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Overview: Human Decision-Making Behavioral economics: studies the effects of psychological, cognitive, emotional, cultural, and social factors on the decisions of individuals and institutions Dual Process Theory Heuristics and cognitive bias Debiasing techniques





In a lake, there is a patch of lily pads. Every day the patch doubles in size. If it takes 48 days to cover the entire lake, how long would it take to cover half the lake?

A. 24 days B. 47 days



Adapted from D. Kahneman, Thinking, Fast and Slow (2011)

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Dual Process Theory

Thoughts arise from two different processes:

System I: an implicit, automatic, unconscious (95%)

- Unconscious
- Intuitive
- Fast
- Usually accurate
- Comfortable
- Easily reinforced

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Thoughts arise from two different processes:

System II: an explicit, controlled, conscious process (5%)

- Very accurate
- Time consuming
- Deliberate
- "Conscious"
- Easily overloaded (fatigues)
- Requires patience
- Demands multiple inputs (sometimes conflicting)

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In the US, which is more likely?

- A. Dying from an illegal immigrant terrorist attack
- B. Dying from an asteroid strike

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Cause of Death	Lifetime Odds
Choking on food	1 in 3,409
Bicycling	1 in 4,337
Accidental gunshot	1 in 7,945
Police	1 in 8,359
Airplane and spaceship incidents	1 in 9,738
Heat wave	1 in 10,785
Electricity/radiation/heat/pressure	1 in 14,697
Animal attack or accident	1 in 30,167
Sharp objects accident	1 in 30,863
Foreign-born terrorists (all forms)	1 in 45,808
Tornado	1 in 60,000
Cataclysmic storm	1 in 63,685

Sources: National Safety Council; National Center for Health Statistics; Alex Nowrasteh/Cato Institute; Stephen A. Nelson/Tulane University; "Natural Disasters"/Patrick L. Abbot

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Terrorists Pose a Very Small Threat to Americans

Cause of Death	Lifetime Odds	Cause of Death	Lifetime Odds
Choking on food	1 in 3,409	Asteroid (global impact)	1 in 75,000
Bicycling	1 in 4,337	Legal execution	1 in 111,449
Accidental gunshot	1 in 7,945	Dog attack	1 in 114,634
Police	1 in 8,359	Earthquake	1 in 130,000
Airplane and spaceship incidents	1 in 9,738	Bus, train, or streetcar	1 in 160,487
Heat wave	1 in 10,785	Lightning	1 in 174,443
Electricity/radiation/heat/pressure	1 in 14,697	Stinging by hornets, wasps, and bees	1 in 308,629
Animal attack or accident	1 in 30,167	Asteroid (regional impact)	1 in 1,600,000
Sharp objects accident	1 in 30,863	Shark attack	1 in 8,000,000
Foreign-born terrorists (all forms)	1 in 45,808	Refugee terrorists	1 in 46,192,893
Tornado	1 in 60,000	Illegal immigrant terrorists	1 in 138,324,873
Cataclysmic storm	1 in 63,685	Visa Waiver Program entrant	0 in 1

Sources: National Safety Council; National Center for Health Statistics; Alex Nowrasteh/Cato Institute; Stephen A. Nelson/Tulane University; "Natural Disasters"/Patrick L. Abbot

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POD2 G5 P4 patient s/p 3rd C-section becomes acutely hypotensive and SOB



She is morbidly obese, has 2+ pitting edema. She's refused her last three doses of subcutaneous heparin. She rapidly loses consciousness and progresses to PEA arrest.

What is the most likely diagnosis?

- A. Pulmonary embolism
- B. Postpartum hemorrhage

Adapted from Anesthesiology 2014; 120:204-7











Fixing Cognitive Bias to Improve Decision-Making Very difficult to study/document because the processes are internal/psychological Analysis can only occur retrospectively or externaly. Studying bias is fraught with Hawthorne effect No single approach will work—interventions may need to be bias-specific External: improving decision-making environment Internal: improving thought processes







Debiasing: External Strategies

Systemic or environmental

- Outside perspective (colleagues)
- Case discussions debriefing
- Culture change: create an environment where it's safe to ask questions of ourselves and each other



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Debiasing: Internal Strategies

Metacognition, or "thinking about thinking"

- Being aware of your process of reasoning
- Forcing thought alternatives:
- Consider the opposite
- Articulate the justification for a choice
- Ask: What might I be missing?



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Debiasing: Internal Strategies

Metacognition, or "thinking about thinking"

- Awareness of your emotional and psychological state
- Ask:
 - Am I tired?
 - Is this about my authority?
 - Was I hasty in judgment?
 - Do I want to go home?
 - Am I listening?
 - Am I distracted?



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Some Final Observations

- Debiasing in general is only modestly successful; System 1 is default
- Being wrong feels just like being right—until it's apparent you're not
- System II readily breaks down to System I
- Decision-making environments can be changed
- We *may* be able to debias ourselves and each other; requires selfawareness, humility, and leadership

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