State Diagrams

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Definition

State diagrams are UML diagrams that represents the different states an object can have during a program and the transitions between the states.
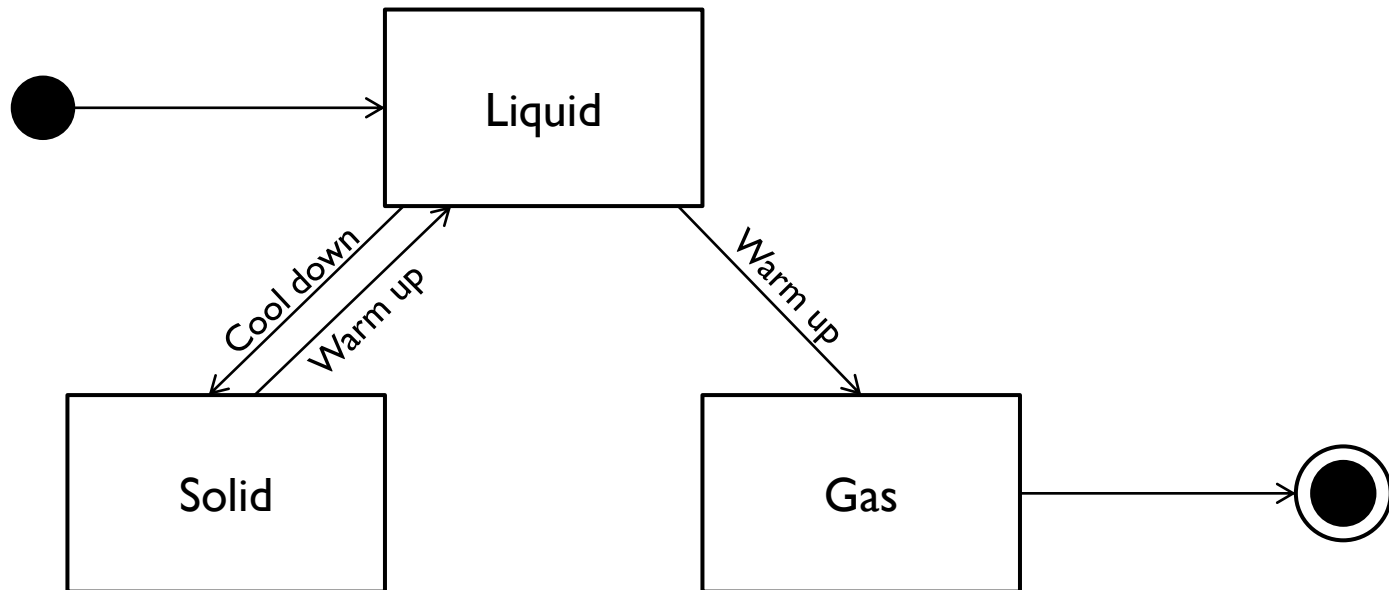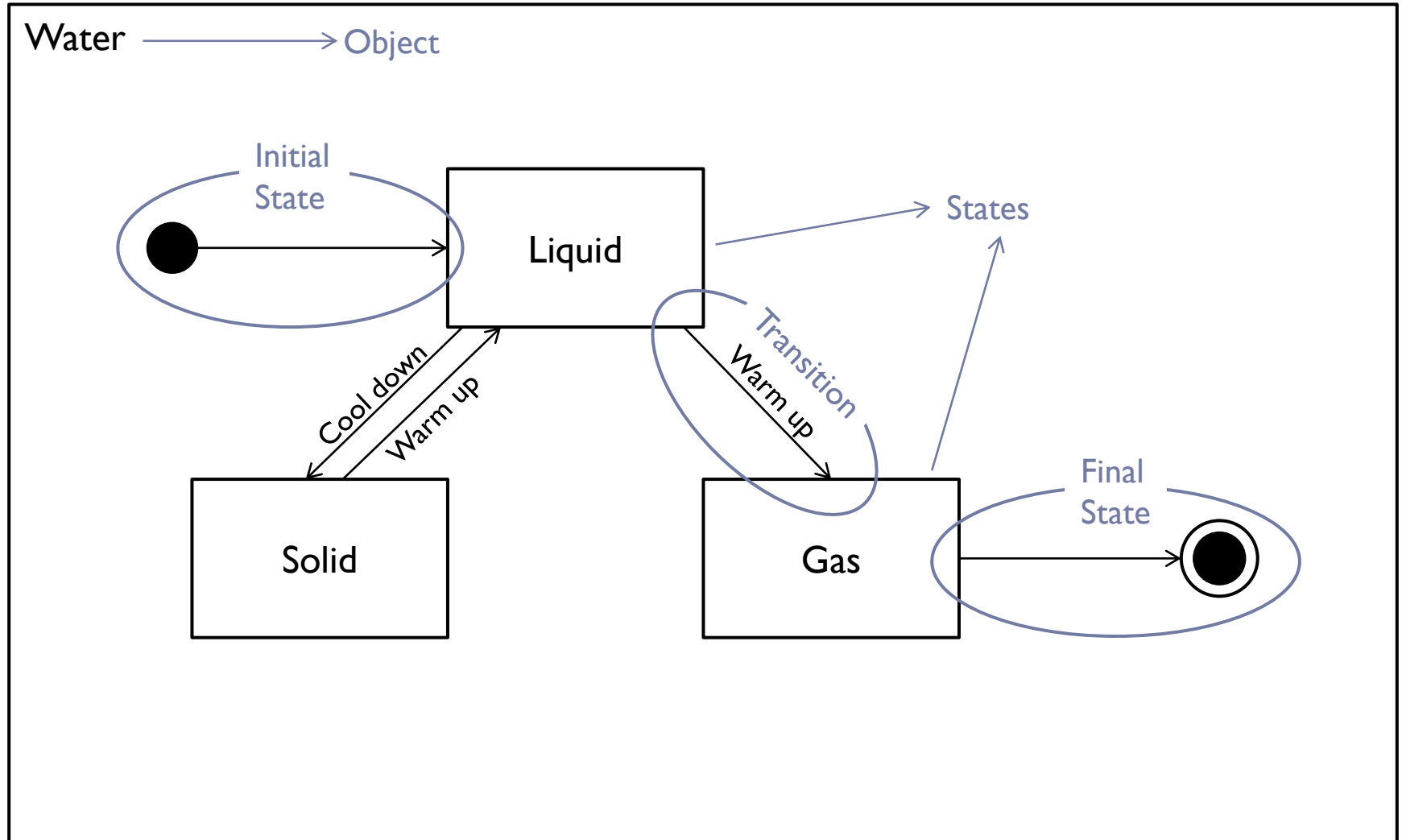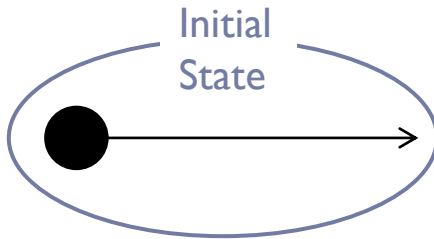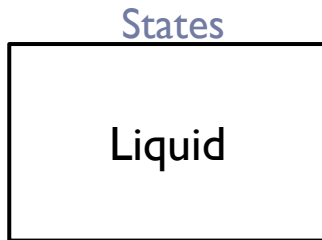
Simple Examples

Very simple example

Example explained

Example explained

Initial State
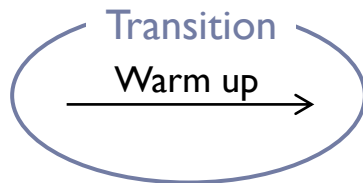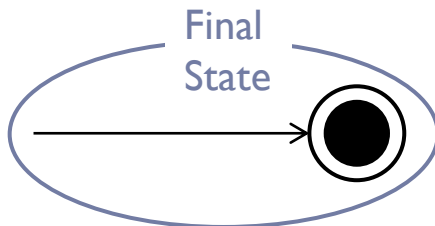
Represents the initial state of an object.

States

Liquid

The different states the object can have are represented by boxes.

Transition

Warm up

The arrows represents transitions which describe how states change (the events).

Final State
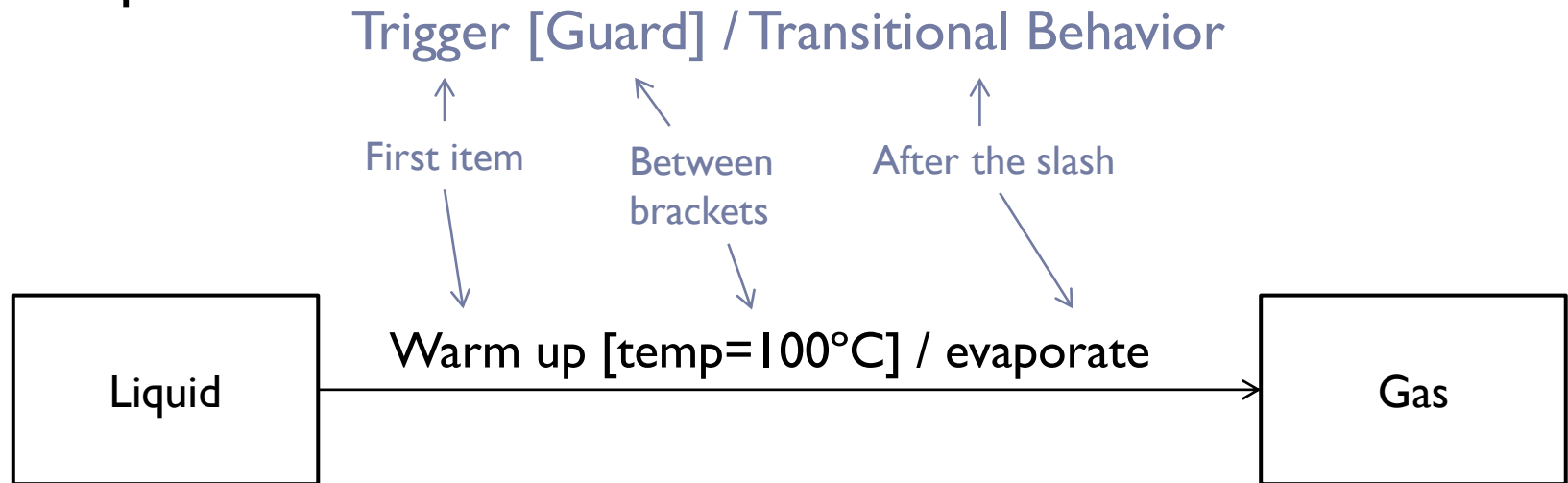
Represents the final state of an object.

More detailed ways to represent **transitions**

▸ The transitions can be more descriptive and include a *Trigger*, a *Guard* (a logic statement) and a *Transitional Behavior* following this pattern:

Trigger [Guard] / Transitional Behavior

↑   ↑   ↑

First item   Between   After the slash
brackets

| Liquid | Warm up [temp=100°C] / evaporate | Gas |

▸ This means the Water will just evaporate and become Gas if the *Guard* condition is true, it means, if its temperature is equal to 100° Celsius.

More detailed ways to represent **transitions**

▸ Note some parts of the text line can be omitted so you may find examples like this (among others):

Liquid	[temp=100°C] / evaporate →	Gas

| Solid	Warm up →	Liquid
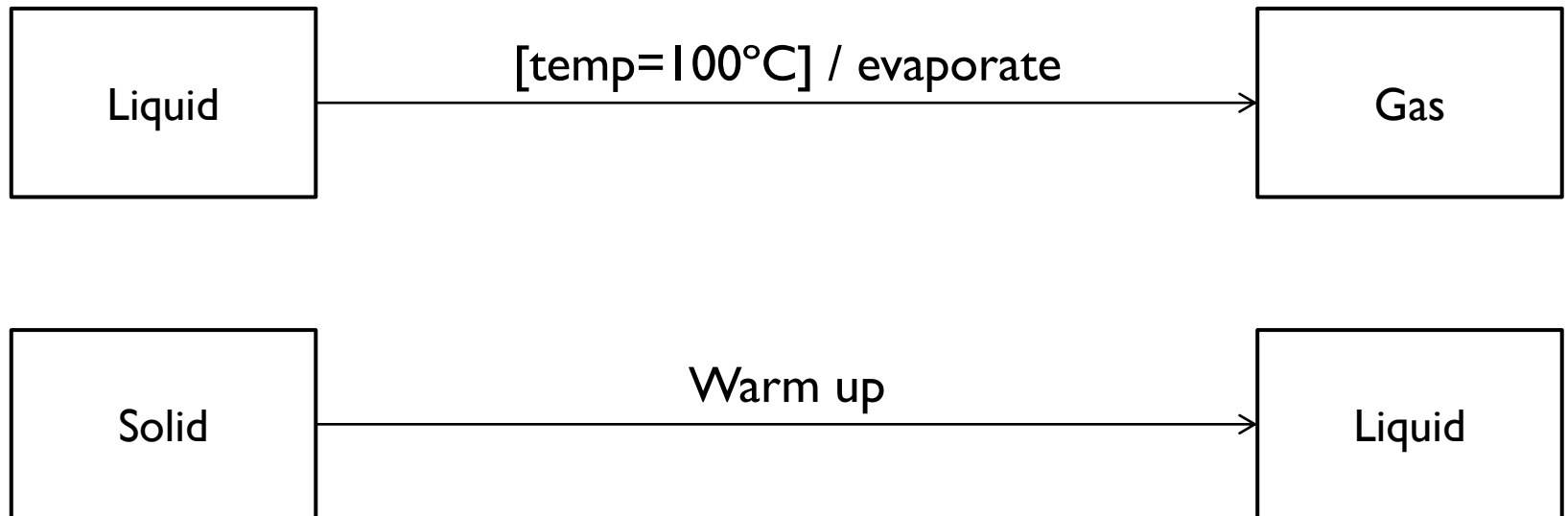
More detailed ways to represent **states**

For this example imagine a "Human" object with states "hungry", "eating", and "satisfied".

Eating
entry / receive food do / chew and swallow exit / say thanks
[foodOnFork = liver] / set aside on the plate

▸ You can add **internal behavior** to a certain state by making a solid horizontal line. The "entry" event triggers when we reach the state, the "do" event will be executed while in the state, and the "exit" event triggers when leaving the state.

▸ You can add the **internal transition** to a certain state by making a dashed horizontal line. This causes something to happen when a trigger is activated. (It is written in the same pattern we use for transition arrows: *Trigger* [*Guard*] / *Transitional Behavior*).

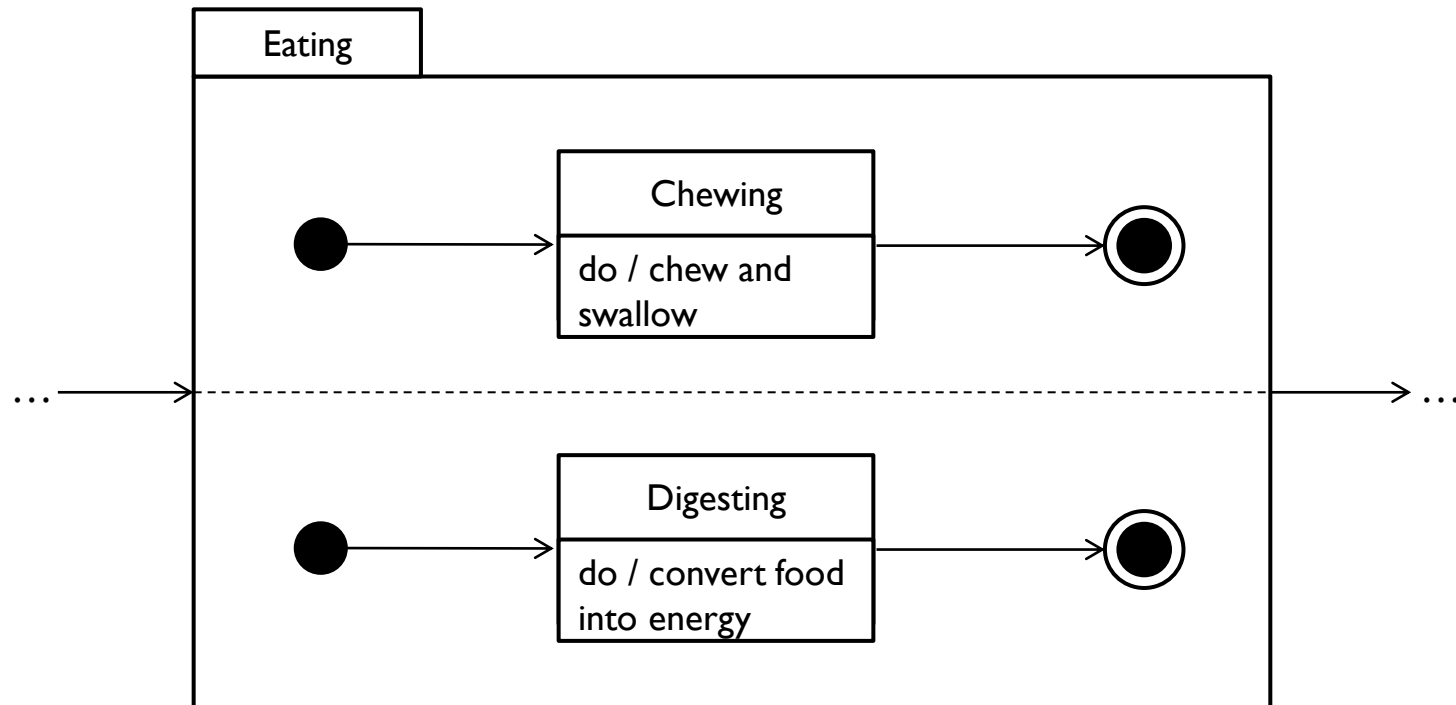▸ These are actions that **do not** change the state of the object.
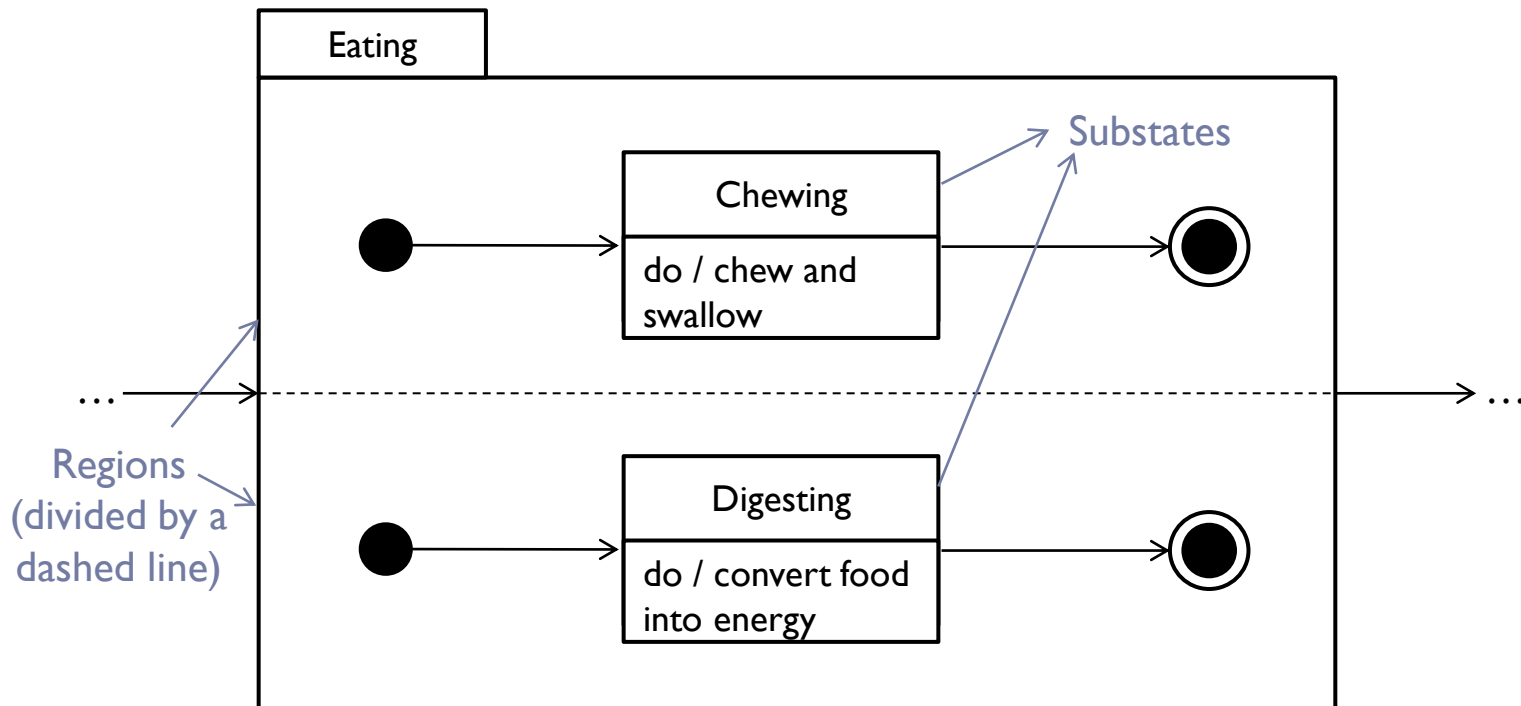
Simple Human example
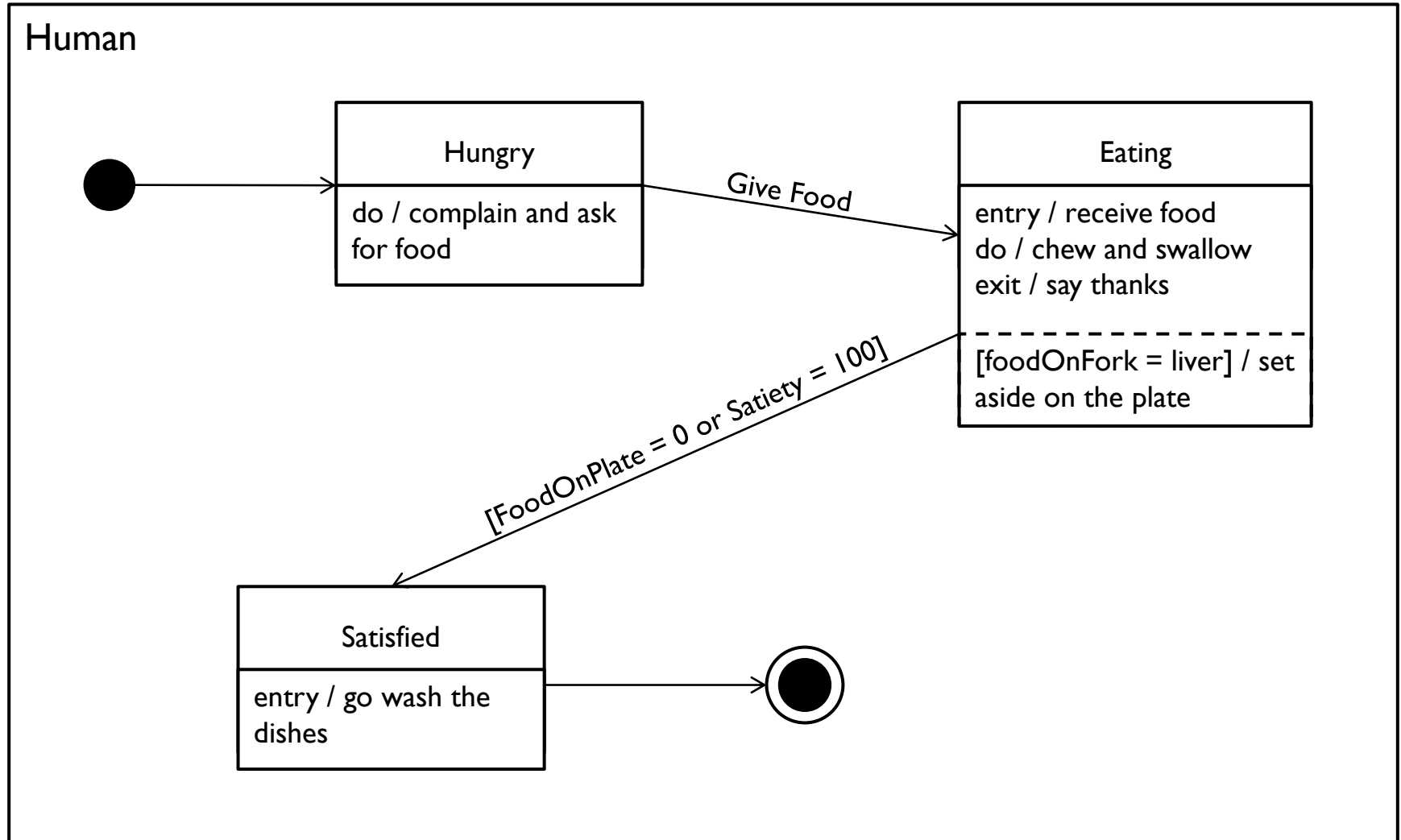
More Symbols and Examples

Another diagram symbols – **Composite States**

▸ Composite states can be used when we have two or more states that occur at the same time.

Another diagram symbols – **Composite States**

▸ In the model bellow we are using the Human object as an example. The composite state "Eating" here has two substates "Chewing" and "Digesting".
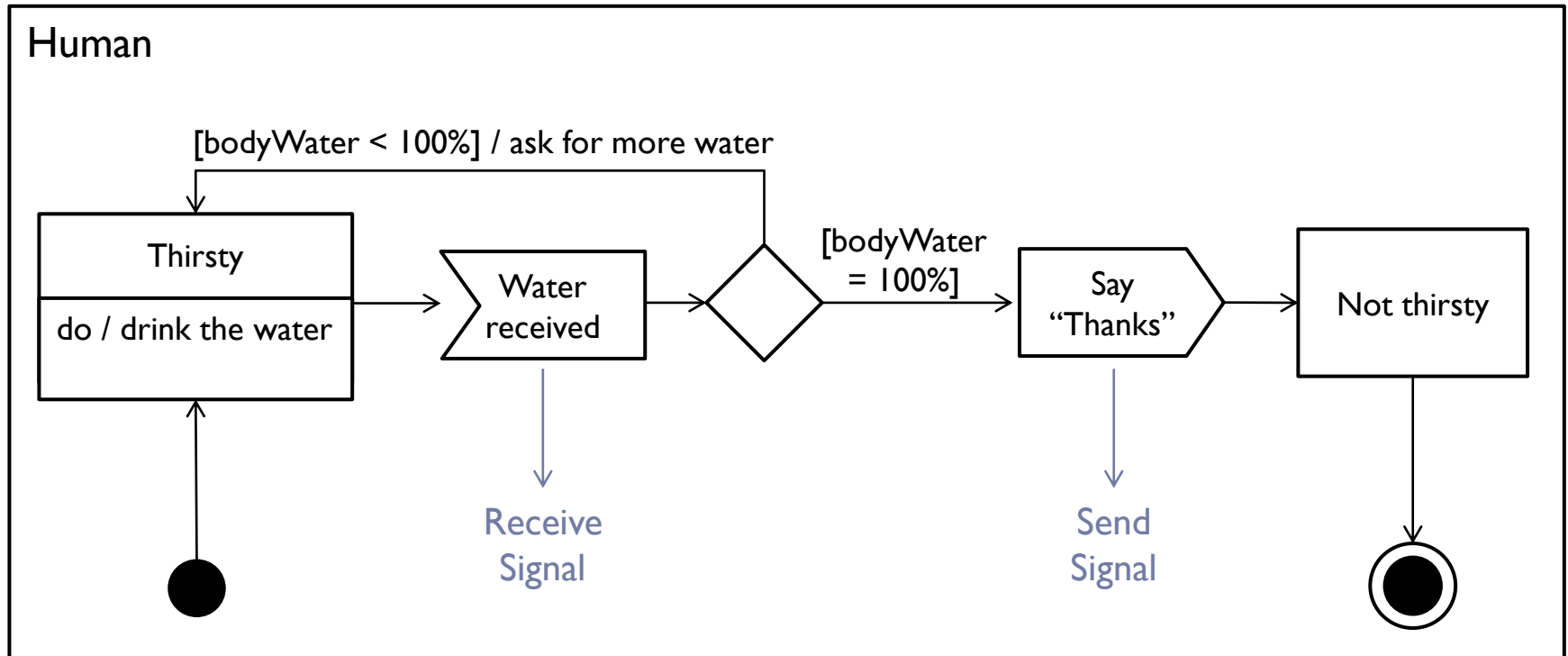
Another diagram symbols – **Choice Pseudostates**

▸ The choice pseudostate is used when a Boolean condition determines the transition that will be followed.
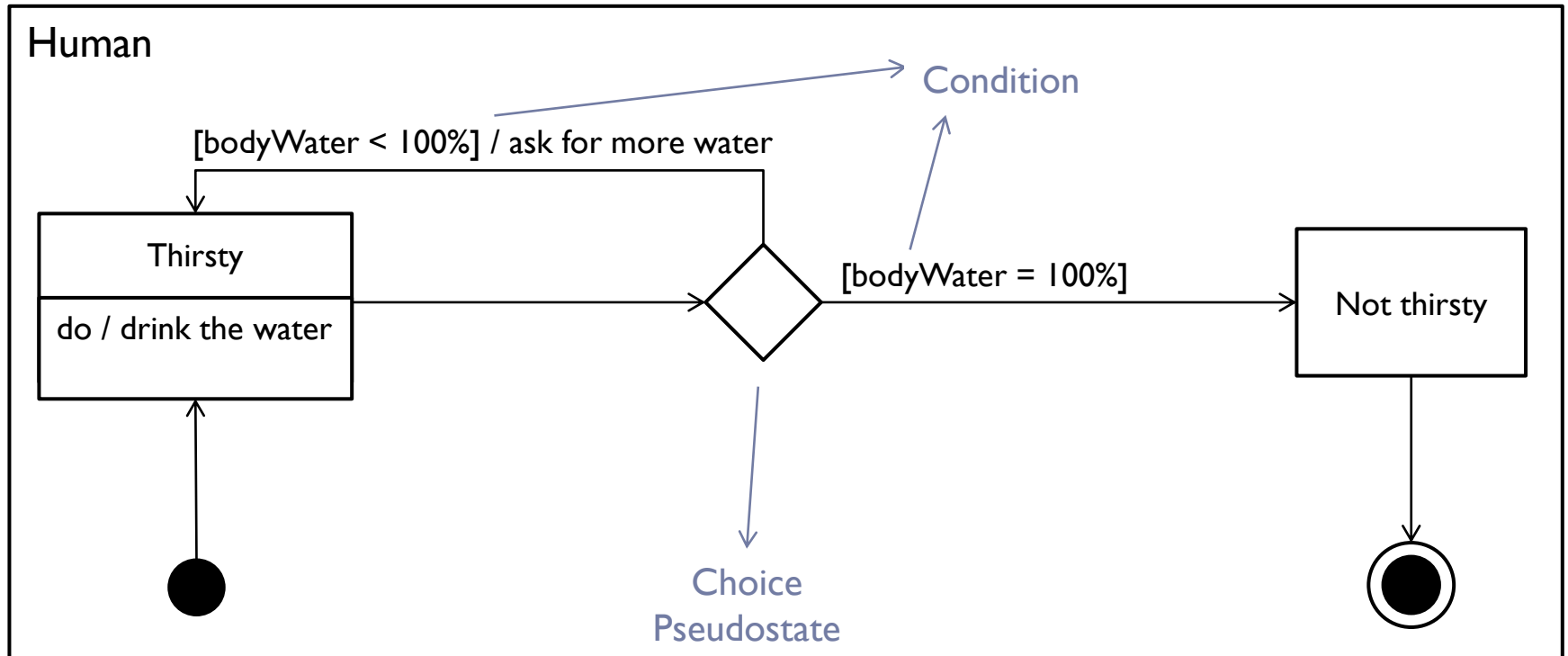
Another diagram symbols – **Diagramming Signals**

▸ The Receive Signal triggers when a certain signal is entered.

▸ The Send Signal triggers sending a signal.

Improving the previous example:

Sources

- https://www.youtube.com/watch?v=_6TFVzBW7oo
- https://www.youtube.com/watch?v=L9UCsQxuWmw

More info at:

https://www.uml-diagrams.org/state-machine-diagrams.html

Other Examples

SingleThreadExecutor

Waiting
do / wait a new task

.submit(Runnable)

Running task
entry/ Runnable.run()

[if task is finished]

.shutdown()

.shutdownNow()
/kill tasks and
close

[if a task is running]

Waiting the task
do / wait the task to finish
exit/ close

[if no tasks are running]/close