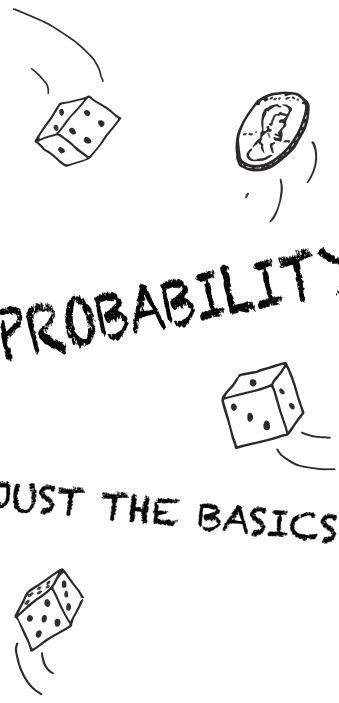


# PROBABILITY

## JUST THE BASICS



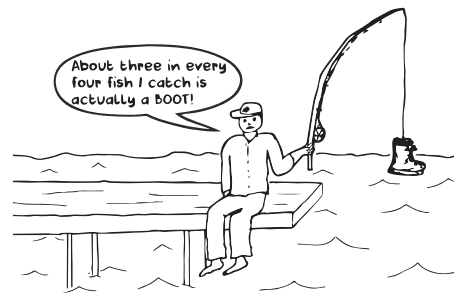
# UNCERTAINTY & CHANCE...

SHOW UP ALL THE TIME IN EVERYDAY LIFE



# PROBABILITY

HOW MANY TIMES ON AVERAGE YOU EXPECT AN UNCERTAIN EVENT TO HAPPEN AFTER A NUMBER OF REPETITIONS



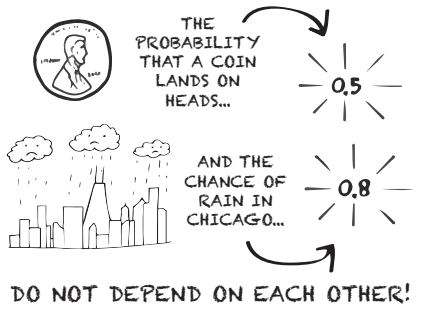
FOR THIS UNLUCKY FISHERMAN, THE PROBABILITY OF CATCHING A BOOT IS:

expected # of boots caught  $\rightarrow \frac{3}{4} = 0.75$  or 75%

total # of "fish" caught  $\rightarrow$

# INDEPENDENT EVENTS

EVENTS WHOSE PROBABILITIES DO NOT DEPEND ON EACH OTHER



DO NOT DEPEND ON EACH OTHER!

INDEPENDENT PROBABILITIES MULTIPLY!

SO THE PROBABILITY THAT IT IS RAINING AND WE GET A HEADS IS...  $0.5 \times 0.8 = 0.4$

# DEPENDENT EVENTS

WHEN THE OUTCOME OF ONE EVENT AFFECTS THE PROBABILITY OF ANOTHER

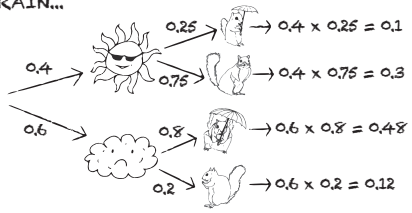
WHEN IT'S RAINING, 80% OF PEOPLE CARRY AN UMBRELLA



BUT, WHEN IT'S NOT RAINING, ONLY 25% OF PEOPLE CARRY AN UMBRELLA

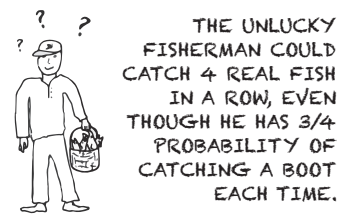


SO, WHEN THERE'S A 60% CHANCE OF RAIN...



# COMMON MISTAKES

PROBABILITY IS JUST AN AVERAGE



IF YOU FLIP A COIN AND GET HEADS 6 TIMES IN A ROW, WHAT IS THE PROBABILITY THAT THE NEXT ONE IS HEADS TOO?



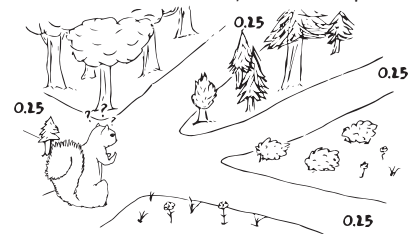
ANSWER: IT'S STILL 0.5!



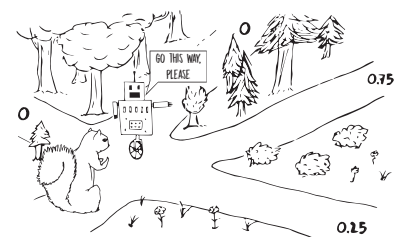
BECAUSE COIN FLIPS ARE INDEPENDENT OF ONE ANOTHER!

# QUANTUM COMPUTATIONS

We use probabilities to express the likelihood of each outcome in a quantum computation



And quantum algorithms adjust and refine those probabilities to make the correct outcome the most likely!



Find more Quantum Computing zines here:

<https://www.epiqc.cs.uchicago.edu/resources/>

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