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Cognitively Biased Teams

The Planning Fallacy

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#GDC22







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TOM CLANCY'S
**GHOST
RECON**
FUTURE SOLDIER



WATCHDOGS



pepper



2010

2022

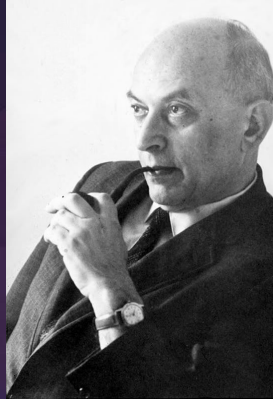
Prologue

DECISION-MAKING

What's a **good decision**?

Prologue
Decision-Making





Solomon E. Asch
Gestalt Psychologist

Asch Conformity Experiments



The Economist

Subscriptions

Online only
\$59

16%



68%

~~Print only
\$125~~

~~0%~~

Print & online
\$125

84%



32%

Decoy effect



Target - Decoy - Competitor

Prologue
Decision-Making

Group pressures



Perception

The
Economist



Cognitively Biased Teams

THE PLANNING FALLACY

AGENDA

Chapter One | Mental Shortcuts

An introduction to the science of decision-making

Chapter Two | The Planning Fallacy

5 cognitive biases in the context of planning

Chapter One

MENTAL SHORTCUTS

Dual process model

System 1

Fast

Unconscious
Automatic
Effortless



of the mind

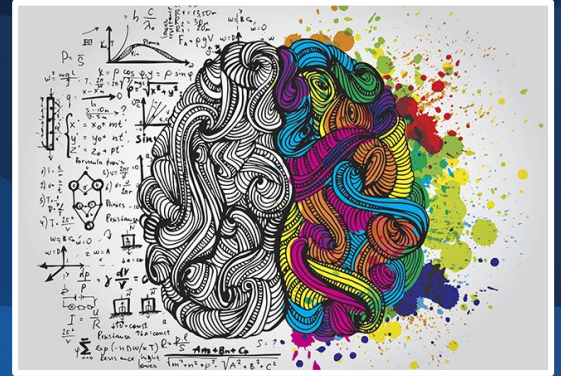
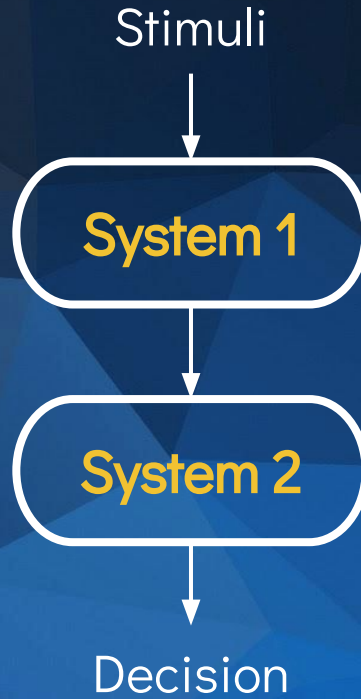
System 2

Slow

Deliberate
Analytical
Effortful

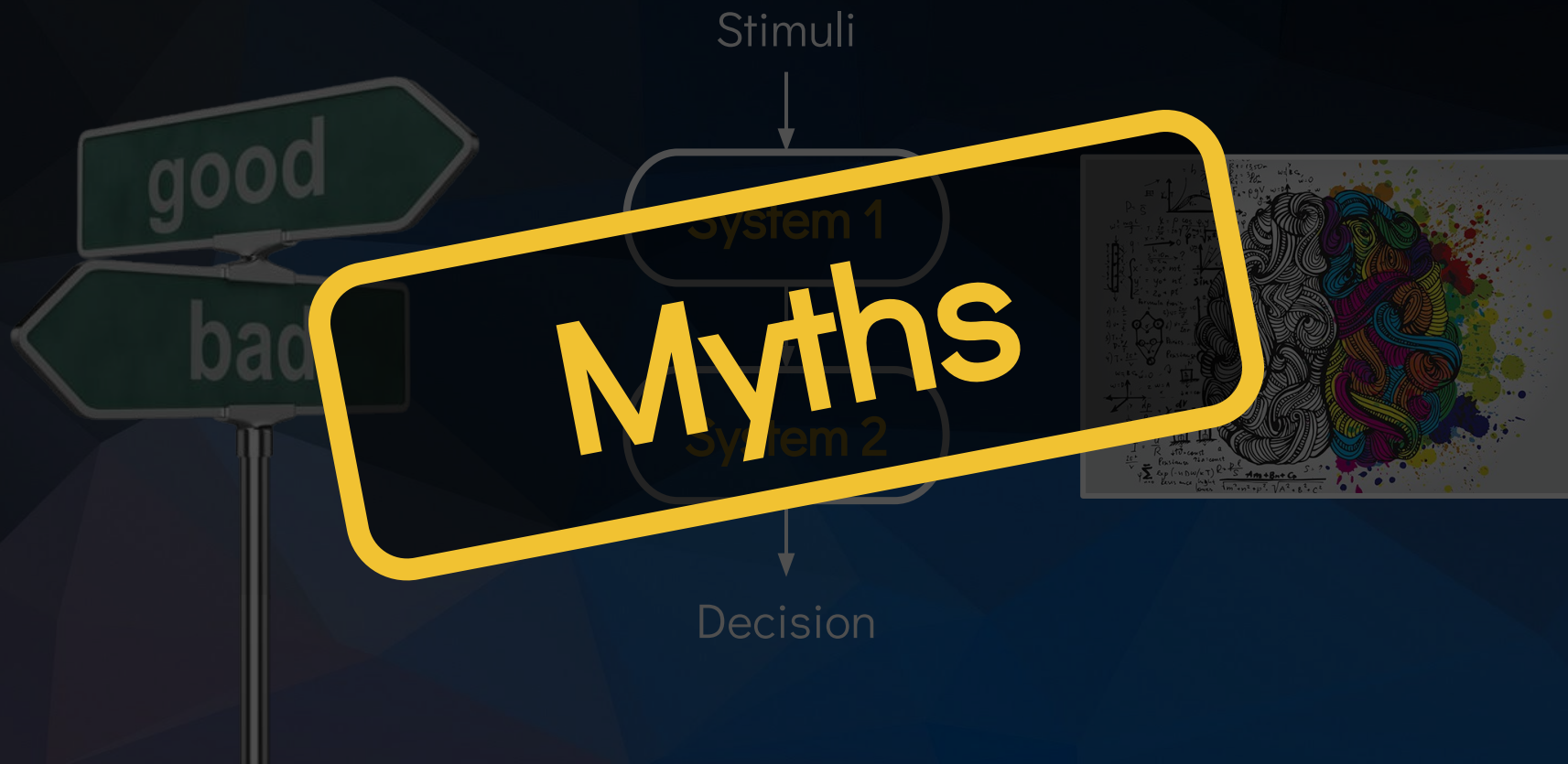
Chapter One

Mental Shortcuts

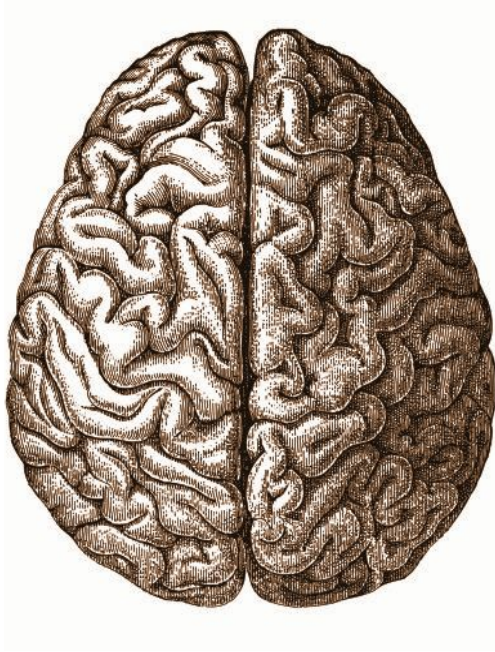


Chapter One
Mental Shortcuts





Chapter One
Mental Shortcuts



Cognitive Biases

Amos Tversky & Daniel Kahneman, 1974

Judgment under Uncertainty: Heuristics and Biases

Biases in judgments reveal some heuristics of
thinking under uncertainty.

Amos Tversky and Daniel Kahneman

Many decisions are based on beliefs concerning the likelihood of uncertain events such as the outcome of an election, the guilt of a defendant, or the future value of the dollar. These beliefs are usually expressed in statements such as "I think that . . .," "chances are . . .," "it is unlikely that . . .," and

mated when visibility is good because the objects are seen sharply. Thus, the reliance on clarity as an indication of distance leads to common biases. Such biases are also found in the intuitive judgment of probability. This article describes three heuristics that are employed to assess probabilities and to

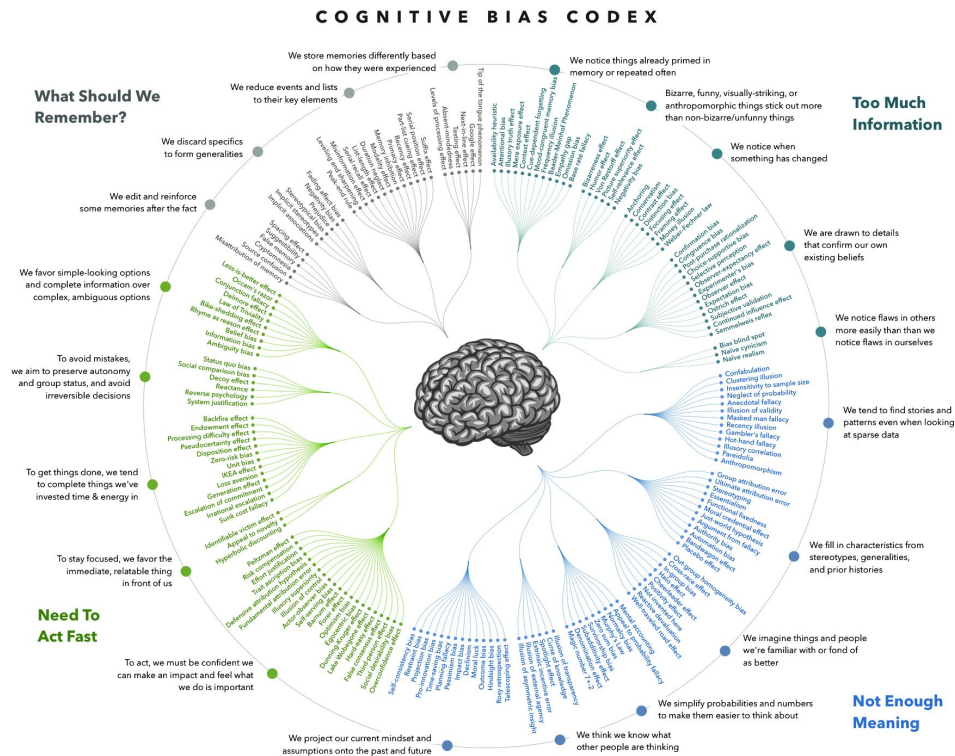
occupation from a list of possibilities (for example, farmer, salesman, airline pilot, librarian, or physician)? How do people order these occupations from most to least likely? In the representativeness heuristic, the probability that Steve is a librarian, for example, is assessed by the degree to which he is representative of, or similar to, the stereotype of a librarian. Indeed, research with problems of this type has shown that people order the occupations by probability and by similarity in exactly the same way (*1*). This approach to the judgment of probability leads to serious errors, because similarity, or representativeness, is not influenced by several factors that should affect judgments of probability.

Insensitivity to prior probability of outcomes. One of the factors that have no effect on representativeness but should have a major effect on probability is the prior probability, or base-rate frequency, of the outcomes. In the case of Steve, for example, the fact that there are many more farmers than li-

COGNITIVE BIASES

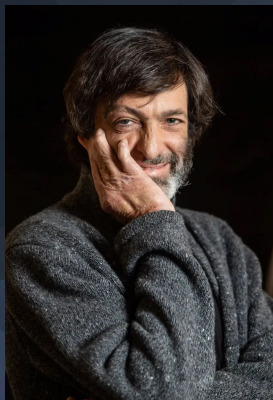
Patterns of **systematic, involuntary errors**, deviation from rationality

“**Mental shortcuts**”

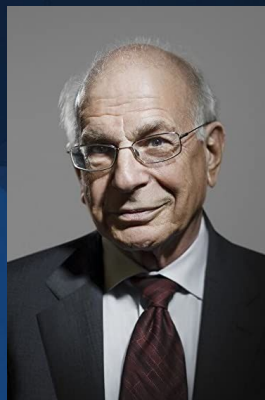
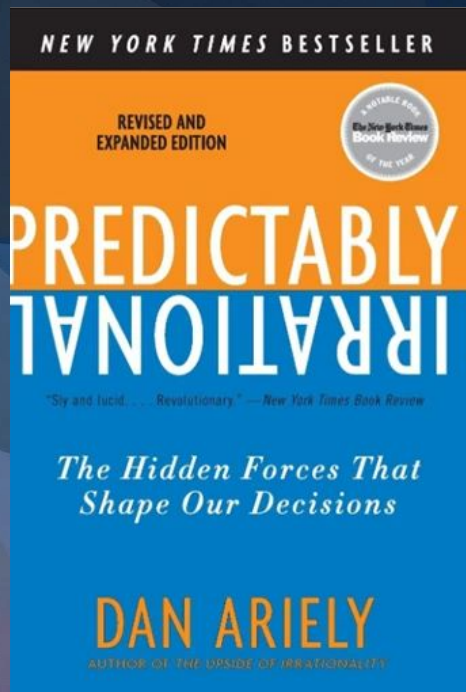


Chapter One Mental Shortcuts

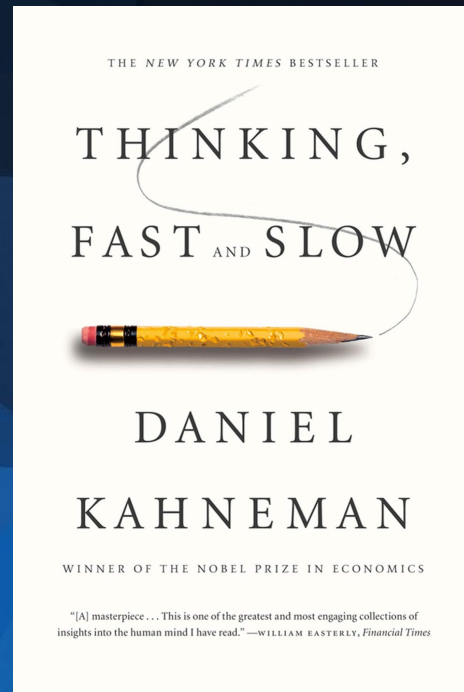
Ariely (2008); Kahneman (2011)



Dan Ariely
Behavioral economist



Daniel Kahneman
Psychologist, Economist



Chapter One Takeaways

Prologue

Chapter One
Mental shortcuts

Chapter Two
The Planning Fallacy

Epilogue

- We have two methods of thought: **System 1 & System 2**
 - System 1 is **fast, automatic, effortless**
 - System 2 is **slow, deliberate, effortful**
- We tend to make errors when **we make decisions using System 1** when we needed System 2
- We use **heuristics** (mental shortcuts) to make most decisions: **we are all cognitively biased**

Chapter Two

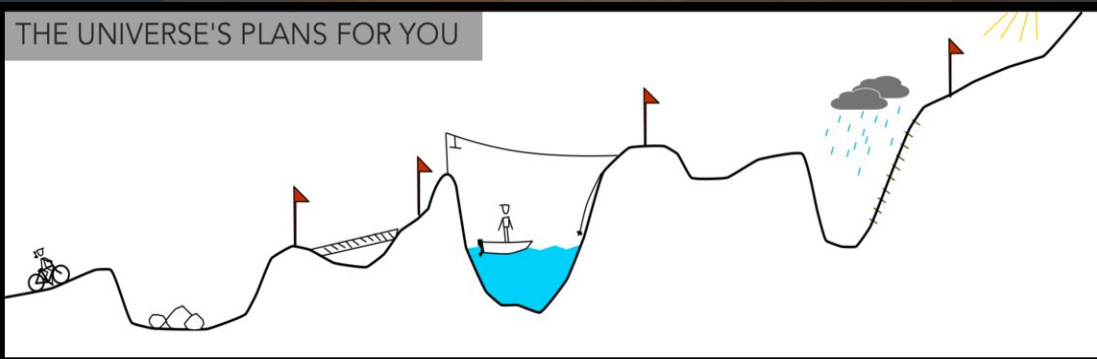
THE PLANNING FALLACY

The Planning Fallacy

YOUR "PLANS"



THE UNIVERSE'S PLANS FOR YOU



Chapter Two
Cognitive Biases



- 1 **Optimism Bias**
- 2 **Dunning-Kruger Effect**
- 3 **Framing Effect**
- 4 **Anchoring Effect**
- 5 **Confirmation Bias**

Cognitive Biases

in the context of **planning with teams**

1

2

3

4

5

Optimism Bias

Thinking we're more likely to
succeed/less at risk of experiencing
a negative event than we really are



Research Studies

Optimism Bias

1

2

3

4

5

Academic
performance

Everybody in top 16% ?!

on average, they reported
they would outperform

84%

of their peers

~80% reported they were better
drivers than the average

Best driver

Average driver

Worst driver

Mitigation Strategies

1

Optimism Bias

2

3

4

5

For me

Recognize that
optimism is not realism

For teams

A safe space for
diverse perspectives

1

2

Dunning-Kruger Effect

3

With low ability at a task we overestimate our ability while with high ability we underestimate it

4

5



MEMBER OF THE
DUNNING-KRUGER
CLUB



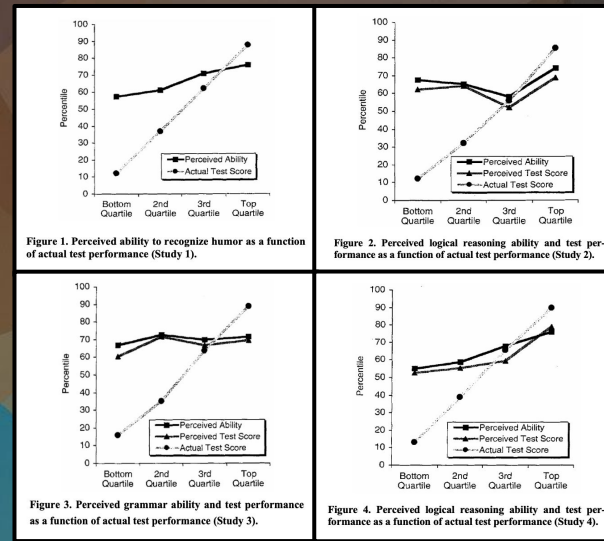
ALSO MEMBER
OF THE
DUNNING-KRUGER
CLUB

Research Studies

Dunning-Kruger Effect

People who performed poorly at a test overestimated how well they would do and vice versa

This paper says nothing about confidence levels or arrogance



Dunning-Kruger Effect

Research Studies

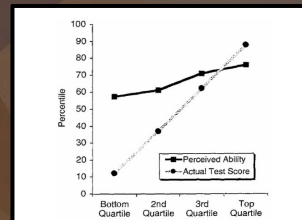
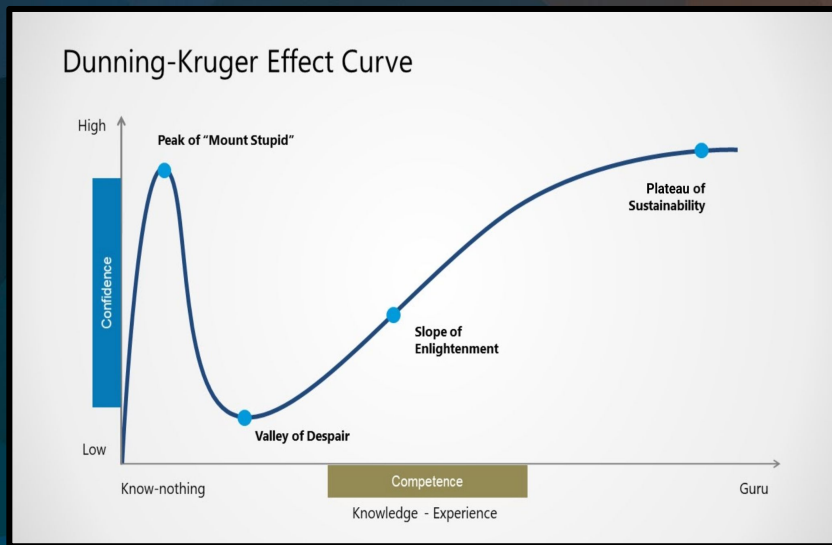


Figure 1. Perceived ability to recognize humor as a function of actual test performance (Study 1).

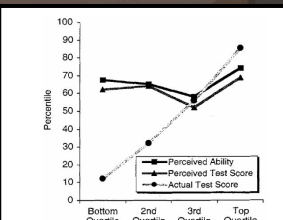


Figure 2. Perceived logical reasoning ability and test performance as a function of actual test performance (Study 2).

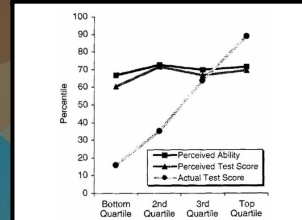


Figure 3. Perceived grammar ability and test performance as a function of actual test performance (Study 3).

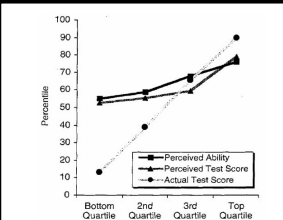
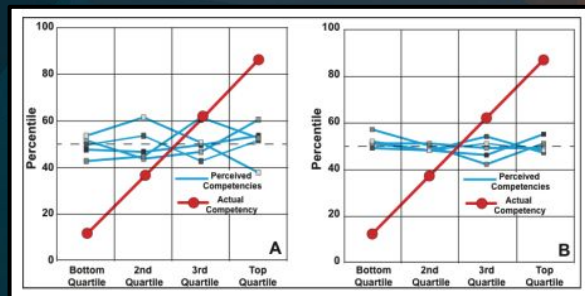


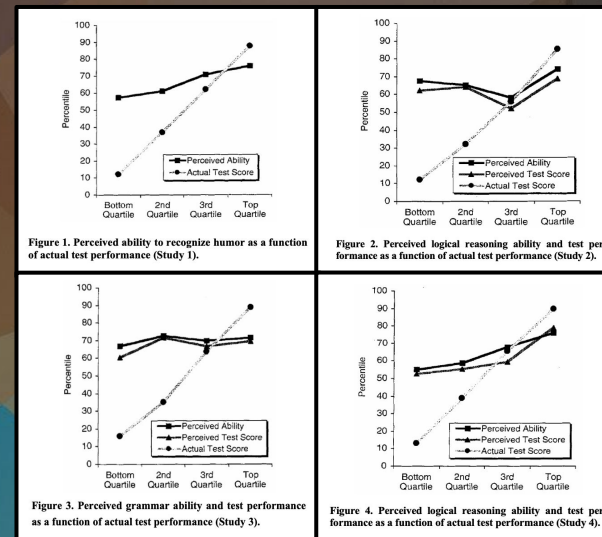
Figure 4. Perceived logical reasoning ability and test performance as a function of actual test performance (Study 4).

Dunning-Kruger Effect

Research Studies



Random numbers



Research Studies

1

Dunning-Kruger Effect

2

Stereotype A

Women are bad at maths

3

Worse performance

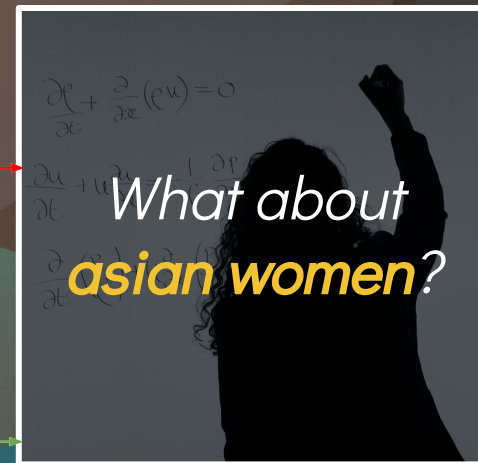
4

Stereotype B

Asian people are good at maths

5

Better performance



Mitigation Strategies

Dunning-Kruger Effect

1

2

3

4

5

For me

Recognize the effects
of **labelling** people

For teams

A safe space to say
“I don’t know”

1

2

3

4

5

Framing Effect

Drawing different conclusions
from the same information
presented differently



Research Studies

1 Framing Effect

“How fast were the cars going when they
(smashed / collided / bumped / hit / contacted)
each other?”



Smashed
41 mph

Contacted
32 mph

Mitigation Strategies

1 **Framing** Effect

For me

Recognize the effects
of **options** you propose

For teams

Share **assumptions**
explicitly

1

2

3

4

5

Anchoring Effect

Relying too heavily on the first piece of information we are given about a topic



Research Studies

Anchoring Effect



10 → 25%

65 → 45%

Research Studies

Anchoring Effect

1

2

3

4

5



\$2



\$2000



\$200 000

Mitigation Strategies

Anchoring Effect

For me

Make your own
estimates **first**

For teams

Planning Poker

S

M

L

XL

1

2

3

4

5

Confirmation Bias

Seeking and prioritising information that confirms your existing beliefs



DOING YOUR OWN
RESEARCH



SCROLLING UNTIL
YOU FIND
SOMETHING YOU
AGREE WITH

Research Studies

Confirmation Bias

Wason's Rule Discovery Test

Find a rule that applies to
a series of three numbers

2, 4, 6 satisfies this rule

“A sequence of even numbers.”

4, 6, 8
4, 8, 12
8, 12, 16
20, 40, 60
...

The rule was simply:
increasing numbers.

1

2

3

4

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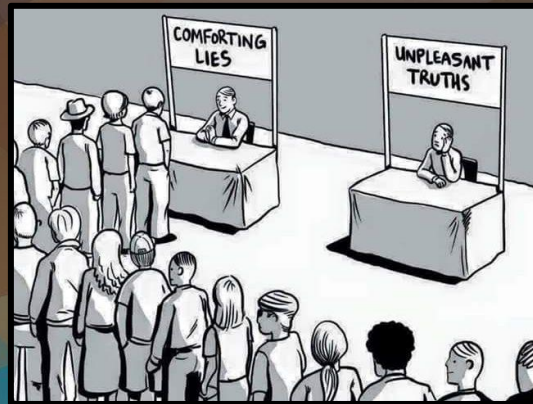
Research Studies

Confirmation Bias

Adopt similar beliefs in order to better fit into the group

Also known as “groupthink”

How innovation dies



Mitigation Strategies

Confirmation Bias

For me

Be open to
self-critique

For teams

Foster a **diverse and
inclusive** culture

Chapter Two Takeaways

Prologue

Chapter One
Mental Shortcuts

Chapter Two
The Planning Fallacy

Epilogue

The Planning Fallacy is our tendency to underestimate the time it takes to complete a task. It's facilitated by several **cognitive biases we all have**:

1. **Optimism Bias:** We make over optimistic plans
2. **Dunning-Kruger Effect:** We don't know that we are
3. **Framing Effect:** We present them in convincing ways
4. **Anchoring Effect:** We get attached to them
5. **Confirmation Bias:** We tend to agree with ourselves

A team's ability to **think critically** is facilitated when we reward **diverse opinions**, not only the optimistic ones.

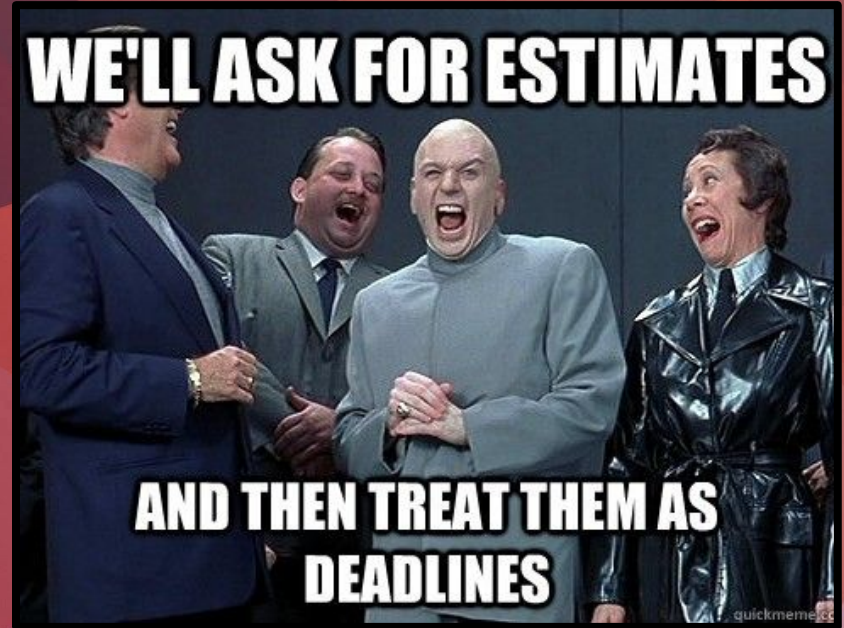
Epilogue

DECISION-MAKING

What's a **good decision**?

We make decisions
under the effects of

group pressures
&
cognitive biases



What's a **good decision**?

Judge not by **how things turned out**,
but by how **it was made**.

“Good decisions come
to those who wait.”

It's not just a saying.

(that I've made-up)





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The Planning Fallacy

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Product Manager, DeepMind



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#GDC22



Appendix

References

Research Papers & Books

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