

Modeling Autobiographical Memory for Believable Agents

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Outline

1. Define Autobiographical Memory
2. Our Approach
3. Function of Our Model and Prototype
4. Future Directions

Autobiographical Memory

- **Autobiographical Memory:**
 - All of an individual's episodic memories
 - “Life Story”
- **An Episodic Memory:**
 - Memory of an event
 - Occurs at a specific time and place

Our Approach

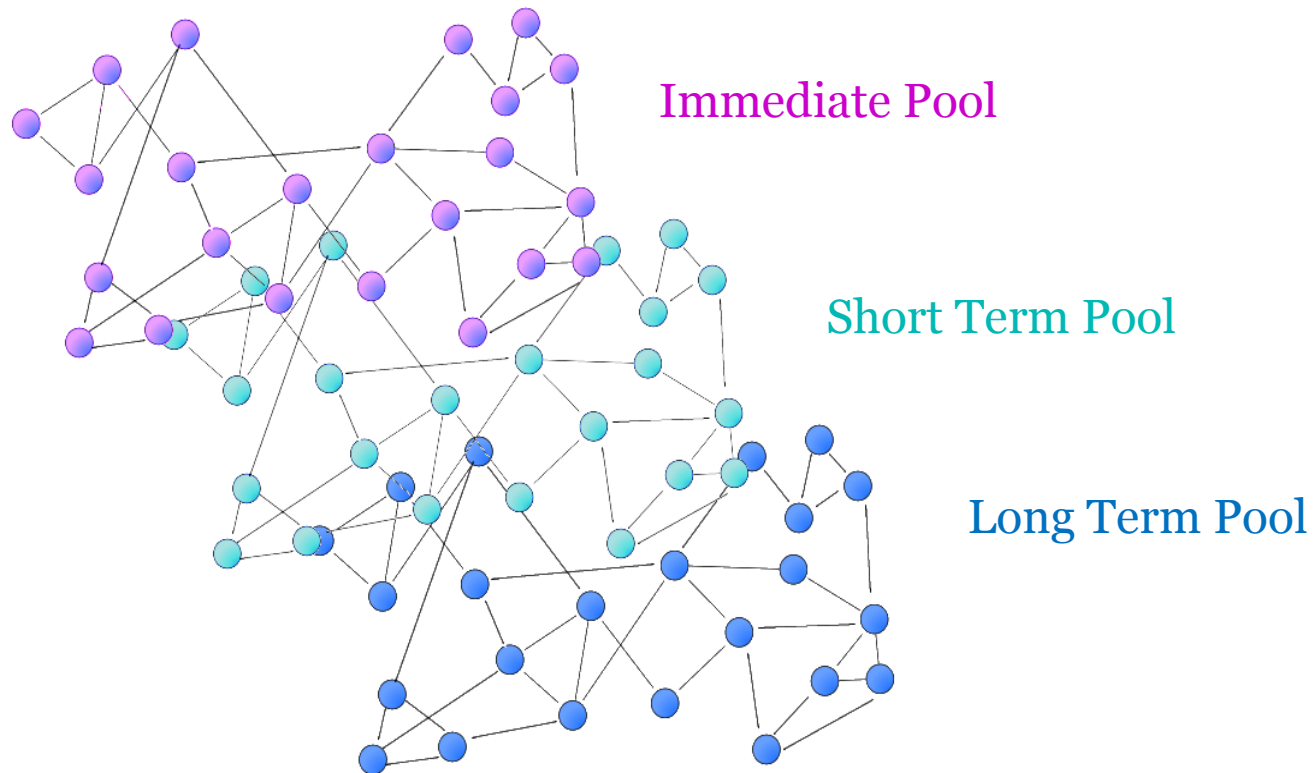
- Survey psychological research
- Identify key theoretical attributes of human memory
- Build a memory model based on those attributes
- Situate it within an overall agent model

Human Memory Attributes

1. Repetition strengthens memories over time
2. Cues elicit memory retrieval
3. A memory is activated by a control system
4. The memory system is dynamic
 - Structures are assembled as required
 - New experiences are built from existing memories

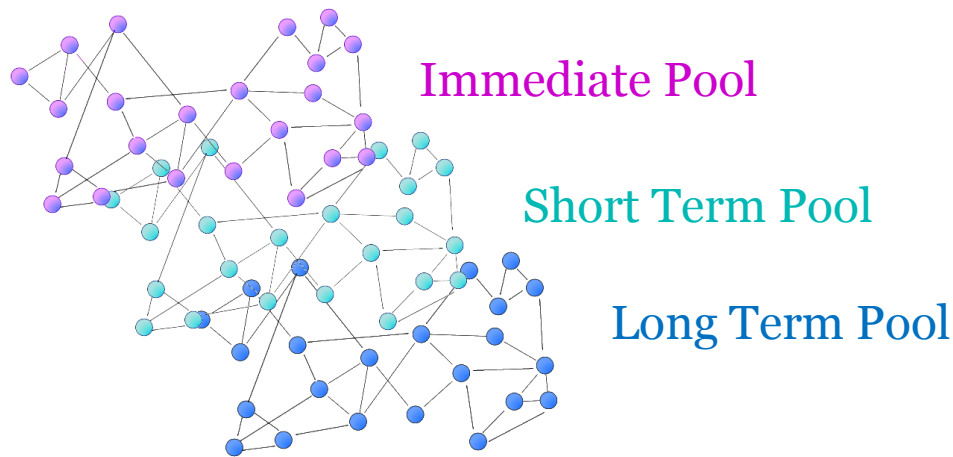
Our Memory Model

- Multi-layer connectionist network



Our Memory Model

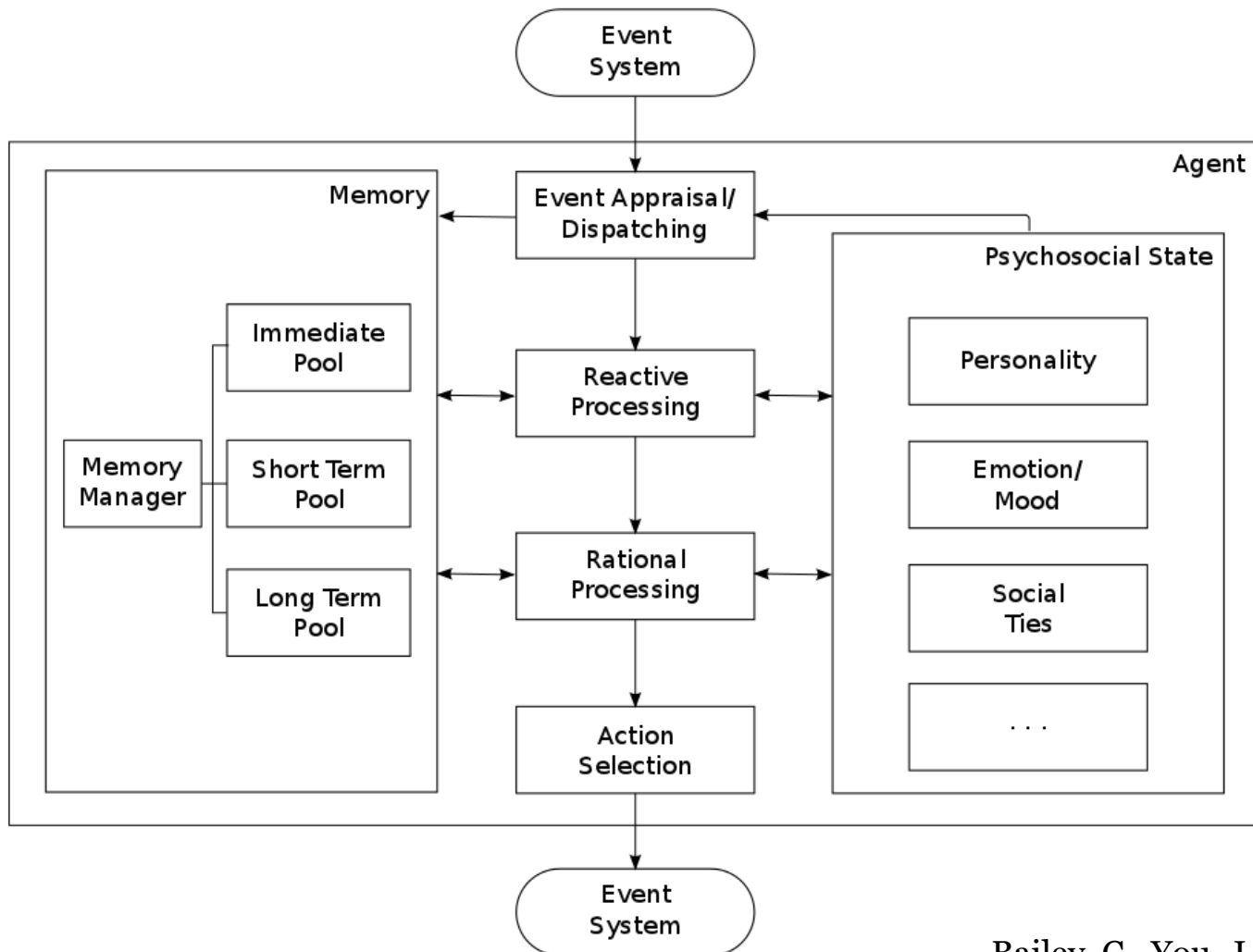
- Multi-layer connectionist network
- A memory pattern is represented in the network by connections between nodes



Memory Pattern:

- ID
- Type
- Emotional Valence
- Weight
- Timestamp
- **Keywords**

Overall Agent Model



Features of Our Memory Model

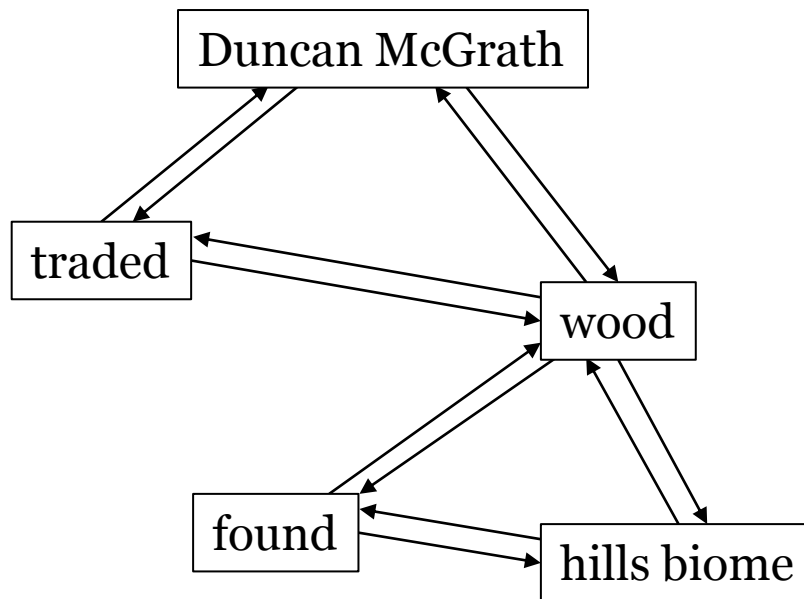
- Situated in an overall agent model
- New events are easily added to the system
- Hierarchical structure to encode time
- Context dependent recall

Context Dependent Recall

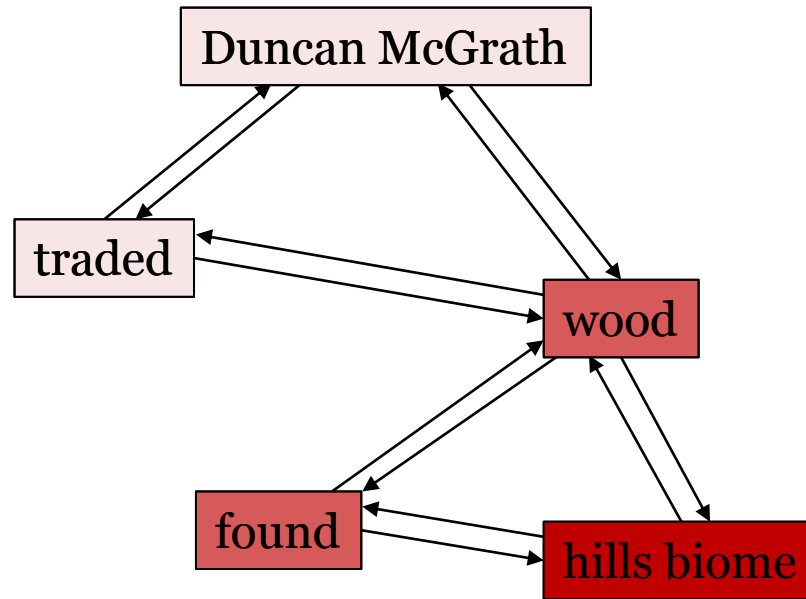
- Non-deterministic
- Recently recalled or added memories are higher in the memory system hierarchy
- ‘Conversational Context’ now matters

Adding New Memories

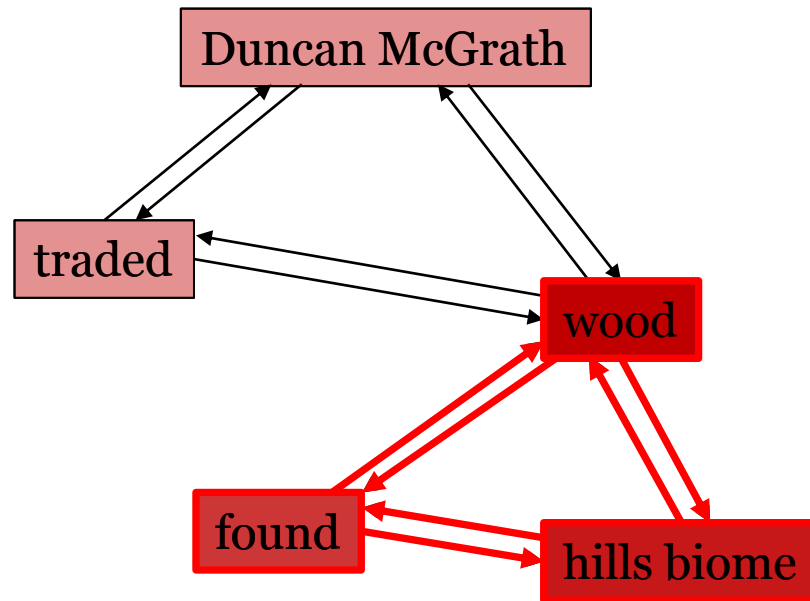
- I found some wood in the hills biome
- I traded some wood to Duncan McGrath



Context Dependent Recall

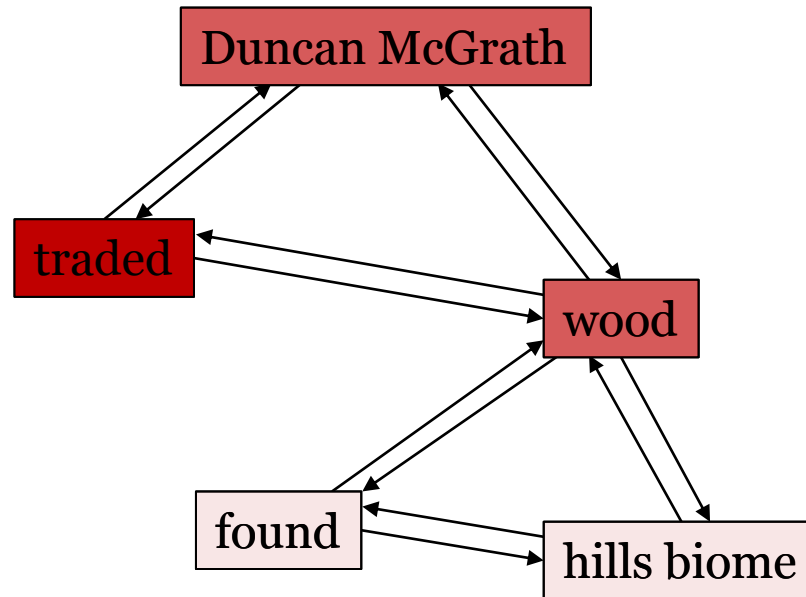


Context Dependent Recall

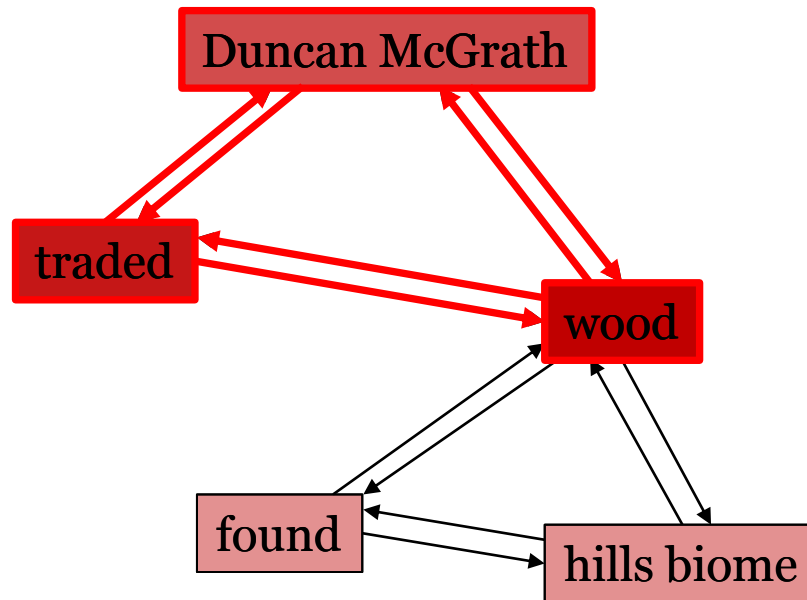


“I found some wood in the hills biome”

Context Dependent Recall



Context Dependent Recall



“I traded some wood to Duncan McGrath”

Prototype Implementation

- Minecraft mod
- 50 NPCs
 - 50-150 memories each
- Text chat interface

Prototype Implementation



Prototype Future Directions

- Improve dialogue system
- Realistic performance testing
- Assess gameplay improvement

References

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