

Awareness Types in LLM-Based Agents

From Context to Situational, Social and Self-Awareness

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Motivation

- Users expect human-like interactions with LLMs
- LLM interactions happen over extended timeframes
- Pure text generation leads to:
 - Loss of coherence
 - Misunderstandings
 - Inappropriate responses
- Simply having access to past experiences is not enough

What is Context?

"Context is any information that can be used to characterize the situation of an entity involved in an interaction."¹

Examples

- Physical: Temperature, Location
- Social: Relationships, Roles, Norms
- User: Preferences, Goals / Tasks
- Historic: Past Interactions, Past Events

Context Aware Systems

"[A context aware system] uses context to provide relevant information and/or services to the user, [depending] on the user's task."³

Components

- Perception = Acquiring data
- Thinking = Reasoning over data
- Acting = Selecting and executing appropriate response

Context Awareness in LLMs

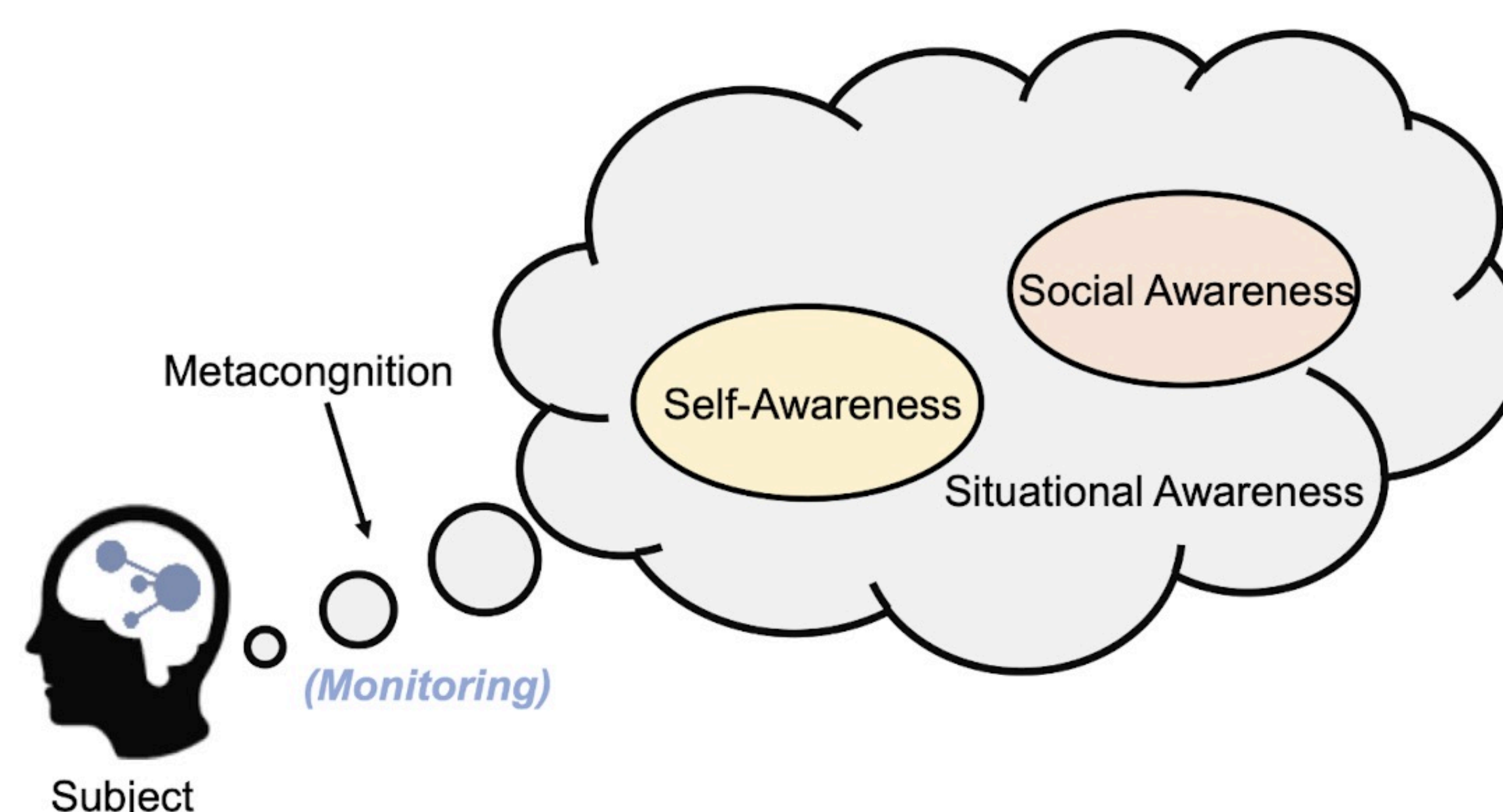
Memory as an enabler

- Short term / working memory is realized as the context window
- Long term memory integrated e.g. with RAG, knowledgebases or episodic buffers
- Temporal structure possible e.g. with timelines or event grouping

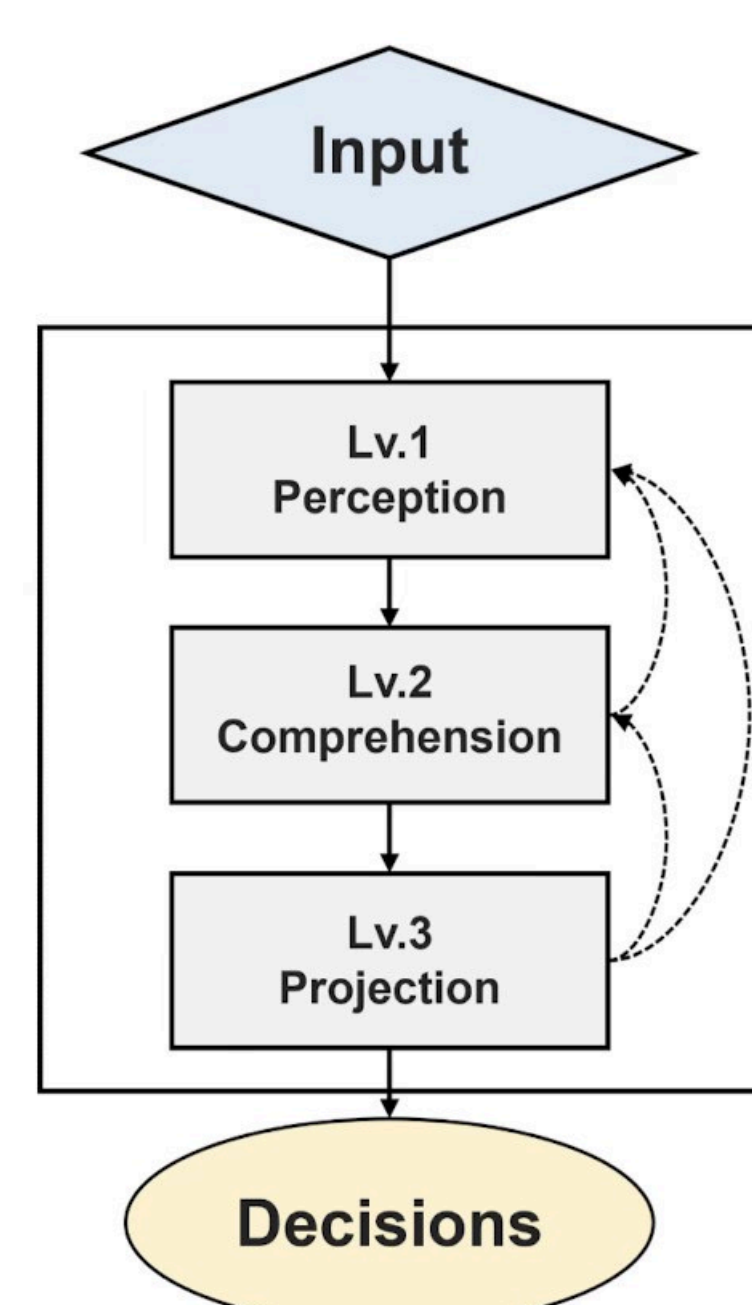
Challenges

- Catastrophic forgetting
- Coherence over time
- Selecting relevant context
- Preserving continuity

The Different Types of Awareness²



Situational Awareness



"The perception, comprehension, and projection of environmental elements and their future status [within a volume of time and space]."²

Internal loop

1. Tagging elements in environment semantically
2. Integrating information into knowledgebase / context
3. Planning & evaluating options

In LLMs

- Perception e.g. via multi-modal inputs in AI systems
- Relatively refined (e.g. discerning between "under review" and "serving users")

Self-awareness

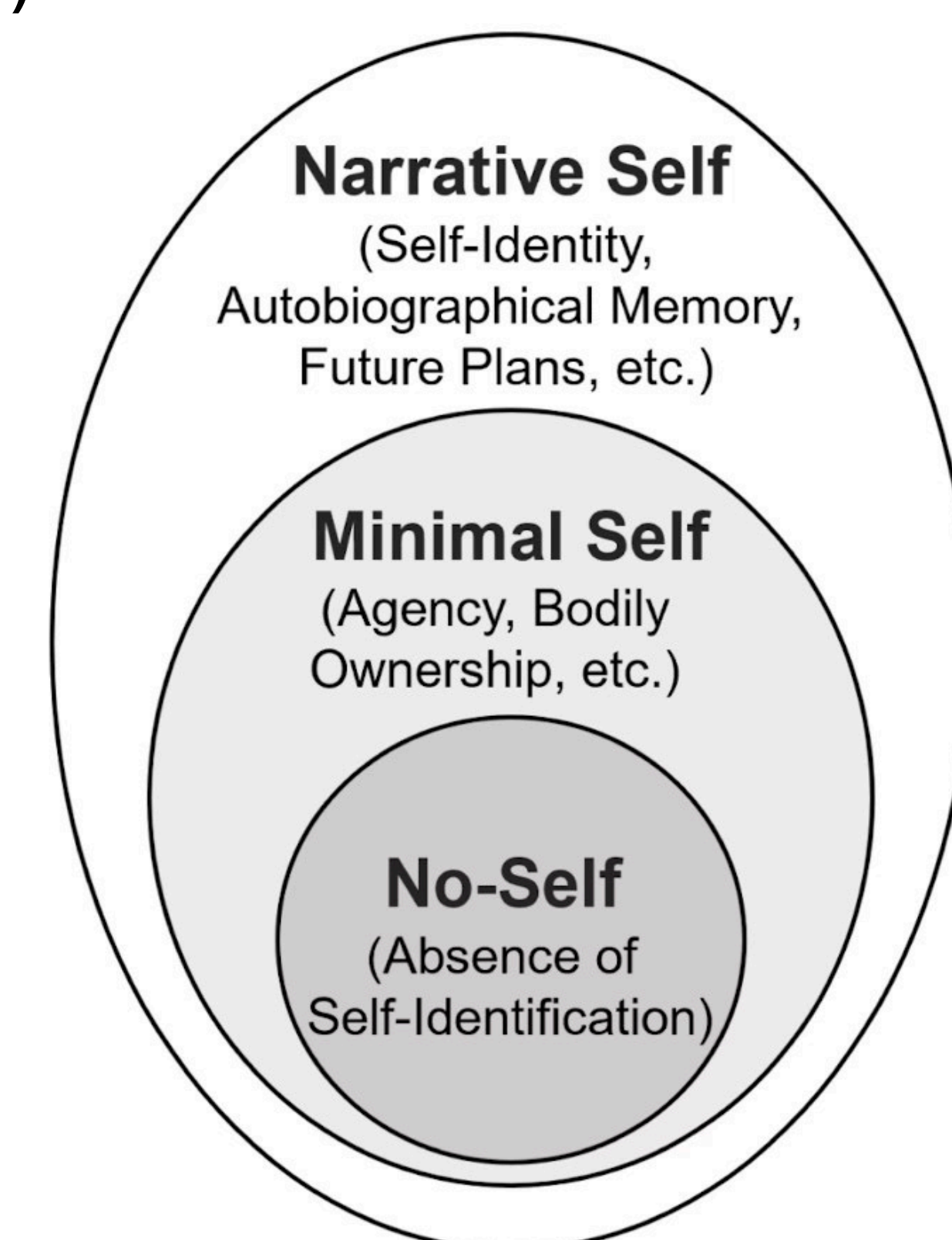
"The capacity of taking oneself as the object of awareness."²

Properties

- Agency & Body ownership
- Self-identity recognition (self-knowledge)
- Consistent self (e.g. mirror test)
- Knowledge boundaries (answer confidence)

In LLMs

- Limited self-knowledge
- Struggles to identify own responses
- Knowledge boundary awareness close to human level



Social Awareness

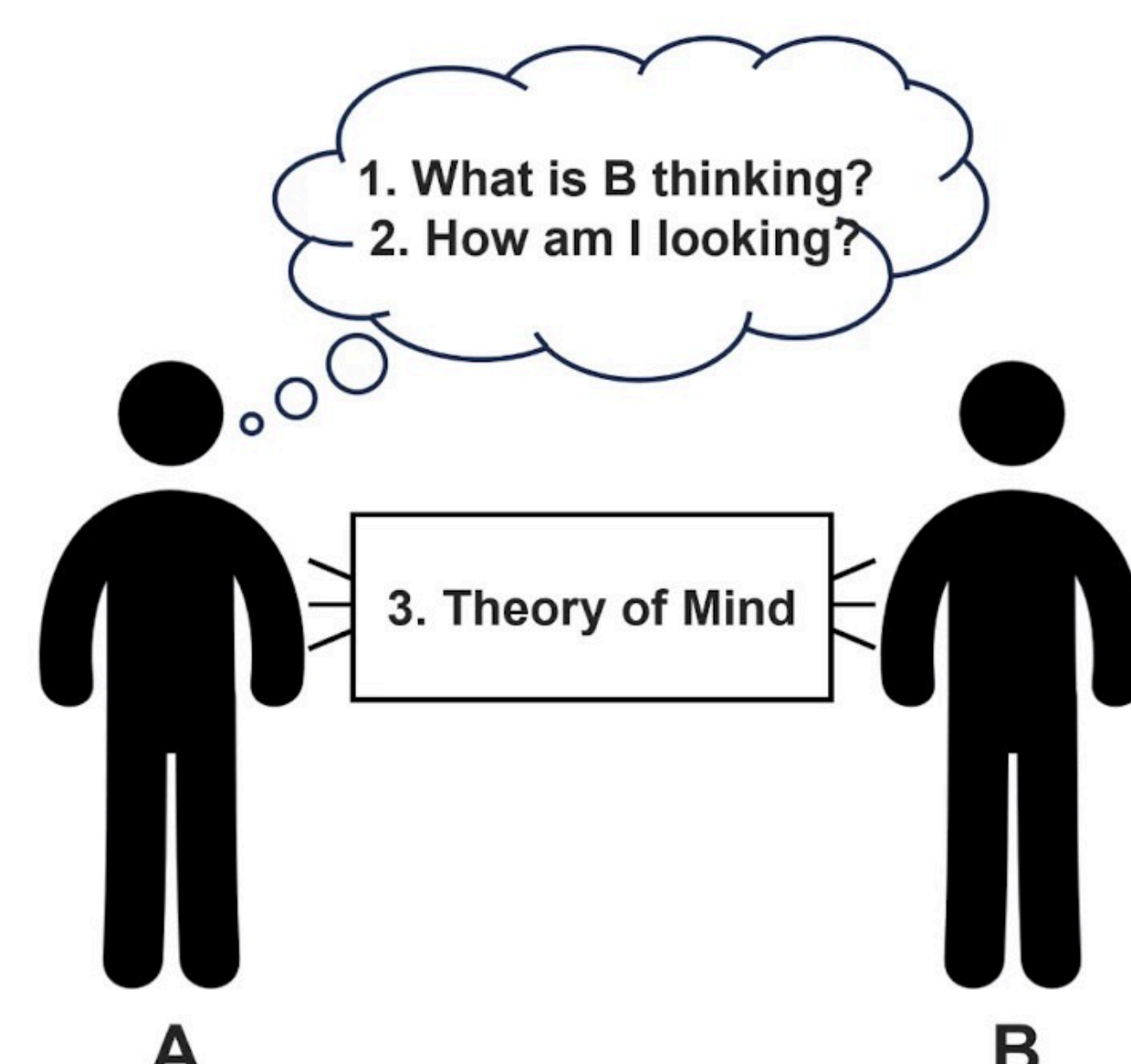
"The cognitive capacity to perceive, interpret, and respond to the social signals, emotions, and perspectives of other agents"²

Properties

- Theory of mind (ToM) & empathy
- Understanding of interpersonal relationships
- Knowledge of society & social norms

In LLMs

- ToM comparable to a child (no higher order)
- Basic social awareness, but lacking in less familiar cultural contexts, missing embodied experience
- Global South is underrepresented



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References

¹Abowd, Gregory D., et al. "Towards a better understanding of context and context-awareness." International symposium on handheld and ubiquitous computing. Berlin, Heidelberg: Springer Berlin Heidelberg, 1999.
²Li, Xiaojian, et al. "AI awareness." arXiv preprint arXiv:2504.20084 (2025).
³Dey, Anind K. "Understanding and using context." Personal and ubiquitous computing 5.1 (2001): 4-7.