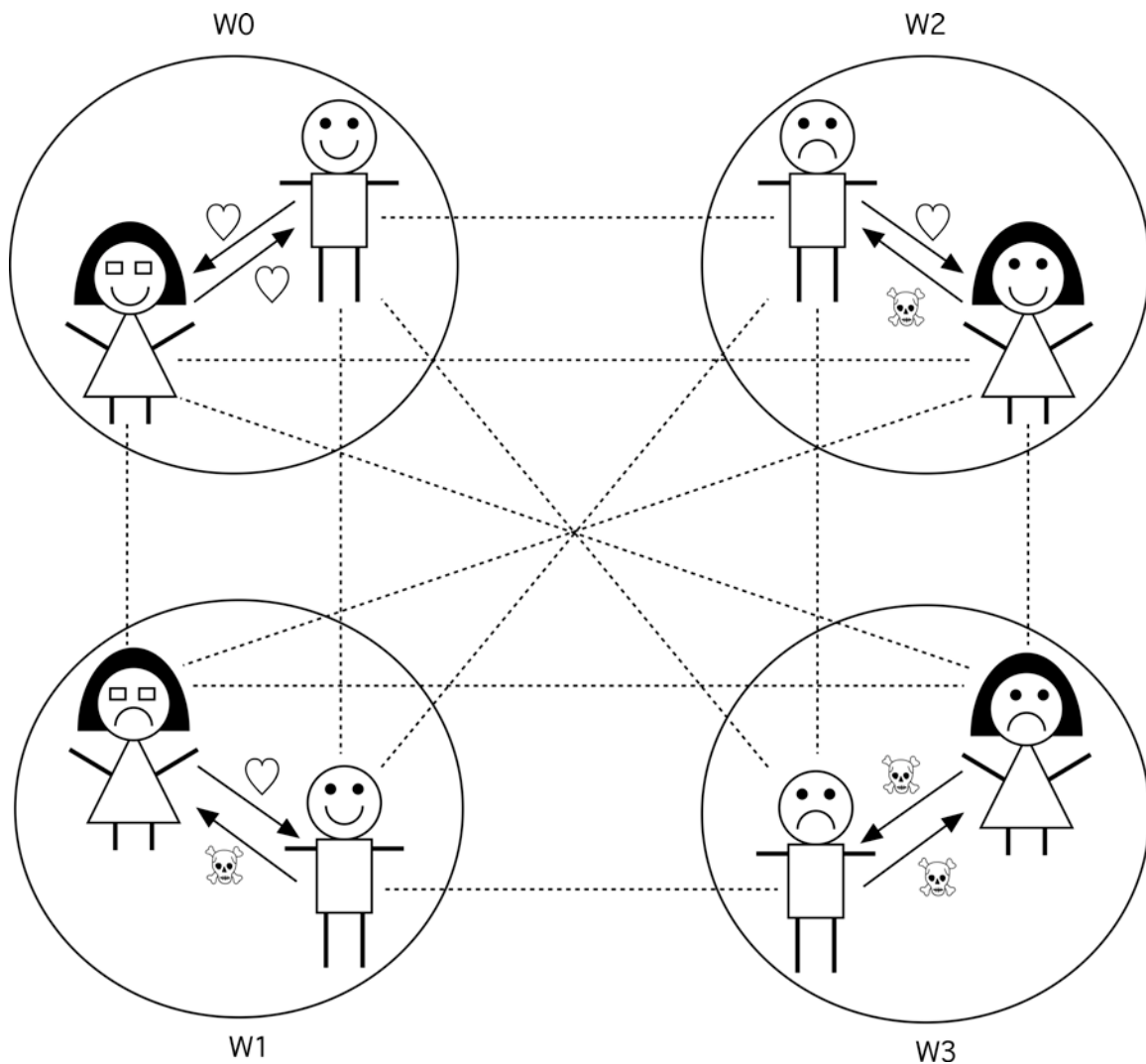


Semantics – Exercises (Selected Answers)

Exercises for Chapter 4 of Steinhart, E. (2017) *More Precisely: The Math You Need to Do Philosophy*. Broadview Press. Copyright (C) 2017 Eric Steinhart. Non-commercial educational use encouraged! All others uses prohibited. (Version 2)

Model 0

Each circle is a world containing some things in some relations. The relations are indicated by arrows. Triangular bodies are female; square bodies are male. Robots have square eyes; humans have round eyes. The heart is love the skull and bones is hate. A dotted line connecting two things indicates that they are counterparts.



Propositions and their Worlds (Fill in the table with true/false)

Proposition	W0	W1	W2	W3
Bob is human	true		true	
Bob is a robot	false		false	
Sue is human	false		true	
Sue is a robot	true		false	
Bob is joyful	true		false	
Bob is sad	false		true	
Sue is joyful	true		true	
Sue is sad	false		false	
Bob loves Sue	true		true	
Bob hates Sue	false		false	
Sue loves Bob	true		false	
Sue hates Bob	false		true	

Properties Distributed across Worlds (Fill in the cell with things that have the property at the world; for relations, use ordered pairs.)

	World W0	World W1	World W2	World W3
human		Bob1		Bob3, Sue3
robot		Sue1		
joyful		Bob1		
sad		Sue1		Bob3, Sue3
loves		Sue1 \rightarrow Bob1		
hates		Bob1 \rightarrow Sue1		Bob3 \rightarrow Sue3 Sue3 \rightarrow Bob3

Questions (True or false, unless asking for a list of worlds).

“Bob loves Sue” at W2

“Sue is a joyful robot” at W1 (False)

“Sue hates a sad human” at W3

It is possible that Bob is a robot. (False; Bob is not a robot at any world)

It is possible that Bob loves a joyful robot.

It is possible that everybody is sad. (True, due to W3)

It is necessary that Sue is a robot.

It is necessary that somebody is loved. (False, due to W3)

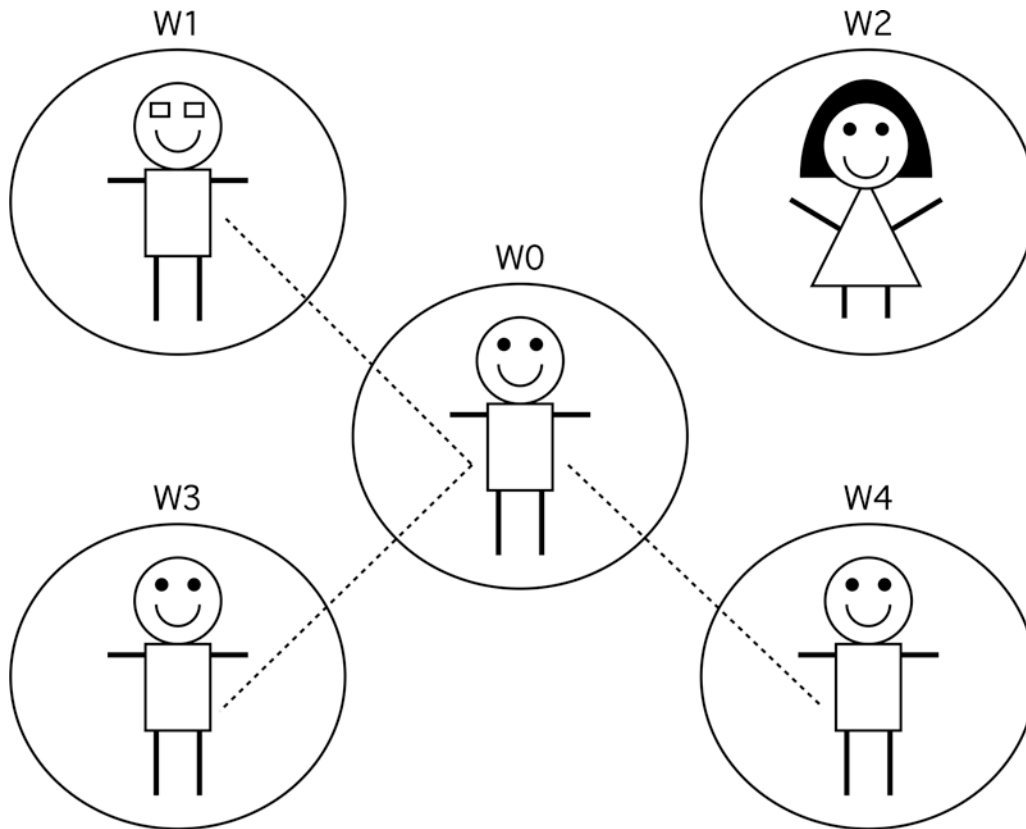
Necessarily, Sue loves a happy human.

Necessarily, if Bob is loved, then he is loved by some robot.

List the worlds at which some robot loves somebody:

It is necessary for robots to love. (True)

Model 1 (Same conventions as Model 0)



In this model, John exists at world W0.

Questions (list worlds or answer true/false)

List the worlds where John has counterparts.

List the worlds where John has no counterpart. (W2)

It is necessary that John exists. (False – he does not exist at W2)

It is necessary that John is male.

John is necessarily male. (True – he is male at every world at which he exists)

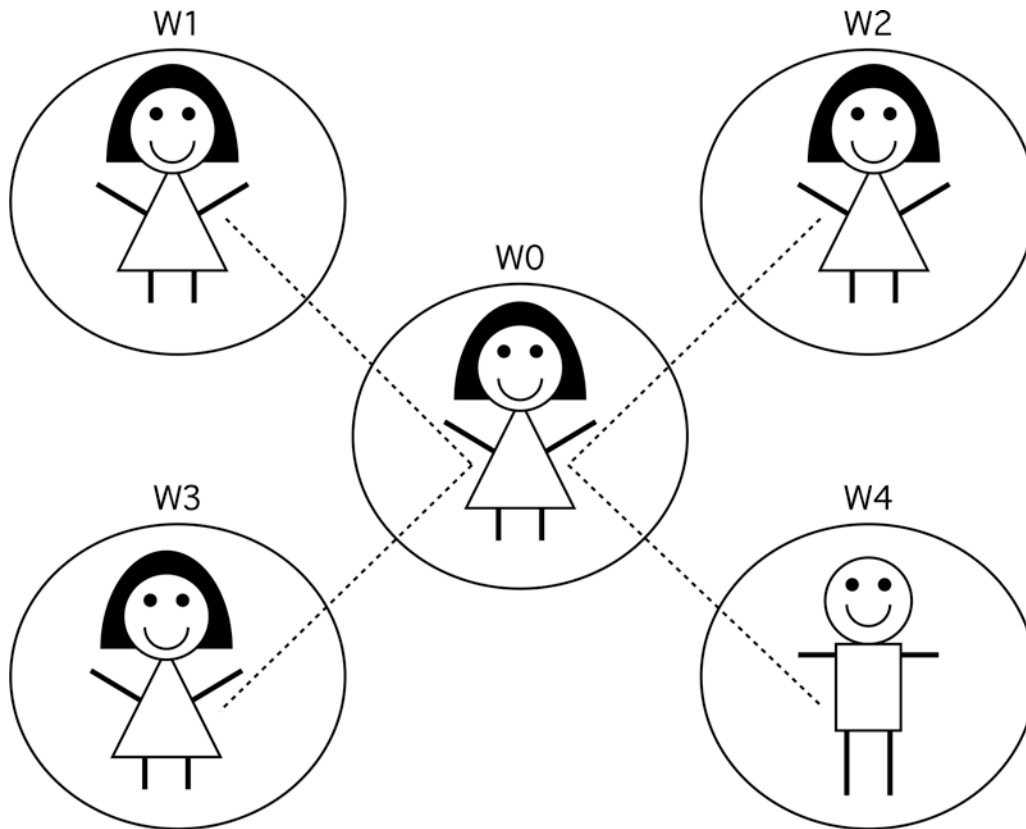
John is essentially male.

John is essentially human. (False – he is a robot at W1)

John is contingently human.

John is accidentally human (True – same as John is contingently human.)

Model 2 (Same conventions as Models 0 and 1)



In this model, Sue exists at W0.

Questions (true or false)

Sue has a counterpart at every other world.

It is necessary that Sue exists. (True)

It is necessary that Sue is happy.

It is necessary that Sue is female. (False)

Sue is necessarily female.

Sue is contingently female.

Sue might be male. (True)