

Prey and Predator Activity

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VOCABULARY

Prey: An organism this is hunted, killed, and eaten by another organism.

Predator: An organism that hunts, kills, and eats other organisms.

Camouflage: The ability of an organism to blend into its environment to avoid being seen.

Visual acuity: The ability of an organism to see clearly and precisely.

Offspring: The 'children' of an organism.

BACKGROUND

In this game you will observe the evolution of two traits, *camouflage* (of a prey population) and *visual acuity* (in a predator population).

- Each animal is represented by a card (prey = blue; predator = yellow).
- The number on each card represents the quality of the animal's camouflage (for prey) and visual acuity (for predators).
- A low score indicates poor camouflage/visual acuity, and a high score indicates good camouflage/visual acuity.
- Predators also have another number which represents their birth date (this is the round in which they were 'born').

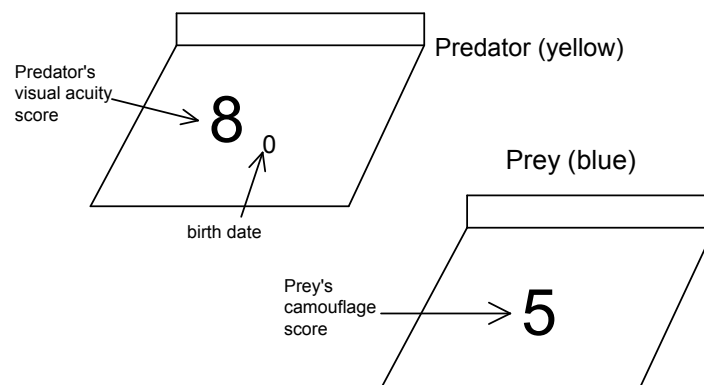


Figure 1. Two game pieces, a prey with a camouflage score of 5 and a predator with a visual acuity score of 8. The predator was born in round 0.

Table 1. Initial frequency distribution of traits in predator and prey populations. This shows the number of prey and predators with a particular camouflage or visual acuity score, respectively.

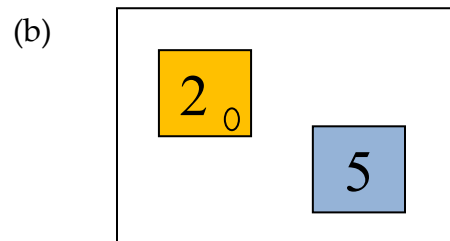
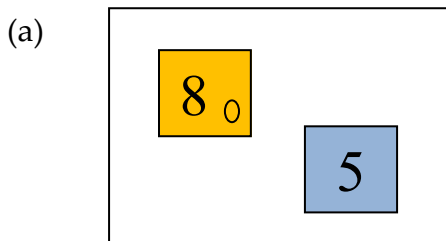
Camouflage / Vision Score	# Prey Pieces	# Predator Pieces
2 (worst)	1	1
3	2	2
4	3	3
5	4	4
6	3	3
7	2	2
8 (best)	1	1
Total # Pieces	16	16

- What is the **average** camouflage score of the prey population? _____
- What is the **average** visual acuity of the predator population? _____

INSTRUCTIONS

- *Begin the game by placing the cards on the board.*
- *Roll the dice to determine the location for each card.*
- *Follow the instructions below.*

Predation - If a predator and prey are on the same square the predator has a chance to eat the prey. But, the predator can only eat the prey if it's score is higher than the prey.



- (a) The predator can eat the prey.
- (b) The predator cannot eat the prey.

Predator Reproduction - After a predator eats it produces 2 offspring, and then the parent dies (remove it from the board). One of the offspring has a score one point higher than its parent and the other has a score one point lower than its parent.

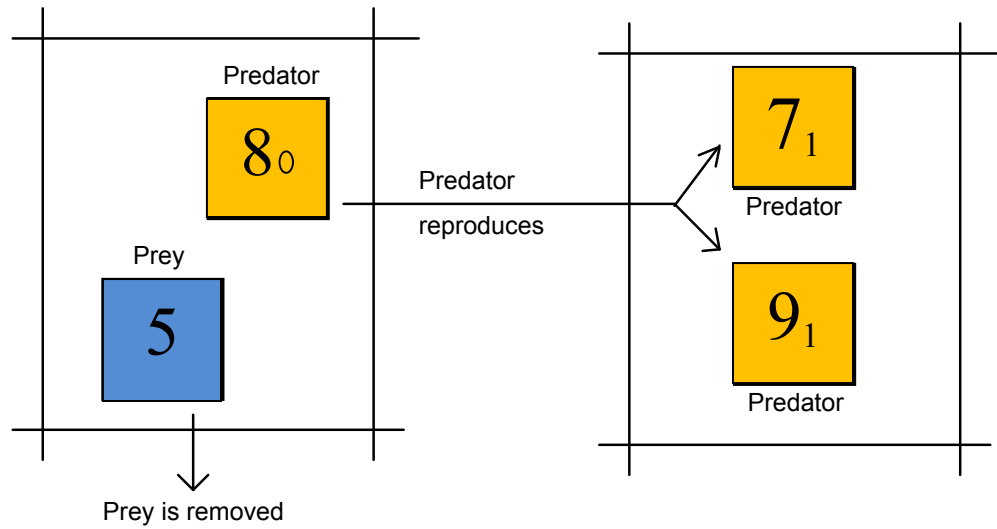


Figure 2. A predator with a visual acuity of 8 eats a prey with a camouflage of 5 and then reproduces and dies.

Note: You need to make new cards for the offspring. Don't forget to add the new birth date (the round that the offspring was 'born').

Predator Starvation - If a predator doesn't eat for 2 rounds, then it will starve. For example, a predator with a birth date of '0' will die at the end of round 2 if it doesn't eat. When a predator starves, remove it from the board.

Prey Reproduction - Prey that survive will reproduce. Reproduction for prey is the same as described for predators; the parent will produce 2 offspring (one with a lower, and one with a higher score than its parent), and then the parent will die.

Note: Prey cannot reproduce if there is more than one prey on a square (due to limited resources). These prey will survive, but they will not reproduce.

Record Results - **At the end of each round** count the number of prey and predators left on the board. Also, calculate the average score for prey, and the average score for predators. Write your results in Table 2. After you have recorded your results clear the board and start the next round with the remaining cards.

Table 2: Record the average score and number alive at the end of each round.

ROUND	PREY POPULATION		PREDATOR POPULATION	
	Avg. Score	# Alive	Avg. Score	# Alive
0	5.0	16	5.0	16
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

SUMMARY OF INSTRUCTIONS

1. **Put cards on the board** (use dice to determine each card's location)
2. **Predators eat** (remember to remove dead prey immediately after they are eaten)
3. **Predators reproduce** (parent dies and is replaced by 2 offspring)
4. **Starving predators die** (remove them from board)
5. **Surviving prey reproduce** (parent dies and is replaced by 2 offspring)
6. **Record results!!!** (write results in Table 2)
7. **Continue to the next round...**
8. **Last round** (record results in Table 3)

What if...

- What if the prey and predator have the same score?
Flip a coin to see who wins.
- What if there are two predators and one prey on the same square?
The predator with the higher visual acuity will see the prey first and eat it.
- What if there are two prey and one predator on the same square?
The prey with the lower camouflage will be seen and eaten.

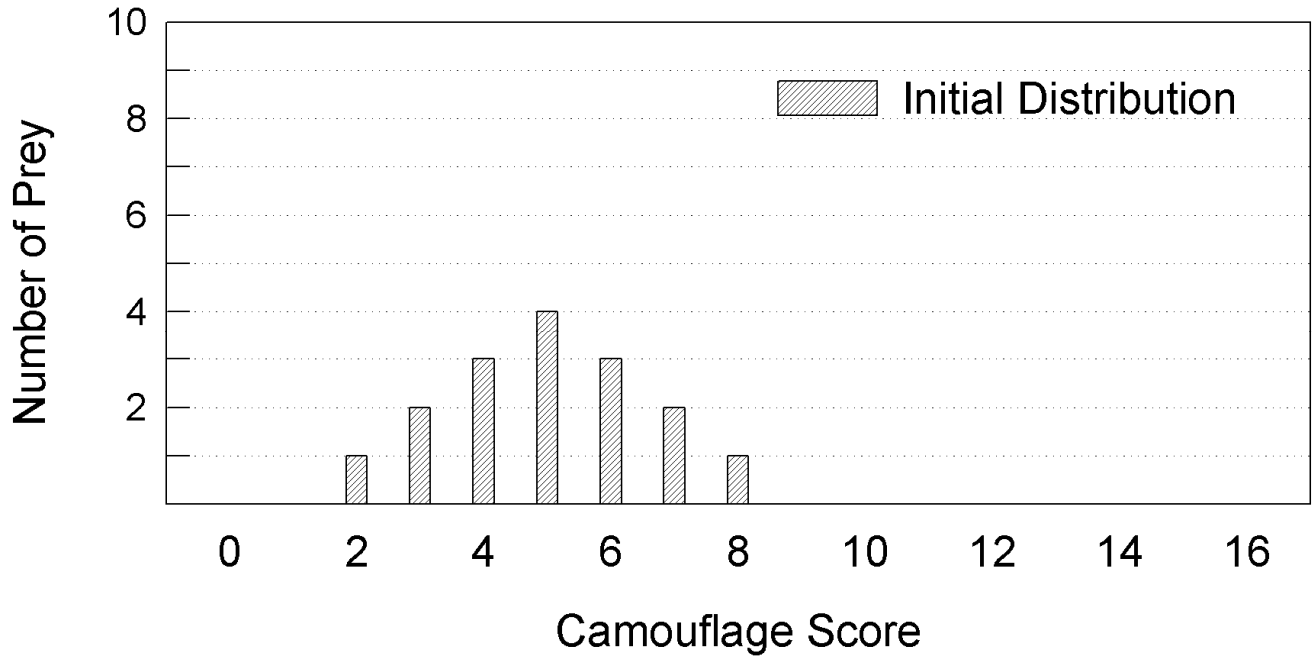
Note: A predator can only eat one prey.

Table 3: After the last round record the number of cards with each score for predators and prey.

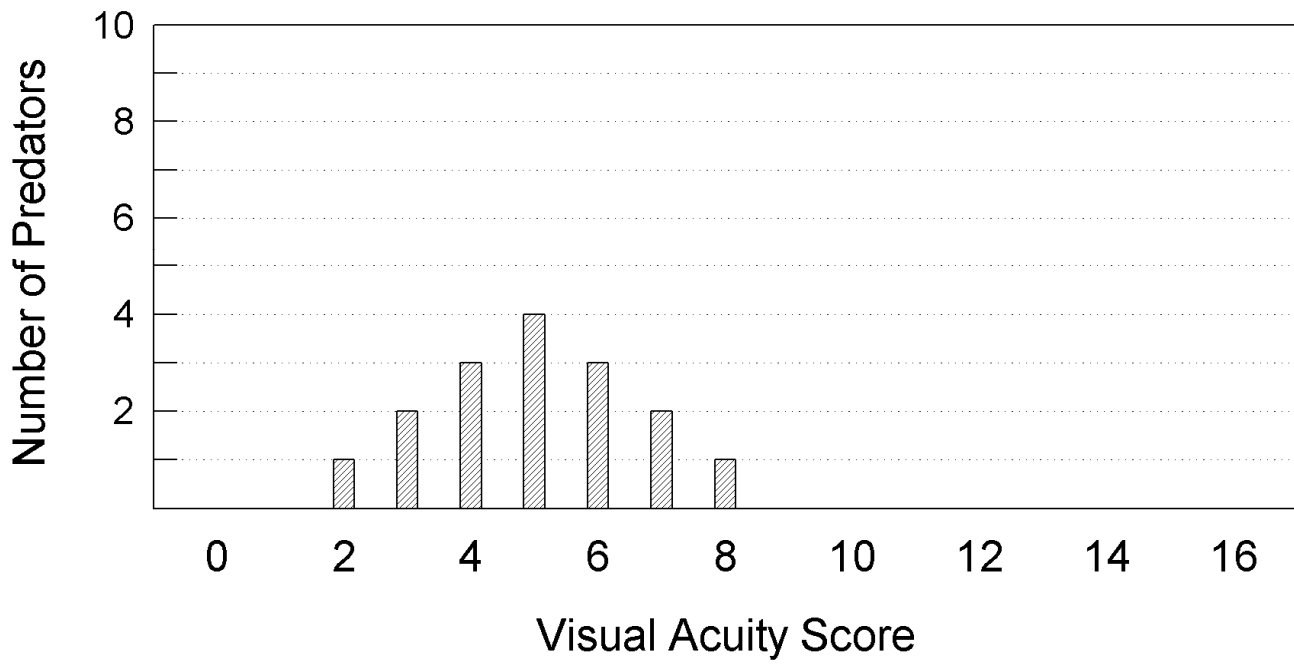
SCORE	# Prey	# Predators
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Note: *The lowest score possible is 0, but there is no limit for the highest score*

Prey Population

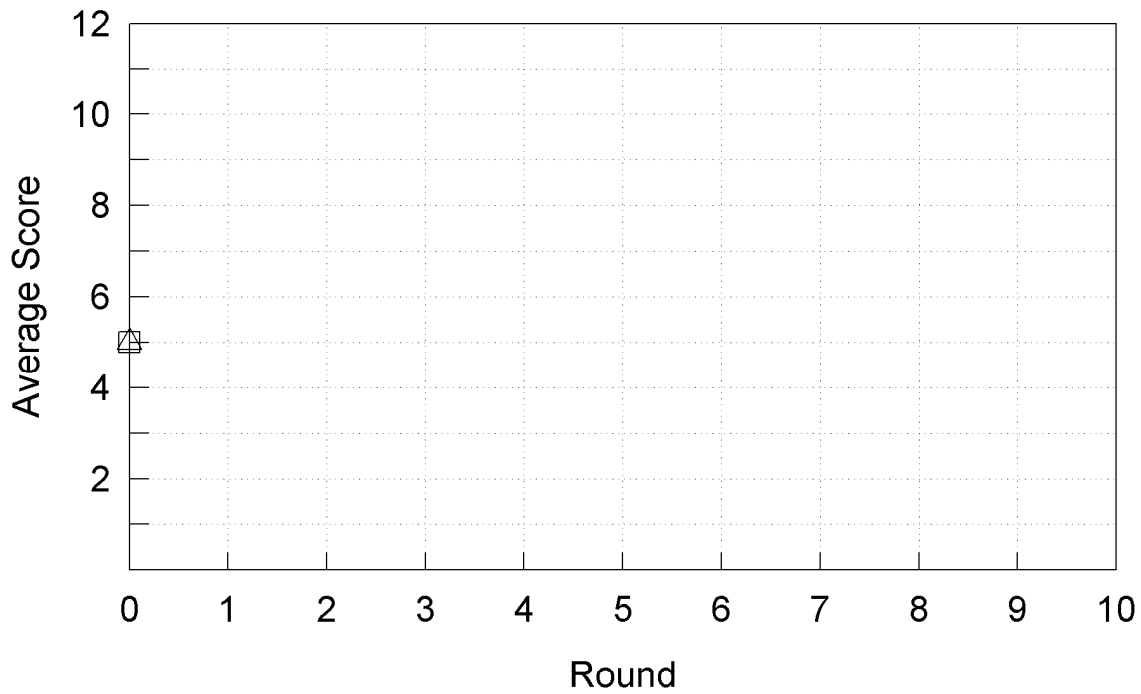


Predator Population

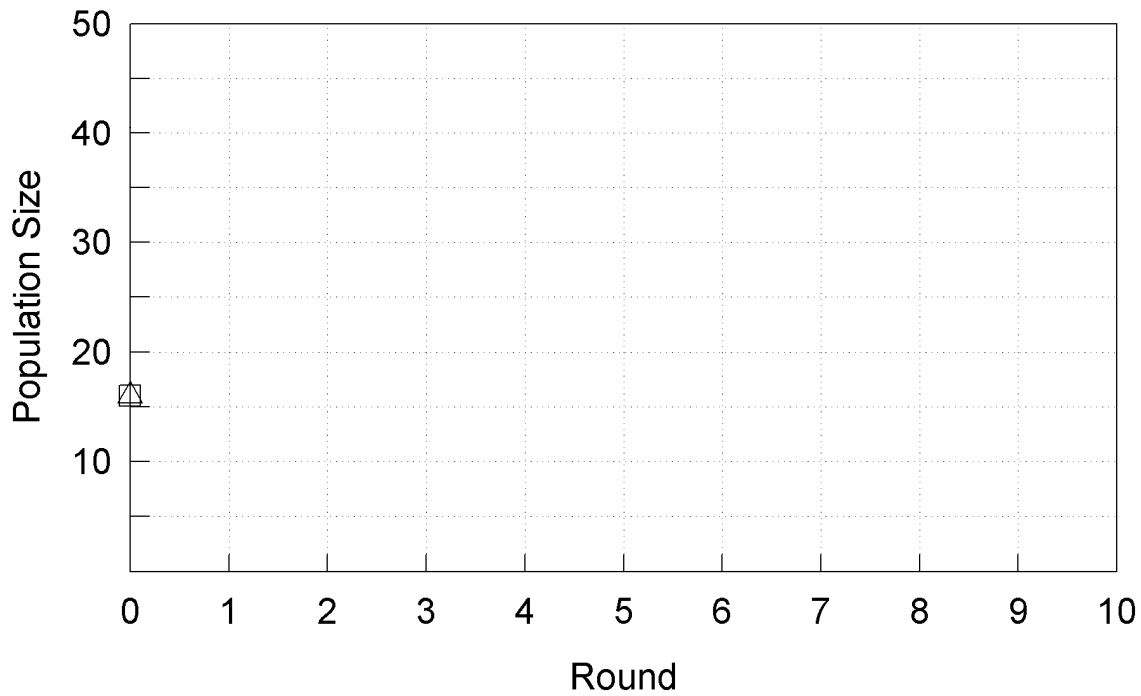


△ Predator
□ Prey

Average Score of Predators and Prey



Population Sizes of Predators and Prey



QUESTIONS

1. Did you see a change in the average camouflage of the prey and visual acuity of the predator? Describe what you observed.
2. You probably noticed that 'chance' can influence this game. Give two examples of chance events that might affect evolution in nature.
3. If you increased the starting size of each population to 1000 (and increased the size of the board) would this increase or decrease the importance of chance events? Explain.
4. Sometimes in these games a population goes extinct. Why are small populations more likely to go extinct than large populations?