

CSPB3202 Artificial Intelligence

Intelligent Agents

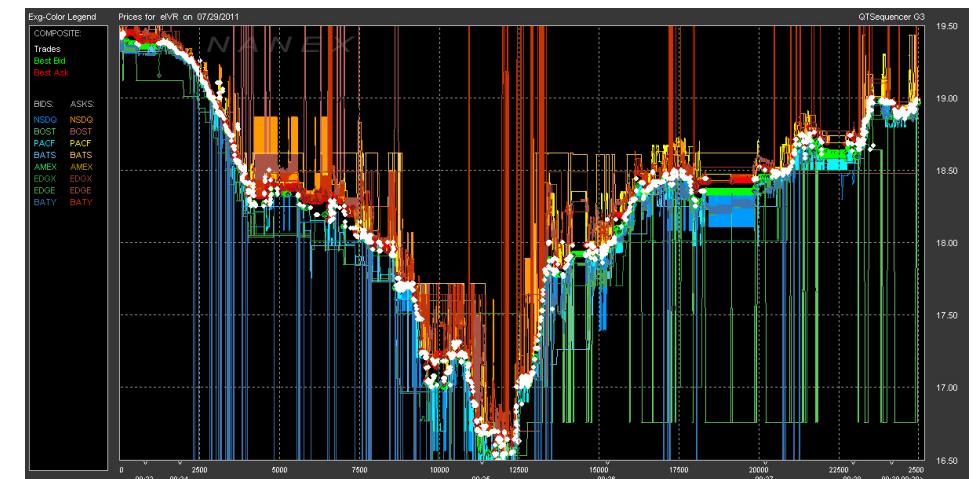
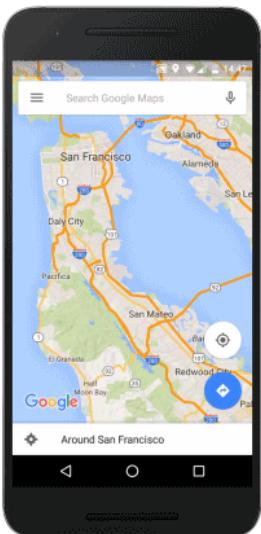
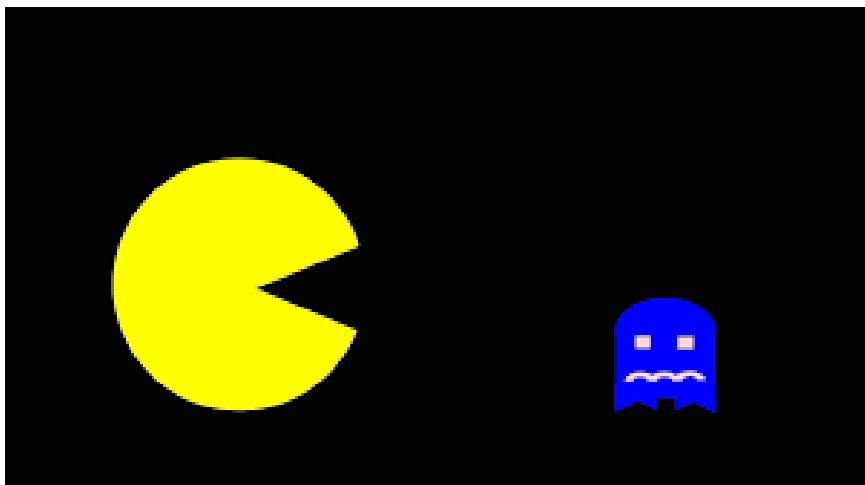


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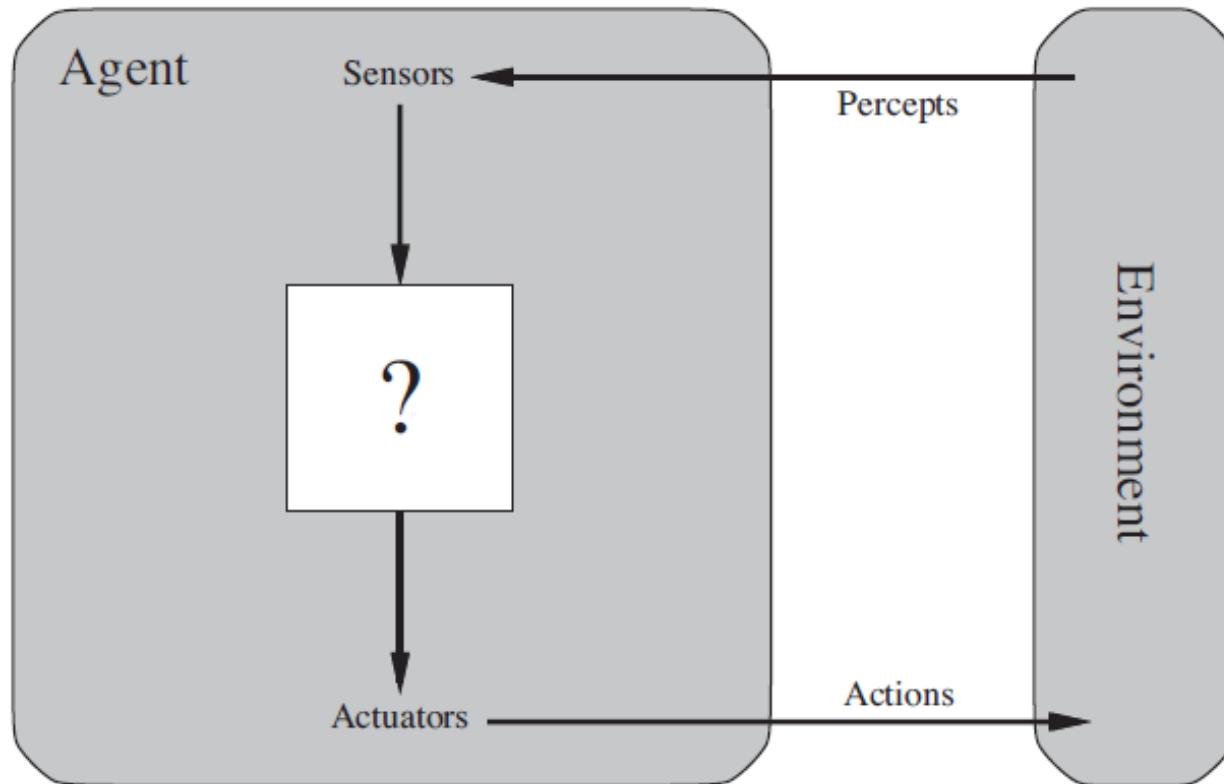
What is an Agent in AI?



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Rational Agent



A Rational Agent : Maximize its Performance Measure

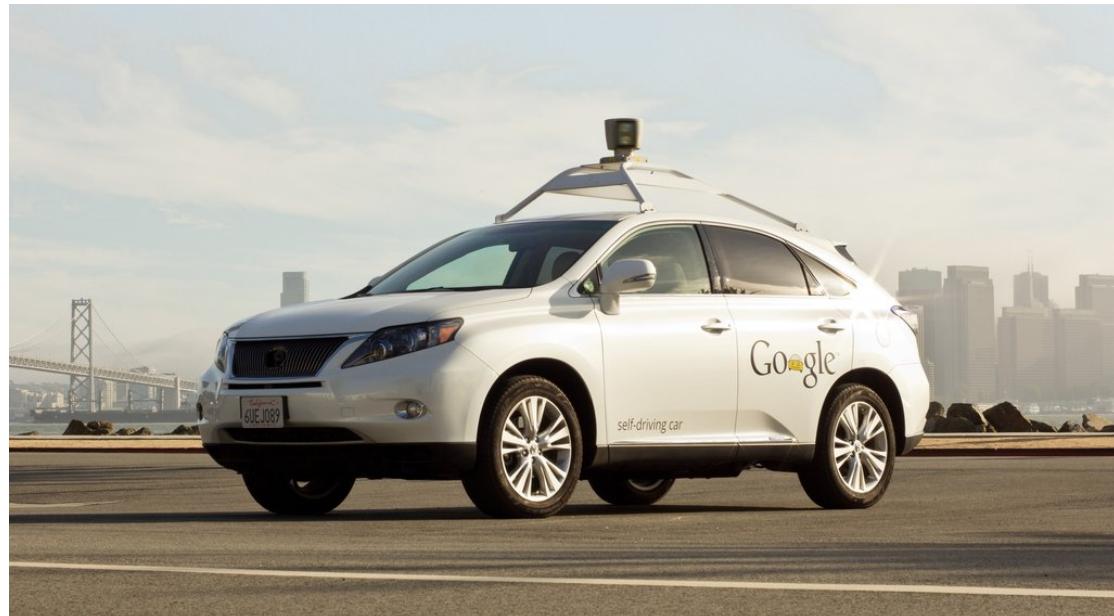


Rational Agent- Cleaning Robot



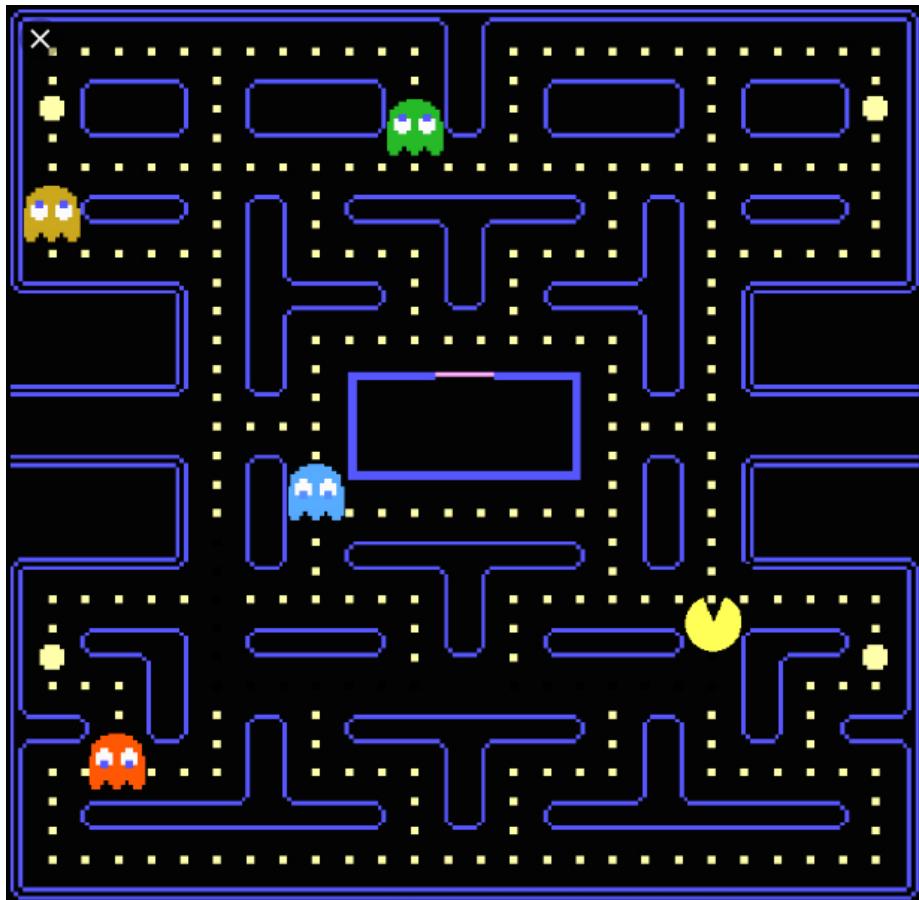
- Percept: Dust
- Actions: Suck, Move (L,R,U,D)
- Goal: Suck all the dust
- Reward: (+) dust collected
or (-) dust on the floor

Rational Agent- Self-Driving Car



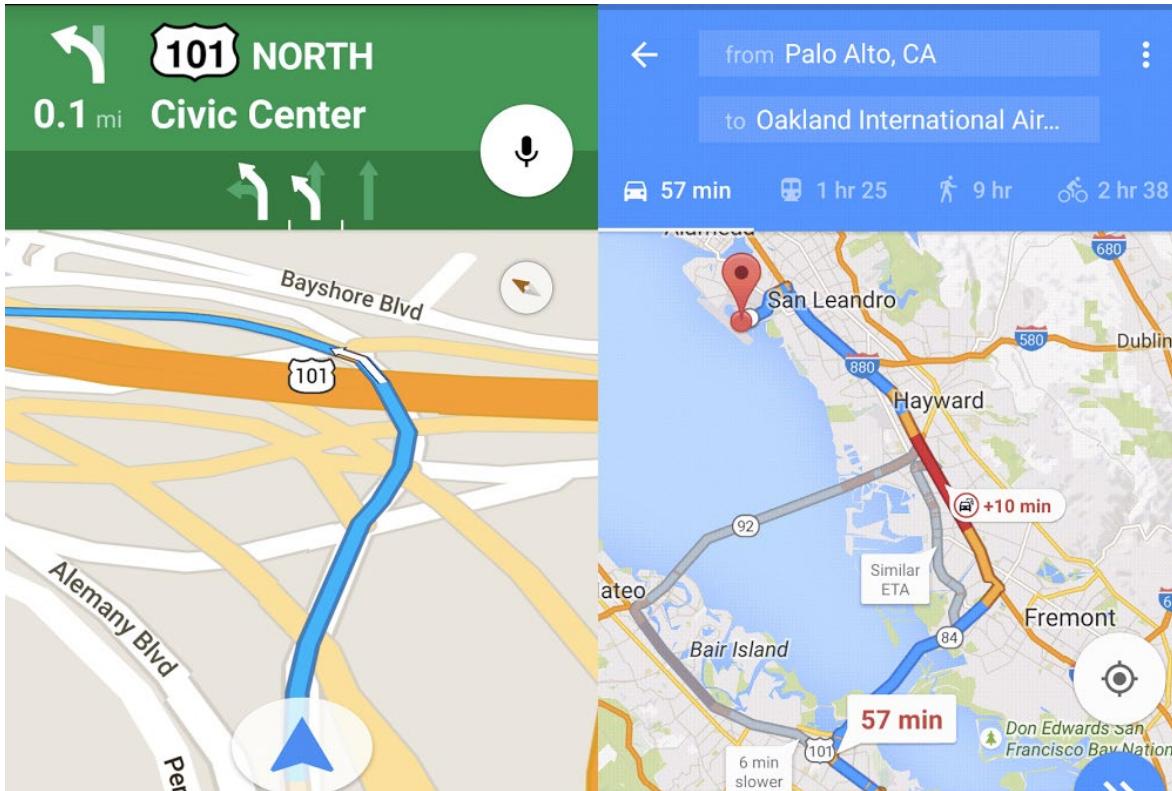
- Percept: Street scene (camera, LIDAR, etc)
- Actions: (continuous) accelerate, brake, steer, etc.
- Goal: To drive to the destination safely
- Reward: (-) time, (-) crash, (-) dangerous moves, (+) keep the traffic rules

Rational Agent- Pacman



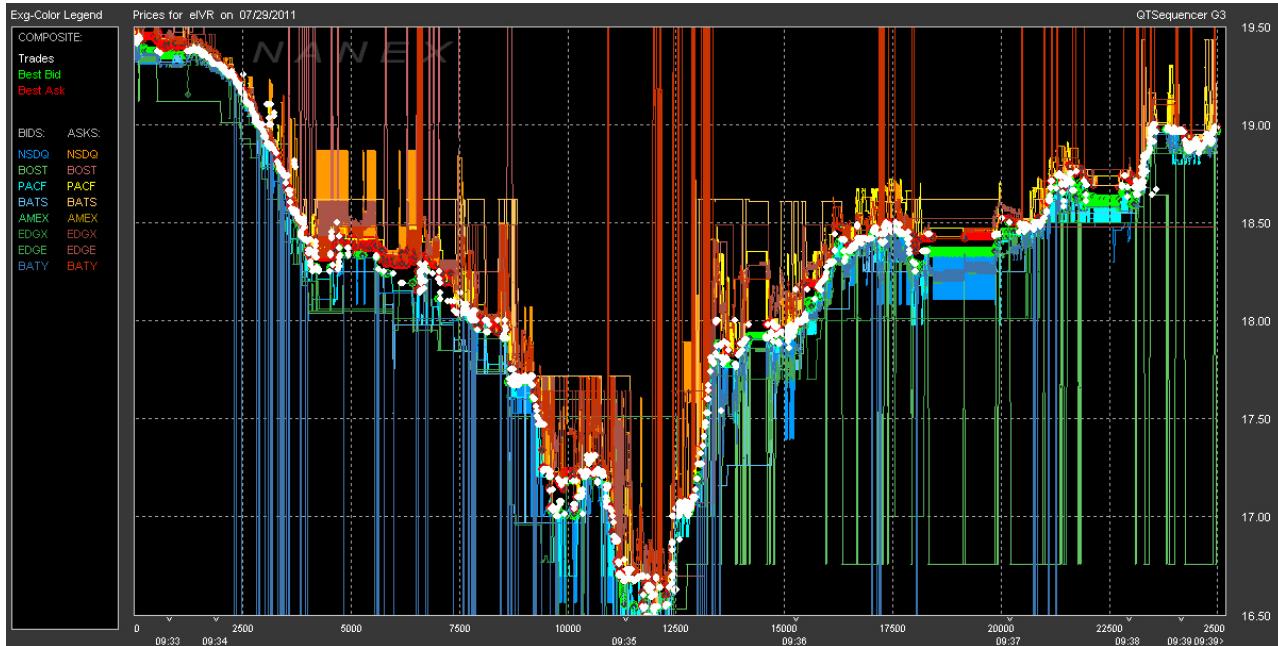
- Percept: dots, ghosts on the next sites
- Actions: Move (L,R,U,D)
- Goal: Eat all dots while avoiding ghosts
- Reward: (-) time, (+) points from eating dots

Rational Agent- GPS Navigation



- Percept: possible routes, congestion info
- Actions: route sequence
- Goal: Find the shortest path
- Reward: (-) the travel time

Rational Agent- Stock Trading Bot



- Percept: stock pricing
- Actions: Buy, Sell
- Goal: Maximize the profit
- Reward: (+)Profit, (-)Loss

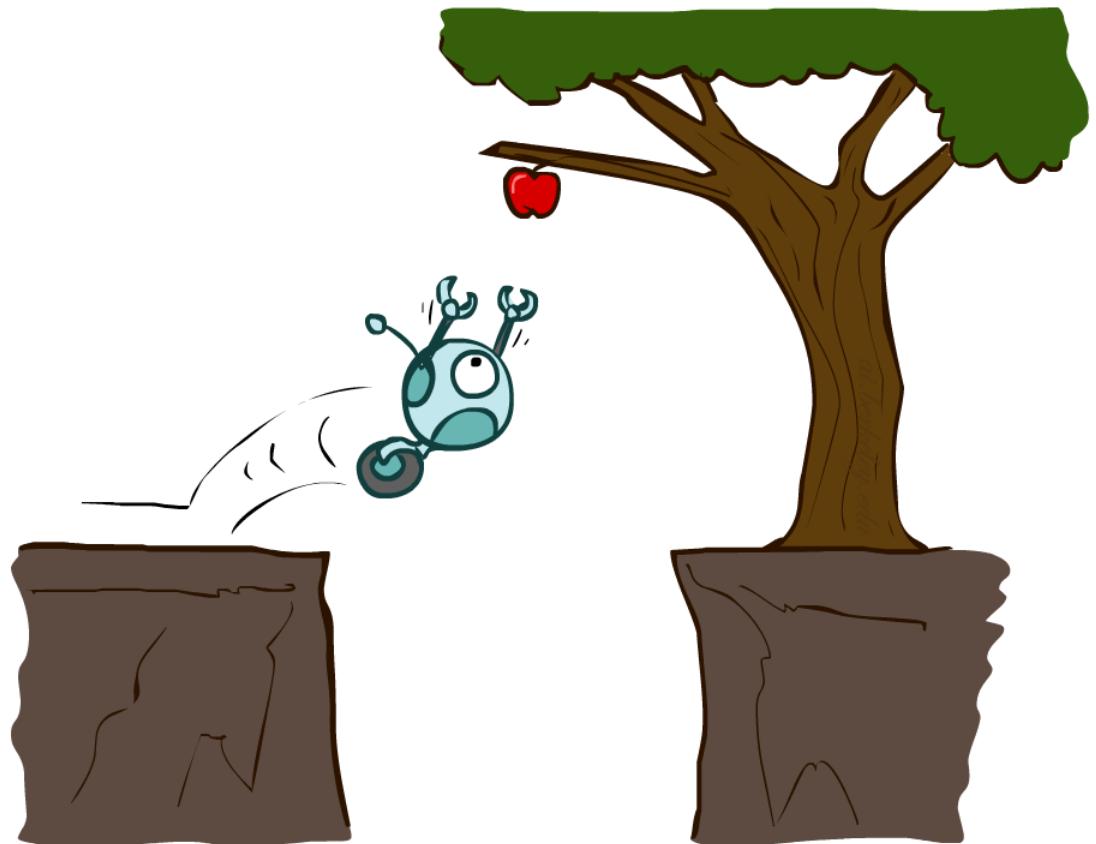
Rational Agent- Agent Smith



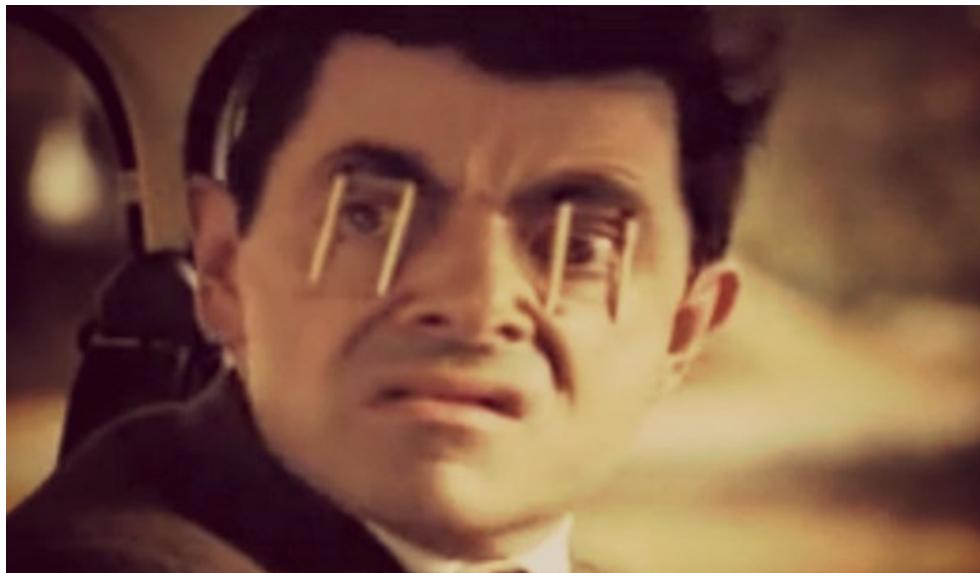
- Percept: anomalies in the Matrix system
- Actions: chase, attack
- Goal: Stop Neo's revolution (or kill him)
- Reward: (+) Neo's frustration or pain

Reflex Agents

- Reflex agents:
 - Choose action based on current percept (and maybe memory)
 - May have memory or a model of the world's current state
 - Do not consider the future consequences of their actions
 - Consider how the world IS
- Can a reflex agent be rational?



Reflex Agent as a Rational Agent



```
def eyereflex():
    while not Sleeping:
        eyelid_open()
        if insect_flying_to_eyes:
            eyelid_close()
```

Pitfalls of a reflex agent

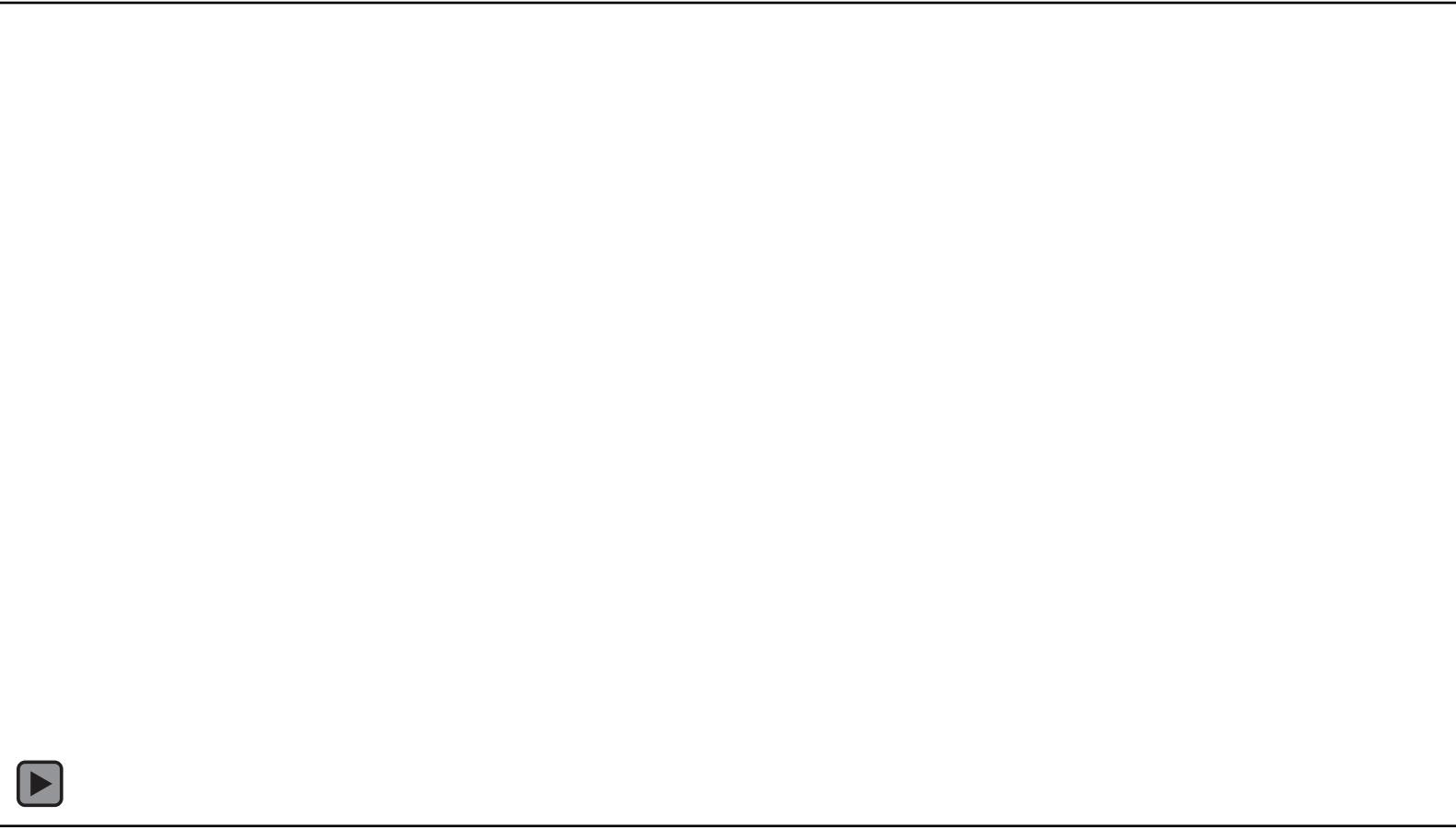
```
def sphex():
    while True:
        look_for_insect()
        if found_insect==True:
            bring_to_nest_entrance()
            check_the_nest()
            if insect_still_there:
                bring_the_insect_into_nest()
                lay_eggs()
                break
            else:
                continue
        else:
            continue

    return "Success"
```



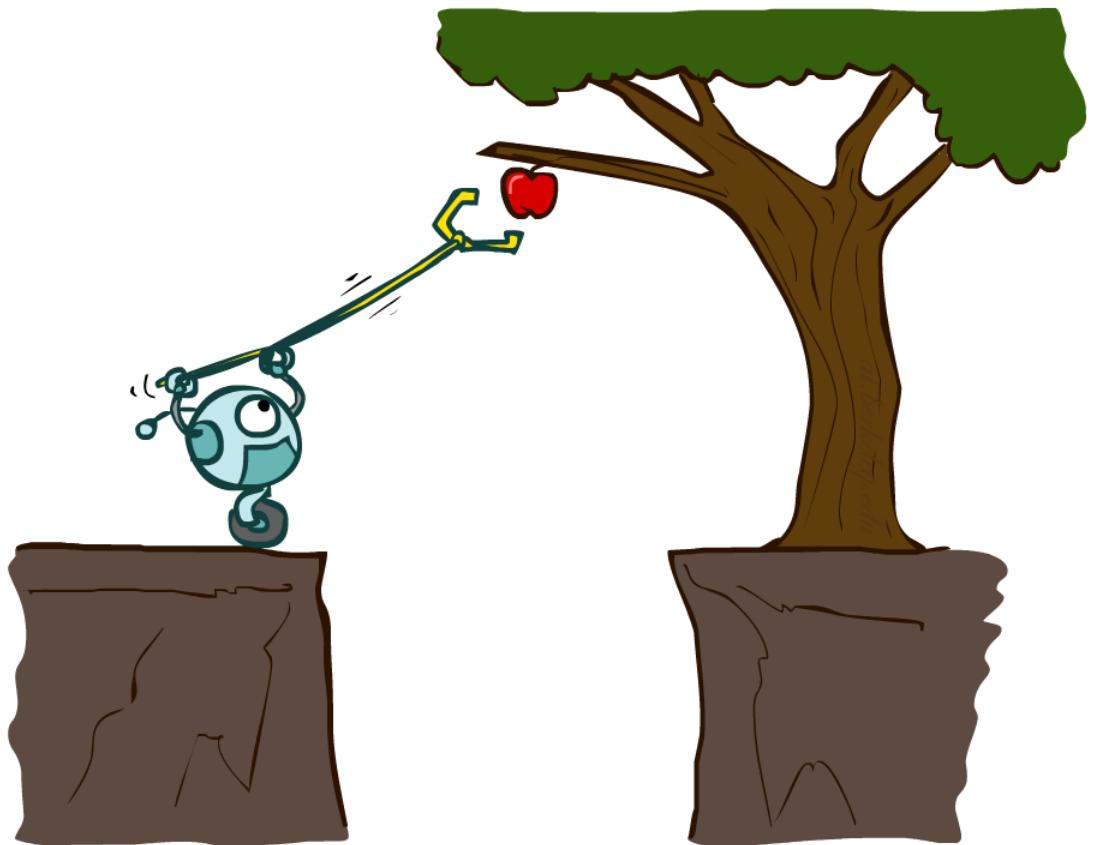
https://youtu.be/YNvi_j2z96w

Is it bad?



Planning Agents

- Planning agents:
 - Ask “what if”
 - Decisions based on (hypothesized) consequences of actions
 - Must have a model of how the world evolves in response to actions
 - Must formulate a goal (test)
 - Consider how the world **WOULD BE**



Nature of Environments: Why do we care?

- Sensor: Fully Observable vs. Partially Observable
- Agent: Single Agent vs. Multi-Agent
- State: Deterministic vs. Stochastic
- Task: Episodic vs. Sequential
- Environment: Static vs. Dynamic
- Time: Discrete vs. Continuous