Reinforcement Learning (INF11010)

Lecture 1: Introduction

Pavlos Andreadis, January 16th 2018

Course Details

- Tuesday and Friday 12:10-13:00, Teviot Lecture Theatre

- Webpage: http://www.inf.ed.ac.uk/teaching/courses/rl/

- Piazza: https://piazza.com/ed.ac.uk/spring2018/infr11010

- Email: *Pavlos.Andreadis@ed.ac.uk*

- Office Hours (subject to change/extension): Friday 14:00 – 17:00, Appleton Tower, Room 3.06

Assessment

- Homework 1 (10%) - available February 6th, due March 2nd

- Homework 2 (10%) - available March 6th, due March 30th

- Final Exam (80%)

- Homework will focus on:
    - Problem Comprehension, Modelling
    - Algorithmic Comprehension, Implementation

- Exams will be similar, but with a little more theory

Course Content

- Markov Chains; Markov Decision Processes (MDPs); Multi-Arm Bandits; Partially Observable MDPs (POMDPs)

- Policy and Value Iteration; Monte Carlo Methods; Temporal Difference Methods

- Function Approximation; Multi-agent RL; Inverse RL
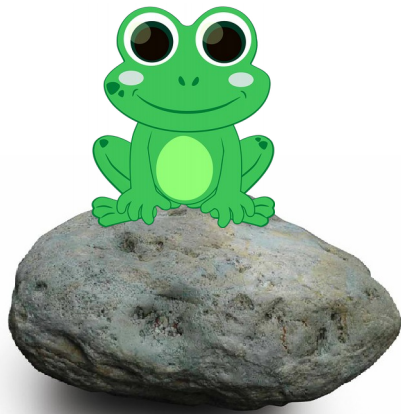
- ...

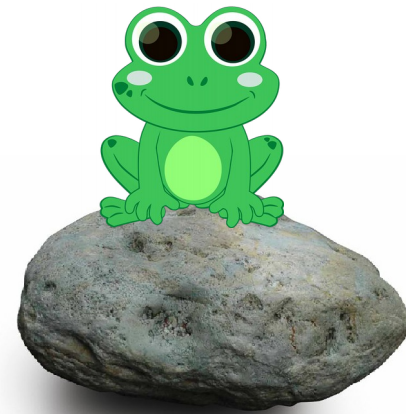# What is Reinforcement Learning?
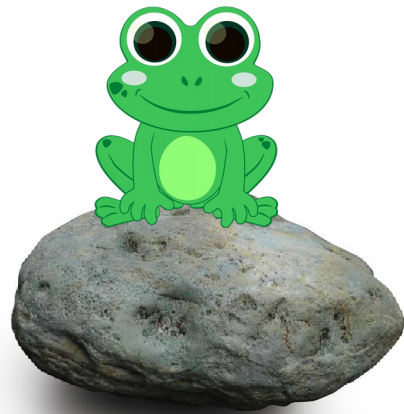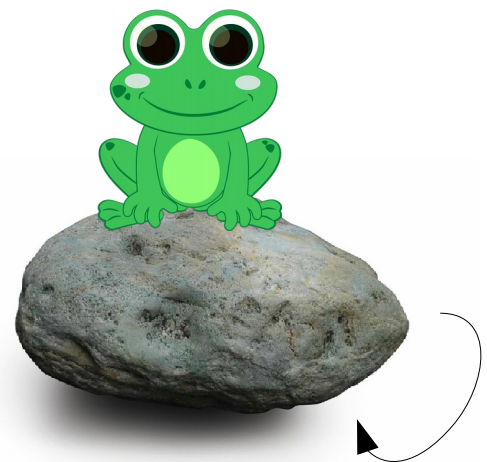
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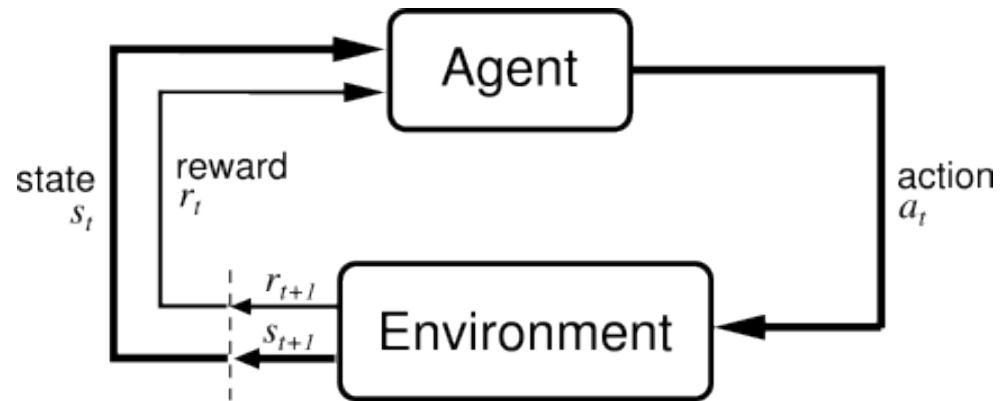
a Frog on a Stone

s_1

a Frog on a Stone

s_2

a Frog on a Stone

s_1

s_2

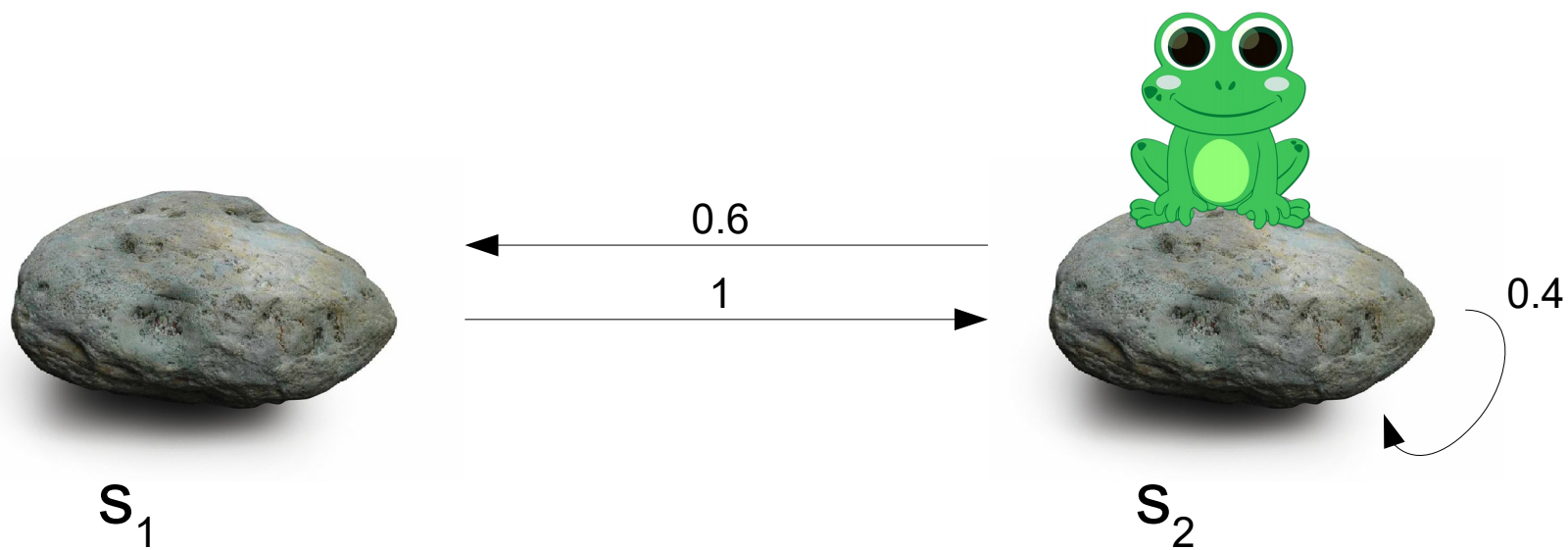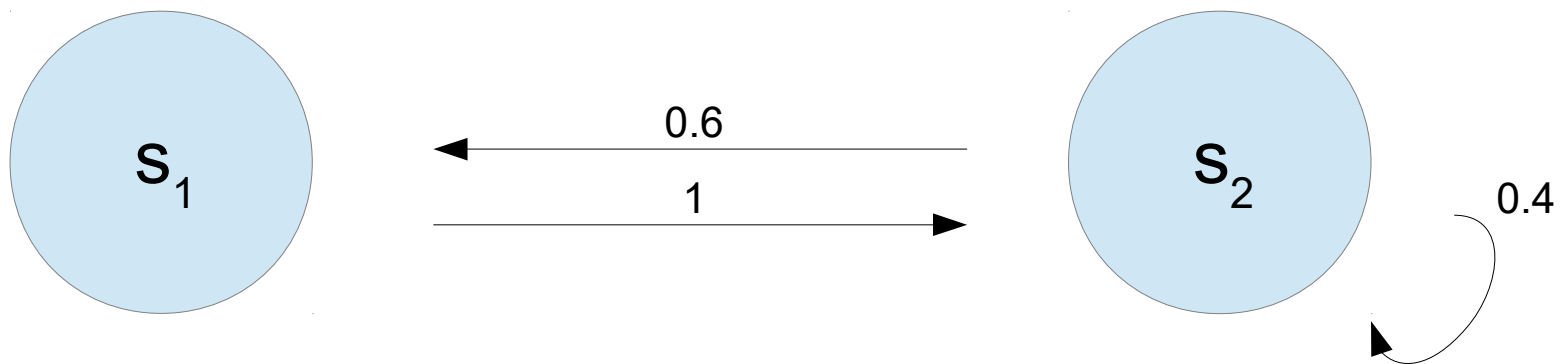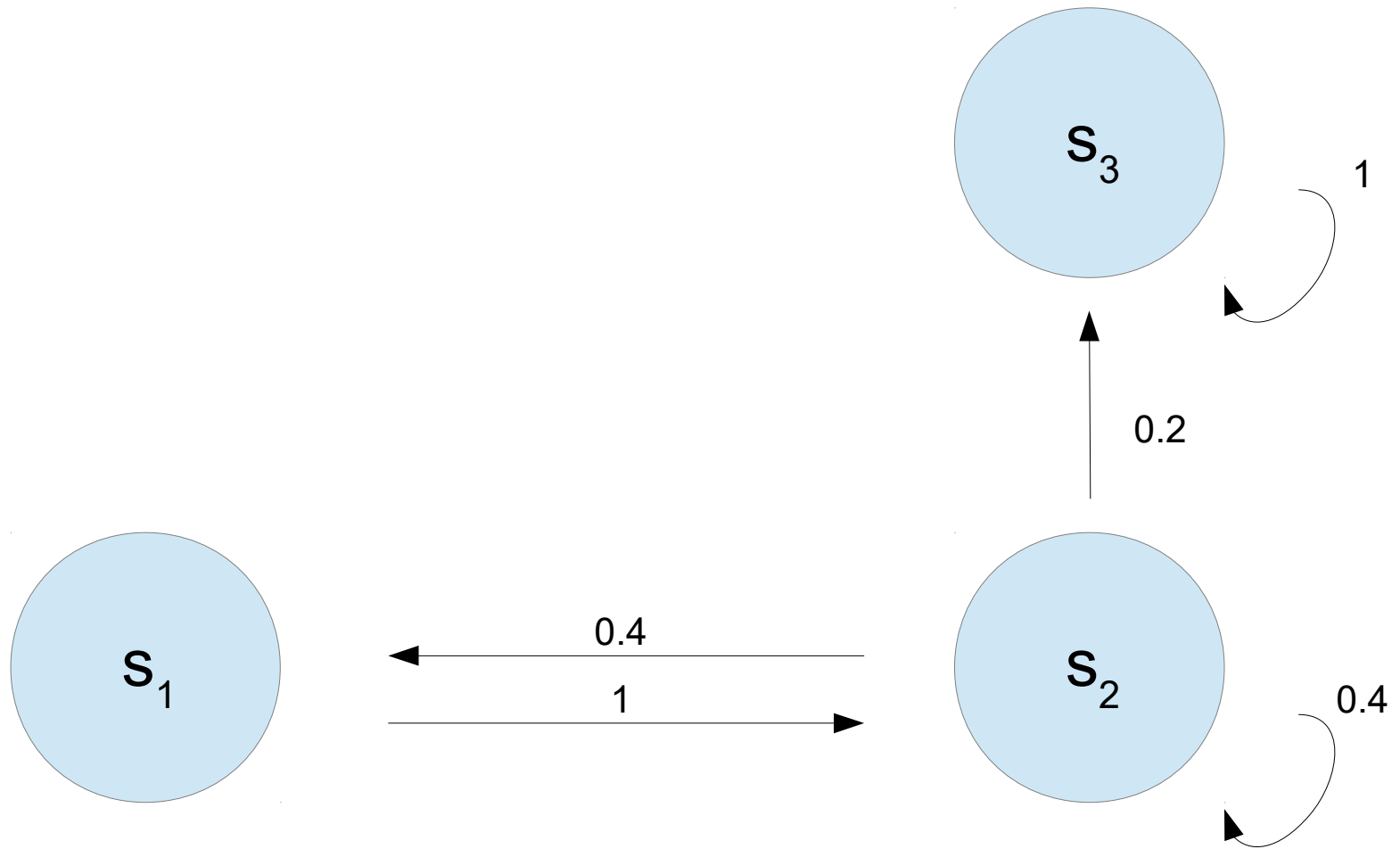# a Frog on a Stone

s_1 s_2

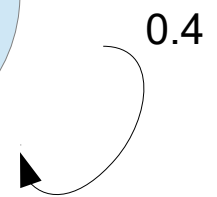# a Frog on a Stone

s_1

s_2

a Frog on a Stone

a Markov Chain

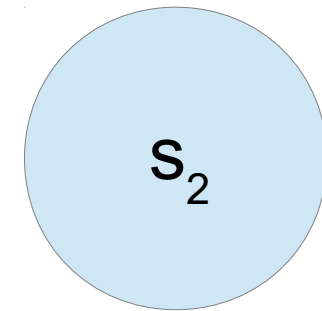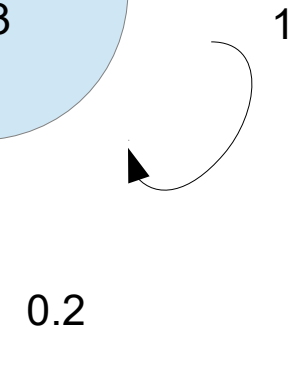s_1 $\xleftarrow{\quad 0.6 \quad}$ s_2
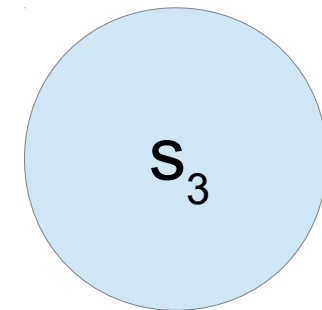
s_1 $\xrightarrow{\quad 1 \quad}$ s_2 $\quad 0.4$

a Markov Chain (absorbing state)

a Markov Chain (stochastic matrix)

from \ to	S_1	S_2	S_3
S_1	0	1	0
S_2	0.4	0.4	0.2
S_3	0	0	1
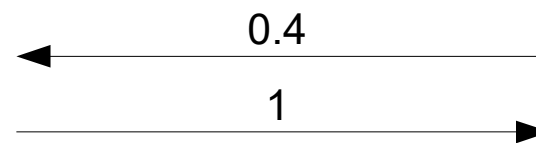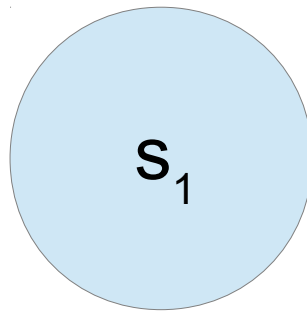
an MDP ...
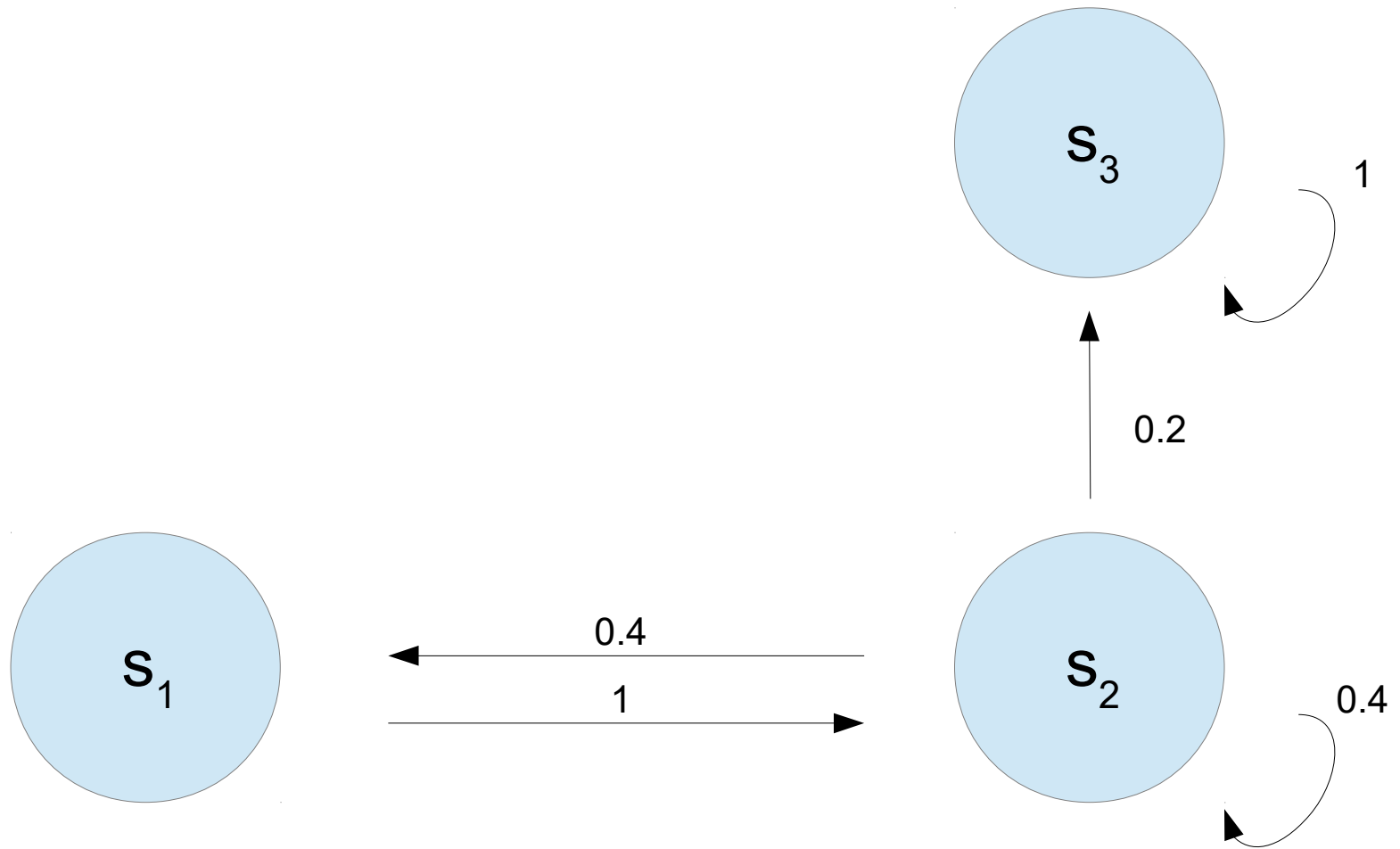
an MDP
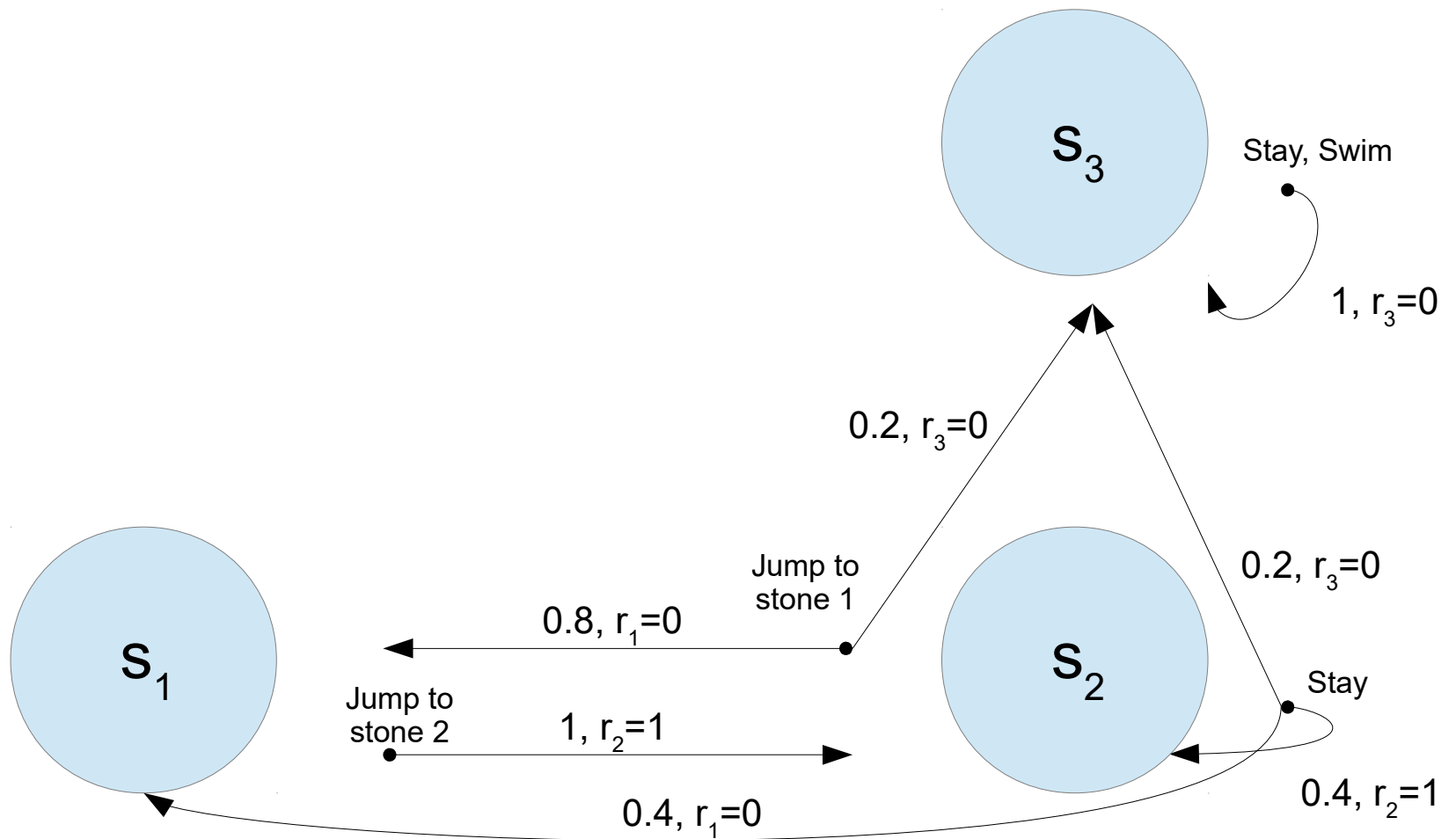
Reading

- For an *Introduction* → Chapter 1 of Sutton and Barto
  http://incompleteideas.net/book/ebook/the-book.html

    Optional:

- For *Markov Chains* → Section 17.2 of Kevin Murphy, Machine
  Learning: a Probabilistic Perspective
  https://www.ed.ac.uk/information-services/library-museum-gallery

a Frog on a Rock