Stats Video Lecture – Independence and Multiplication Rule

Week 2, Video 2

1. Independent Events
   1. two processes are independent if knowing the outcome of one gives no info on the outcome of another
   2. such as flipping one coin and getting heads gives no information on how the second coin will land
2. Dependent Events
   1. two processes are dependent if knowing the outcome of one informs on the outcome of another event
   2. such as drawing one card from a deck, looking at it, then drawing another card without replacement
3. Assessing Independence
   1. if P(A|B) = P(A), then A and B are independent
   2. that’s A given B
4. Determining dependence based on the sample data
   1. If we observe difference between two conditional probabilities, we say it’s dependent.
      1. Next, we run a hypothesis test to see if the data is dependent
      2. like the gender promotion bias hypothesis
   2. If the observed difference is large, there is stronger evidence that the difference is real (such as the gun ownership/race probabilities)
   3. If the sample size is large, even small differences in probabilities can provide strong evidence of a real difference
5. Multiplication Rule for Independence
   1. If A and B are independent, then P(A and B) = P(A) \* P(B)
   2. can be expanded to as many events as needed
      1. P(A and B and C and…X) = P(A) \* P(B) \* P(C)\*…\*P(X)