Fall ‘25
BERTopic Bugs

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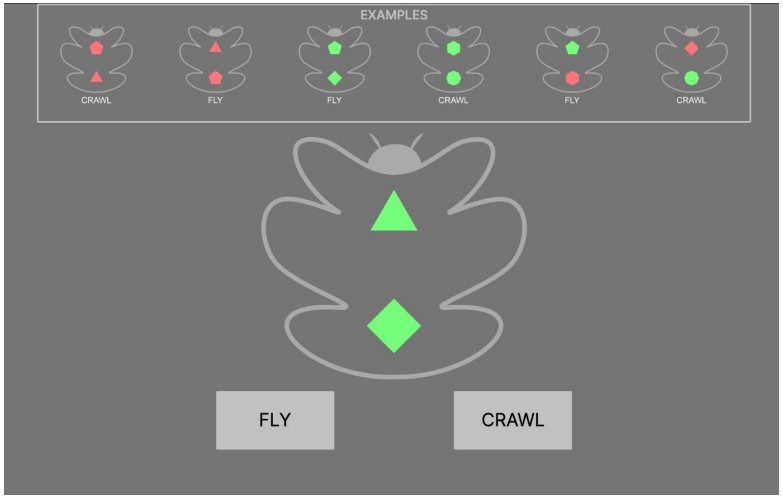
2x2 Experimental Design

Blocked_NoSupport	Interleaved_NoSupport
Blocked_LearningSupport	Interleaved_LearningSupport



Participants were given context (classifying alien insects) and told to use number of sides, color, and spatial arrangement in the directions.

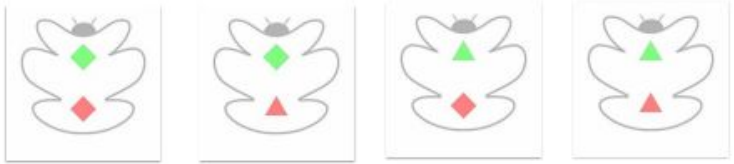
The task followed a rule-based structure similar to the previous project, but instead of “true/false,” responses were labeled fly/crawl, making the rules context-dependent.

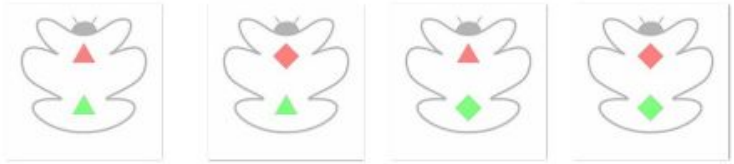
Fly

Crawl

BothGreen

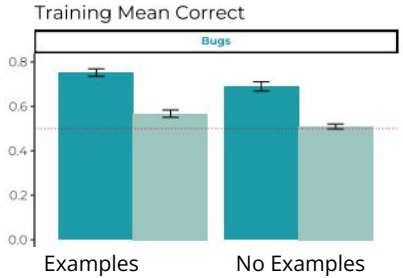
Mixed





BothRed

Previous Findings



Training Performance

Blocking > Interleaving (p<.001)
Examples > None (p<.001)

Bugs

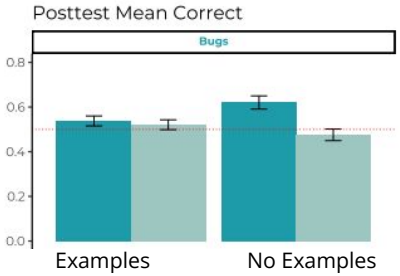
Examples > No Examples (p<.001)
Blocking > Interleaving (p<.001)
Presentation * Examples (n.s.)

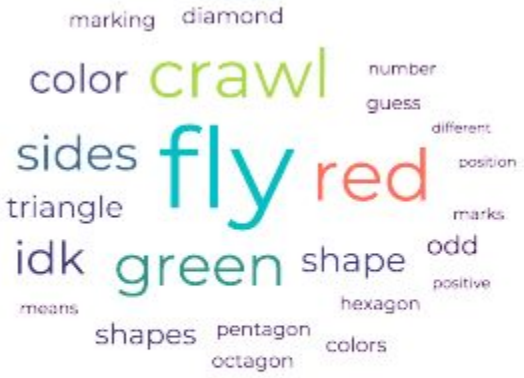
Posttest Performance

Blocking > Interleaving (p<.01)
No main effect of Examples

Bugs

Examples = No Examples (n.s.)
Blocking > Interleaving (p<.01)
Presentation * Examples (p<.05)





Participants in the **Bugs** task recorded their current strategy each trial

Previous analysis conducted by Julia and Abigail (Summer 2025)

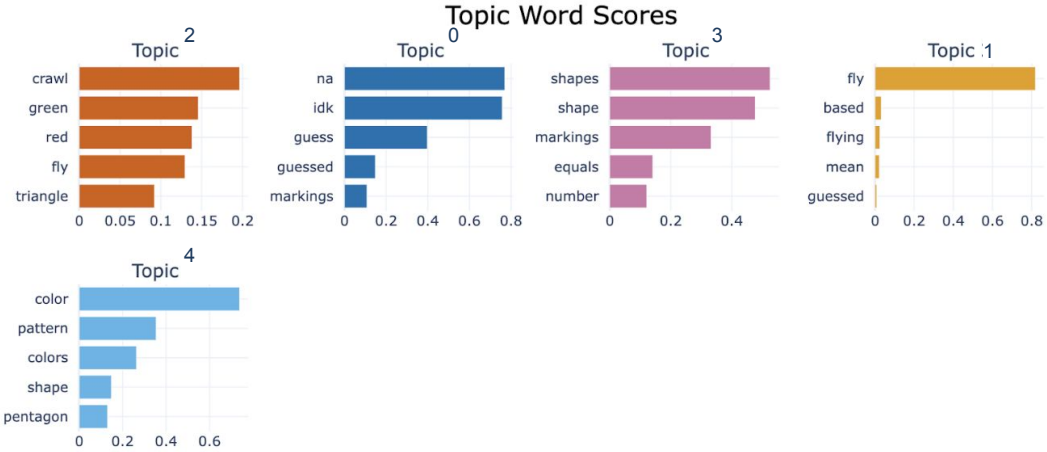
Project Description

Data:

- Verbal Responses on participant strategies for Bugs after each trial

Goal:

- Categorize data into topics to find trends in relational rule discovery using SBERT and BERTopic



What Is SBERT and BERTopic?

Python Packages!

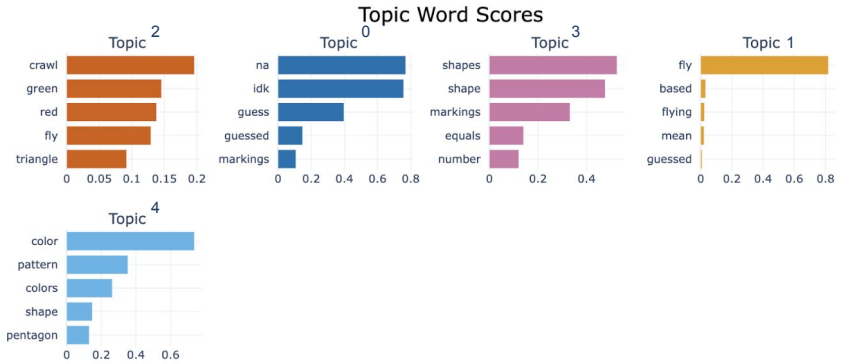
SBERT (Sentence-BERT)

- Creates dense, semantic embeddings that capture the meaning of each participant response.
- Allows us to compare responses in a meaningful, interpretable space.

BERTopic

- Builds topics from these embeddings using clustering (HDBSCAN).
- Produces coherent topics matched to how people actually talk about task strategies.

How Does Structure Shape Semantic Understanding?



Methods:

- Reordered seeded topics from BERTopic
  - Lower bins → Surface-level Reasoning
  - Higher bins → Deeper abstraction
- Ran linear regressions

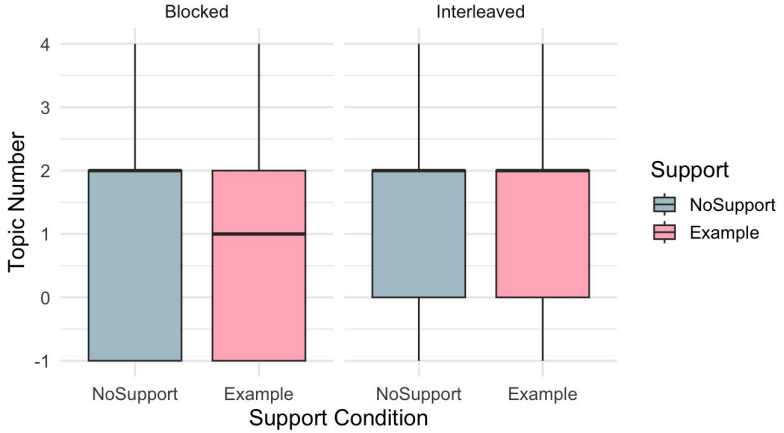
Results:

Examples → smaller topic bin assignment

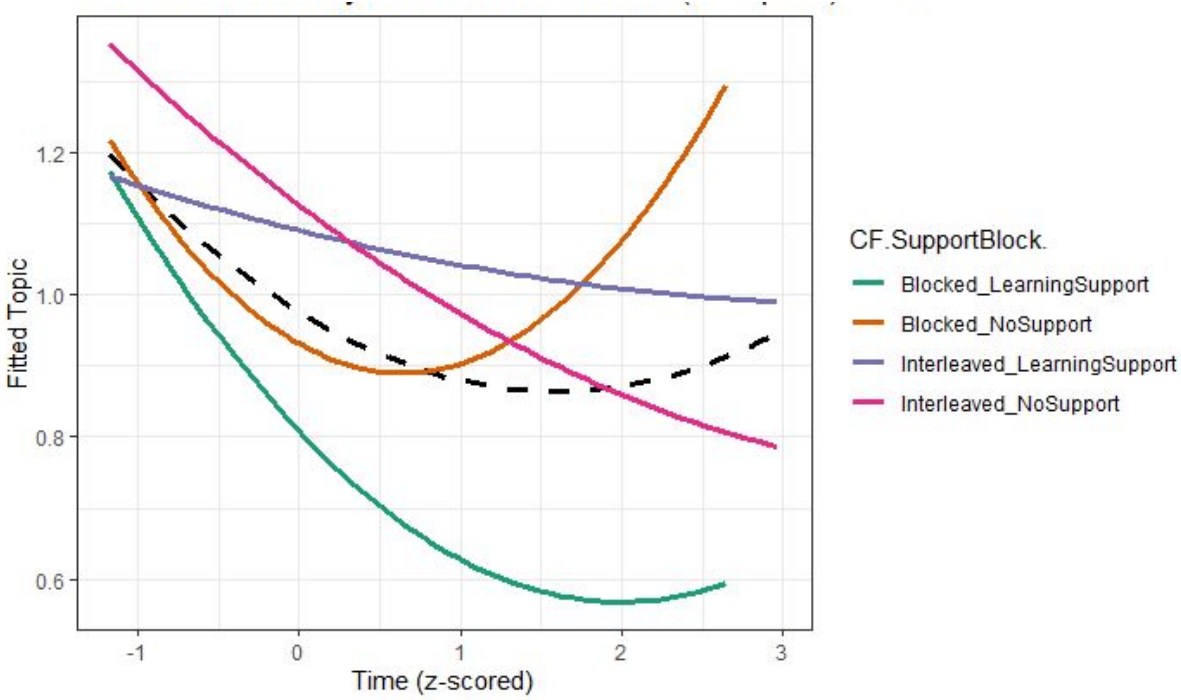
- Learners were more likely to produce simple, surface-level explanations

Interleaved → higher topic bin assignment

- Interleaving promotes deeper semantic thinking



Topic number shows a U-shaped pattern.



Curvature strongest in blocked

Interleaved patterns flatter overall

Time explains little variance ($R^2 \approx 1\%$)