In-Class Probability 2

ECO 602

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1. How could you define an event in your sampling scheme? Explain your reasoning.

The presence of a brown creeper in any of the six plots.

2. What is the *sample space* of your bird sampling scheme?

The sample space is the six possible plots.

3. You observed two presences and 4 absences in your daily survey. One possible spatial arrangement of these presences/absences is:
   How many ways are there to arrange the two presences in your grid of six plots? Explain how you found your answer.

   6! / (4! * 2!) = 15

   Proof: x = bird o = empty:

   XXO OXX OOO OOO XOO OXO OOX OOX OXO XOO OXO
   OOO OOO XXO OXX XOO OXO OOX OXO XOO OXO OOX

   XOX OOO XOO OOX
   OOO XOX OOX XOO

4. Given that the probability of observing a brown creeper presence in a given forest plot is about 50%, do you think that observing *exactly 2 presences* is an unusual event? Explain your reasoning. HINT: The coins might help with this question.

the total number of possible plot arrangements is 6^2 = 64. The number of possible plots with 2 birds is 15. Exactly 2 birds in any order would be 15/64 so then the probability of having *exactly* two birds in 6 plots is ~.25, which is decently unlikely.

Have exactly 2 presences of a brown creeper in a given forest plot is very low, because 0.5 (P to have a BRCR) x 0.5 (P to have BRCR) x 0.17 (P of a given forest plot) = 0.042

5. Consider the scenario in which you pick up two acorns at the same time in one hand without looking.

4 white, 4 red, 4 blank

a. Enumerate the events in this sample space.

RR, RW, RB, WW, WB, BB

6 possible events

b. Are these events *combinations*, or *permutations*?

These are combinations

c. Make sure you explain your reasoning.

We are unconcerned with the order in which the acorns are picked. (RW = WR, same as WB = BW)

6. Consider the scenario in which you pick up one acorn, place it in your left pocket, walk a short distance, then pick up a second acorn and place it in your right pocket.

Enumerate the possible events in this sample space.

1. W … R
2. W … W
3. W … B
4. R … W
5. R … B
6. R … R
7. B … B
8. B … R
9. B … W

And this can happen for all three colors so 3* 3 = 9 possible events

Are these events *combinations*, or *permutations*?

These are permutations.

Make sure you explain your reasoning.

In this scenario, we care about the order the acorns are selected in. You are picking them up in two separate events, one after the other, so the order in which you select them is important. W...R does not equal R...W.