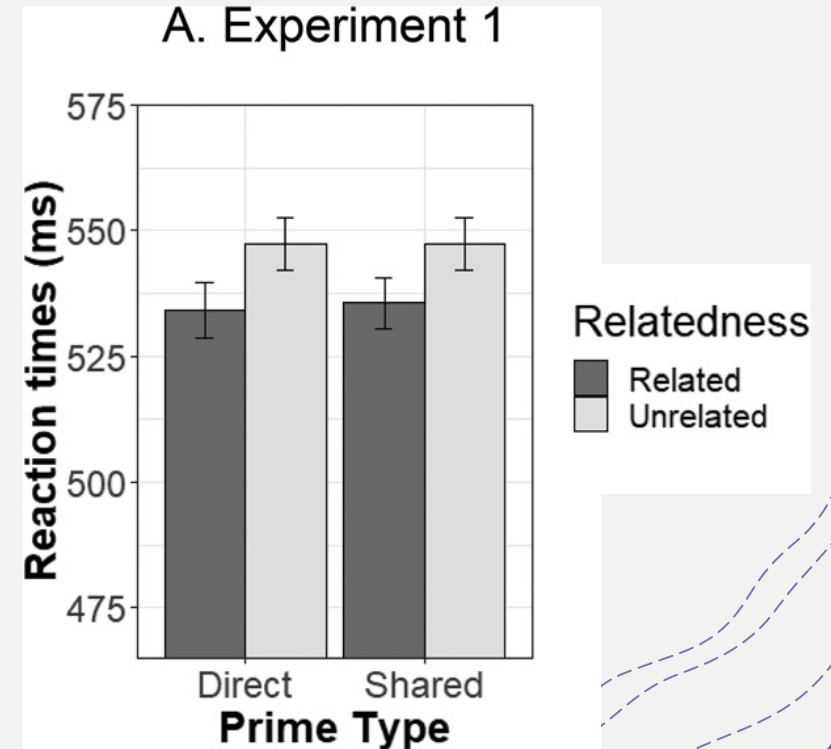
fall 2023 studies / valence and meaning!

+ do you learn anything about the novel word beyond its association with the older word?
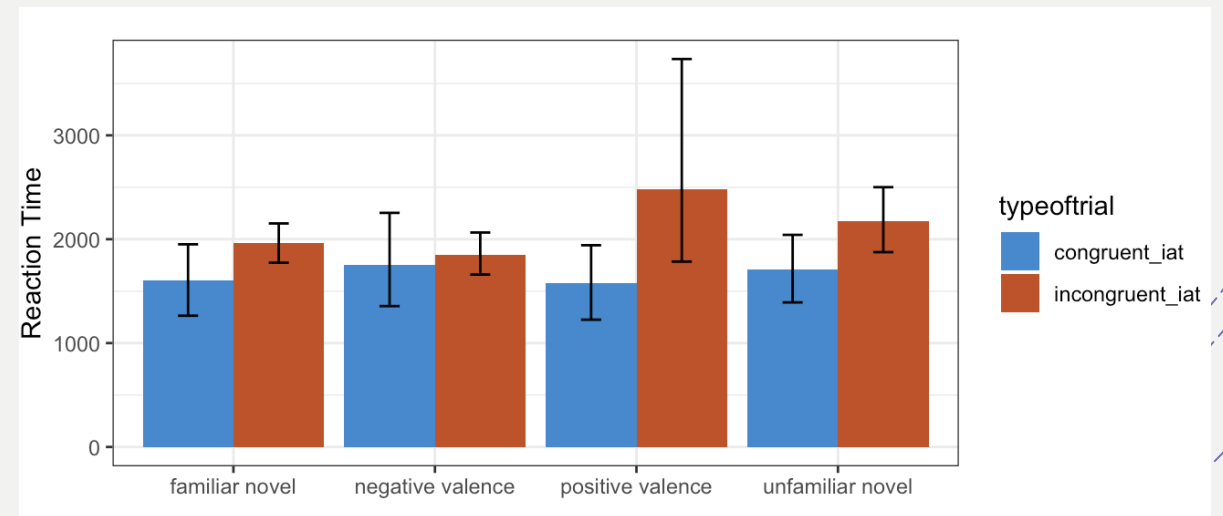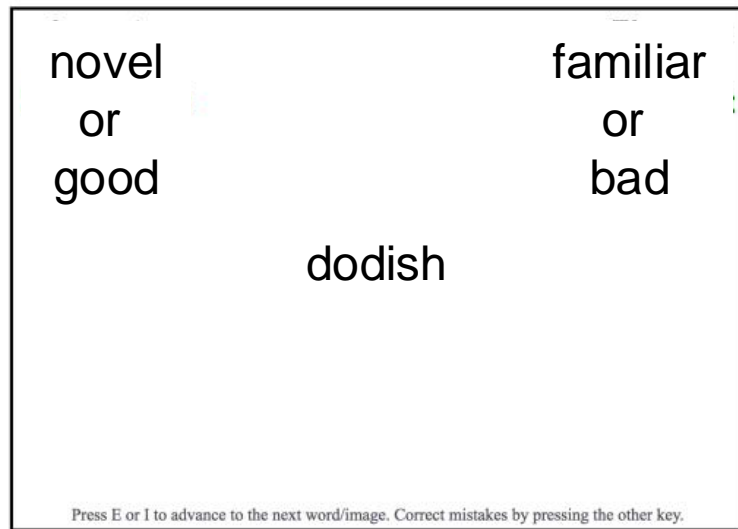
associative vs. taxonomic relations

+ relations between concepts are derived from co-occurrences

+ direct co-occurrences lead to *associative* links

+ indirect co-occurrences lead to *taxonomic* links

themes

+ Haley: non-semantic associations

+ Rachel: conflation of terms

+ Jennifer: oral vs. written words, visual component

+ Emely: gender stereotypes and taxonomic relations

+ Ocean: context and prior knowledge

+ May: cultural influences on semantic relations?

explore your associations!

+ https://smallworldofwords.org/en/project/

+ https://smallworldofwords.org/en/project/research

This week, you will write your first formal summary of a research article, using the QALMRI/SPARK tools we have discussed in class. You can choose whichever article spoke to you the most for this summary.

Please provide an APA citation for the material at the TOP of the page and then write the QALMRI/SPARK summary below the citation. You are encouraged to go over the **QALMRI/SPARK** ⇗ tutorial on the course website and make sure your summary follows the expected format.

Note: if you are summarizing an EMPIRICAL article, you must write a QALMRI. If you are summarizing a REVIEW article, you must write a SPARK. Which article requires which kind of summary is mentioned below:

Tuesday, September 12, 2023 ⇗

- [EMPIRICAL/QALMRI] Saffran, J. R., Aslin, R. N., & Newport, E. L. (1996). Statistical learning by 8-month-old infants. *Science, 274*(5294), 1926-1928.
- [REVIEW/SPARK] Saffran, J. R., & Kirkham, N. Z. (2018). Infant statistical learning. *Annual Review of Psychology, 69*, 181-203.

Thursday, September 14, 2023 ⇗

- [REVIEW/SPARK] Unger, L., & Fisher, A. V. (2021). The emergence of richly organized semantic knowledge from simple statistics: A synthetic review. *Developmental Review, 60*, 100949.

review article summary (SPARK)

+ review articles summarize a large collection of empirical/experimental work on a sub-domain of cognition

+ they often highlight key emerging themes, ideas, and questions

+ SPARK is a tool to help you summarize the information from a review article (created using ChatGPT!)

Subject

Perspectives

Analysis

Reflection

Knowledge

empirical article summary (QALMRI)

+ QALMRI: a tool to glean important information from empirical papers in psychology

+ for multi-experiment papers, you must differentiate each experiment

Question

Alternatives

Logic

Methods

Results

Inferences

QALMRI activity

project discussion

Milestones

Regardless of what final form your project takes, there will be several formative low-stakes milestones during the semester to ensure you are making steady progress towards the final project. The breakdown of how the milestones contribute to your final project grade is below:

Milestone	Points
Questions of interest	2.5
QALMRI + SPARK for research articles	10
Project plan/outline	5
First draft	2.5
Final submission	20
Total	40

project discussion

3	Tuesday, September 17, 2024	W3: Statistical Learning
3	Thursday, September 19, 2024	W3 continued…
3	Sunday, September 22, 2024	**W3 Assignment (Reflection) Due**
4	Tuesday, September 24, 2024	W4: Statistical learning & other minds
4	Thursday, September 26, 2024	W4 continued…
4	Sunday, September 29, 2024	**W4 Assignment (Reflection) Due**
5	Tuesday, October 1, 2024	**NO CLASS**
5	Thursday, October 3, 2024	W5: Language
6	Tuesday, October 8, 2024	**Fall Break!! NO CLASS**
6	Thursday, October 10, 2024	W6: Review and Reflect
6	Sunday, October 13, 2024	**W6 Assignment (Project Milestone #2: QALMRI/SPARK) Due**
7	Tuesday, October 15, 2024	W7: Perception and Action
7	Thursday, October 17, 2024	W7 continued…
7	Sunday, October 20, 2024	**W7 Assignment (Reflection) Due**
8	Tuesday, October 22, 2024	W8: Emotional learning
8	Thursday, October 24, 2024	W8 continued…
8	Sunday, October 27, 2024	**W8 Assignment (Project Milestone #3: Project Plan) Due**

questions of interest

+ discuss your questions and ideas

+ think about next steps

coming up

Week 4: Statistical Learning & Other Minds

Tuesday, September 24, 2024: Can animals learn patterns?

- Hauser, M. D., Newport, E. L., & Aslin, R. N. (2001). Segmentation of the speech stream in a non-human primate: Statistical learning in cotton-top tamarins. *Cognition, 78*(3), B53-B64.[ANNOTATE]
- Santolin, C., & Saffran, J. R. (2018). Constraints on statistical learning across species. *Trends in Cognitive Sciences, 22*(1), 52-63.[ANNOTATE]

Thursday, September 26, 2024: Can machines think?

- Turing, A. M. (1950). Computing Machine and Intelligence. *MIND ,LIX*, 433-460. [ANNOTATE]

Sunday, September 29, 2024, 2024: Week 4 Assignments

- Submit Week 4's Reflection
- Submit Week 4's Meme
- Submit a Discussion Leader Reflection (ONLY if you led a GROUP discussion this week!)

Week 5: Language

Tuesday, October 1, 2024: No class!

Thursday, October 3, 2024: How is meaning learned?

- Lake, B. M., & Murphy, G. L. (2021). Word meaning in minds and machines. *Psychological Review.***(27 Pages)** [ANNOTATE]

- Many Minds Podcast: What does ChatGPT really know? **(1 h 17 mins)** [ANNOTATE]