The Neuroscience of Decision Making

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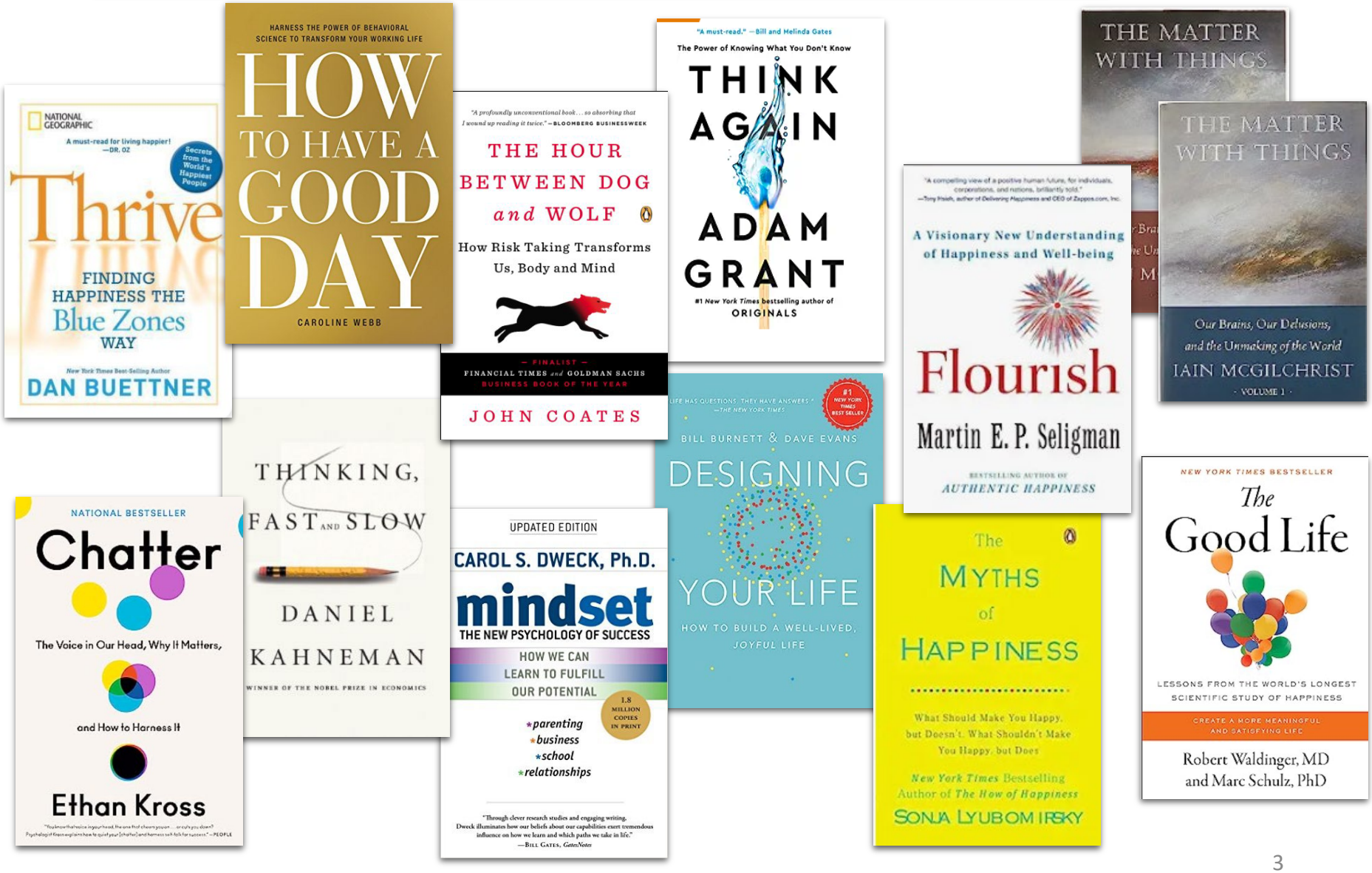
Learning for a Life Well-Lived

Topics

- Introduction
  - References/Resources
  - Technology
  - Approach
- Neuroscience Basics
  - The Two-System Brain
  - The Brain in the Gut
  - The Brain's Chemical "Soup"
  - The Response Cycle
- Ten Practical Research Insights

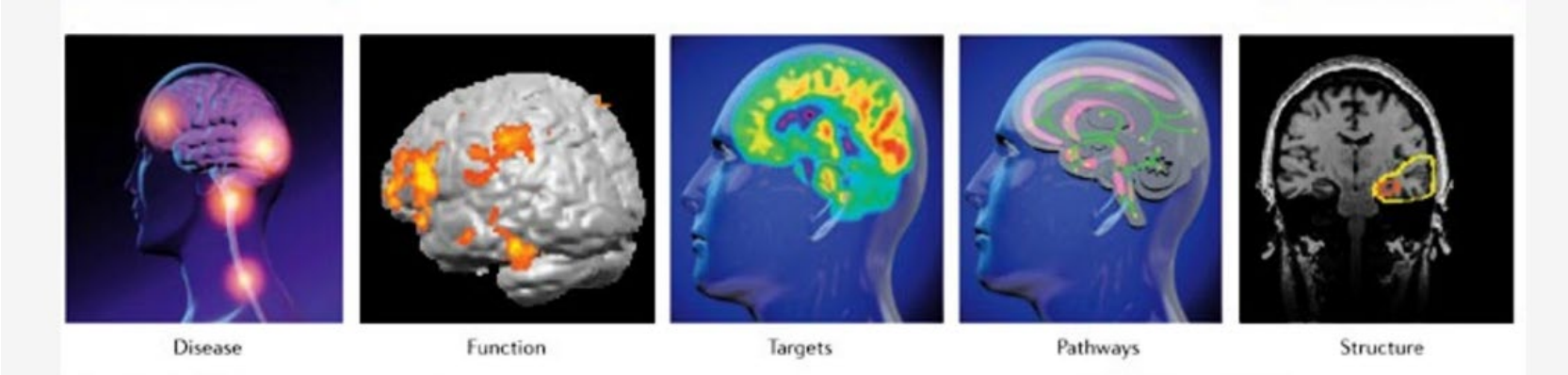
Disclaimer: from the perspective of a working practitioner, not a scientist …

Sources of Ideas

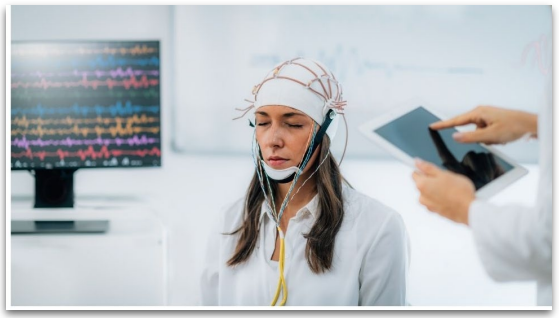


Enabling Technology

- Functional MRI (fMRI) (1991) ~ 32 years!
- Ability to "see" brain function in *healthy* human beings based on blood flow



- Still not a "normal" environment!
- Technology advances continue …



Practical Simplification

- Focus on…
  - Function not anatomy
  - Application not theory
- Belief that we can make practical use of this information without getting lost in the details

**"Everything should be made as simple as possible.
But not simpler."** ***Albert Einstein***

Our "Two System Brain"

90%

System 1 – Right Hemisphere

Intuition & Instinct

- ***Subconscious and fast***
- Seat of beliefs, emotions, habits, values, intuition, imagination, connects new learning with old
- Non-verbal
- Automates much of daily life
- Always "on" 24/7
- Scans for "danger" (physical or psycho-social) and alerts us to fight, flee, or freeze
- Manages scarce mental energy by streamlining decision

Autopilot | Guardian | Dot Connector | Energy Manager

System 2 – Left Hemisphere

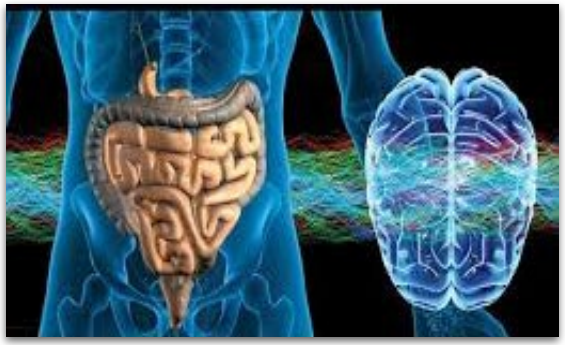
10%

Executive Thinking

- ***Conscious and slow***
- Seat of higher-order reasoning, emotional intelligence, feelings, and "adult" behavior
- "Smart – but small, sequential, and slow"
- Heavily dependent on working memory only 3-4 "chucks" at a time
- Seat of willpower and decision making
- Easily distracted
- Easily tired

Higher Order Thinker | Adult | Planner | Social and Emotional Navigator

The "Brain" in the Gut



- The gut has a mind of its own, the **"enteric nervous system"**
- This system sends and receives impulses, records experience and responds to emotions
- The gut contains 100 million neurons - more than the spinal cord and about the same as our dog's brain

- Its nerve cells are bathed and influenced by the same neurotransmitter drugs
- The vagus nerve connects the brain in the head with the gut; 80% of connections are bi-directional

The Brains "Chemical Soup"

Pleasure

- **Endorphin** – Runner's high, released in response to stress and pain, services to mask the pain
- **Dopamine** – Generates good feeling for finding something we have sought after or satisfaction for task accomplished
- **Serotonin** – Feeling of pride
- **Oxytocin** – Social feelings of friendship, love, trust

Fight, Flee, Freeze

- **Adrenaline** – under conditions of threat (real or not), redirects blood flow, and carbohydrate metabolism
- **Noradrenaline/ Norepinephrine** – prepares muscles and heart for response to acute threat
- **Cortisol** – the primary stress hormone, increases glucose in the bloodstream, enhances your brain's use of glucose and prepares body to repair tissues

Example: Response Sequence

Challenging Event(s)

- COVID -19
- Toxic politics
- Social challenges
- 24-hours news and social media
- Financial pressure & uncertainty
- Random acts of violence
- Stressed relationships
- Natural disasters
- Technology threats
- International Conflicts

Our Human Response

- 24/7 alert
- Fight, flight, or freeze response
  - Vison narrowed
  - Higher order reasoning diminished
  - Social and emotional navigation impaired
  - "Adult" response is degraded
- Long-term stress hormones i.e., cortisol can lead to:
  - Anxiety
  - Depression
  - Digestive problems
  - Headaches
  - Heart disease
  - Sleep problems
  - Weight gain
  - Memory and concentration impairment

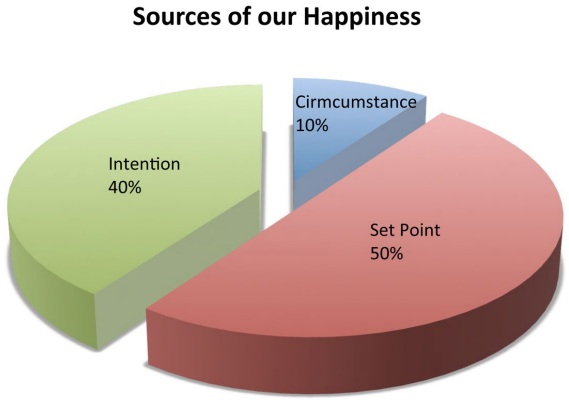
The Lived Experience

- Fearful, negative, reactive, unsettled, isolated
- Hunkered down

"So fast are our reactions that consciousness is frequently left out of the loop." (John Coates)

Negativity is Our Inheritance

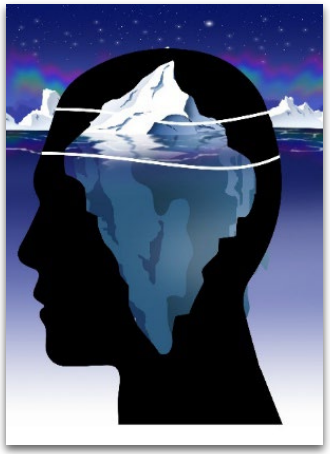
- We are negative by nature!
  - **Our biology evolved to keep us safe, not happy** (Rick Hanson)
  - The mind is like Velcro for negative experiences, positive experiences are like Teflon (Rick Hanson)
  - It takes ~5positive experiences to 1 negative to be "flourishing" (Barbara Frederickson)
- Happiness is on average about 50% genetic setpoint and 10% life circumstance. We can intentionally address the remaining 40%! (Sonja Lyubomirsky)



Negativity is our inheritance – not our destiny!

Ten
Research Insights
Impacting Decision-Making

1. 90% of Thinking is Unconscious



- 90% of our thinking is unconscious!
- Human retina transmits to the brain approximately 10 million bits of info per second; other senses add 1 million bits per second - only 40-50 bits per second reach our consciousness
- We think 12,000 – 60,000 thoughts per day; 80% are negative (National Science Foundation)
- 90% of our thinking is negative!
- "We talk to ourselves. And we listen to what we say." (Ethan Kross)
- Our inner voice is active about 50% of our waking hours; 33-50% of those hours are not lived in the present moment

2. Skill Practice Trumps Intuition

- Two decision-making experts squared off:
  - **Gary Klein** – Naturalistic Decision-Making studied firefighters, nurses, military commanders, fighter pilots – those on the front line operating in conditions of time stress, high stakes, multiple players, dynamic settings, uncertainty, and vague goals
  - **Daniel Kahneman** – Nobel prize-winning behavioral economist worked with "everyday people" whose researched intuitive decisions were no greater than chance
  - Disagreement turned to collaboration and their conclusion was that we **"should not be asking if we should trust our intuitions; we should be asking how we can train ourselves to possess a skill that can be relied upon"** (Coates, 2012)
- Eisenhower's "weather decision" for the D-Day Invasion is a classic example of deliberate decision-making practice

3. With Inattention Comes Blindness

- "The human brain has evolved to hide from us those things we are not paying attention to" (Daniel Levitin, 2014)
- When tasked-focused, the automatic system filters out anything that is not relevant

When observers were tasked to count basketball passes among specific players, 50% didn't see the woman in the gorilla suit (Simons, 2010)

A gorilla, 48 times larger than the average nodule, was inserted in the last case. 83% of radiologists did not see the gorilla (Drew, 2013)

4. Choice Has a Shadow Side

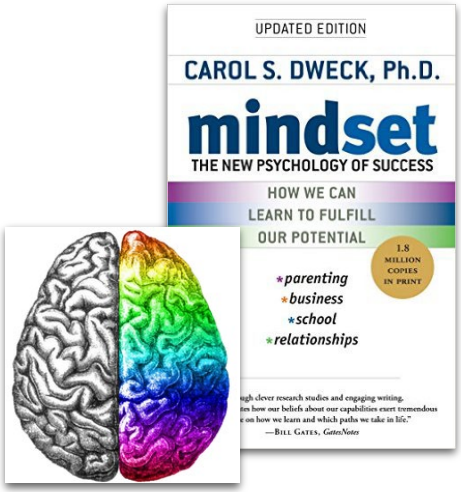
- We love having choices! Options and alternatives are highly valued
- However, too many choices can result in "choice overload"
- "Choice overload" can negatively impact decision making and decision satisfaction
- Iyengar and Lepper presented shoppers in a specialty food store the opportunity to sample jam and then measured actual purchases. These are the results:

Jam Varieties	% Sampled	% Purchased
24	60	3
6	40	30

- Good decisions involve both option exploration and the narrowing of options

5. We are of Two Minds

- Those with "fixed mindset" believe:
  - Character, intelligence, and creative ability are static givens which we can't change in any meaningful way
  - Success is the affirmation of that inherent intelligence, an assessment of how those givens measure up against an equally fixed standard
  - Avoiding risking mistakes and failure at all costs become a way of maintaining the sense of being smart or skilled
- Those with the "growth mindset" …
  - Thrive on challenge and see failure not as evidence of unintelligence but as the basis for growth and for stretching their abilities
  - Believe mistakes are part of learning



Cautions:

- We are not universally in all areas or in all times of one "mindset"
- Organizational cultures can be fixed or growth oriented

6. Our Thinking is Easily & Habitually Hijacked

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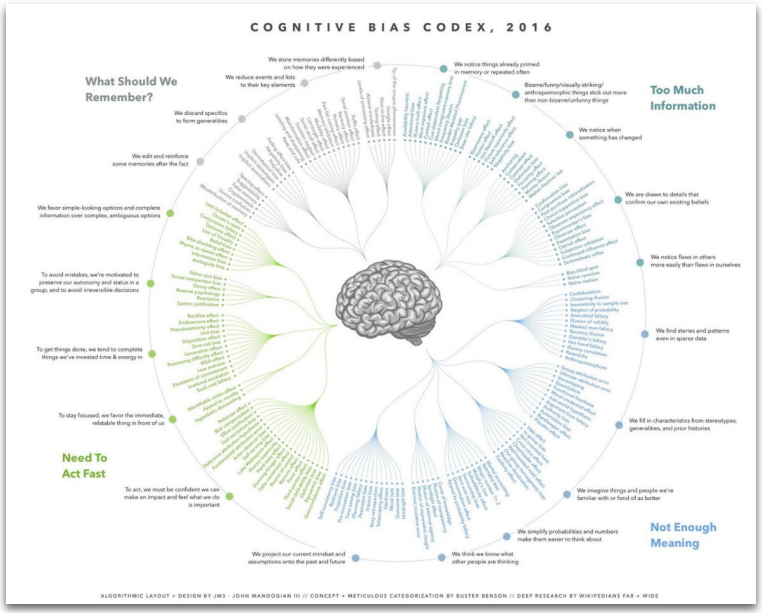
System 1: Right Hemisphere (Automatic Subconscious System)

Autopilot | Guardian | Dot Connector | Energy Manager

How does the automatic/ subconscious brain multi-task to …

- Process huge amounts of data?
- Connect new learning to old?
- Preserve the limited energy reserves of the deliberate/conscious brain?
- Act quickly?



Simplistically, by using "heuristics"

"… **a simple procedure that helps find adequate, though often imperfect, answers to difficult questions."** *(Kahneman)*

Examples of Cognitive Bias

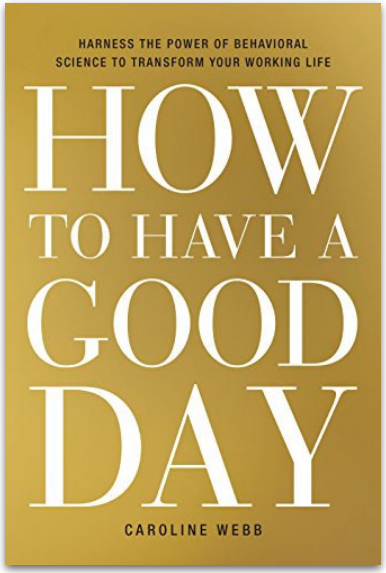
Anchoring or focalism	"If we're exposed to a piece of information (an "anchor"), even if its irrelevant to the question at hand, we'll subliminally use it as a starting point for our thinking--and we won't drift too far from it"
Certainty bias	"We generally prefer the "sure thing" to taking risk and prefer to avoide ambiguity where we can."
Confirmation bias	"We tend to seek out information that confirms our expectgations and assumptions, and tend to ignore anything contractory. Example of selective attention."
Curse of knowledge	When better-informed people find it extremely difficult to think about problems from the perspective of lesser-informed people.
Default Bias	If someone makes a clear suggestion that's halfway reasonable and requires no active decisions from us, we'll generally accept it
Discounting	"We prefer options that deliver real benefits here and now, versus options that aren't going to pay off right away. They're more taxing to wrap out heads around so we value them less"
Endowment effect	"We place disproportionate value on things we already have, versus thiings we don't have that are of equal value. Applies even when there is no sentimental attachment involved."
Fundamental attribution error	"A common attribution error, where we assume bad behavior in others results from bad character, rather then from difficult circumstances that are causing a good person to behave badly."

Examples of Cognitive Bias

Groupthink	"If everyone around us thinks something, we're likely to agree. Not only does it save our brain some energy in working out what to think, but it gives us an evolutionarily important sense of belonging."
Inattentional blindness	"Out automatic system tends to direct our conscious attention to anything that we believe to be imporant, while filtering out other information so that we're not aware of it."
Loss aversion	"Losses loom larger in our minds than gains of the same size; we get more upset at the prospect of losing $10 than we get excited at the prospect of winning $10."
Omission bias	"We tend to assess the pros and cons of doing something, but not to assesss the pros and cons of not doing that thing."
Peek-end effect	The value we place on an experience is disproportionately affected by its peak and the way it ends. It wsaves us thiking about all the data in between these points."
Planning fallacy	"We tend to estiamte the time it will take to complete a tased based on the best experience we've ever had, rather than on the average time it's taking in the past."
Present bias	"It takes a lot of mental energy to conceive of the abstract future, so we tend to give much more weight to whatever's present and known to us."
Processing fluency	We naturally gravitate toward ideas that are easy to understand (aka "cognitive fluency"

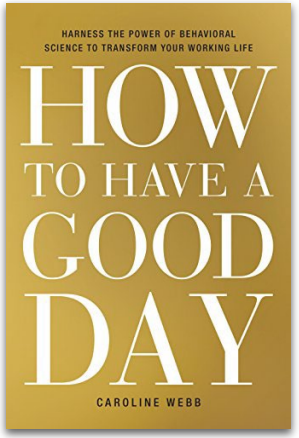
Examples of Cognitive Bias

Projection bias	"We tend to assume that everyone else is more or less like us, so that we don't have to puzzle out why they're behaving the way they're behaving."
Recency bias	"Whatever has happened recently tends to dominate our view of what's likely and true about the world."
Social Proof	"If we hear that other people like us are in favor of something, we're also likely to get on board."
Status quo bias	"Its mentally taxing to conceive of unknown futures. So we tend to prefer to keep things as they are, all other things being equal."
Sunk cost fallacy	"When deciding whether to continue investing in a project, we tend to be distracted by what we've already invested rather than focusing on what's actually at stake; the pros and cons of future investment



Countering Heuristics – Cognitive Bias

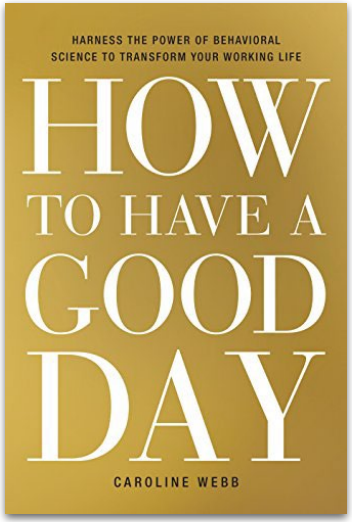
- Notice **the language of "automatic system"**
  - It is obviously right (or wrong) [confirmation bias]
  - I recently heard XYZ… therefore… [anchoring bias]
  - Everyone agrees … [groupthink bias]
  - I understand - so I like it! [processing fluency bias]
  - Let's just stick with what we know. [endowment effect]
  - There's only one real option. [default bias]



- Adopt a cross-check routine, using these questions:
  - **Don't default:** "What would be another option, and what do its advantages tell me?"
  - **Play devil's advocate:** "What would be another way of seeing this?
  - **Mandate dissent:** "If you had to raise a concern, what would you say?"
  - **Never say never:** "Is it always/never/absolutely the case?"
  - **Conduct a pre-mortem**: "If this goes horribly wrong, what will have caused that?"

Countering Heuristics – Cognitive Bias

- Watch out for **system fatigue**
  - If you feel impatient, distracted, or clumsy, give your deliberate system a mindful pause
  - Shift your focus to more routine tasks
  - Take extra cross-cutting steps to compensate for your automatic system's shortcuts
  - Resolve dilemmas with greater ease
  - Ask **"What *could* I do?" rather than "What *should* I do?**



7. We are Negative by Nature

- "Adults display a **negativity bias**, or the propensity to attend to, learn from, and use negative information far more than positive information"
  (Amrisha Vaish)

- In a relationship, it typically takes five good interactions to make up for a single bad one.
- Painful experiences are much more memorable than pleasurable ones
- **Negativity is emotionally contagious**

Our biology evolved to keep us safe, not happy
(Rick Hanson)

8. Psychological Safety Matters

- Google's two-year Aristotle Study on what makes the highest performing teams
  - Not most senior
  - Not most intelligent
  - Not most mistake-free
- Five factors
  - Psychological Safety
  - Dependability
  - Structure & Clarity
  - Meaning
  - Impact
- **Psychological Safety #1**

Psychological Safety Matters

Pleasure

- Endorphin
- Dopamine
- Serotonin
- Oxytocin

Workplace Rewards

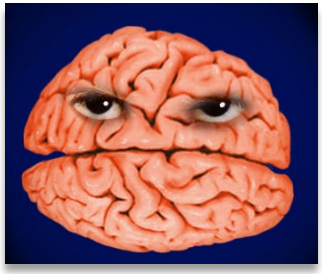
Humor, sense of autonomy, feeling of personal competence, and new learning

Stress, Fight, Flee, Freeze

- Adrenaline
- Cortisol
- Noradrenaline/ Norepinephrine

Workplace Triggers

Exclusion, isolation, perceived unfairness, getting nothing in return, being publicly undermined, not getting enough recognition, not being listened to

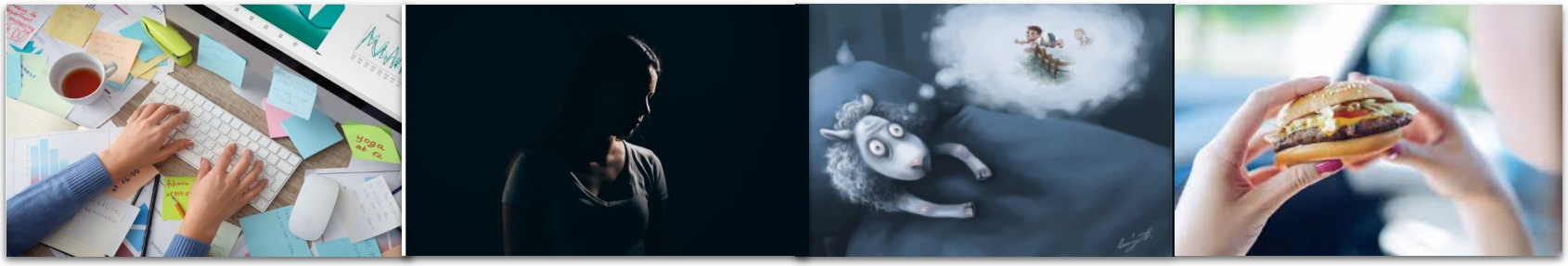


9. Get Some Sleep!

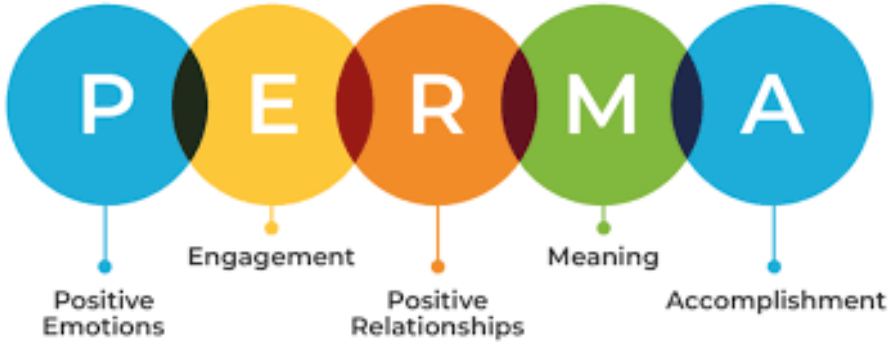
- During sleep, new learnings are linked with older information
- The deliberate, higher order side of the brain needs rest time
- The automatic, associative brain works 24/7 and can search for solutions and answers while asleep
- Sleep deprivation lowers immunity
- 50-70M American adults have a sleep disorder
- Over 30% of Americans are sleep deprived!

10. Self-Care is Important!

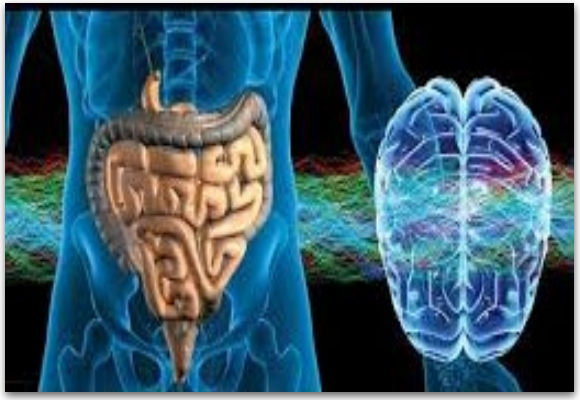
- Good self-care enables both the highest professional practice ***and*** a well-lived life
- Distraction, worry, sleep deprivation, and "fast food" lifestyle are ***not a Rx* for well-being – or good decisions**



- Well-being is enabled by:



In Summary

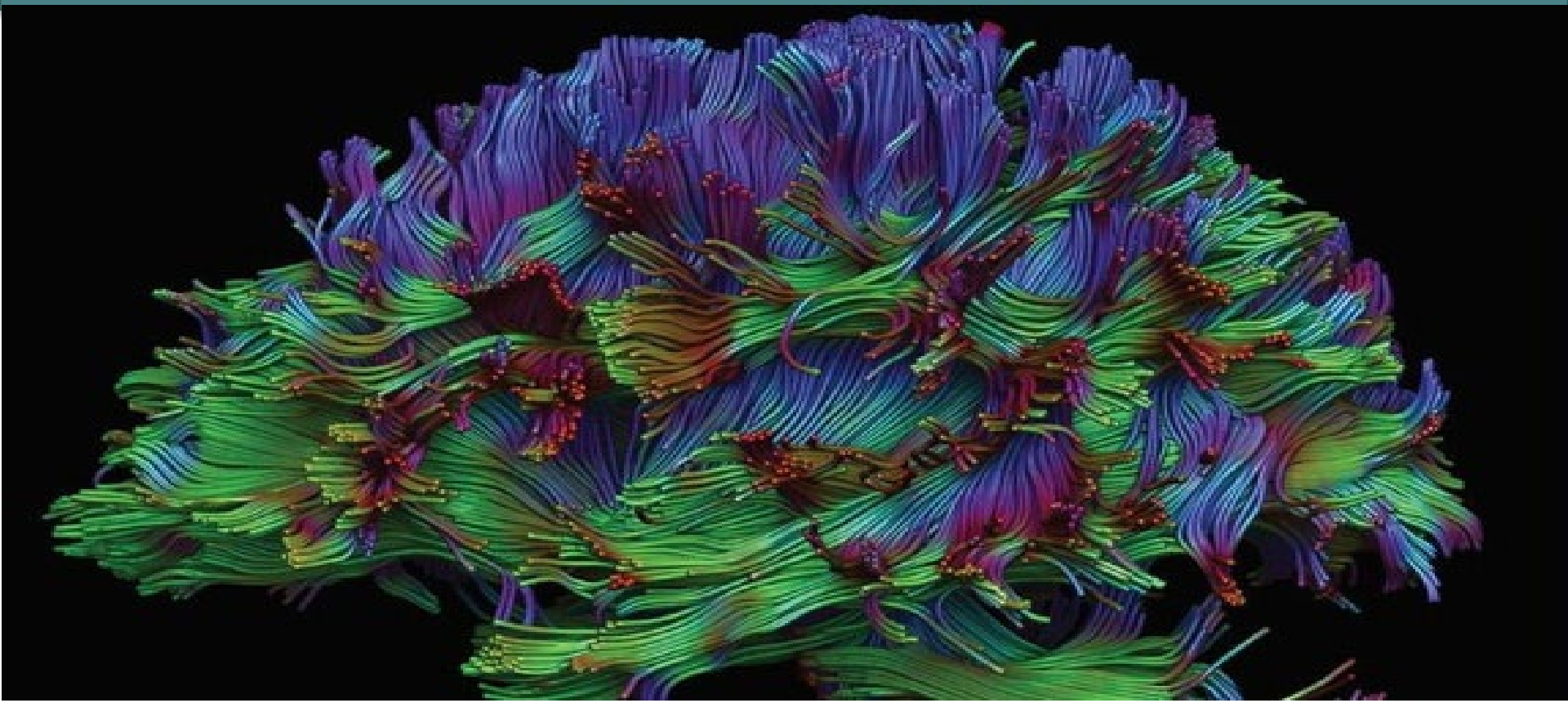


- Our two “brains”
- Our “gut”
- Bathed in “happy & sad” chemicals

- Current challenges – hunker down - fight/flight/freeze or with awareness and intention we can soar

In Summary (continued…)

- Decision Insights
  1. 90% unconscious
  2. To be powerful intuition needs to be honed with practice
  3. Inattention causes blindness
  4. Too many choices can confuse us
  5. Growth and fixed mindsets are norm
  6. Mental shortcuts hijack our thinking – naturally
  7. Negativity is an inherent bias
  8. Psychological safety matters
  9. Sleep makes us better
  10. **Self-care is not a luxury!**



Questions?
Thoughts?

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