Daniel Kahneman: Thinking, Fast & Slow
Some Notes by Peter Borrell

Page and chapter numbers refer to the Penguin Edition, 2012

The Notes

These notes are intended to serve as an *aide-memoire* to the concepts and many of the terms introduced in the book. They are neither exhaustive nor complete and were intended for my own use. They can provide a guide but ***there is no substitute for reading the book!***

The Book itself

For me this has been an influential book. It appears to provide a simple framework for a multitude of impressions, thoughts and feelings about thinking, decision making and indeed, living that I have accumulated over nearly eighty years. For me, it makes sense of things.

At the start, much seems self-evident but one rapidly comes across ideas and effects that are counter intuitive. We realise that we have been brought up to believe that people are rational and we seem to try to be rational ourselves. But this is clearly not the case – while there is an overall rationality, all of us are afflicted by hidden biases and we use a variety of tricks to make our decision making and our intellectual lives simpler and less laborious. This is the price we pay for the cognitive ease.

I had hoped to summarise the book but I rapidly realised that it would be like trying to summarise a text book; it can't be done if you want to keep the content. So I made the notes to help me try to remember the various terms and contexts and the more prominent examples.

The two appendices do in fact give shortened versions of various parts of the book and are most helpful, though rather condensed.

If you feel like giving the book a try, the notes may well be of help in making a start, as the appendices also might. The book will certainly provide you with understanding, it may actually help you.

The Answer - 42

I read Kahneman's book shortly after re-reading Daniel Dennett's book on Consciousness which was also important to me. They, together with regular reading of the popular scientific journals, *The American Scientist*, the *Scientific American* and the *New Scientist,* as well as *Chemistry World, PC World, Cam* and many others, seem now to have provided me with an overall picture of my place in the Universe. To have arrived at such a picture as I approach eighty and just as my grip on facts and memories is beginning to loosen is a source of much contentment. There is much that I don't know and even more that I cannot explain, but at least I have a coherent and reasonably consistent picture - indeed it is perhaps my own "42" – the answer to the ultimate question of Life, the Universe and Everything!!

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Chap 1	Kahneman believes we have two systems for thinking System 1 is fast System 2 is slow ***The fast system, S1,*** appears to be in continuous operation, reacting to and responding to inputs as they occur providing you with immediate responses and interpretations to events and ideas, with no sense of voluntary control. It is almost automatic in operation drawing on the current situation and a range of memories, probably extensive but far from complete. It provides one with stories to interpret current happenings immediately; however it doesn't try to provide a comprehensive account.	p20
Ch 1	**System 1 – Examples of automatic activities attributed to S1** • Detect than one object is more distant than another • Orient to the source of a sudden sound • Complete the phrase "bread and …." • Make a disgust face when shown a horrible picture • Detect hostility in a voice • Answer: 2 + 2 =? • Read words on large billboards • Drive a car on an empty road • Find a strong move in chess (if you are a master!) • Understand simple sentences • Recognise that a "meek and tidy soul with a passion for detail" resembles an occupational stereotype. ***See also the Table of S1 characteristics on p105***.	p21

Ch 1	***The slow system, 2,*** is the conscious system employed to think about things and the system which many of us believe is our "real" self S2 thinks for itself, allocates attention to effortful mental activities, reviews and modifies the ideas thrown up by the initial responses of S1 and with time draws on a more extensive memory than S1. However it has to work (physically) harder and is inclined to be lazy, simply accepting the responses provided by S1. (physical & mental effort)	p21
Ch 1	**System 2 – Examples of activities attributed to S2** Brace for the starter gun in a race Focus attention on the clowns at a circus Focus on the voice of a person in a crowded noisy room Look for a woman with white hair Answer: 17 * 24 = ? Search your memory to identify a surprising sound Walk faster than your natural pace (***physical & mental effort) Monitor the appropriateness of your behavior in a social situation Count the occurrences of the letter *a* in a page of text Tell someone your phone number Park in a narrow space (probably S1 for a garage attendant) Compare two washing machines for overall value Fill in an income tax form Check the validity of a complex logical argument. *(in all S2 activities you must pay attention)*	p22

	Influential Biases in S1	
Ch.2	Attention and Effort Mental & physical effort, pupil dilation with S2. Least effort (rely on S1) not noticing gorilla example	31
Ch. 3	The Lazy Controller The busy & depleted system, Lazy System 2, intelligence, control and rationality	39
Ch. 4	The Associative Machine **Priming** Words, concepts, numbers can prime S1 for what follows. The Florida effect; *you have to believe (57)*	50

Ch. 5	Cognitive Ease
	
	    Easy: no threats, no major news, no need to re-direct attention or effort.
	
	    Strained: problem exists which will require mobilization of S2.
	
	Illusions: not only optical but memory and thinking
	
	    Memory: introduced names easier to see!
	
	    Truth: familiarity produce by S1 is often accepted by S2.
	
	Repetition produces cognitive ease and familiarity
	
	Good mood, intuition, creativity, gullibility and increased reliance on S1 form a cluster.
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Ch. 6	Norms Surprises and Causes
	
	A capacity for surprise is an essential aspect of our mental life.
	
	    Surprising events can rapidly become the norm.
	
	    Communication is simplified because we share so many norms.
	
	Seeing causes and intentions
	
	    We see causality just as directly as we see colour.
	
	Causal intuitions are prominent in our thinking.
		71

Ch. 7	A Machine for Jumping to Conclusions	79
	Jumping to conclusions is efficient, if the conclusions are likely to be correct and the cost of an occasional mistake is acceptable. *It is risky* in an unfamiliar situation where the stakes are high.	
	A bias to believe and confirm.	
	S1 is gullible and biased to believe. S2 is in charge of doubting and believing.	
	When S2 is otherwise engaged, we will believe almost anything.	
	Exaggerated Emotional Coherence (**The Halo Effect**)	
	Attributing favourable traits to someone pleasant met for the first time (*or vice versa*)	
	Marking essays; for a single student: order of marking two essays.	
	De-correlate error to reduce bias (independent judgements).	
	WYSIATI – What you see is all there is.	
	Success for S1is the coherence of the story it manages to create; the amount and quality of the data are largely irrelevant. When information is scarce, S1 is a machine for jumping to conclusions.	
	WYSIATI facilitates the achievement of coherence and cognitive ease that causes acceptance of a statement as true.	
	WYSIATI is the source of the following biases.	
	Overconfidence (neglecting to find critical evidence)	
	Framing effects (90% fat-free or10% fat)	
	Base rate neglect (neglecting statistical background)	
Ch. 8	How Judgments Happen	89
	Basic Assessments: facial features indicative of character and suitability.	
	Intensity matching. (sound loudness and crime severity)	
	The mental shotgun	

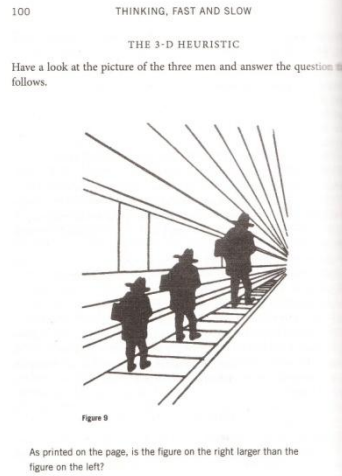| Ch. 9	Answering an Easier Question	97
	Substituting questions: replacing target by an easier heuristic question. An heuristic is a simple procedure that helps you to find adequate though often imperfect answers to difficult questions. *Target*: How much would you contribute to save an endangered species? *Heuristic*: How much emotion do I feel when I think of dying dolphins? **3-D Heuristic**: optical illusion. Automatic. Aware but cannot correct. **Mood Heuristic for happiness**: question order in happiness and dating questions. **Affect Heuristic**: letting one's likes and dislikes determine one's beliefs *S2 is able to resist the suggestions of S1 but, in the context of attitudes, S2 often acts as an apologist for the emotions of S1. The active coherent-seeking S1 suggests solutions to an undemanding S2.*	
	Characteristics of S1 (table)	105

	Part II Heuristics and Biases	107	
Ch. 10	**The Law of Small Numbers**	109	
	"The law of large numbers applies to small numbers as well."		
	Kidney Cancer lowest in US counties which are rural, sparsely populated and situated in the predominantly republican states of the Midwest and south.		
	S1 is not prone to doubt; S2 can encompass doubt but it is easier to slide into certainty.		
	Cause and Chance.		
	We are pattern seekers, believers in a coherent world, and regularities appear by causality or intention.		
	Gates Foundation's misplaced support of small schools.		
Ch. 11	**Anchors**	119	
	Estimates of numbers and quantities are strongly influenced by receiving a previous number which acts as an anchor.		
	The anchor may be quite unrelated to the estimate in question.		
	Anchors can be useful; they can act as primers. They can be abused (e.g. in advertising).		
	Redwood Tree heights in feet: 1200 (est. 844); 180 (est. 282)		
	Capping injury damages – limits enormous damages – increases smaller sums.		
	S2 can counteract the anchor effect, but it often works on anchored data provided by S1. *Thus Anchoring effects are threatening in the same way as priming: you may be aware of the anchor and even pay attention to it, but you do NOT know how it constrains and guides your thinking, because you cannot imagine what you would have thought if the anchor had been different or absent.*		
Ch. 12	The Science of Availability	129	
	The availability heuristic. To estimate the frequency of an event or the size of a category, one actually reports on the ease of retrieval of examples from one's memory		
	Air crashes, celebrity divorces, personal experiences.		
	Risk perception?		
Ch. 13	Availability, Emotion and Risk	137	
	Availability and Affect		
	The Public and Experts		
	The availability cascade: inflation of the importance of small events (hard cases make bad law?)		
	Examples of poor medical risk assessments on p138		

Ch. 14	Tom W's Specialty	146
	The Sins of Representativeness	
	Judging probability by representativeness has some virtues, but not always.	
	One sin is the excessive willingness to predict the outcome of unlikely events.	
	The second sin is insensitivity to the quality of the evidence.	
	Disciplining your Intuition	
	Anchor your judgment with a plausible base rate	
	Question the diagnosticity of your evidence	
	Use Bayesian Methods!	
Ch. 15	Linda: Less is More	156
	The conjunctive fallacy: when one judges a conjunction of two events to be more probable than one of the events in a direct comparison.	
	Linda, Bank Teller, Feminist. Buying dinner plates.	
Ch. 16	Causes trump Statistics	166
	Neglect of base rate information (green and blue cabs) Need Baysesian statistics.	
	Resistance to stereotyping is laudable but the cost can be ignoring base rate information.	
	People's unwillingness to deduce the particular from the general was matched only by their willingness to infer the general from the particular.	
Ch. 17	Regression to the Mean	175
	Good performance is typically followed by deterioration, poor performance by improvement.	
	(praise and blame; golf, seeds, marriage of intelligent women)	
Ch. 18	Taming Intuitive Predictions	185
	Correcting intuitive predictions is a task for S2 and requires significant effort to find the reference category, estimate the baseline prediction and evaluate the quality of the effort. It is only justified when the stakes are high and you are keen not to make mistakes.	
	***Correcting has a downside since you will never predict an outcome that is either rare or far from the mean!	

	Cannot blame experts for failing to predict in an unpredictable world; fair to blame them for believing they can succeed in an impossible task.	
	Feedback and Practice.	
	Contrast learning to drive (fast clear feedback) and learning to pilot an ocean liner (slow feedback). Anaesthetists (fast feedback) with other medical specialists	
	Expertise is not a single skill; it is a collection of smaller skills.	
Ch.23	The Outside View	245
	Example of a team producing a text book. Early forecasts of two years – actual eight years; most similar projects failed!	
	The Planning and Sunk Cost Fallacies	
	Forecasts that are	
	Unrealistically close to best-case scenarios	
	Could be improved by consulting the statistics of similar cases (the outside view)	
	Scottish Parliament Building, rail projects world wide, re-modelling kitchens.	
	Mitigating the Planning Fallacy	
	Identify a reference class	
	Obtain the statistics of the reference class	
	Use the information to adjust the baseline statistics	
	A budget reserve is to a contractor as red meat is to a lion; they will devour it.	
Ch.24	The Engine of Capitalism	255
	The Optimistic Bias	
	The OB plays a significant role in whether people or organisations take risks. Often optimists underestimate the risks they are taking	
	Entrepreneurial Delusions	
	CEO Hubris; drop in value of takeover firms	
	Small business survival, evaluation of inventors. How should governments support small businesses which are more than likely to fail?	
	Competition neglect (are you a good (an average) driver?) Hubris, WYSIATI.	
	Overconfidence – we need confident people to run things!	
	A partial corporate remedy – the *Premortem*.	

	Part IV Choices		269
Ch. 25	Bernoulli's Errors		
	The Agent of economic theory is rational, selfish and his tastes do not change.		
	Aversion to Risk. Choices are made on the *utility* of the outcome not the dollar amount		
	Seriously flawed: £10M to £1M and £100K to £1M. The outcome is the same but the feelings are quite different.		
	Bernoulli's theory lacks a reference point. Explains risk aversion going up, but not risk taking going down.		
	Theory-induced blindness		
Ch. 26	Prospect Theory		278
	Evaluation of financial outcomes. Three cognitive features		
	1. Evaluation is relative to a neutral reference point (the adaption level)		
	2. A principle of diminishing sensitivity applies to both sensory dimensions and to evaluation of wealth.		
	3. Loss aversion (risk aversion and risk seeking)		
	Example.		
	Given £1000; choose between a 50% chance to win £1000 or to get £500 for sure.		
	Given £2000; choose between a 50% chance to lose £1000 or to lose £500 for sure		
	Decisive counter example to Bernoulli's utility theory (is happiness of a financial outcome determined by the total wealth that you have? – no – it depends on the change in wealth)		
Ch. 27	**The Endowment Effect**		289
	Indifference map: contours join points of equal desirability for two goods.		
	Endowment Effect; reluctance to sell because you own it. (Wine example; $100 versus $35 per bottle) *Loss aversion*		
	No problem with exchanging money, or buying things in a shop, because money and things in a shop are "held for exchange". But for possessed items, selling is a loss and loss aversion plays a part.		
	Thinking like a trader: Endowment effect is reduced or eliminated.		
Ch. 28	Bad Events		300
	Brain is tuned to bad events. "bad is stronger than the good"		
	Marital relations – to survive good interactions must be five times more frequent than bad!		
	Status Quo is often the reference point but Goals can be reference		

	points.	
	Golf Example: golfers at all levels strive much harder to putt for par (and avoid a bogie) than to putt for a birdie. (Reference point is par)	
	New York taxi drivers – wet and dry days. Work just as long on both despite wet days being far more profitable.(Reference point is daily fixed earnings total)	
	Defending the status quo. Fight harder to prevent losses than achieve gains.	
	Commerce: snow shovel price going up when it snows (regarded as unfair – ref. point is normal price)	
	Employment. Regarded as unfair to reduce salary of present employee when salaries in neighborhood go down. (ok to reduce for a new employee)	
Ch. 29	**The Four Fold Pattern** Bernoulli's **expectation principle** (expected outcome is the averageof the outcome weighted by the probability) is ok for gambles but not for psychological outcomes. Million dollar example with 5% changes in probability.	310

$0 - 5\%$ is emphasised because of the **possibility effect**. (lottery tickets)

$95 -100\%$ is emphasised because of the **certainty effect**. (low settlements for high probabilities)

	Gains	Losses
High probability Certainty effect *Attitude in court*	95% chance to *win* $10,000 Fear of Disappointment Risk Averse Accept unfavourable settlement *Buy costly risk adjustment*	95% chance to *lose* $10,000 Hope to avoid loss Risk Seeking Reject favourable settlement *Gamble to avoid a sure loss*
Low Probability Possibility effect *Attitude in court*	5% chance to *win* $10,000 Hope of a large gain Risk Seeking Reject favourable settlement *Buy lottery tickets*	5% chance to *lose* $10,000 Fear of a large loss Risk Averse Accept unfavourable settlement *Buy insurance*

Frivolous litigation: *bottom row*: plaintiff bold; defendant settles for a modest amount.

Can be costly for a local authority faced with such litigation from a number of plaintiffs.

Ch. 30	Rare Events	322
	People overestimate the probabilities of rare events	
	People overweight unlikely events in their decisions *problem with statistical risks of disasters?*	
	Vivid Outcomes: a rich and vivid representation of the outcome, whether emotional or not, reduces the role of probability in determining the response.	
	Vivid Probabilities	
	Anomalous results in choosing a red ball between urns that contain 1 red ball and 9 white, and 8 red balls and 92 white.	
	Medical probabilities: vaccination: 0.001% chance of disability, or 1 of 10,000 will be disabled. ***Denominator neglect.***	
Ch. 31	Risk Policies (Variations in framing)	p.334
	Logical consistency of human preferences is a hopeless mirage.	
	Broad framing is generally superior.	
	Serious Advice given to those who reject a single highly favourable gamble (essentially impossible to follow!) p. 339	
Ch. 32	Keeping Score	342
	Main motivators of money seeking are not necessarily economic; money is a proxy for points on a scale of self regard and achievement.	
	Keep mental accounts in our heads of rewards & punishments, promises and threats. The ultimate currency is often emotional, a form of mental self-dealing which can create conflicts of interest.	
	Two fans travelling a distance to see football match: one has bought his ticket, the other got his free from a friend. A blizzard is announced, which fan is more likely to brave the blizzard?	
	Same selling two stocks to raise some money– *sell the one that has just gone up or that which has just gone down?* Massive preference for selling winners, not the one that is likely to do worst in the future – **the dispositional effect**. An instance of narrow framing (want to gain on every stock).	
	If you care about your wealth more than your emotions , sell the loser!	
	Throwing good money after bad because of emotional attachment to a project. (*Top right hand of table: risk seeking*). Where there are sunk costs, the manager's interests are often not aligned with those of the firm.	
	The sunk cost fallacy keeps people too long in poor jobs, unhappy marriages and unpromising research projects!	
	Regret is an emotion and a self-punishment	

	Often provoked by comparison of the result to normality. Departure from the default produces regret. Affect sports coaches and doctors administering experimental treatments.	
	Hazardous insecticides and children. The **taboo tradeoff** is not an efficient way to use a health budget.	
	Problem with the *precautionary principle* which can paralyse action. (hardly any aspect of modern life would have passed barriers based on the principle). Intense loss aversion.	
	The dilemma between intensely loss averse moral attitudes and efficient risk management does not have a simple and compelling solution.	
	One precaution to inoculate against regret is to be explicit about the potential for regret in any decision. Regret and hindsight bias will occur together so try to preclude hindsight.	
	People generally anticipate more regret than they actually feel!	
Ch. 33	Reversals	353
	Compensation for victims of crime.	
	i - Victim shot in store he visits regularly.	
	ii - Victim shot in another store	
	Overall agreed: compensation should be same in both cases.	
	However when considered separately, (ii) rates most compensation. *Poignancy effect* is disregarded in overall evaluation but enters when looking at a particular case.	
	Two bets at Roulette:	
	A. 11/36 to win $160; 25/36 to lose $15	
	B. 35/36 to win $40; 1/36 to lose $10.	
	B (the safer) is most popular.	
	However how much would you sell each bet for individually?	
	A is generally higher (anchored on a higher number). This is **a preference reversal**.	
	Categories and Norms.	
	John age 6 is 5' tall; Jim (16) is 5'1".	
	Separately (single evaluation) John is very tall; different norms)	
	Together – who is taller – no ambiguity; changed norm	
	Appeals for support	
	Threatened dolphins versus medical checkups for farm workers. Dolphins single; farm workers joint evaluation	
	Dictionary	

	A: 10,000 entries, like new; B:20,000, cover torn.
	
	Single evaluation; A valued more highly; joint: B.
	
	Unjust Reversals
	
	    Case 1: Child with burns wearing un protected pyjamas
	
	    Case 2: Bank 1 caused another bank a loss of $10 million.
	
	        Single evaluations: highest to the bank; joint highest to the child
	
	    Incoherence in legal judgments. Single evaluations tend to be higher (S1) than comparative judgments (S2)
	
	        Amounts awarded for damages by various government agencies: consistent within an agency but inconsistent between agencies (worker safety: $7000; Wild Bird Conservation: $25000)	

Ch. 34	Frames and Reality
	
	    Emotional Framing
	
	    a. A gamble for a 10% chance to win $95; 90% to lose $5.
	
	    b. $5 for a lottery ticket that offers a 10% chance to win $100 and 90% chance to win nothing.
	
	        Choice b is much more popular since it offers a *cost* rather than a *loss*. *Costs are NOT losses*
	
	    Petrol stations want to charge more for credit cards than cash. Credit industry wanted the differential to be made illegal but the fallback was that there would be a "discount" for cash. People would be more willing to forego a discount than pay a surcharge.
	
	    Wheel of chance: offered £50, offer was either *keep* £20 – or *lose* £30. Subjects all choose the "keep" frame, although two are identical.
	
	    Mortality. Offered:
	
	    - a treatment with a one month survival rate of 90%
	
	    - a treatment where there is a 10% mortality in the first month.
	
	        Former preferred although there is no difference.
	
	        S1 (even in physicians) is susceptible to emotional words.
	
	    Empty Intuitions
	
	        Asian Disease problem; people prefer certainty over a gamble
	
	        Child exemptions from tax; prefer same exemption for rich and poor; but problem if childless poor pay as large a surcharge as rich. Problems in consistency.
	
	    Good frames
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	Some early comments by PB	
	These were a few thoughts on the first chapters – I then gave up trying to add to them.	
a.	What Kahneman has demonstrated is that System 1 has a variety of biases, most of which are inherent and which will systematically affect S1's responses, if not recognised and corrected by S2 It is the recognition of these biases, and the realisation that they influence all decisions, particularly in money matters, that gained Kahneman the Nobel prize for Economics.	
b.	Jounalists have seized on his work to claim that people are not "rational". However, much of Economic theory deals with the "economically rational man". What Kahneman has apparently shown that this being is a convenient but misleading fiction. People are in fact rational, but subject to biases.	
c	S1 seems to be an extension of normal physical accomplishments. Balance, walking, reacting to threats. No time to consider; must respond and act immediately.	
d	Interaction between the S1 and S2. Learning and acquiring skills. Riding a bicycle, learning to ski, learning a second language at a later age. Studying creates the memory and skill within S1 so that the responses to simpler tasks are apparently automatic.	
e	Aging seems to slow down S1 so that some things are no longer automatic.	

SCR Book Club, November 26th 2014

Notes for an introduction.

Thanks to Laura, and to a number of other colleagues for putting up with my enthusiasms.

A Note on the Notes: Never made comprehensive notes on a book before. Tutorial or Exam!

For me this has been an influential book. It appears to provide a simple framework for a multitude of impressions, thoughts and feelings about thinking, decision making and indeed, living that I have accumulated over nearly eighty years. For me, it makes sense of things.

However on p221 there is a Speaking of caution: " she has a theory that explains everything – and gives her the illusion that she understands the world.

I am however not the only one.

> Steve Pinker the philosopher, and a group including an author, a psychologist and an economist, writing in the Guardian, were all wholly enthusiastic about Kahneman's approach.

> The latest magazine, Perspective, from my Stockbroker, has an article on the psychology of money which draws heavily on Kahneman.

> The Guardian Weekly has a column written by Oliver Burkeman entitled "this column will change your lives" which is all behavioural psychology and draws from time to time on Kahneman

One other aspect: I once wrote a booklet on lecturing for Keele – if I were still teaching there would be a lot of Kahneman in it.

As the notes show – the book itself is almost like a text book and therefore impossible to summarise adequately. You can look at it in the following way:

> Part I: the model : S1 and S2

> Parts II to IV: applications with extensions and limitations.

> Part V: The Two Selves is about living.

A clever feature is the *speaking of* sentences at the end of each chapter. Seem to be phrases usable at meetings to show awareness of biases.

I suggest we start with S1 and S2 and see where the discussion takes us.

****

Query about Research methods?

S1: most used, least familiar

Old age: moving out of S1 with a bigger separation or S1 and S2

Theory induced blindness