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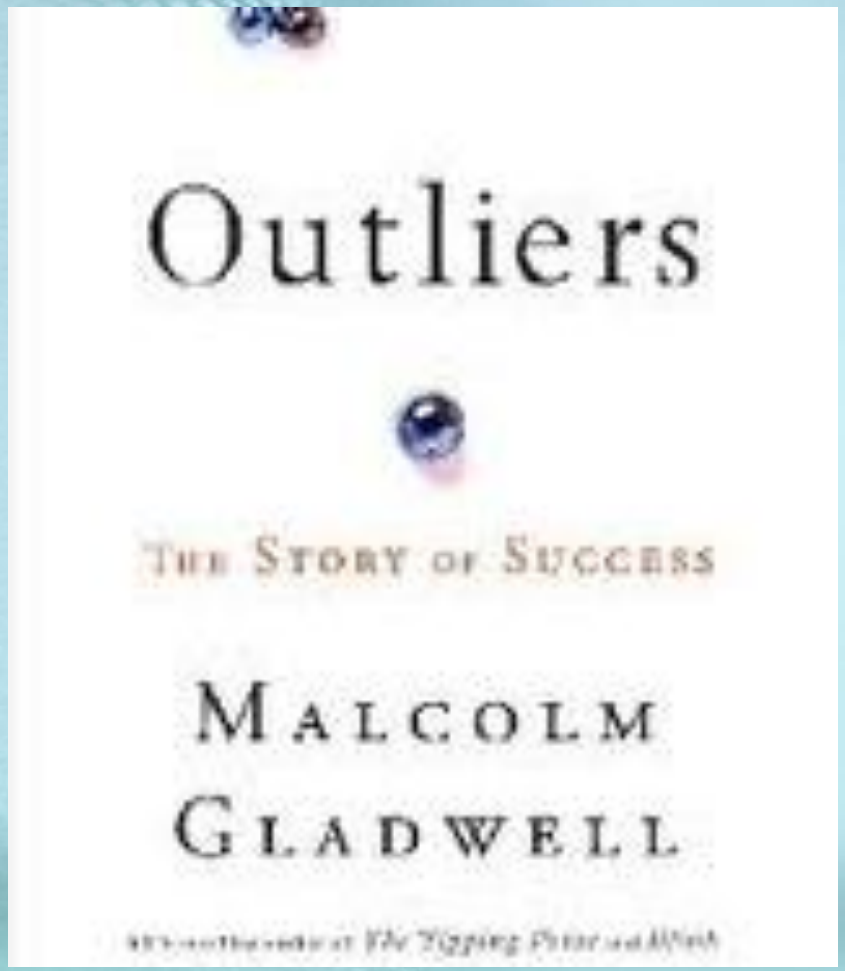
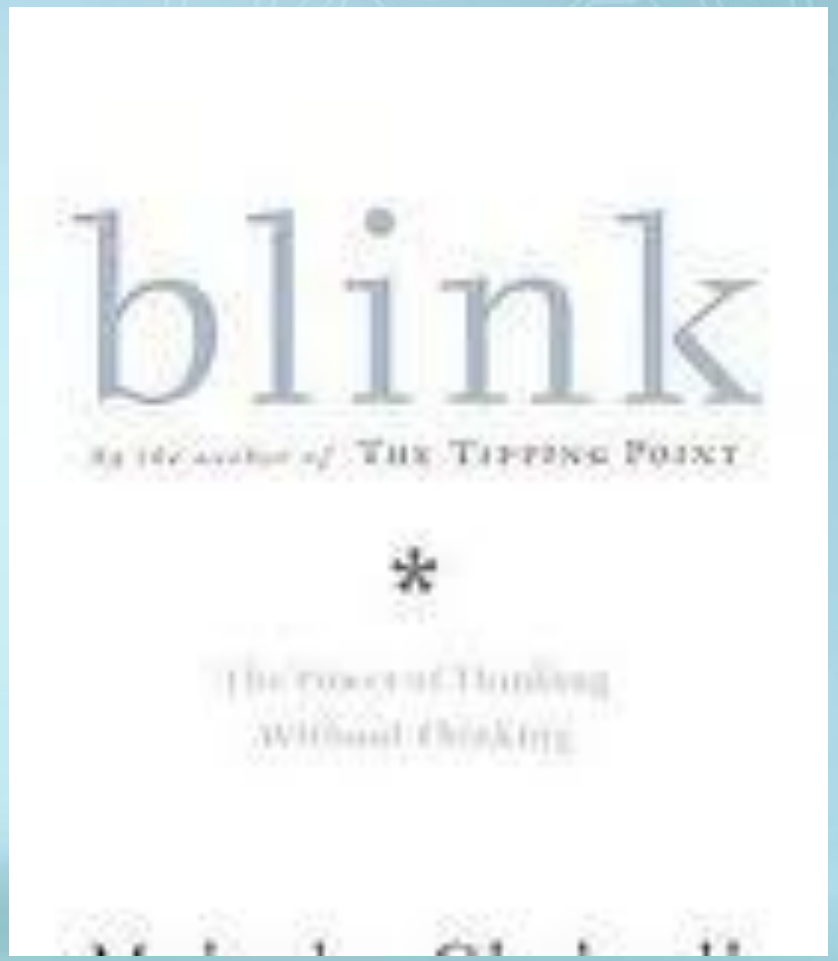
Internal Medicine | Doctors for Adults

Learning to think like a Doctor

Robert M. Centor, MD, FACP

Chair-Elect, Designee, ACP Board of Regents


Outliers
The Story of Success
Malcolm
Gladwell


blink
The Tipping Point
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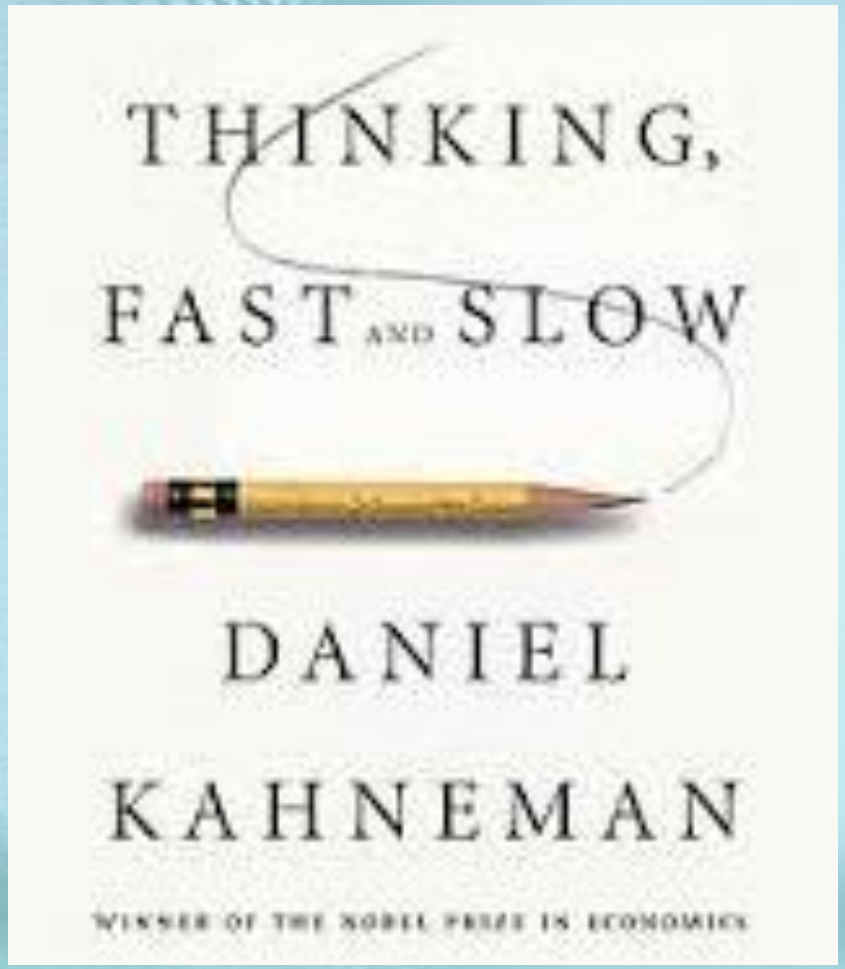

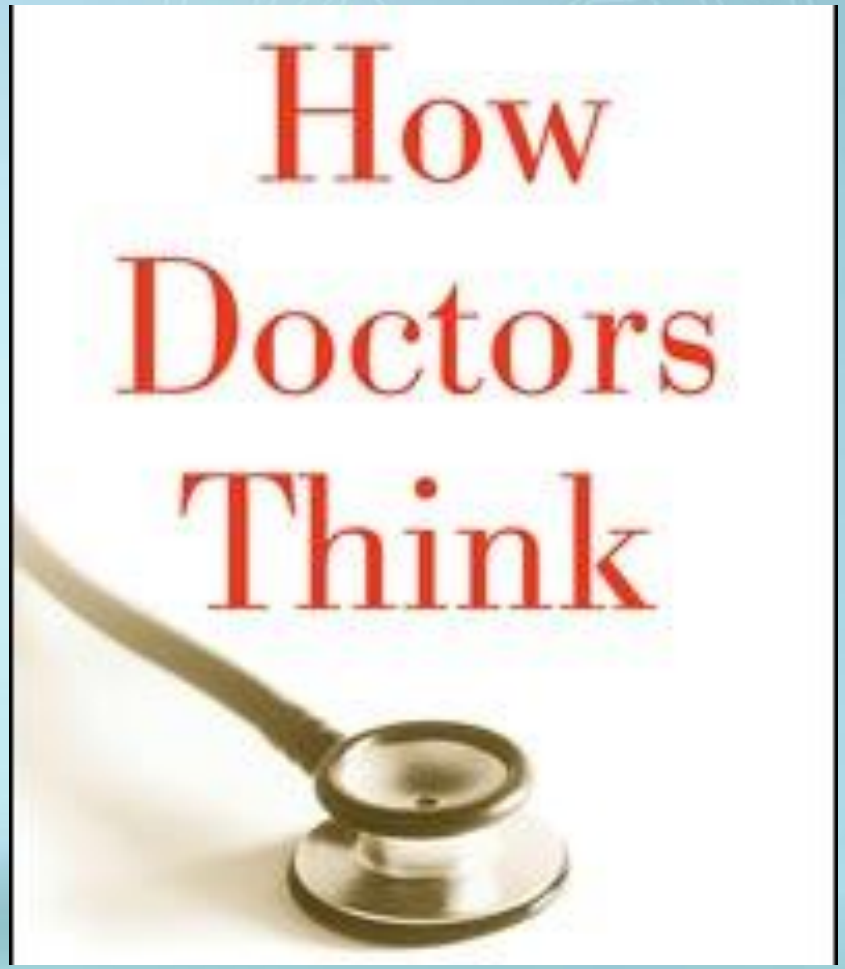

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Acknowledgements

- Castiglioni, Roy and colleagues – WAR research
- The CPS team
- Society to improve diagnosis in medicine

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Why clinical reasoning

- Kassirer:
  - Academic Medicine July, 2010 “Teaching Clinical Reasoning”
- WAR research
  - Value of attendings sharing their thought processes

Diagnosis is Job #1

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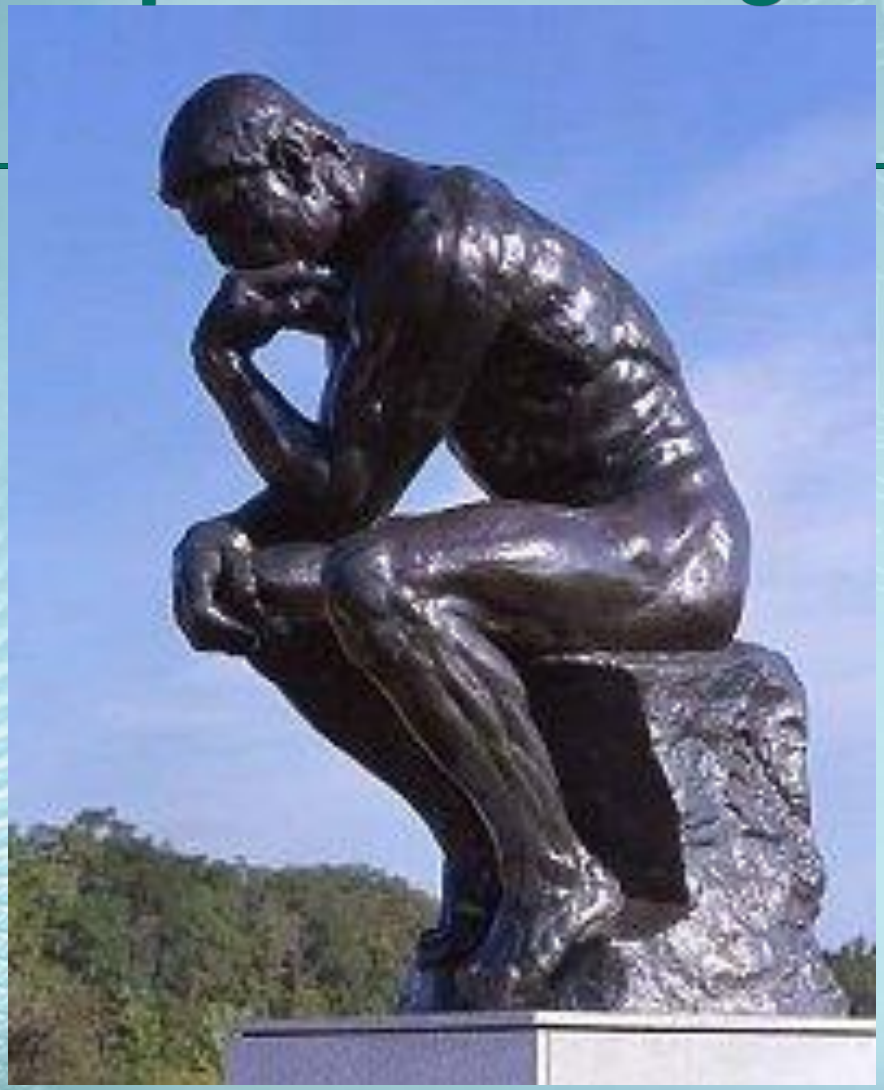
Requires thinking



Problem Representation

… early step is the creation of the mental abstraction or "problem representation," usually as a one-sentence summary defining the specific case in abstract terms

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Patient #1

The patient's story

- 47-year-old man presents to emergency department with right elbow pain
- No PMH, no meds
- Went to bed at 10:30 pm, awoke at 2:17 am with severe right elbow pain, elbow hot and exquisitely tender
- No previous similar episodes
- Arthrocentesis: 140k WBC with no organisms on gram stain

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Two problem representations

SENIOR RESIDENT	ATTENDING PHYSICIAN
47-year-old man with a hot, right elbow and pus in the joint.	

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Two problem representations

SENIOR RESIDENT	ATTENDING PHYSICIAN
47-year-old man with a hot, right elbow and pus in the joint.	■ 47-year-old man with SUDDEN ONSET of a hot, right elbow and pus in the joint, but a negative gram stain.

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Illness scripts

- Features present (or absent) that we use to match against our problem representation
- Example – CAP – productive cough, fever, sweats &/or rigors, abnormal chest exam, typical CXR – short duration

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Implications from problem representation

SENIOR RESIDENT	ATTENDING PHYSICIAN
47-year-old man with a hot, right elbow and pus in the joint.	
Therefore – septic arthritis	

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Implications from problem representation

SENIOR RESIDENT	ATTENDING PHYSICIAN
47-year-old man with a hot, right elbow and pus in the joint.	47-year-old man with SUDDEN ONSET of a hot, right elbow and pus in the joint, but a negative gram stain.
Therefore – septic arthritis	Therefore, must consider crystalline arthritis.

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Denouement

- The patient had pseudogout.
- The resident focused solely on the synovial fluid WBC
- He did not believe that crystalline arthritis could cause that high WBC
- The attending focused on the negative gram stain and sudden onset. The WBC did not influence decision making.
- Both used system 1, the attending had a more refined illness script

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The Dual Process theory of cognition

- In making diagnoses (really diagnostic decisions) we start with system 1
- When we think that system 1 is failing, we resort to system 2
- So what do we mean by system 1 and system 2

Dual process theory

System 1 - Experiential

- Intuitive
- Tacit
- Experiential
- Pattern recognition
- Matching against illness script

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Dual process theory

System 1 - Experiential

- Intuitive
- Tacit
- Experiential
- Pattern recognition
- Matching against illness script

System 2 - Analysis

- Analytic
- Deliberate
- Rational
- Careful analysis
- Consider a wide differential

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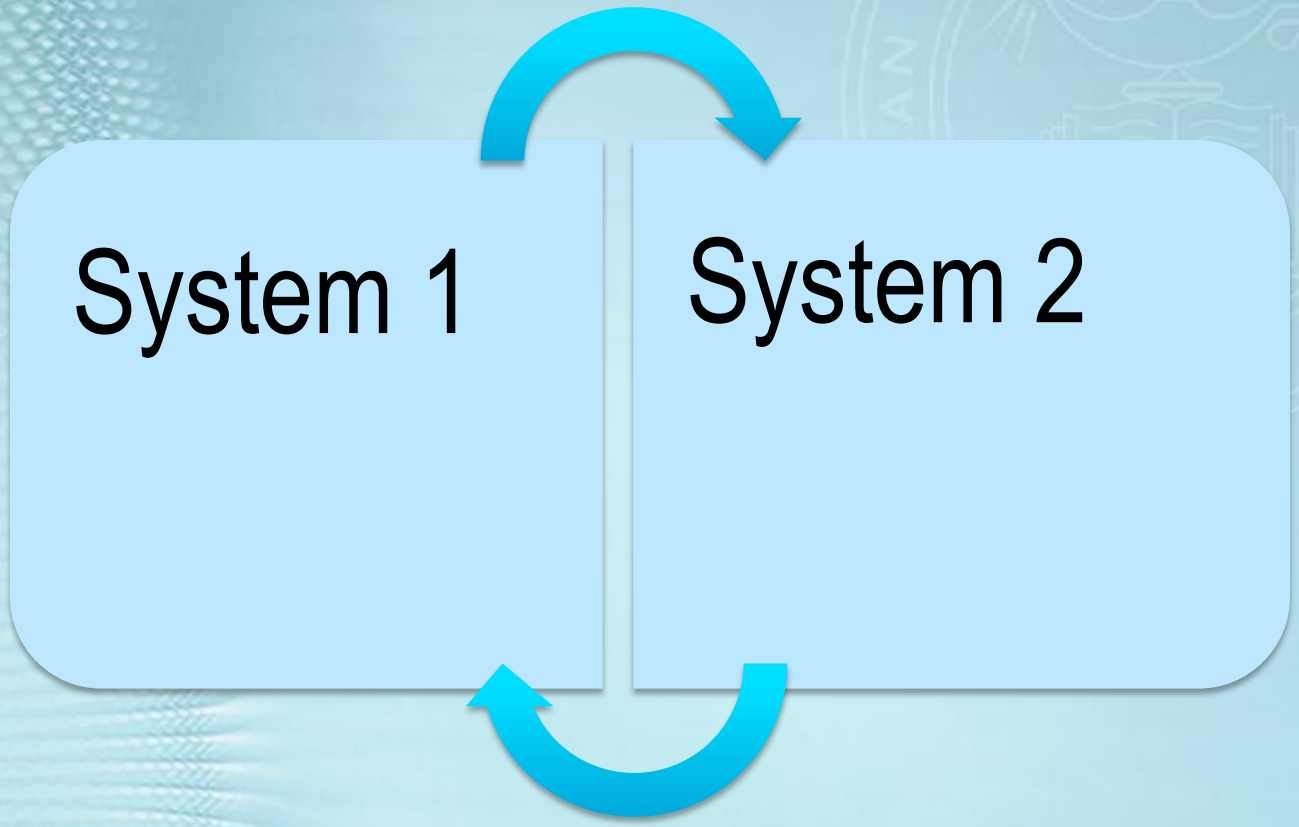
Not Independent!!!



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Hypercalcemia patient

- 50-year-old male veteran presents with chest pain. Sent for stress test, but the lab finds that he has tachycardia. Labs include Calcium of 11.5.
- The patient is volume contracted because of 5 liters daily ileostomy losses (colectomy while in service for Crohn's colitis)
- With repeated testing patient consistently has an elevated Calcium

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Problem representation

- 50-year-old man with chest pain, tachycardia, markedly increased ileal output (ileostomy) and an elevated calcium level

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System 1 thinking

- Many students and residents just guess – usually focus on the hypercalcemia and pick cancer related or hyperparathyroidism – common causes
- Unfortunately, they do not develop problem representation
- They focus on one lab test, rather than the entire patient

System 2 thinking

- This diagnosis is obtuse. Most correct answers come from a careful consideration of the entire differential diagnosis
- As one goes through the differential diagnosis, the correct answer (hyperthyroidism) becomes a consideration
- Few if any learners include hyperthyroidism in their initial differential diagnosis
- We need system 2 when the correct diagnosis not clear.

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Systems 1 & 2

Going back and forth

- Most diagnostic decisions represent system 1 thinking
- We only move to system 2 when we must
- Experts do more with system 1 than can experienced non-experts

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System 1 for experts

- Illness scripts with greater granularity
- More attention to “red flags”

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Exercise

- Develop your illness script for pneumococcal pneumonia
- Develop a script for left heart systolic dysfunction with pulmonary edema
- Develop your illness script for viral pharyngitis

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Challenges – Heuristics and Biases

- Kahneman and Tversky
- Skeptical attitude towards expertise and expert judgment
- Focuses more on errors
- Heuristic – shortcuts or “rules of thumb”
- While heuristics often work, they do have risks

Classic heuristics that lead to errors

- Anchoring heuristic – focusing too much on 1 piece of information
  - The synovial fluid WBC in our patient
- Availability heuristic – influenced by the last patient you saw, or a particularly memorable patient
  - My estimate of risk of allopurinol causing TEN
- Premature closure
  - Often related to anchoring heuristic

- ***You have a solution that you like, but you are choosing to ignore anything that you see that doesn't comply with it.*** **"** – from the Blind Banker – Sherlock Season 1 Episode 2

Now for a different construct

- The Naturalistic Decision Making movement
- Sources of Power – Gary Klein

Naturalistic decision making

- How do experts get it right?
- Especially high stakes, uncertainty and time pressure
- Firefighter studies

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Recognition-Primed Decision Making

RPD

- Approach 1 – use pattern recognition to match the problem representation with an illness script
  - Experts note “red flags” or discomforts when 1 or more key features do not match
  - Experts have more completely developed illness scripts

Recognition-Primed Decision Making

RPD

- Approach 1 – use pattern recognition to match the problem representation with an illness script
  - Experts note “red flags” or discomforts when 1 or more key features do not match
  - Experts have more completely developed illness scripts
- Approach 2 – related to hypothesis testing
  - Search for missing data
  - Example – examine synovial fluid for crystals
  - More system 2 – but then reverts to system 1 when data collected

More RPD

- Approach 3 – mentally simulate the consequences of adopting the diagnosis
  - Klein calls this a “premortem” examination
  - Mental simulation can highlight concerns – and sometimes leads to re-evaluation
  - Analagous to – what diagnosis can we not afford to miss!

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An example

The Tyranny of a Term

- 29-year-old female – fever and cough
- CXR

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Treatment

- Azithromycin for presumed community acquired pneumonia

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One week later

- No improvement
- Admitted to hospital
- Treated for CAP with moxifloxacin
- CXR

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2 weeks after discharge

- Continued cough and fever
- ID consulted
- Repeat CXR

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ID consultant

TAKES a good HISTORY

- 2 months of symptoms
- Night sweats
- 9 pound weight loss
- Lives in a recovery home for drug abusers
- Another resident has a bad cough

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Errors

Diagnosis = TB

- Anchoring – premature closure
- Incomplete illness script
- Inadequate data collection

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Understanding cognition and medical education

- Learners want to learn how and why we make decisions
- Facts are retrievable
- Therefore we must teach diagnostic reasoning every day on rounds, consults and in the clinic
- Wisdom trumps knowledge

What should we be teaching?

- Remember that experts have more refined illness scripts and problem representation
- Therefore, we are trying to help our learners know when System 1 is adequate and when to move to System 2
- As learners progress they should spend more time in System 1
- They will get there faster if we are explicit in explaining the clues and cues