

Context is everything
or
How could I have been that stupid?

Pat Croskerry MD, PhD

Halifax 8
Winnipeg, 2008

Lucian Leape's decision

ISQua Copenhagen
20 October 2008

ABC





Did you hear about the man who fatally shot his wife in the chest and got away with it? Damn those bleeding heart liberal judges and their hugs for thugs

The accused was an elderly man whose terminal cancer diagnosis filled him with fear that his partner -- bedridden with Alzheimer's would die without his care

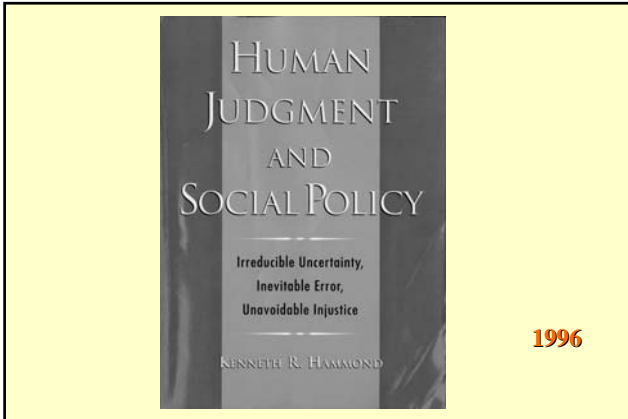
The only decision we must make in our lives is how to live our lives

L.J.Savage, 1954

'How to live our lives'
means
'How to make decisions'

Gigerenzer et al, 2002

What do we know about human decision making?

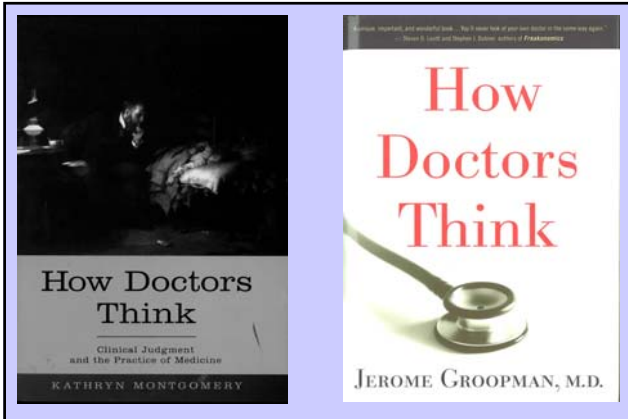


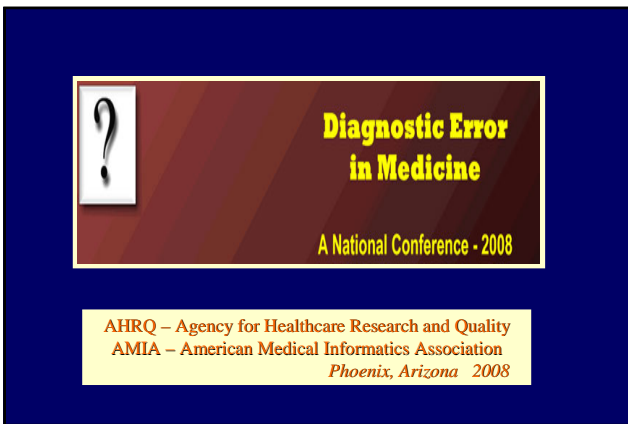
Cognition and Decision Making

- Sentence guidelines in judicial practice
- Design decisions in engineering
- Decisions in the launch of the space shuttle Challenger
- Diagnostic and treatment decisions in medicine
- Forecasts in economic decision making
- Role of advisors in political decision making
- Decision making in welfare allocations

In all areas of human decision making

- Irreducible uncertainty
- Inevitable error
- Unavoidable adversity





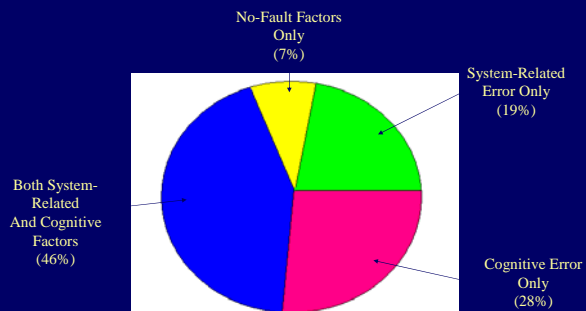


How often do we get it wrong?

15%

Why do physicians
make diagnostic errors?

Categories Contributing to Diagnostic Error
in 100 Patients *Graber et al., 2005*



30 Cognitive Errors

Aggregate bias	Gender bias	Psych-Out Errors
Anchoring	Hindsight bias	Representativeness
Ascertainment bias	Multiple alternatives	Search satisficing
Availability	Omission bias	Sutton's Slip
Base rate neglect	Order effects	Triage-Cueing
Commission bias	Outcome bias	Unpacking principle
Confirmation bias	Overconfidence	Vertical line failure
Diagnostic creep	Playing the odds	Visceral bias
Attribution error	Posterior prob.	Ying-Yang Out
Gambler's Fallacy	Premature closure	Zebra retreat

Sources of Affective Error

- Ambient, chronobiological, and other influences
- Specific affective biases/FAE/Countertransference
- Endogenous Disorders within the Physician
 - Mood disorders
 - Anxiety disorders
- Emotional Dysregulation in Physicians

Decision making in the brain (converging lines of evidence)

- Folklore: aphorisms, proverbs, philosophical
- Functional properties: descriptive, psychological
- Neuroanatomical correlates: brain lesion, fMRI
- Neurophysiological correlates: electrophysiology

Functional Properties

Clinical Decision Making

- Pattern recognition
- Hypothetico-deductive process
- Arborization
- Exhaustion
- Normative reasoning
- Coherence-Correspondence Theory
- Bounded rationality
- Flesh and blood decision making
- Heuristics and biases
- Subjective expected utility theory (SEU)
- Multiattribute utility theory (MAUT)
- Bayesian reasoning
- Naturalistic decision making (NDM)
- Unconscious Thought Theory

Intuitive

Experiential-inductive
Bounded rationality
Heuristic
Gestalt effect/ pattern recognition
Modular (hard-wired) responsivity
Recognition primed /thin slicing
Unconscious thinking theory
Insight

Analytical

Hypothetico-deductive
Unbounded rationality/Bayesianism
Normative reasoning
Robust decision making
Acquired, analytical, critical thought
Multiple branching, arborisation
Exhaustion strategy
Methodologicl

Dual processing accounts of reasoning, judgment, and social cognition

Evans JStBT
Ann Rev Psychol 2008

System 1 and System 2
(dual process theory)

	<u>System 1</u> (intuitive)	<u>System 2</u> (analytical)
Cognitive style	Heuristic	Systematic
Cognitive awareness	Low	High
Cost	Low	High
Automaticity	High	Low
Rate	Fast	Slow
Reliability	Low	High
Errors	Usually	Few
Effort	Low	High
Predictive power	Low	High
Emotional component	High	Low
Scientific rigour	Low	High

The Rational-Experiential Inventory (REI)

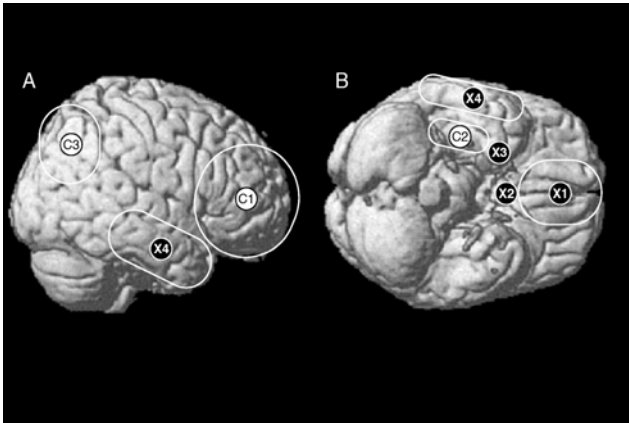
Epstein et al., 1996

Rational-Experiential Inventory

- Gender
- Age
- Personality
- Intellect

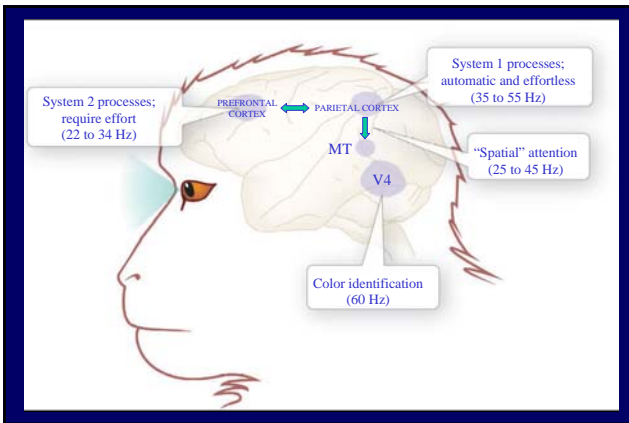
Neuroanatomical correlates

- **System 1** (X-System ; refleXive) ventromedial prefrontal cortex, nucleus accumbens, amygdala, and lateral temporal cortex
- **System 2** (C-System: refleCtive): prefrontal cortex, hippocampus and medial temporal lobe, posterior parietal cortex

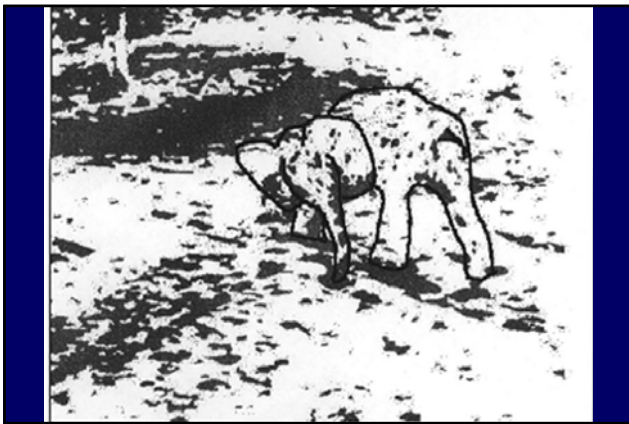


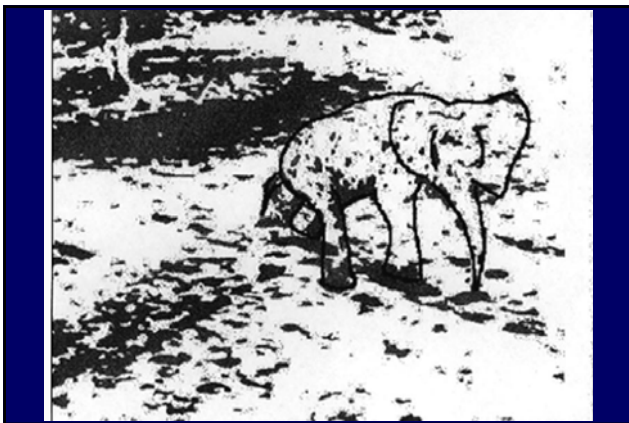
Neurophysiological correlates

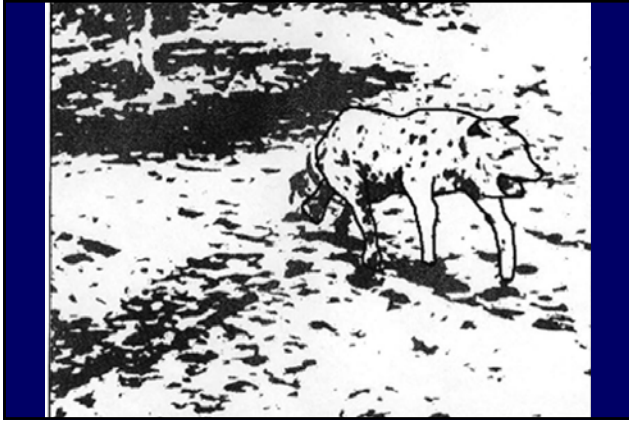
- **System 1:** rapid, automatic, effortless activity
Parietal -> Prefrontal (35-55 Hz)
- **System 2:** slow, effortful, deliberate searching
Prefrontal -> Parietal (22-34 Hz)









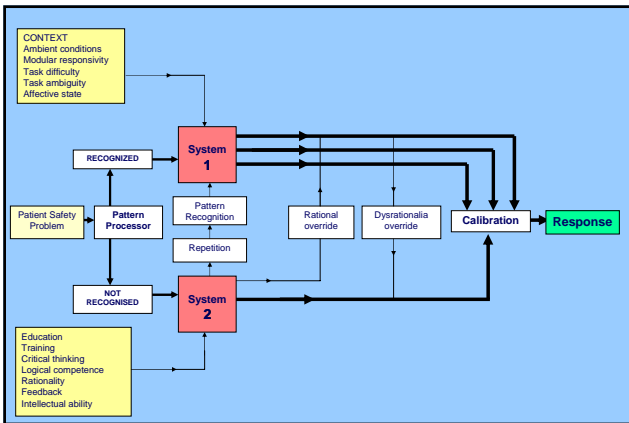








How can dual process theory be applied to clinical decision making?



Automaticity of System 1 Thinking

- From innate modules
- From repetitive processing in System 2

Innate Modules

- Fear
- Emotional perception
- Getting food and water
- Detecting/avoiding predators
- Finding a mate
- Raising children
- Social exchange

- Grammar acquisition
- Intuitive number
- Spatial relations
- Anticipatory motion
- Naïve physics
- Effort allocation and recalibration
- Semantic inference



Sources of input into System 1



Appetitive behaviours
Basic drives
Human instincts

Higher order modular activities

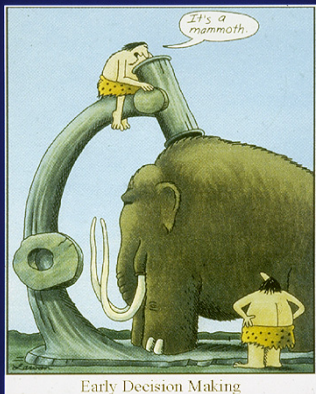
System 1

Responses

Repetitive reasoning in System 2

'...we carry Stone Age minds in modern skulls'

Cartwright, 2000



The power of System 1





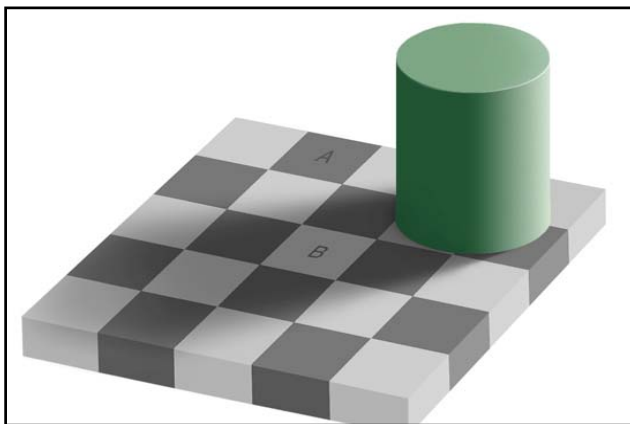


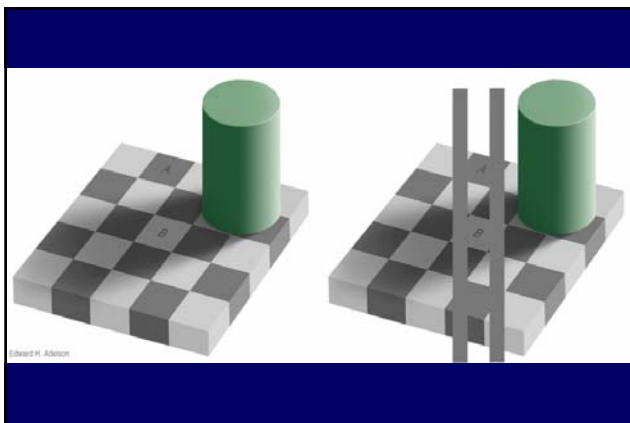


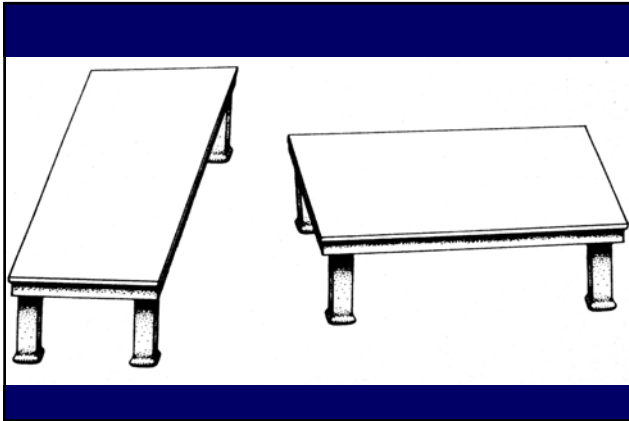












Swallowing saliva

Would you drink a glass of your own saliva?

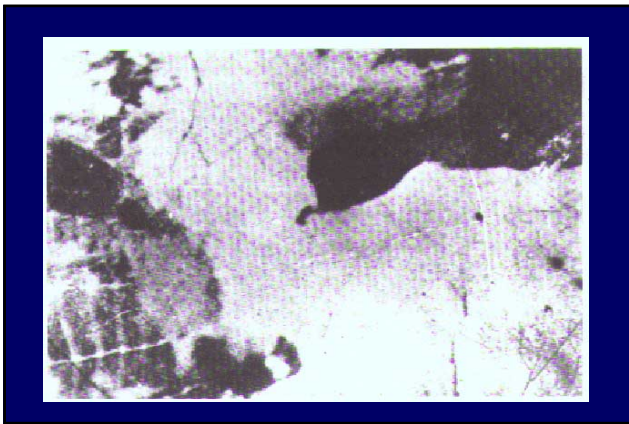


The emotion of disgust (System 1)
overcomes rational input (System 2)
-a form of dysrationalia

RED	GREEN	BLUE	YELLOW	PINK
ORANGE	BLUE	GREEN	BLUE	WHITE
GREEN	YELLOW	ORANGE	BLUE	WHITE
BROWN	RED	BLUE	YELLOW	GREEN
PINK	YELLOW	GREEN	BLUE	RED

RED	GREEN	BLUE	YELLOW	PINK
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GREEN	YELLOW	ORANGE	BLUE	WHITE
BROWN	RED	BLUE	YELLOW	GREEN
PINK	YELLOW	GREEN	BLUE	RED



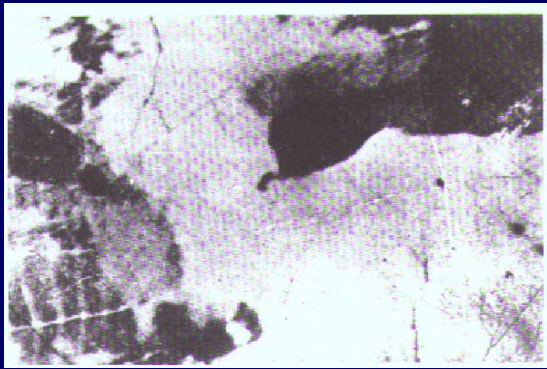


What context is this image from?

- Is it a map?
- Is it a view from 10,000 feet?
- Is it a person or thing?
- Is it something I have seen before?
- Is it meaningless?

One learns the basic patterns





Medical System 1 overrides of System 2

- Lack of awareness of bias in decision making
- Knowledge implementation
- Minimizing impact of fatigue/sleep deprivation on performance

Where context really counts

- Morbidity and Mortality Rounds
- Critical incident review / Root cause analysis
- Medico-Legal cases

How do we get clinical decision making into the patient safety arena?

- Raise awareness of importance of decision making
- Teach dual process theory
- Teach the main cognitive and affective biases
- Teach cognitive and affective forcing functions
- Promote critical thinking
- Promote reflective practice
- Promote use of cognitive aids
- Know the conditions that compromise decision making
- Know that everything is always in context

