

Architectural Mechanisms for Mitigating Uncertainty during Long-Term Declarative Knowledge Access

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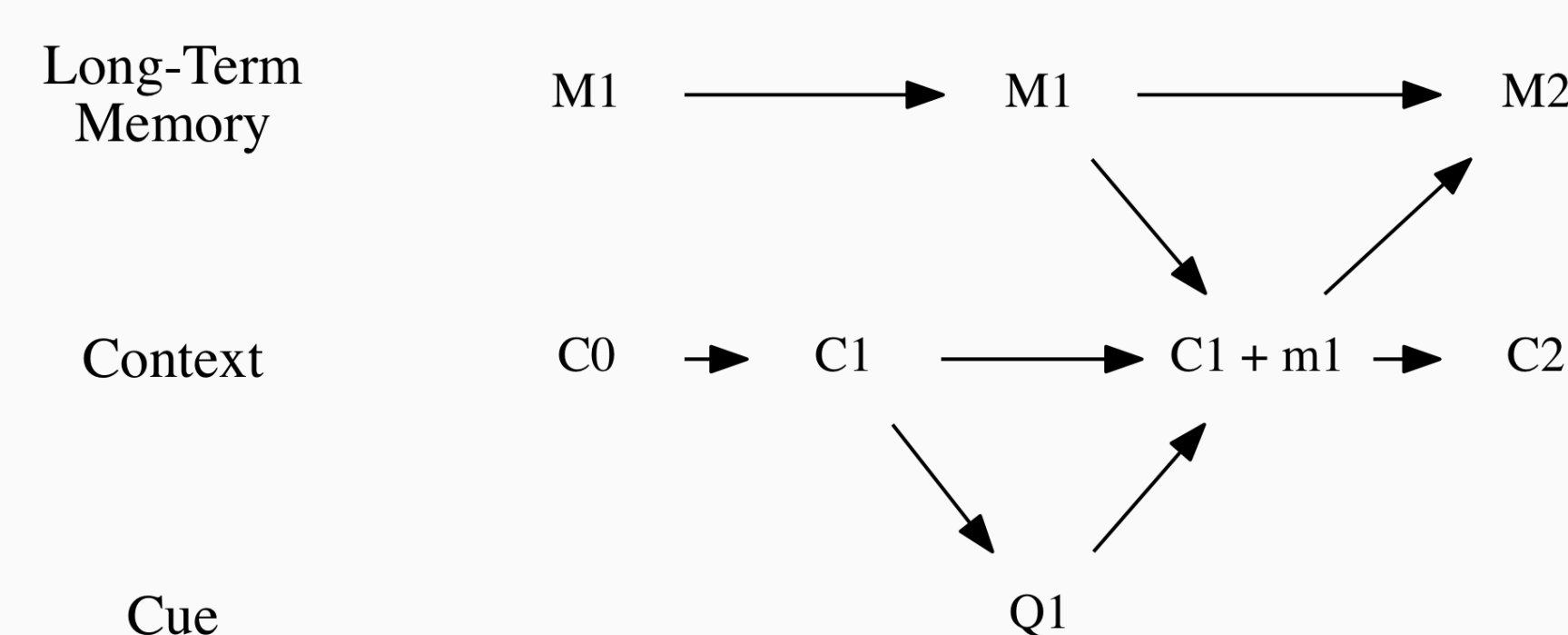
Takeaway

Diverse memory mechanisms should be understood as attempts to mitigate agent uncertainty

Problem and Approach

- Cognitive architectures have adopted diverse long-term memory mechanisms
- We lack a theory that explains why mechanisms are necessary
- Rational analysis accounts for environmental regularities, but ignores agent computational bounds
- Approach: analyze memory in terms of *uncertainties* and how *mechanisms* mitigate them by using additional *sources of information*

Conclusion



- Can depict influences to memory retrievals over time
- No theoretical reason sources of information must be mediated through memory mechanisms
- Globally optimal algorithm using all sources of information may exist

On Spreading Activation

- Standard explanation of spreading activation as correlation does not match implementation
- Current architectures do not track correlation, nor construct any causation network
- Structure of memory plays questionable role under this narrative

- Instead, spreading on structure compensates for potential *errors in knowledge representation*
- Mirrors how kernel density estimation compensates for sensor noise

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