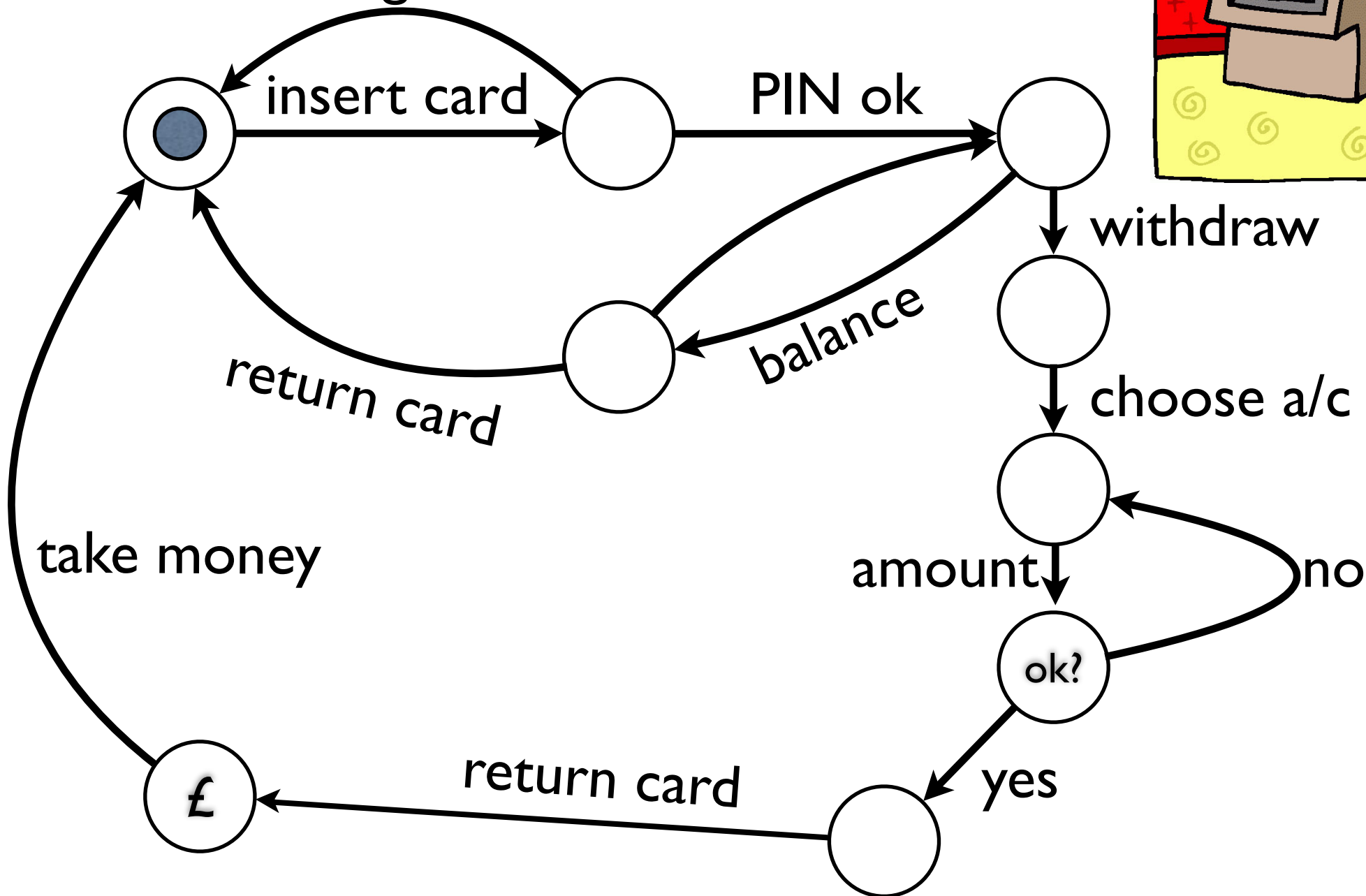


Finite-State Machines (Automata) lecture 13

cl

- a simple form of computation
- used widely
- one way to find patterns
- with thanks to Gérard Berry

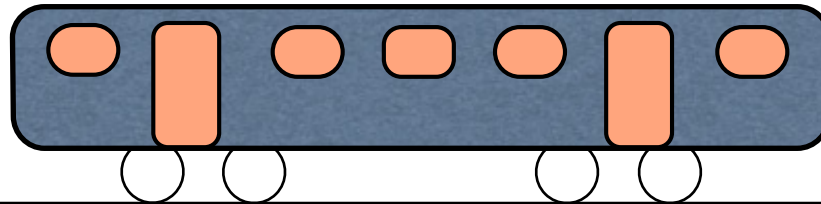
ATM





Counting trains

A

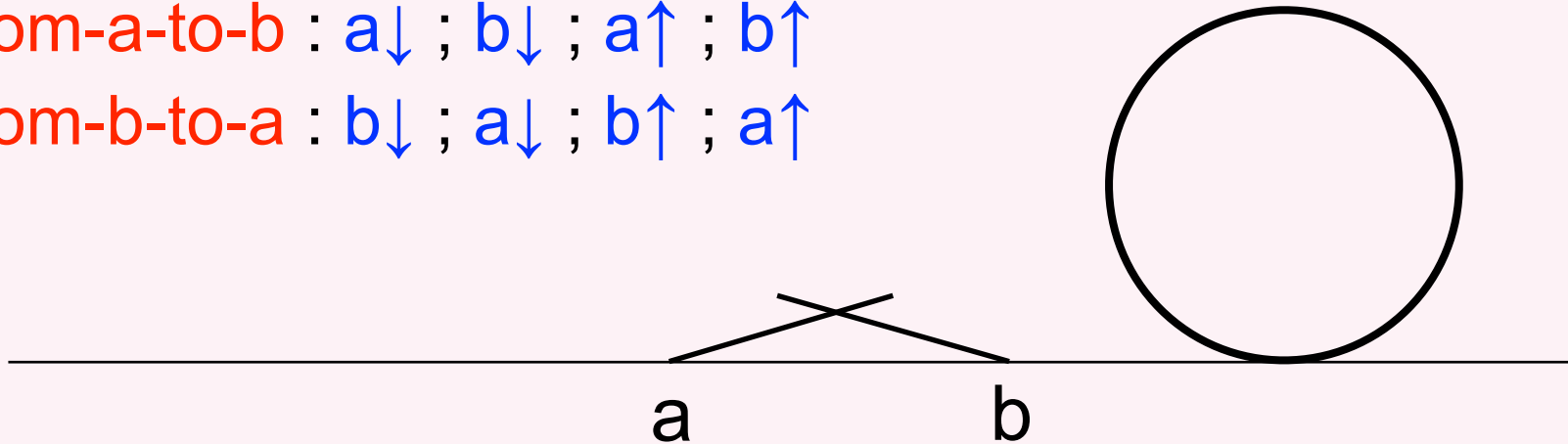


B

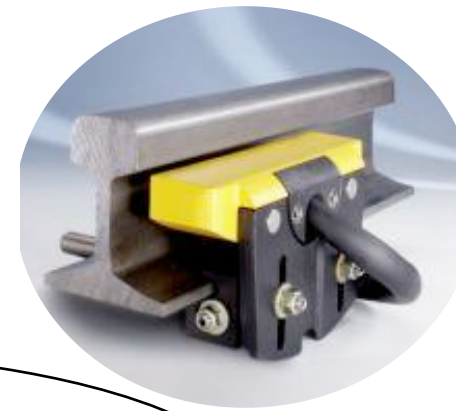
axle sensor (detects passing wheels)

from-a-to-b : $a \downarrow$; $b \downarrow$; $a \uparrow$; $b \uparrow$

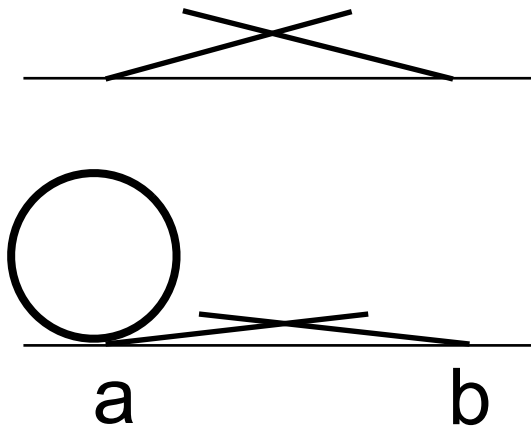
from-b-to-a : $b \downarrow$; $a \downarrow$; $b \uparrow$; $a \uparrow$



Finite-state machines



axle sensor

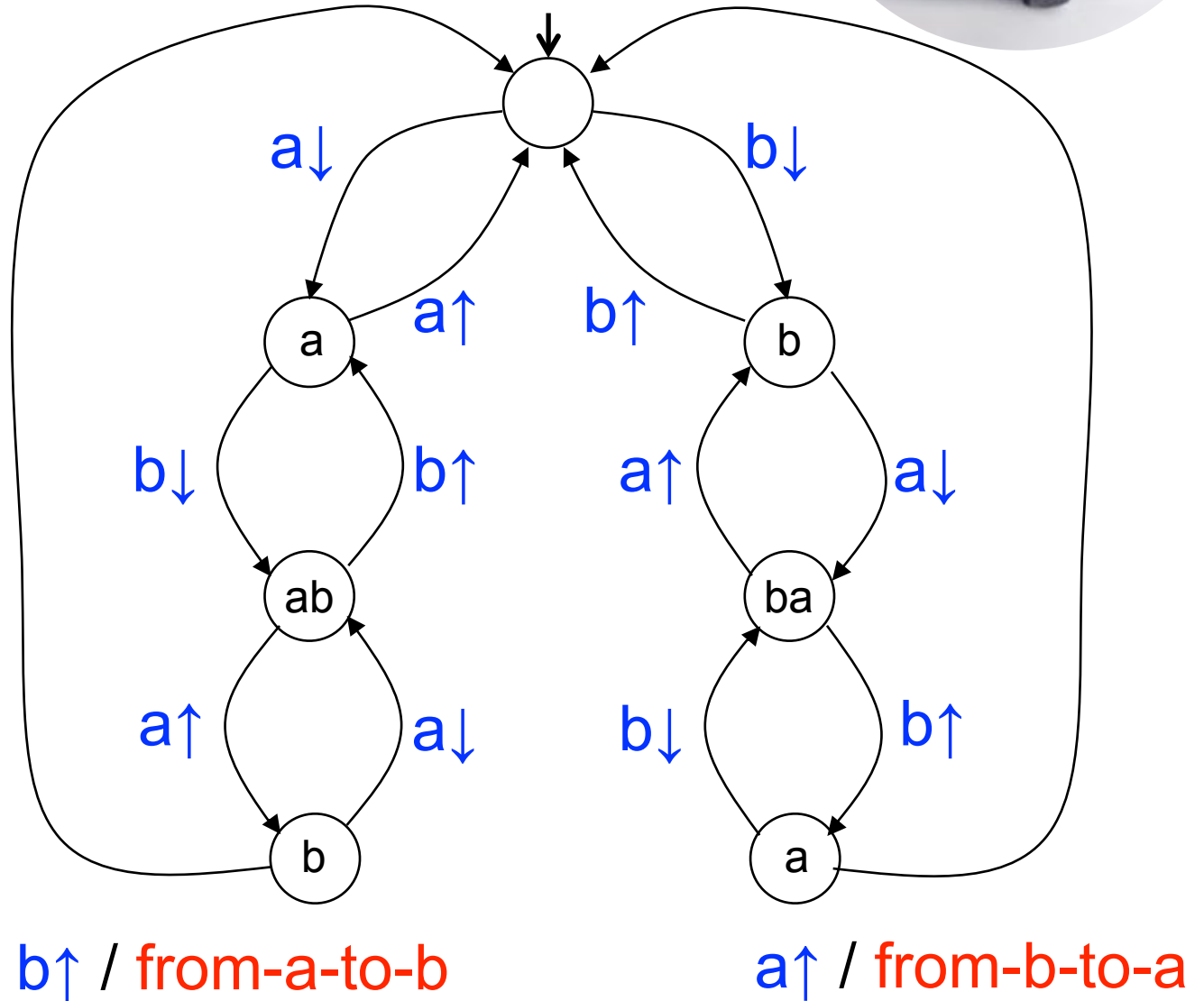


inputs :

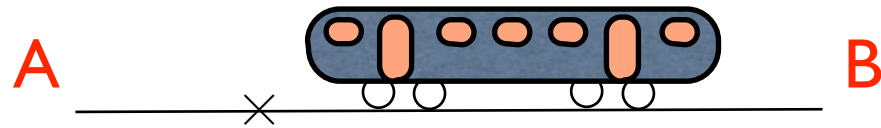
$a\uparrow$, $a\downarrow$, $b\uparrow$, $b\downarrow$

outputs :

from-a-to-b,
from-b-to-a



Hierarchical FSMs



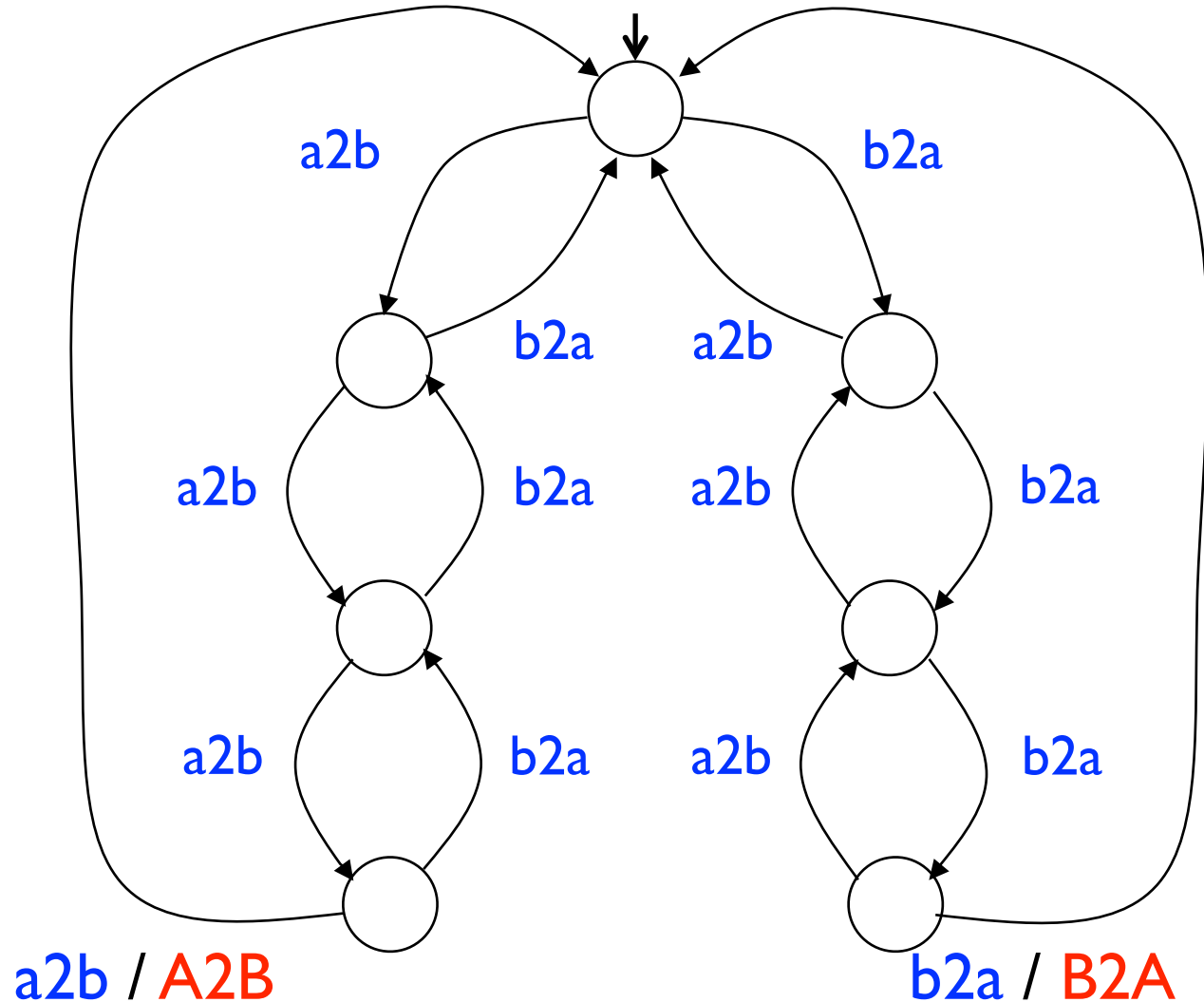
carriage counter

inputs :

a2b, b2a

outputs :

A2B, B2A



a2b = from-a-to-b

Application Fields

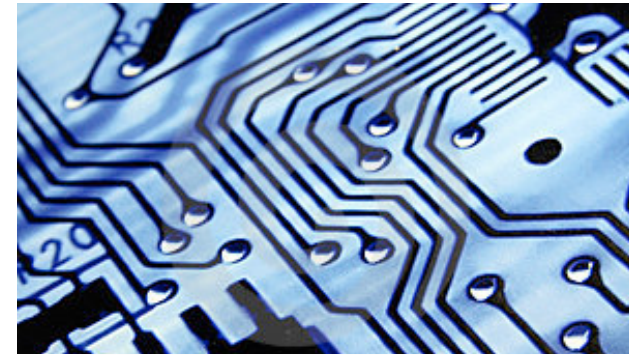


Industry

- real-time control, vending machines, cash dispensers, etc.

Electronic circuits

- data path / control path
- memory / cache handling
- protocols, USB, etc.



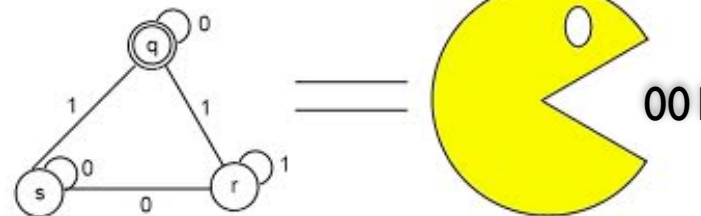
Communication protocols

- initiation and maintenance of communication links
- error detection and handling, packet retransmission

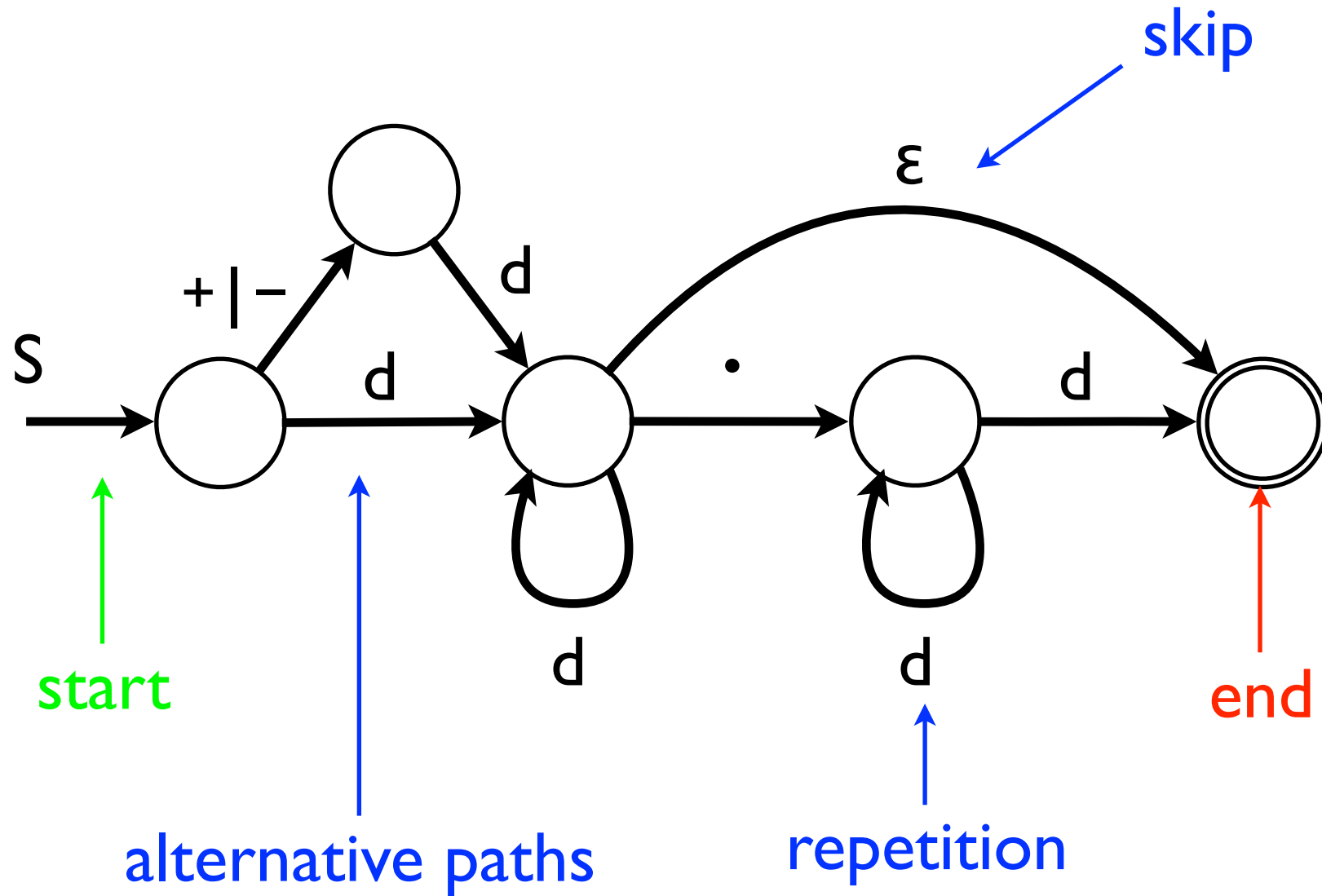


Language analysis

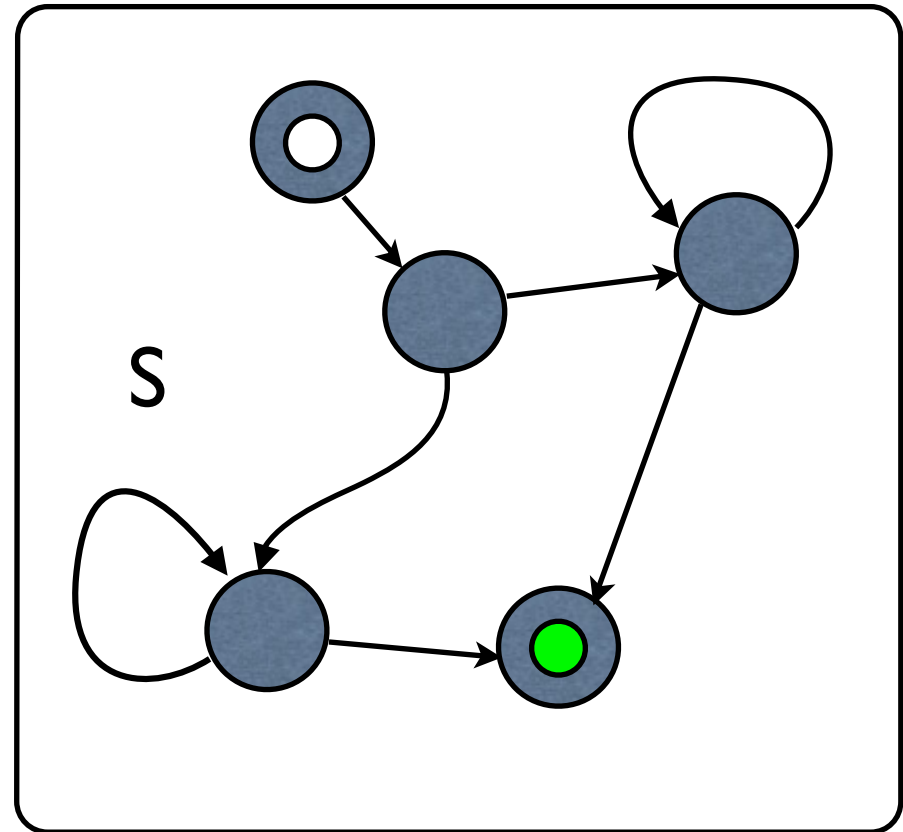
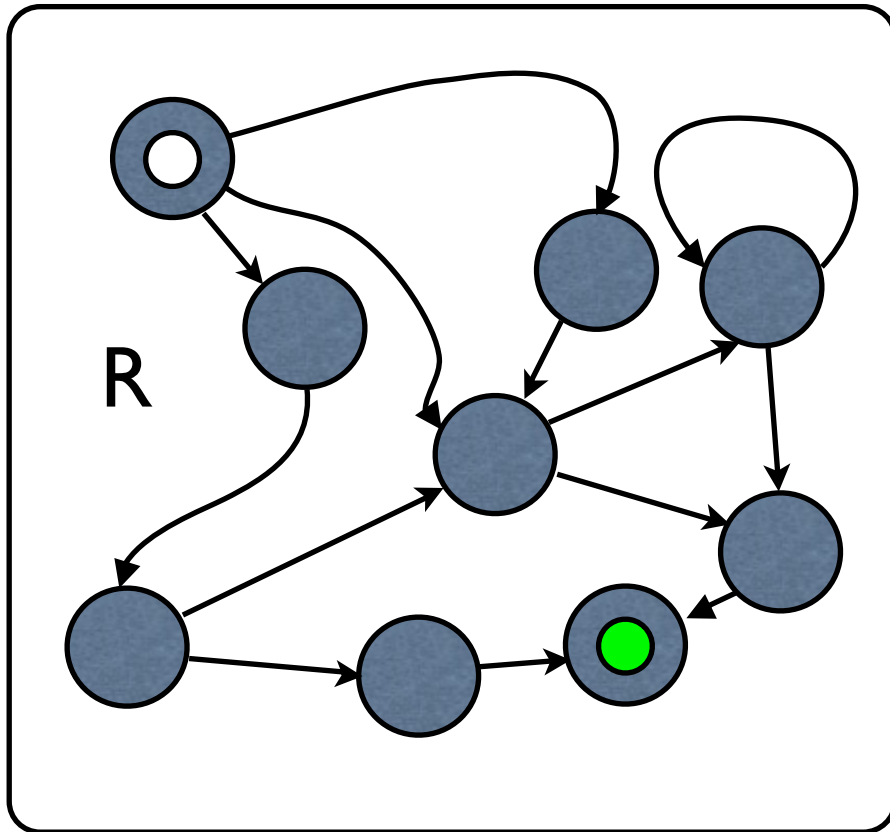
- natural languages
- programming languages
- search engines



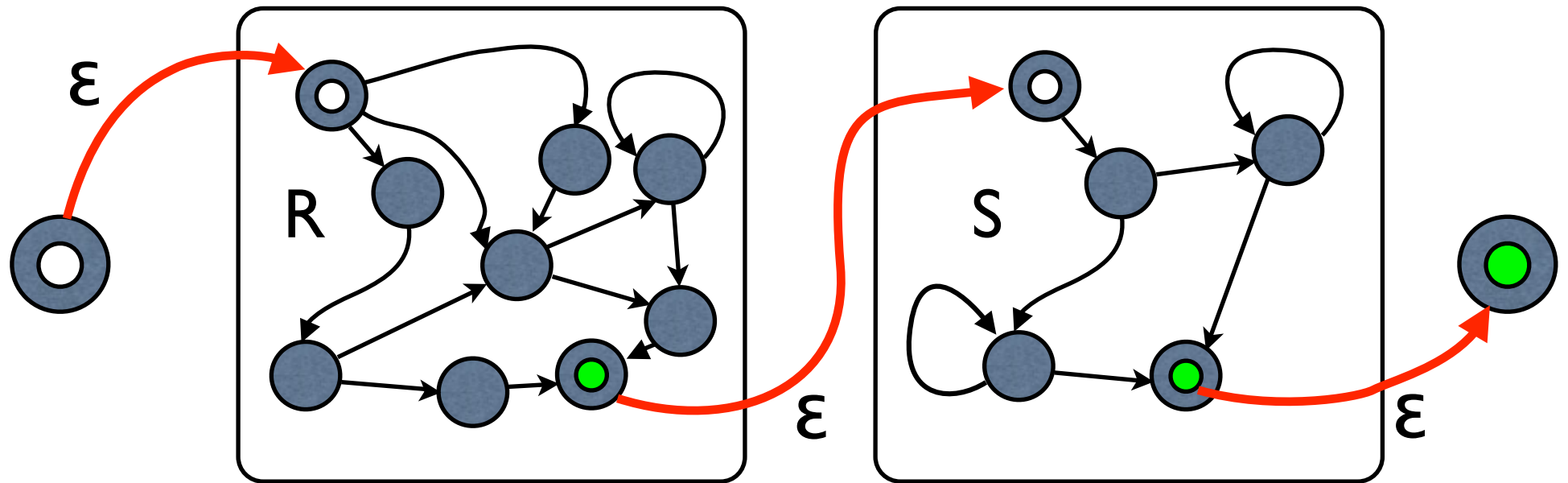
A Decimal Number



finite state machines

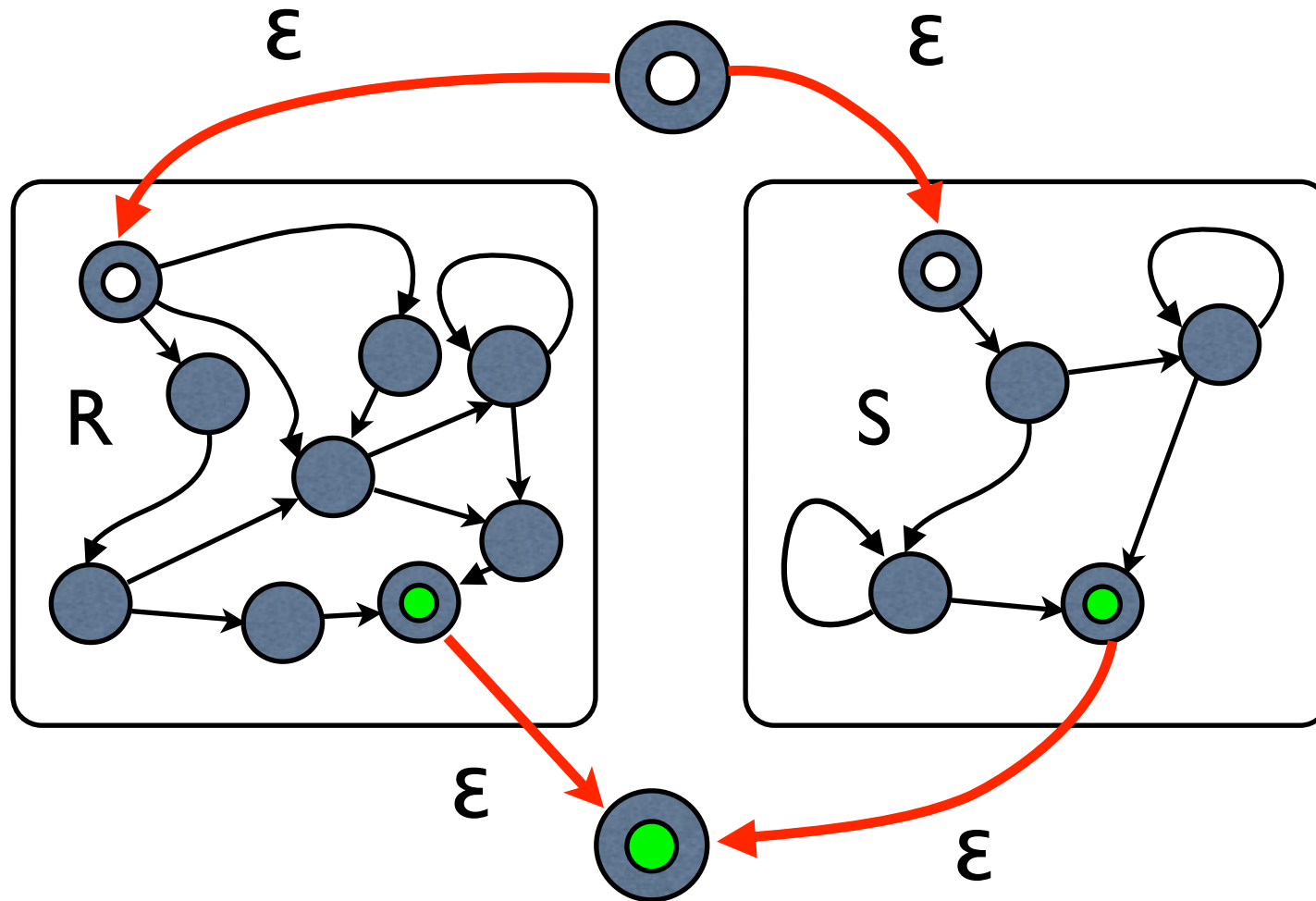


sequence RS



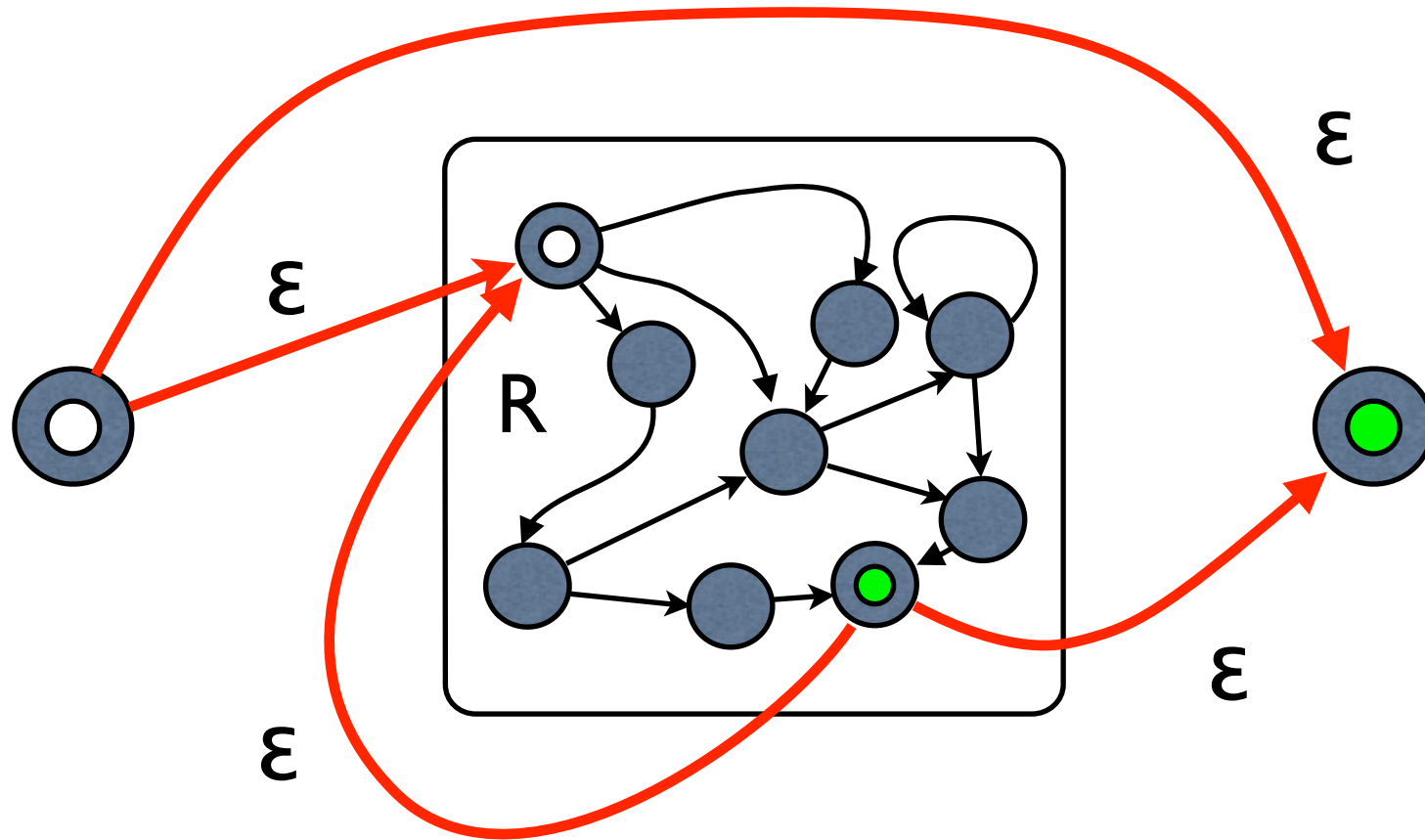
alternation

R|S



iteration

R^*



finite state spaghetti

