# Teaching the Scarecrow: Improving Thinking to Improve Clinical Decision Making

Pat Croskerry MD, PhD, FRCP(Edin)

*27th Annual Rural and Remote Medicine Course*

Halifax Convention Centre April 4-6 2019

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Does decision making actually need improvement?

3

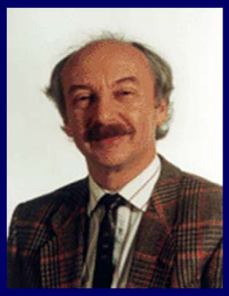
Most of us do not reach our potential for critical thinking

4

# Decision making

'The most important decision we need to make in Life is how we are going to make decisions'

Professor Gigerenzer



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# 3 domains of decision making

Patients

Healthcare leadership

Healthcare providers

6

# Patients

7

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## Personal Decisions Are the Leading Cause of Death

**Ralph L. Keeney**
The Fuqua School of Business, Duke University, Durham, North Carolina 27708,
keeney@duke.edu

This paper analyzes the relationships between personal decisions and premature deaths in the United States. The analysis indicates that over one million of the 2.4 million deaths in 2000 can be attributed to personal decisions and could have been avoided if readily available alternative choices were made. Separate analyses indicate 46% of deaths due to heart disease and 66% of cancer deaths are attributable to personal decisions, about 55% of all deaths for ages 15–64 are attributable to personal decisions, and over 94% of the deaths attributable to personal decisions result in the death of the individual making the decisions. Relative to the current 45%, retrospective appraisal suggests that roughly 5% of deaths in 1900 and 20%–25% of deaths in 1950 could be attributed to personal decisions. These results suggest that more effort directed toward improving personal choices regarding life risks may be an effective and economical way to save lives.

*Subject classifications*: risk; decision making; decision analysis: applications; health care; information systems: management; statistics: data analysis.
*Area of review*: Special Issue on Operations Research in Health Care. OR Forum.
*History*: Received July 2006; revisions received March 2007, September 2007, February 2008; accepted April 2008.

Participate in the OR Forum discussion at http://orforum.blog.informs.org.

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## Leading Medical Causes of Death in the US and their Preventability in 2000

| *Cause* | *Total* | *Preventability (%)* |
|---|---|---|
| Heart disease | 710,760 | 46 |
| Malignant neoplasms | 553,091 | 66 |
| Cerebrovascular | 167,661 | 43 |
| Chronic respiratory | 122,009 | 76 |
| Accidents | 97,900 | 44 |
| Diabetes mellitus | 69,301 | 33 |
| Acute respiratory | 65,313 | 23 |
| Suicide | 29,350 | 100 |
| Chronic Liver disease | 26,552 | 75 |
| Hypertension/renal | 12,228 | 68 |
| Assault (homicide) | 16,765 | 100 |
| All other | 391,904 | 14 |

Keeney (2008)

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## Healthcare leadership

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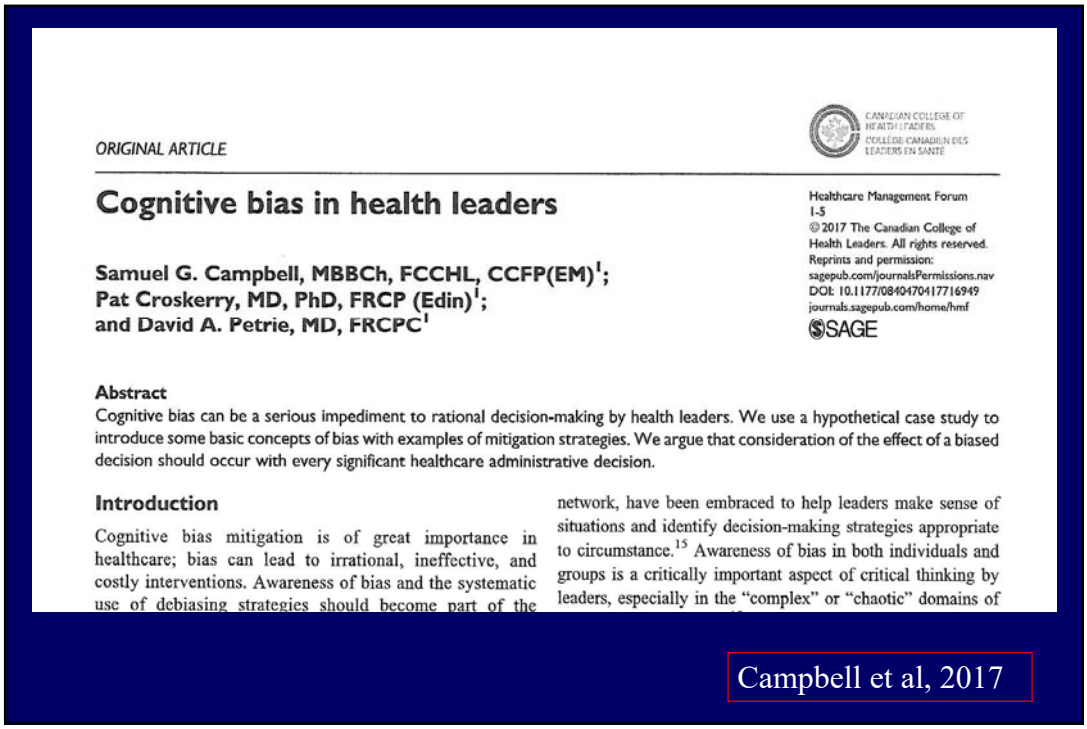

ORIGINAL ARTICLE

# Cognitive bias in health leaders

Samuel G. Campbell, MBBCh, FCCHL, CCFP(EM)[1];
Pat Croskerry, MD, PhD, FRCP (Edin)[1];
and David A. Petrie, MD, FRCPC[1]

Healthcare Management Forum
1-5
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**Abstract**
Cognitive bias can be a serious impediment to rational decision-making by health leaders. We use a hypothetical case study to introduce some basic concepts of bias with examples of mitigation strategies. We argue that consideration of the effect of a biased decision should occur with every significant healthcare administrative decision.

## Introduction

Cognitive bias mitigation is of great importance in healthcare; bias can lead to irrational, ineffective, and costly interventions. Awareness of bias and the systematic use of debiasing strategies should become part of the

network, have been embraced to help leaders make sense of situations and identify decision-making strategies appropriate to circumstance.[15] Awareness of bias in both individuals and groups is a critically important aspect of critical thinking by leaders, especially in the "complex" or "chaotic" domains of

Campbell et al, 2017

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# Healthcare providers

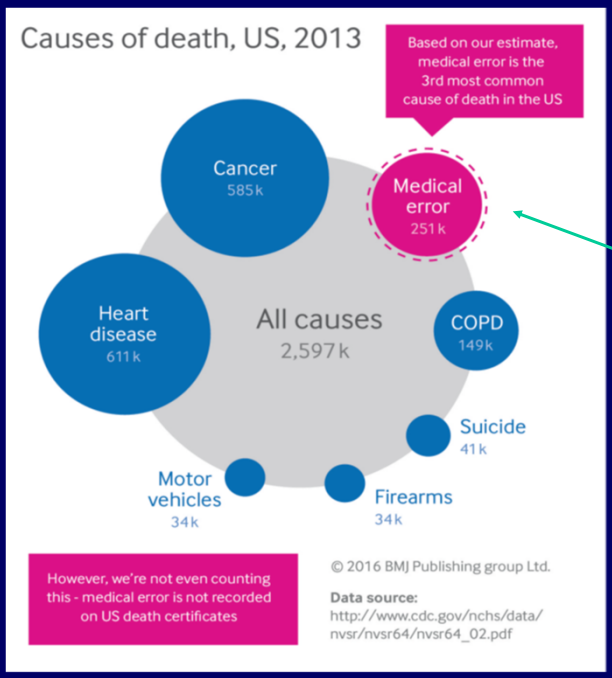
12

# US deaths in 2013

- 611,105 Heart disease
- 584,881 Cancer
- 251,454 Medical error

Medical error is the 3rd leading cause of death

13




Makary and Daniel, *BMJ* 2016

Data source:
Xu et al, 2016 NVSS
(National Vital Statistics System)

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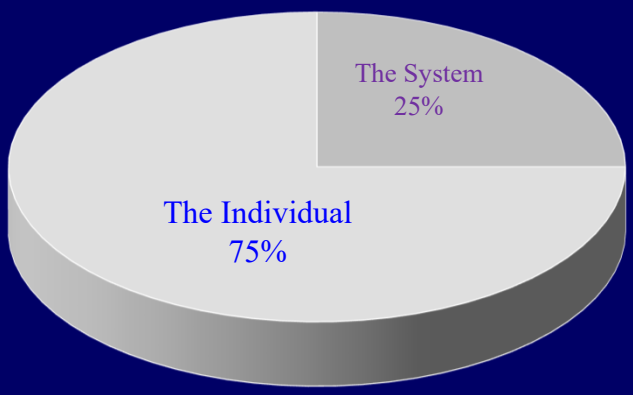
Estimated number of preventable hospital deaths due to diagnostic failure annually in the US

40,000 – 80,000

*Leape, Berwick and Bates JAMA 2002*

15

## Sources of Diagnostic Failure




Graber M, Gordon R, Franklin N.
Reducing diagnostic errors in medicine: what's the goal?
*Acad Med.* 2002

16

Diagnostic failure is the biggest problem in patient safety

Newman-Toker, 2017

17

Many physicians are reluctant to believe this

18

# Diagnostic Failure

15%

19

# It varies by specialty

Dermatology
Radiology
Anatomic pathology
} (1-2%)

Internal medicine
Family medicine
Emergency medicine
} (~15%+)

Rural and remote medicine (?)

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*Estimates of Diagnostic Error Rate in Internal Medicine Using Different Methodologies (adapted from Graber, 2013)*

| Research approach | Method | Observation |
|---|---|---|
| Patient surveys | | 33% of patients relate a diagnostic error that affected themselves, a family member or close friend |
| Second reviews | Image or sample is reviewed by another clinician | 10-30% of breast cancers are missed on mammography; 1-2% of cancers misread on biopsy samples |
| **Standard patients** | Clinician is unaware that patient is trained to act as a real patient to simulate a set of symptoms or problems | Internist misdiagnosed 13% of patient presenting with common conditions (chronic obstructive pulmonary disease, rheumatoid arthritis, others) |
| **Look backs** | Specific conditions are retroactively investigated to see if diagnosis could have been made at an earlier stage | 30% of subarachnoid hemorrhage misdiagnosed; 39% of dissecting abdominal aortic aneurysm; Delayed diagnosis; 25-50% of women with cervical cancer – last PAP abnormal on re-read |
| **Autopsies** | | Major unexpected discrepancies that would have changed the management found in 10-20% |

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Diagnosis is the canary in the coal mine for decision failure

22

23

**Table 4.** Factors contributing to diagnostic errors.

| Factor | No. | %* |
|---|---|---|
| Cognitive factors | 76 | 96 |
| Judgment | 69 | 87 |
| Knowledge | 46 | 58 |
| Vigilance or memory | 32 | 41 |
| Communication factors | 28 | 35 |
| Handoffs | 19 | 24 |
| Establishment of clear lines of responsibility | 5 | 6 |
| Conflict | 2 | 3 |
| Other communication factor | 7 | 9 |
| Systems factors | 29 | 37 |
| Supervision | 24 | 30 |
| Workload | 18 | 23 |
| Interruptions | 4 | 5 |
| Fatigue | 3 | 4 |
| Technology | 0 | 0 |
| Ergonomics | 0 | 0 |
| Patient-related factors | 27 | 34 |
| Patient nonadherence | 8 | 10 |
| Atypical presentation | 6 | 8 |
| Complicated medical history | 6 | 8 |
| Substance abuse | 6 | 8 |
| Poor historian | 4 | 5 |
| Psychiatric issue | 3 | 4 |
| Obesity | 2 | 3 |
| Language barrier | 1 | 1 |

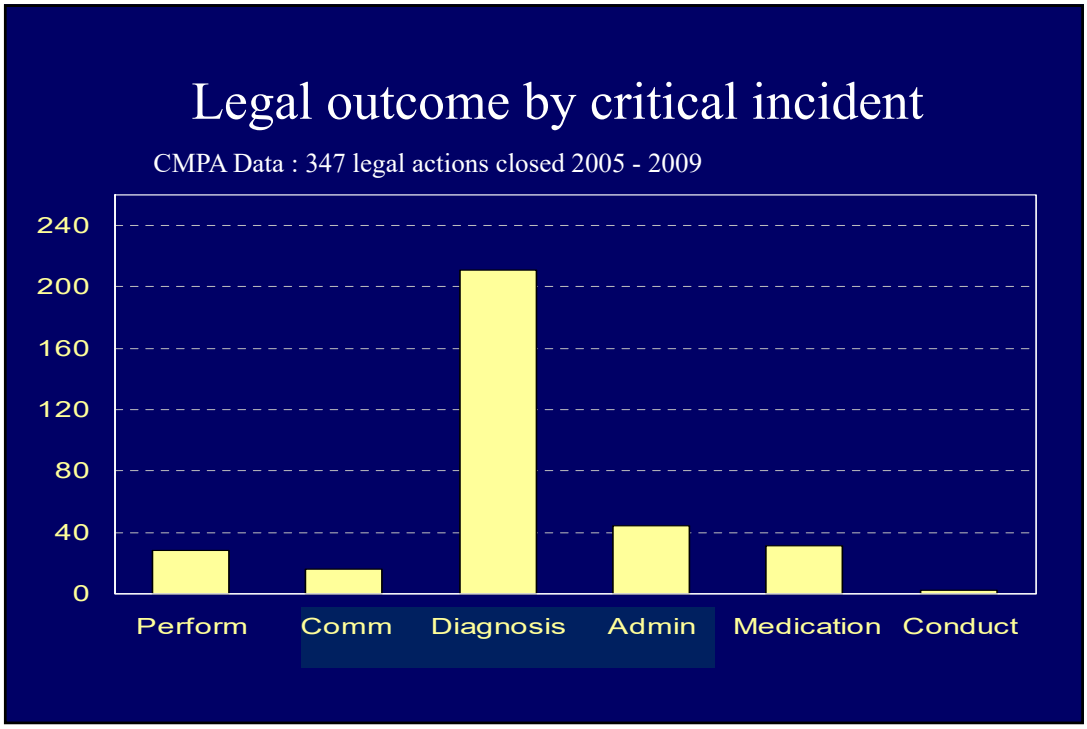
*Calculates as a percentage of 79 claims with identified errors.

Kachalla et al, Annals of Emergency Medicine 2007

24

Legal outcome by critical incident
CMPA Data : 347 legal actions closed 2005 - 2009
Number of patients
240
200
160
120
80
40
0
Perform
Comm
Diagnosis
Admin
Medication
Conduct

25


Legal outcome by critical incident
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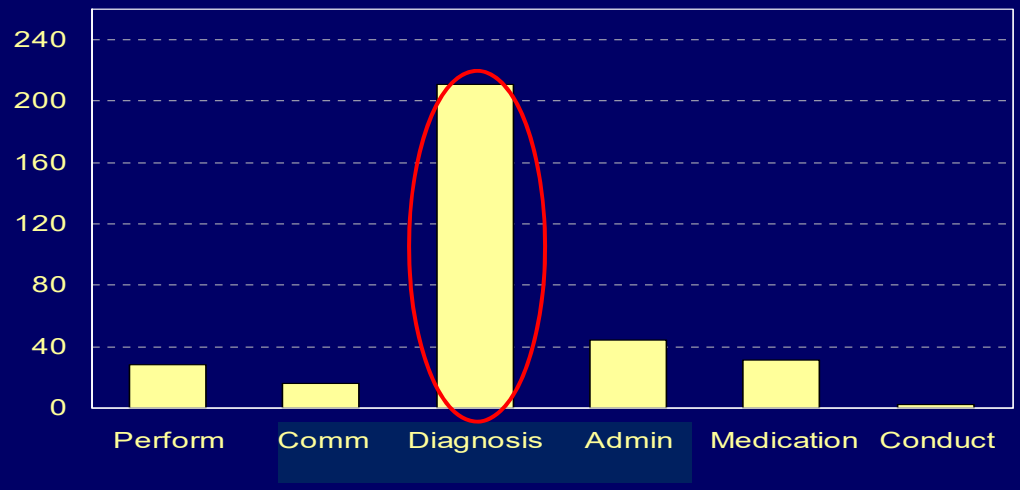
240
200
160
120
80
40
0
Perform
Comm
Diagnosis
Admin
Medication
Conduct

26

## Legal outcome by critical incident

CMPA Data : 347 legal actions closed 2005 - 2009

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## The complexity of diagnostic reasoning

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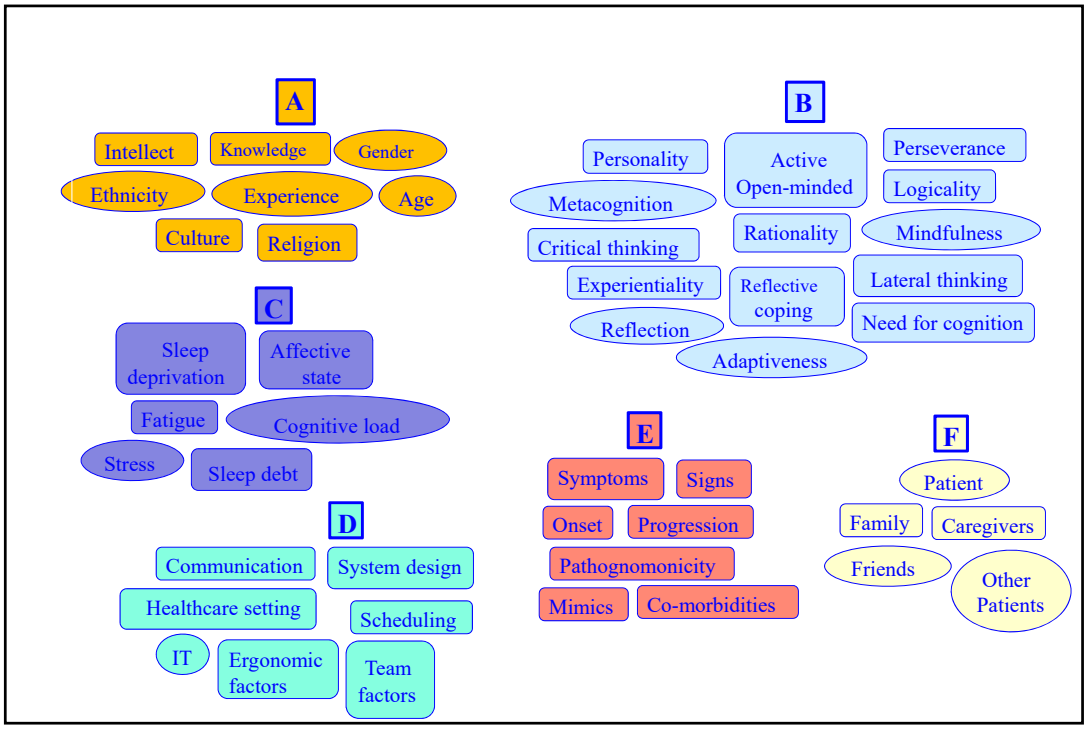


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# Features of rural and remote medicine that may impact decision making

- Wider scope of practice
- Access to specialists
- Access to resources
- Work longer hours
- Higher Doctor : Patient ratio
- Social proximity of patients
- Zebra retreat

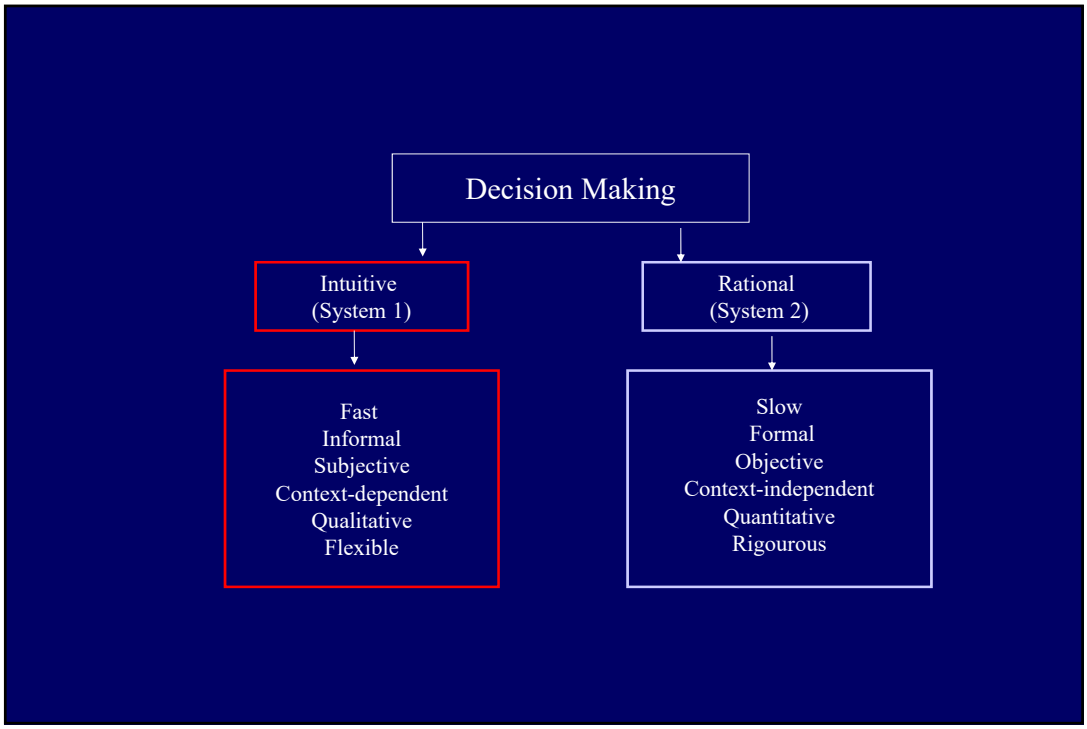
30

# Understanding decision making

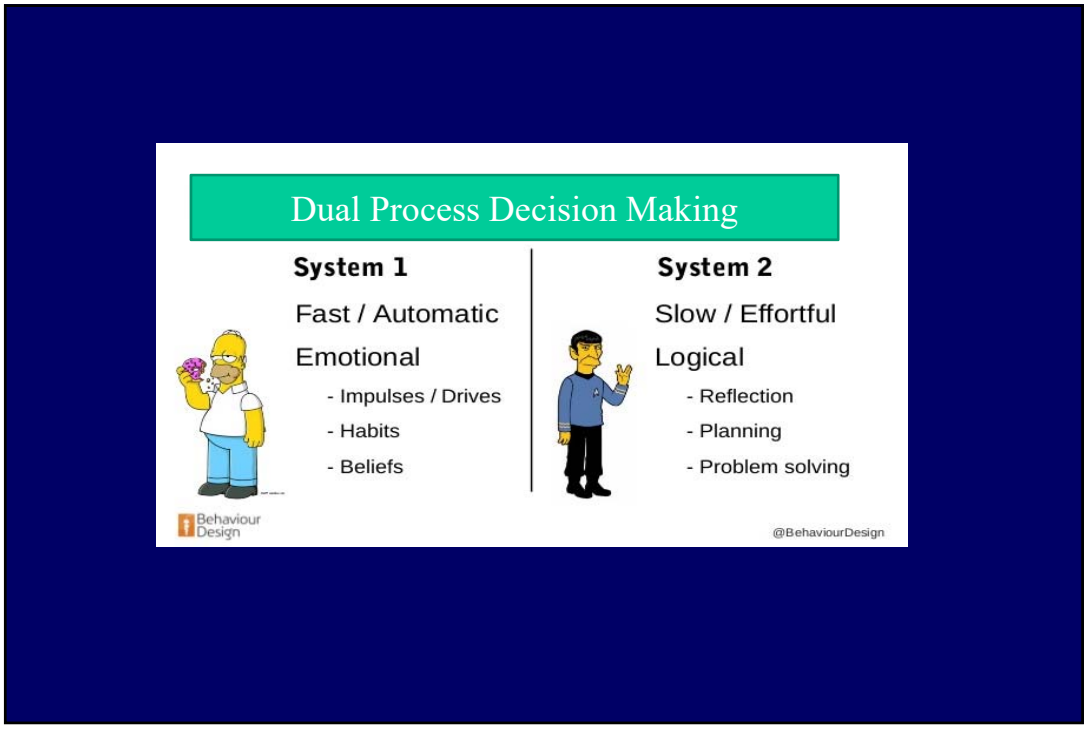
31

# Dual Process Theory

32


Decision Making
Intuitive
(System 1)
Rational
(System 2)
Fast
Informal
Subjective
Context-dependent
Qualitative
Flexible
Slow
Formal
Objective
Context-independent
Quantitative
Rigourous

33


Dual Process Decision Making
System 1
Fast / Automatic
Emotional
- Impulses / Drives
- Habits
- Beliefs
System 2
Slow / Effortful
Logical
- Reflection
- Planning
- Problem solving
Behaviour Design
@BehaviourDesign

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# Dual Process Decision Making

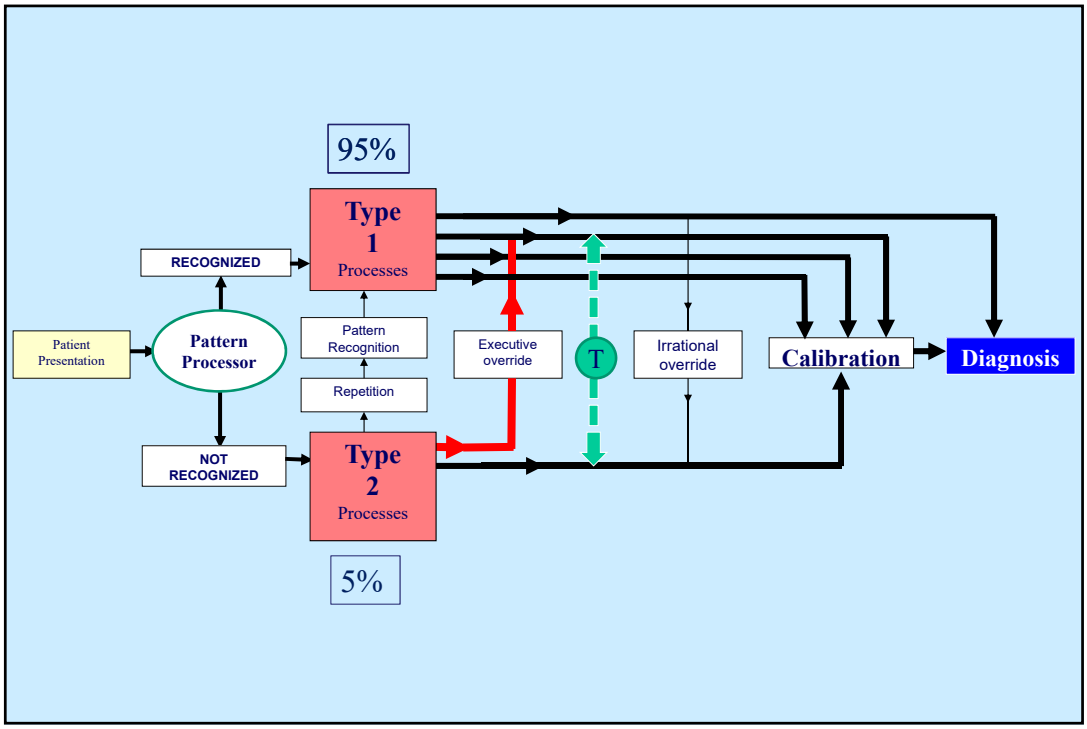
**System 1: Automatic/streamlined**

**System 2:Cautious/complex**

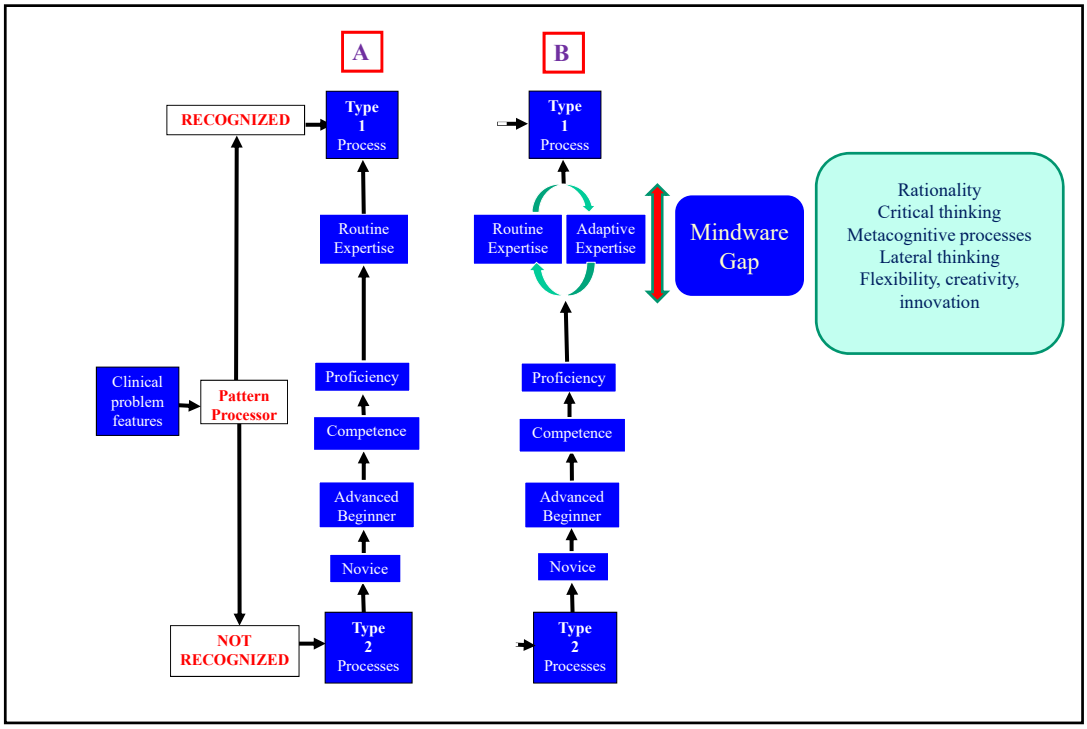
35

# A schematic model of how the systems work together

36


95%
Type 1 Processes
RECOGNIZED
Patient Presentation
Pattern Processor
Pattern Recognition
Repetition
NOT RECOGNIZED
Type 2 Processes
5%
Executive override
T
Irrational override
Calibration
Diagnosis

37


A
B
RECOGNIZED
Type 1 Process
Routine Expertise
Proficiency
Competence
Advanced Beginner
Novice
Clinical problem features
Pattern Processor
NOT RECOGNIZED
Type 2 Processes
Routine Expertise
Adaptive Expertise
Mindware Gap
Rationality
Critical thinking
Metacognitive processes
Lateral thinking
Flexibility, creativity, innovation

38

Mindware Gap

Critical thinking
Metacognitive processes
Rationality, biases. mitigation
Lateral thinking
Humanities

39

The best calibrated decisions are described as 'rational' – they come from a blend of System 1 and System 2 decisions

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## What is meant by rationality?

- The best possible decision given the available evidence and the prevailing conditions
- Assuming you are well-slept, well-rested, well-fed, and can give the problem your undivided attention
- And you are aware of and know how to deal with bias

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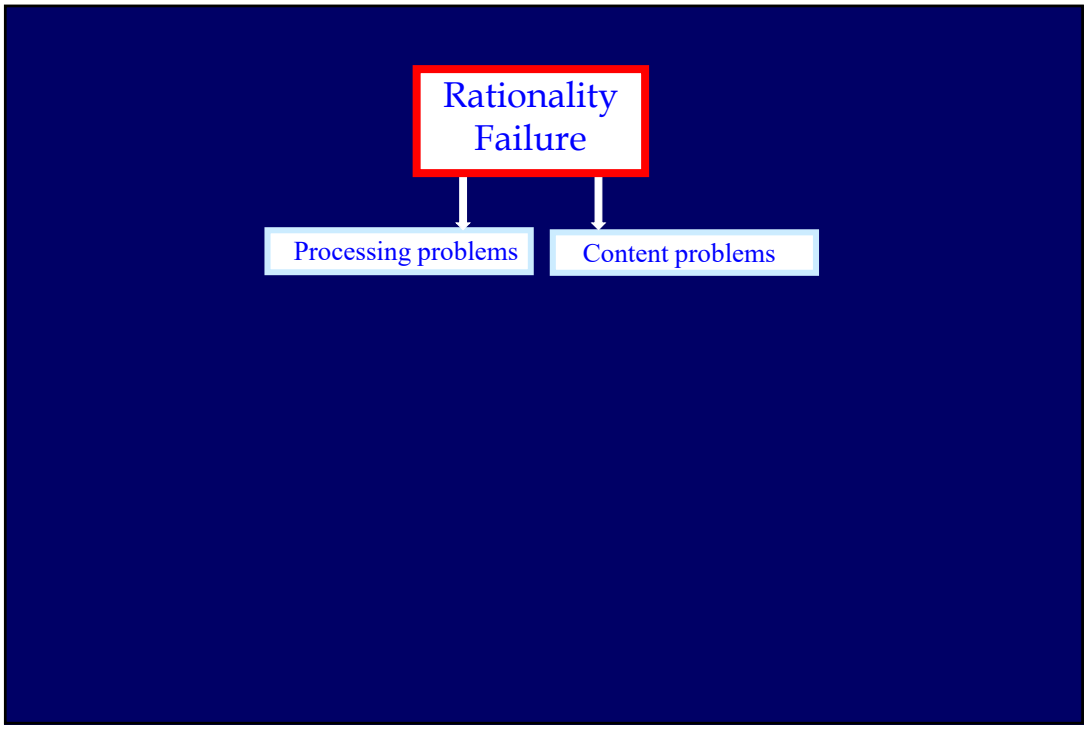
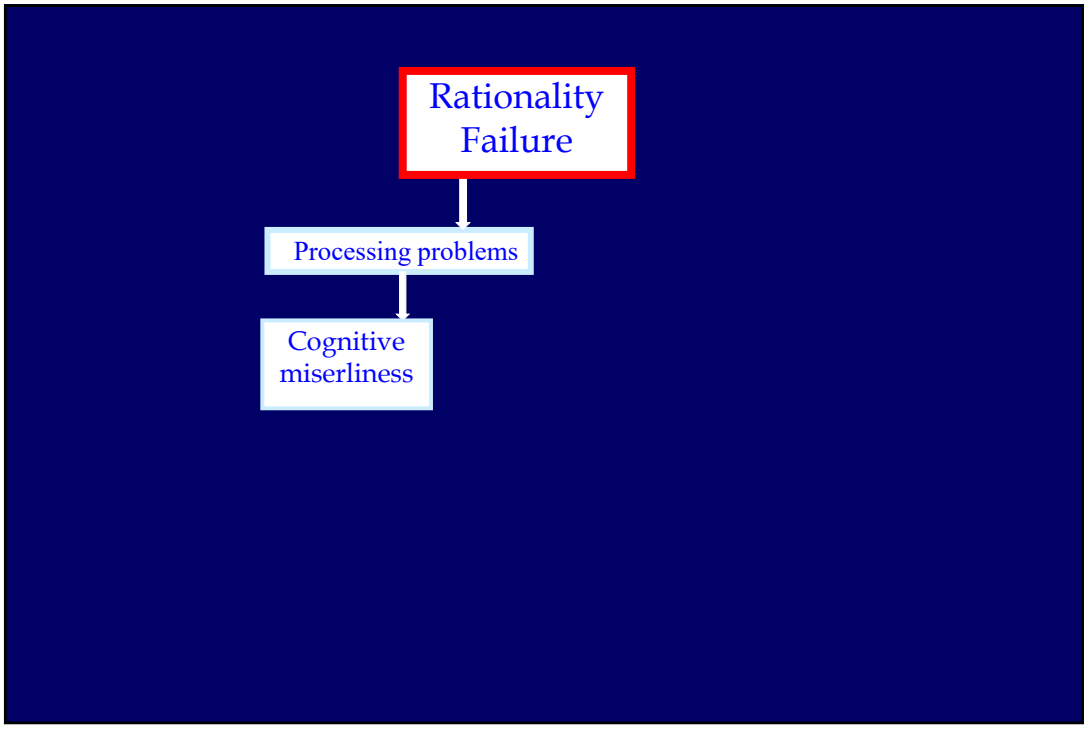
Rationality Failure

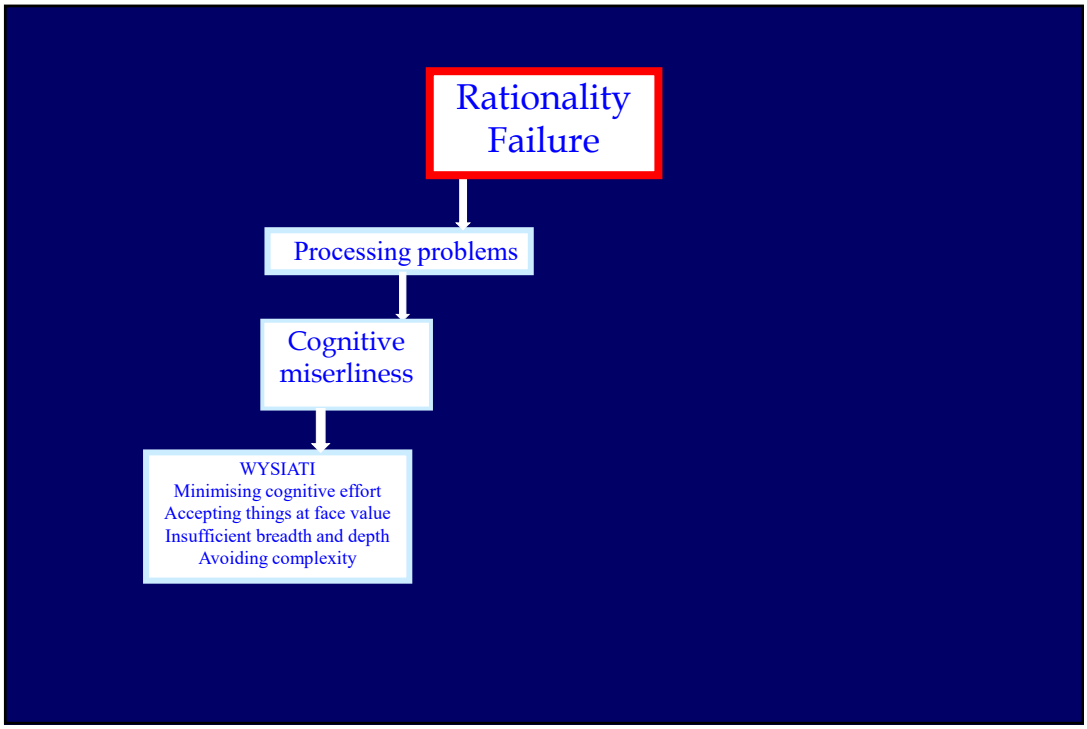
42


Rationality Failure
Processing problems
Content problems

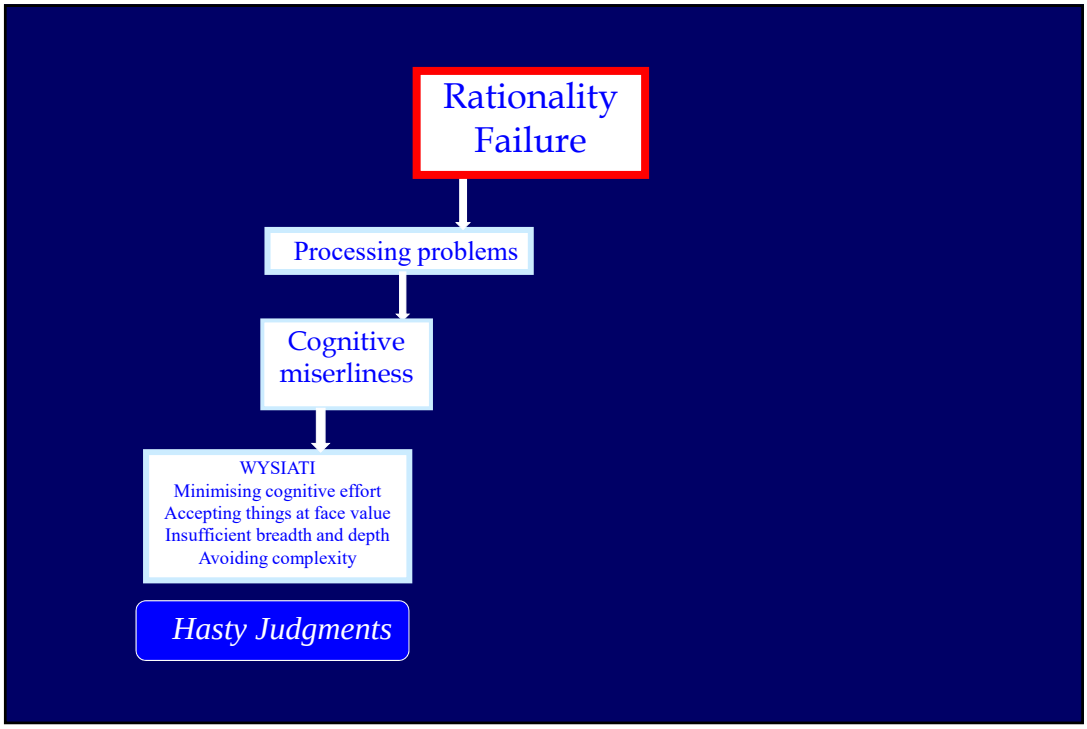
43


Rationality Failure
Processing problems
Cognitive miserliness

44


Rationality Failure
Processing problems
Cognitive miserliness
WYSIATI
Minimising cognitive effort
Accepting things at face value
Insufficient breadth and depth
Avoiding complexity

45


Rationality Failure
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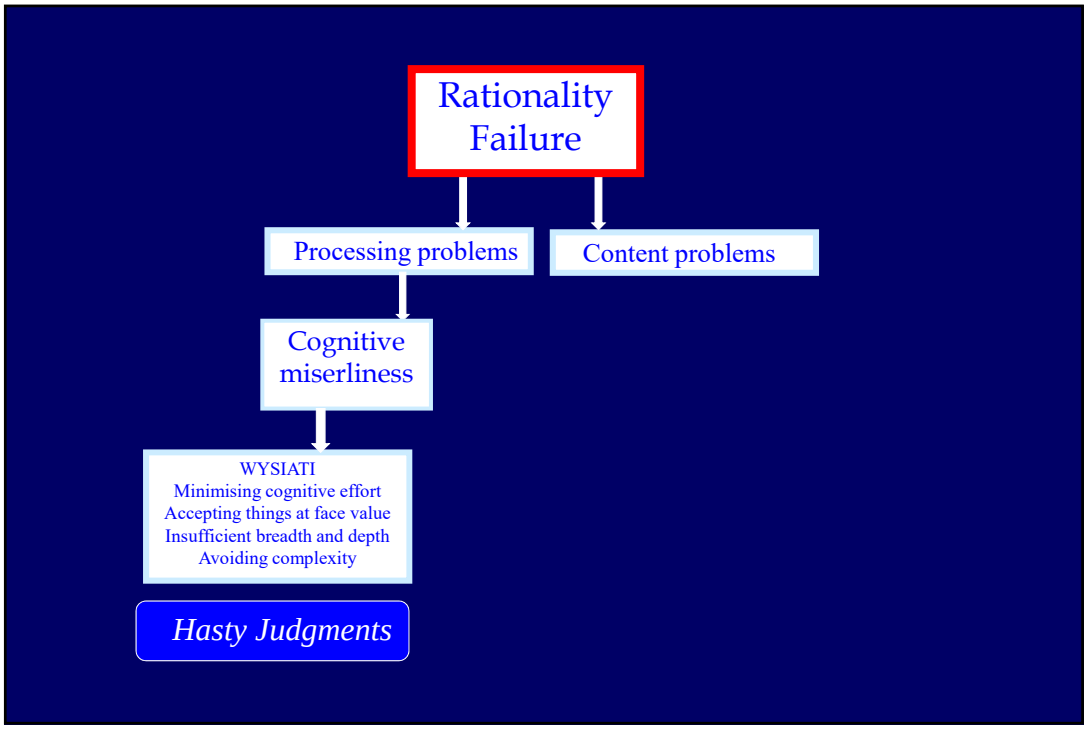
Accepting things at face value
Insufficient breadth and depth
Avoiding complexity
Hasty Judgments

46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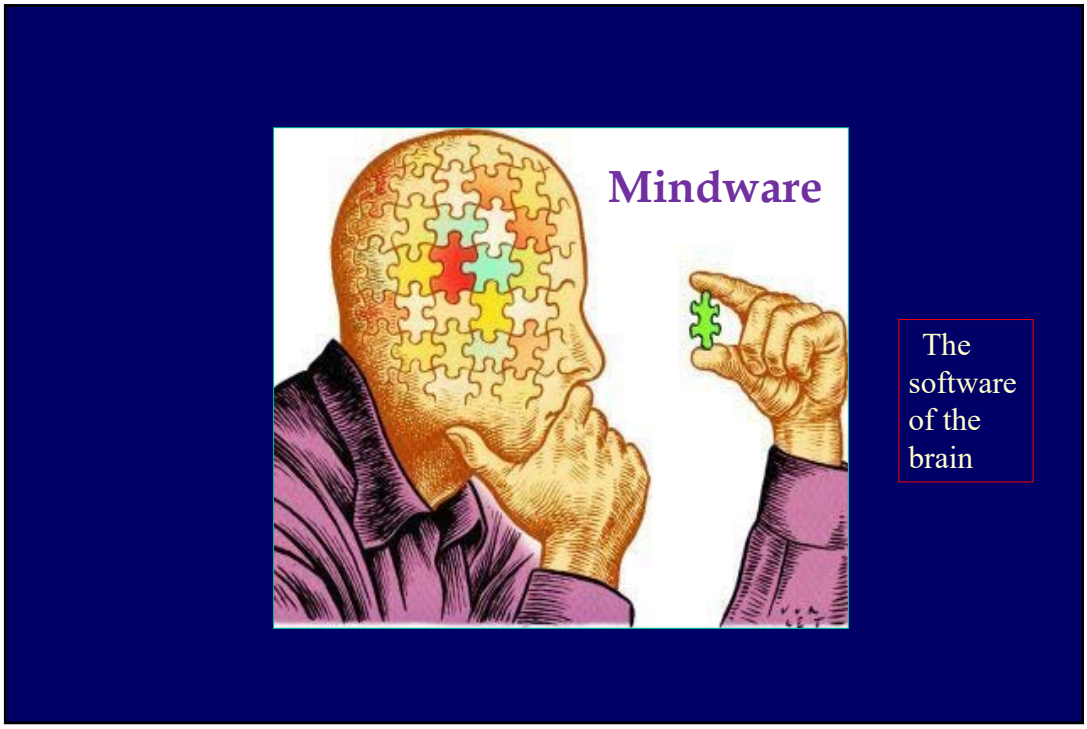
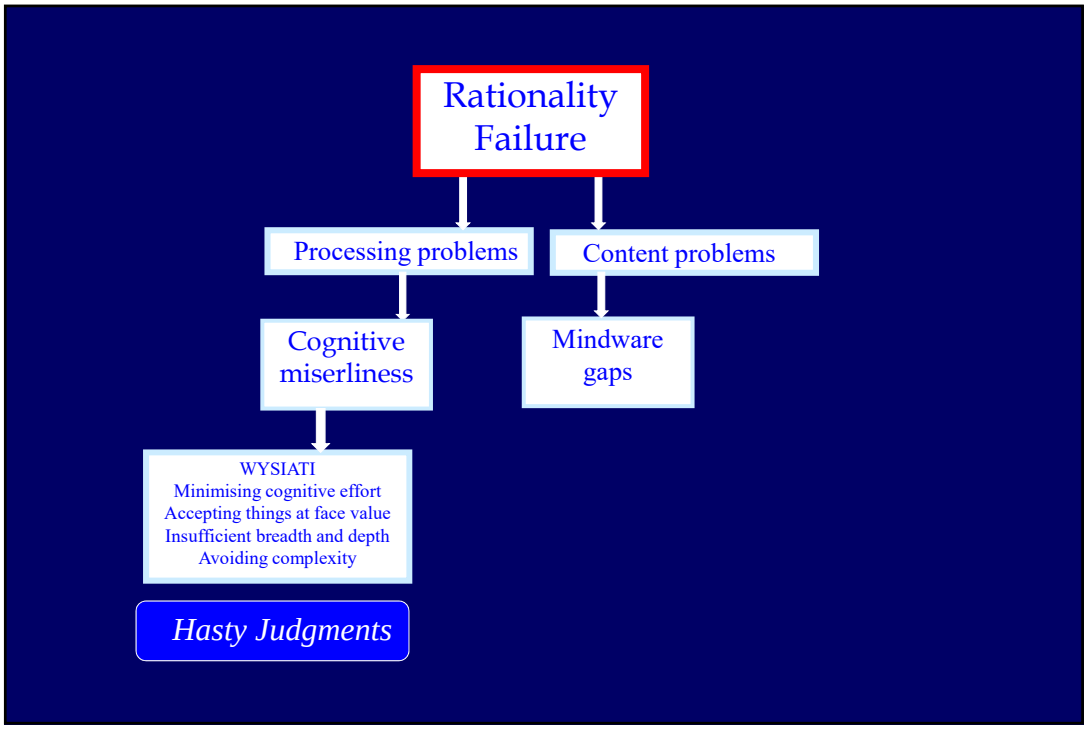
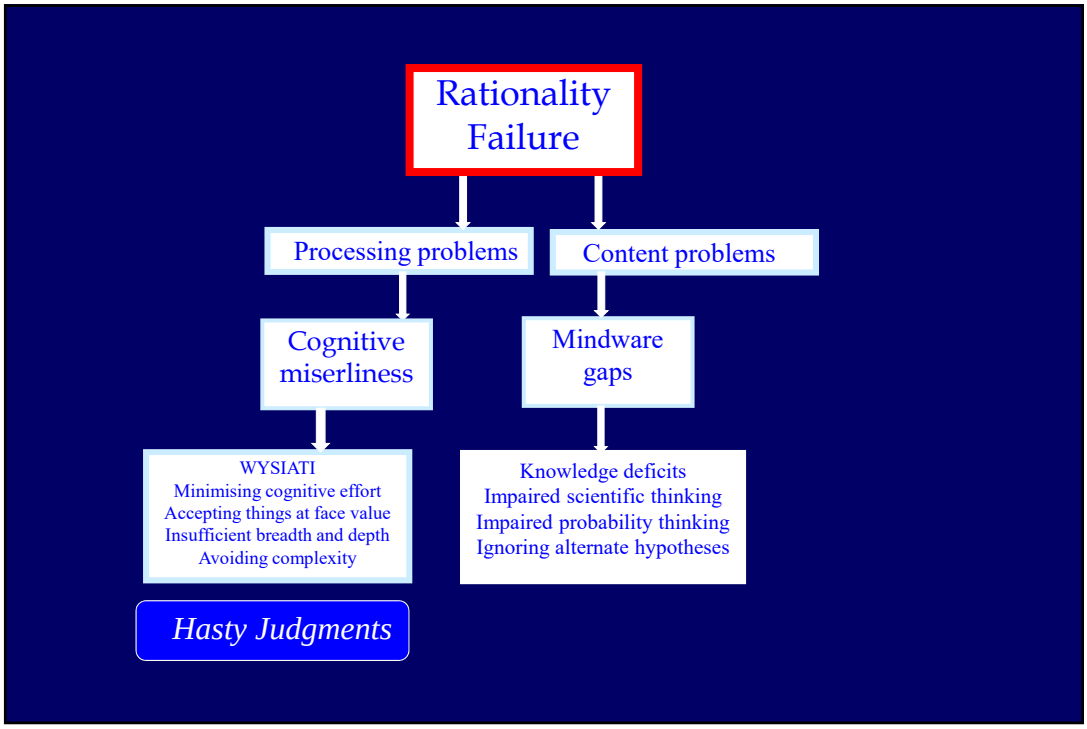
47


Mindware
The software of the brain

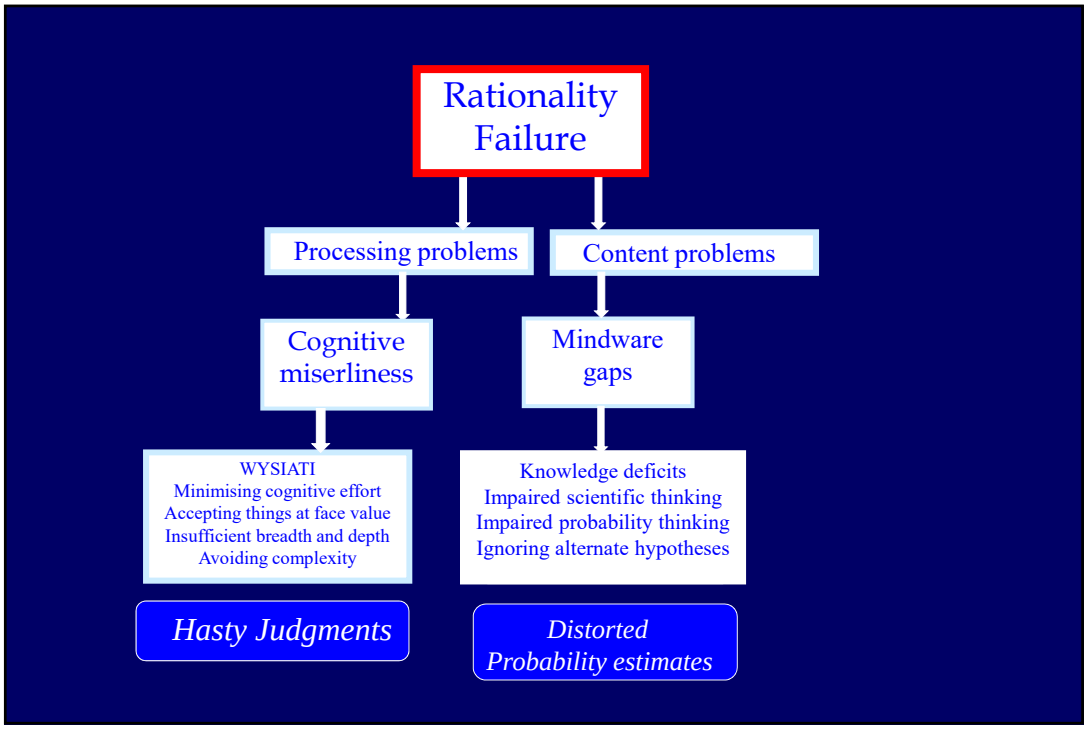
48


Rationality Failure
Processing problems
Content problems
Cognitive miserliness
Mindware gaps
WYSIATI
Minimising cognitive effort
Accepting things at face value
Insufficient breadth and depth
Avoiding complexity
Hasty Judgments

49


Rationality Failure
Processing problems
Content problems
Cognitive miserliness
Mindware gaps
WYSIATI
Minimising cognitive effort
Accepting things at face value
Insufficient breadth and depth
Avoiding complexity
Knowledge deficits
Impaired scientific thinking
Impaired probability thinking
Ignoring alternate hypotheses
Hasty Judgments

50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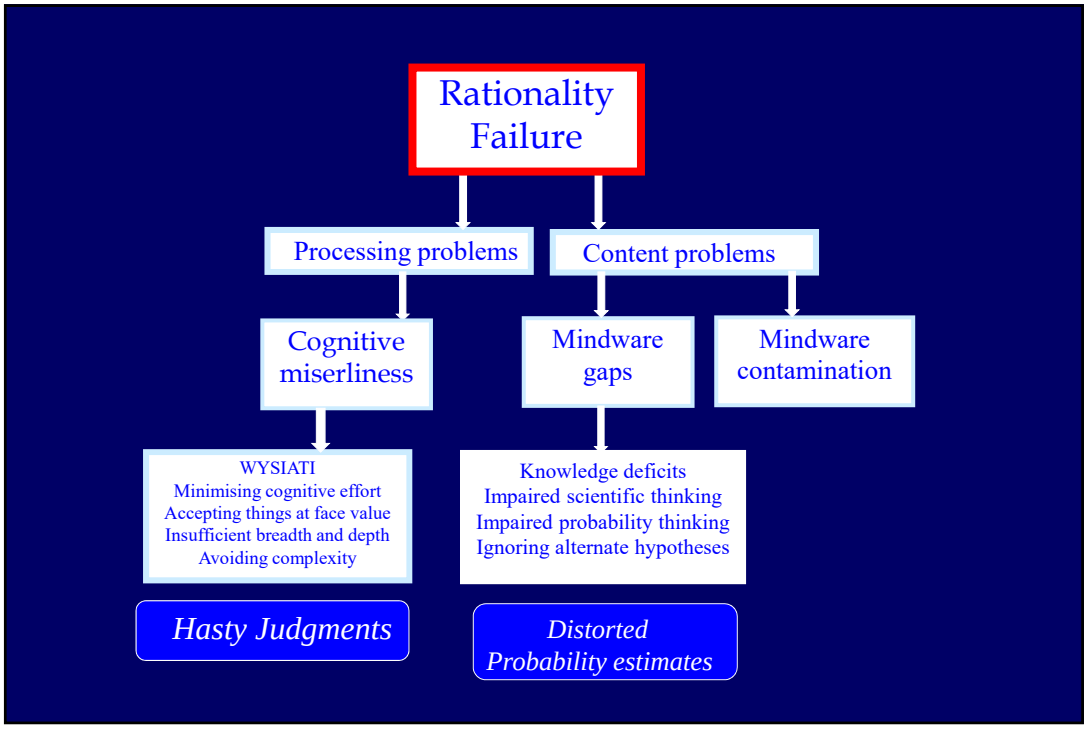
Impaired probability thinking
Ignoring alternate hypotheses
Hasty Judgments
Distorted Probability estimates

51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Mindware contamination
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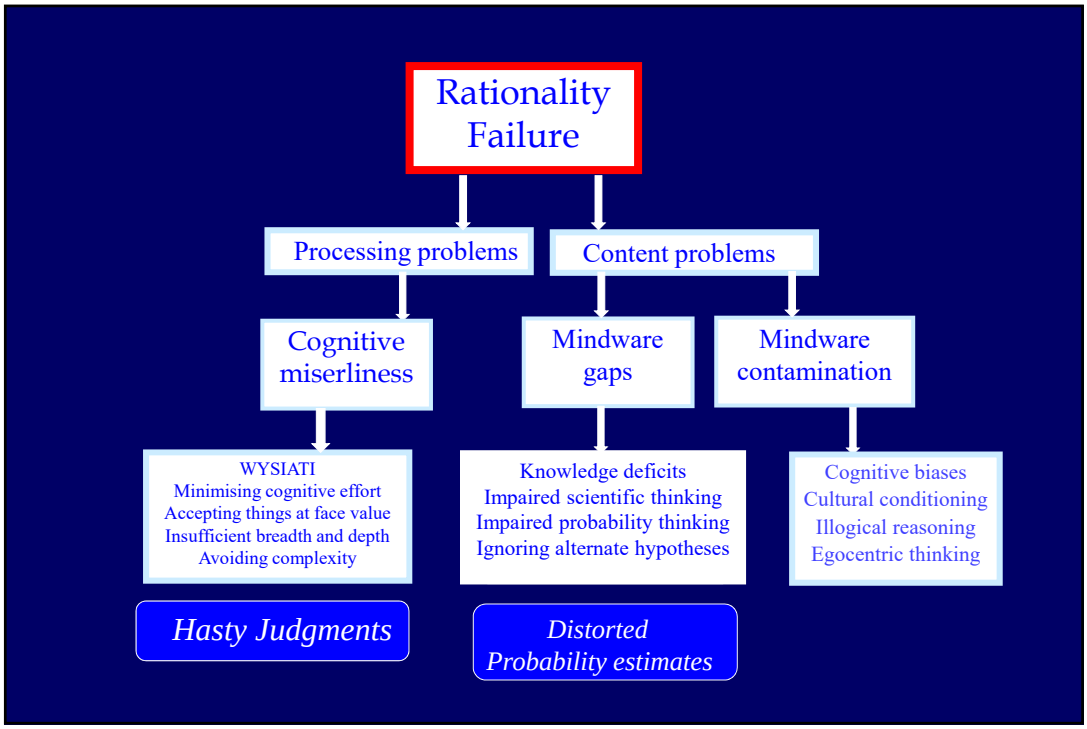
Distorted Probability estimates

52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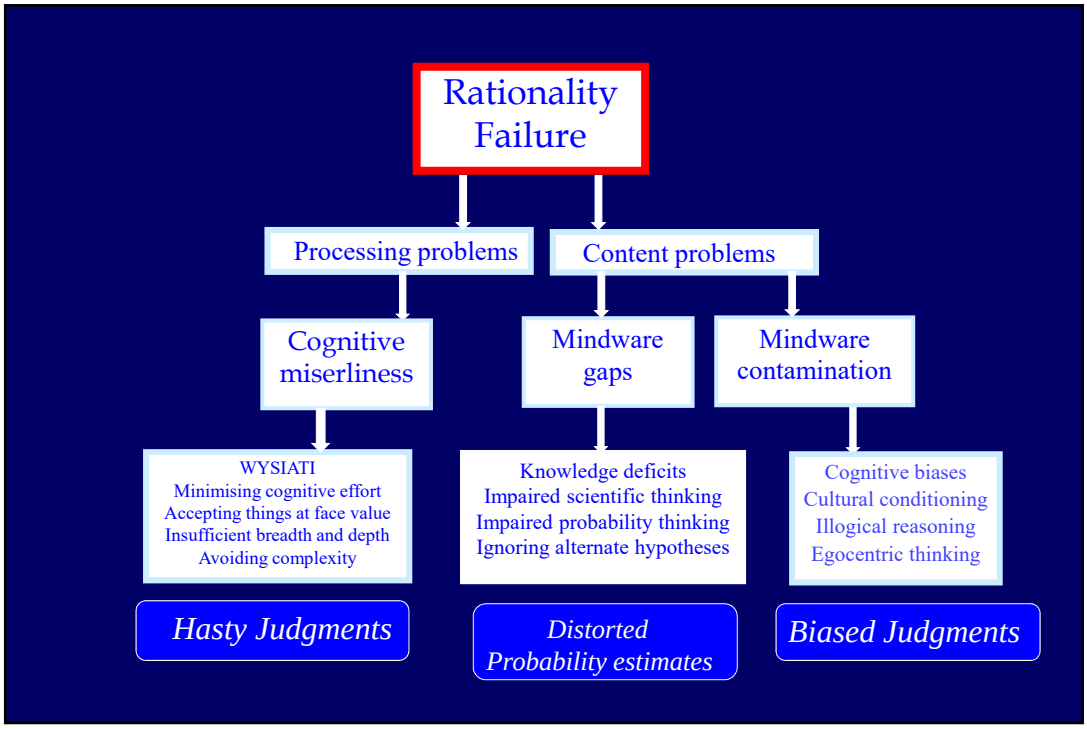
Cognitive biases
Cultural conditioning
Illogical reasoning
Egocentric thinking
Hasty Judgments
Distorted Probability estimates

53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Cultural conditioning
Illogical reasoning
Egocentric thinking
Hasty Judgments
Distorted Probability estimates
Biased Judgments

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## Ambient Dx Risk Situations

- Cognitive overloading
- Interruptions/distractions
- Sleep deprivation/sleep debt
- Negative mood
- Fatigue

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## So how do we help scarecrows?

56

You aren't thinking critically enough, so try harder

57

## Is trying harder going to work?

58

The occasional slap
might wake some people up

59

60

## Main Points

- The barometer for failed clinical reasoning is diagnostic failure
- The current estimate of diagnostic failure is 10-15%
- The sources of diagnostic failure are System (25%) and Individual (75%)
- The principle source of individual failure is how the individual thinks and less what they know
- The main factor that determines thinking competence is rationality
- We need to promote facilitators of rationality

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## Scarecrow Imperatives

- Raise awareness of the importance of decision making
- Promote metacognition, reflective practice, mindfulness
- Teach the main biases and essentials of bias mitigation
- Raise awareness of conditions which may compromise decision making (fatigue, sleep deprivation, cognitive overload)
- Promote rationality, critical thinking, and lateral thinking
- Promote adaptive decision making and resilience
- Promote the humanities!

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Special Section: Open Forum

*Cambridge Quarterly of Healthcare Ethics* (2014)
© Cambridge University Press 2014.

*The Ethical Imperative to Think about Thinking*

*Diagnostics, Metacognition, and Medical Professionalism*

MEREDITH STARK and JOSEPH J. FINS

**Abstract:** While the medical ethics literature has well explored the harm to patients, families, and the integrity of the profession in failing to disclose medical errors once they occur, less often addressed are the moral and professional obligations to take all available steps to prevent errors and harm in the first instance. As an expanding body of scholarship further elucidates the causes of medical error, including the considerable extent to which medical errors, particularly in diagnostics, may be attributable to cognitive sources, insufficient progress in systematically evaluating and implementing suggested strategies for improving critical thinking skills and medical judgment is of mounting concern. Continued failure to address pervasive thinking errors in medical decisionmaking imperils patient safety and professionalism, as well as beneficence and nonmaleficence, fairness and justice. We maintain that self-reflective and metacognitive refinement of critical thinking should not be construed as optional but rather should be considered an integral part of medical education, a codified tenet of professionalism, and by extension, a moral and professional duty.

**Keywords:** medical decision making; medical ethics; professionalism; medical education; medical error; diagnostic error; patient safety; cognition; judgment; metacognition

No longer an option…

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# Summary

- Improving rationality improves decision making
- It can be taught
- Training should be explicit (not implicit or tacit)
- Current medical training may suppress it?
- It is needed in UGME, PGME, and CME
- It is an ethical imperative

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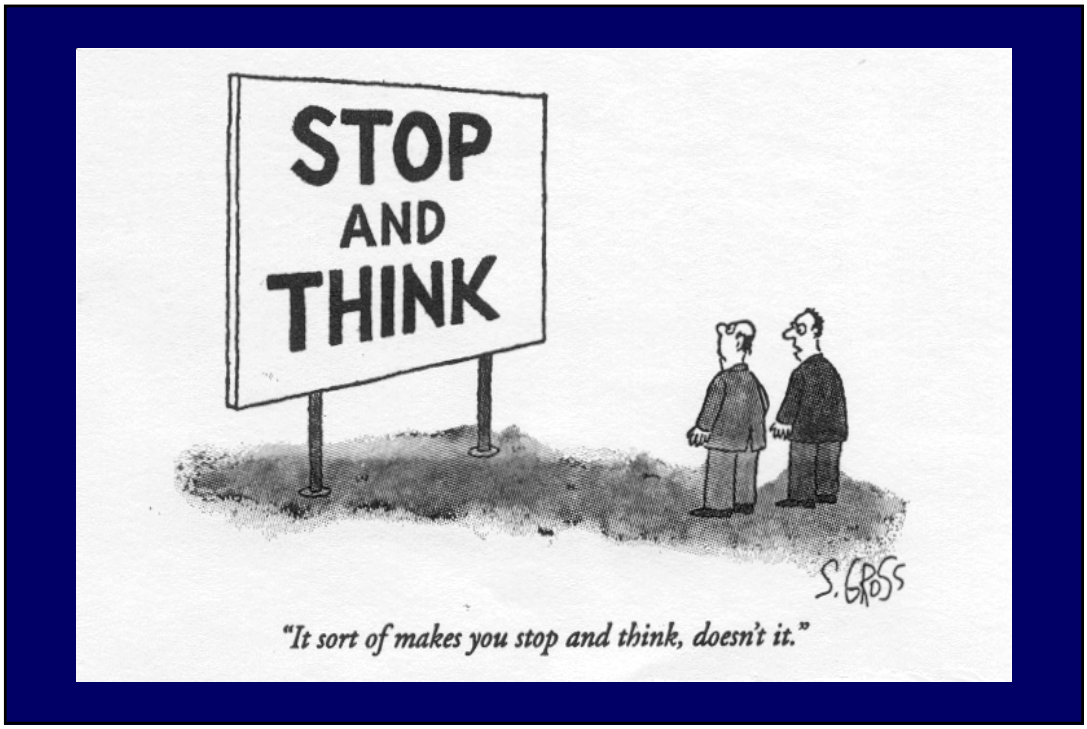
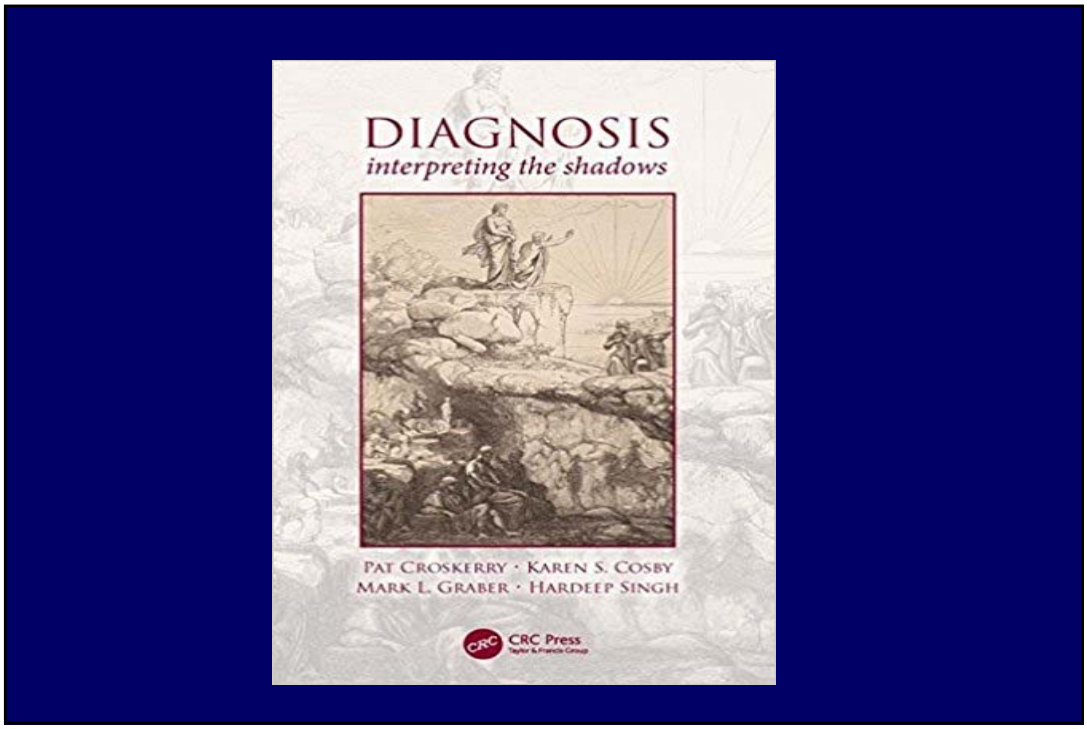

STOP
AND
THINK
S. GROSS
"It sort of makes you stop and think, doesn't it."

65

Thank you

66


DIAGNOSIS
interpreting the shadows
PAT CROSKERRY · KAREN S. COSBY
MARK L. GRABER · HARDEEP SINGH
CRC Press

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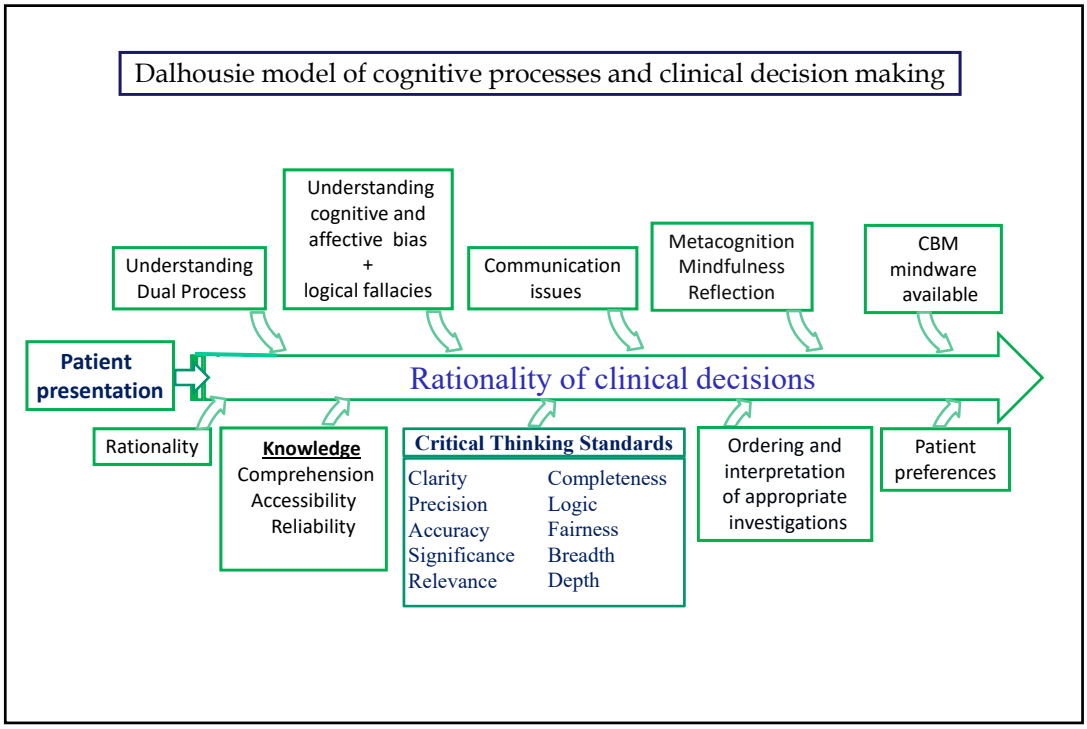
Dalhousie model of cognitive processes and clinical decision making
Understanding Dual Process
Understanding cognitive and affective bias + logical fallacies
Communication issues
Metacognition Mindfulness Reflection
CBM mindware available
Patient presentation
Rationality of clinical decisions
Rationality
Knowledge
Comprehension
Accessibility
Reliability
Critical Thinking Standards
Clarity
Precision
Accuracy
Significance
Relevance
Completeness
Logic
Fairness
Breadth
Depth
Ordering and interpretation of appropriate investigations
Patient preferences

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