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#DOMINOREV

A nighttime photograph of a city skyline, featuring the Empire State Building prominently in the center, illuminated with blue lights. Other skyscrapers and a bridge are visible in the background, also lit up.

rev 2

Combating Cognitive Bias as a
Data Scientist

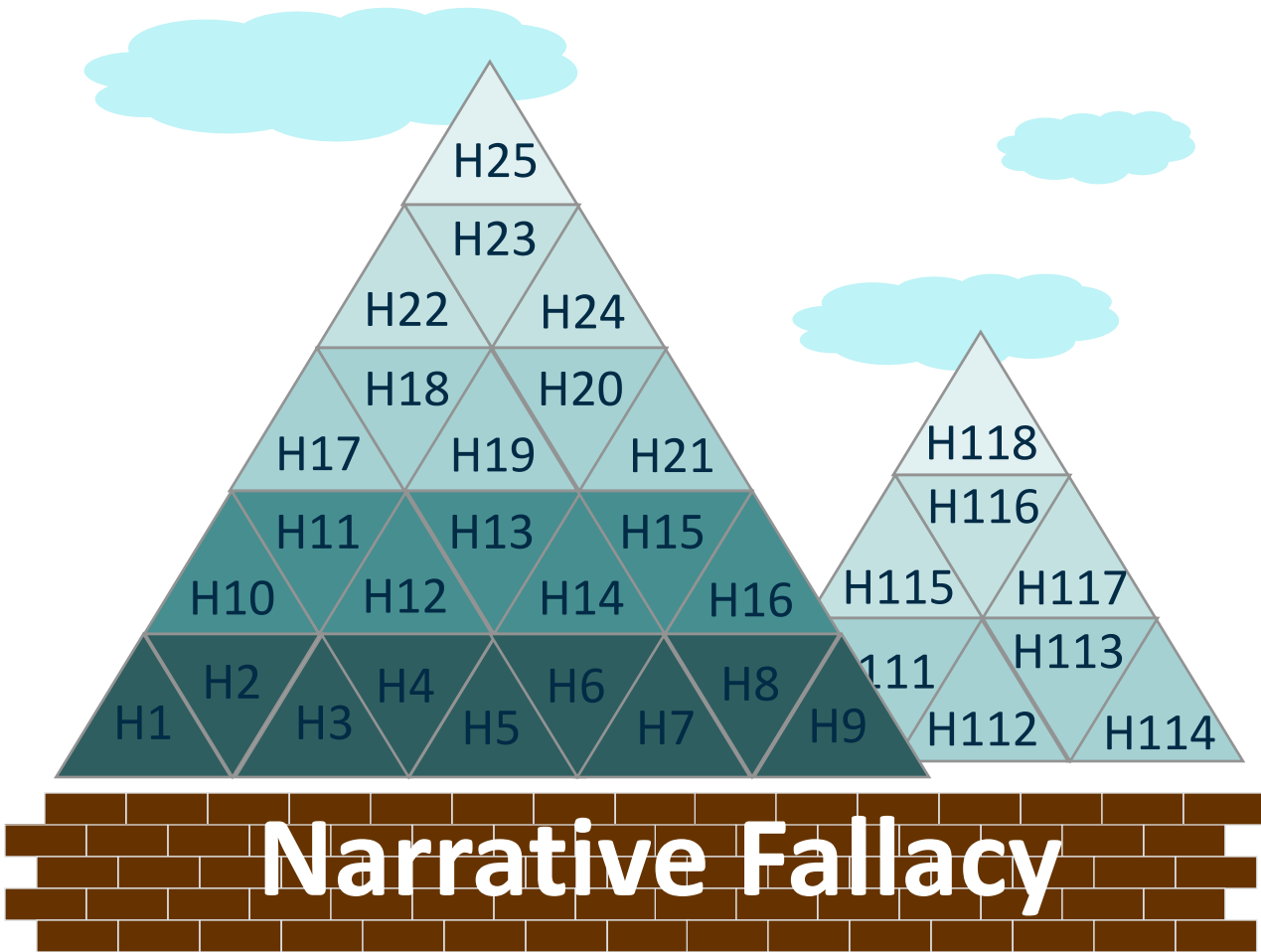
Combating Cognitive Bias as a Data Scientist

A talk by Gokhan Metan, PhD

Director, Enterprise Data Science | Humana

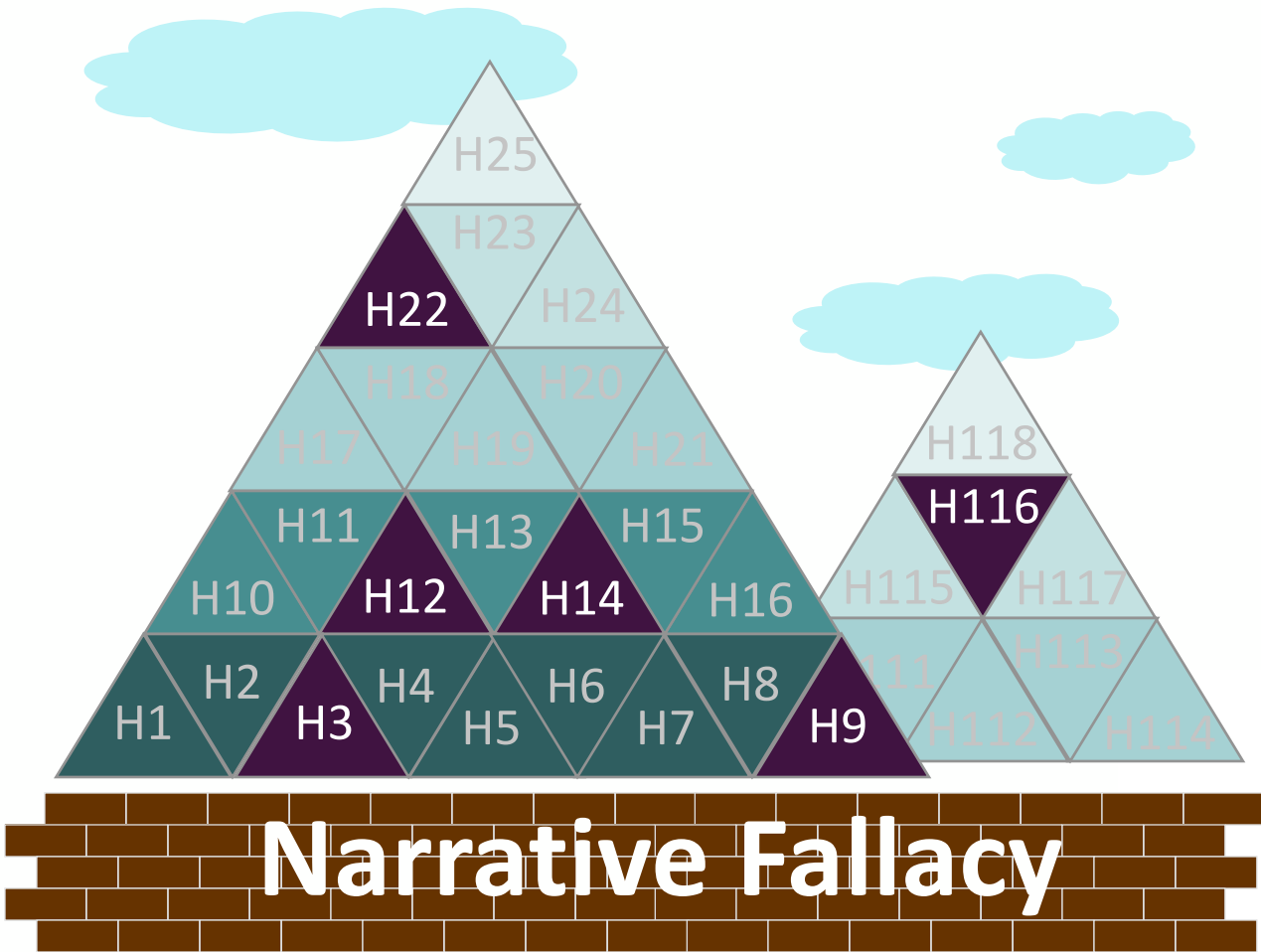
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Situation 1 | Narrative Fallacy & Mountains of Hypotheses



- ▶ **1** Skin in the game
- ▶ **2** Random is your friend
- ▶ **3** Jigsaw puzzle strategy

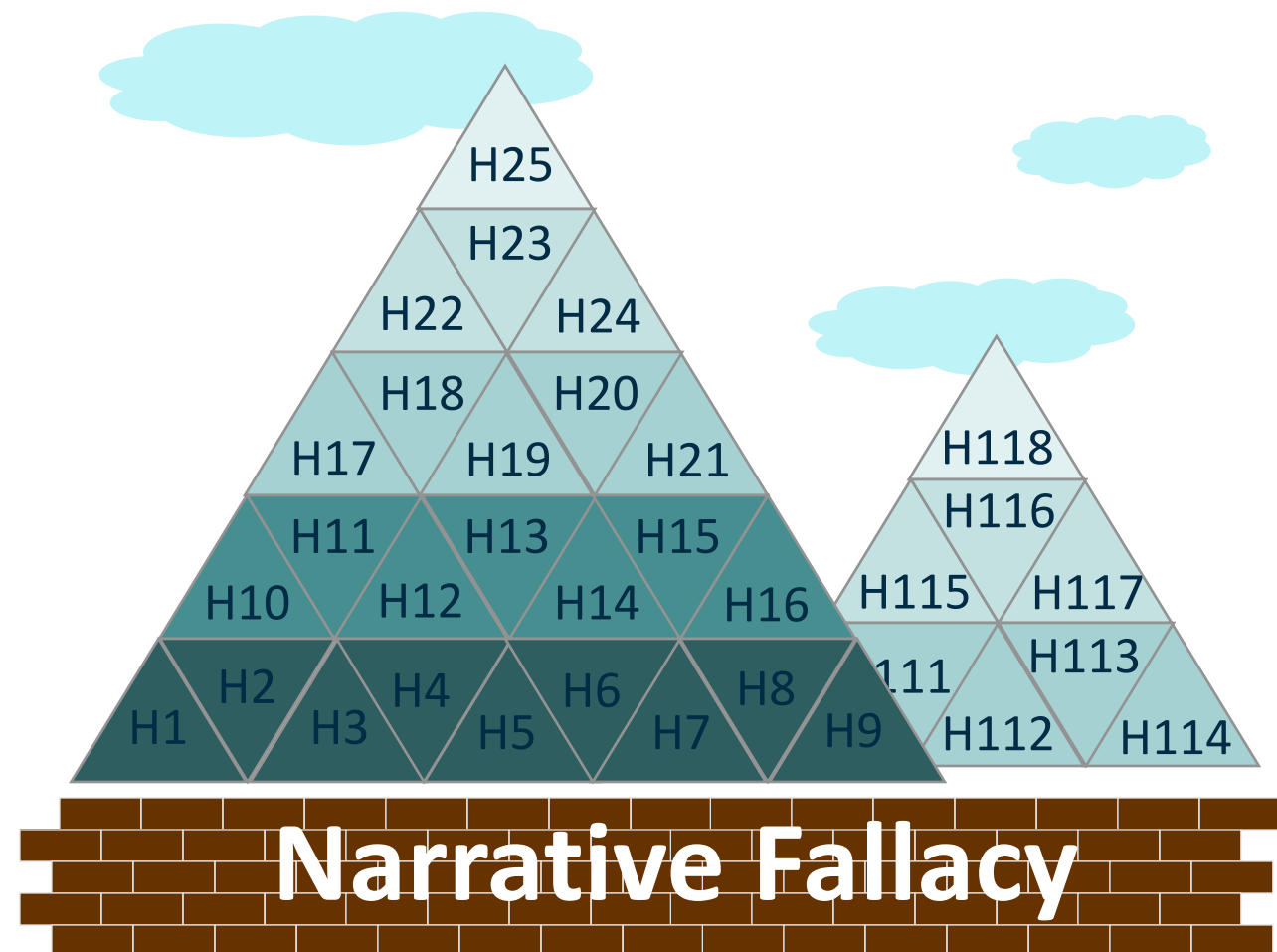
Situation 1 | Narrative Fallacy & Mountains of Hypotheses



1 Skin in the game

Where would you bet your monthly salary?

Situation 1 | Narrative Fallacy & Mountains of Hypotheses



2

Random is your friend

[illegible]

Build a Predictive Model & Generate Variable Importance

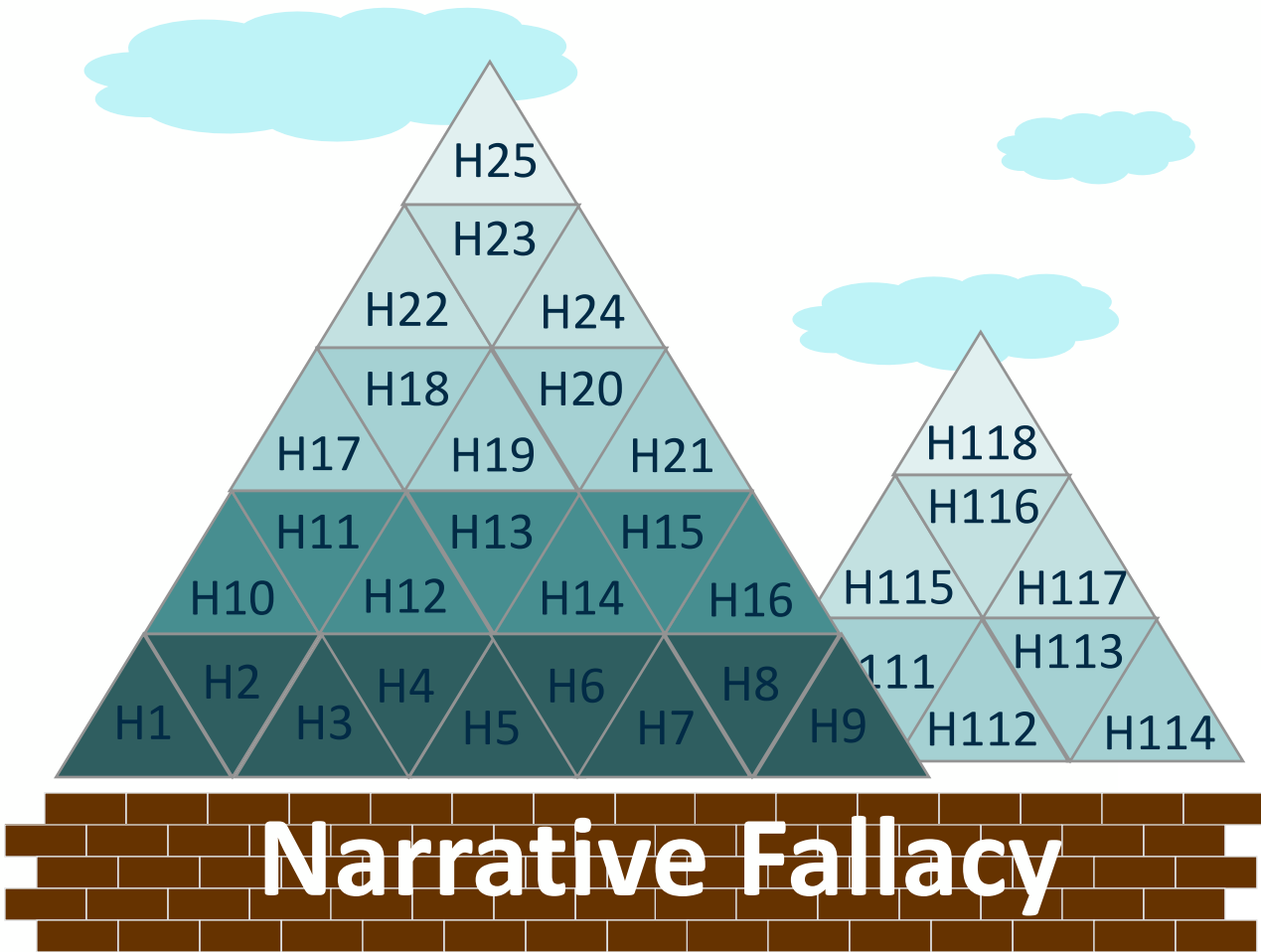
Feature	Importance
f2	100%
f3	95%
f4	90%
...	40%
f1	20%
f5	12%
r2	10%
r4	9%
f11	9%
r1	8%
f6	7%
...	4%
fN	2%

Consider Hypotheses related to features

Event Horizon

Avoid Hypotheses related to features

Situation 1 | Narrative Fallacy & Mountains of Hypotheses



3

Jigsaw puzzle strategy

Is there any pattern in the data?

f1	f2	f3	fN	T
						A
						A
						A
						A
						A
						F
						F
						F
						F
						F

Randomly Mixed

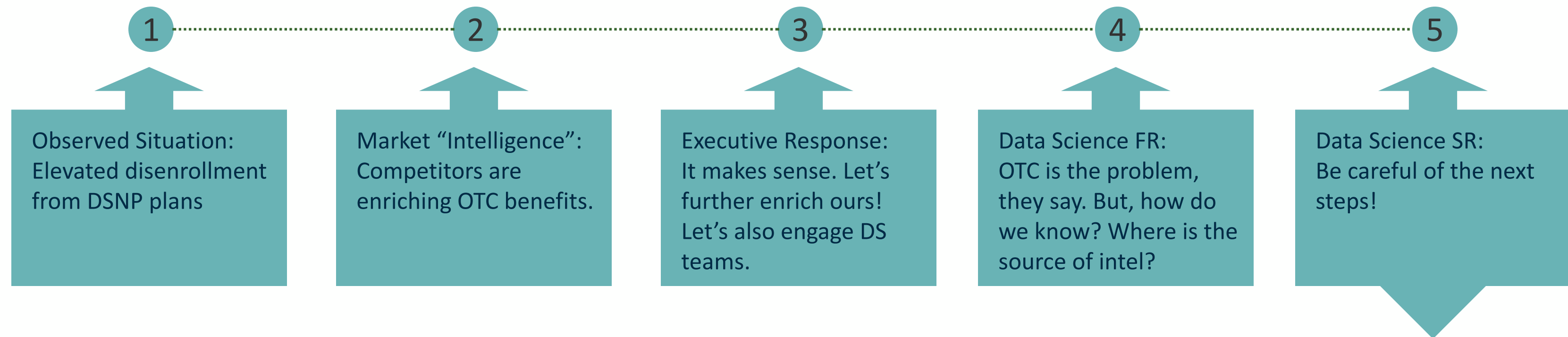
Actual Observed Data

Build a decision tree on T

Covariates that split the data potentially carry real signal

Prioritize Hypotheses related to such features

Situation 2 | Continuing on Narrative Fallacy & Law of Small Numbers

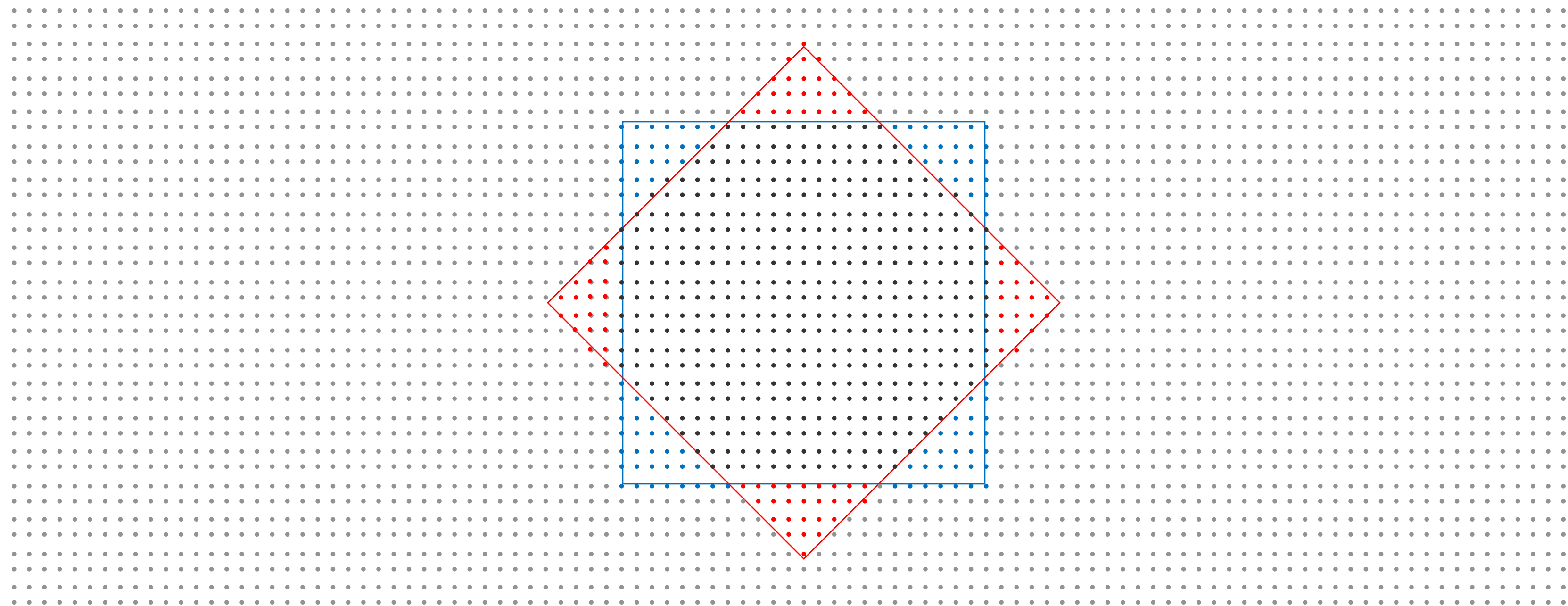


Data Scientist at this stage is also dealing with "people problem". Untangle the people problem from the material problem.

Simple analysis of the OTC data revealed the benefit is already underutilized.

Do not stop there. Point the issue to the LoSN. Propose more viable data driven hypothesis around market influences, product awareness, benefit availability/ access.

Situation 3 | What You See Is All There Is (WYSIATI)

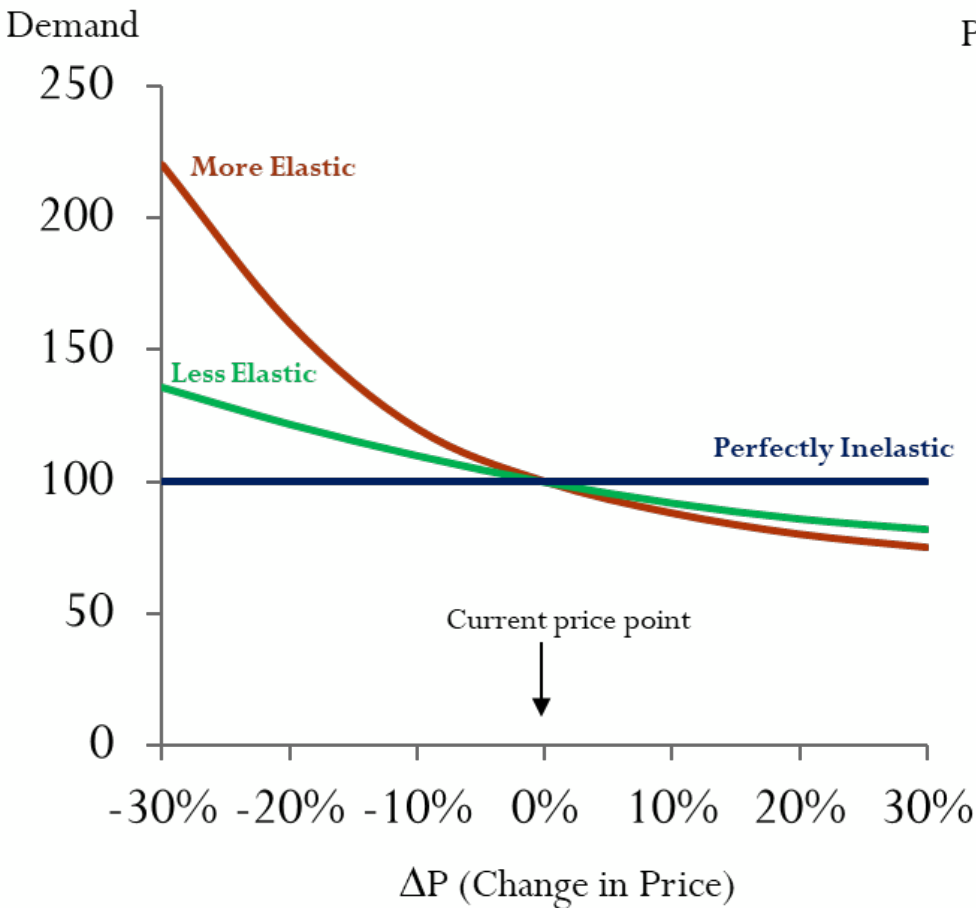


Probability(Event X |Business operates in blue box) \neq Probability(Event X |Business operates in red box)

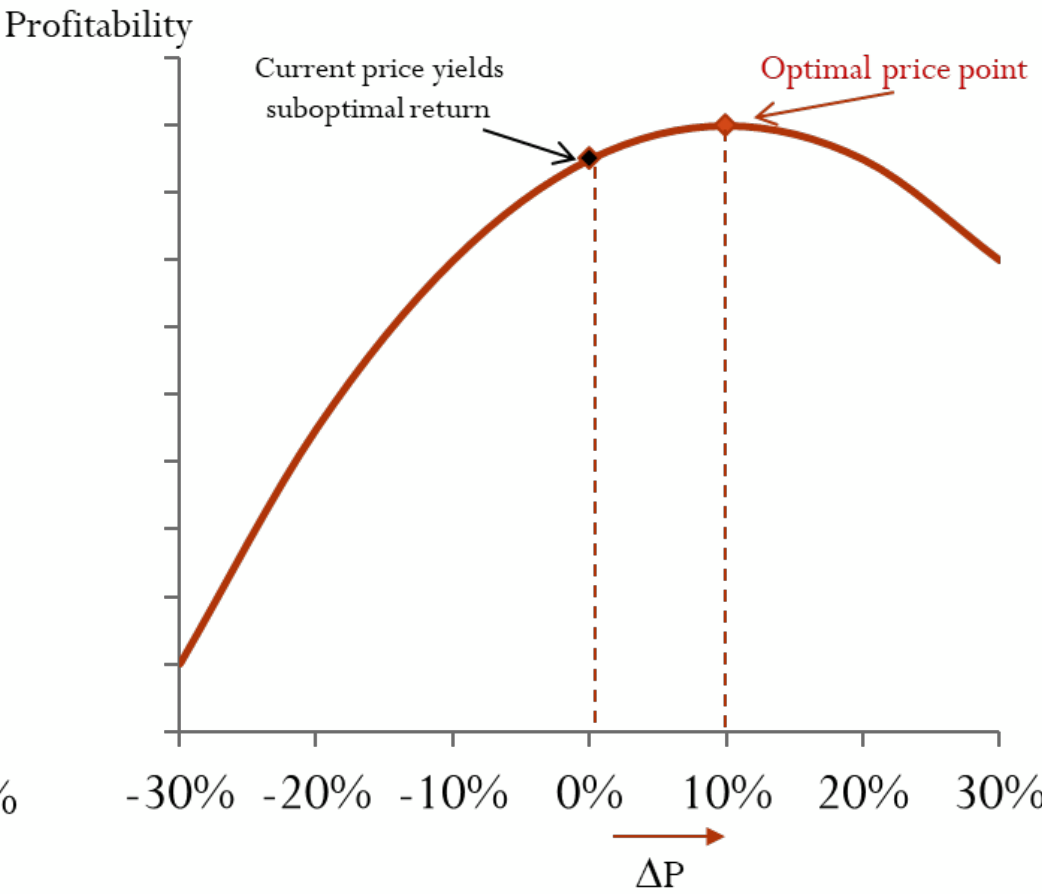


Situation 3 | What You See Is All There Is (WYSIATI) – Real life example

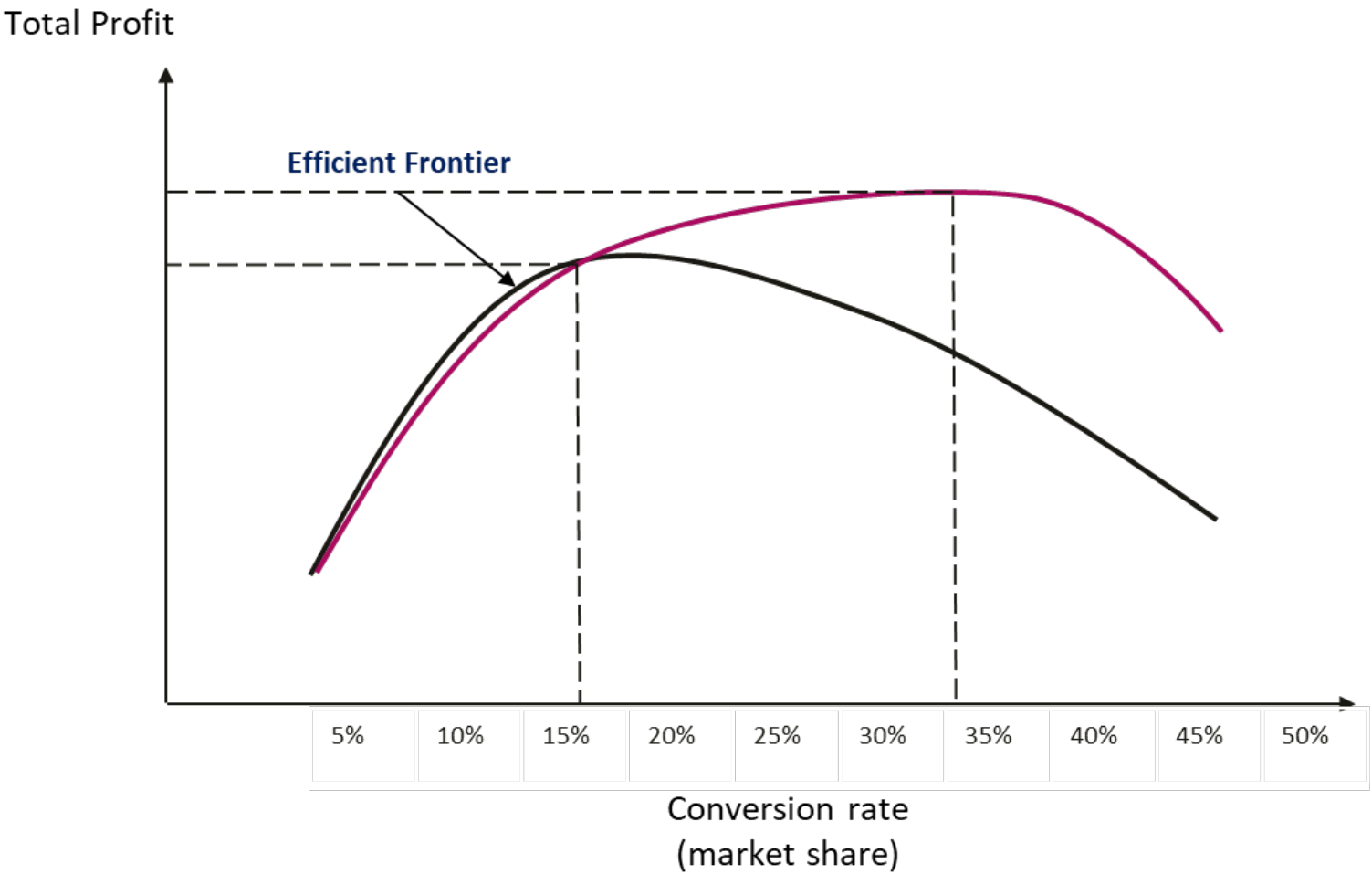
PE Curve around Current Price
by various degrees of price elasticity



Profit Maximizing vs. Suboptimal Pricing



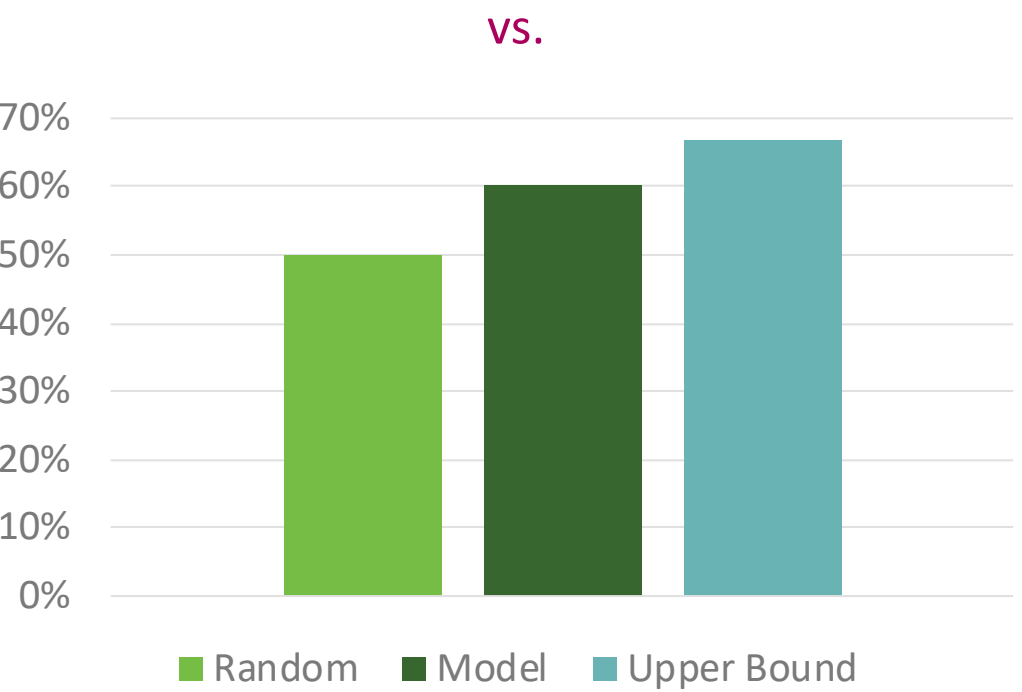
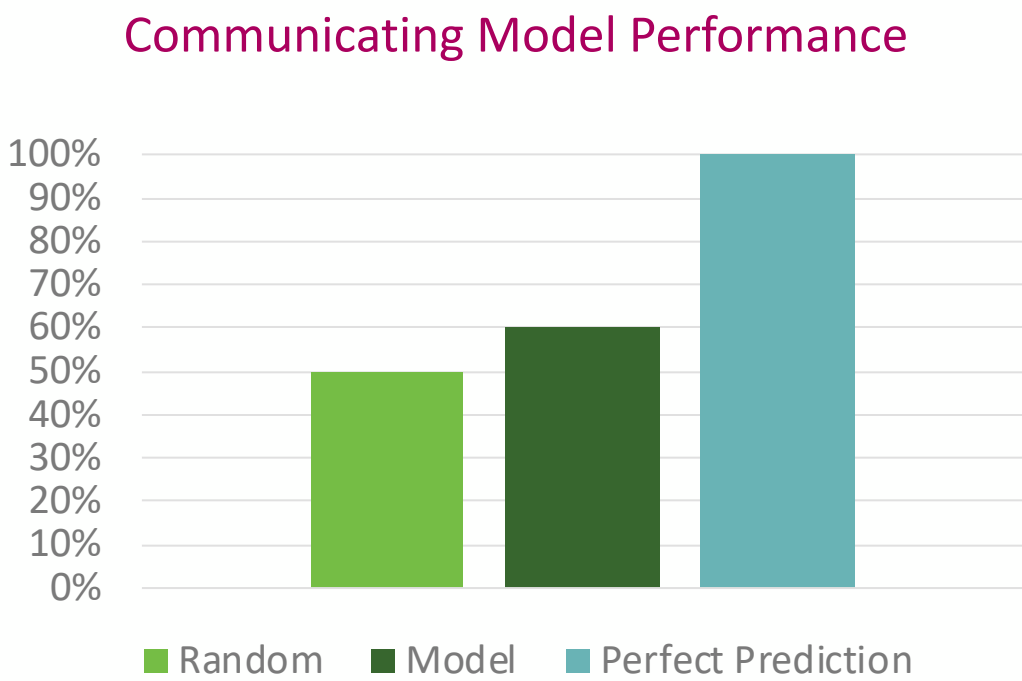
Efficient Frontier by Market Share



Note: All numbers are representative and do not reflect real business parameters



Situation 4 | Anchoring – Ohh dear anchoring!



Project Deadline Negotiations

Naïve DS approach:

When do you need it by?

Anchoring-aware DS approach:

I can get this to you by June 15. Is this reasonable?

Contract Negotiations



Thank You for Smoking (1/5) Movie CLIP - The Joan Show (2005) HD

Situation 5 | Confirmation Bias



Situation 5 | Confirmation Bias – Strategies in fighting back

Morning/ Evening (or Monday/ Friday) Strategy

We need cognitive power to unbelieve statements.

When do people typically have replenished (or depleted) cognitive power?

Schedule critical meetings where you need people to unbelieve statements based on pure anecdotes during high cognitive stamina day/times.

Take advantage of *Positive Test Strategy*

Rather than asking A, ask anti-A. Ex: Is current OTC benefit a problem? vs. Is current OTC benefit rich enough?

Asking the anti-A will trigger for a search for confirming evidence for anti-A.

Doesn't eliminate the bias. Only induces us to believe anti-A as starting point and unbelieve anti-A if we can.

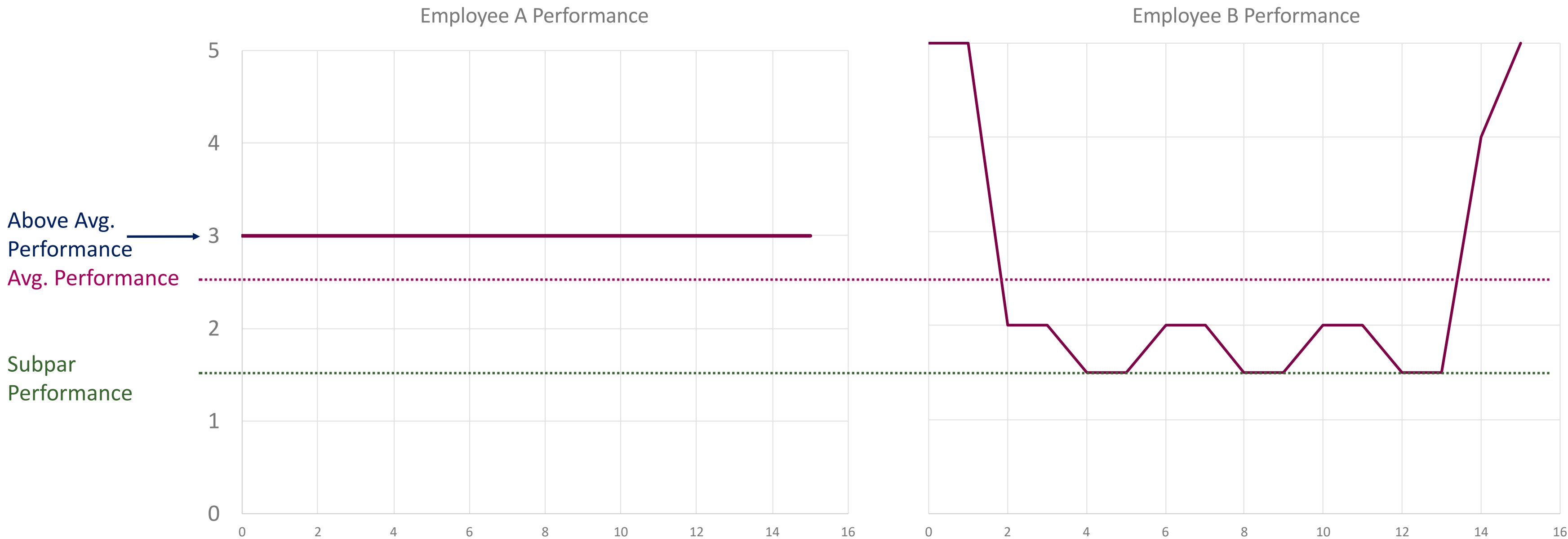
Situation 6 | Halo Effect – A common & very powerful bias



vs.



Situation 7 | Which employee would you promote?



| Thank You!

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