

# Intro to Market-Making: Paragon

# Thought Experiment 1

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- How many elephants are there in the world? (Spot Estimate)
- How confident are you that this is exactly right in terms of a percentage?

# Thinking about Confidence Intervals

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- Definition:
- **Correct interpretation:** If we repeated the sampling process over and over, 95% of the intervals constructed in this way would contain the true parameter. The interval we have, therefore, has been calculated with a method that captures the true value 95% of the time.
- **Incorrect interpretation:** There's a 95% chance that the true parameter lies within *this specific interval*. Once the interval is calculated, the true parameter is either in it or not — the 95% figure refers to the reliability of the process, not the probability for this specific interval.

Your width of the interval should be some **function** of your confidence level.

Ex: 99% Confidence Interval on Number of Elephants: 10k to 100 million

50% Confidence Interval on Number of Elephants: 100k to 800k

# What does this have to do with Quant?

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- Thought Experiment 2:



**What price would you buy a ticket to this year's March Madness Final at?**




**What price would you sell it at?**

**What if it's your favorite team playing?**

# Defining Market Making

- **Bid**: The amount you are willing to pay to purchase something
- **Ask**: The amount you are willing to sell something for
- **Spread**: The difference between your bid and ask
- **Fair Value**: What you think the real, true value of the contract is

<div> <b>Donald Trump</b> \$998,559,124 Vol. </div> <div>59.9%</div> <div>Buy Yes 60.0¢</div> <div>Buy No 40.1¢</div>			
Order Book   Graph   Resolution   Rewards 			
TRADE YES	PRICE	SHARES	TOTAL
	60.3¢	50,849.00	\$187,711.62
	60.2¢	7,958.08	\$157,049.67
	60.1¢	141,392.93	\$152,258.91
Asks	60.0¢	112,136.27	\$67,281.76
Last: 60.0¢   Spread: 0.1¢			
Bids	59.9¢	1,176.32	\$704.62
	59.8¢	5,000.20	\$3,694.74
	59.7¢	22,041.08	\$16,853.26
	59.6¢	9,321.00	\$22,408.58

<div> <b>Kamala Harris</b> \$624,536,609 Vol. </div> <div>40.3%</div> <div>Buy Yes 40.3¢</div> <div>Buy No 59.8¢</div>			
Order Book   Graph   Resolution   Rewards 			
TRADE YES	PRICE	SHARES	TOTAL
	40.6¢	10,128.00	\$33,128.00
	40.5¢	34,263.44	\$29,016.03
	40.4¢	21,545.00	\$15,139.34
Asks	40.3¢	15,968.14	\$6,435.16
Last: 40.2¢   Spread: 0.1¢			
Bids	40.2¢	18,332.98	\$7,369.86
	40.1¢	38,862.44	\$22,953.70
	40.0¢	44,403.39	\$40,715.06
	39.9¢	40,324.09	\$56,804.37

# Chiefs Winning the SuperBowl: Explained

 Chiefs	19%	Buy Yes 19.8¢	Buy No 81.1¢
\$2,598,848 Vol. 			
Order Book	Graph	Resolution	Rewards  
TRADE YES	PRICE	SHARES	TOTAL
	20.1¢	266.39	\$5,160.45
	20.0¢	153.72	\$5,106.91
	19.9¢	25,456.54	\$5,076.17
Asks	19.8¢	52.13	\$10.32
Last: 18.9¢	Spread: 0.9¢		
Bids	18.9¢	633.71	\$119.77
	18.7¢	197.00	\$156.61
	18.6¢	100.00	\$175.21
	18.3¢	50.00	\$184.36

If I was a market maker on this market, I can make 0.9 cents by putting my market at

18.9c at 19.8c (Fair Value ~ 19.3c)

if I can get 2 people to disagree if they think the Chiefs will win or lose the Superbowl!

Hence, you want to set your price to where you can get one person to buy if they think 19.3% is cheap, or sell if they think 19.3% is expensive.

What if my Chiefs SB market is 85c at 86c? What would you do?

# When can I lose as a Market Maker?

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## 1.) I have a bad market!

- I don't capture "two way flow" (disagreeing opinions) and so I'm skewed towards either buying or selling a lot of contracts at bad prices.
- Ex: (Made Before Meeting) Number of People in this Room: **85 at 105**
  - What would you do on this market?
  - **I am so far off that when this "settles" (count the # of ppl), I lose!**

# When can I lose as a Market Maker?

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## 2.) Being too Narrow or Too Wide:

- Narrow:
  - The narrower I am, the less confident I am that I captured the value in between. (**Think a 50% Confidence Interval**)
  - If the true value is in between my numbers, I make money as a MM! But if I am too narrow, I could lose money as my spread fails to capture the true value.
- Wide:
  - The wider I am, the more confident I am that I captured the value in between (**Think a 90% Confidence Interval**)
  - Ex: Number of People in this Room: 10 at 200
    - **No one will trade on this market! I can't make money if no one is going to trade!**
- How do I decide if I am too narrow or too wide?



# When can I lose as a Market Maker?

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## 3.) Information Asymmetry:

- Thought Experiment 3: **What is the current temperature in Budapest Hungary?**
  - Raise your hand and give me a 3 wide Market

# When can I lose as a Market Maker?

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## 3.) Information Asymmetry:

- Thought Experiment 3: **What is the current temperature in Budapest Hungary?**
  - Raise your hand and give me a 3 wide Market
- Even though you made a pretty good market, you lost because **I know the answer**. This happens all the time in trading: whether someone knows which direction a stock is going or if they have obtained a piece of research no one else has, this leads to trading opportunities!
- **Adverse Selection**

# Things to Consider

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- Who am I trading against? Do they have any biases or opinions that I can take advantage of? How can I make my market to express my own opinion? (**MARKET TAKING**)
- Is the person I am trading against “sharp”? Could they know more than I do? How should I adjust my market to limit their “market-taking” opportunities?
- How much do I know about this contract? Should I be a market maker if I have no clue what the fair value is?
- If someone just traded on my market, how do I update my market? What information did I gain? How do I connect the dots based on these trades?

# General Market Making Landscape

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