

THE COGNITIVE BIAS CODEX

What Should We Remember?

To avoid mistakes, we aim to preserve autonomy and group status, and avoid irreversible decisions

To get things done, we tend to complete things we've invested time and energy in

To stay focused, we favor the immediate, relatable thing in front of us

To act, we must be confident we can make an impact and feel what we do is important

Need To Act Fast

We project our current mindset and assumptions onto the past and future

We store memories differently based on how they were experienced

We reduce events and lists to their key elements

We discard specifics to form generalities

We edit and reinforce some memories after the fact

We favor simple-looking options and complete information over complex, ambiguous options

Less-is-better effect, Occam's razor, Confirmation bias, Law of triviality, Bike shedding effect, Information bias, Ambiguity bias, Status quo bias, Social comparison effect, Decreation, Reactance, Reverse psychology, System justification effect

Backfire effect, Processing difficulty effect, Pseudodiscordancy effect, Disposition effect, Zero-risk bias, IKEA effect, Loss aversion, Generation effect, Impression escalation, Appeal to novelty, Identifiable victim effect, Hyperbolic discounting, Pizarman effect, Risk compensation, Prior justification bias, Prior justification bias that associates blame with action, Defensive attribution hypothesis, Fundamental attribution error, Attribution of personal traits to others, Unconscious bias, False witness effect, Social desirability effect, Overconfidence effect, Self-constraining bias

We notice things already primed in memory or repeated often

Bizarre, funny, visually striking, or anthropomorphic things stick out more than non-bizarre/unfunny things

We notice when something has changed

Too Much Information

We are drawn to details that confirm our own existing beliefs

We notice flaws in others more easily than we notice flaws in ourselves

We tend to find stories and patterns even when looking at sparse data

We fill in characteristics from stereotypes, generalities, and prior histories

We imagine things and people we're familiar with or fond of as better

We simplify probabilities and numbers to make them easier to think about

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Intro

Intro Poem

- I have read a cool book.
-
-
-

Intro Poem

- I have read a cool book.
- And you should too!
-
-

Intro Poem

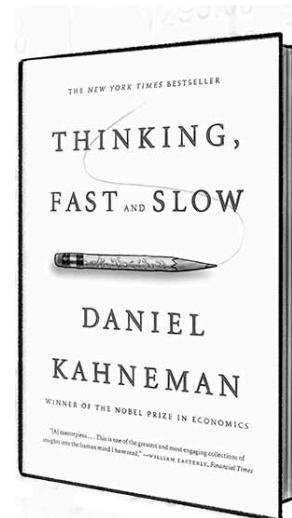
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Cognitive biases



- Our brain was not made to write software.
- We tend to think of our brain as reliable logical processor.
- Our brain has bugs, which are called *cognitive bias*.
- We focus on how our brain prohibits writing good software.
- I'm qualified for this talk because I do software and have a brain.

Don't believe me?



Don't believe me?

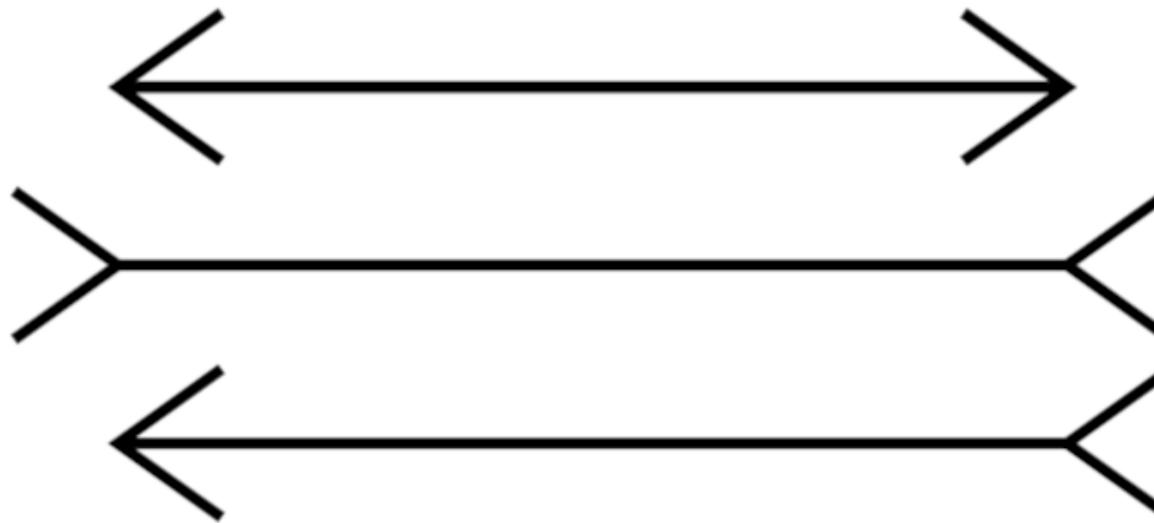


Watch your thoughts:

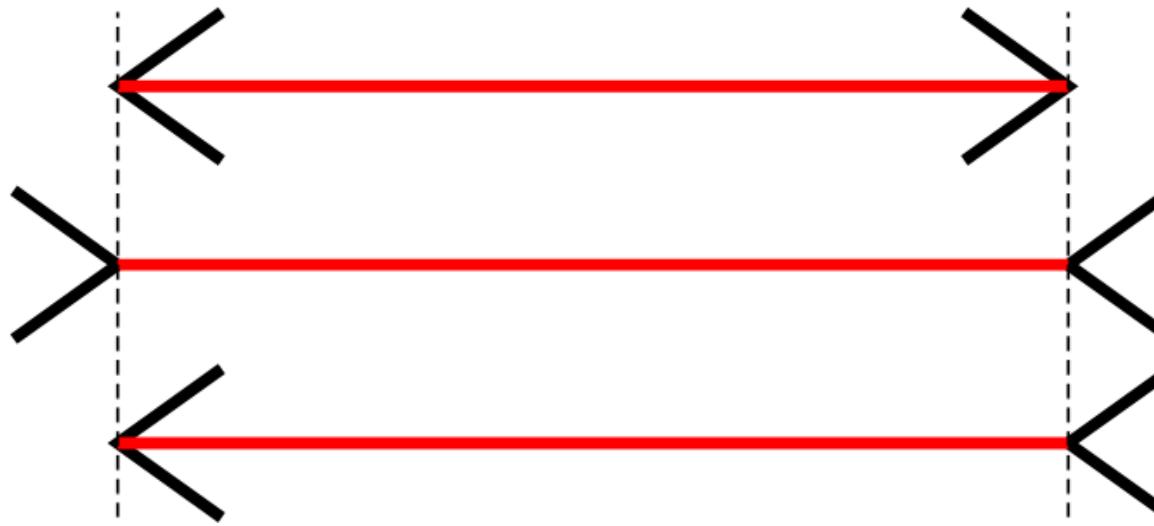
Watch your thoughts:



Which is the longest line?

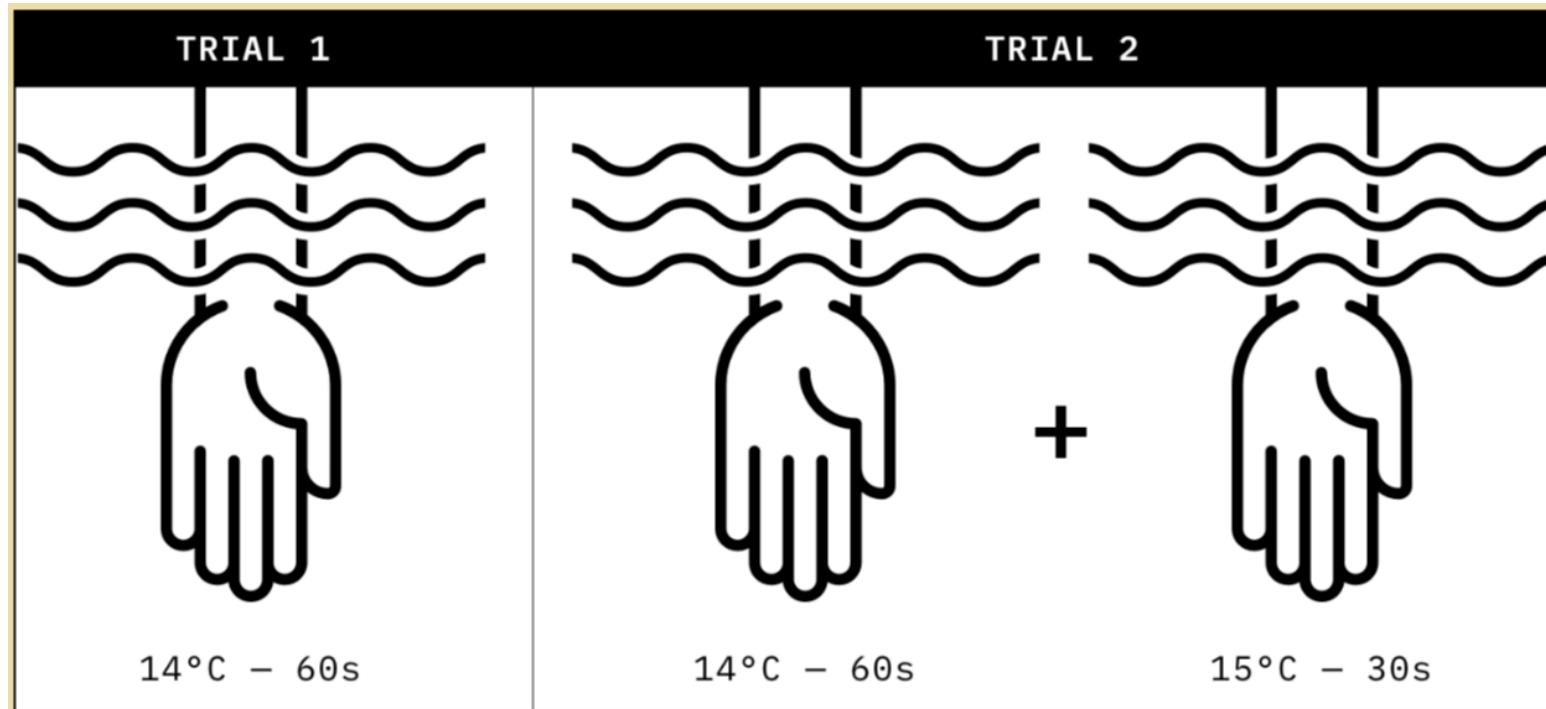


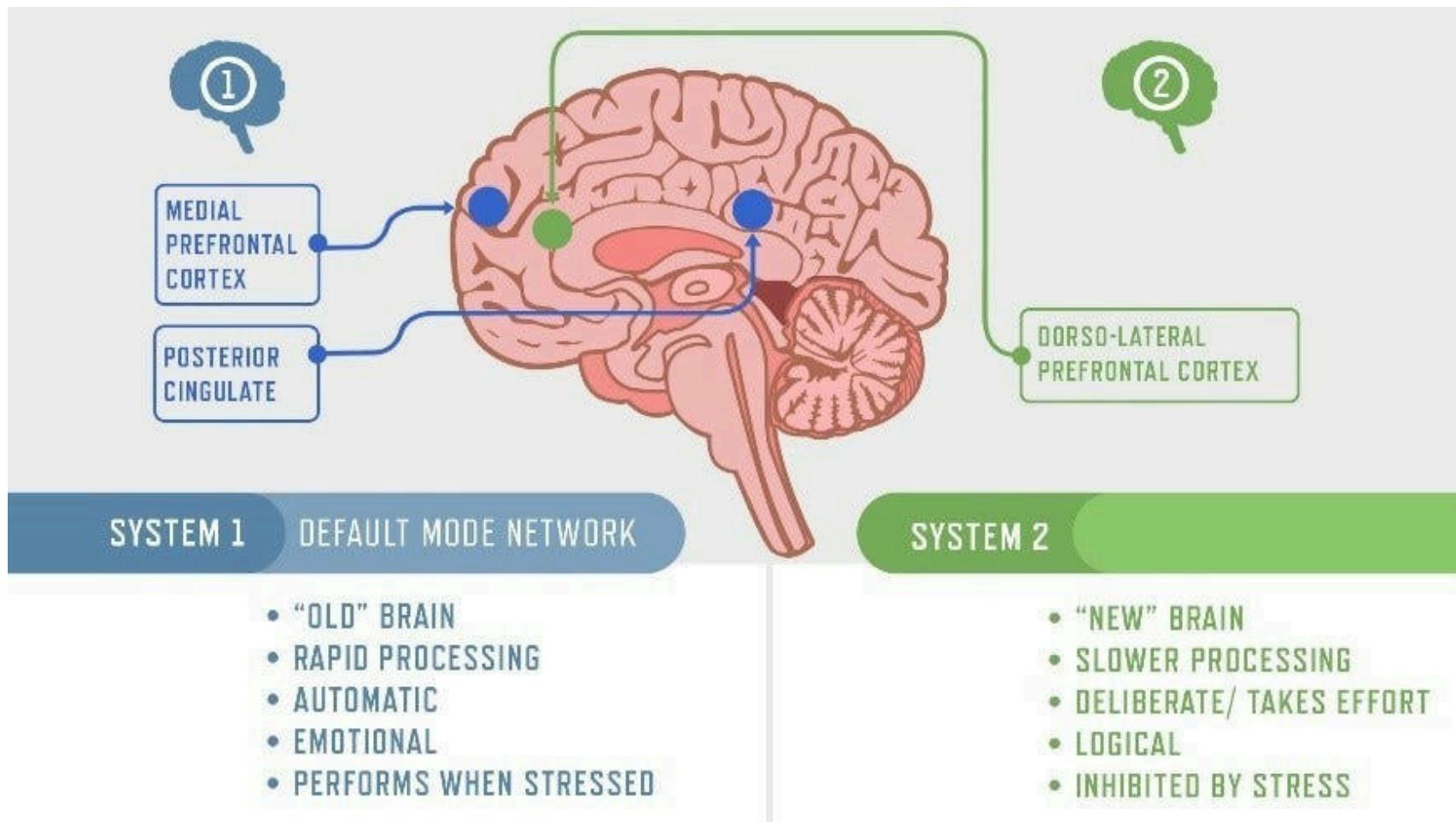
Which is the longest line?



THE CAT

Peak-End-Rule





Math

- $2 + 2$
-
-

Math

- $2 + 2$
- $21 \cdot 13$
-

Math

- $2 + 2$
- $21 \cdot 13$
- $77 + 33$

Intelligence vs Rationality

“Linda is 31 years old, single, outspoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations.”

Intelligence vs Rationality

“Linda is 31 years old, single, outspoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations.”

You have 5 seconds. Which is more likely?

Raise left hand for 1, right for 2.

Intelligence vs Rationality

“Linda is 31 years old, single, outspoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations.”

1. Linda is a bank teller.
2. Linda is a bank teller and is active in the feminist movement.

Framing

The way of presentation of information influences how it is perceived.

Imagine a patient with psychological issues called “Jon”:

- Patients like Jon commit crimes with a probability of 10%.
-

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Imagine a patient with psychological issues called “Jon”:

- Patients like Jon commit crimes with a probability of 10%.
- Out of 100 patients like Jon 10 will commit crimes.

Option 2 was considered way more dangerous by psychological practitioners.

Agenda

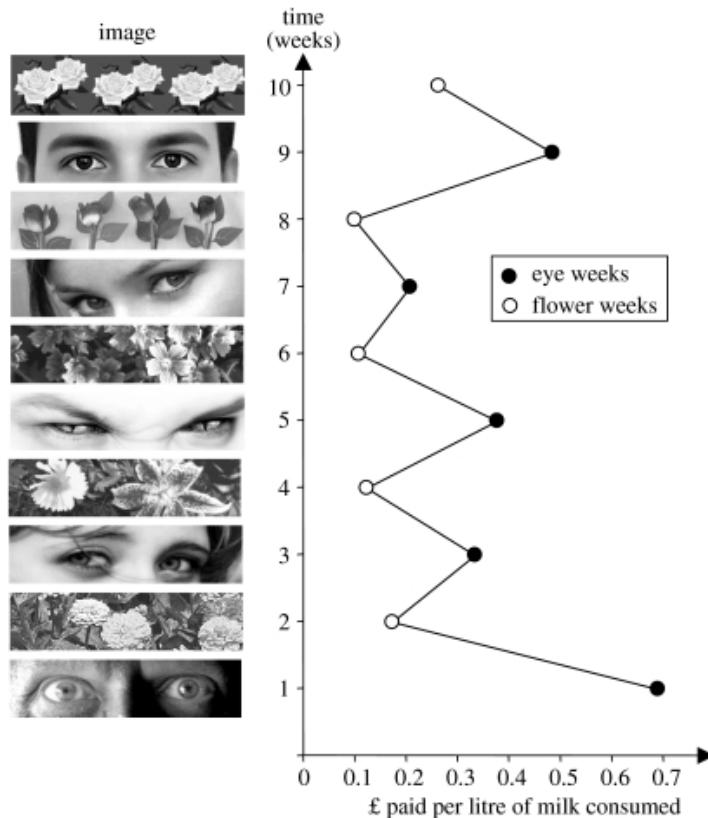
1. Intro
2. Agenda
3. Priming
4. Cargo Cult
5. Shiny Object Syndrome
6. Anchoring
7. Overconfidence
8. IKEA effect
9. Sunken Cost Fallacy
10. Curse of knowledge
11. Bikeshedding
12. Confirmation, Hindsight & Attribution Bias
13. Optimism bias
14. Halo effect
15. Outro

3 slides per cognitive bias:

- Experiment (Quiz, Story time, ...)
- Explanation & Effect (Why?)
- Fix (How to fix?)
- Discussion welcome after each bias.

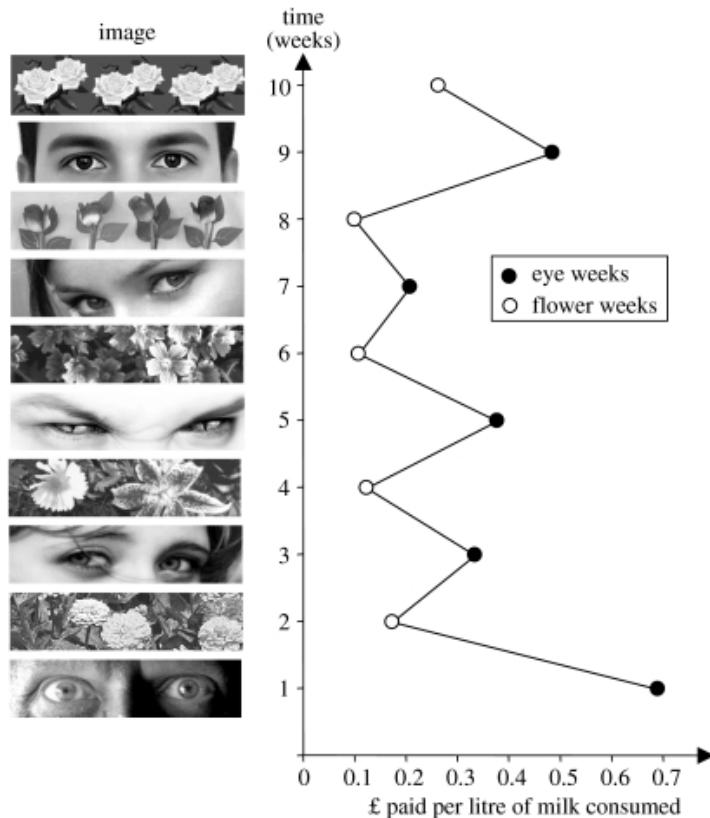
Priming

Experiment



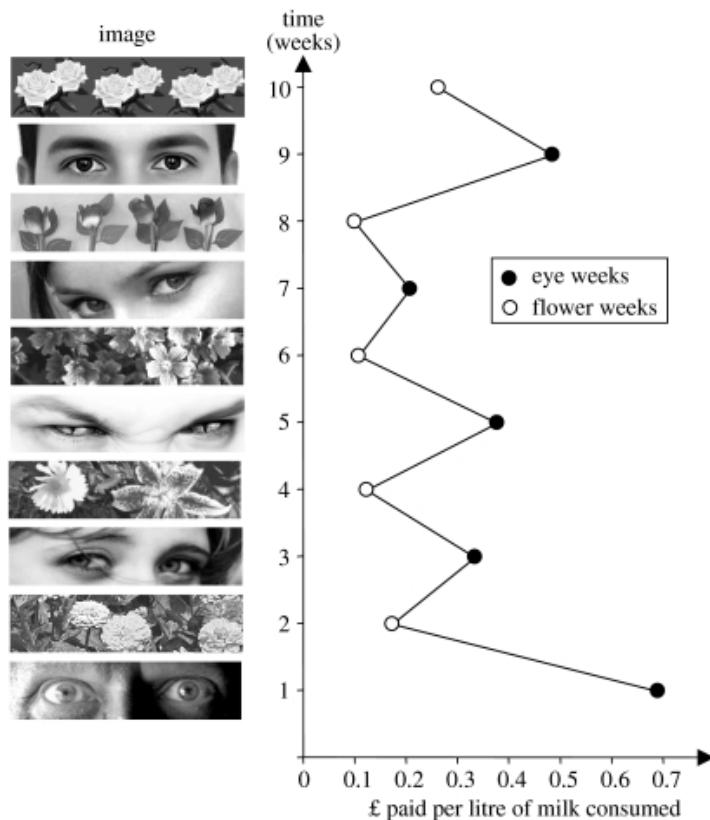
- A trust fund (“Bierkasse”) for coffee milk in office.
-
-
-

Experiment



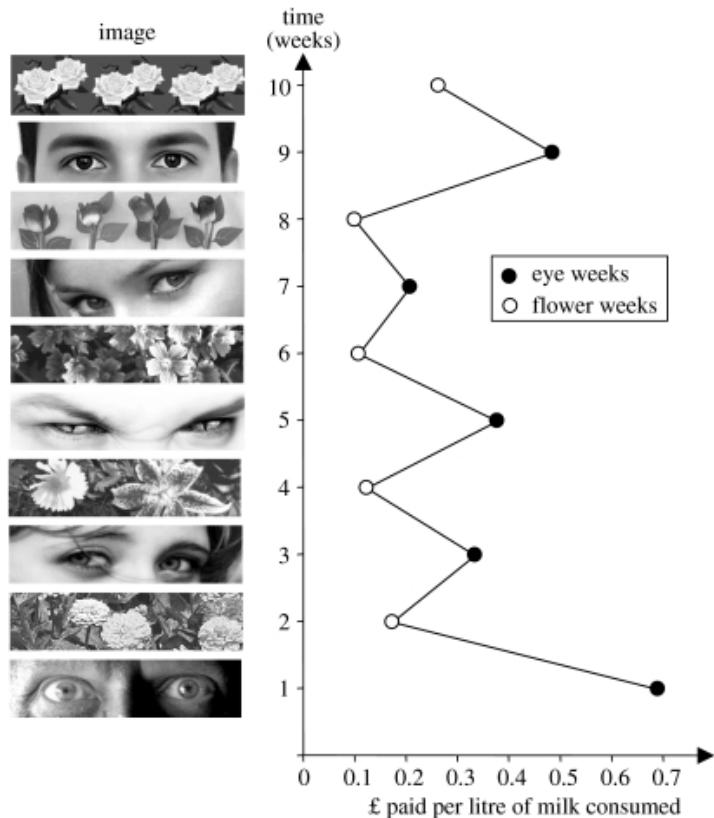
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Experiment



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- Images on the left was put above the £ box & changed weekly.
-

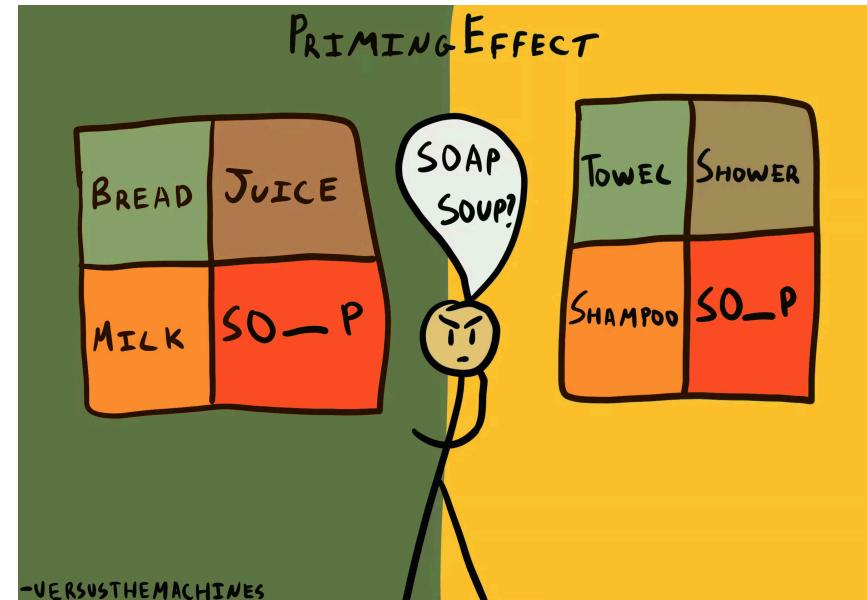
Experiment



- A trust fund (“Bierkasse”) for coffee milk in office.
- Amount of £ was based on trust.
- Images on the left was put above the £ box & changed weekly.
- Face images yielded a much higher cash flow.

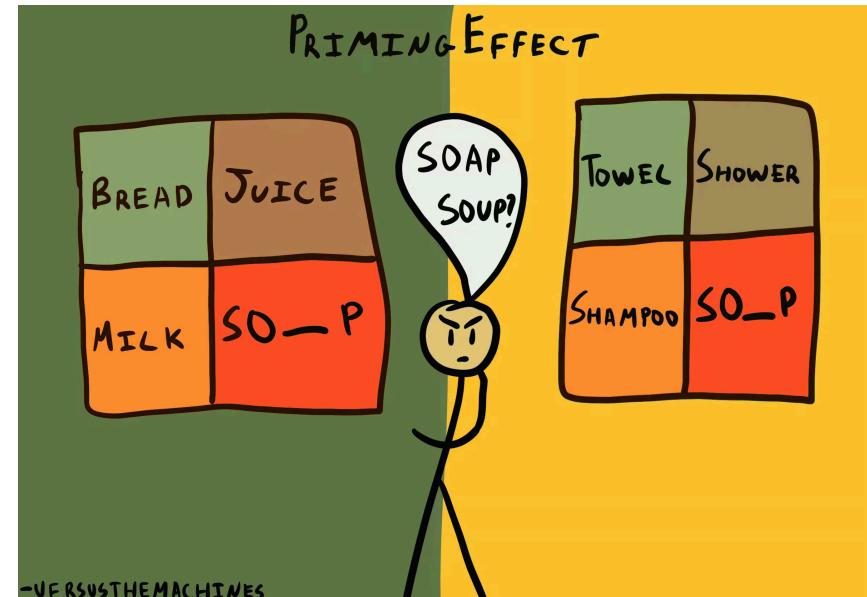
Explanation

- Feeling watched changes our behavior to more cautious.
-
-
-



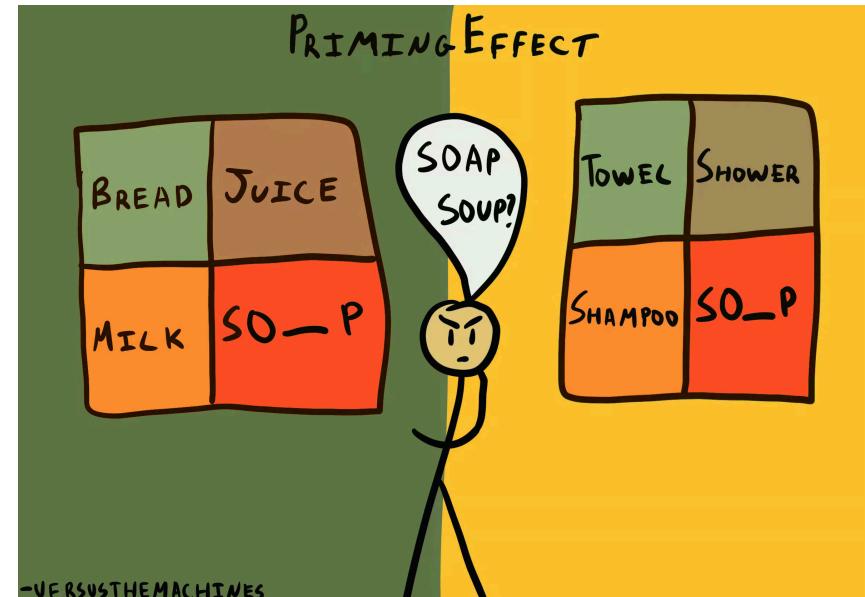
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- Feeling watched changes our behavior to more cautious.
- Thinking of happy moments improves our mood and makes us more gullible.
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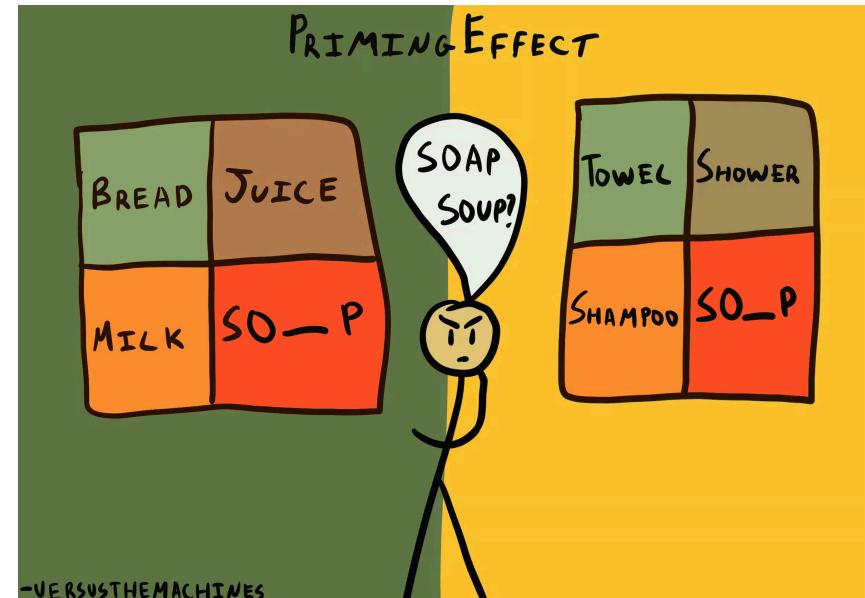
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- Thinking of bad memories makes us more analytical (and sad).
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Explanation

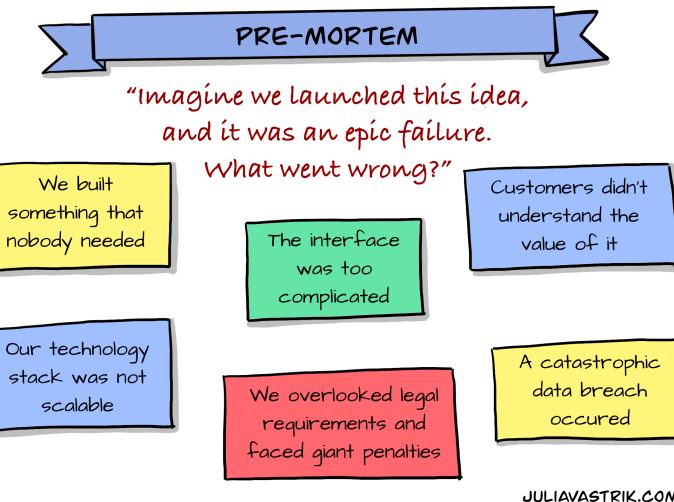
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- Thinking of money makes us more greedy.



Fix

None. If it happens it happens. But:

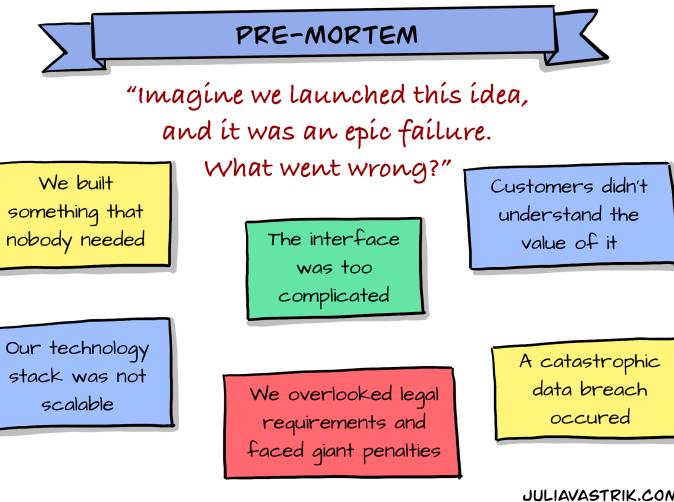
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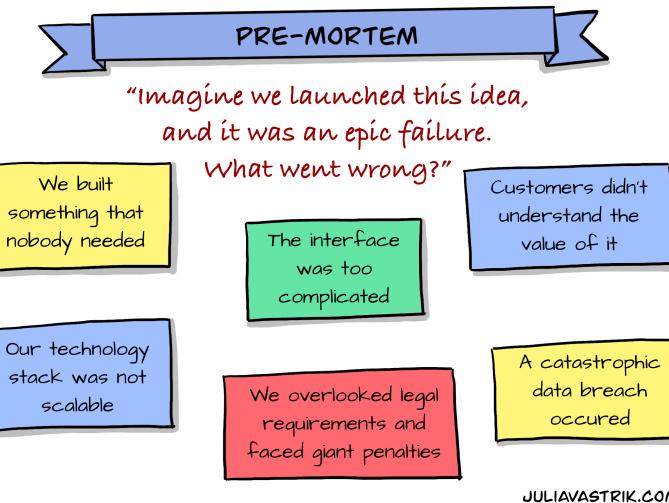
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- **Asking advice:** Do not mix explanation with opinions.
-



Fix

None. If it happens it happens. But:

- **Pre-Mortem:** Prime yourself to think about possible mistakes.
- **Asking advice:** Do not mix explanation with opinions.
- **Take time:** Priming wears off over time. Sleep over it.



Cargo Cult

Story



Explanation

- Doing rituals in the hope of gaining a benefit without understanding what leads to the benefit.
-
-
-

Explanation

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- For Software: Usually emulate successful software houses.
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- Examples: k8s, AI, Blockchain, ...
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Explanation

- Doing rituals in the hope of gaining a benefit without understanding what leads to the benefit.
- For Software: Usually emulate successful software houses.
- Examples: k8s, AI, Blockchain, ...
- We simply tend to copy behaviors of others, without thinking twice.



Fix

Ask: Do I understand it and do I need it?

Do not:

- Copy & Paste solutions that worked elsewhere without understanding.
- Fixing applications by “Shotgun debugging”.
- Applying tools like k8s – just because Google uses it.
- Applying patterns (e.g. GoF) without limit.
- ...

Shiny Object Syndrome

Experiment



Explanation

- New and exciting things release Dopamine.
- Applies to...
 - ▶ ...choosing new technology.
 - ▶ ...distractions in projects.
 - ▶ ...trends.



@marketoonist.com

Fix

- Use well-tested & renowned software.
- Strategy first and stick to it.
- Get used to be skeptic about new technology:
 - ▶ Does it solve an actual problem?
 - ▶ Can the technology improve software quality and reduce complexity?
 - ▶ Can I understand the new technology?
 - ▶ Do not ask: “Does it make my life easier?” or “Is it cool?”
- **Opposite:** Status Quo Bias.
- **Bonus:** Zero risk bias

Anchoring

Anchoring: Experiment

- Divide in two groups!
- Answer the question **silently** below and note on a piece of paper.
- If it is not your turn, close your eyes.

Anchoring: Experiment

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How high is the Eiffel tower? Is it higher than 1000m?

Anchoring: Experiment

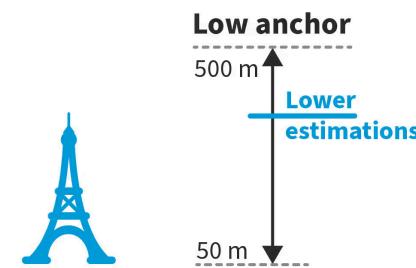
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Anchoring: Explanation

- We initially imagine something.
- The initial image is the anchor.
- We iterate until we feel happy about our guess.

Anchoring Effect



Interaction Design Foundation
interaction-design.org



Anchoring: Effect

Dangers:

- Effort estimations.
- Fixation on initial ideas.
- Dark patterns in frontend.

Bonus: Affinity Bias.



Overconfidence

Story

- Dunning Kruger
- Cognitive Dissonance.
- Illusory superiority
- Worse-than-average-effect (for very hard tasks)
- 80% of drivers judge themselves to be better than the average - which cannot be correct.

Explanation

- People with the required skill do not have the ability to judge themselves.
- The value of a skill is often not recognized.
- A positive self-image has positive effects on mental health.
- Cognitive Dissonance
- Recognizing the own incompetence is required for growth.

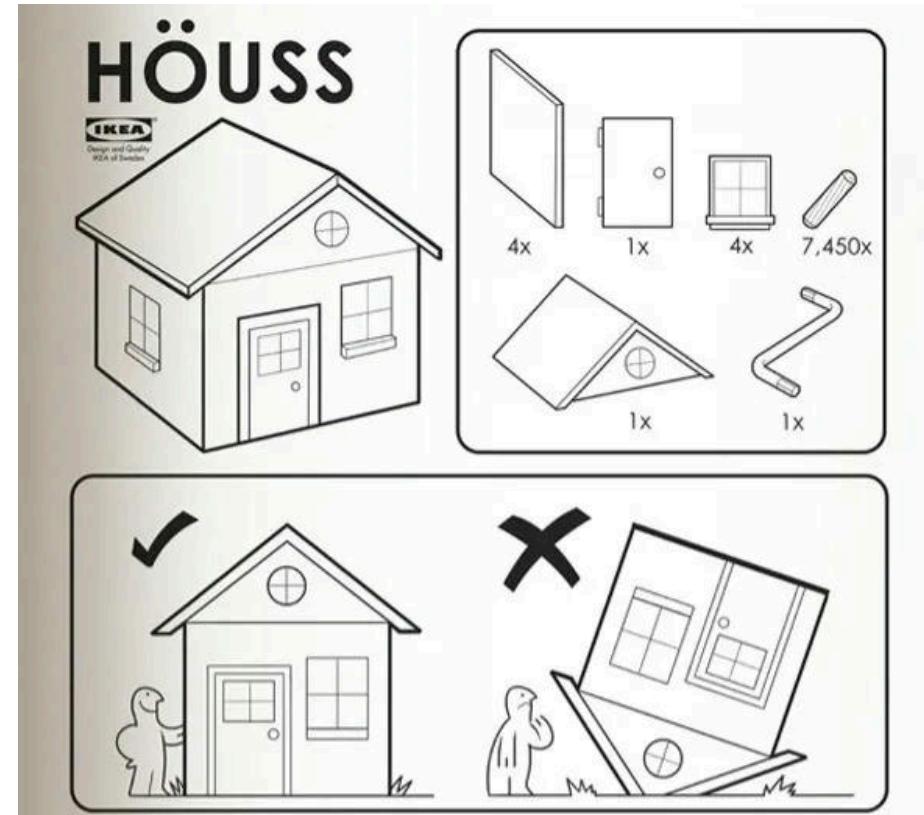
Fix

- If you feel like you are lacking, it might be a good sign!
- Force overconfident people to explain.
- Don't write code that overloads your brain.

IKEA effect

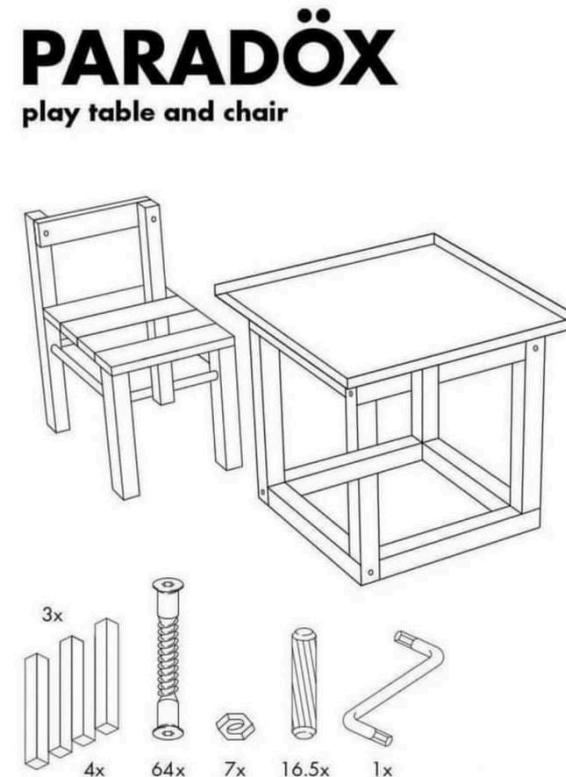
Story

- Goods are more valued if they are build by themselves.
- Even if done partially only.
- Even if done poorly!



Explanation

- Building something makes us feel confident about our skills.
- Elevates users to “co-creators”.
- The more effort the more positive we see the product.



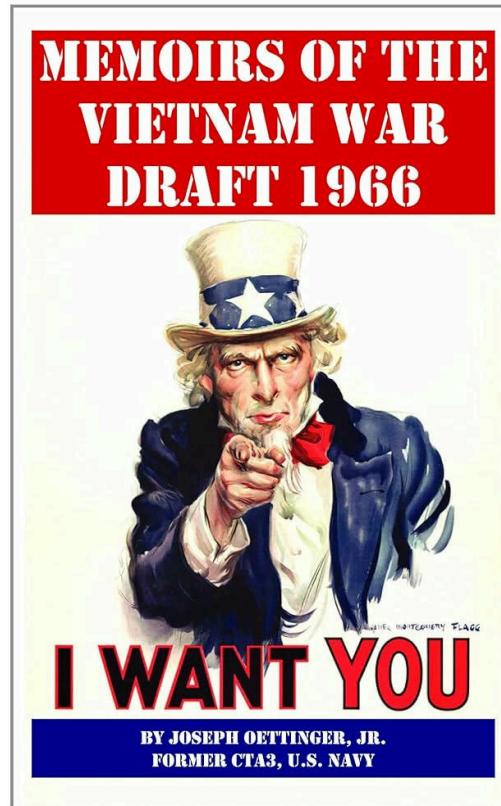
Fix

- The primary cause for *Not-Invented-Here-Syndrom*.
- Open Source: Increases contribution.
- Tools we researched more are more appealing.
- If users can adjust something, they love it more (dashboards, profiles)

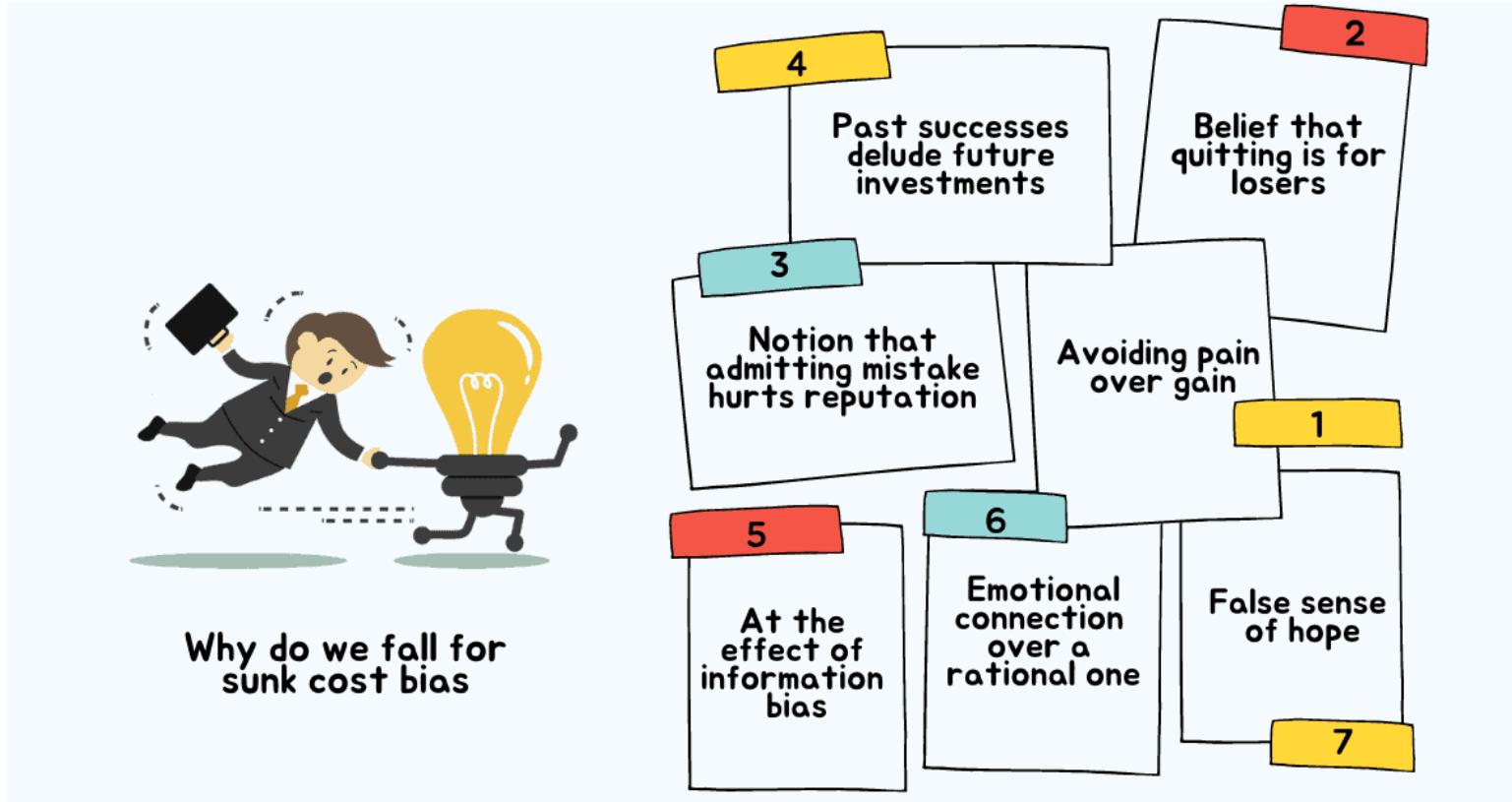


Sunken Cost Fallacy

Story



Explanation



Fix

- Evaluate choices like you'd start freshly.
- Have a good error culture.
- Get used to abandoning old stuff.
- IKEA effect contributes here.



Curse of knowledge

Experiment

Explain to your seating neighbor a specific detail you assume they have no idea about. What do you notice?

Explanation

- We implicitly assume everyone else has the same knowledge as we do.
- This can apply also to future selves
No comments in code, anyone?
- UI design also suffers from CoS: We assume the user knows.
- Often not called out.

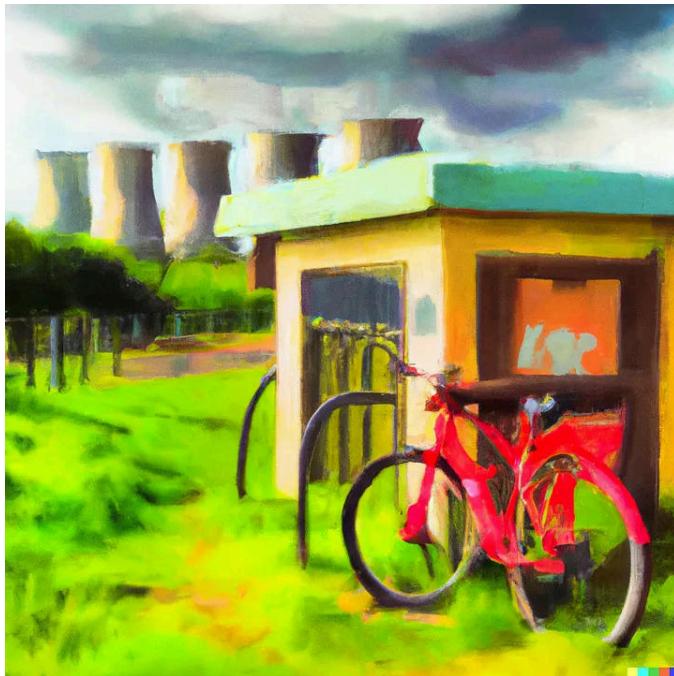


Fix

- Knowing about it helps. Feel free to interrupt your peer.
- Try to see the world from your peer's perspective.
- Ask questions to see if your peer understood.
- Be patient and do not be an a-hole.

Bikeshedding

Story & Experiment



The Bikeshed Effect

The amount of time spent discussing an issue in an organization is inversely correlated to its actual importance in the scheme of things.

Discuss: What trivial detail did you did give disproportional detail?

Explanation

- We tend to decide quickly on things we do not know much about.
- Focusing illusion shifts priorities.
- If we know much about a subject we tend to over discuss it.
- We see opportunity to demonstrate our skills.
- We forget about the greater goal.
- Can lead to Analysis Paralysis.

Fix

Hard to fix, since it often masquerades as useful discussion.

- Have frameworks like OKR for common goals.
- Time-box meetings and give priorities.
- Leaders should actively discussions gone wild.
- Explain Bikeshedding to peers.

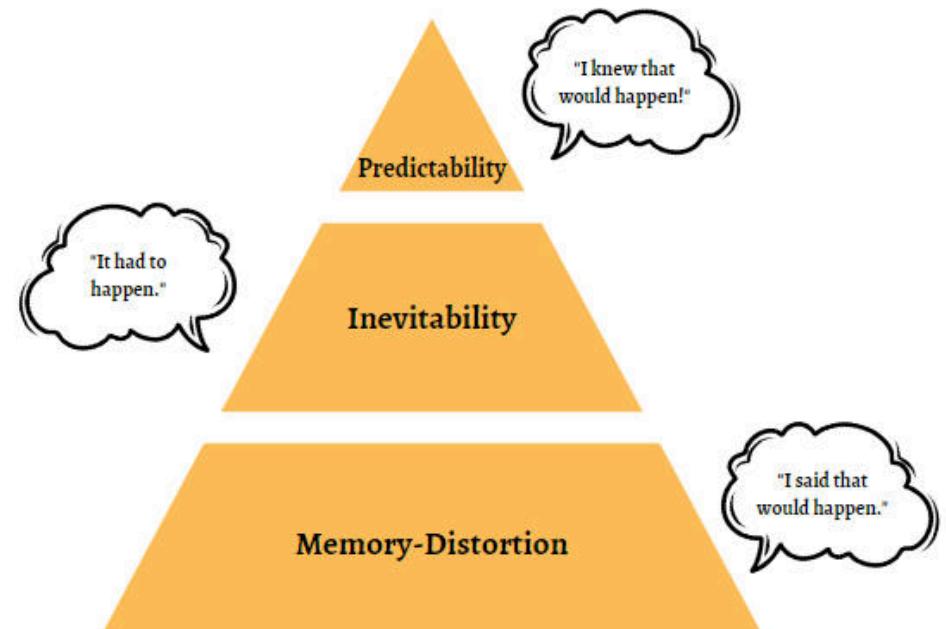
Confirmation, Hindsight & Attribution Bias

Story & Experiment

CONFIRMATION BIAS



Hindsight Bias



Explanation

Confirmation bias:

- Desire to be right & Self esteem.
- We like to confirm more than to refute.
- Mental shortcut.

Hindsight bias:

- Desire for control.
- Reducing regret by sugarcoating.

The Fundamental Attribution Error:

	Reason for my action	Reason for other person's action
Positive outcome	Personal character	The situation
Negative outcome	The situation	Personal character

Example:

	Reason for the time I arrived	Reason for the time the other person arrived
On time for work	I take my job seriously	It's their job
Late for work	Heavy traffic	They are disrespectful

Fix

- Tends to create echo chambers.
- Testing: Positive tests > Negative tests.
- Re-use of old solutions for new problems.
- When Deployment goes wrong: I had a bad feeling!
- Colleague X is such an idiot, I would have it done so much better!

Optimism bias

Common sayings amongst developers

It's not that hard to add 2 database columns...

I smoke way less than others

That solution will be fast enough!

That deadline will no issue.

Loosing all backups is really unlikely

That new framework/tool/whatever will fix it all.

Hackers target only big companies!

Explanation

- Representativeness heuristic
- People want to feel good.
- Focus on desired end states.
- Missing painful experiences.
- Good mood.

Fix

Very hard to eliminate.

There is no glory in prevention.

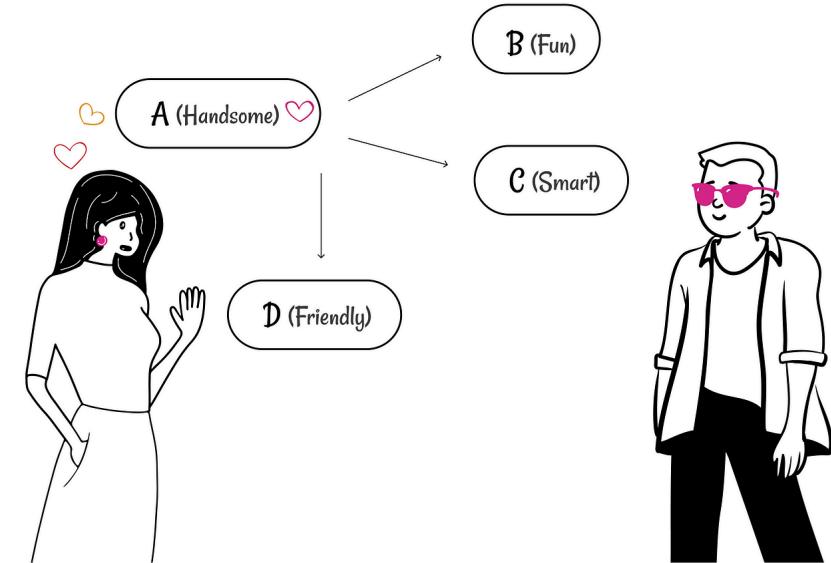
- Convince others of preemptive measures.
- Use base rates
- Pre-Mortem it!
- Let peers challenge your plans.

NOTE: There is also a pessimism bias. It depends on the character which applies more.

Halo effect

Story

TODO: Kahnemann story of student grading.



Explanation

Fix

- We tend to overvalue *Rockstar developers*
- Each of us have a technology they love.
- Do not use *exciting* software, but boring one.

Solution: Accept all software sucks.

Outro



Hegel Borg™

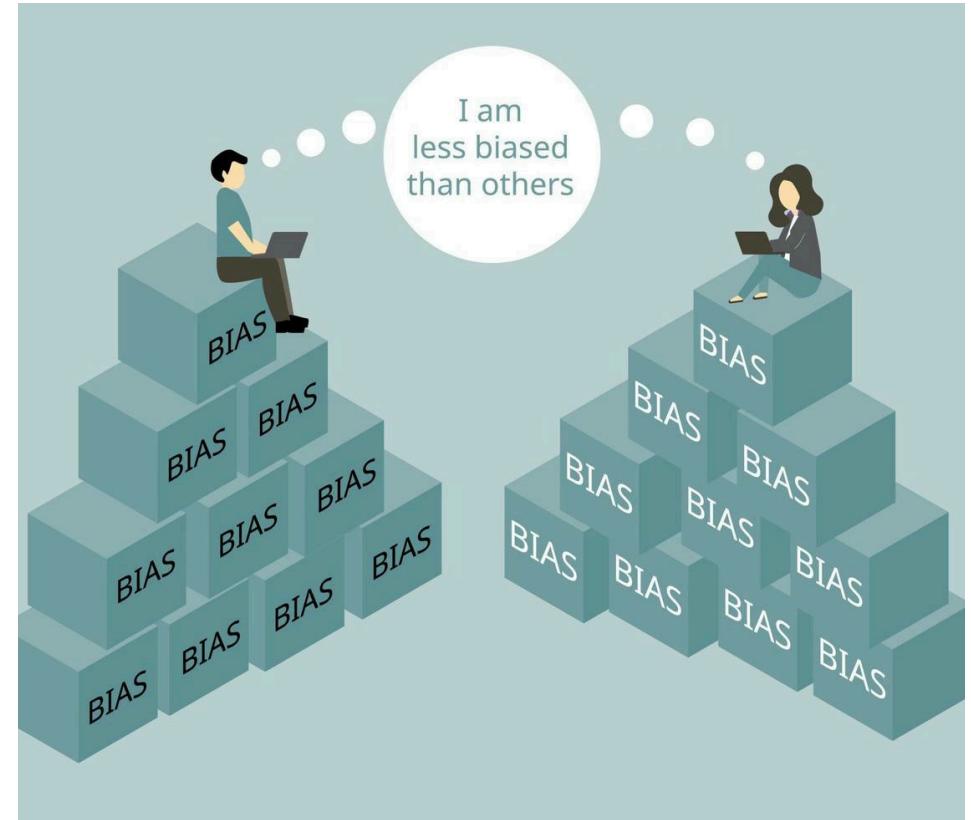


@xxclusionary

I have a mental illness that makes me think that people will change their minds if I present the correct arguments with the appropriate facts and data.

Summary

- Even if we know about biases, our brain will still experience them.
- Now we can at least debug our past behavior.
- Make it a habit watching your mind.
- Take time for important decisions.
- Build intuition through experience to use System1.
- This talk was not complete (e.g. Dark Patterns in UI/UX)



Outlook & Homework

I left out something important: Cognitive load.

<https://minds.md/zakirullin/cognitive>

Outro poem

- Riddled with problems is our mind
- Easy solutions not in sight
- Now no longer as blind,
- but our behavior is still not bright.

Sources

- https://en.wikipedia.org/wiki/Cognitive_bias
- <https://github.com/zakirullin/cognitive-load>
- <https://thevaluable.dev/cognitive-bias-software-development>

The End

Tip: The title slide is clickable!