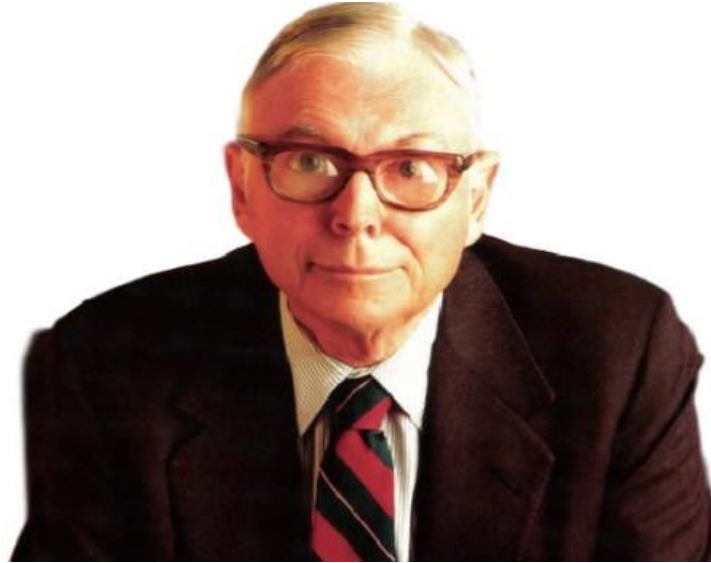
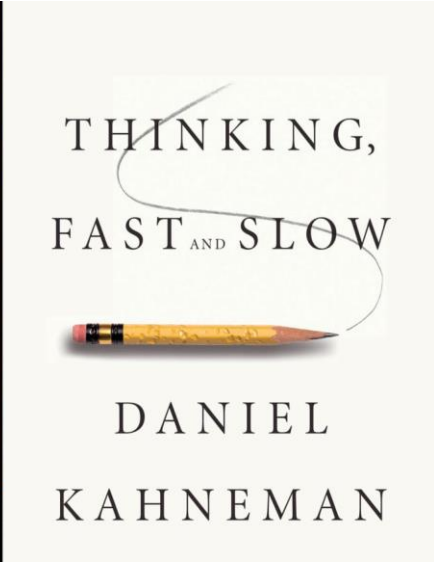
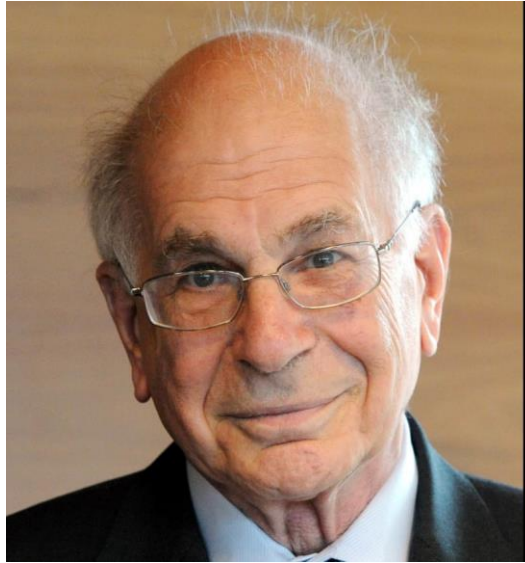


Cognitive Biases in Healthcare Decision Making

How to protect you and your patient from yourself

Dr Anup Shah



Heuristics

- Psychology
 - Perception
 - Irrationality
 - Decision Making
 - Errors of Judgement
 - Cognitive Science
- Statistics
 - Uncertainty
 - Illogical Thinking
 - Behavioural Psychology
 - Intuition

System 1 & System 2

System 1	
Automatic	Driving
Intuitive	Reading an angry expression
Involuntary	Recalling our age
Efficient & Effortless	Impulse purchases
Jumps to conclusions regarding causality	
Can be wrong but is more often right	
Acting on 'heuristics' – may not be accurate	

System 2	
Slowing down	Calculating arithmetic
Deliberating	Buying a house
Solving problems	Filling out a complicated form
Reassuring	
Computing	
Focusing & Concentrating	
Not jumping to quick conclusions	
Makes up stories to confirm or deny those conclusions	
Can be right or wrong depending how hard it works	
Assesses heuristics but may be error prone	

As you get skilled in certain tasks its demand for energy diminishes and it moves from system 2 to system 1

- “Most people don’t take the trouble to think through a problem”
- “Intelligence is not just ability to reason, but also to find relevant material in memory and deploying attention when needed.”
- High intelligence does not make people immune to biases as rationality is separate to intelligence
- “Accessing memory takes effort, but by not doing so, we can make errors of judgement.”

System 2 : Thinking Slow

- Affects our bodies – dilated pupils
- Attention – limited observation
- Energy – depletes resources
- Thinking slow takes energy – we prefer to think fast, the path of least resistance.
“Laziness is built, deep into our nature.”
- Think fast to accomplish routine tasks and slow to manage complicated tasks
- Switching from 1 complicated task to another is effortful, especially under time pressure.
- Frequent switching of tasks and sped up mental workload are not intrinsically pleasurable

Heuristics

- Cognitive Ease
- Coherent Ease
- Associative Machine
- Confirmation Bias
- Halo Effect
- Judgement
- Substitution
- Law of Small Numbers
- Confidence over Doubt
- Availability Heuristic
- Representativeness
- Intuitive Predictions
- Narrative Fallacy
- Hindsight Illusion
- Optimism Bias
- Loss Aversion
- Joint Evaluations
- Frames
- Peak End Rule
- Remembering vs Experiential Self

Lazy Controller



- People walking stop when asked to calculate something
- Being interrupted when focused is frustrating
- We forget to eat when focused on an interesting project
- Multi-tasking when driving is dangerous – **why is multi-tasking in healthcare any less**
- When stressed – resisting temptation is difficult
- Self control shrinks when we are tired, hungry or mentally exhausted
- **Because of this reality, we are prone to let system 1 take over intuitively and impulsively**

Mental Energy



- All voluntary efforts: cognitive; emotional and physical all draw a common pool of mental energy
- If you force yourself to act, you're less willing to exert self control when the next challenge comes around – 'ego depletion'
- 1 complex patient; 2 complex patients; 3 complex patients ...
- If busy or stressed; dealing with problems – you may deviate from diet; overspend; be unable to restrict nicotine or alcohol

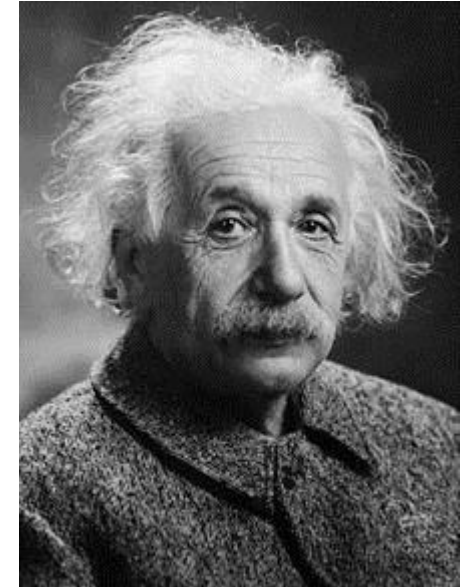


Cognitive Ease

- Things easier to compute, more familiar and easier to read seem more 'true' than those requiring hard thought
- A statement is true, if linked by logic or association to other beliefs you hold
OR comes from a source you trust = cognitive ease
- Teachers; advertisers; marketers; cult leaders; authoritarian tyrants, all repeat messages endlessly
- Patients prefer to repeatedly see doctors they've seen before – not always because they like them – but because they've seen them before

‘Everything should be as simple as possible but not simpler’

- Simplicity is beautiful – why?
- Persuasion:
 - maximal clarity
 - slow
 - simple spare prose (no poly-syllables)
 - easy to understand – lyrical
- Cognitive ease is crucial to work
- Complexity coupled with cognitive ease is ideal – a variable mix



Coherent Ease

- The world is too chaotic to understand
- We make associations between circumstances and occurrences – **we find patterns**
 - The more we place events into our own stories/understanding the more normal they seem
- Unexpected events surprise us, to make sense of them in our world, we make more stories to allow this
 - Everything happens for a reason
 - It's God's hand
- Your mind is eager to identify causality which may not depend on causation
- The potential for error: seeing intention where none exists, we confuse causality for correlation and we make more out of coincidence than statistics should warrant

Associative Machine

- Conscious and subconscious exposure to an idea 'primes' us to think about an associated idea
- So – things outside conscious awareness influence our thought. Subtle influences affect our behaviour
- Advertisers Know This!
- If we smile – jokes are funnier; if we think about the elderly – you walk slower
- If you smile – the patient relaxes, if you are relaxed – the patient is relaxed; if you are on edge or rushed – so will be the patient & they may not disclose that important symptom

Confirmation Bias

- A tendency to search for a belief while overlooking counter examples
 - Jumping to conclusions is **efficient if conclusions are likely to be correct, and the cost of an occasional mistake acceptable** if the jump saves time and effort
 - Jumping to conclusions is **risky if the situation is unfamiliar, the stakes are high and there is no time to collect more information**
- System 1 fills ambiguity with automatic guesses, assumptions for our pre-conceived stories.
- When system 1 makes mistakes, system 2 slows us down to offer alternatives
- System 1 is gullible and biased to believe
- System 2 is sometimes busy and often lazy



Halo Effect (+ Social Proof)

- To like or dislike everything about someone, including that not observed (and what's associated with them)
- Major pitfall in medicine: senior makes a judgement – all subsequent doctors agree based on respect
- Social proof is powerful: someone agreeing, is evidence of being right regardless of facts



“You may encounter a patient who shares a disturbing tale of multiple mistakes in previous treatments, of several doctors who may have failed them, but they tell you their story, you listen to them and they perceive you as different.

You share the same feeling you are convinced you understand them, and you sympathise and you may be able to help them”

WYSIATI

What You See Is
All There Is



What You See Is All There Is!

- System 1 creates stories – coherence & vividness: not data
- Interview scenario is classic – build a coherent & vivid picture of what they want (careful)
- Patient with : terrible social circumstances; terrible partner; terrible employer; horrendous situation
- WYSIATI

Substitution – We Are All Guilty!

- Complex problems lend themselves to substitution
- Confronted by a hard problem you make life easier by substituting a simpler problem and solving it
- When in A+E / OPA /GP – multiple or complex issues
- System 2 provides an ‘off the shelf’ response to more complex questioning
- Easy in A+E – as you’ll never see the patient again, but in GP, OPA, ‘real life’ – these problems cannot be substituted over time

Confidence over Doubt

- System 1 suppresses ambiguity by making stories from scraps of data
- System 2 is our inner sceptic, weighing + doubting, suspending judgement
- Disbelief requires more work than belief – “we are biased toward believing”
- Great advances come when people question status quo
- Widespread imaging & guidelines has disrupted the old professor shouting at juniors as their seniority count for less
- Easier to see patterns than understand randomness. It's easier to attribute things to some intelligent force in the universe than accept them as having no explanation

Availability Heuristic

- If you've been mugged you will feel a higher prevalence of muggers
- If terrorism is on TV you fear terrorism more than diabetes or cancer. Rationally you should be "1000x more" fearful of diabetes or cancer than any terrorist act
- In South Eastern USA people fear tornadoes more than asthma. But asthma kills 20x as many people than tornadoes

Availability Heuristic

- If you see a woman with ovarian cancer – you will be vigilant for it.
- If you haven't seen ovarian cancer recently, you're more likely to ignore its prevalence
- 3 women with ovarian cancer. Now you're pre-occupied with it. More if missed or delayed, but statistics, hence, rational thinking = **next atypical presentation will be different**, but pre-occupation with rare presentations of ovarian cancer leads to missing the next rare thing
- Availability cascades:
 - George Alagiah: bowel cancer and screening uptake rises
 - Jade Goody / Senator Bob Dole

Representativeness: think like a statistician

- Generalism :
 - Probability (likelihood)
 - Statistics (base rates)
 - Sampling size
- Your prevalence of cancer, IHD and all chronic disease will be the same as every other area with a similar demographic

Regression to the mean!!!

Law of Small Numbers



- Simple coherent, vivid, message with no basis in statistical fact – so to the rational mind, no conclusion can be drawn
- Beloved of pharma reps
- System 1 loves the results of small numbers as it is easy to understand and easy to believe
- We want to believe

Judgement

- System 1: lies in intuition
- Intuition is the mental process of repetition: able to analyse something quickly
- In medicine: intuitive decision making lends to repetitive work:
anaesthetics, radiology, pathology; maybe not psychiatry
- GP workload is part complex; part simple and high volume; a danger is to fit symptoms into preconceived notions of the narrative of illness and miss the rare event
- Common criticism – doctor attempts to make complex presentation simple – not the same as breaking it down to its constituent parts

Narrative Fallacy

- In our attempt to make sense of things – for us, patients and best choice interventions ...
 - We create stories, often true but sometimes flawed
- Why do more people live to aged 100 in Ikaria than in Surrey?
- Why is there 1/3rd the prevalence of dementia in Ballagbarh, when age is factored in than in Pennsylvania?
- Is it: low stress; low fat vegetarian diet; extended family support; active lifestyles?
- People jump to conclusions based on their own bias

Narrative Fallacy (+ Substitution)

- The comforting conviction the world makes sense, sits on a secure foundation: an amazing ability to ignore our own ignorance
- Substitute admission of ignorance to offering help (its easier)
 - Patient : Why do I get eczema?
 - Dermatologist: There are many possible reasons
 - Patient: What can I do to prevent it?
 - Dermatologist: Let's focus on treating you
- Drives medicine / Drives Professions
- Gives appearance of confidence to patients and amongst colleagues
- Greater level of confidence supports greater respect until something goes wrong ... Ian Patterson

Intuition

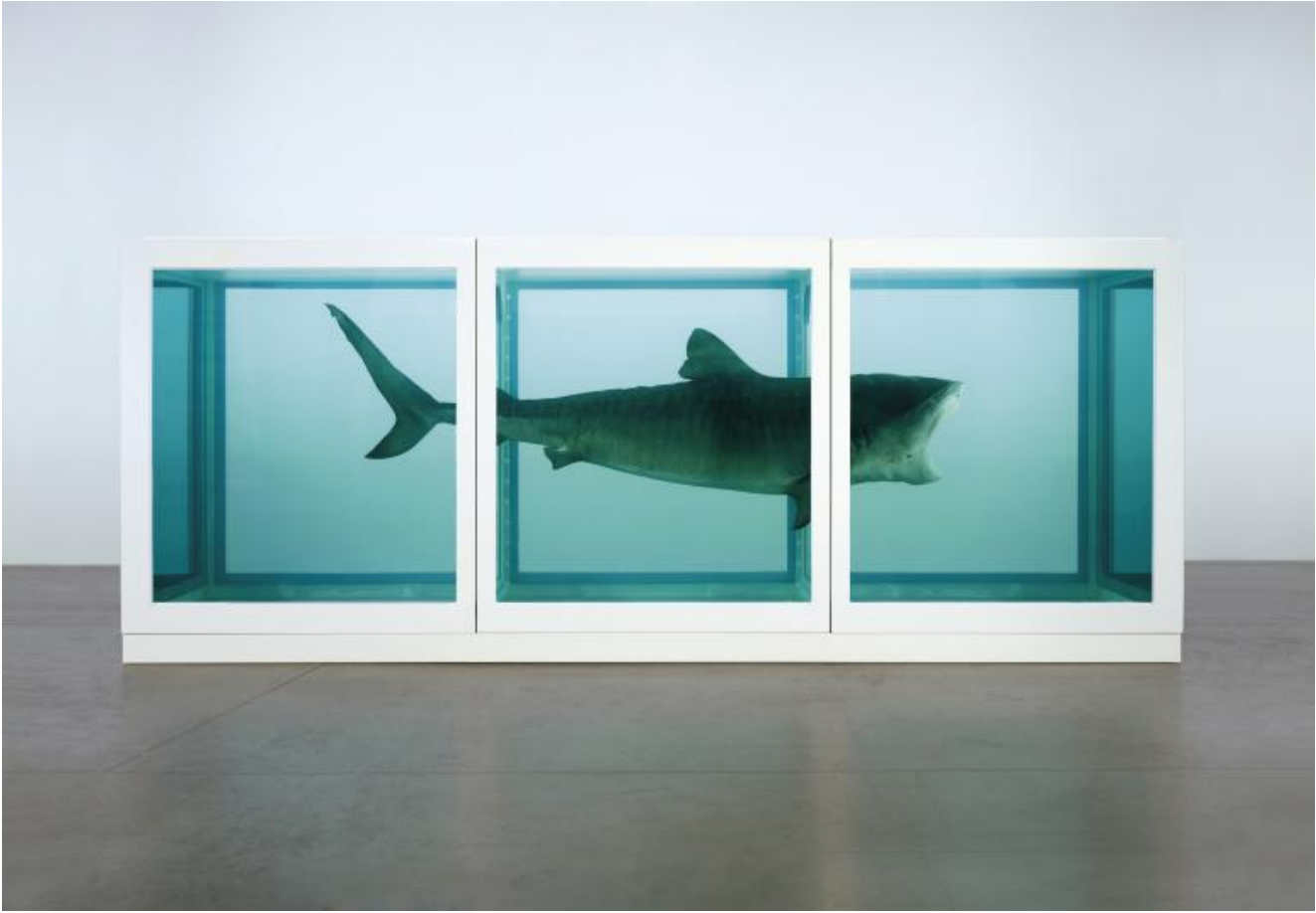
- Intuition is nothing more than recognition
 - Kids with video games
 - Senior anaesthetist knowing when something is wrong
- Intuition is thus most useful in repetitive tasks
- Trusting an expert on intuition, only if they know limits of their knowledge.
- People talking confidently gives you the illusion of validity
 - A doctor can be confident about common illness, but not the future of the NHS (neither could a health policy expert nor a politician)
- Skill is obtained in regular environments with opportunity to learn regularities through prolonged practice
- Learning through emotional fear – is quick and sometimes effective but “expertise” is a collection of mini-skills which takes time to develop

Intuitive Predictions

- When we feel something “in our bones” or feel this is the correct outcome based on your emotions
 - 1) slow down
 - 2) examine your intuition
 - 3) consider the quality of the evidence
 - 4) consider regression to the mean

Ignoring Algorithms

- We overlook statistical info and favour gut feelings ... **this is not good!**
- In most things, over time, algorithms win – almost always
- Computers don't have:
 - Arguments with spouses; hangovers; bullying bosses; divorces; sick parents; need to prove themselves; overconfidence; boredom; multi-tasking etc
- Why it's better for the brain to work as an algorithm
 - Checklists are favoured: APGAR; ATLS; antenatal; MPS advice; “the checklist manifesto”
- Radiological interpretation will be largely software based very soon



Optimism Bias

- Most “start-up” businesses fail – only 33% succeed. In entrepreneurs conference you won’t hear this. Why? Because each one is “different”
- Most people don’t think they’ll get diabetes/IHD or cancer – but it’s a high chance for many in this room
- Cigarette smokers are a living embodiment of the optimism bias
- We feel outcomes in our lives depend on our achievements and actions without ignoring base rates and random chance – risky

Hindsight Illusion

- Landscape of medical negligence
- Lawyer & the 'expert witness'
- Basic building block of behavioural psychology at play:
 - Intuitions & premonitions feel more true after the fact
 - Revising the history of one's beliefs in the light of what happened produces a robust cognitive illusion
- *When things go wrong, lawyers, expert witnesses, peers & seniors often blame doctors for not seeing the writing on the wall, forgetting it was written in invisible ink, that only became legible afterwards*
 - Forces risk aversion
 - Promotes working with margins of safety



Loss Aversion – Prospect Theory

- Be careful what you give people in terms of NHS services, as it's harder to take meds, services, etc. away than to provide it in the beginning
- The value placed on losing something you have is often more painful than gaining something you don't have
 - It's not symmetrical
- A 10% risk of amputation is more than doubly bad as a 5% risk

Loss Aversion – Prospect Theory

- People are risk averse; unless all outcomes are bad then tend to be risk-seeking
 - High risk intervention rather than certain death
 - Psychological risk of 95% risk of death and 100% risk of death is the difference between night and day
 - It's why the underdog sometimes wins
- Low probability events more weighted in terms of relative frequencies (how many), rather than risk or probability e.g. (1 in 1000 may die) rather than 0.1%.
 - System 1 is better dealing with individuals than categories
 - See how pharma companies frame their data and promote their products and how you can frame statistics so patients can make simpler decisions about treatments

Loss Aversion – Prospect Theory

- Greater sense of regret through losses from action vs inaction
- More when deviate from default or conventional thought – can be a greater candidate for blame – **whatever your intention**
 - An unconventional treatment
 - Going off guidelines
 - Choosing a different approach
- **Loss aversion coefficient is almost twice as high for losses or gains in health than other walks of life**
- When choosing a treatment / procedure
 - Be explicit about anticipation of regret
 - Optimism doesn't pay
 - Be clear with side effects and complications
 - Ask people – “if things go wrong, would you have regretted this” –allows better frame for their response

Joint Evaluations

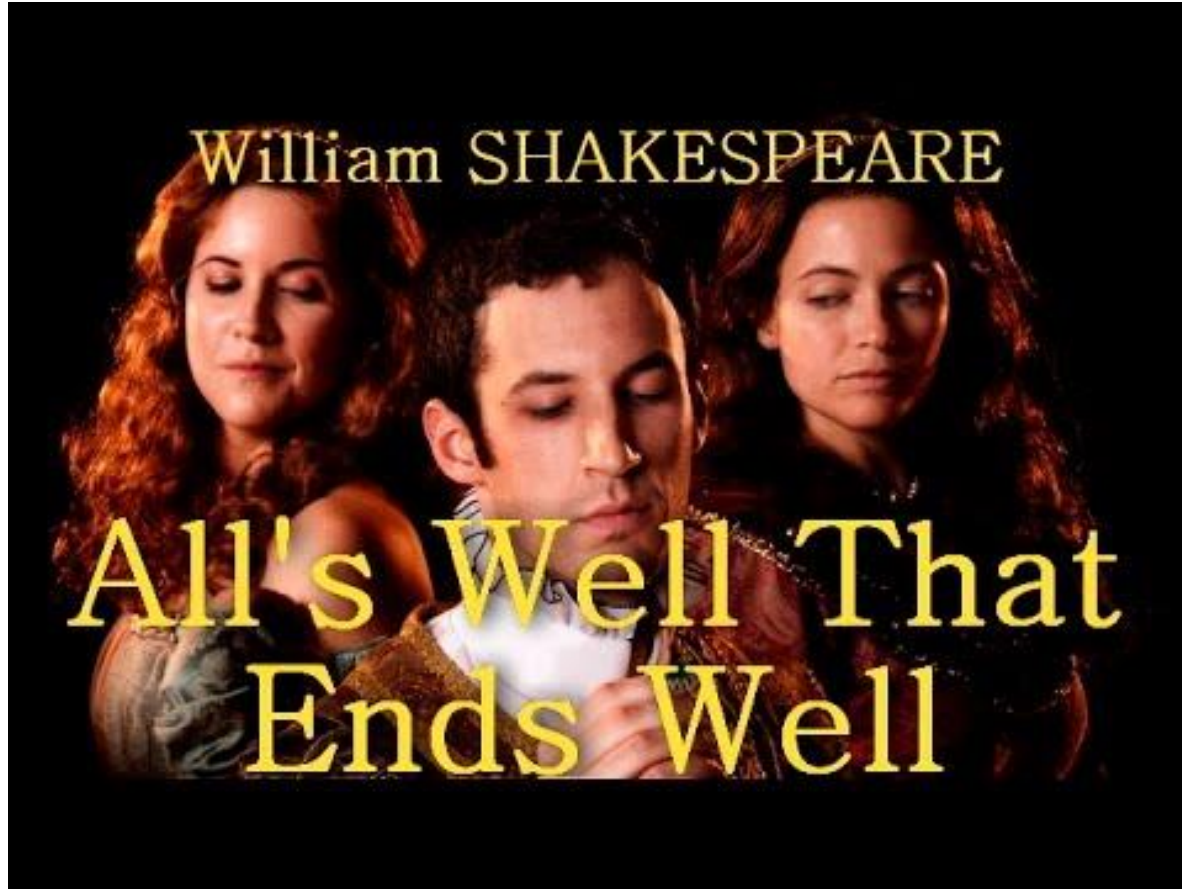
- The idea that individuals make different decisions in different situations
 - A) Polish male construction worker aged 40, with known IBS and migraine presenting with anxiety
 - B) Polish male construction worker aged 40 suffering with anxiety
- Which is more likely?
- Should they be investigated the same way?
- Remember to ensure your decision is fair and rational and not skewed by your pre-conceived assumptions of what these people have?

Frames & Ignoring Frames

- NNT: statins 1 in 49 prevention of CVD in primary prevention
- Statins reduce your risk of heart attacks significantly
 - Both sentences mean the same thing
- 1 year survival rate of 90%
- 10 % death rate in first 1 year
 - The word survival is what makes people emotionally engaged
 - Personally reframing the 1st statement to the 2nd is effortful and system 2 is lazy

William SHAKESPEARE

All's Well That
Ends Well



Peak-End Rule

- Retrospective rating : of the experience
 - worst stage and the end
- Duration neglect :time of the experience lesser effect
- Event, relationship, procedure: if ends on a bad note – it leaves an unpleasant memory
 - Colonoscopy or any medical intervention
 - Patient doctor relationship
 - Acrimonious divorce after years of happiness
 - Breakdown with colleagues

Peak-End Rule

- How people die, for relatives, is fundamental to experience of overall care, this is the lingering memory – hence a legal minefield
- All care until then, is for little, if the end is bad.
- ‘Duration neglect’ – an experience can be bad for ‘a while’ but if the end is okay – much is forgiven
- Sensitive complaint handling is key: –
 - be wary the doctor, who says ‘I’m not going to apologise,’ forgetting the major impact small concessions make – **as this demonstrates very poor professional judgement**

Focusing Illusion

- Nothing in life is important as you think it is when you are thinking about it!
 - How much pleasure do you get from your car
- Living in a sunny climate
- Most of life: bad or good: adaptation is about thinking less and less about something
 - Paraplegia
 - Stoma - ...
- Exceptions: (biological signals that attract attention)
 - Chronic pain
 - Exposure to loud noise
 - Severe depression (self reinforcing cycle of miserable thoughts – one cannot adapt to)



Two Selves: Julia and Jules

- Julia: experiencing self Jules: remembering self
- Remembering self tends to take precedence over the experiencing self
- “I had a wonderful 2 week holiday, but it was ruined on the last day by (... something)”
- 13/14 days were good; so is it fair to complain?
- A 2 hour music concert was ruined by 5 minute fire alarm at the end??
- Memory overrides experience
- Confusing experience with memory is a compelling cognitive illusion

Two Selves

- Experiencing self doesn't have a voice
- Remembering self composes stories and keeps them for future reference
- Remembering self can be wrong but keeps score, governs what we learn from life, and drives future decisions
- What we learn from the past is to maximise the qualities of future memories, not necessarily our future experience
- You are more your remembering self than your experiencing self

Remembering Self vs Experiential Self

- Most people can go through much of the day with no single unpleasant episode.
- Significant minority of people experience much emotional distress for a lot of the day.
- So, a small fraction of people do most of the suffering
 - Mental illness
 - Misfortunes or personal tragedies in life
 - Unhappy temperament
- Functional loss of the optimism bias

Remembering Self vs Experiential Self

- If people present feeling low, not depression, and you go over their day– many have no specific unpleasant situations, but may recall a chat with partner, boss, or relative, that dictates the day
- Some people will sit happily in bad traffic if happy in other aspects of their life (relationships)
- Other people have lives free from major adverse events but small things make them seriously unhappy
 - Emotional remembering self overwhelms their experiential self, which is not that bad (may be many reasons for this – many are from early childhood and are essentially unfixable)

Life Satisfaction

Life Evaluation	Experienced Well Being
More education but no effect on wellbeing	Better health
Living with children (more anger and stress but ...)	
Higher than a basic threshold of wealth	

- Being poor makes one miserable, but being rich (beyond a threshold) makes no difference to wellbeing
- Severe poverty AMPLIFIES experienced effects of other misfortunes in life
 - Illness (short or long term)
 - Divorce / loneliness
 - Bereavement
 - Burglary / RTA
- Low correlation between individual circumstances & satisfaction of life, is experienced happiness and life satisfaction are largely determined by genetics of temperament –inheritable as height or IQ
- Goals are important– having low expectations of individuals or circumstances boosts your general well being and your satisfaction with outcomes

System 1 & System 2

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Makes up stories to confirm or deny those conclusions	
Can be right or wrong depending how hard it works	
Assesses heuristics but may be error prone	

As you get skilled in certain tasks its demand for energy diminishes and it moves from system 2 to system 1

System 1 & System 2

- System 1 obtains its bad reputation as the source of errors and biases
 - WYSIATI
 - Intensity matching
 - Associative coherence
 - Anchoring
 - Non regressive predictions
 - Overconfidence
- What can you do?
 - Slow down
 - Recognise you're in a cognitive minefield
 - Ask for reinforcement from system 2
- Cognitive Illusions: more difficult to notice than perceptive illusions
- Voice of reason is fainter than clear voice of erroneous intuition and doubting is unpleasant in the face of big decisions – **more doubt is not welcome when in trouble**
- Its easier to see a minefield when observing others wading in, than yourself – observers are less cognitively busy than actors

The Hedgehog and The Fox



- Hedgehogs know 1 big thing, they have a theory of the world and can account for events within a particular framework. They are impatient with people who don't see things their way and are confident in their forecasts ... they are reluctant to admit error ... they are opinionated and clear ...
- Foxes by contrast are complex thinkers. They don't believe one big thing drives history, but realise reality emerges from interactions of many different agents and forces including blind chance, which often produces large and unpredictable outcomes ... (they have no problems admitting their ignorance)

THE NEW YORK TIMES BESTSELLER

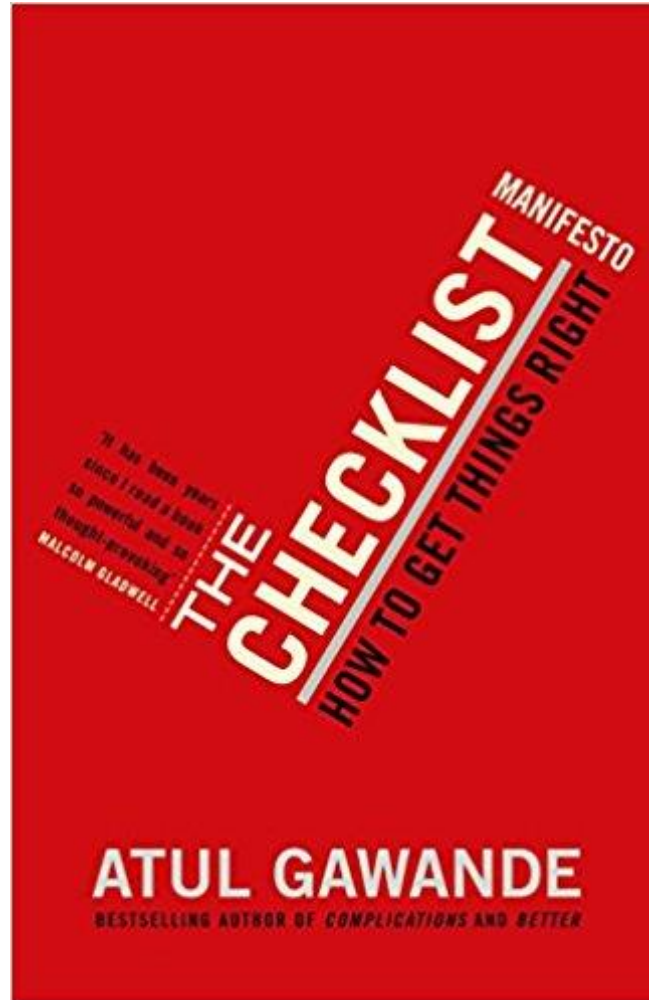
THINKING, FAST AND SLOW



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KAHNEMAN

WINNER OF THE NOBEL PRIZE IN ECONOMICS

"[A] masterpiece . . . This is one of the greatest and most engaging collections of insights into the human mind I have read." —WILLIAM EASTERLY, *Financial Times*



Relationships

- Long term success of a relationship depends far more on avoiding or being able to settle arguments rather than seeking the positive. Stable relationships require that good interactions outnumber bad ones by 5-1

Sunk Cost Fallacy

- Avoiding feeling bad about cutting our losses or being called a failure
- Why we stay in bad jobs, abusive relationships, why patients continue to smoke after a diagnosis of lung cancer

Anchoring Effect

- Considering a value for an unknown quantity before considering that quantity
- Doctor 1: simple lower back pain
- Doctor 2: (HALO) simple low back pain
- Doctor 3: (HALO) simple low back pain
- Autopsy: osteosarcoma with multiple mets