

**‘THINKING FOR OURSELVES’****CONCISE OUTLINE BY CHAPTERS**

Draft

**THEME**

When we explore the secrets of scientific discovery we find they are very largely based on Common Sense and Observation, not, as commonly supposed, on Experiment, Deduction and leaps of genius. But how does Common Sense Thinking work? We start by consulting a successful gambler, then a detective, then a research astronomer before going into a jury room to find out how Common Sense works in coming to a verdict on a complicated murder. Example by example, piece by piece the secrets of Common Sense emerge from the deep shadows in which they must have evolved over hundreds of millions of years as our key survival mechanism. It's bloody clever, and a lot more effective than Logic or Statistics.

All but Chapter 1 have a brief summary at the end.

**A DOZEN OUTRAGEOUS STATEMENTS ABOUT THINKING AND LEARNING.****CHAPTER 1 CAN WE LEARN TO THINK BETTER?**

Here we lay out the promise of the book in outline.

- (1:1) The Aim of this book.
- (1:2) The strange history of thinking.
- (1:3) Who this book is for.
- (1:4) The big picture.
- (1:4) Why learn to think straight now?

**CHAPTER 2 : DIFFERENT KINDS OF THINKING**

Deduction, Induction and Common Sense compared.

(2:1) Deduction, Induction and Common Sense.

(2:2) Induction versus Deduction.

(2:3) Exact and Comparative logic; one man-made, the other of animal vintage.

(2:4) Which kind of thinking is more persuasive? Why have we been so confused?

(2:5) Theories and hypotheses: the real business of a thinking life is deciding between them.

(2:6) History again.

(2:7) Other Thinkers and their work.

### **CHAPTER 3 HOW DO SCIENTISTS THINK?**

Nineteen short stories from the history of discovery reveal how scientists think and, more particularly, how they don't. Stories include : Why the sky is dark at night; Hunting down the origins of both Cholera and Malaria; How studying storms at sea led to the unification of Electricity and Magnetism; tripping over Continental Drift in a library; a fogged photograph and the discovery of Deep Time; how a rotten theory of starvation led to the discovery of Evolution; how Relativity forced itself upon us.....

Section (3:20) then looks at the above stories and asks 'So how do Scientists think?' We conclude that Common Sense forms the basis of most scientific thinking, not scientific genius. But how does Common Sense Work? That will become our quest.

### **CHAPTER 4: NATURAL THINKING AND BAYES' RULE**

From a successful gambler we learn how to incorporate new evidence into sound decision-taking and hence to win bets.

(4:1) Induction.

(4:2) Probability and Odds.

(4:3) Thinking like a Gambler.

(4:4) The Reverend Bayes and Burglars.

(4:5) The case of the Missing Galaxies.

(4:6) The case of the Dreaded Cancer Test.

(4:7) Did they see Flying Saucers on Jura?

(4:8) The case of The Miraculous Cure.

## **CHAPTER 5: DECISIVE THINKING AND THE DETECTIVE'S EQUATION.**

How can different clues be combined together to reach Odds on which one can reasonably decide between one idea and another? We stumble over The Detective's Equation, the  $E = mc^2$  of Common Sense Thinking.

(5:1) Detectives and Astronomers.

(5:2) Combining Evidence.

(5:3) Murder in the Library.

(5:4) The Case of the Missing Wife.

(5:5) Animal Thinking.

(5:6) Thinking like Stone Agers.

(5:7) When should we use the Detective's Equation?

## **CHAPTER 6: NUMBERS AND THINKING**

It's all too easy to be bamboozled by numbers because we have no instincts for dealing with them. Here we find out how to tame them.

(6:1) Introduction.

(6:2) Looking at Numbers.

(6:3) Is the Universe Expanding?

(6:4) Problems with Finding Weights.

## **CHAPTER 7: WOOLLY THINKING AND OCKHAM'S RAZOR**

Why are some ideas progressive while others lead into a maze? It's vital to know. The great philosophical principle – Ockham's Razor or 'Parsimony' – has so often proved to be the beacon light of scientific success.

(7:1) The Expanding Universe and Ockham's Razor.

(7:2) The complexity of hypotheses.

(7:3) Ockham's Razor in action. Some great triumphs and tragedies of Science.

(7:4) Parsimony, Noise and Prediction.

(7:5) Examples of Woolly thinking in Science.

## CHAPTER 8: COMMON SENSE

Now we have assembled 4 of the 5 tools of Common Sense we try them out in the real world of the jury room and the science lab.

(8:1) Reaching the watershed.

(8:2) Inference Tables

(8:3) The Logic of Common Sense Thinking

(8:4) Tipping Weights

(8:5) Setting Priors

(8:6) Jury Duty: you must reach your verdict on a murder.

(8:7) Common Sense Thinking in the real world.

(8:8) Do you believe in the Big Bang?

## CHAPTER 9 : ERROR ANALYSIS

Successful thinkers need to recognize and avoid some nasty pitfalls en route towards a wise decision.

(9:1) Weighing Evidence.

(9:2) Counting-Errors and Scatter.

(9:3) Small Number Statistics.

(9:4) Correcting Inference Tables for Scatter.

(9:5) Weighing Numbers.

(9:6) Measurement Errors: a looming disaster.

## **CHAPTER 10: SYSTEMATIC ERRORS, THE ELEPHANTS IN THE ROOM.**

How can we prevent plausible, but wildly wrong ideas from leading us too far astray?

(10:1) Introduction

(10:2) A Gallery of Rogue Elephants.

(10:3) Elephant Lessons.

(10:4) The Principle of Animal Wisdom (PAW).

(10:5) Unscientific Elephants.

(10:6) Wisdom and Weights

## **CHAPTER 11: STATISTICS – OR TERROR ANALYSIS.**

Modern thinking is bedazzled by Mathematical Statistics. We show why much of it is so wrong and how Common Sense, properly used, will do the job instead.

(11:1) Introduction

(11:2) The Magic of Statistics. The perils of smoking.

(11:3) The Gambler's Secret.

(11:4) Probability Wars.

(11:5) The Magic Fades Away. Why Statistics became a disaster.

(11:6) Good-simple versus Bad-simple.

(11:7) Death in the Sky: bomber casualties over Nazi Germany: more statistical disasters.

(11:8) An Aside to the Angry Reader who still believes in Statistics.

(11:9) Death in the Cot. The Sally Clark tragedy. How hard thinking can be.

## **CHAPTER 12 PERSUASION.**

How can Common Sense Thinking (CST) – which is private – lead to more general agreement on issues of wide interest?

(12:1) Introduction.

(12:2) Beyond Reasonable Doubt.

(12:3) Scientific debate in practice; Peer Review.

(12:4) A hesitant guide to Persuasion.

(12:5) Afterword.

### CHAPTER 13 **POOR THINKING.**

(13:1) We need to identify the main causes of poor thinking, both in our own head and in others'. The Internet is changing everything.

(13:2) Misunderstanding Common Sense : Popperism.

(13:3) The Principle of Limited Variety: where Common Sense Thinking won't work.

(13:4) When a science is not a science: Economics.

(13:5) Psy\*\*\*\*y: why it can't help us to think better.

(13:6) Tunnel Vision I; dismissing alternative hypotheses.

(13:7) Tunnel Vision II: Favouring pet clues. The case for Animal Wisdom.

(13:8) Prejudicial Thinking in general.

(13:9) The Burden of Proof.

(13:10) Misplaced Deference: how to screw yourself.

(13:11) Careerism: conforming for promotion.

(13:12) Groupthink.

(13:13) Resurrective Thinking; forgetting Ockham.

(13:14) Uncritical use of Analogy.

(13:15) Forgetting the Tarantula.

(13:16) The Pygmalion Complex.

**CHAPTER 14: THE EXTRAORDINARY HISTORY OF THINKING.**

Why scholars and educationalists have been so confused for so long, and why most of them still are.

(14:1) Introduction. You're not going to believe this.

(14:2) The Geometer's World.

(14:3) The Instrumental World.

(14:4) The struggle for Induction.

(14:5) The appearance and disappearance of the Reverend Bayes.

(14:6) Subjective Bayesianism.

(14:7) Objective Bayesianism.

(14:8) Why the Detectives Equation remained hidden.

(14:9) Bayesians and Detectives.

(14:10) Ockham's Razor: its history.

(14:11) The Detective's Equation versus Bayes' Theorem.

(14:12) The obstacle course. How we got held up for 2000 years.

**CHAPTER 15: THE PECULIARITIES OF SCIENCE.**

and why scientific thinking can't always be applied in other spheres.

(15:1) Introduction.

(15:2) Systematic Exploration.

(15:3) Devising new instruments.

(15:4) Posing fruitful questions.

(15:5) Measuring and quantifying.

(15:6) Experimenting.

(15:7) Repeating.

(15:8) Relating.

(15:9) Explaining.

(15:10) A cautionary tale.

(15:11) Publishing.

(15:12) What about Mathematics?

## CHAPTER 16: CONSEQUENCES: THE METEORIC ASCENT OF MANKIND.

Now we know how to think we take wing and make some extraordinary discoveries in the fields of learning, education, time, cunning, government, religion, civilization and the emergence of homo sapiens as the dominant species. The prospects ahead look dazzling.

(16:1) Where could our newfound knowledge of Common Sense Thinking (CST) lead?

(16:2) The value of learning – each new thing you learn is valuable in proportion to what you *already* know.

(16:3) Decisiveness goes viral. The Exponential value of Evidence.

(16:4) Mental Laziness: to be expected; to be exploited.

(16:5) Education. The questionable value of a modern-day education lasting 20 years. It's way too long: it's for growing big babies, not wise men and women.

(16:6) Common Sense and Governance. The impact of CS ideas on governance at all levels. Well ordered committees are likely to be more decisive – and wiser – than strong CEOs.

(16:7) Religion and Common Sense. The possible bearing of CST on atheism, religion and tolerance in general.

(16:8) The Meteoric Ascent of Mankind: How come a zoological failure took over the world in a mere 5000 years? It's Common Sense – but with a new twist. And we haven't started yet.

(16:9) Priestliness, Holiness and Certainty.

(16:10) Last Thoughts.

**FINAL SUMMARY OF THE BOOK. (1.5 kw)**

**Epilogue** ‘THROTTLE UP’ (0.6 kw)

## **GLOSSARY**

**REFERENCES** (and discussion of), by chapter. (7.4 kw)

## **ACKNOWLEDGEMENTS**

## **APPENDICES.**

Appendix A1\* : A Table of Normal and PAW Weights.

Appendix A2\* : Murder in a University Town: your verdict.

Appendix A3: The Expected Scatter.

Appendix A4: The Boy/ Girl problem.

Appendix A5: Where the Normal Law of Error comes from.

Appendix A6\*: The Sally Clark Case.

Appendix A7: Philosophy and our Book.

Appendix A8\*\* : Certainty, Falsifiability and Common Sense.

Appendix A9\*\* : Categorical Inference and Animal Wisdom

Appendix A10: Hidden Galaxies netted at last.

Appendix A11: How this book got written.

Appendix A12: Can machines be trained to Think ?

Appendix A13: A sketch-map of Thinking.

Where \* means ‘Indispensible Reading’ and \*\* ‘Absolutely Spinal’.

TOTAL WORD COUNT 139 kw

**WEBSITE:** TBD: will, among other things, contain the Exercises with Answers, some of the longer appendices, most of the bibliography, a place for feedback between readers and author, and between readers. Many extra figures and pieces of evidence. Short biblios and caricatures of some of the main heroes and villains. It will be interactive and accretive, and be maintained by the author.