Cognition

PSYC 2040

L9: Memory II

Part 2

today's agenda

- episodic memory
  - contextual effects on memory
  - memory processing principles
  - flashbulb memories
- semantic memory
  - structure
  - priming

meaningfulness: context

- claim: meaningful context cues improve comprehension and recall
- evidence: Bransford & Johnson (1972)
  - tested participants on comprehension and recall of different passages by providing no or some context before/after the passage was read
  - providing context **before** encoding produced the highest recall and comprehension scores

TABLE 1

MEAN COMPREHENSION RATINGS AND MEAN NUMBER OF IDEAS RECALLED, EXPERIMENT I

	No context (1)	No context (2)	Context after	Partial context	Context before	Maximum score
Comprehension	2.30 (.30)[a]	3.60 (.27)	3.30 (.45)	3.70 (.56)	6.10 (.38)	7
Recall	3.60 (.64)	3.80 (.79)	3.60 (.75)	4.00 (.60)	8.00 (.65)	14

[a] Standard error in parentheses.

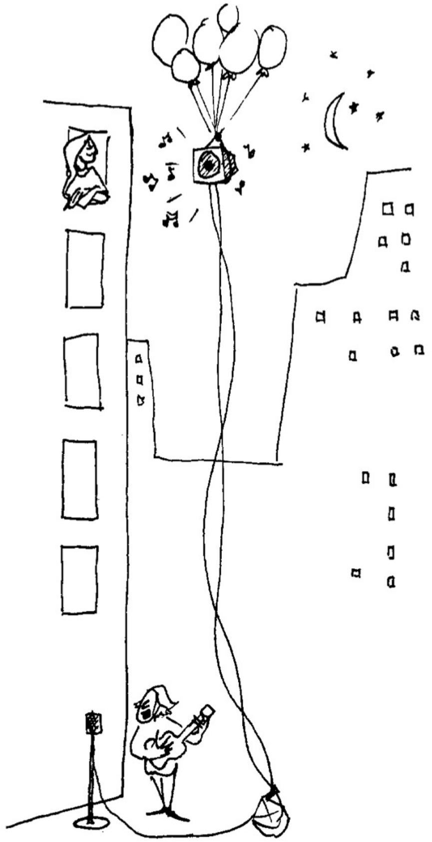

FIG. 1. Appropriate context picture for Experiment I.

environmental context

- claim: similar encoding/retrieval contexts can improve memory
- evidence: Godden & Baddeley (1975)
    - divers learned words before they went for a dive (dry) or after (wet), and then recalled words in dry or wet conditions
    - the divers recalled more words when the encoding and and retrieval (learning and recall) environments matched

Table 1. *Mean number of words recalled in Expt. I as a function of learning and recall environment*

	Recall environment				
	Dry		Wet		
Learning environment	Mean recall score	S.D.	Mean recall score	S.D.	Total
Dry	13·5	5·8	8·6	(3·0)	22·1
Wet	8·4	3·3	11·4	(5·0)	19·8
Total	21·9	—	20·0	—	—

test seating and context independence

Memory & Cognition
1985, 13 (6), 522-528

Context effects: Classroom tests and context independence

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Contextual dependence has been hypothesized to influence classroom test performance such that taking a test away from the lecture room should lead to lower test scores (Abernethy, 1940). We studied the performances of students who took typical college tests in rooms different from the lecture rooms and made comparisons to classmates who remained in the lecture rooms. No statistically reliable effects were found in 21 such comparisons in seven courses. Although contextual dependence has been produced under laboratory control, college classes induce students to decontextualize information. The theoretical utility of contextual associations is based on simpler, more tightly controlled conditions, and generalization to representative situations is an empirical matter.

key memory principles

- levels of processing: Craik and Lockhart proposed the idea that the strength and quality of encoding determine later memory
- transfer-appropriate processing: cognitive processing at both encoding AND retrieval matters for memory
  - transfer inappropriate processing (TIP): mismatch in what happened during encoding vs. retrieval
  - transfer appropriate processing (TAP): match in what happened during encoding vs. retrieval

levels of processing

- recall the self-reference effect (Rogers et al., 1977)
- could be explained by shallow (structural, phonemic conditions) vs. deep (semantic, self-reference) processing
- memory traces are stronger when the original information is processed in a meaningful way

Table 1
Examples of the Rating Tasks

Task	Cue question	Manipulation
Structural	Big letters?	The adjective was either presented in the same size type as the question or twice as large.
Phonemic	Rhymes with xxxx?	xxxx was a word that either rhymed or did not rhyme with the adjective.
Semantic	Means same as YYYY?	YYYY was either a synonym or unrelated word to the presented adjective.
Self-reference	Describes you?	Subjects simply responded *yes* or *no* to indicate the self-reference quality of the presented adjective.

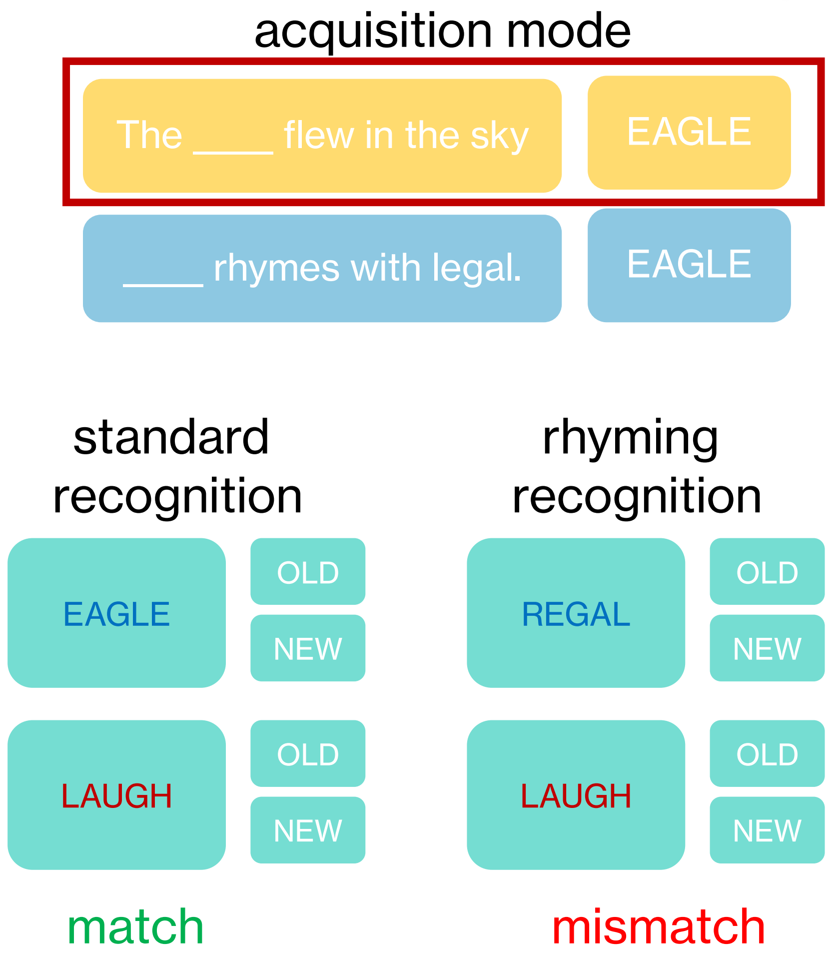
	Rating task				
Rating	Structural	Phonemic	Semantic	Self-reference	
		Mean recall			Total
yes	.28	.34	.65	1.78	3.05
no	.06	.34	.68	1.06	2.14
Total	.34	.68	1.33	2.84	5.19

memory experiment

- review the procedures
- what do you think it could be measuring?

TIP/TAP > levels of processing

- claim: the tasks performed at encoding and retrieval take precedence over the nature of processing (shallow vs. deep)
- evidence: Morris, Bransford, and Franks (1977)
    - participants encoded words in a semantic or rhyming context
    - the test phase was either a standard recognition test or a rhyming-based recognition test

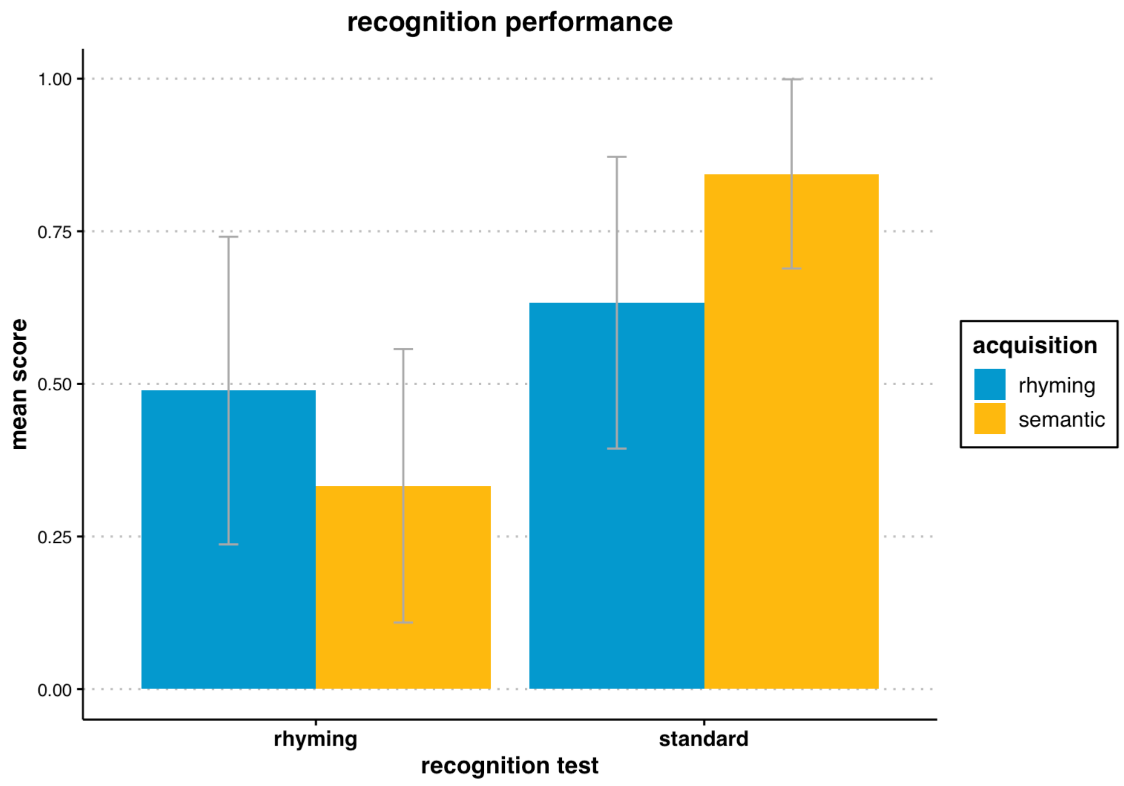


TIP/TAP > levels of processing

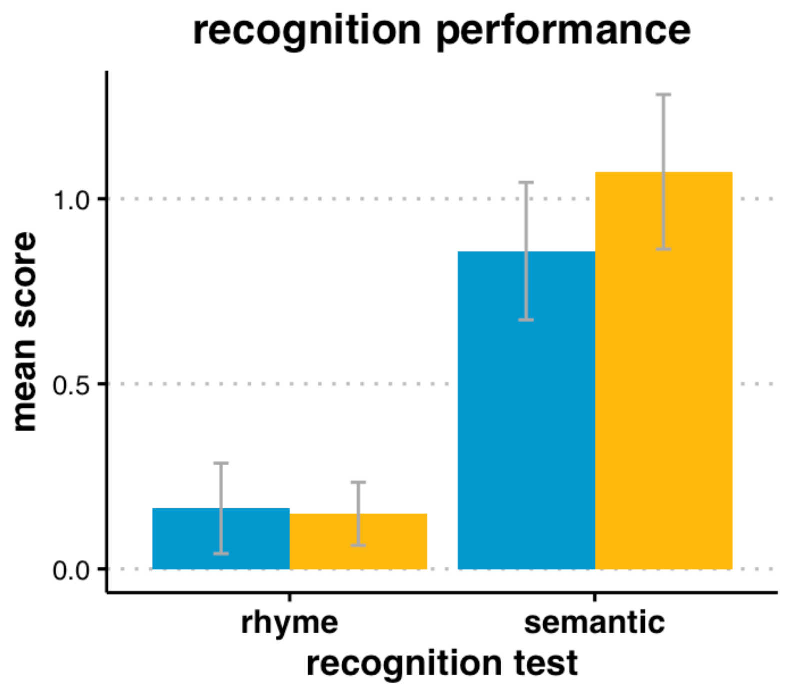
- claim: the tasks performed at encoding and retrieval take precedence over the nature of processing (shallow vs. deep)
- evidence: Morris, Bransford, and Franks (1977)
  - on standard test, recognition was higher for semantic vs. rhyme words
  - on rhyme test, recognition was higher for rhyme vs. semantic words

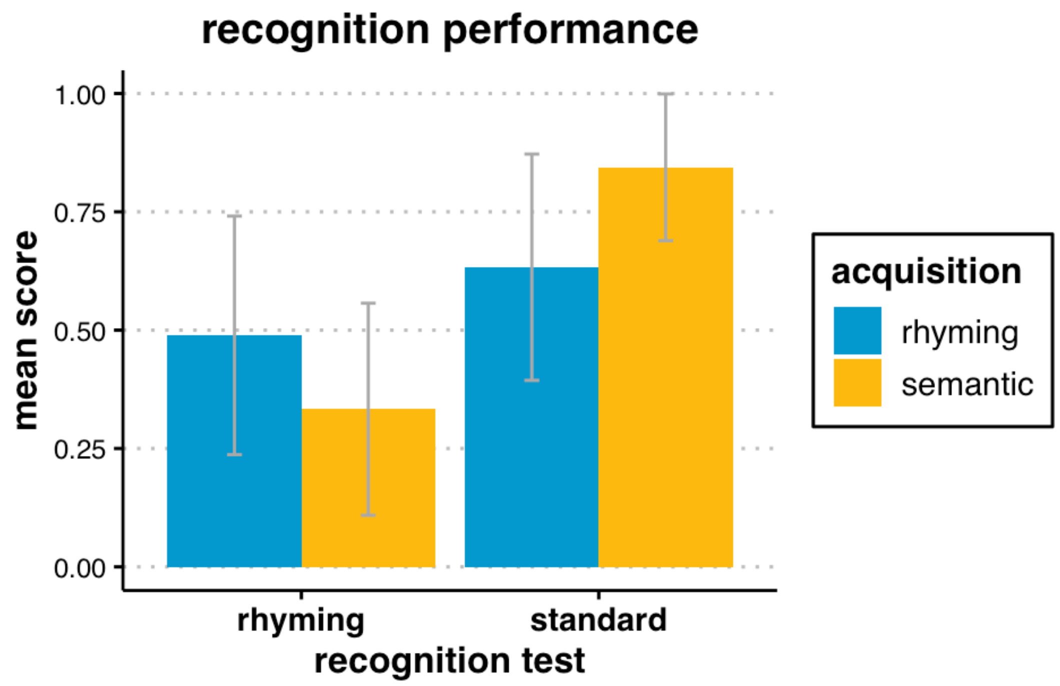
Bransford et al.'s results and plot

	Recognition test	
Acquisition mode	Standard	Rhyming
Semantic–Yes	.844 (.155)[a]	.333 (.224)
Rhyme–Yes	.633 (.239)	.489 (.252)



Bransford et al.'s data vs. your data





flashbulb memories

- *autobiographical* memories for salient, emotionally charged events
  - common examples: 9/11 attacks, death of Princess Diana etc.
  - recent examples?
- feel very vivid and are reported with high confidence, but typically show memory declines and lack specific details over time
- factors that affect flashbulb memories
  - retroactive interference: new information presented from multiple sources
  - rehearsal and spacing: makes them more vivid and strengthened

flashbulb memories: age differences

Age-Related Differences in Flashbulb Memories: A Meta-Analysis

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Recent meta-analyses reveal age-related declines in short-term memory (STM), working memory, associative memory, prospective memory, face memory, recognition, and recall. The present meta-analyses extend this work beyond predominantly laboratory-based tasks to a naturalistic phenomenon. *Flashbulb memories* are vivid autobiographical recollections for the circumstances in which one learns of a distinct event that may be surprising, emotional, or personally important (the *reception event*). The existing literature on aging and flashbulb memories includes inconsistent findings. The present meta-analyses included 16 studies (N = 1898) that examined flashbulb memory in nonclinical samples of younger adults (below age 40 years) and older adults (above age 60 years). Findings, after exclusion of an outlier, suggest a small-to-moderate age-related impairment in flashbulb memory scores (k = 14, Hedges' g = −0.30, 95% CI [−0.45, −0.15], p < .001) that was not moderated by study characteristics. After exclusion of an outlier, older adults' flashbulb memories were also significantly less consistent across time than younger adults' (k = 7, Hedges' g = −0.29, 95% CI [−0.47, −0.11], p = .002). Secondary analyses investigated age-related differences in the presence and consistency of canonical categories of flashbulb memories and encoding and rehearsal variables associated with flashbulb memory formation and retention. Age-related differences were found only for consistency of memory for ongoing activity at the time of the reception event, favoring younger adults (k = 3, Hedges' g = −0.40, 95% CI [−0.65, −0.15], p = .002). Overall, these findings are consistent with age-related impairment in flashbulb memory formation and retention.

Table 1
Characteristics of Included Studies

Study	Country	Study design	Event
Bohn and Berntsen (2007)	Germany	CS	Fall of Berlin Wall
Cohen, Conway, and Maylor (1994)	United Kingdom	CQ	Resignation of Margaret Thatcher
Davidson, Cook, and Glisky (2006)	United States	CQ	September 11, 2001 terrorist attacks
Davidson and Glisky (2002) Study 2	United States	CQ	Death of Mother Theresa
Denver, Lane, and Cherry (2010)	United States	CS	September 11, 2001 terrorist attacks
Gerdy, Multhaup, and Ivey (2007)	United States	CQ	September 11, 2001 terrorist attacks
Greene, Loftus, Grady, and Levine (2018)	Ireland	CQ	May 2018 abortion referendum
Kensinger, Krendl, and Corkin (2006)	United States	CQ	Explosion of Columbia Shuttle
Kvavilashvili, Mirani, Schlagman, Wellsted, and Kornbrot (2009), Study 1	United Kingdom	CS	Death of Princess Diana
Kvavilashvili et al. (2009) Study 2	United Kingdom	CS	Death of Princess Diana
Kvavilashvili et al. (2009) Study 3	United Kingdom	CQ	September 11, 2001 terrorist attacks
Otani et al. (2005)	Japan	CQ	Nuclear accident in Ibaraki
Tekcan et al. (in press), Study 1	Turkey	NR	Challenger shuttle explosion
Tekcan and Peynircioğlu (2002)	Turkey	CS	Death of President Ozal
Wolters and Goudsmit (2005)	Netherlands	CS	September 11, 2001 terrorist attacks
Yarmey and Bull (1978)	United States and Canada	CS	Assassination of John Fitzgerald Kennedy

Note. CS = cross-sectional; CQ = cross-sequential; NR = not reported.

- moderate age impairment in a recent meta-analysis (Kopp et al., 2020)

flashbulb memories: recent work

Flashbulb Memories and Memories for Personal Events: Their Role in Social Categorization and Identification

Travis G. Cyr, Kayla Toscano, and William Hirst
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Does the act of remembering or not remembering convey socially relevant information? The present work explored this question by examining the role flashbulb memories (FBMs) and memories for personal (MPEs) events play in social categorization and social identification. Study 1 investigated the extent to which Americans believe FBMs of both domestic and international public events and memories for life-script events should be remembered by an American or a Briton. Study 2 built on Study 1 and examined whether these normative expectations serve as a basis for identifying someone as "American," "American immigrant," "Black American," "female," "religious," or "politically conservative." Results indicate that FBMs and MPEs affect social categorization and identification in distinctive ways. The role of FBMs as markers of social identity is discussed.

A day that America will remember: flashbulb memory, collective memory, and future thinking for the capitol riots

Nawël Cheriet, Meymune Topçu, William Hirst, Christine Bastin & Adrien Folville

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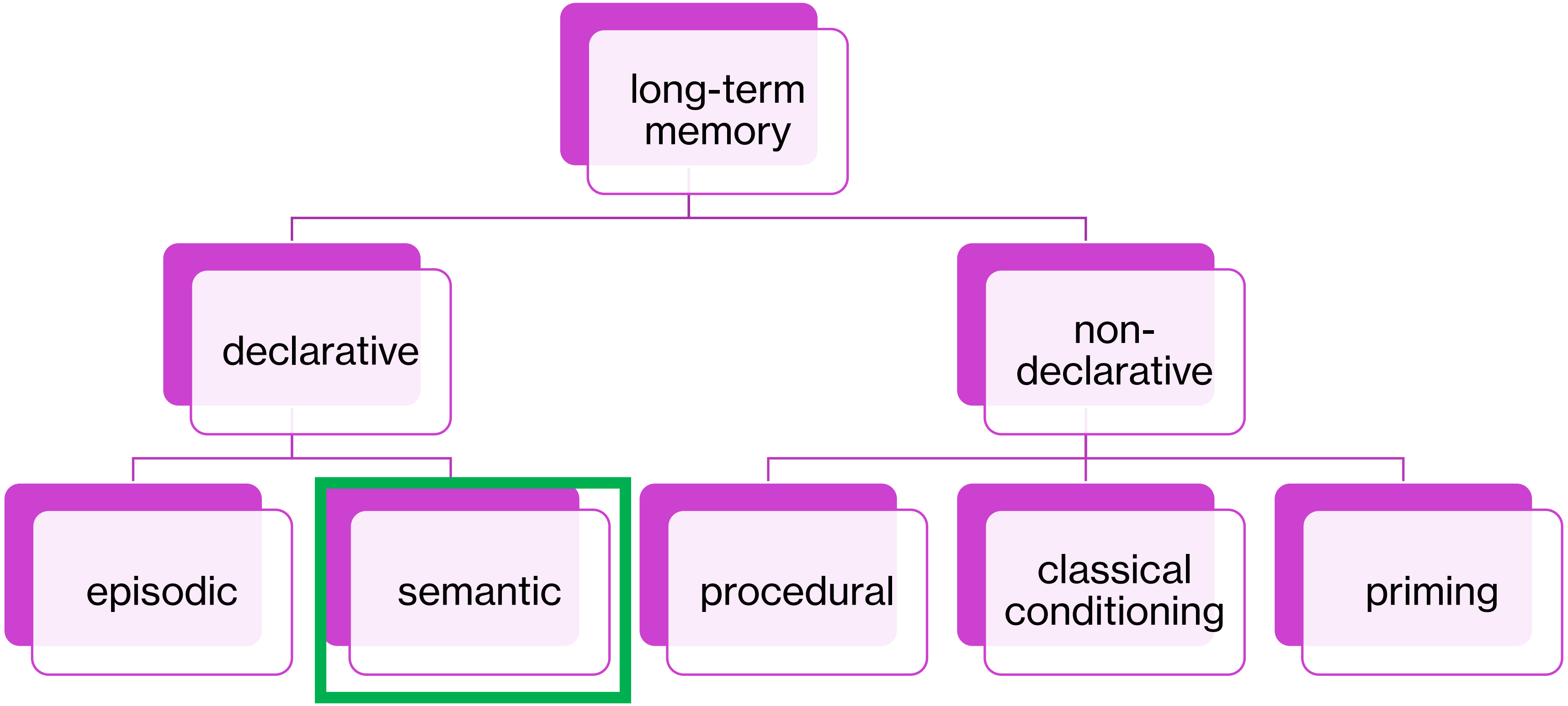
ABSTRACT

This study explores the topics of flashbulb memory, collective identity, future thinking, and shared representations for a public event. We assessed the memories of the Capitol Riots, which happened in Washington DC, on 6 January 2021. Seventy Belgian and seventy-nine American citizens participated in an online study, in which they freely recalled the unfolding of Capitol Riots and answered questions regarding their memory. Inter-subjects similarity of recalled details was analysed using a schematic narrative template (i.e., the event, the causes and the consequences). Results revealed that representations of the event, and its causes were more similar among Belgians compared to Americans, whereas Americans' representations of the consequences showed more similarity than Belgians'. Also, as expected, Americans reported more flashbulb memories (FBMs) than Belgians. The analysis underlined the importance of rehearsal through media and communication in FBM formation. This research revealed a novel relation between FBM and future representations. Regardless of national identity, participants who formed an FBM were more likely to think that the event would be remembered in the future, that the government should memorialise the event, and that a similar attack on the Capitol could happen in the future compared to participants who did not form FBM.

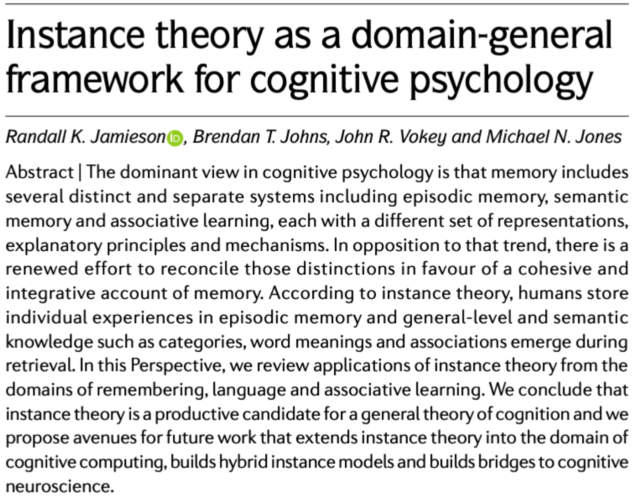
long term memory



Squire, 1986

two separate systems or one?

- evidence for separate systems
  - amnesic patients
  - neurodegenerative diseases (Alzheimer vs. semantic dementia)
- evidence for single system
  - memory tests are not "process pure"
  - meaning can be "context-dependent"
  - shared neural substrates
  - computational models


Instance theory as a domain-general framework for cognitive psychology

Randall K. Jamieson, Brendan T. Johns, John R. Vokey and Michael N. Jones

Abstract | The dominant view in cognitive psychology is that memory includes several distinct and separate systems including episodic memory, semantic memory and associative learning, each with a different set of representations, explanatory principles and mechanisms. In opposition to that trend, there is a renewed effort to reconcile those distinctions in favour of a cohesive and integrative account of memory. According to instance theory, humans store individual experiences in episodic memory and general-level and semantic knowledge such as categories, word meanings and associations emerge during retrieval. In this Perspective, we review applications of instance theory from the domains of remembering, language and associative learning. We conclude that instance theory is a productive candidate for a general theory of cognition and we propose avenues for future work that extends instance theory into the domain of cognitive computing, builds hybrid instance models and builds bridges to cognitive neuroscience.

how is semantic memory organized?

- account #1: hierarchical network
- Collins and Quillian (1969)
- principle of cognitive economy: not storing redundant information but organizing taxonomically
- navigating levels in the network takes time

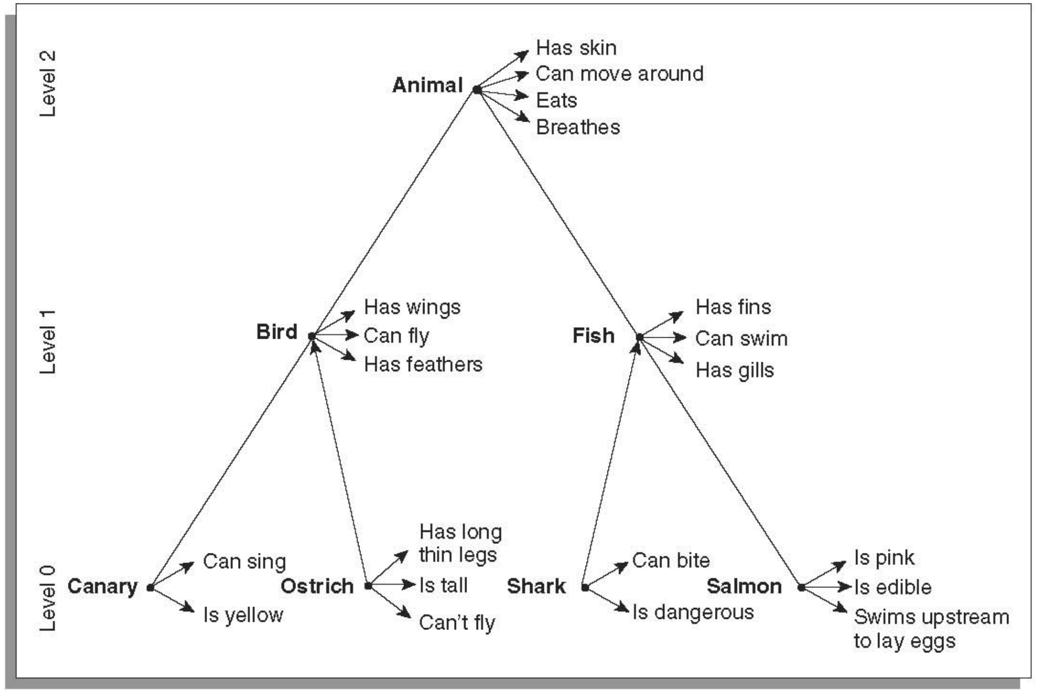
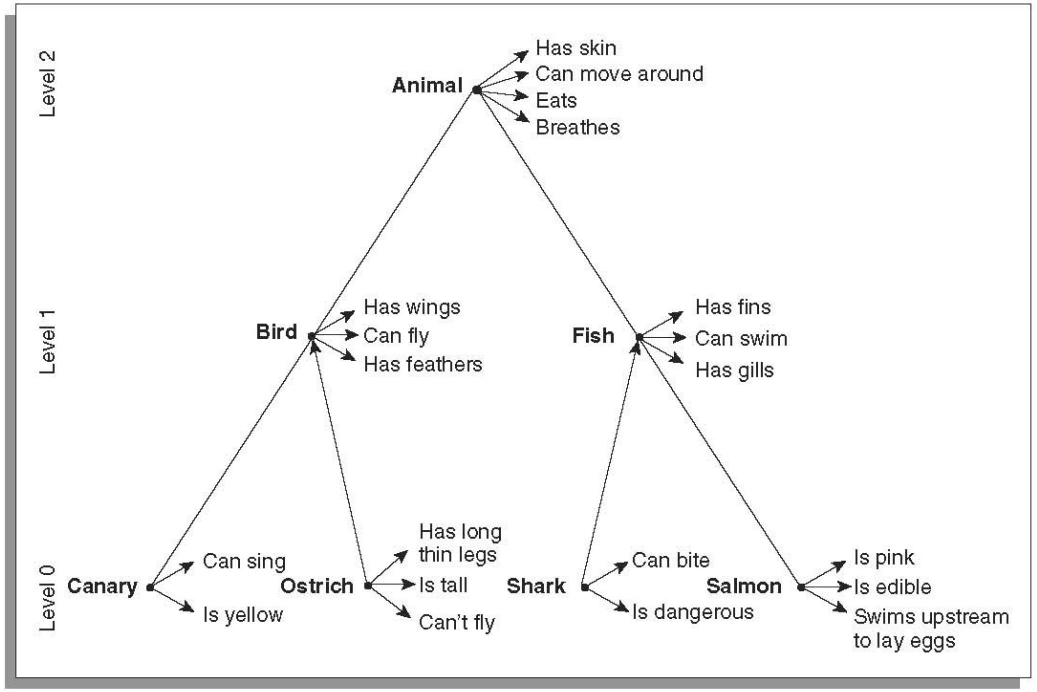


Figure 7.12 A hierarchical network representation of concepts.

SOURCE: From Collins, A. M., & Quillian, M. R., Retrieval time from semantic memory. *Journal of Verbal Learning and Verbal Behavior, 8,* 240-247, copyright © 1969. Reprinted with permission.

account #1: hierarchical network

- testing the model: sentence verification task (yes / no)
- is a canary a bird?
- does a canary sing?
- navigating levels in the network takes time



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account #1: hierarchical network

- response times increased linearly as a function of how many "levels" had to be traveled to retrieve that information

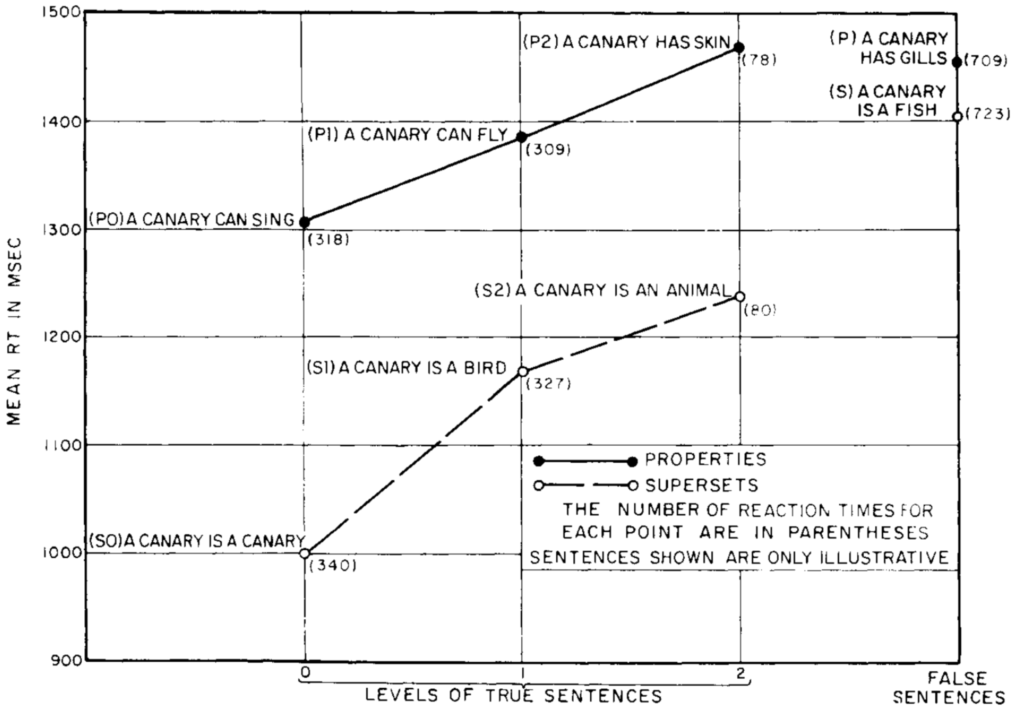


FIG. 2. Average reaction times for different types of sentences in three experiments.

account #1: hierarchical network

- problems:
- typicality effects: people responded faster to “robin is a bird” than “vulture is a bird” when the model predicts no difference in response times
- “no”/false response times were different depending on the items “butterfly is a bird” was slower than “monkey is a bird”

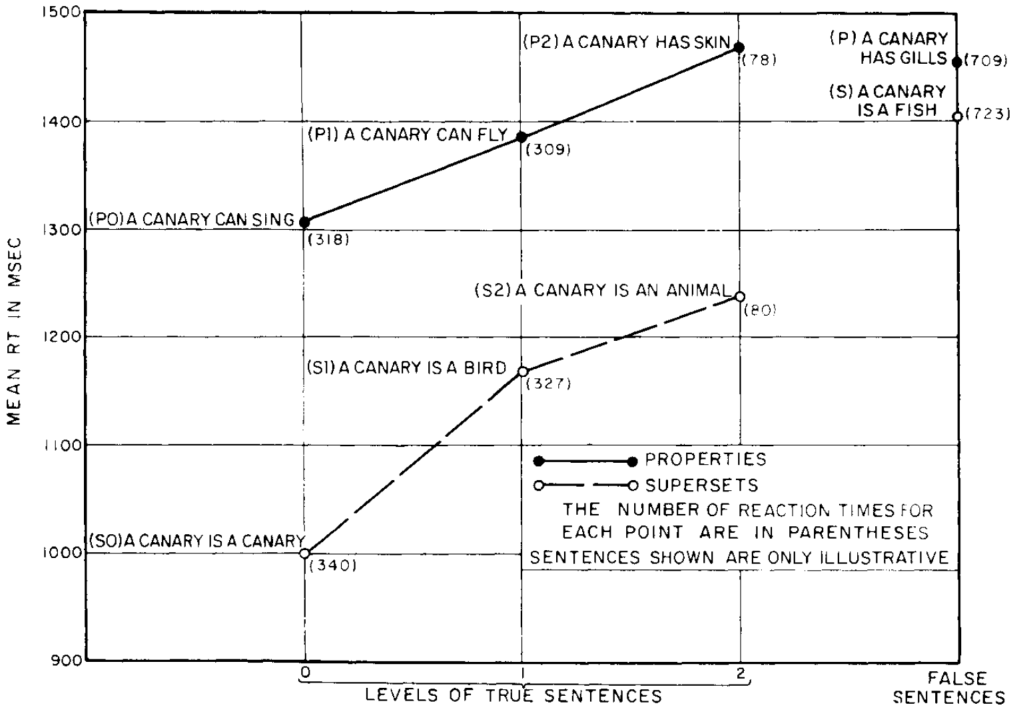
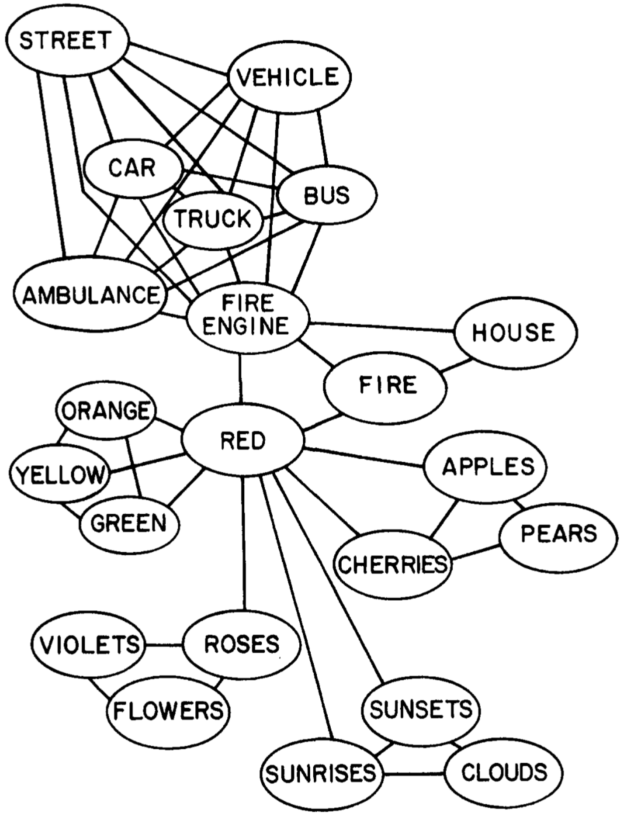


FIG. 2. Average reaction times for different types of sentences in three experiments.

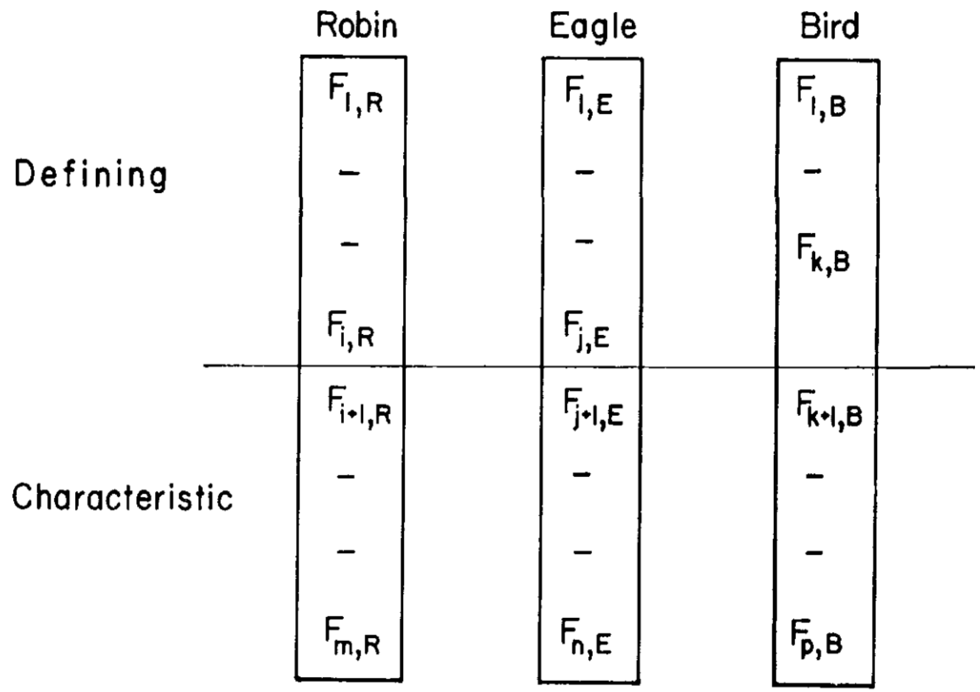
account #2: non-hierarchical network

- account #2: non-hierarchical network
- Collins and Loftus (1975)
- concepts are organized in a semantic network, with connections being weighted by semantic similarity
- less constrained account, but how do we learn these similarities and connections?!



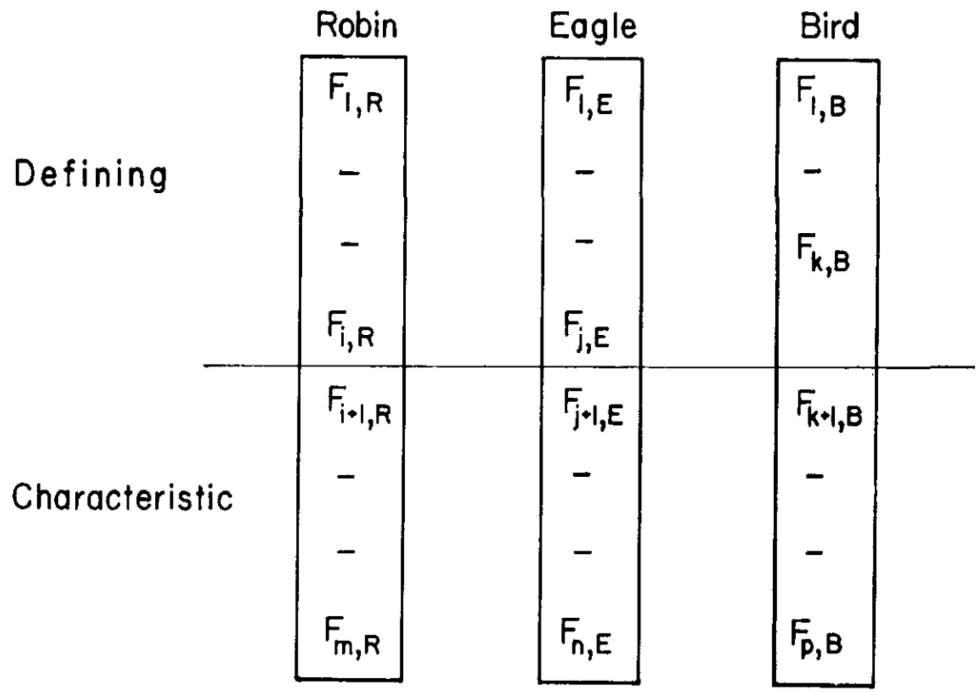
account #3: feature comparison model

- account #3: feature comparison model
- Smith, Shoben, & Rips (1973)
- distributed representation of each concept along a set of features/dimensions
  - defining features: all birds have wings
  - characteristic features: only some birds fly
- overlap between features determined response times
- was able to explain typicality effects, false RTs, etc.



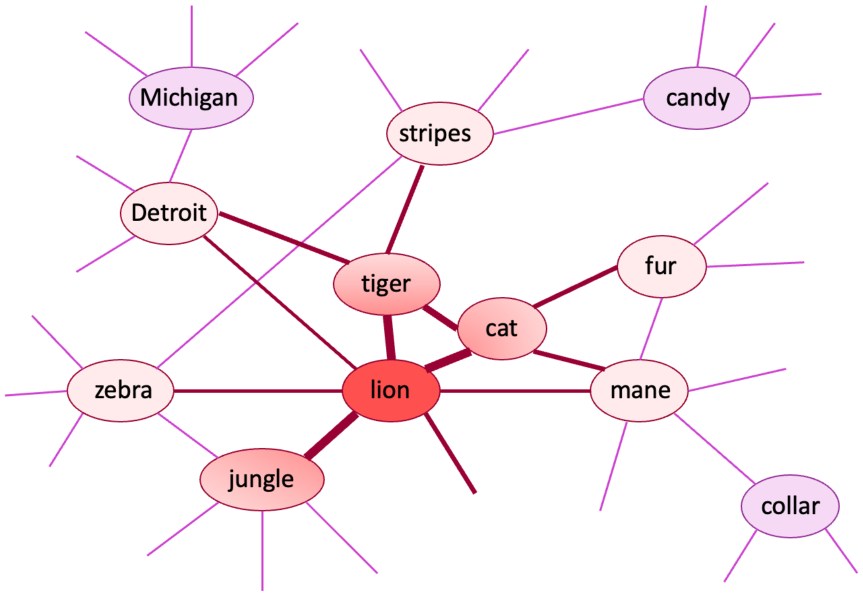
account #3: feature comparison model

- positives:
  - changed how concepts could be represented, i.e., a distributed representation
  - the beginning of mathematical modeling of words, language, neural networks!
- problems:
  - what are the features?!
  - how are they learned?!



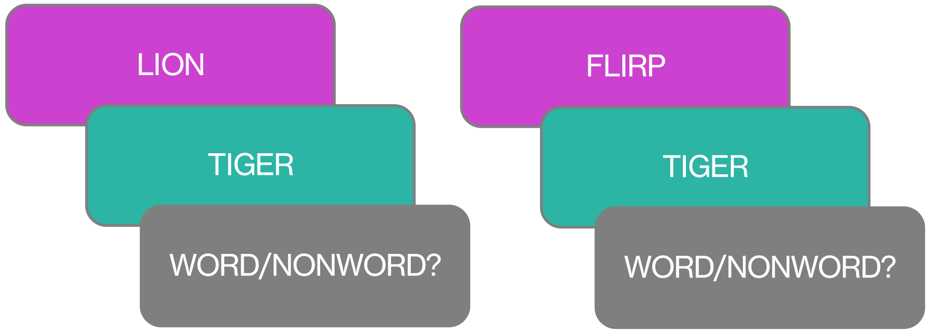
testing semantic knowledge

- the closer two concepts are in semantic memory, the more likely they are to activate one another
- general paradigm: priming = prior processing can influence how information is accessed or retrieved
- semantic priming: when priming tasks are used to test semantic memory



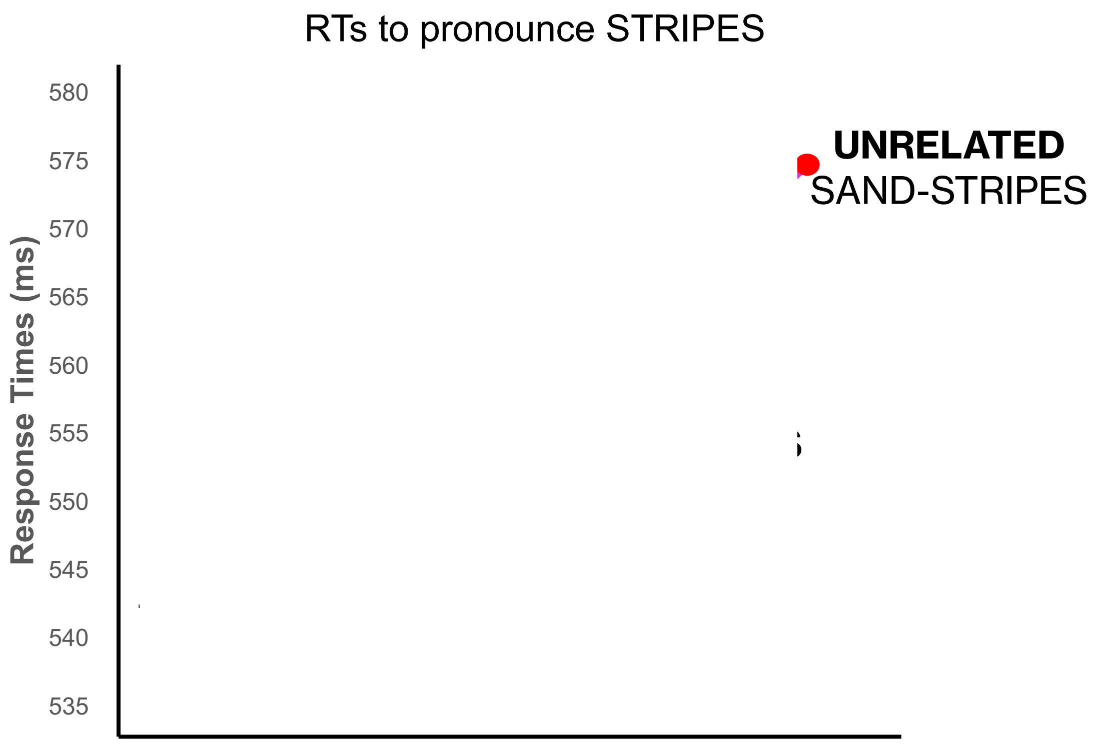
semantic priming

- semantic priming tasks involve presenting a prime that may be related / unrelated to the upcoming target word
    - lexical decision task: deciding whether a target word is a word/non-word
    - relatedness judgment task: deciding whether two words are related or unrelated
- processing a related word speeds up or facilitates processing of the target word



how far does activation spread?

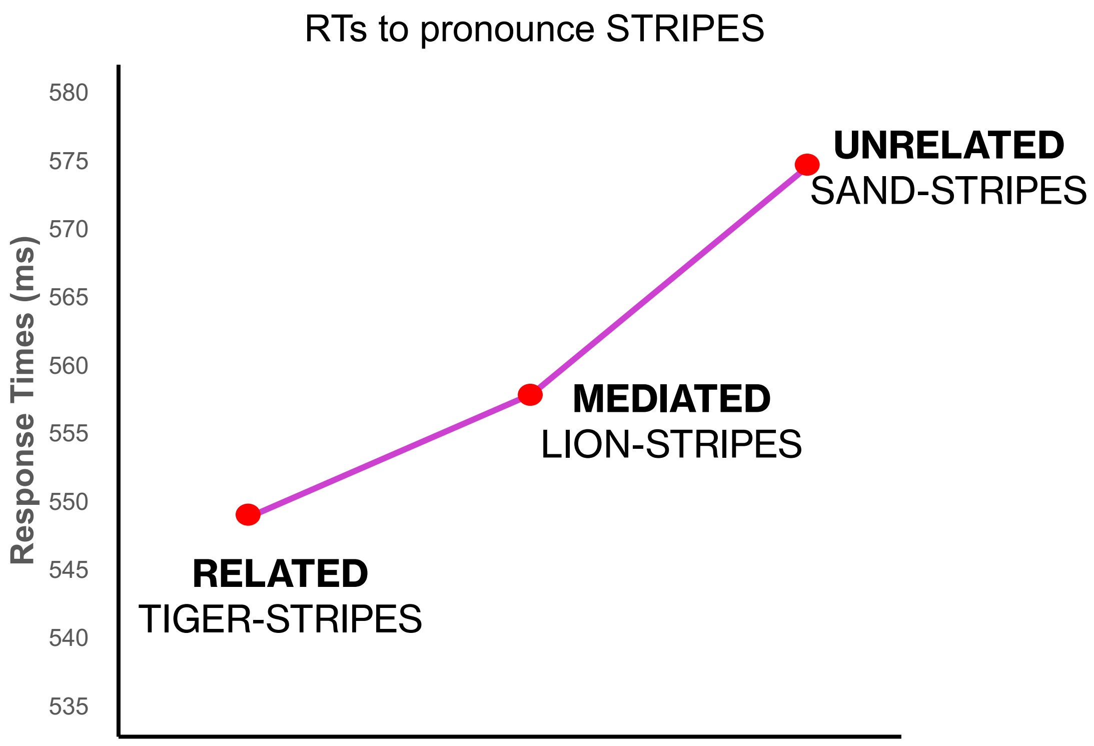
- mediated priming has been shown for items that do not seem to share a direct relationship, e.g., lion-stripes in pronunciation (Balota & Lorch, 1986) and lexical decision tasks (McNamara & Altarriba, 1988)



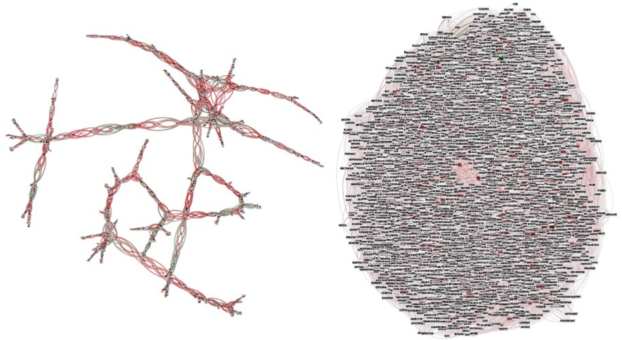
Balota & Lorch, 1986

how far does activation spread?

- potential limitations/issues:
- how do we know how close or far concepts are from one another?

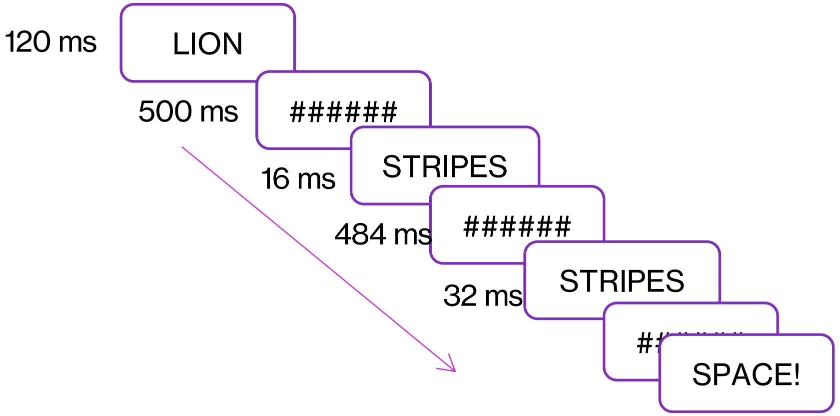


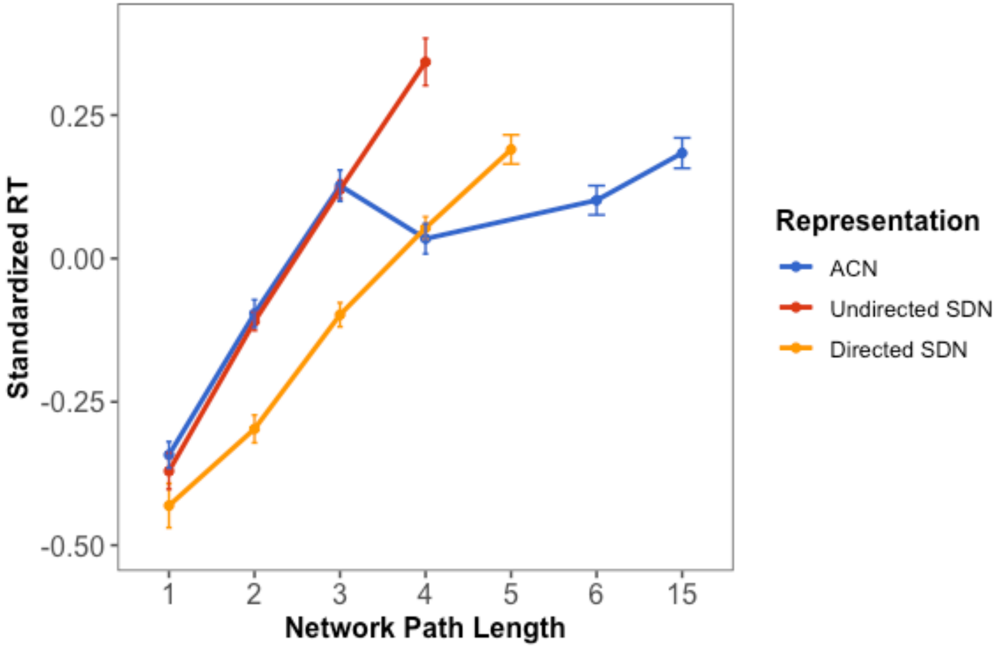
Balota & Lorch, 1986



distant semantic priming

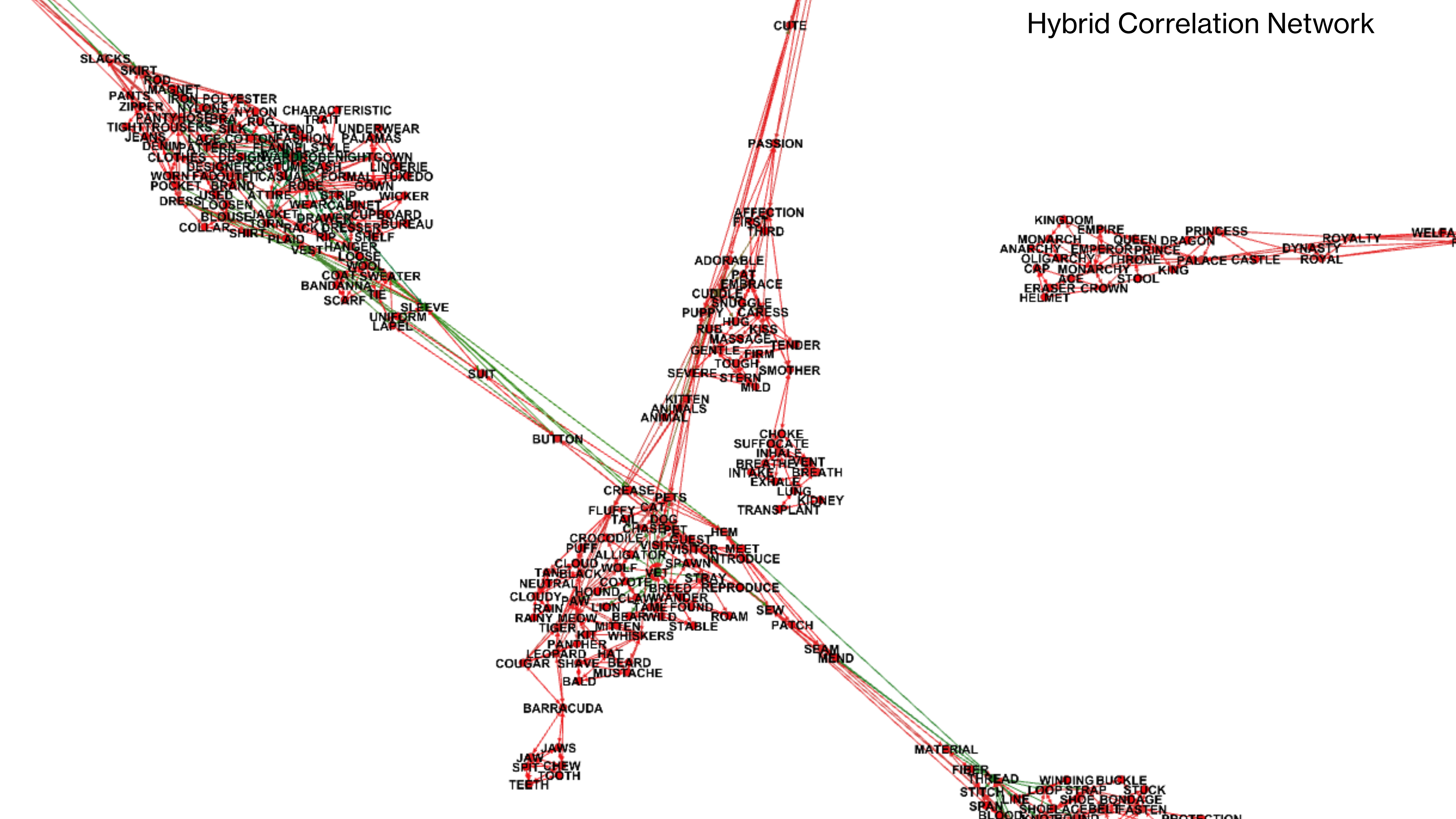
- using computational models of semantic memory to estimate "path lengths" between words



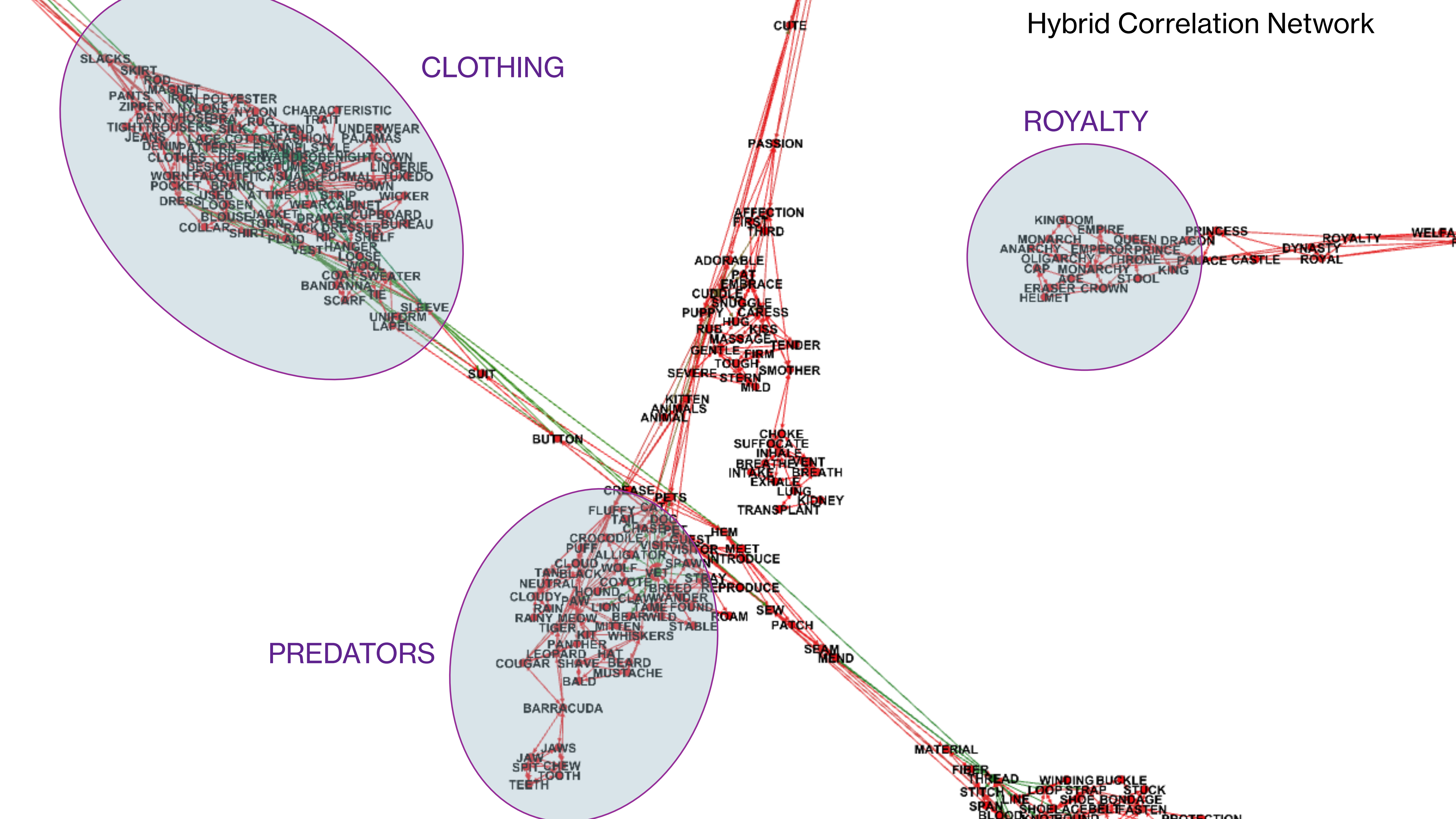


Kumar, Balota, & Steyvers (2021)

Hybrid Correlation Network

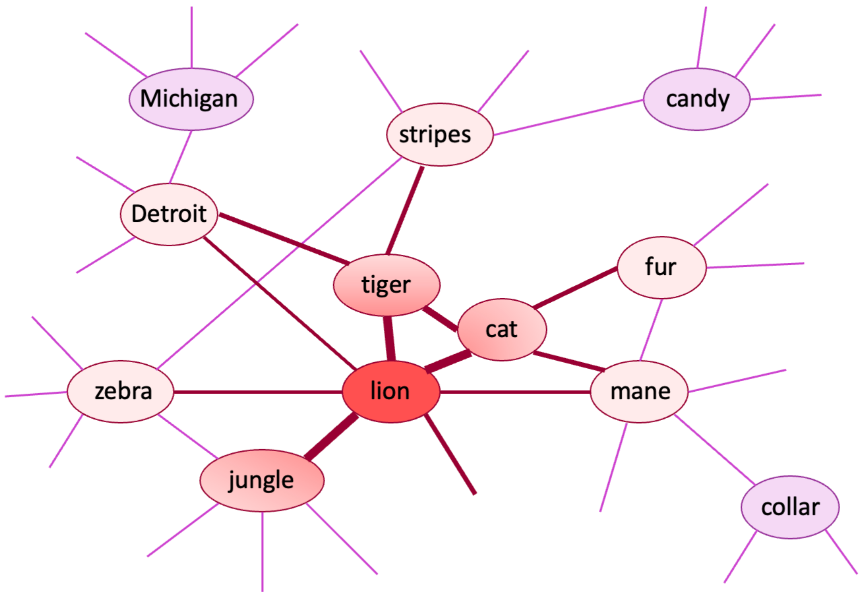


Hybrid Correlation Network



outstanding issues

- how do we learn features and/or distances between concepts?
- how do we build models of semantic memory based on these features?
- coming up: language [L10]



next class

- **before** class:
  - *finish:* L9 quiz/assignments
  - *work on:* SPARK summaries!
- **during** class:
  - language (FINALLY!)