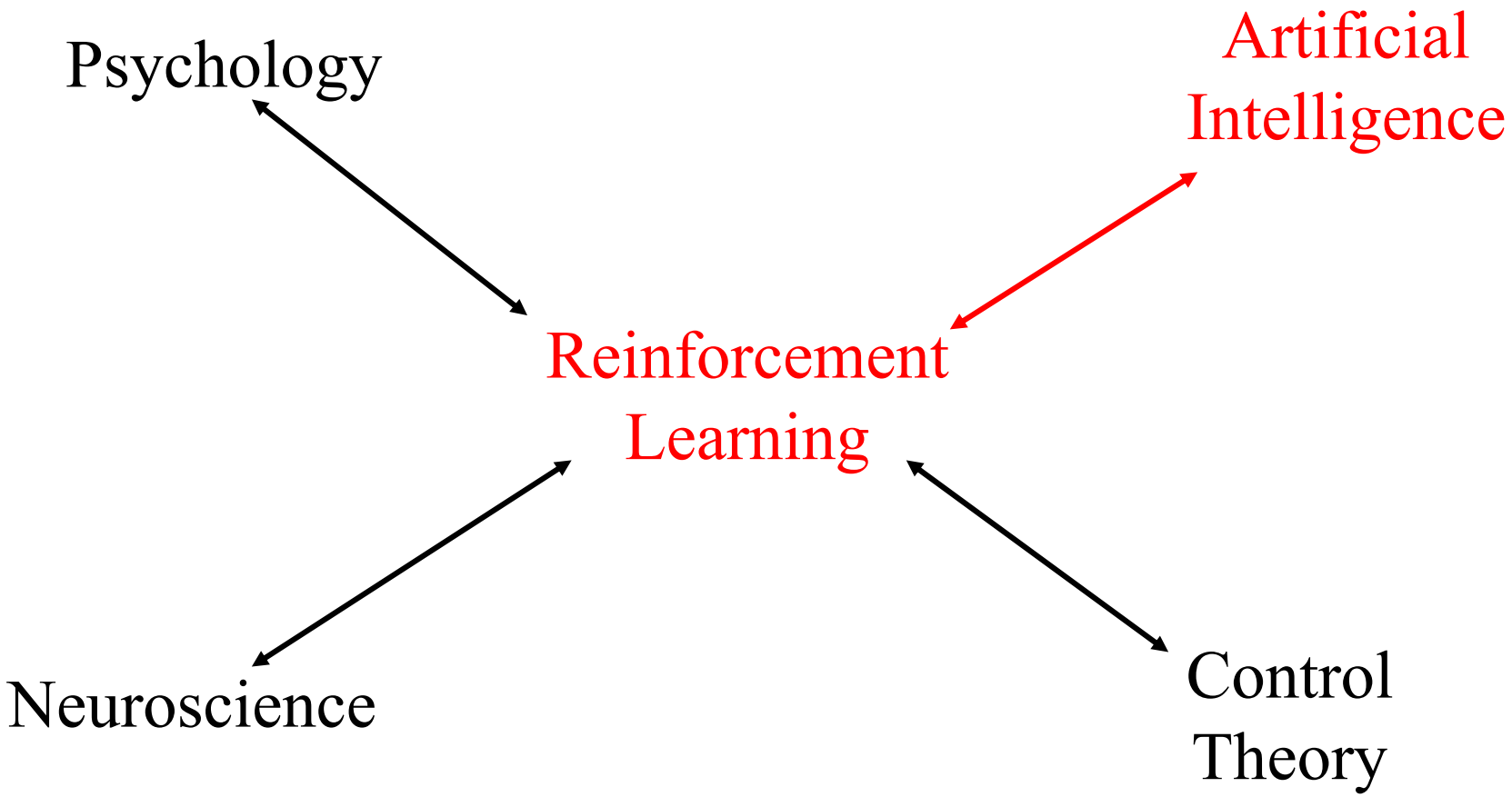
Machine Learning

Lecture 16
Application of RL
Based on lecture of Rich Sutton,
Department of Computing Science
University of Alberta.
“Toward a Computational Theory of Intelligence”

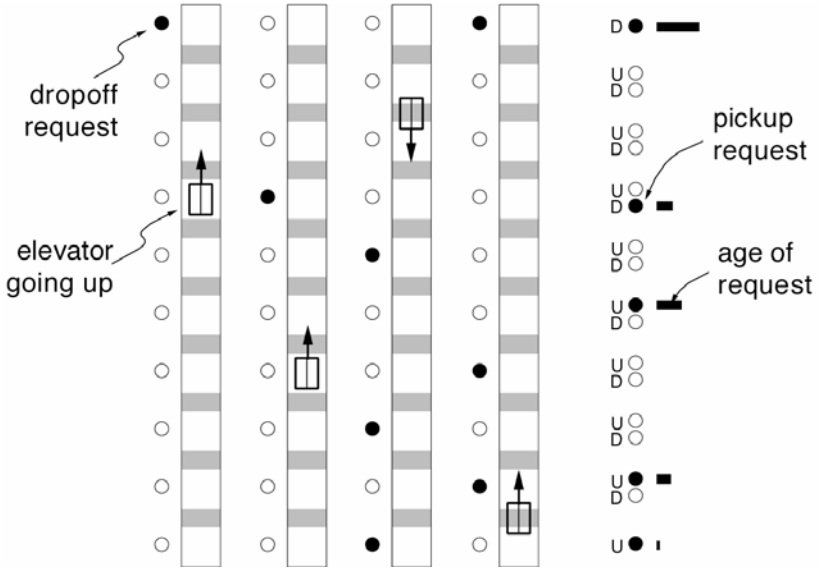
Bidirectional Influences



“Autonomous helicopter flight via Reinforcement Learning”
Ng (Stanford), Kim, Jordan, & Sastry (UC Berkeley)
2004

Elevator Controller

Consider a 10-story building with 4 elevators,
and everybody trying to go home at the end of the day



$\approx 10^{22}$ states

Where should the elevators go,
moment by moment,
to minimize squared waiting time?

What if the pattern of requests
changes?

Methods can be tested (and learned)
from *simulated* experience

RL controller performs better than best known commercial
and research controllers. Crites & Barto (Univ. of Massachusetts) 1996

RL is applicable anywhere a *sequence* of actions must be taken to achieve a *measurable* goal

A very wide range of application

Some suitable application areas

- Process control
- Inventory management
- Marketing
- Portfolio management
- Logistics
- User interfaces
- Queue/server control
- Robotics

Why RL is so popular and perspective?

- Most similar learning of animals and human
- Based on leaning by sequences of states and actions
- Oriented on unknown or partially unknown environment and interaction with it
- So may be basis for development of General Intelligence in particular for robots