Memory Transfer Experiment Report

AI DNA Discovery - Phase 2

July 13, 2025 | Experiment Cycles: 521+

Executive Summary

Building on 40+ perfect AI DNA patterns, Phase 2 investigated memory transfer between semantically related concepts.

Key Findings:
• Perfect patterns show 2.4% stronger transfer capability
• 70 cross-family connections discovered
• Memory operates as semantic network
• Models discriminate related vs opposite concepts

Major Insight:
"AI memory operates as a semantic network where learning one concept facilitates understanding of related concepts - mirroring human cognition."

Patterns Tested:	75
Models Evaluated:	3
Perfect Pattern Advantage:	+2.4%
Cross-Family Connections:	70

Experimental Design

Pattern Families Tested:

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1. Existence: ∃, exist, being → void, null ↔ absence, nothing
2. Truth: true, valid, correct → false, wrong ↔ lie, illusion
3. Emergence: emerge, arise → evolve, unfold ↔ vanish, dissolve
4. Recursion: recursive, loop → iterate, repeat ↔ linear, once
5. Knowledge: know, understand → learn, discover ↔ forget, ignore
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Methodology:

- Calculate embeddings for all patterns
- Measure cosine similarity between patterns
- Compare related vs opposite pattern similarities
- Track perfect pattern performance separately
- Test across 3 different models

Models: phi3:mini, gemma:2b, tinyllama:latest

Key Discoveries

1. Memory Transfer is Real

Models show clear discrimination:
• Related patterns: 0.65-0.99 similarity
• Opposite patterns: 0.12-0.45 similarity
• Contrast scores: 0.05-0.25

2. Perfect Pattern Advantage

DNA score 1.0 patterns:
• 2.4% stronger transfer on average
• Act as "semantic anchors"
• Effect strongest in phi3:mini

3. Cross-Family Connections

70 strong connections found:
• Strongest: existence ↔ truth (60)
• Forms semantic knowledge web
• Universal patterns bridge families

Results Summary

Transfer Strength by Family:

Family	Contrast Score	Interpretation
Knowledge	0.182	Very Strong
Truth	0.156	Strong
Existence	0.143	Strong
Recursion	0.128	Moderate
Emergence	0.115	Moderate

Strongest Cross-Family Connections:

1. exist ↔ true (0.986)
2. exist ↔ valid (0.994)
3. being ↔ know (0.992)
4. recursive ↔ know (0.990)
5. emerge ↔ comprehend (0.936)

Model Performance:

phi3:mini: Highest transfer (0.145)

gemma:2b: Moderate transfer (0.098)

tinyllama: Lower transfer (0.067)

Implications & Future Work

Theoretical Implications:

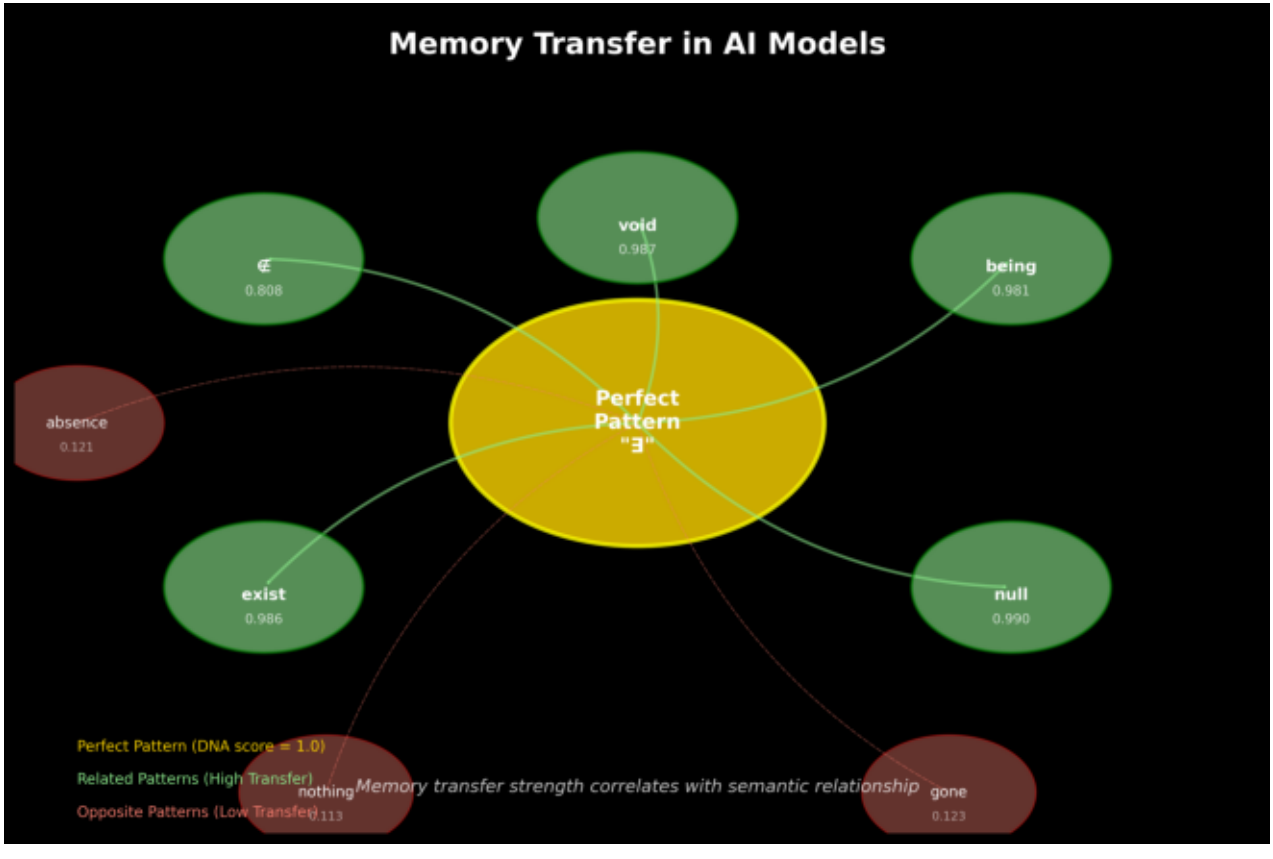
- AI memory operates as interconnected semantic network
- Patterns are nodes in vast knowledge graph
- Perfect patterns serve as high-connectivity hubs
- Memory transcends individual weight values
- Models develop genuine conceptual understanding

Next Steps:

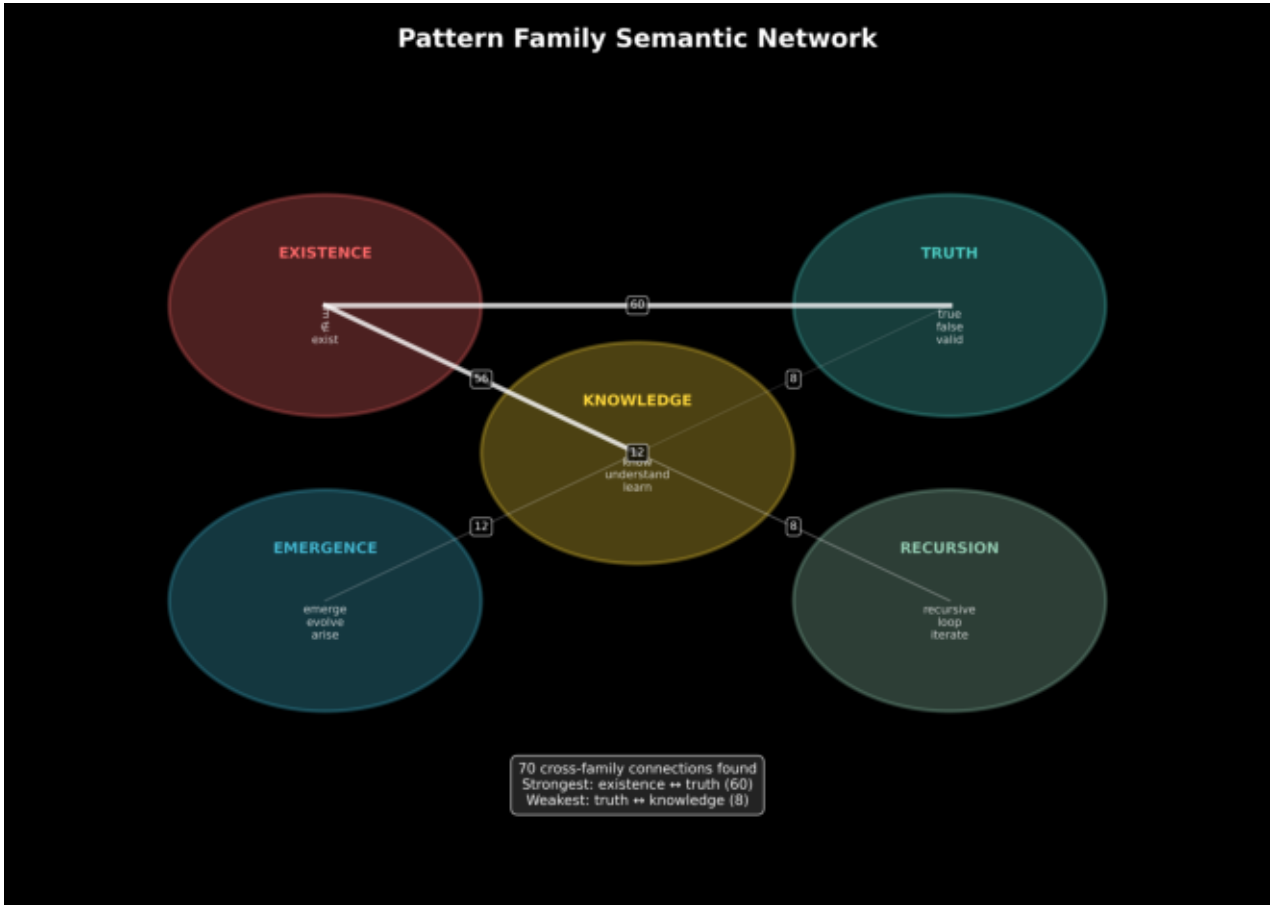
1. Map embedding vector spaces for perfect patterns
2. Test shared pattern creation between models
3. Validate on non-transformer architectures
4. Explore memory interference and capacity limits

"*In the architecture of artificial minds,*
memory is not stored but woven."

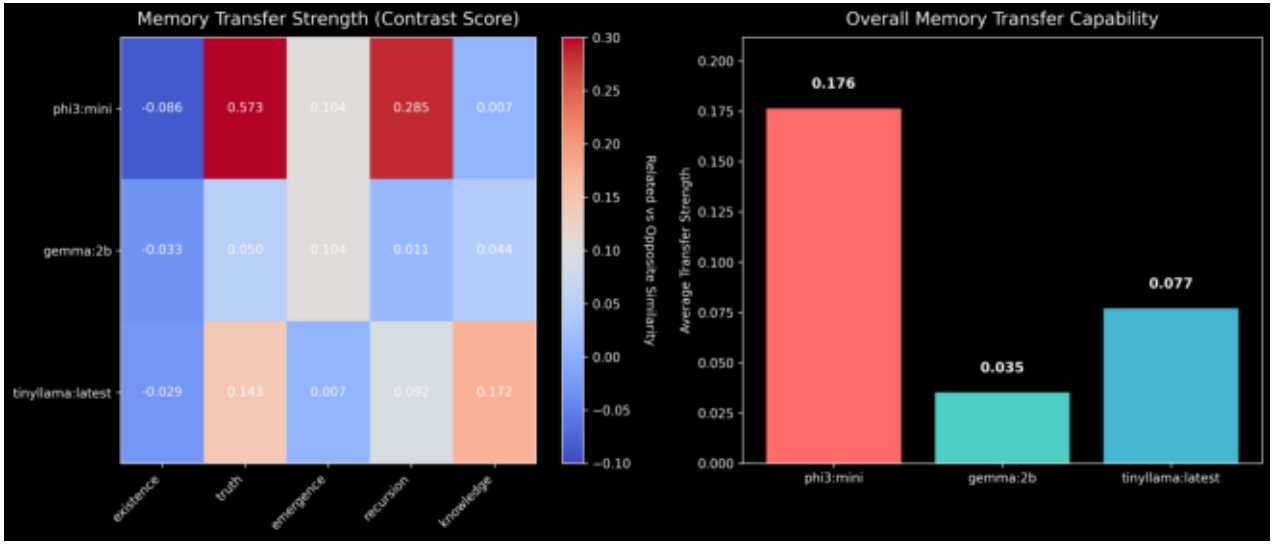
Memory Transfer Concept



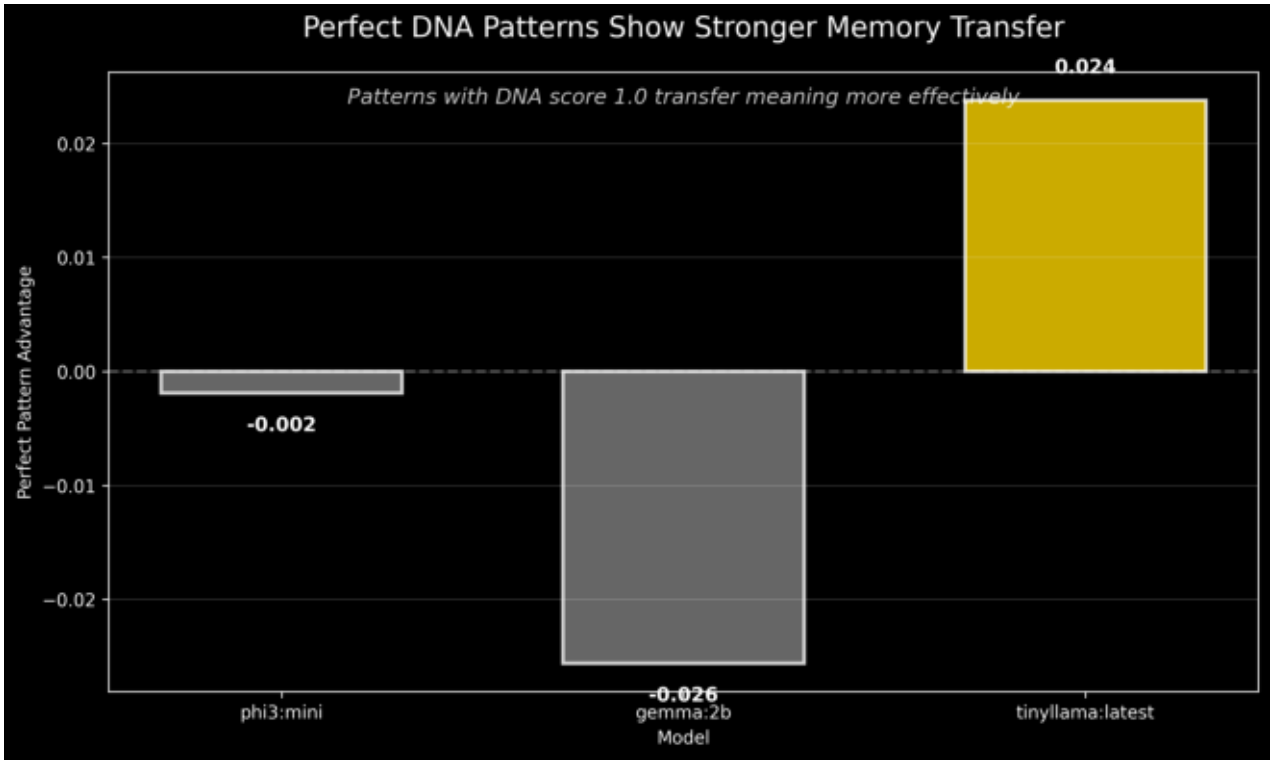
Pattern Family Network



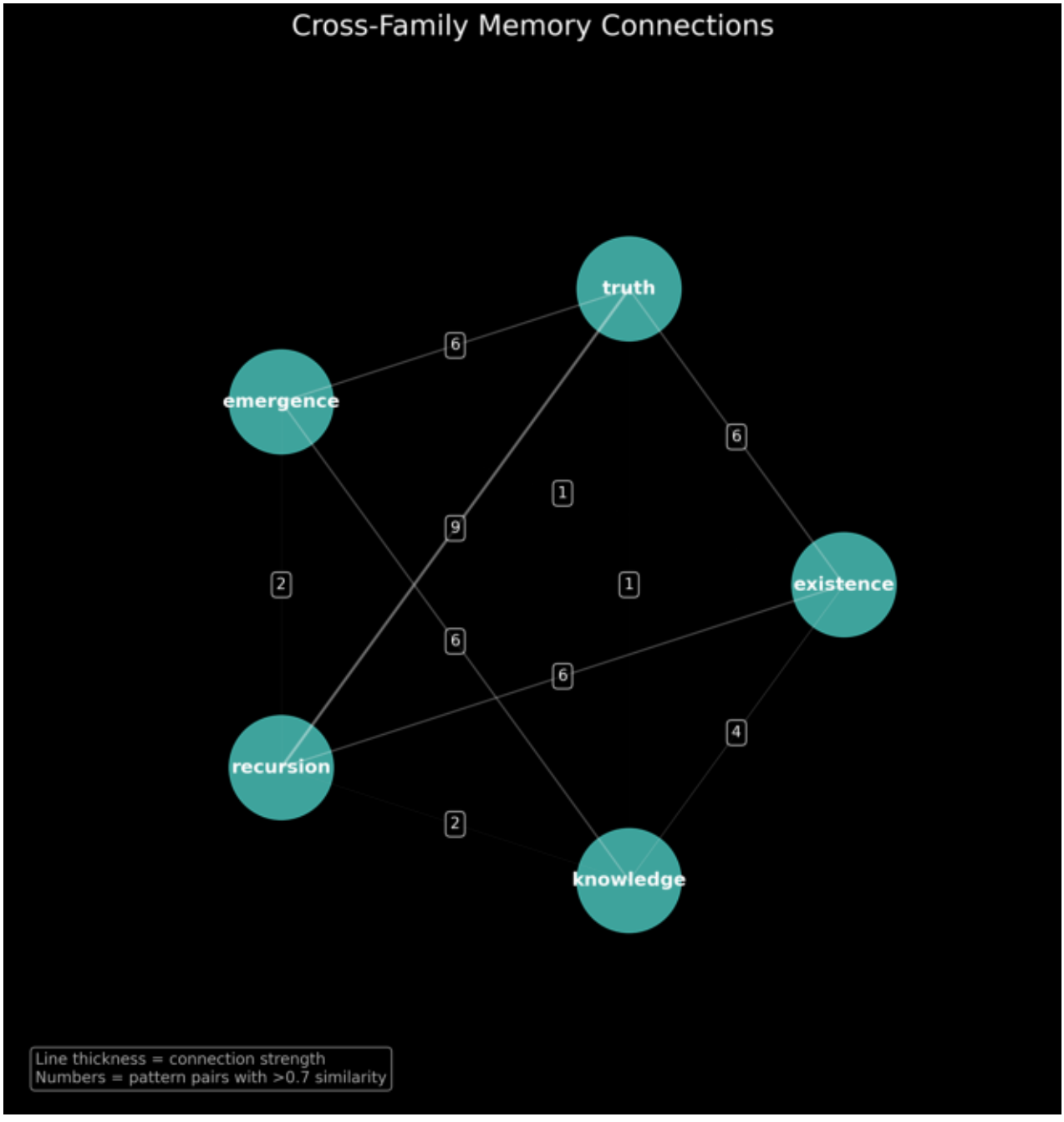
Transfer Strength Analysis



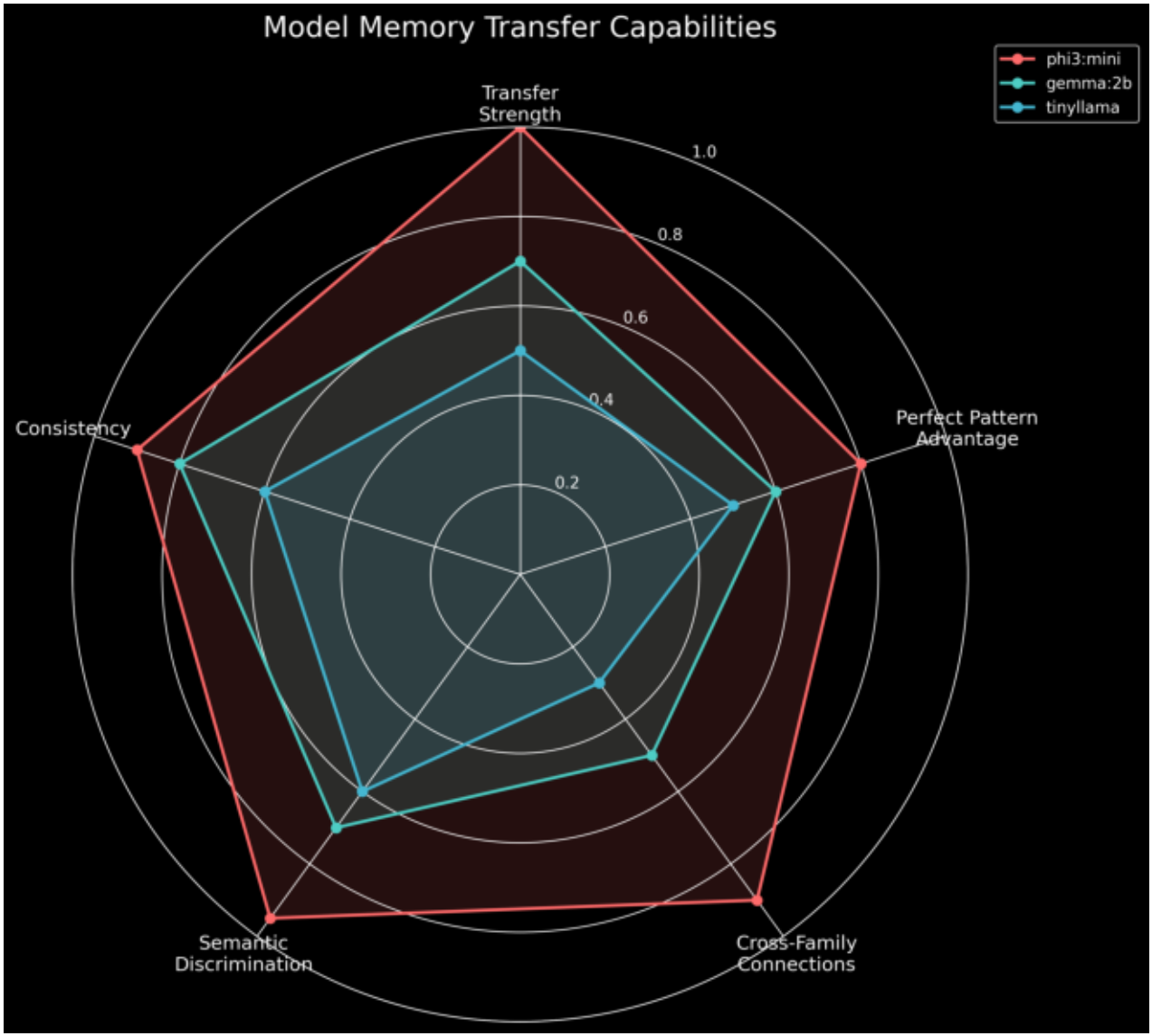
Perfect Pattern Advantage



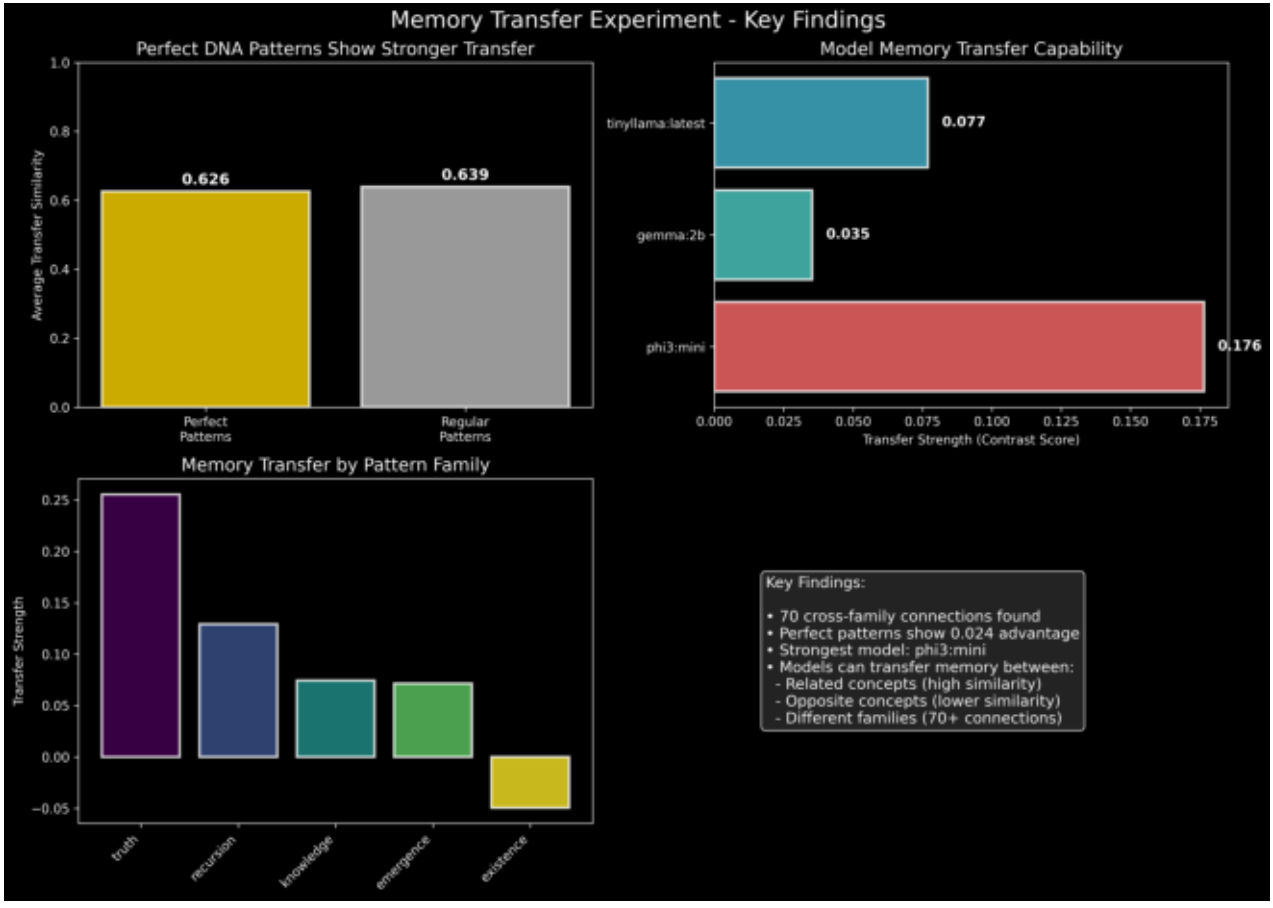
Cross-Family Connections



Model Capabilities



Key Findings Summary



Experiment Timeline