Opening Exercise (Do now!)

Write one (general-knowledge) fact that you are X% sure of, for each of the following X: {10, 30, 50, 70, 90}

Try not to “game the system” by writing obviously true things, like that 1 + 1 = 2. (Are you really only 30% sure of that?) The goal isn’t being correct, but being calibrated - that is, being the most accurate judge of your self-confidence.

When you’re done, feel free to count the number of equilateral triangles that can be formed from the vertices in the picture. How confident are you?
The Calibration Game

Answer each of the following questions with a range that you are 90% sure the real answer is in (a “90% confidence interval”)

Example: How many people are there in this call?
   If you are 90% sure the answer is between 15 & 25, write “15-25”

Note this means you should be right for around 9 of the 10 questions
Questions and Answers

1. North Dakota was the xth state to enter the Union
2. Canada has x provinces
3. x people have walked on the moon
4. An average banana contains x calories
5. Metropolitan Boston has x colleges/universities
6. Spain’s population is x million
7. The world’s longest bridge is x miles long
8. Magnus Carlsen’s (world chess champion) peak rating was x
9. Pac-man came out in year x
10. The average body temperature of an adult chicken is x
Questions and Answers

1. North Dakota was the xth state to enter the Union: 39
2. Canada has x provinces: 10
3. x people have walked on the moon: 12
4. An average banana contains x calories: 105
5. Metropolitan Boston (“within the 128/95/1 loop”) has x colleges/universities: 52
6. Spain’s population is x million: 46.94
7. The world’s longest bridge is x miles long: 102.4
8. Magnus Carlsen’s (world chess champion) peak rating was x: 2882
9. Pac-man came out in year x: 1980
10. The average body temperature of an adult chicken is x: “105-107”
Results?
Self-Calibration

S1/S2 and biases
Today

1) S1 and S2
2) Predictable Biases
3) Overconfidence
1. S1 & S2
Our Two Systems

- One way to **model** our brains
Our Two Systems

- One way to model our brains
- System 1 & System 2
Our Two Systems

- One way to **model** our brains
- System 1 & System 2
- Solve the following math problem as fast as you can
1 + 1
Our Two Systems

- One way to **model** our brains
- System 1 & System 2
- Solve the following math problem as fast as you can
- Try **not** to solve the following math problem
2 + 2
So... what is System 1?

- "Fast"
- Intuition-based
So... what is System 1?

- “Fast”
- Intuition-based
So... what is System 1?

- “Fast”
- Intuition-based
- Can’t stop yourself (more on this later)
What about System 2?
But first... another math problem
94 \times 237
System 2

- “Slow”
System 2

- “Slow”
- Effortful
System 2

- "Slow"
- Effortful
System 2

- “Slow”
- Effortful
- Attention-using
System 2

- “Slow”
- Effortful
- Attention-using
- Requires concentration
2. Predictable Biases
Vocabulary

**Bias**: a systematic error in our thinking

**Heuristic**: a rule of thumb for our thinking that usually works
2a. Ease
Cognitive Ease

Repeated
Clearly displayed
Easy to follow
Good mood

Feels effortless
Feels good
Feels familiar
Feels true
Fact:

Mahatma Gandhi was born in 1874.

Mahatma Gandhi was born in 1856.
Some Sayings

Woes unite foes

Little strokes can tumble great oaks
Some Sayings, ver. 2

Woes unite enemies

Little strokes can tumble great trees
Did you know?

Pushkin’s disease is transmitted through tick bites and has symptoms including a tight chest and puffiness.
Mere Exposure Effect

Pushkin’s disease is transmitted through tick bites and has symptoms including a tight chest and puffiness.

Seeing is believing!
Notice confusion.
Humans assume truth by default

- How do people check if a statement is true?
- First, assume that it's true. If it seems weird, then unbelieve it.
- There is no other way to do this.
- What might this idea imply?
- If your S2 is not ready to do the gruntwork necessary to really, really check, then you are predisposed to just believing anything you hear!
2b. Faulty Memory
Do Now: remember these words!

bed    rest    awake    tired    dream

wake    snooze    blanket    doze

slumber    snore    nap    peaceful

night    yawn    drowsy
Write the ones you remember
An Associative Machine

Boston is in Massachusetts.
Plants need water.
Chickens have four legs.

Chickens have three legs.
A ball is coming towards you...
S1 knows what is normal

The large mouse ran over the trunk of a small elephant.
How S1 knows what is normal

S1 takes in cues (evidence) to decide what is normal
It then changes (updates) your mental models
How S1 knows what is normal

S1 takes in cues (evidence) to decide what is normal.
It then changes (updates) your mental models.

Very little repetition is needed! "Coincidence? I think not!"
We like thinking in stories & have a strong sense of causality (S1)
Relation between ice cream sales and lifeguard incidents
“Correlation is not Causation”

First impressions: ice cream might make swimming hard?

Zoom out: actually, these both are just caused by hot days!

https://www.tylervigen.com/spurious-correlations
S1 loves jumping to...

Will Mindik be a good leader? She is intelligent and strong.
Vending Machines
Vending Machines

We judge ourselves by our intentions,

but judge others by their actions.
Look at these people. Glassy-eyed automatons going about their daily lives, never stopping to look around and think! I’m the only conscious human in a world of sheep.
Seeking coherent narratives

Consider the cardiologist issue: Maryland cardiologist performs over 500 dangerous unnecessary surgeries to make money. Unrelated Maryland cardiologist performs another 25 in a separate incident. California cardiologist does several hundred dangerous unnecessary surgeries and gets raided by the FBI. Philadelphia cardiologist, same. North Carolina cardiologist, same. 11 Kentucky cardiologists, same. Just a couple of miles from me, a cardiologist was found to have done $4 million worth of the same. Etc, etc, etc.
Seeking coherent narratives

Assume that there are about 1 billion (1,000,000,000) Chinese people in the world, and that one in a thousand (1/1000) of these are robbers.

Furthermore, suppose for some reason that I wanted to make the point that Chinese people like to steal things.

I’d be able to write articles for years “proving” this.
Seeking coherent narratives

The halo effect is the tendency to like (or dislike) all the traits of a person (or thing).

Say, at a party, you meet someone named Joan. She is personable and easy to talk to. You can see that she is generally a popular person.

Would Joan be someone to donate to charity?
Seeking coherent narratives

Alan:
intelligent, industrious, impulsive, critical, stubborn, envious

Ben:
envious, stubborn, critical, impulsive, industrious, intelligent

The sequence in which we observe characteristics of a person is often determined by chance. Sequence matters, however, because the halo effect increases the weight of first impressions
Post-World War II study found the following results:

1. Better educated soldiers suffered more adjustment problems than less educated soldiers. (Intellectuals were less prepared for battle stresses than street-smart people.)
2. Southern soldiers coped better with the hot South Sea Island climate than Northern soldiers. (Southerners are more accustomed to hot weather.)
3. White privates were more eager to be promoted to officers than Black privates. (Years of oppression take a toll on achievement motivation.)
4. Southern Blacks preferred working with Southern officers to Northern White officers. (Southern officers were more experienced and skilled in interacting with Blacks.)
5. Soldiers were more eager to return home during the war than after the war ended. (During the fighting, soldiers knew they were in mortal danger.)

However, the historian Arthur Schlesinger Jr. dismissed these as “ponderous demonstrations” of common sense.
Kidney Cancer

A study of kidney cancer in the 3,141 US counties:

The counties in which the incidence of kidney cancer is lowest are mostly rural, sparsely populated, in traditionally Republican states in the Midwest, the South, and the West.

Why?
Money Matters: FREE!!

Geico: Save up to 15% or more on car insurance!

The more you spend, the more you save!
Which would you choose?

Video games:

1. Digital-only copy for $49
2. Physical-only copy for $89
3. Digital AND physical copy for $89
Which would you choose?

Video games:

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100 students at MIT's Sloan School of Management
Which would you choose?

Video games:

1. Digital-only copy for $49 -- 16
2. Physical-only copy for $89 -- 0
3. Digital AND physical copy for $89 -- 84

100 students at MIT’s Sloan School of Management
Which would you choose?

Video games:

1. Digital-only copy for $49
2. Digital AND physical copy for $89
Which would you choose?

Video games:

1. Digital-only copy for $49 -- 68
2. Digital AND physical copy for $89 -- 32
I used to think correlation implied causation.

Then I took a statistics class. Now I don’t.

Sounds like the class helped.

Well, maybe.
Decision Making: $

Cafe to hang out with a friend:
$3 - Small regular coffee / tea
$5 - Medium Americano / iced tea with lemonade
$8 - Large latte

New TV
36-inch Panasonic for $690
42-inch Toshiba for $850
50-inch Philips for $1,480
Decision Making: $

Suppose you are on an errand to buy a new, nice pen. At an office supply store, you find a nice pen for $25. You are set to buy it, when you remember that the same pen is on sale for $18 at another store 15 minutes away.
Decision Making: $  

Suppose you are on another errand to buy a new, nice suit.

You find a luxurious gray pinstripe suit for $455 and decide to buy it, but then another customer whispers in your ear that the exact same suit is on sale for only $448 at another store, just 15 minutes away.
3. Overconfidence

In Summary
People tend to be overconfident.
Priors, Evidence, and Updating

- Broadly speaking, your **priors** are your beliefs **before** you see anything new.
- Anything new that you notice is **evidence**.
- You (should) then **update** your priors.

- E.g.: Heads or tails?
- E.g.: You notice someone flying
Map and the Territory
CRACK

BOOM

WHOA! WE SHOULD GET INSIDE!

IT'S OKAY! LIGHTNING ONLY KILLS ABOUT 45 AMERICANS A YEAR, SO THE CHANCES OF DYING ARE ONLY ONE IN 7,000,000. LET'S GO ON!

THE ANNUAL DEATH RATE AMONG PEOPLE WHO KNOW THAT STATISTIC IS ONE IN SIX.