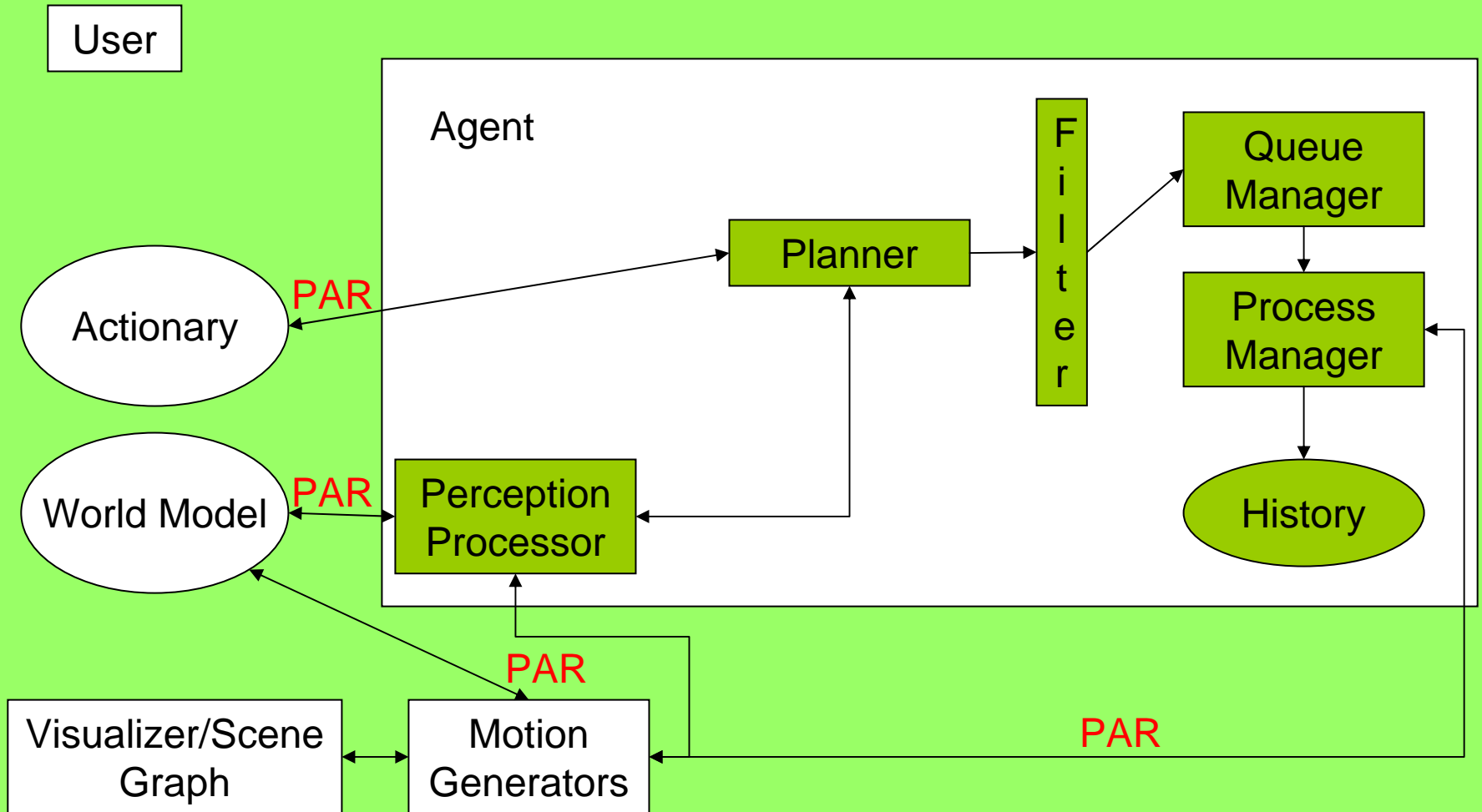


Using PAR with Agents

Types of User/Agent Interactions

- No interaction
- Manipulation of virtual world (through avatar or object manipulation)
- Dialog with agent (ECA)
- Instructions to agent (through NL or GUI)

Interaction with Virtual World



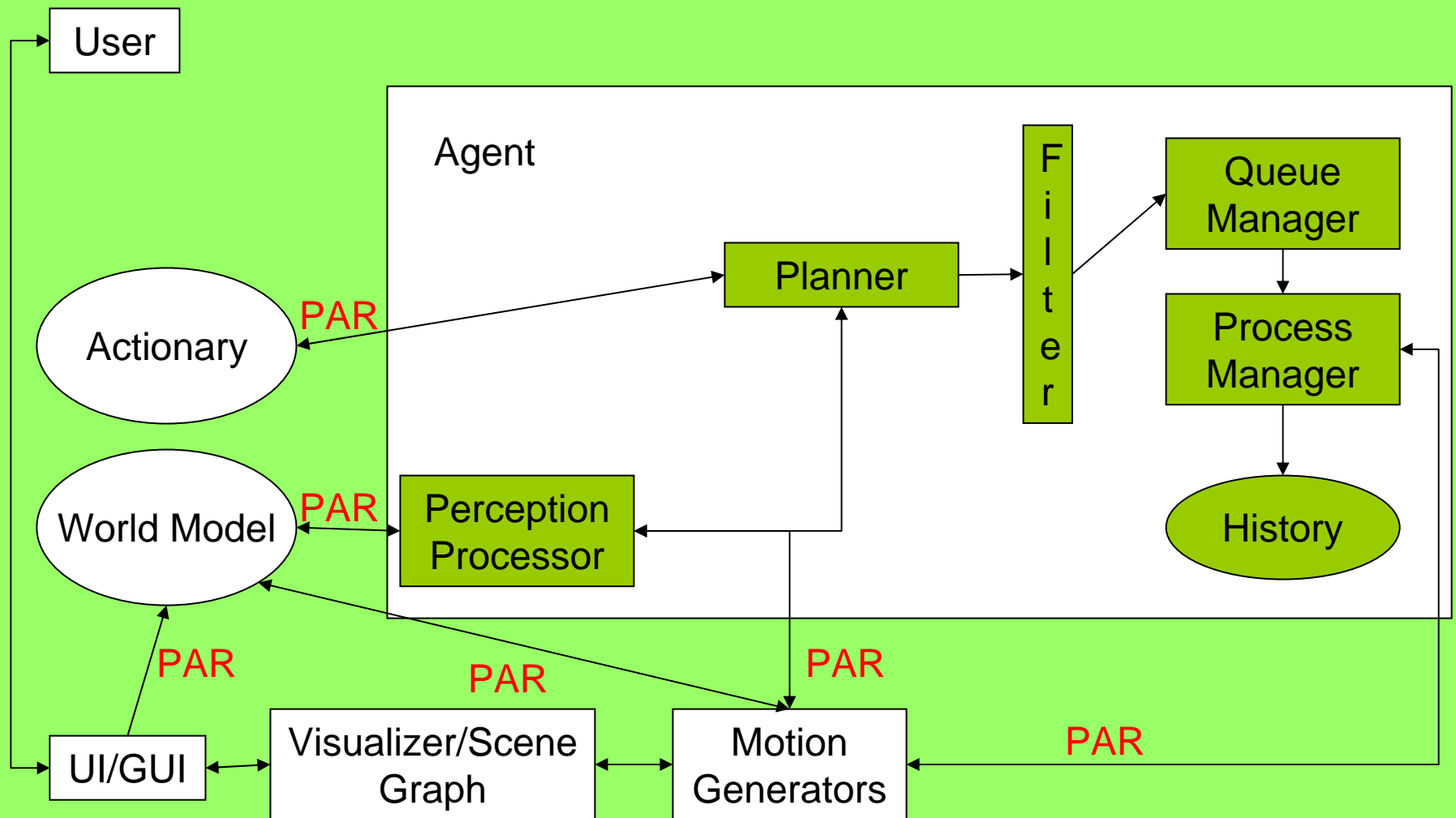
Components

- **Actionary:** Holds UPARs
- **Perception Processor:**
 - Agents are not omniscient.
 - Can be individualized.
 - Handles reflexes.
- **Planner:**
 - Chooses agent goals and actions.
 - Should include resource management.
- **Filter:**
 - Sets parameters of actions to individualize for agent state
 - Contains or links to social, emotional, physiological components

Components (2)

- **Queue Manager:** Manages queue of actions to be performed.
- **Process Manager:** Manages execution of actions and failures.
- **Motion Generators:** smart animators that also update the world model.
- **Visualizer:** manages screen graph.
- **World Model:** contains current state of the world.

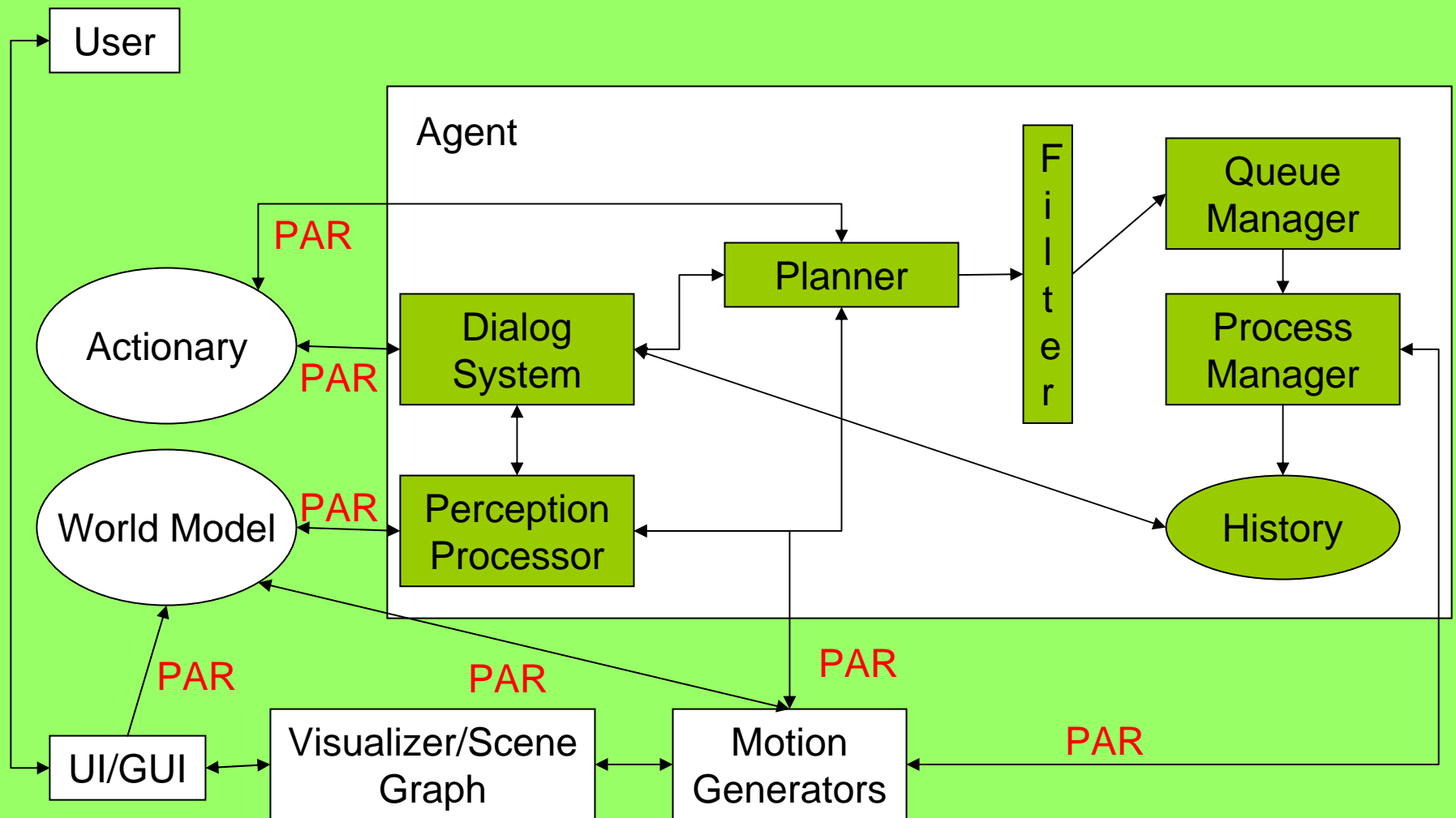
User Manipulation of Virtual World



Added Complexity

- In this model, the UI or GUI for user manipulation updates the world model.
- Alternatively, an “observer” could be created and linked to the visualizer to catch changes in the world and update the world model.

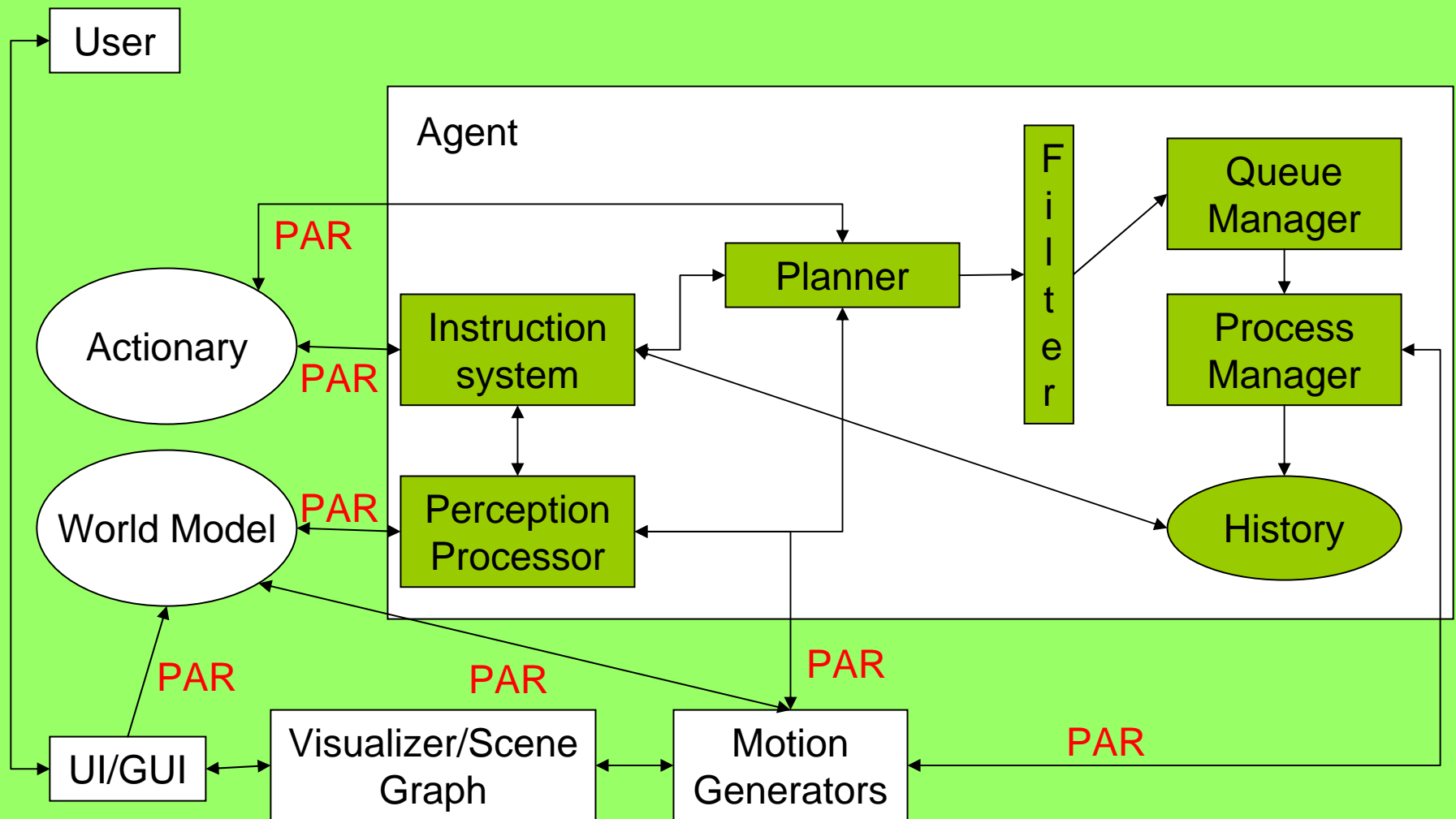
Including a Dialog System



Added Complexity: Dialog

- Input to the dialog system (e.g. questions or comments) is sent through the world model like all other perceptions.
- The dialog system can also query the world model to help disambiguate the utterance.
- The dialog system should generate a speech act and gesture with timing information.
- It can access the Actionary to get information about gesture timings.
- The dialog system generates a script with utterances, gestures, and timing which are then sent to the planner to be wrapped in a PAR.

Including User Instructions



Added Complexity: Instructions

- Instruction processing is very different from dialog processing, but fits in the same way.
- Instruction processing turns instructions into PARs, by referencing the world model, history, and Actionary.
- The planner may expand or alter the instructed PARs to fit in the current planned context.

PAR

- Name: String
- Participants: agent, objects, segments
- Applicability conditions: boolean expression
- Preparatory specification: sequence conditions and actions
- Termination conditions: boolean expression
- Post assertions: statement
- During conditions: statement
- Purpose: purpose-specification
- NL: string and NL spec. (utterance or instruction)

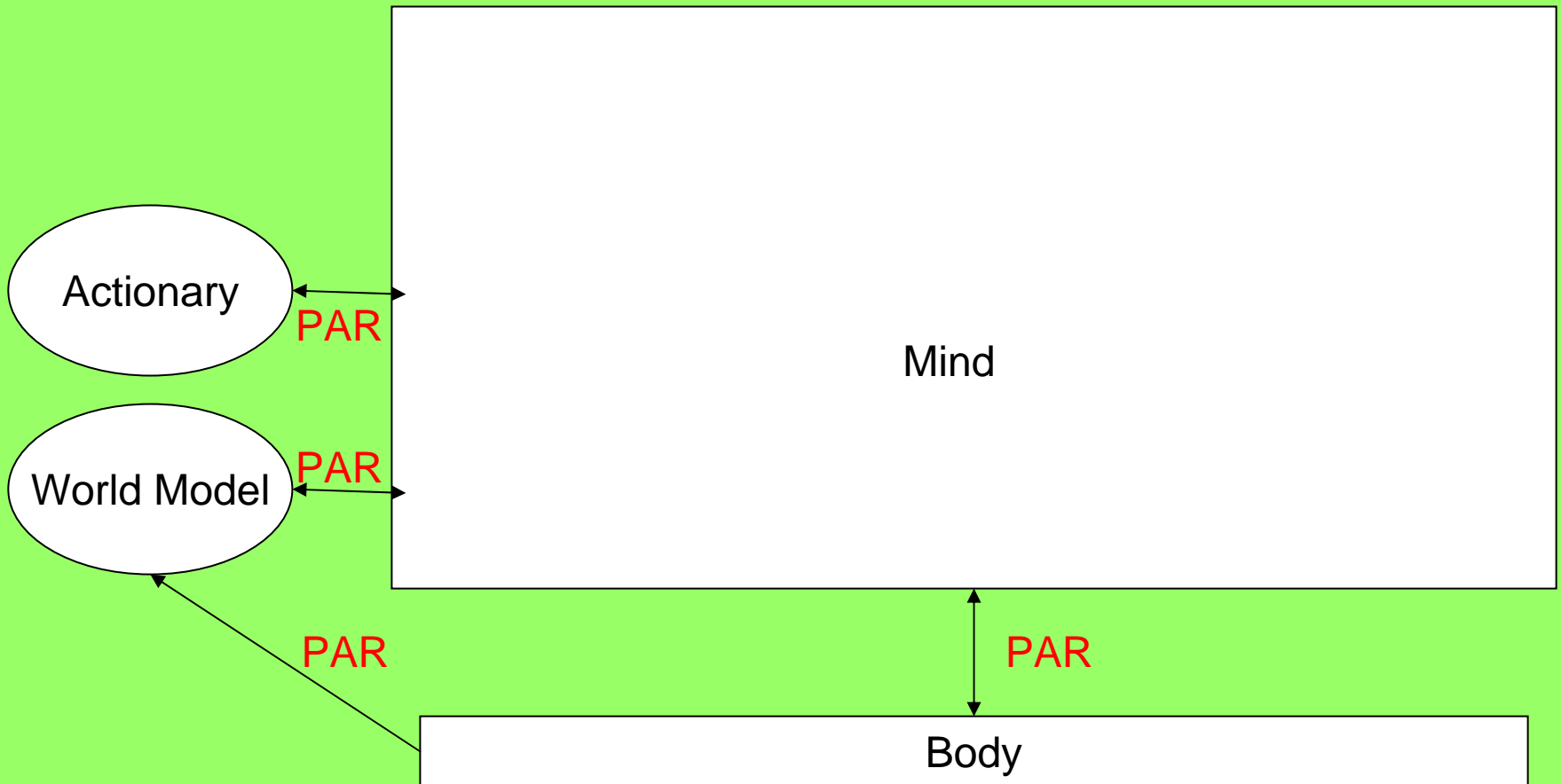
PAR (cont)

- Subaction: PAR constraint graph
- Parent action: PAR
- Previous action: PAR
- Concurrent action: PAR
- Next action: PAR
- Start, end, duration: time specification
- Priority: integer
- Manner: manner specification
- Adverbs: sequence of adverb specification

PAR needs

- Link to script file such as BEAT containing utterances and gestures with timing information. These scripts can be created in the dialog system and linked to a PAR or multiple PARs for execution.
- A slightly more developed object representation.

PAR splits mind and body



PAR Features

- Different minds and bodies can be used in the system as long as they can interpret PARs.
- The world model and history can even be represented as a group of PARs.
- General information about actions such as a baseline duration and required body resources can be assessed through uPARs in the Actionary.

PAR with Multiple Agents

- Coordination among agents could be done through perceptions of each other in the world.
- Previously message passing was used between agents in the PAR system.
- Types of communication
 - Dialog
 - Instructions
 - Alerts and Warnings