

Introduction

“Two systems of thought: The intuitive System 1, which does the fast thinking, and the effortful and slower System 2, which does the slow thinking, monitors System 1, and maintains control as best it can within its limited resources”

- Need to improve the ability to identify and understand errors of judgment and choice in others and eventually in ourselves by providing a richer and more precise language to discuss them
- They ignored the relevant statistical facts and relied exclusively on resemblance
- Resemblance is a simplifying heuristic (roughly a rule of thumb)
- Reliance on the ease of memory search is the availability heuristic
- It is very easy to ignore relevant statistical facts
- Our minds are susceptible to systematic errors
- The reliance on a heuristic produces a predictable bias in judgments
- Learn to recognize situations in which mistakes are likely and try harder to avoid significant mistakes when the stakes are high
- Our mind is strongly biased toward causal explanations and does not deal well with “mere statistics.” When our attention is called to an event, associative memory will look for its cause – more precisely, activation will automatically spread to any cause that is already stored in memory.
 - Causal explanations will be evoked when regression is detected, but they will be wrong because the truth is that regression to the mean has an explanation but doesn’t have a cause
- The intuitive System 1, which does the fast thinking, and the effortful and slower System 2, which does the slow thinking, monitors System 1, and maintains control as best it can within its limited resources

System One

- System 1 can respond to impressions of events of which System 2 is unaware
- Doesn’t keep track of alternatives that it rejects, or even of the fact that there were alternatives
- When uncertain, System 1 bets on an answer, and bets are guided by experiences
- System 1 registers the cognitive ease with which it processes information, but it doesn’t generate a warning signal when it becomes unreliable
- System 1, which understands language, has access to norms of categories, which specify the range of plausible values as well as the most typical cases
- System 1 is impulsive and intuitive
- In the absence of an explicit context, System 1 generated a likely context on its own

- System 1 excels at constructing the best possible story that incorporates ideas currently activated, but it does not and cannot allow for information it does not have
- The combination of a coherence-seeking System 1 with a lazy System 2 will endorse many intuitive beliefs, which closely reflect the impressions generated by System 1
- System 1 is highly adept in one form of thinking – it automatically and effortlessly identifies causal connections between events, sometimes even when the connection is spurious
- System 1 is designed to jump to conclusions from little evidence – and it is not designed to know the size of its jumps. Because WYSIATI, only the evidence at hand counts. Because of confidence by coherence, the subjective confidence we have in our opinions reflects the coherence of the story that System 1 and System 2 have constructed
- System 1 represents sets by averages, norms, and prototypes, not by sums

System Two

- Controlling thoughts and behaviors is one of the tasks that System 2 performs
- System 2 is the only one that can follow rules, compare objects on several attributes, and make deliberate choices between options.
- When System 2 is otherwise engaged we will believe almost anything
- System 2 is capable of reasoning, and it is cautious, but at least for some people it is also lazy
- Cognitive strain is experienced when the effortful operations of System 2 are engaged
- A deliberate search for confirming evidence, known as the positive test strategy, is also how System 2 tests a hypothesis
- System 2 may “know” that the probability of an event is low, but this knowledge does not eliminate the self-generated discomfort and the wish to avoid it

Anchoring Effect

- Occurs when people consider a particular value for an unknown quantity before estimating that quantity
- Anchors that are obviously random can be just as effective as potentially informative anchors
- In general, a strategy of deliberately “thinking the opposite” may be a good defense against anchoring effects, because it negates the biased recruitment of thoughts that produces these effects
- Anchor your judgment of the probability of an outcome on a plausible base rate. Question the diagnostic of your evidence

Availability Heuristic and Availability Cascade

- Ease of retrieval affects the estimated frequency expectation of an item
- Biases due to the retrievability of instances
- Biases due to the effectiveness of a search set
- Biases of imaginability



- If retrieval is easy and fluent, the category will be judged to be large
- Simple availability bias: both spouses remember their own individual efforts and contributions much more clearly than those of the other, and the difference in availability leads to a difference in judged frequency
 - You will occasionally do more than your share, but it is useful to know that you are likely to have the feeling even when each member of the team feels the same way
- Which will count more – the amount retrieved or the ease and fluency of the retrieval?
 - Self-ratings were dominated by the ease with which examples had come to mind. The experience of fluent retrieval of instances trumped the number of retrievals
- The ease with which instances come to mind is a System 1 heuristic, which is replaced by a focus on content when System 2 is more engaged
- Availability cascades are real and they undoubtedly distort priorities in the allocation of public resources
- Terrorism is the best example of an availability cascade

Base Rate Information and Probabilities

- An intention to answer one question evoked another, which was not only superfluous but actually detrimental to the main task
- Using base-rate information is the obvious move when no other information is provided
- When you specify a possible event in greater detail you can only lower its probability
- Statistical base rates are facts about a population to which a case belongs, but they are not relevant to the individual case
- Casual base rates change your view of how the individual case came to be
- The two types of base rate information are treated differently

Cognitive Engagement, Cognitive Effort & Jumping to Conclusions

- Flow neatly separates the two forms of effort: concentration on the task and the deliberate control of attention
- People who are cognitively busy are also more likely to make selfish choices, use sexist language, and make superficial judgments in social situations
- When you are actively involved in difficult cognitive reasoning or engaged in a task that requires self-control, your blood glucose level drops
 - Tired and hungry judges tend to fall back on easier default positions of denying requests for parole
 - Both fatigue and hunger probably play a greater role in the results
- They apparently find cognitive effort at least mildly unpleasant and avoid it as much as possible
- When people believe a conclusion is true, they are also very likely to believe arguments that appear to support it, even when these arguments are unsound

- Cognitive strain, whatever its source, mobilizes System 2, which is more likely to reject the intuitive answer suggested by System 1
- Jumping to conclusions is efficient if the conclusions are likely to be correct and the costs of an occasional mistake are acceptable
- Jumping to conclusions on the basis of limited evidence is so important to an understanding of intuitive thinking

Halo Effect

- The tendency to like (or dislike) everything about a person – including things you have not observed – is known as the halo effect
- Sequence matters, however, because the halo effect increases the weight of first impressions
- A few lucky gambles can crown a reckless leader with a halo of prescience and boldness
- The halo effect, where favorable first impressions influence later judgments

Humans vs. Econs and Rationality

- Econs never make an important decision without first checking with their Reflective system.
- Rationality is logical coherence – reasonable or not
- Humans, unlike Econs, need help to make good decisions, and there are informed and un-intrusive ways to provide that help
- Econs are rational by this definition, but there is overwhelming evidence that Humans cannot be
- For Humans, mental accounts are a form of narrow framing; they keep things under control and manageable by a finite mind
- Econs of the rational-agent model do not resort to mental accounting: they have a comprehensive view of outcomes and are driven by external incentives
- Unlike Econs, the Humans that psychologists know have a System 1. Their view of the world is limited by the information that is available at a given moment (WYSIATI), and therefore they cannot be as consistent and logical as Econs.
- For behavioral economists, however, freedom has a cost that is borne by individuals who make bad choices, and by a society that feels obligated to help them
- A rational agent will of course engage in broad framing, but Humans are by nature narrow framers

The Inferiority of Expert Judgement to Machines/Algorithms

- Why are experts inferior to algorithms? One reason, which Meehl suspected is that experts try to be clever, think outside the box, and consider complex combinations of features in making their predictions
- Complexity may work in the odd case, but more often than not it reduces the validity
- Another reason for the inferiority of expert judgment is that humans are incorrigibly inconsistent in making summary judgments of complex information



- When asked to evaluate the same information twice, they frequently give different answers
- The research suggests a surprising conclusion: to maximize predictive accuracy, final decisions should be left to formulas, especially in low-validity environments
- Whenever we can replace human judgments with a formula, we should at least consider it
- Expertise in a domain is not a single skill but rather a large collection of mini-skills
- Machines are more likely than human judges to detect weakly valid cues and much more likely to maintain a modest level of accuracy by using such cues consistently

Intelligence, Confidence, Illusion, and Hindsight Bias

- Intelligence is not only the ability to reason; it is also the ability to find relevant material in memory and to deploy attention when needed
- The confidence that individuals have in their beliefs depends mostly on the quality of the story they can tell about what they see, even if they see little
- Illusion – we pay more attention to the content of messages than to information about their reliability and as a result end up with a view of the world around us that is simpler and more coherent than the data justify
- The core of the illusion is that we believe we understand the past, which implies that the future also should be knowable, but in fact, we understand the past less than we believe we do.
- Your inability to reconstruct past beliefs will inevitably cause you to underestimate the extent to which you were surprised by past events
- “I-knew-it-all-along” effect → Hindsight Bias
- Financial advisory industry is built largely on the illusion of skill
 - The illusions of validity and skill are supported by the powerful professional culture
 - The most potent psychological cause of the illusion is certainly that the people who pick stocks are exercising high-level of skills
- Everything makes sense in hindsight, a fact that financial pundits exploit every evening as they offer convincing accounts of the day’s events
 - The illusion that we understand the past fosters overconfidence in our ability to predict the future
- The confidence that people have in their intuitions is not a reliable guide to their validity
- An environment that is sufficiently regular to be predictable and an opportunity to learn these regularities through prolonged practice. When both these conditions are satisfied intuitions are likely to be skilled

Intuition Heuristic, Predictions and Substitution

- Intuition is nothing more and nothing less than recognition
- Valid intuitions develop when experts have learned to recognize familiar elements in a new situation and to act in a manner that is appropriate to it.



- Good intuitive judgments come to mind with the same immediacy as “doggie”
- This is the essence of intuitive heuristics: when faced with a difficult question, we often answer an easier one instead, usually without noticing the substitution
- Our excessive confidence in what we believe we know, and our apparent inability to acknowledge the full extent of our ignorance and the uncertainty of the world we live in.
- Many people are overconfident, prone to place too much faith in their intentions
- Mood affects the operation of System 1: when we are uncomfortable and unhappy, we lose touch with our intuition
- A happy mood loosens the control of System 2 over performance
 - When in a good mood, people become more intuitive and more creative but also less vigilant and more prone to logical errors
- Some intuitions draw primarily on skill and expertise acquired by repeated experience
- Skilled intuitions, in which a solution to the current problem comes to mind quickly because familiar cues are recognized
- Intuitive predictions are almost completely insensitive to the actual predictive quality of the evidence
 - Intuitive predictions need to be corrected because they are not regressive and therefore are biased
 - They also tend to be overconfident and overly extreme
- People are asked for a prediction but they substitute an evaluation of the evidence, without noticing that the question they answer is not the one they were asked
- Extreme predictions and a willingness to predict rare events from weak evidence are both manifestations of System 1
- The first lesson is that errors of prediction are inevitable because the world is unpredictable
- The second is that high subjective confidence is not to be trusted as an indicator of accuracy (low confidence could be more informative)
- Intuition adds value even in the justly derided selection interview
- Intuition cannot be trusted in the absence of stable regularities in the environment

Inside vs. Outside View

- The inside view is the one that all of us spontaneously adopted to assess the future of projects
- Using such distributional information from other ventures similar to that being forecasted is called taking an outside view and is the cure to the planning fallacy

Loss Aversion, Certainty Effect, Possibility Effect, and Decision Weights

- Loss aversion refers to the relative strength of two motives: we are driven more strongly to avoid losses than to achieve gains
- Loss aversion is a powerful conservative force that favors minimal changes from the status quo in the lives of both institutions and individuals

- Because of the possibility effect, we tend to overweight small risks and are willing to pay far more than expected value to eliminate them altogether
- The conclusion is straightforward: the decision weights that people assign to outcomes are not identical to the probabilities of these outcomes, contrary to the expectation principle
- The combination of the certainty effect and possibility effects at the two ends of the probability scale is inevitably accompanied by inadequate sensitivity to intermediate probabilities
- People attach values to gains and losses rather than to wealth, and the decision weights that they assign to outcomes are different from probabilities
- A lottery ticket is the ultimate example of the possibility effect
- Loss aversion is built into the automatic evaluations of System 1
- Disadvantages of a change loom larger than its advantages, inducing a bias that favors the status quo
- Losses loom larger than gains hence why people are loss adverse
- We were not the first to notice that people become risk-seeking when all their options are bad
- The “loss aversion ratio” has been estimated in several experiments and is usually in the range of 1.5 to 2.5
- The negative trumps the positive in many ways, and loss aversion is one of many manifestations of a broad negativity dominance

Overconfidence

- Overconfidence is another manifestation of WYSIATI: when we estimate a quantity, we rely on information that comes to mind and construct a coherent story in which the estimate makes sense
- However, overconfidence is a direct consequence of features of System 1 that can be tamed but not vanquished
- The main obstacle is that subjective confidence is determined by the coherence of the story one has constructed, not by the quality and amount of the information that supports it
- The unrecognized limit of professional skill help explain why experts are often overconfident
- Judgments that answer the wrong question can also be made with high confidence
- The proper way to elicit information from a group is not by starting with a public discussion but by confidentially collecting each person’s judgment
- The people who have the greatest influence on the lives of others are likely to be optimistic and overconfident and to take more risks than they realize
- When can you trust a self-confident professional who claims to have intuition?
- Earlier I traced people’s confidence in a belief to two related impressions: cognitive ease and coherence

Priming, Repetition, and Framing Effects

- The influencing of an action by the idea is known as the ideomotor effect



- The general theme of these findings is that the idea of money primes individualism: a reluctance to be involved with others, to depend on others, or to accept demands from others
- Priming phenomena arise in System 1, and you have no conscious access to them
- A reliable way to make people believe in falsehoods is frequent repetition because familiarity is not easily distinguished from truth
- Framing effects: different ways of presenting the same information often evoke different emotions
- Narrow framing: a sequence of two simple decisions, considered separately
- Broad framing: a single comprehensive decision, with four options
 - As expected, broad framing blunted the emotional reaction to losses and increased the willingness to take risks
- A rational agent will of course engage in broad framing, but Humans are by nature narrow framers

Reference Points

- The comparison of the problems highlights the all-important role of the reference point from which the options are evaluated
- His theory is too simple and lacks a moving part. The missing variable is the reference point, the earlier state relative to which gains and losses are evaluated
- Evaluation is relative to a neutral reference point, which is sometimes referred to as an “adaptation level.” You can easily set up a compelling demonstration
- Outcomes that are better than the reference points are gains. Below the reference point, they are losses

Regression to the Mean

- Whenever the correlation between two scores is imperfect, there will be a regression to the mean
- The more extreme the original score, the more regression we expect because an extremely good score suggests a very lucky day
- Extreme groups regress to the mean over time
- We have already encountered this statistical fact of life: regression to the mean
- Poor performance is typically followed by improvement and good performance by deterioration, without any help from either praise or punishment
- Because we tend to be nice to other people when they please us and nasty when they don't, we are statistically punished for being nice and rewarded for being nasty.

Representativeness Heuristic

- When no specific evidence is given, prior probabilities are properly utilized
- When worthless evidence is given, prior probabilities are ignored



- When probabilities are assessed by representativeness, the judged probability of a sample statistic will be essentially independent of sample size.
- People often “predict” by selecting the outcome that is most representative of the input
- Degree of representativeness: the quality of the match between the selected outcome and the input
- Illusion of validity → the unwarranted confidence which is produced by a good fit between the predicted outcome and the input information

Sunk-Cost Fallacy

- The decision to invest additional resources in a losing account, when better investments are available is the sunk cost fallacy, a costly mistake that is observed in decisions large and small
- In the presence of sunk costs, the manager’s incentives are misaligned with the objectives of the firm and its shareholders, a familiar type of what is known as the agency problem
- The sunk-cost fallacy keeps people for too long in poor jobs, unhappy marriages, and unpromising research projects

Utility Theory, Prospect Theory, and Decision Weights

- In utility theory, decision weights and probabilities are the same
- In prospect theory, variations of probability have less effect on decision weights
- People overestimate the probabilities of unlikely events.
- People overweight unlikely events in their decisions
- The fundamental ideas of prospect theory are that reference points exist and that losses loom larger than corresponding gains

Utility of Wealth and Risk Aversion

- If the utility of wealth is all that matters, then transparently equivalent statements of the same problem should yield identical choices
- It is costly to be risk averse for gains and risk seeking for losses.
 - These attitudes make you willing to pay a premium to obtain a sure gain rather than face a gamble
 - You are also willing to pay a premium (in expected value) to avoid a sure loss
- In fact a risk-averse decision maker will choose a sure thing that is less than expected value, in effect paying a premium to avoid the uncertainty
- Bernoulli’s insight was that a decision-maker with diminishing marginal utility for wealth will be risk averse
- A principle of diminishing sensitivity applies to both sensory dimensions and the evaluation of changes in wealth.

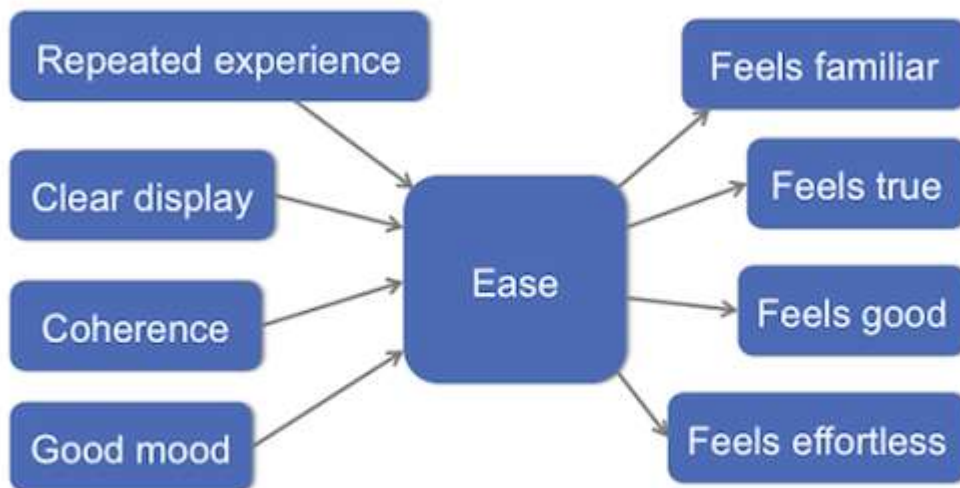


Other Relevant Information

- “The situation has provided a cue; this cue has given the expert access to information stored in memory, and the information provides the answer. Intuition is nothing more and nothing less than recognition!”
- You think with your body, not only with your mind
- Act calm and kind regardless of how you feel
- Chance is commonly viewed as a self-correcting process in which a deviation in one direction induces a deviation in the opposite direction to restore equilibrium.
- Redundancy among inputs actually decreases accuracy even as it increases confidence
- “I’m in a very good mood today, and my System 2 is weaker than usual. I should be extra careful.”
- To derive the most useful information from multiple sources of evidence, you should always try to make these sources independent of each other
- People judge competence by combining two dimensions of strength and trustworthiness
- We are pattern seekers, believers in a coherent world in which regularities appear not by accident but as a result of mechanical causality or of someone’s intention
 - By misclassifying a random event as systematic we are far too willing to reject the belief that much of what we see in life is random
- A very generous estimate of the correlation between the success of the firm and the quality of its CEO might be as high as 0.30 indicating a 30% overlap
- The correlation between income and education level in the United States is approximately 0.40
- Success = talent + luck
- Great success = a little more talent + a lot of luck
- Experiments show that individuals feel relieved of responsibility when they know that others have heard the same request for help
- We are forecasting based on the information in front of us – WYSIATI
- The prevalent tendency to underweight or ignore distributional information is perhaps the major source of error in forecasting. Planners should therefore make every effort to frame the forecasting problem so as to facilitate utilizing all the distributional information that is available.
- Regret is an emotion, and it is also a punishment that we administer to ourselves
 - Regret and blame are both evoked by comparison to a norm, but the relevant norms are different
 - People expect to have stronger emotional reactions (including regret) to an outcome that is produced by action than to the same outcome when it is produced by inaction
- Adaption to a new situation, whether good or bad, consists in large part of thinking less and less about it
- An unbiased appreciation of uncertainty is a cornerstone of rationality – but it is not what people and organizations want



- Emotion and vividness influence fluency, availability, and judgments of probability—and thus account for our excessive response to the few rare events that we do not ignore
- The essence of the focusing illusion is WYSIATI, giving too much weight to the climate, too little to all the other determinants of well-being
- “The easiest way to increase happiness is to control your use of time. Can you find more time to do the things you enjoy doing?”
- The experiencing self is the one that answers the question: “Does it hurt now?” The remembering self is the one that answers the question: “How was it, on the whole?”
- Confusing experience with the memory of it is a compelling cognitive illusion—and it is the substitution that makes us believe a past experience can be ruined
- The probability of a rare event will (often, not always) be overestimated, because of the confirmatory bias of memory. Thinking about that event, you try to make it true in your mind.



Thinking, Fast and Slow, Daniel Kahneman (2011), p. 60

Sonya Song: Psychology of Sharing on Social Media

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