Grounding Language for Interactive Task Learning

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http://www.aclweb.org/anthology/W17-2801

Overview

Motivation

How does human processing work?
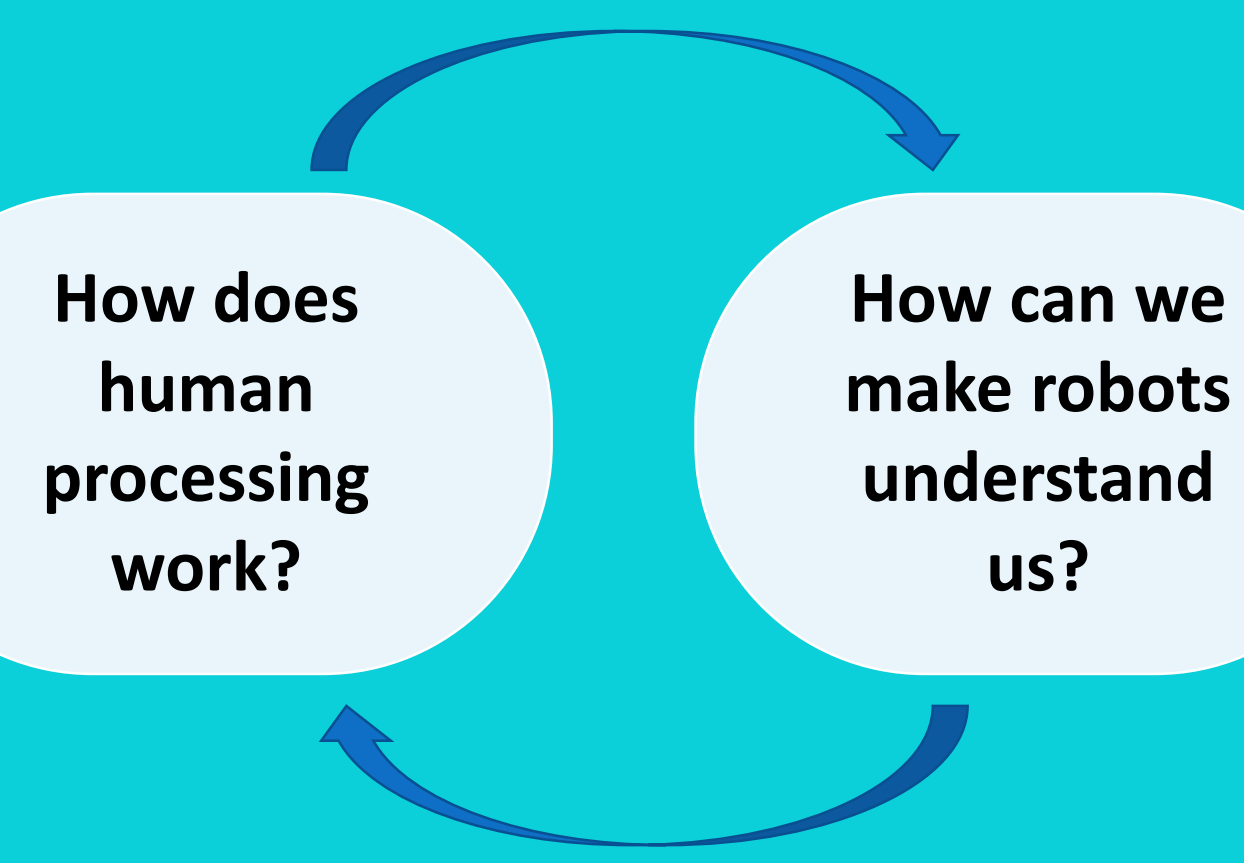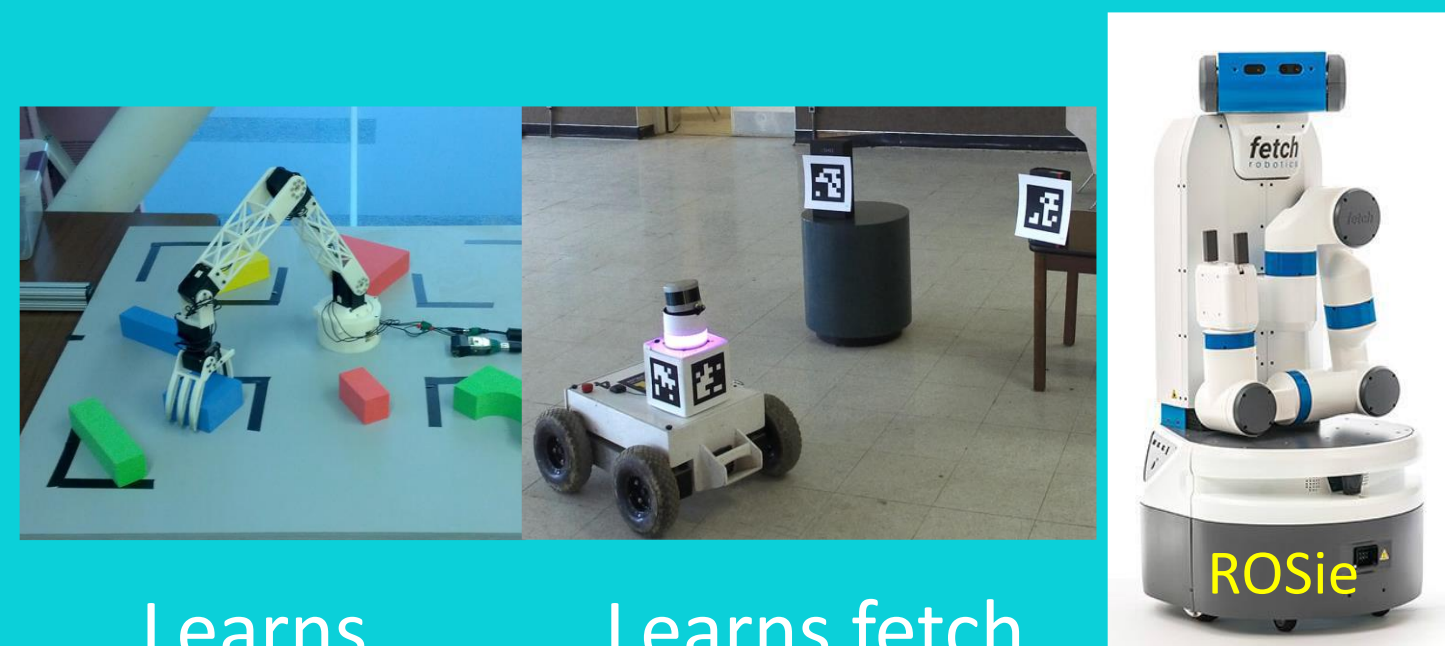
How can we make robots understand us?

Rosie

Learns games

Learns fetch and deliver tasks
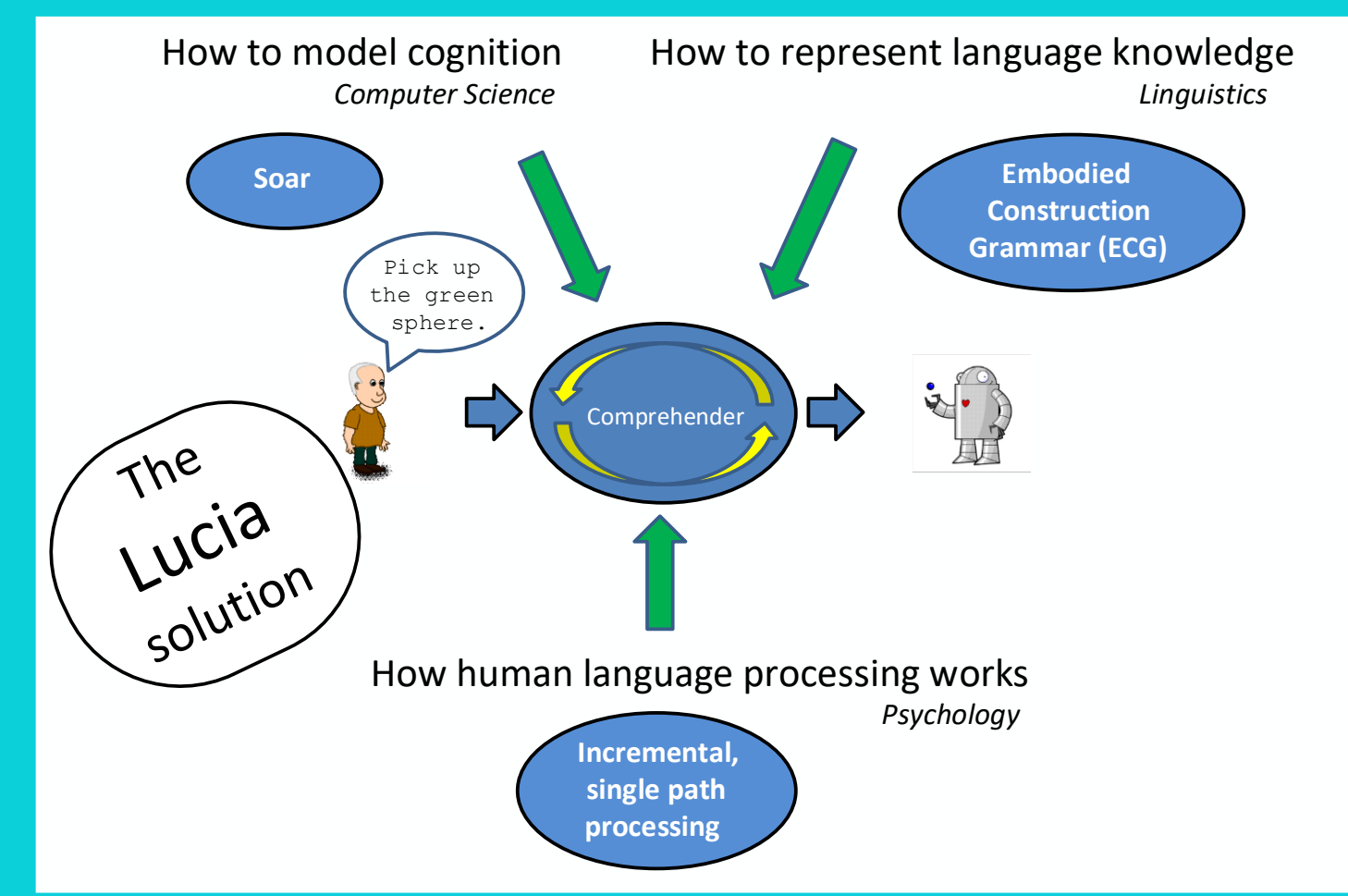
ROSie

Interactive Task Learning

Deliver the box to the main office.
What is the goal?
The goal is that the box is in the office.
What do I do next?
Pick up the box.
What do I do next?
Put down the box.
What do I do next?
You are done.

Fetch a stapler.
What is the goal?
The goal is that the stapler is in the starting location.
I cannot find the stapler. Can you help?
Recall the stapler in a location.
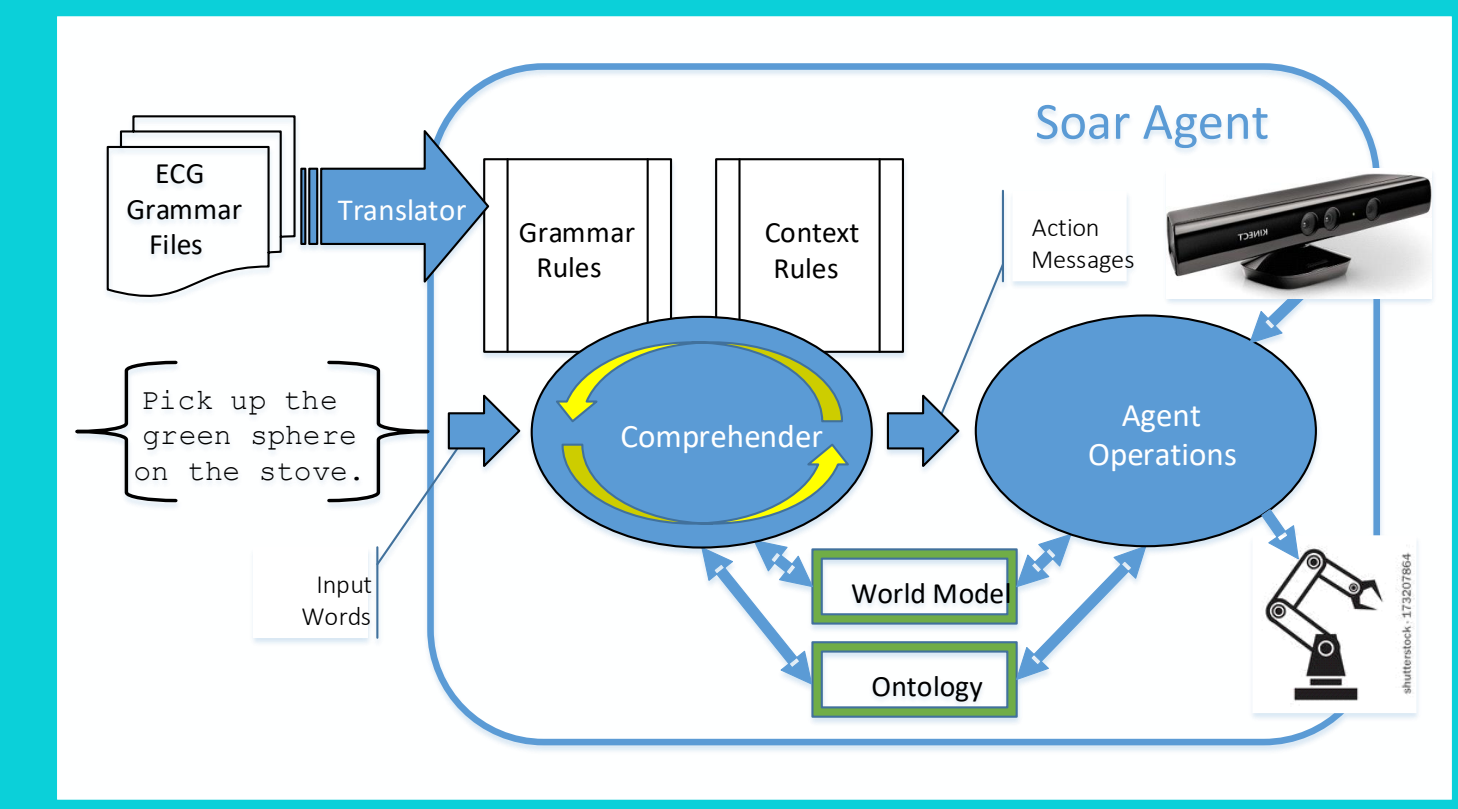(*Rosie goes to the location and brings the stapler back.*)

Deliver the package to Alice.
What is the goal?
The goal is that Alice is holding the package.
(Rosie picks up the package.)
I cannot find Alice. Can you help?
Think of an office for Alice.
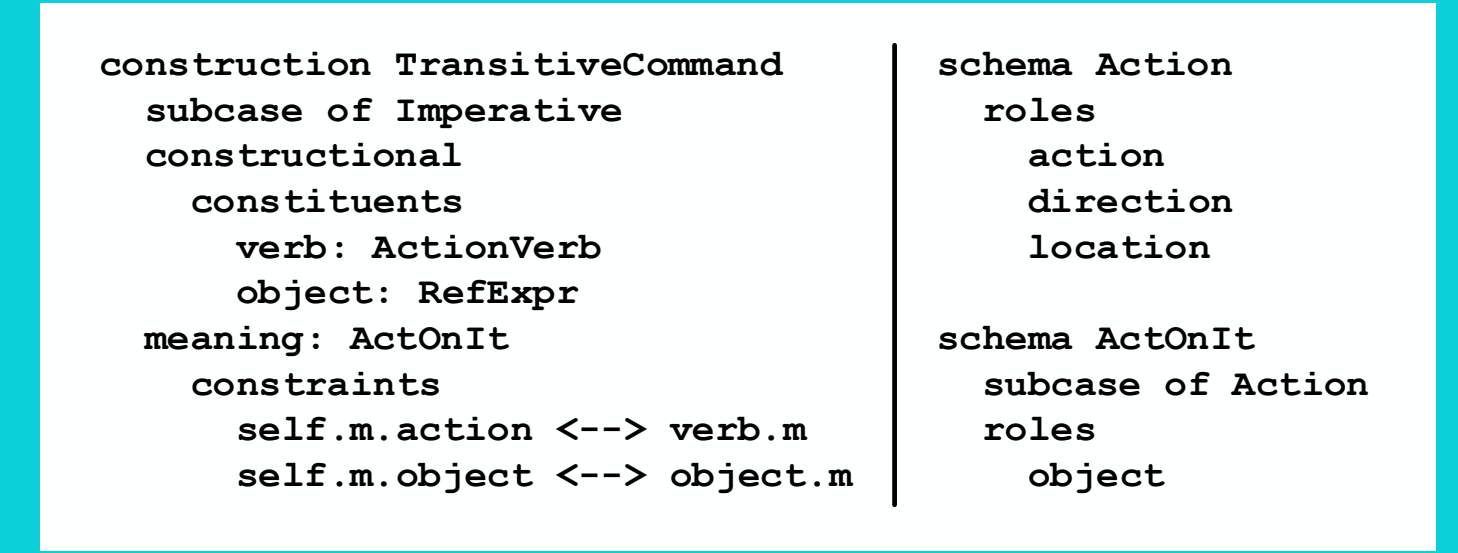(*Rosie goes to her office and gives her the package.*)
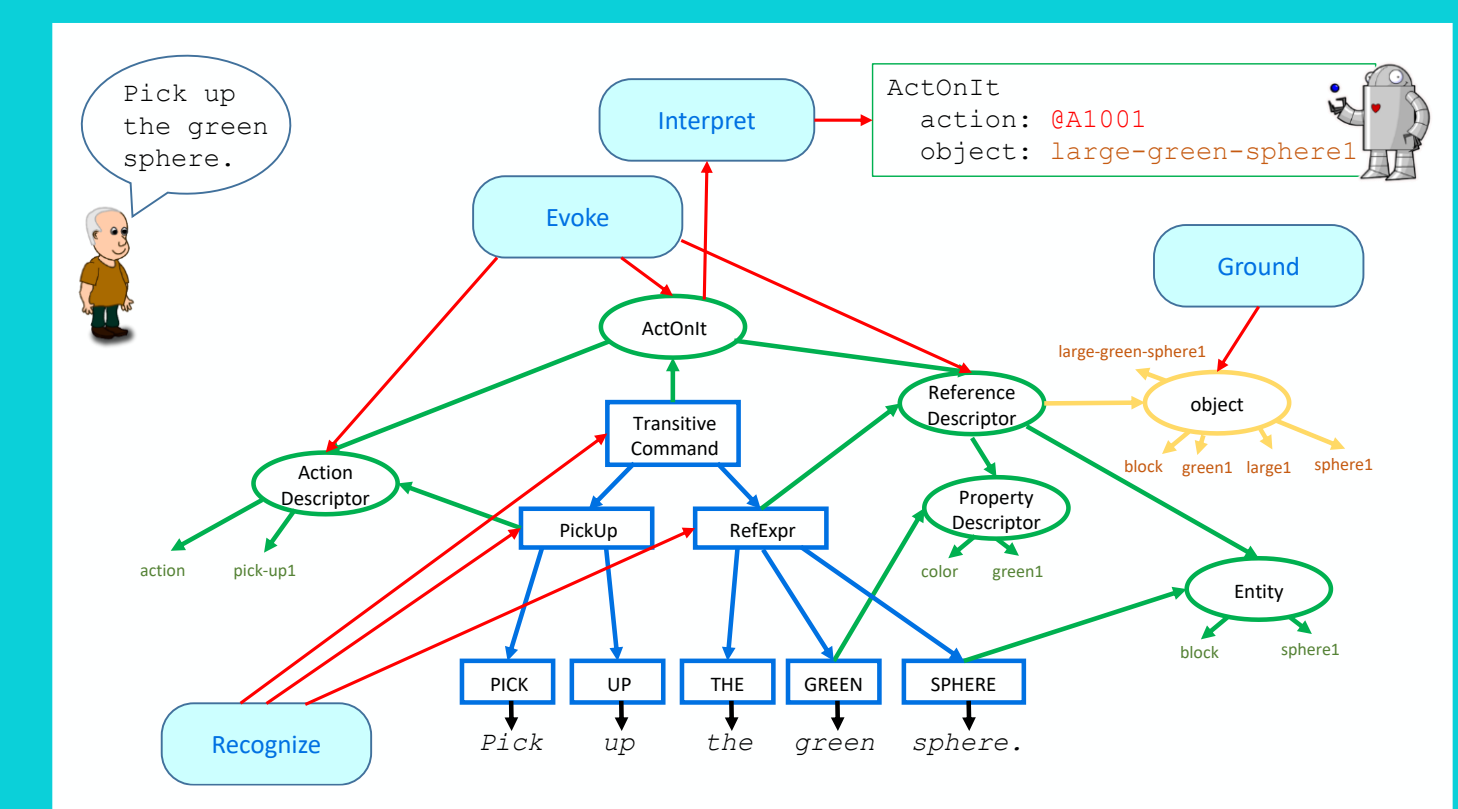
Lucia

Theoretical Background

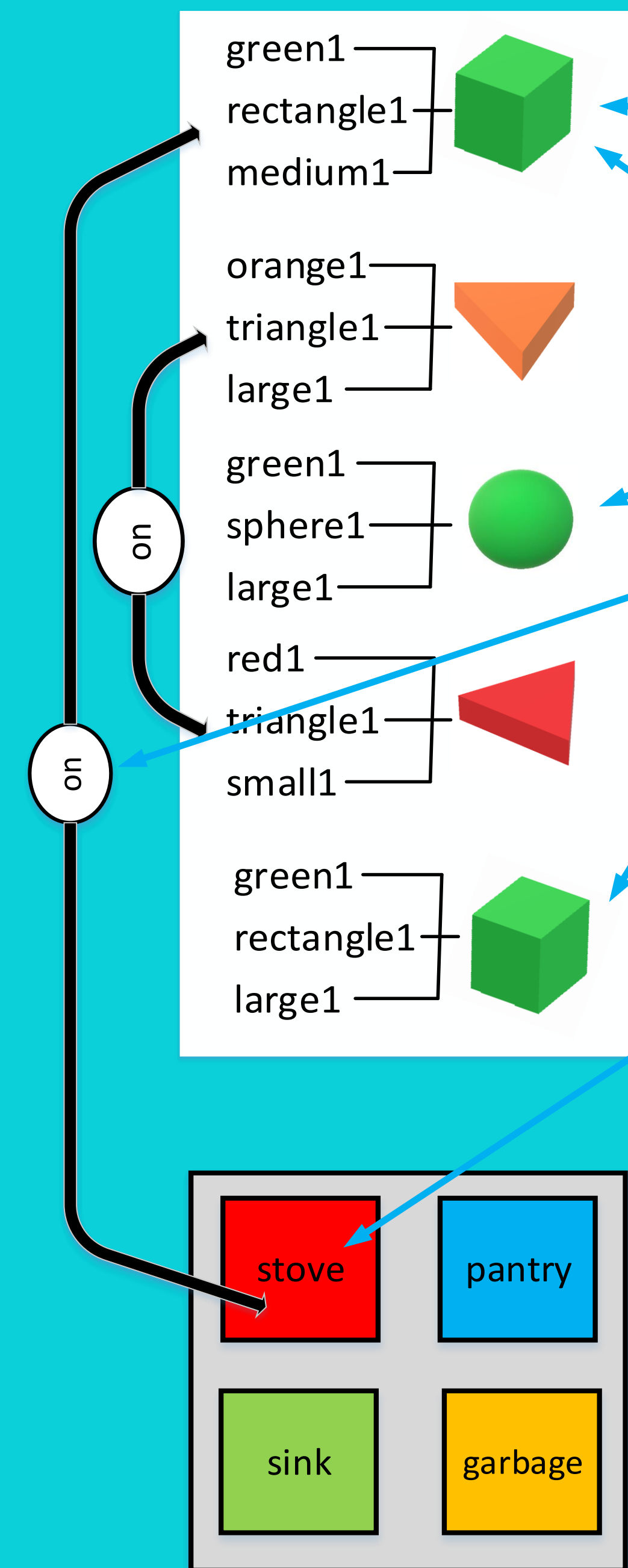### Agent Embedding

Embodied Construction Grammar (ECG)

```
construction TransitiveCommand       schema Action
  subcase of Imperative                roles
  constructional                         action
    constituents                         direction
      verb: ActionVerb                   location
      object: RefExpr
  meaning: ActOnIt                   schema ActOnIt
    constraints                        subcase of Action
      self.m.action <--> verb.m        roles
      self.m.object <--> object.m        object
```

Example Parse

Grounding

World Model

Comprehension State

Command
action: **initiate-pick-up1**
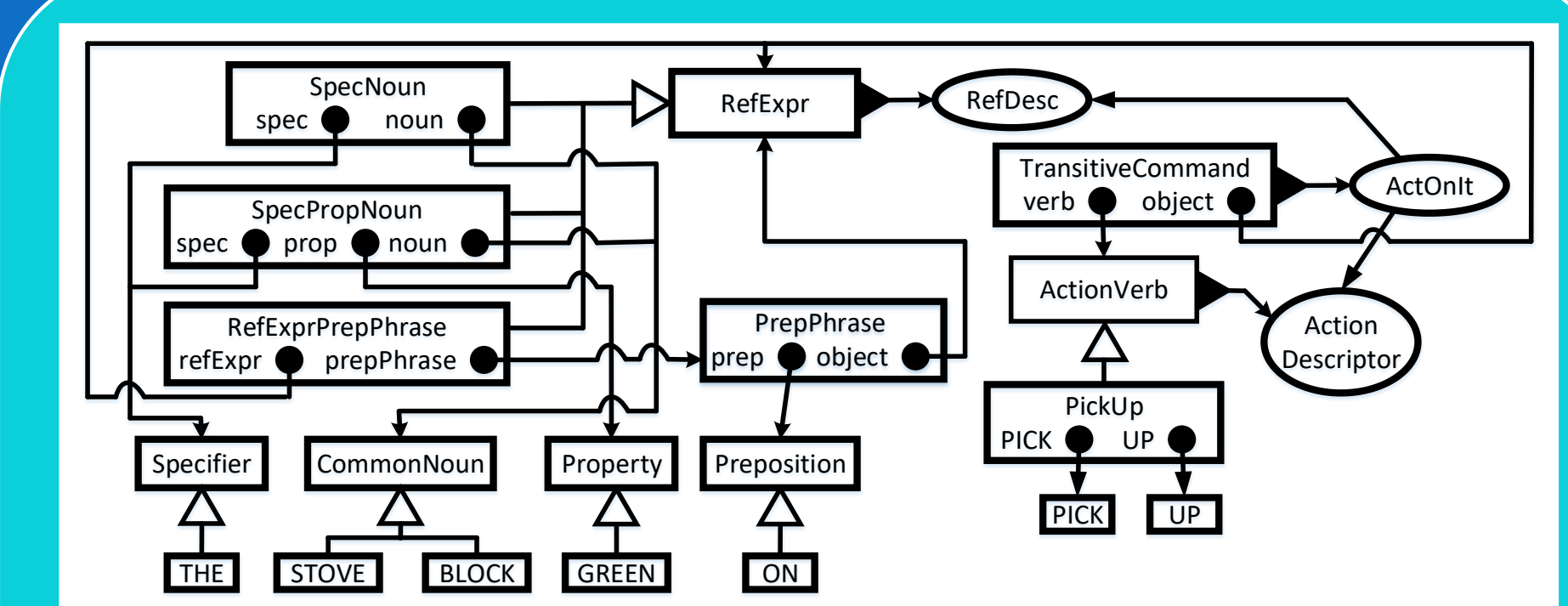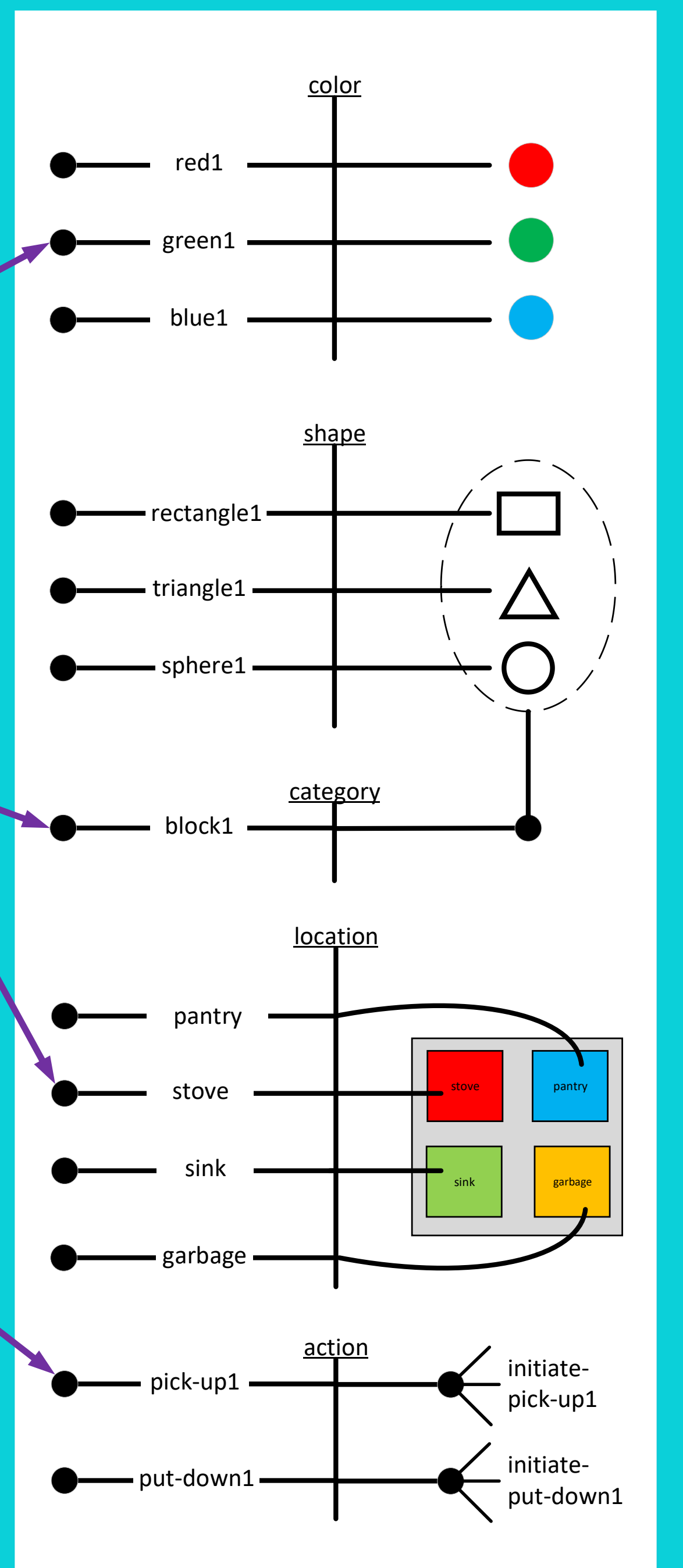object: **medium-green-rectangle1**

Pick up the green block on the stove.
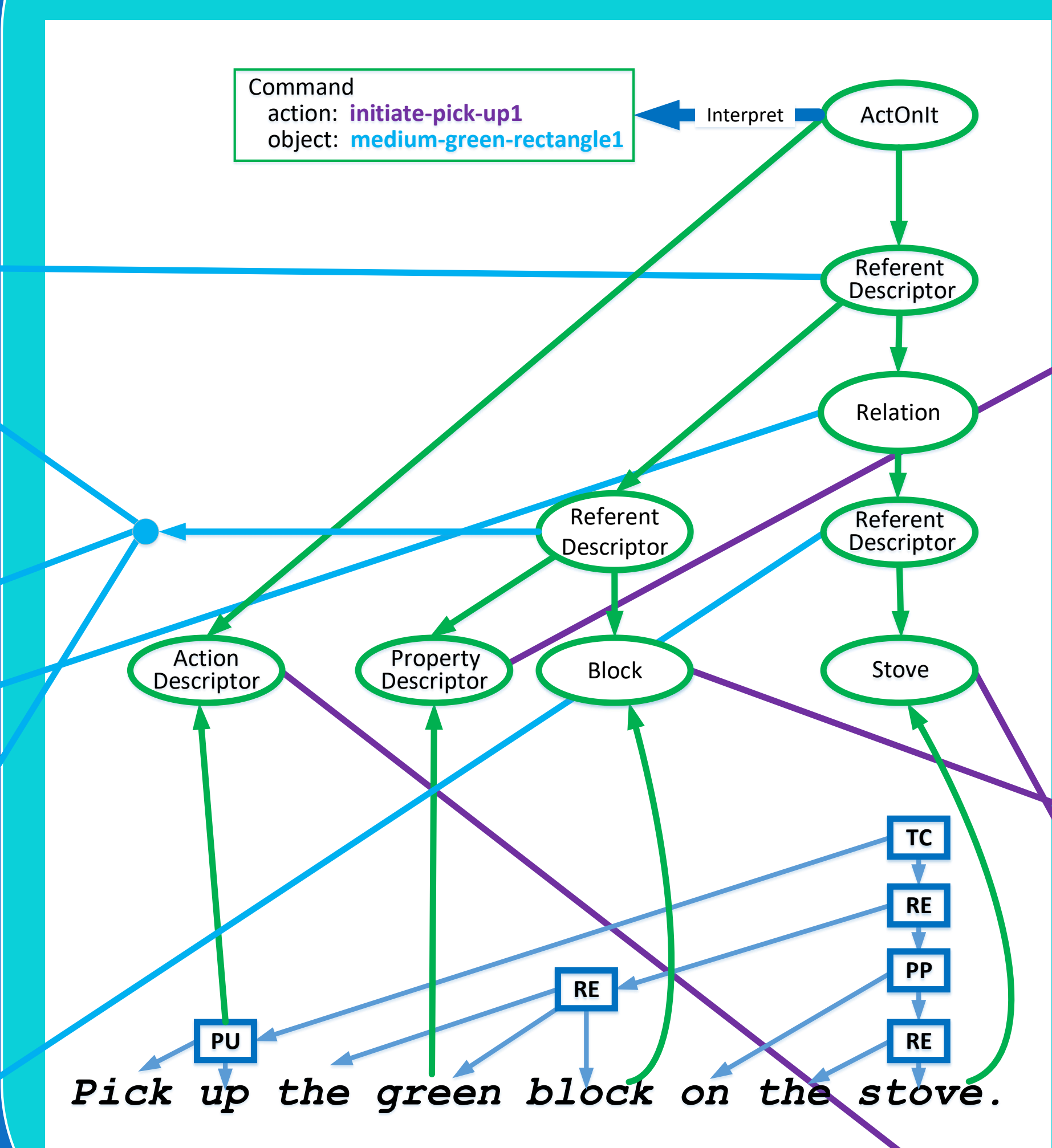
ECG Grammar

Ontology

Benchmark Samples

World Model

```
{"id":"obj-006",
 "handle":"large-green-sphere1",
 "item_type":"object",
 "properties":{
   "category":"block",
   "color":"green1",
   "shape":"sphere1",
   "size":"large1"}}
```

Ontology

```
"categories":[
  {"id":"category-001","handle":"block"},
  {"id":"category-002","handle":"location"},
  {"id":"category-003","handle":"object"}, …]
"colors":[
  {"id":"color-001","handle":"red1"},
  {"id":"color-002","handle":"orange1"},
  {"id":"color-003","handle":"yellow1"},
  {"id":"color-004","handle":"green1"},
  {"id":"color-005","handle":"blue1"}, …]
```

Gold Standard

```
{"id":"S-061",
 "text":"Pick up the green block on the stove.",
 "message":{
   "type":"command",
   "action":"action-006",
   "object":"obj-004"}}
```