

categorical cognition

Channing Hambric, Ph.D.

PSYC 2040

2.20.2025

types of categories

- Inherently tied to the notion of similarity
 - Similar in respect to <u>what</u>?(Medin et al., 1993)
- Different types of categories have different structures, associated with different types of processing
 - Taxonomic
 - Thematic
 - Ad hoc

taxonomic categories

- Concepts as collections of features
- Similar due to overlapping features
- Stable representation in memory
- Easily divided into smaller, more specific subcategories
 - Birds > Songbirds > Warblers > Cerulean Warbler



hierarchical structure





Collins & Quillian (1969)

thematic categories

- But similarity can be highly **contextual**
- Established by functional relationship in a shared environment (Estes et al., 2011)
- Often tied to behavioral scripts
 Wedding, funeral, vacation, etc



things at the beach

ad hoc categories

- Similarity can also be highly **flexible**
- Created "on the fly" in service of a specific goal (Barsalou, 1983)
 - Things to rescue from a burning home, Things made of wood, etc.
- No pre-existing structure in memory



empirical approaches

- How do we study categories?
 - categories = linked concepts
 - What properties are they linked by? Which properties do we actually use?
 - By studying the connectivity among concepts, we can understand how knowledge is represented in the mind
- Ok, so how do we study how concepts are connected?
 - Some case studies:
 - Language production
 - Memory search

case study #1: semantic interference

- How do we access a concept?
- Activation "spreads" along related concepts & words
- But we can only produce one word at a time
- When very similar words are active at the same time, we can experience **interference**
 - Speech errors
 - Longer production time



semantic interference

- Studied via picture naming tasks
- Semantic context manipulated
- Some key paradigms
 - Cyclic naming
 - Masked priming
- Manipulate:
 - Context (semantically related or unrelated)
- Measure:
 - Naming times (RTs)





masked priming



semantic interference

- Hambric & O'Séaghdha (2023)
 - Extension of Abdel Rahman & Melinger (2011)
- Cyclic naming of taxonomically versus thematically related pictures

 Does both taxonomic and thematic relatedness cause
 interference?
- Amp up the activation of each category by adding in masked priming on each naming trial
 - Does it help or hurt naming?

standard cyclic naming

Manipulate: Set Relatedness, Type of Category Measure: Naming Time (RT)



+ masked priming

Manipulate: Set Relatedness, Type of Category Measure: Naming Time (RT)



semantic interference

- Taxonomic and thematic categories influence speech production in different ways
- Why?
 - Different degrees of connectivity

- Extensions:
 - Interference in social categories



Packer et al. (2013)

case study #2: memory search

- How do we search for words within a given category?
- What types of information do we use?
- Semantic fluency task (SFT)
 - "clusters" and "switches"
 - Typically studied in taxonomic categories



memory search

- Semantigories
- Generate as many items as possible in 1 minute
- Analyze with forager (Kumar et al., 2024)
 - How are the items people generate related to one another?
 Somantic vs phonological similarity
 - Semantic vs phonological similarity
 - How big are the clusters of related items, and how often to people switch to new areas of search?

Taxonomic: Animals

Thematic: Things at the Beach, Things in a Classroom Ad hoc : Things to Rescue from a Burning Home, Excuses for Being Late



fluency performance

examples





lexical characteristics



clustering behavior





memory search

- Hierarchical structure of taxonomic categories helps guide search
- In categories with less explicit structure, people use other types of information/strategies
- Future directions
 - Ad hoc categories & large language models (Edinger & Goldstone, 2022)



wrap up

- Different types of categories allow us to:
 - Quickly generalize knowledge
 - Make judgements
 - Predict outcomes
 - Accomplish goals
- Current research examines:
 - Category composition
 - Impact on behavior

Questions/Discussion