

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

Source confirmation bias

Confirmation bias

Law of triviality

Bike shedding effect

Information bias

Ambiguity bias

Source confirmation bias

Confirmation bias

Decommission effect

Reverse psychology

System bias

Backdoor effect

Environment effect

Pseudodiscordance effect

Disposition effect

Zero-risk bias

IKEA effect

Loss aversion

Generation effect

Impression escalation

Sunk cost fallacy

Appeal to novelty

Hyperbolic discounting

Pazman effect

Risk compensation

Prior justification bias

Post-justification bias

Fundamental attribution error

Actor-observer effect

Attribution bias

Outcome bias

Linkage bias

Outcome bias

Intro

Intro Poem

- I have read a cool book.
-
-
-

Intro Poem

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

Intro Poem

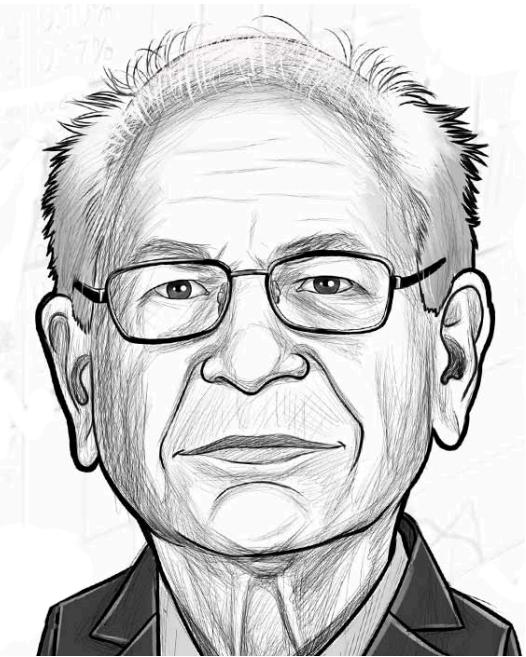
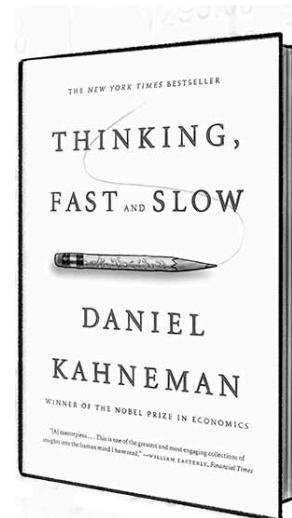
- I have read a cool book.
- And you should too!
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Intro Poem

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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?

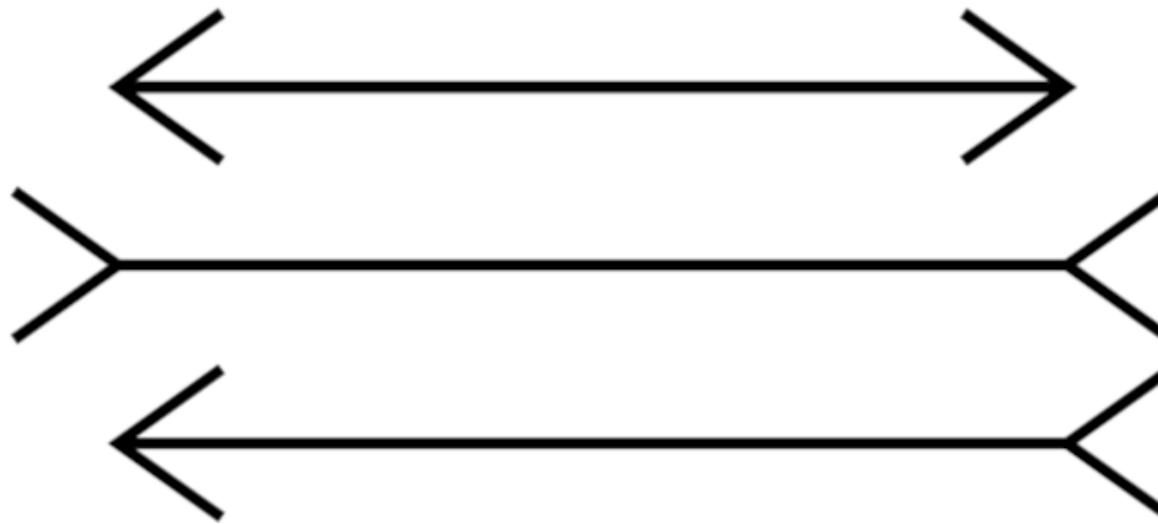


Watch your thoughts:

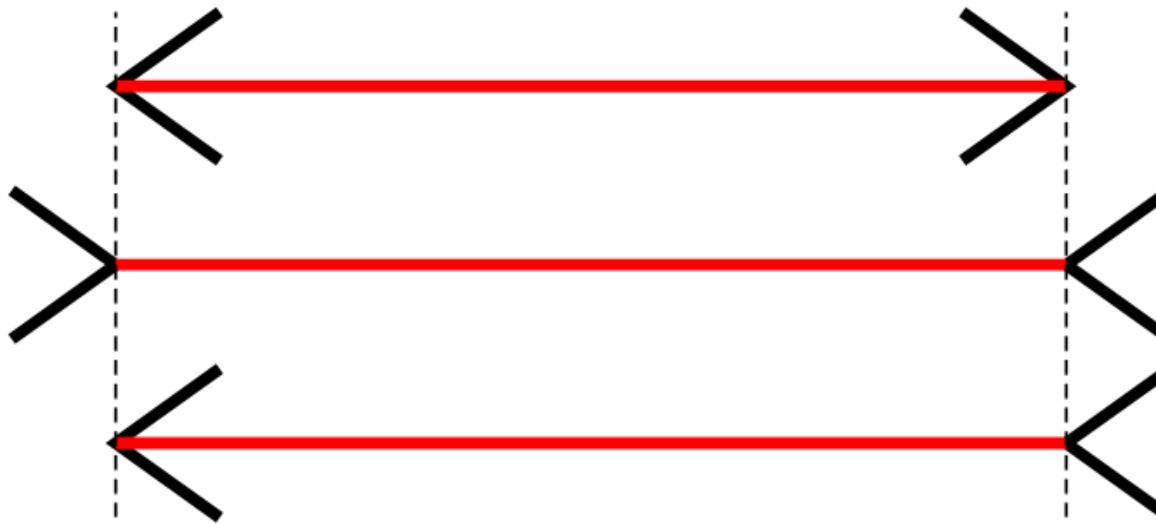
Watch your thoughts:



Which is the longest line?

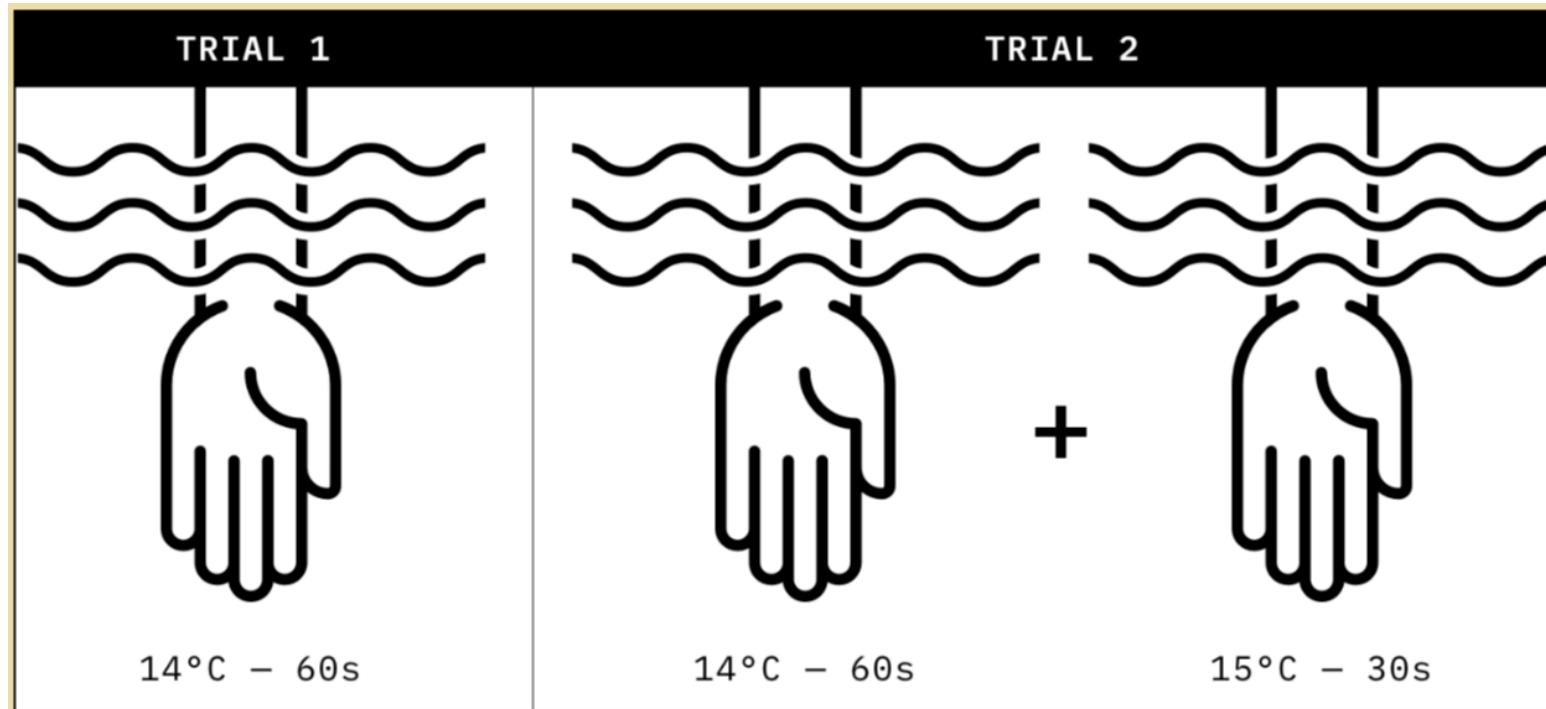


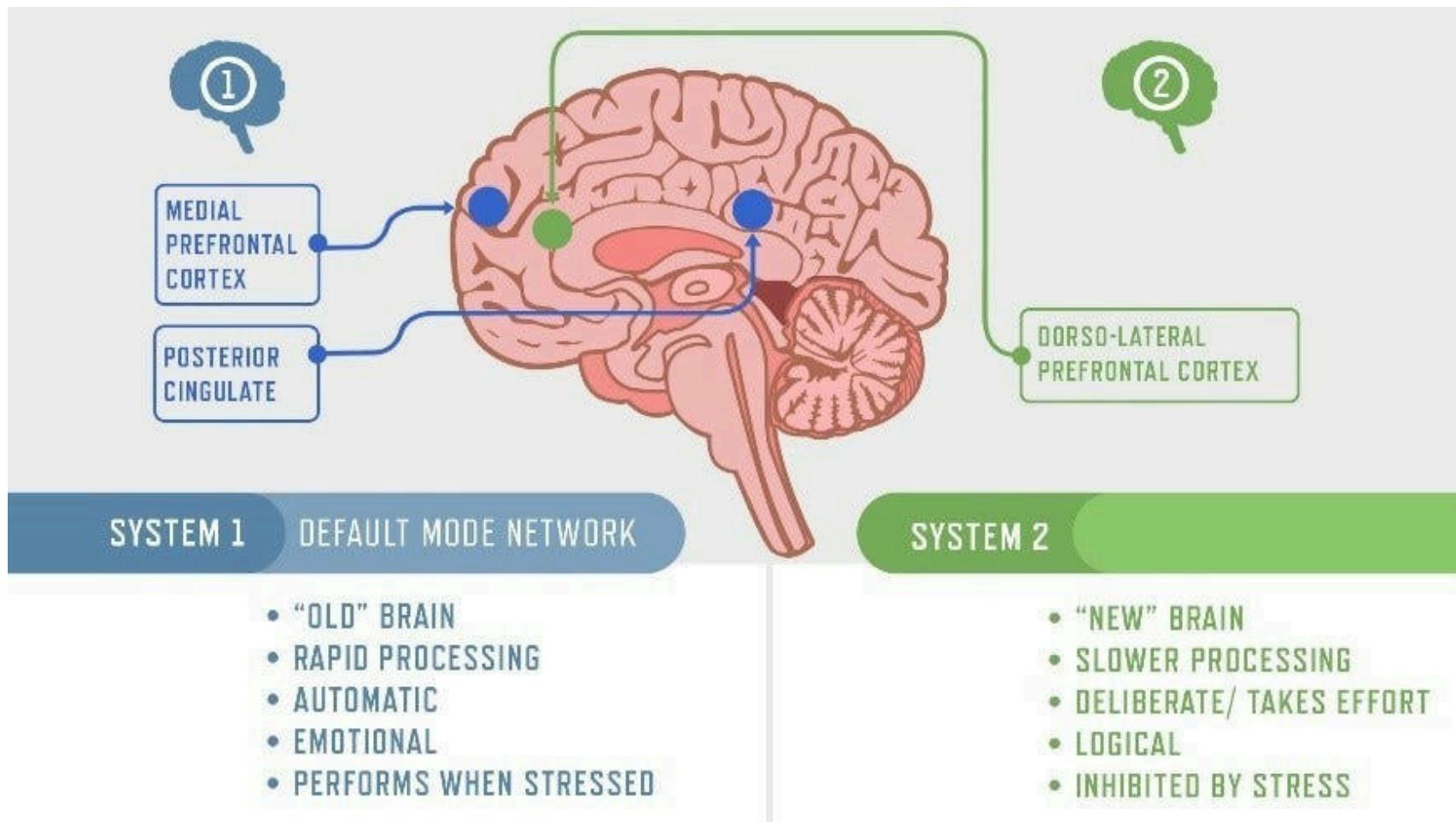
Which is the longest line?



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?

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

Raise left hand for 1, right for 2.

Framing

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

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

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Option 2 was considered way more dangerous by psychological practitioners.

Agenda

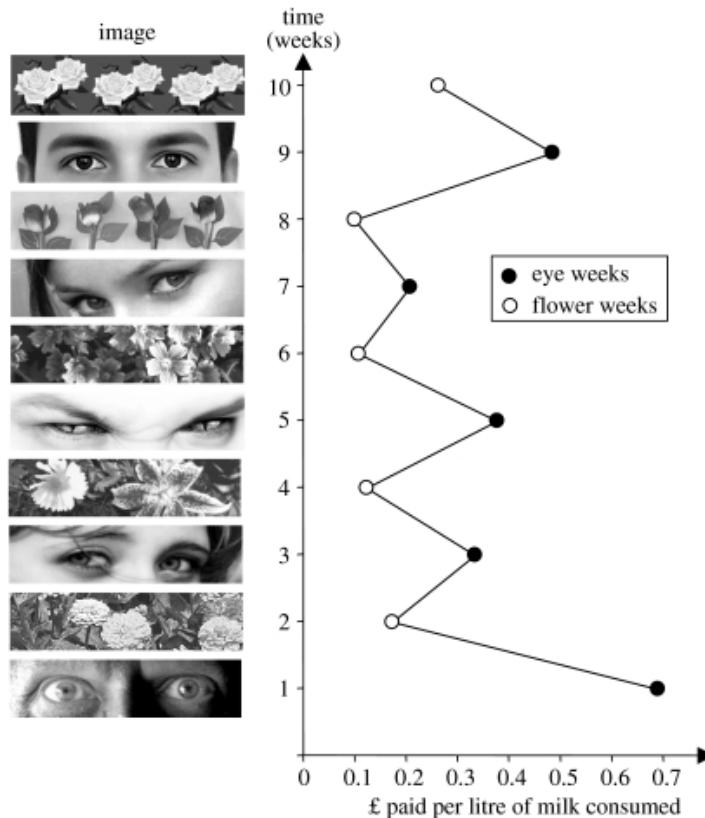
1. Intro
2. Agenda
3. Priming
4. Cargo Cult
5. Shiny Object Syndrome
6. Anchoring
7. Overconfidence
8. IKEA effect
9. Sunken Cost Fallacy
10. Curse of knowledge
11. Bikeshedding
12. Confirmation, Hindsight & Attribution Bias
13. Optimism bias
14. Halo effect
15. Outro

3 slides per cognitive bias:

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

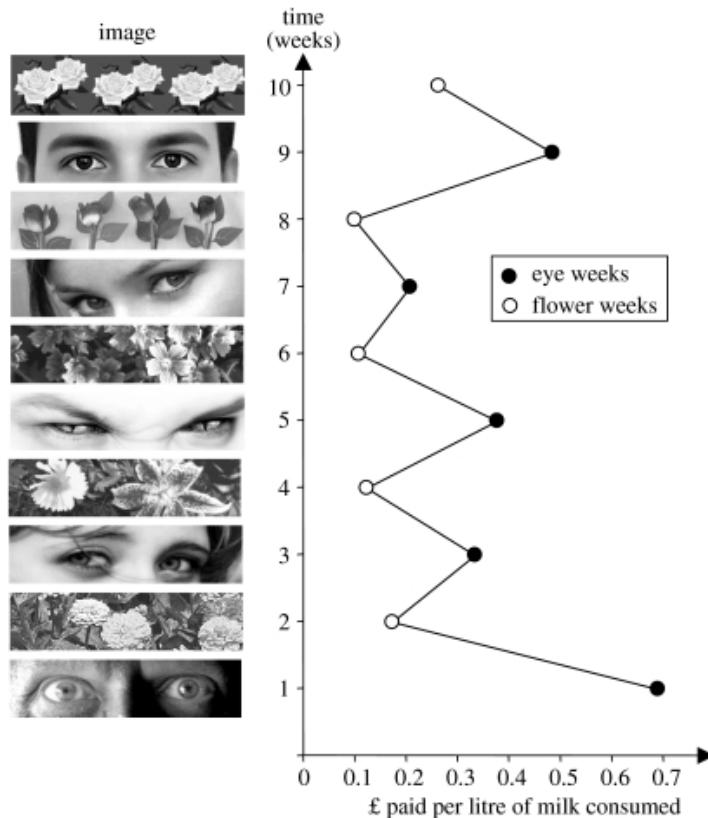
Priming

Experiment



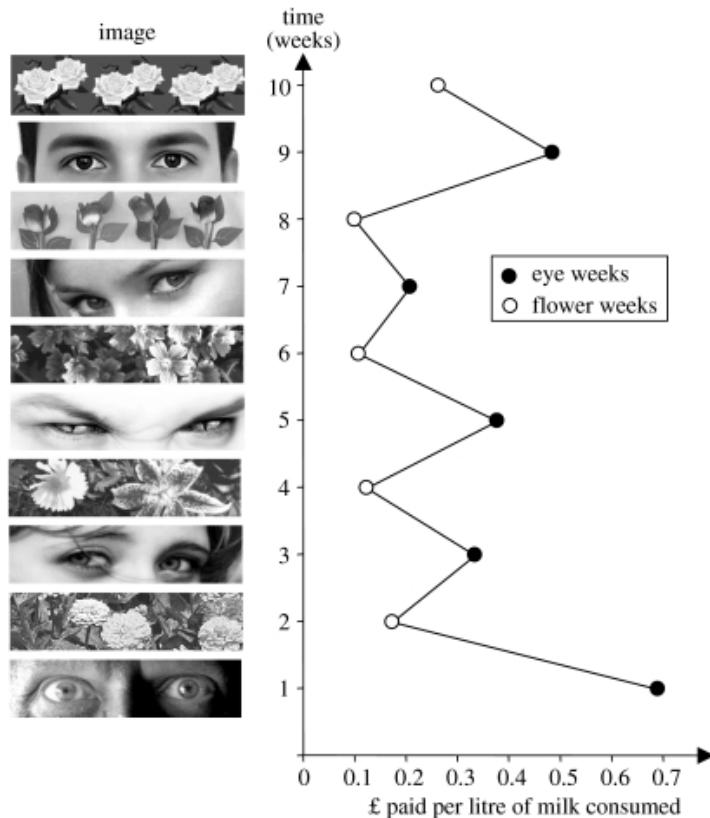
- A trust fund for coffee milk in office.
-
-

Experiment



- A trust fund for coffee milk in office.
- Amount of £ was based on trust.
-

Experiment



- A trust fund for coffee milk in office.
- Amount of £ was based on trust.
- Images on the left was put above the £ box & changed weekly.

Explanation

- Feeling watched changes our behavior.
-
-

Explanation

- Feeling watched changes our behavior.
- Thinking of happy moments improves our mood.
-

Explanation

- Feeling watched changes our behavior.
- Thinking of happy moments improves our mood.
- Thinking of money makes us more greedy.

Fix

TODO:

- errors?
- pre-mortem? Prime yourself about errors before they happen.

Cargo Cult

Cargo Cult: Story



Cargo Cult: Explanation

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

For Software: Usually emulate successful software houses.

Cargo Cult: Effect

- Copy & Paste solutions that worked elsewhere without understanding. (Use your brain, Luke!)
- Fixing applications by “Shotgun debugging”.
- Applying tools like k8s - 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.



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 below, but

Anchoring: Experiment

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

Anchoring: Experiment

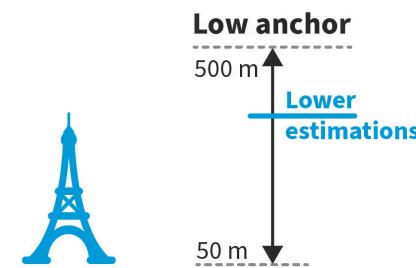
- Divide in two groups!
- Answer the question below, but

How high is the Eiffel tower? Is it higher than 100m?

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.

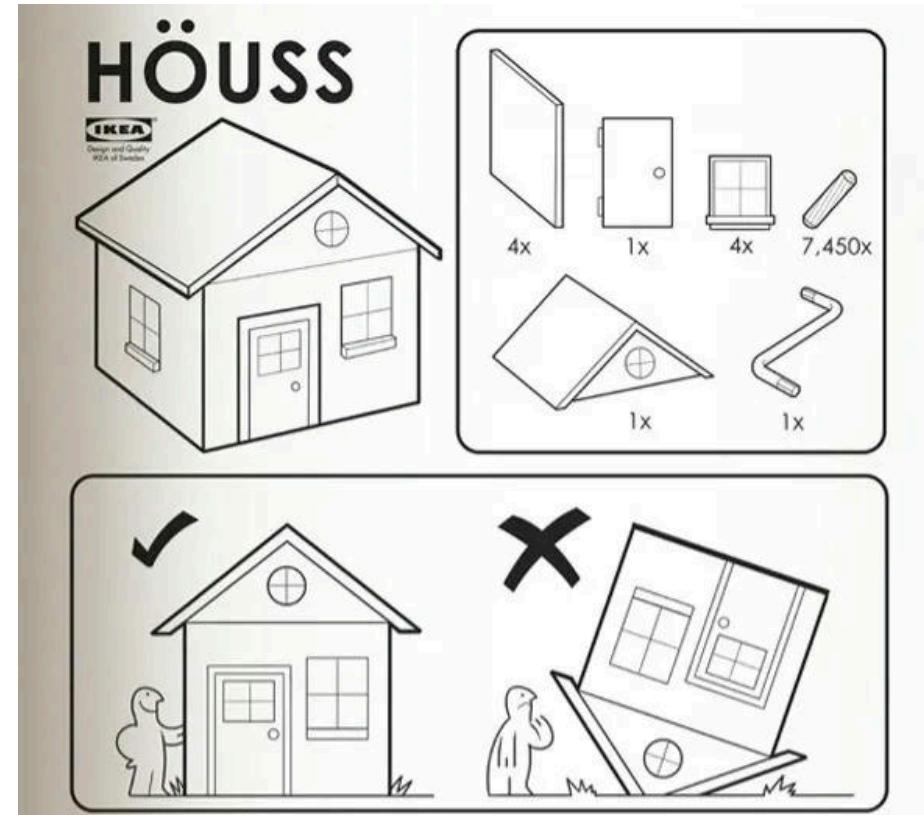
Fix

- 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

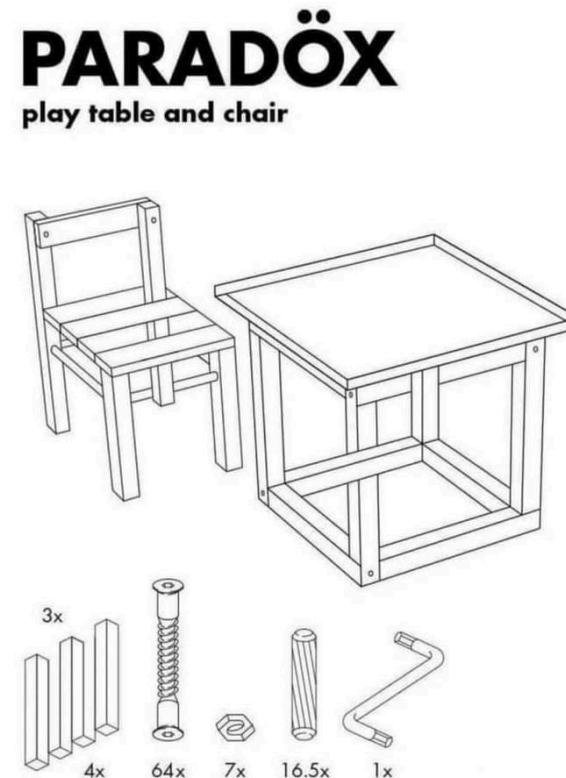
Story

- 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.



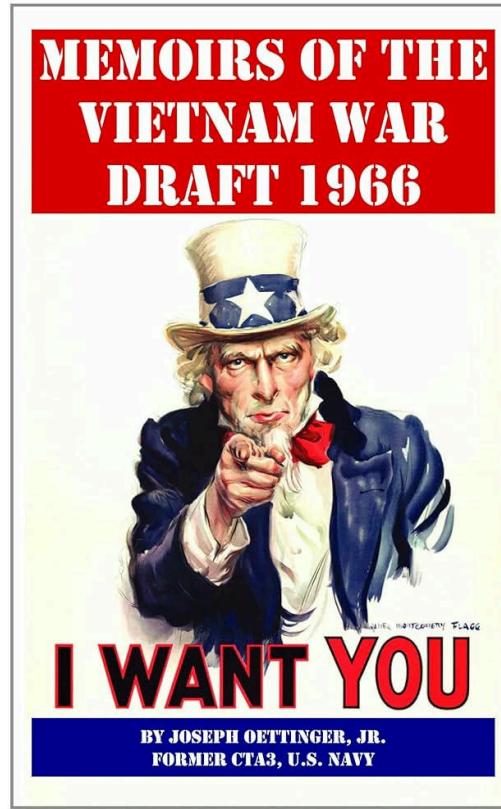
Fix

- 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

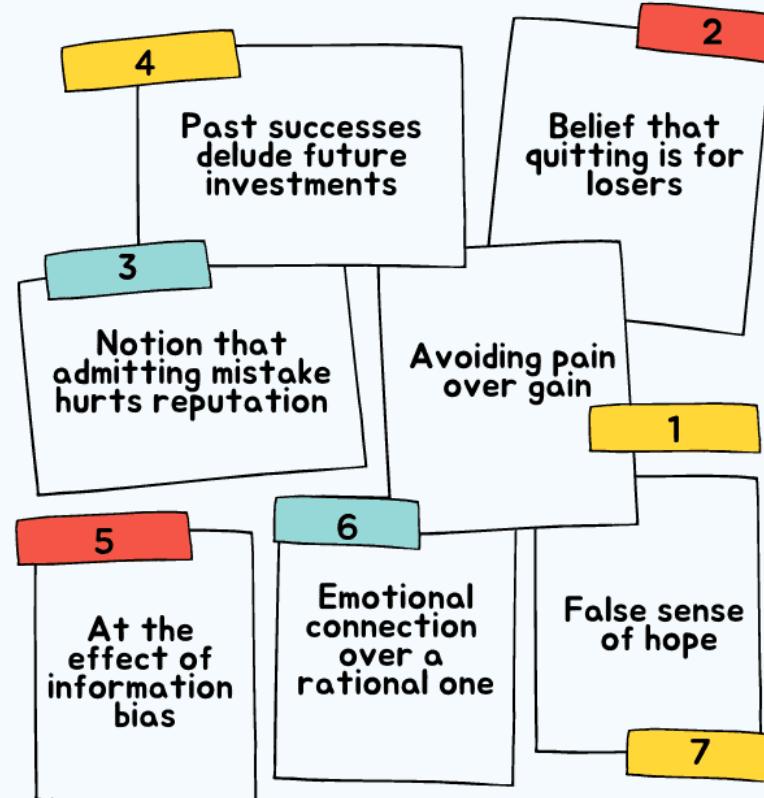
Story



Explanation



Why do we fall for sunk cost bias



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.

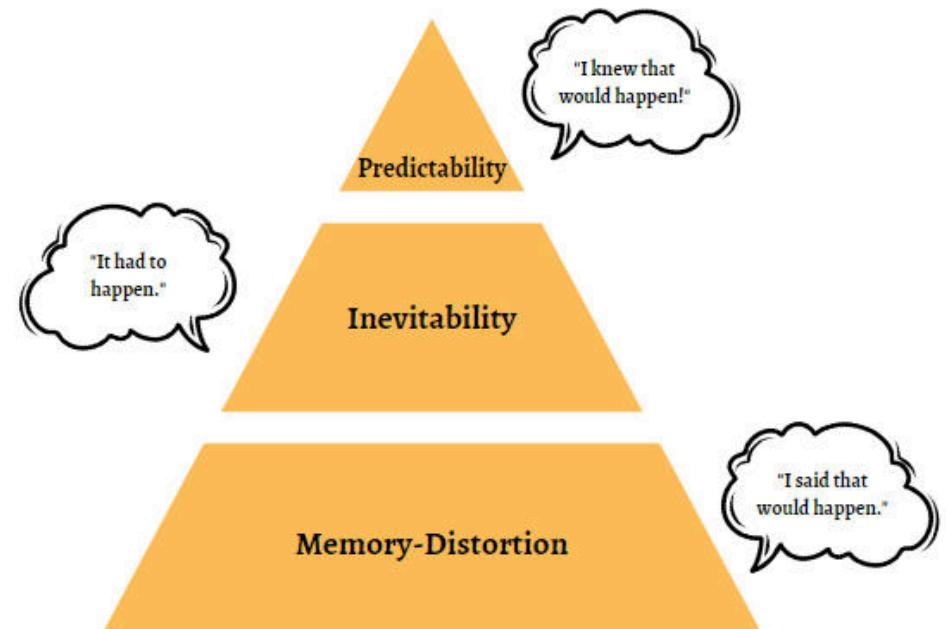
Confirmation, Hindsight & Attribution Bias

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!

Loosing all backups is really unlikely

That deadline will no issue.

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.

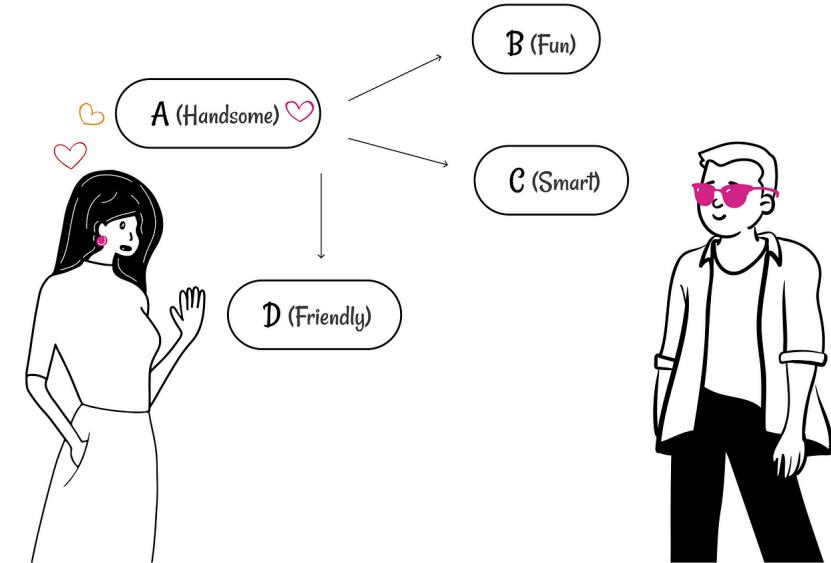
- Convince others of preemptive measures.
- Use base rates
- Pre-Mortem it!
- Let peers challenge your plans.

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

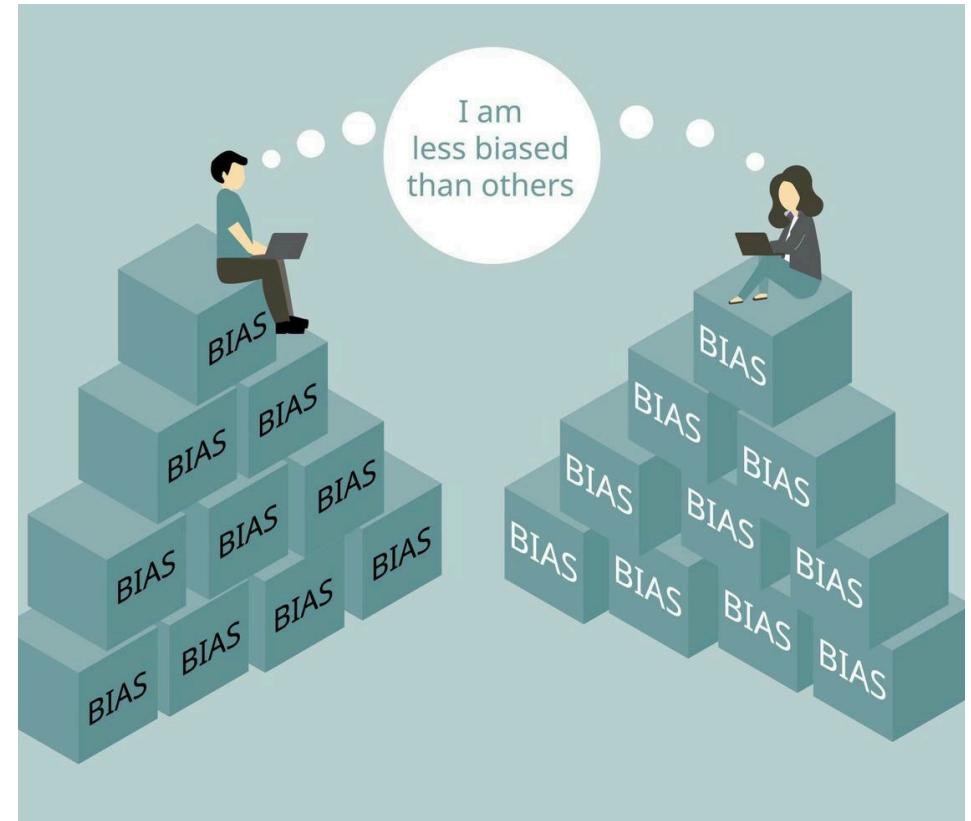
- We tend to overvalue *Rockstar developers*
- Each of us have a technology they love.
- Do not use *exciting* software, but boring one.

Solution: Accept all software sucks.

Outro

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!