Event Memory Mechanisms in Soar's Episodic Memory

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Standard Soar Episodic Memory

Encoding:

- difference between most recently encoded working memory state and current working memory state

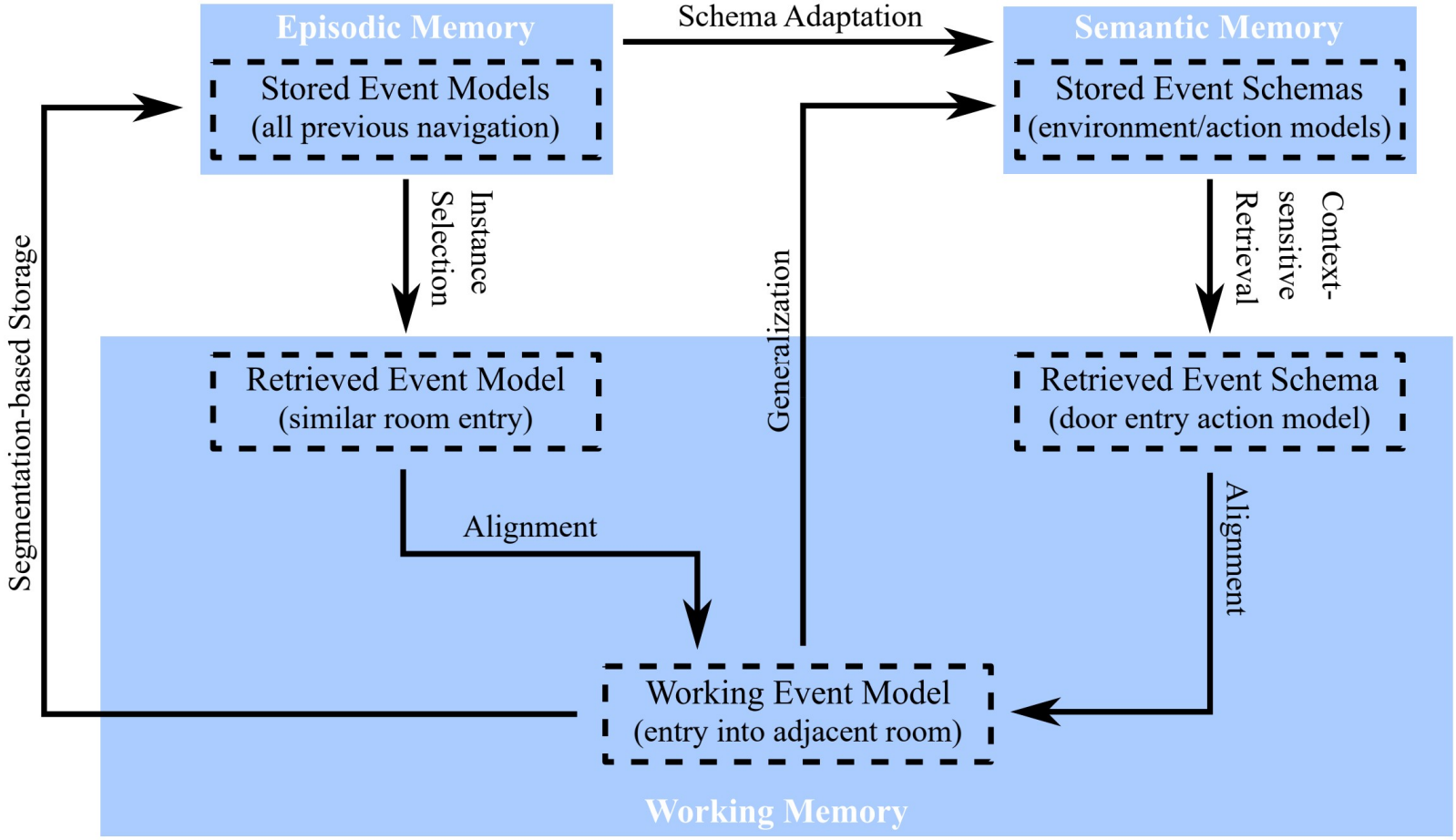
Storage:

- database indexing for when WMEs entered and exited the state

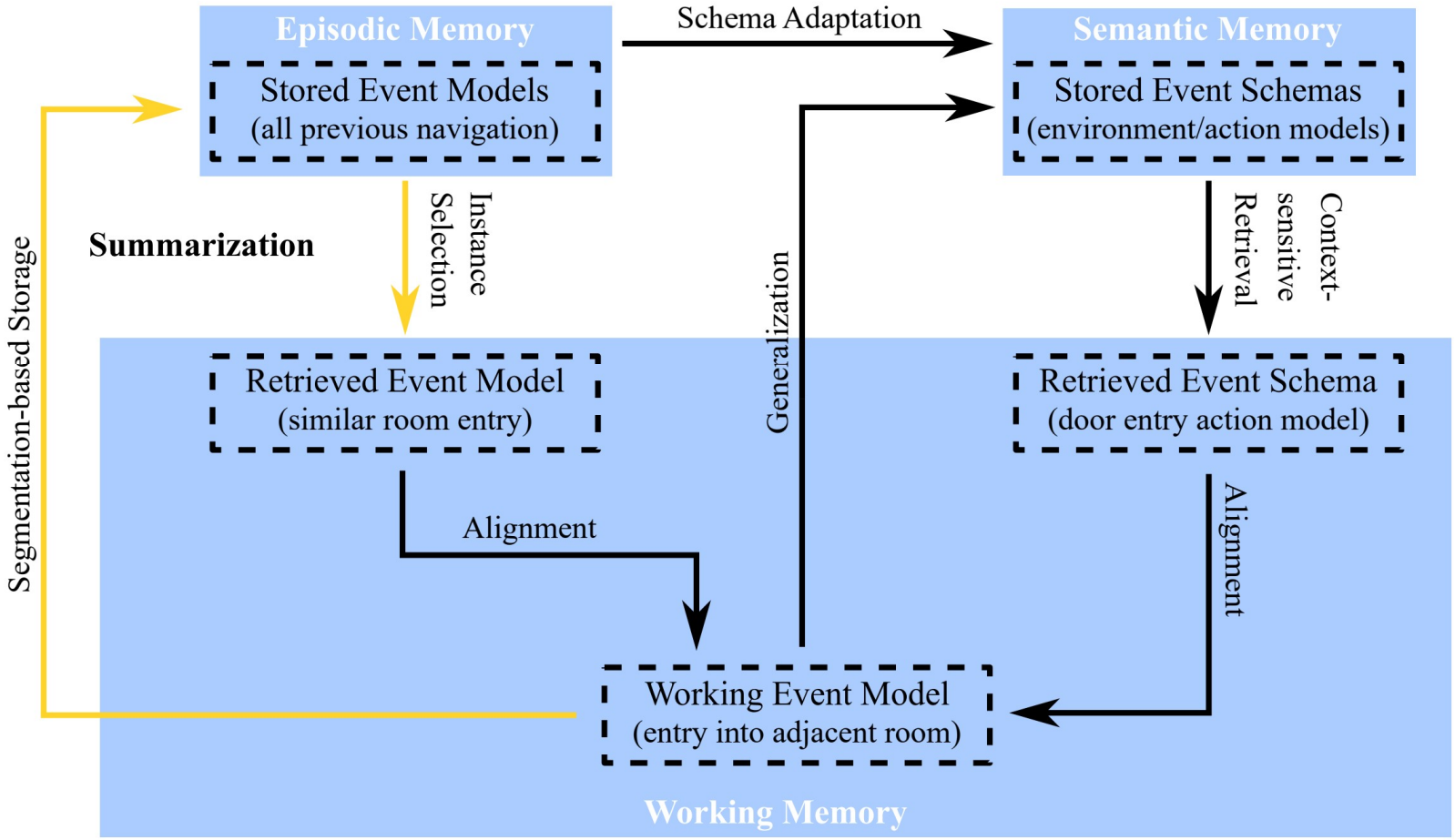
Recall:

- replication of previous working memory state at a single timestep matching pattern specified by a query

Event Cognition in Soar



Event Cognition in Soar



Changes to Support Event Memory

Encoding:

- Additional Surprise metadata

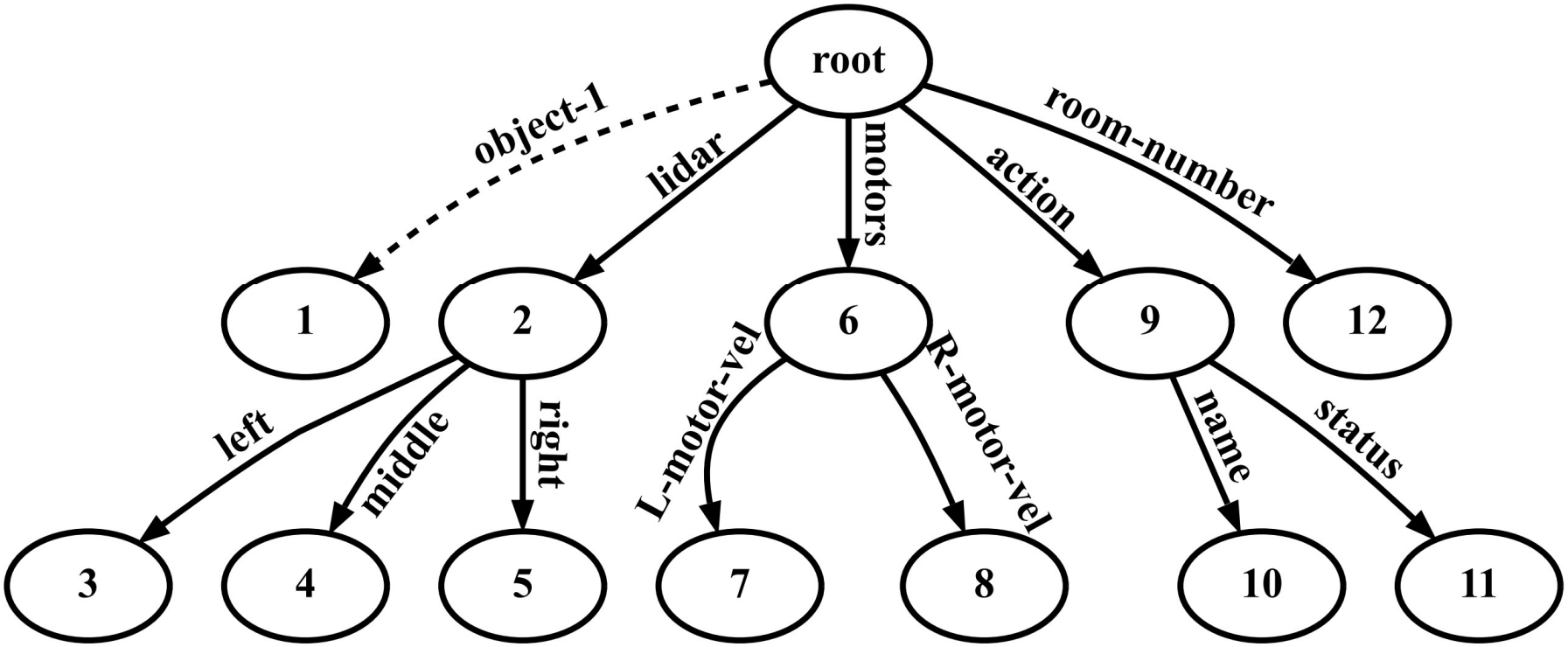
Storage:

- Additional complicated database indexing

Recall:

- Interval-based queries
- Interval-based event representation

Simplified Example RoomsWorld State



Surprise Metadata

location	value	temporal intervals
1	(Symbolic)	
2	(Symbolic)	[0-
6	(Symbolic)	[0-
9	(Symbolic)	[15-22],[25-47]
12	id-3	[20-39]
12	id-4	[40-
10	rotate-left	
10	rotate-right	[25-35]
10	forwards	[15-22],[36-47]
11	initializing	25, 36
11	executing	[16-21],[26-34], [37-46]
11	completed	35, 47
3	+	31, [33-35]
3	-	[26-30], 32, [37-47]
4	+	30, [32-35]
4	-	[26-29], 31, [37-47]
5	+	29, [31-35]
5	-	[26-28], 30, [37-47]

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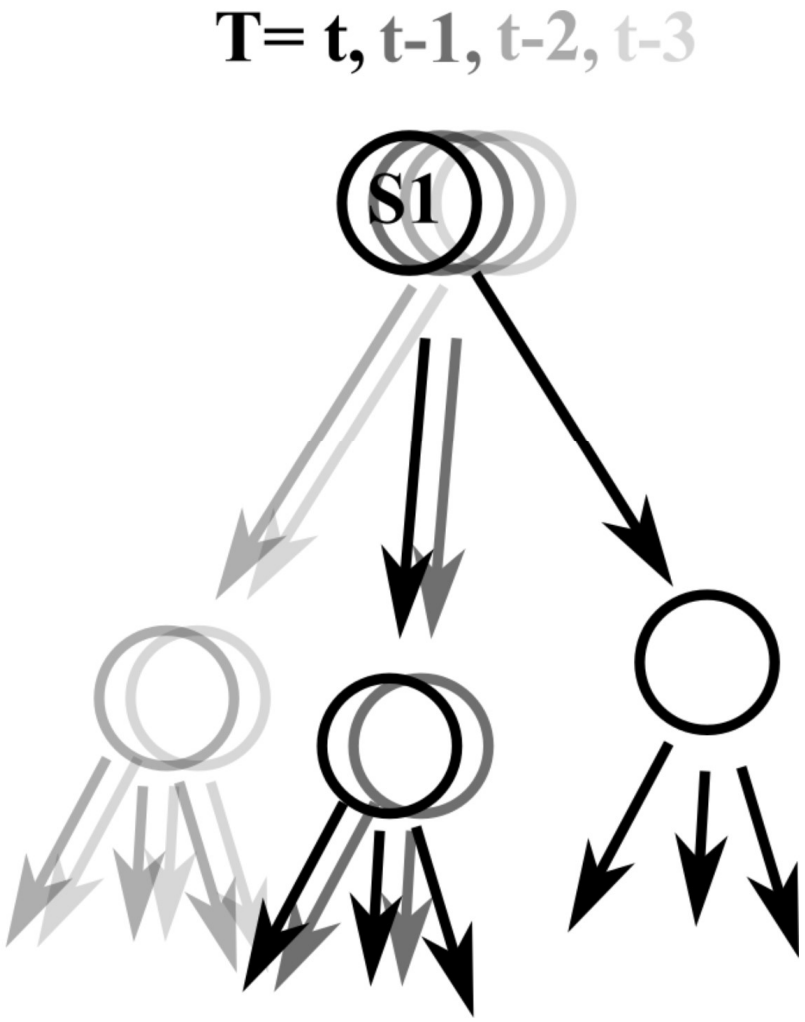
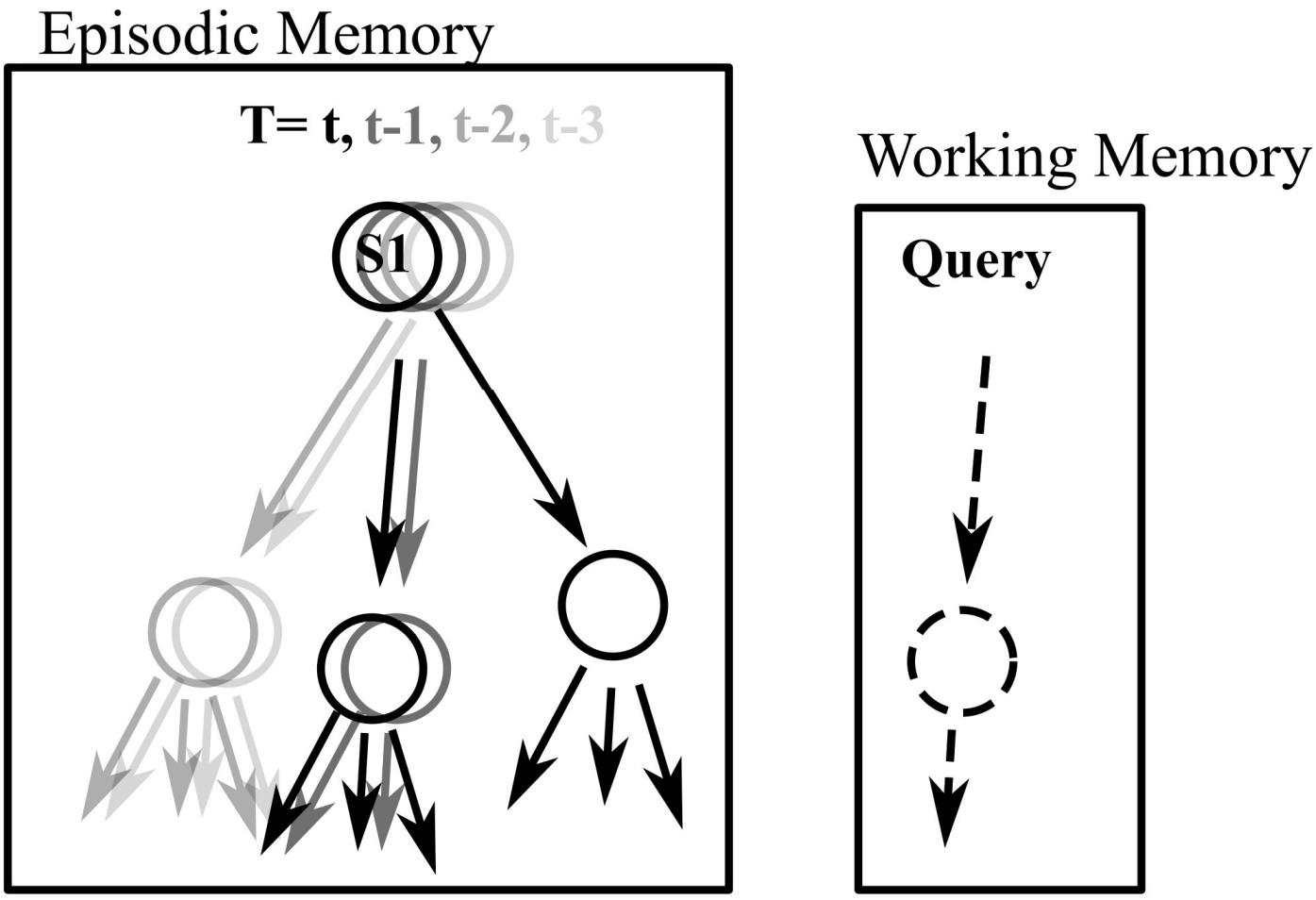
3	-	[26-30], 32, [37-47]
4	+	30, [32-35]
4	-	[26-29], 31, [37-47]
5	+	29, [31-35]
5	-	[26-28], 30, [37-47]

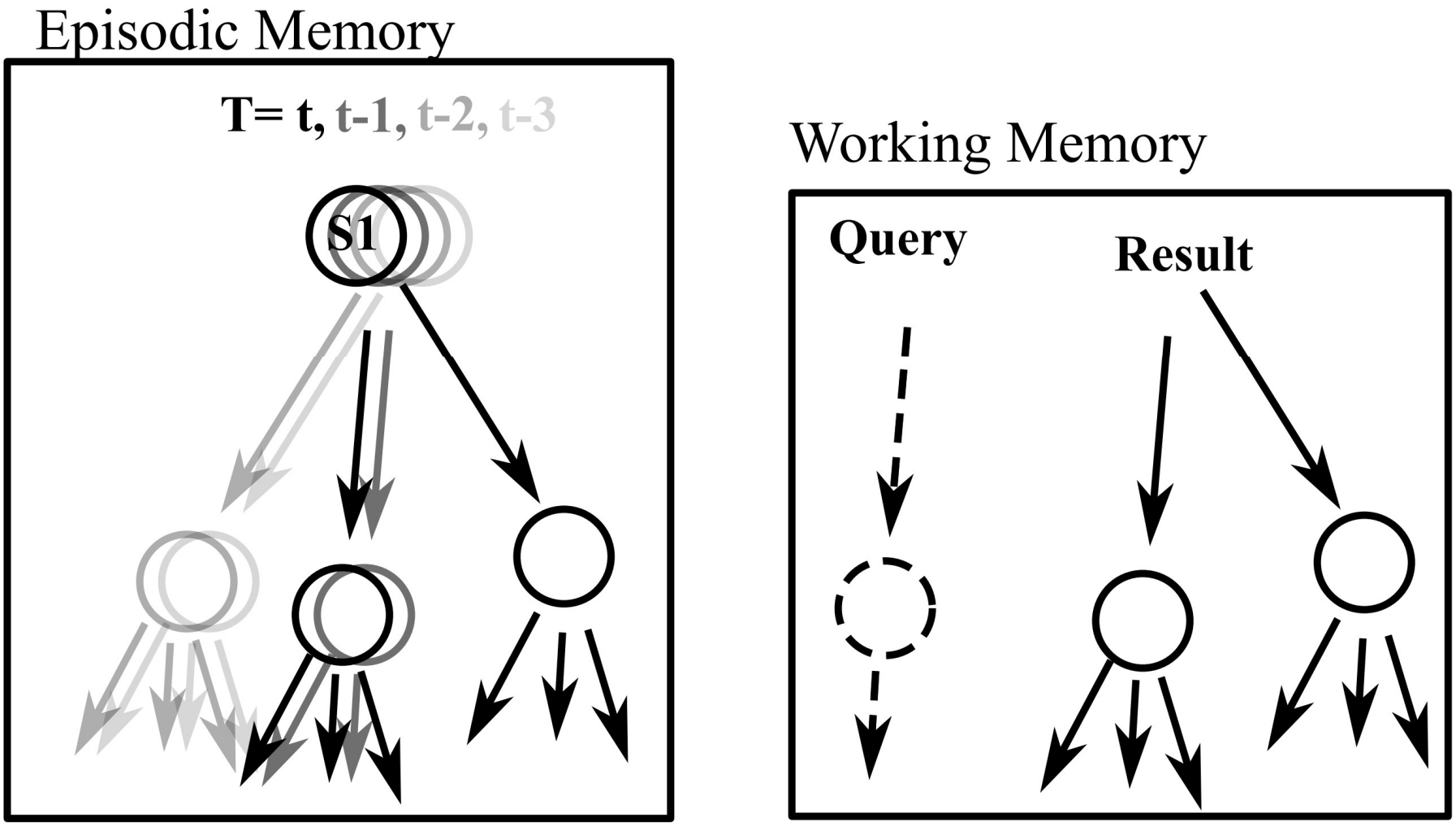
Retrieving an "Event" before:



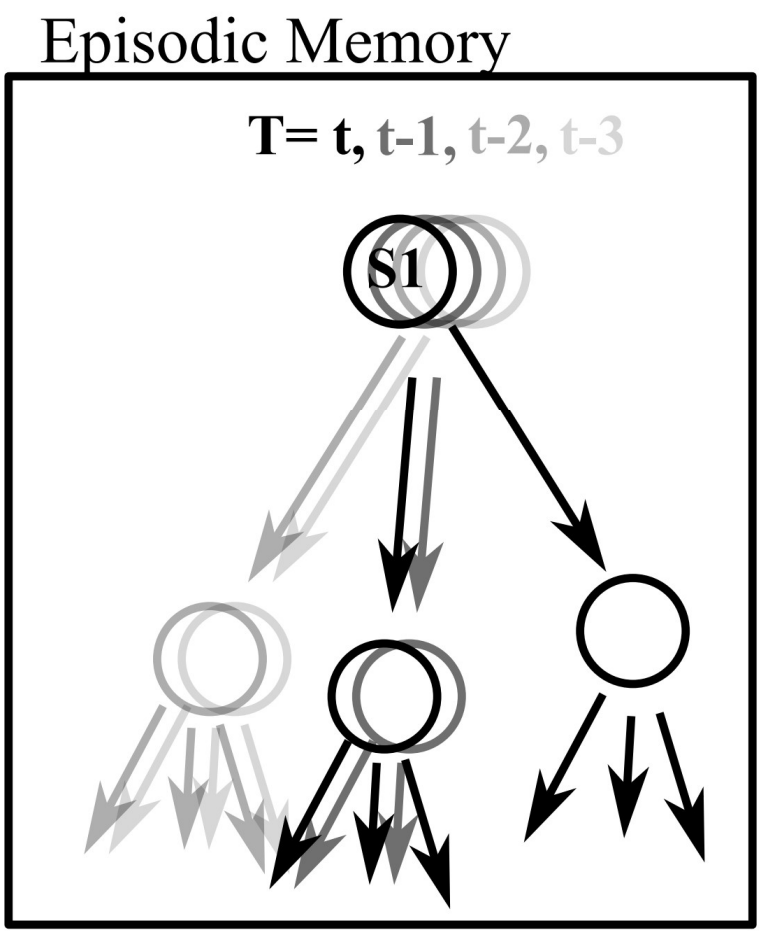
Retrieving an "Event" before:

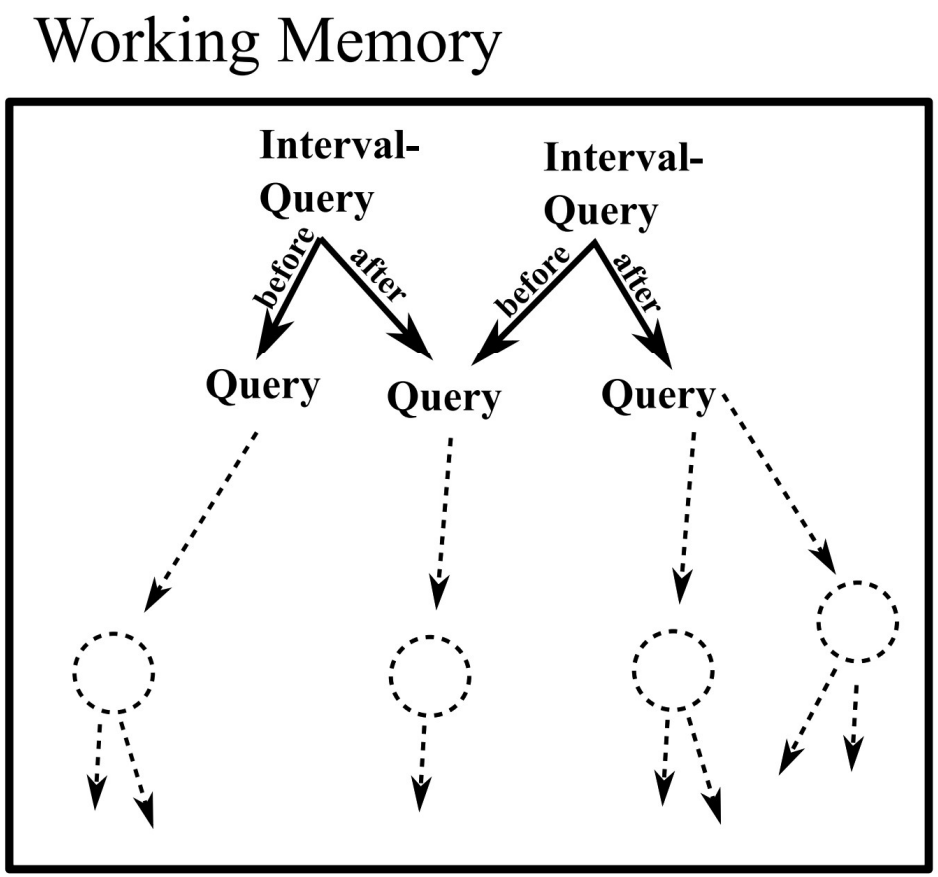


Retrieving an "Event" before:

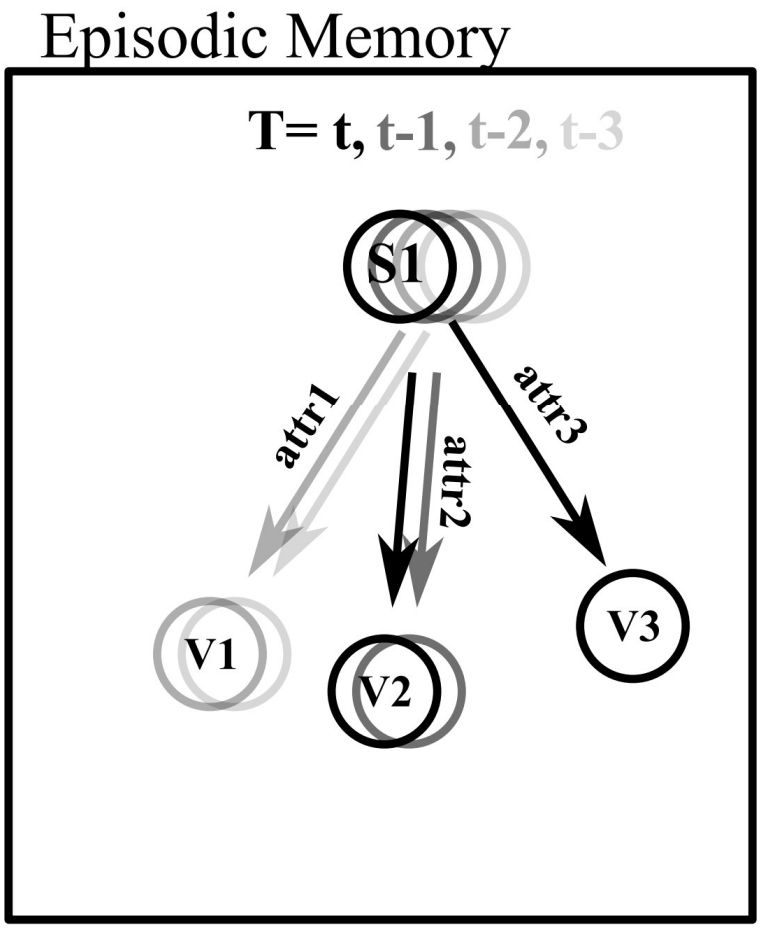


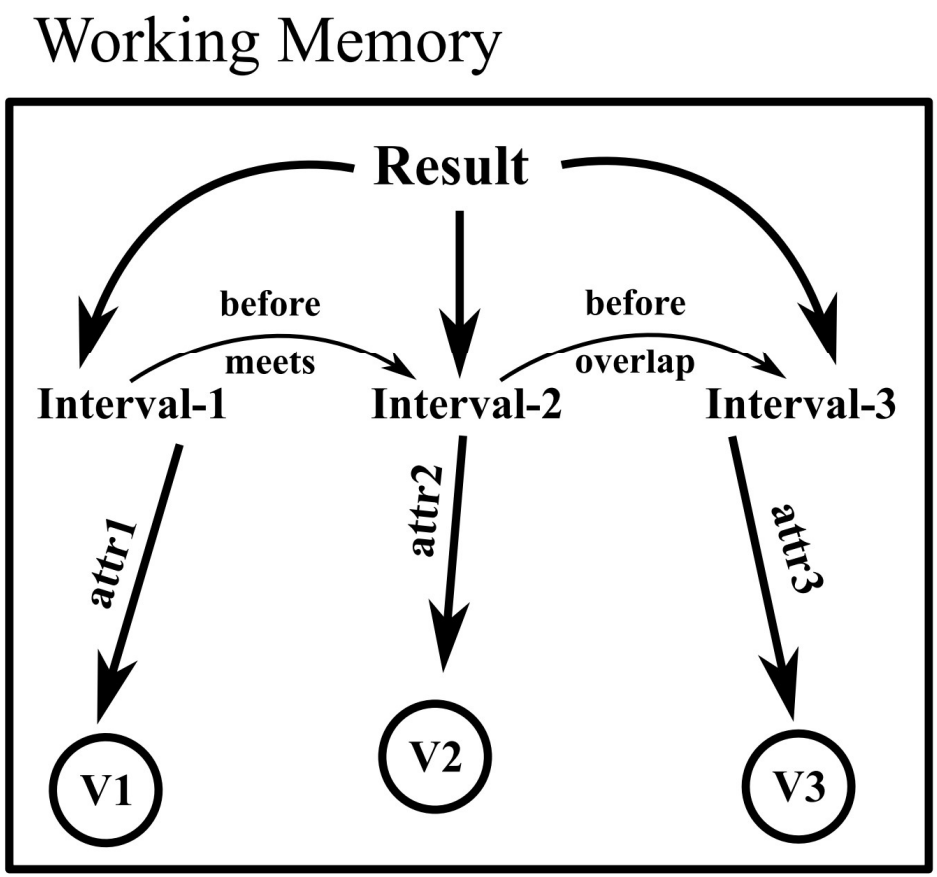
Interval-based Queries





Interval-based Event Representation





Nuggets:

- Backwards Compatible
- Partially Implemented
- Motivated by psych theory
- Reduces deliberate search through EpMem

Coal:

- *Partially* Implemented
- More computationally expensive queries and encoding (not optimized)