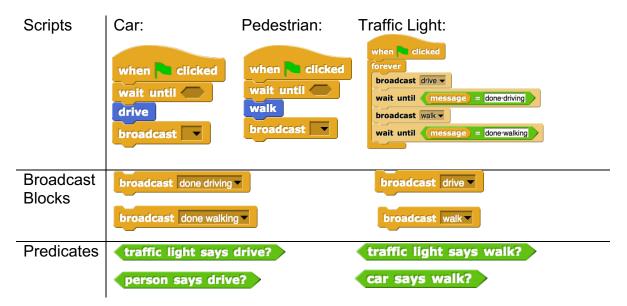# Discussion 6: Concurrency

Mutability Review

1. What does it mean for data to be mutable?
   Data that is mutable can be changed outside of its own scope.

2. What kind of data in Snap! is mutable?
   Lists

Concurrency

1. For the following two subparts, suppose we have the three scripts, four broadcast blocks, and four predicates below:
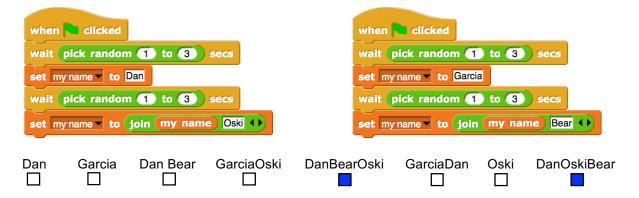
Scripts	Car:	Pedestrian:	Traffic Light:
	when [flag] clicked / wait until < > / drive / broadcast [ ]	when [flag] clicked / wait until < > / walk / broadcast [ ]	when [flag] clicked / forever / broadcast drive / wait until (message = done driving) / broadcast walk / wait until (message = done walking)
Broadcast Blocks	broadcast done driving / broadcast done walking		broadcast drive / broadcast walk
Predicates	traffic light says drive? / person says drive?		traffic light says walk? / car says walk?

a. Fill in the code for the car and the pedestrian such that there will be a deadlock.

	car	pedestrian
waits until…	person says drive?	car says walk?
broadcasts…	broadcast walk	broadcast drive

b. Fill in the code for the car and the pedestrian such that there will not be a deadlock (i.e. the car and the person move without conflicting with each other).

	car	pedestrian
waits until…	traffic light says drive?	traffic light says walk?
broadcasts…	broadcast done driving	broadcast done walking

2. Which of the following could be the value of my_name after the green flag is clicked?

Dan □   Garcia □   Dan Bear □   GarciaOski □   DanBearOski ■   GarciaDan □   Oski □   DanOskiBear ■
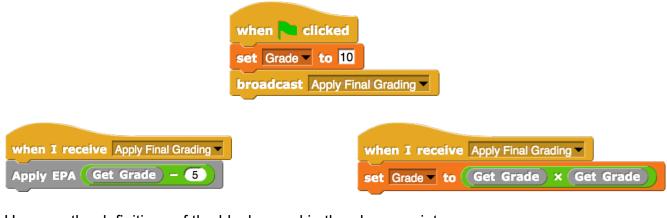
To solve this question, we want to find account for all possible orderings of the above blocks. To do this, we can make a table where we account for different orders:

set my name to Dan	set my name to Garcia	set my name to join (my name) Oski	set my name to join (my name) Bear	my name
1	2	3	4	GarciaOskiBear
1	3	2	4	GarciaBear
1	2	4	3	GarciaBearOski
3	1	4	2	DanOski
2	1	3	4	DanOskiBear
2	1	4	3	DanBearOski

Note: `set my name to join (my name) Oski` can never come before `set my name to Dan`, as `set my name to join (my name) Bear` can never come before `set my name to Garcia`.

Challenge

1. List all possible values of `grade` after the green flag is clicked.

Here are the definitions of the blocks used in the above scripts:

Using a similar strategy as above, the possible values are: 225, 150, 105, and 195.