



### Coincidence and Uncertainty in Daily Life

- many events in our daily lives arise in terms of probabilities and statistics—even the basic interactions of molecules and subatomic particles
- we can use probability to move beyond a vague sense of disordered randomness and describe possible outcomes



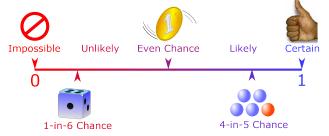
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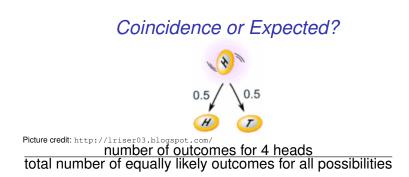
Picture credit: http://spikedmath.com/355.html

### Probability

- quantitative measure of the likelihood of an event
- mathematical foundation of common sense and good judgment
- 0 to 1 (or 0% to 100%)



Picture credit: https://www.mathsisfun.com/data/probability.html



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### Coincidence or Expected?



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Picture credit: http://lriser03.blogspot.com/ \_\_\_\_\_number of outcomes for 4 heads

total number of equally likely outcomes for all possibilities

1 possibility for 4 heads: HHHH

### Coincidence or Expected?



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How many possible outcomes total? 2 choices for each toss, so multiply 2  $\times$  2  $\times$  2  $\times$  2

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# Coincidence or Expected? Picture credit: http://lriser03.blogspot.com/ number of outcomes for 4 heads total number of equally likely outcomes for all possibilities 1 possibility for 4 heads: HHHH

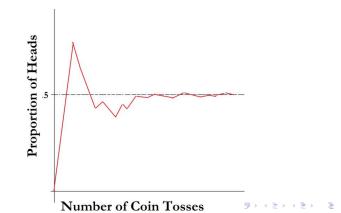
How many possible outcomes total? 2 choices for each toss, so multiply 2  $\times$  2  $\times$  2  $\times$  2

probability of 4 heads in 4 tosses:  $\frac{1}{16}$ 

## Coincidence or Expected? Picture credit: http://lriser03.blogspot.com/ number of outcomes for 4 heads total number of equally likely outcomes for all possibilities 1 possibility for 4 heads: HHHH How many possible outcomes total? 2 choices for each toss, so multiply $2 \times 2 \times 2 \times 2$ probability of 4 heads in 4 tosses: $\frac{1}{16}$ expected number of people? $\frac{1}{16}$ × number of people in class

### Law of Large Numbers

- small number of experiments can have random fluctuations
- repeat an experiment a large number of times: outcome tends to the probability with much greater certainty



### Data on Ourselves, Nature, and Countries

Consumer Statistics and Probability 6/14-6/25 / quantifying ourselves and nature hand in / Answer the questions...

#### Anonymous Class Data Collection

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Complete the following questions. Your identity will remain anonymous (as we will only examine portions of the data at any time).

#### Comparing and Ranking Countries

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Bangladesh	•	0	0	0	0	0	0	0	•	0	0	0	•	0	0
Botswana	•	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	•	٥	0	Θ	0	0	0	0	•	0	0
China	•	0	0	0	0	0	0	Θ	0	0	0	0	•	0	0
Democratic Republic of the Congo	•	0	0	0	0	0	0	0	0	0	0	0	•	0	0
Ethiopia	•	0	0	۲	۲	0	0	0	0	0	0	0	•	0	0
ndia	•	۲	0	۲	0	0	0	0	۲	0	0	0	۲	٥	0
Japan	•	۲	0	۲	0	0	0	0	۲	0	0	0	۲	٥	0
Mexico	•	0	0	۲	0	0	0	0	۲	0	0	0	0	٥	0
Nigeria	۲	0	Θ	0	Θ	0	0	Θ	Θ	0	0	0	Θ	0	0
Republic of Korea	۲	0	Θ	0	Θ	0	Θ	Θ	Θ	Θ	0	0	0	0	0
Russian Federation	•	Θ	Θ	Θ	0	0	Θ	Θ	Θ	Θ	Θ	Θ	0	0	Θ
Singapore	•	0	Θ	0	0	0	Θ	0	0	Θ	Θ	0	•	0	0
South Africa	•	0	Θ	0	0	0	Θ	0	0	Θ	Θ	0	•	0	0
Ukraine	•	0	Θ	0	0	0	Θ	0	0	Θ	0	0	•	0	0
United States of America		0	0	0		Θ	0	0	0	0	0	0		0	0

#### Rate the countries as per our work in class, where 1 is the highest ranking and 16 is the lowest.

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What factors/variables did you use in your rankings?

#### Comparing and Ranking Countries Real-life data and presentations of it Designing Probability experiments Critical and creative Predicting the future and making decisions analysis Data and bias collection Ethical standards Problem solving at the heart of mathematics: visualization, generalization, making decisions and the second