CLINICAL JUDGEMENT & REASONING- CAN IT BE TAUGHT?

DR DAVID NICHOLL
SANDWELL & WEST BIRMINGHAM NHS TRUST
@TOSSTUDYGROUP

RCP CONFERENCE, HARROGATE 2016
BACKGROUND

• Gordon Caldwell-

• Medical errors, misdiagnosis and malpractice – when clinical evaluation goes wrong

• Andrew Elder

• 21st century physical examination – what to teach and how to teach it
STRUCTURE TO THIS TALK

• The link between error, examination & clinical reasoning
• 2 clinical cases- one you know about, one you don’t
• Some useful teaching resources on clinical reasoning
• The future- a risk and a benefit?
MILLER’S PYRAMID

Neurological education

Figure 1  Miller’s pyramid for assessment of clinical competence.

Figure 3  Progression through Miller’s pyramid, with reduction of neurophobia with increasing expertise.
THE FALLING MILLER’S PYRAMID

Figure 2  Use of Miller’s pyramid with assessment of eye movements as an example.
<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Risks of missing the diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subarachnoid haemorrhage (SAH)</strong></td>
<td>Although only ~2% of SAH patients have a normal CT head scan initially, there are risks with a missed diagnosis: case fatality rate ~50% &amp; mean medicolegal cost of a claim for damages in SAH in the UK stands ~ £211,000.</td>
</tr>
<tr>
<td>Ischaemic Stroke</td>
<td>Plain film CT scan can be normal in initial stages, posterior circulation strokes are difficult to visualise on CT.</td>
</tr>
<tr>
<td>Idiopathic intracranial hypertension</td>
<td>Imaging normal but potential for irreversible sight loss if not managed appropriately²</td>
</tr>
<tr>
<td>Neuromuscular disorders</td>
<td>Initial presentation of both myasthenia gravis and Guillain-Barré syndrome may (in early phases) be misdiagnosed as a brain stem stroke or possible cord compression (mortality rate of 8.7% and 7.7% respectively in those patients requiring intensive care.²³)</td>
</tr>
<tr>
<td>Functional disorders</td>
<td>Risk is from delayed diagnosis, over-investigation and iatrogenic harm.²⁴</td>
</tr>
</tbody>
</table>

*Table 1: Caveats for interpreting ‘normal’ imaging*

- **Are the skills of neurological assessment in need of resuscitation?**
- **Nicholl DJ.**
WHY DO A&E KEEPING MISSING ‘SAH’?

Dual process theory describes how humans have two distinct approaches when it comes to decision making.

- A fast, pattern recognising, intuitive way of thinking (type 1)
- A slow, controlled but high effort way of thinking (type 2)

<table>
<thead>
<tr>
<th>Type 1 thinking</th>
<th>Type 2 thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intuitive, uses mental shortcuts (heuristics)</td>
<td>Analytical, systematic</td>
</tr>
<tr>
<td>Automatic, subconscious</td>
<td>Deliberate, conscious</td>
</tr>
<tr>
<td>Fast, effortless</td>
<td>Slow, effortful</td>
</tr>
<tr>
<td>Low/variable reliability</td>
<td>High/consistent reliability</td>
</tr>
<tr>
<td>Vulnerable to error</td>
<td>Less prone to error</td>
</tr>
<tr>
<td>Highly affected by context</td>
<td>Less affected by context</td>
</tr>
<tr>
<td>High emotional involvement</td>
<td>Low emotional involvement</td>
</tr>
<tr>
<td>Low scientific rigour</td>
<td>High scientific rigour</td>
</tr>
</tbody>
</table>
A modified universal model of diagnostic reasoning

- Hard wiring
  - Ambient conditions / context
  - Task characteristics
  - Age and experience
  - Affective state
  - Gender and personality type

- Recognised
- Illness presentation
- Not recognised

- Type 1 processes
  - Pattern recognised
  - Categorical reasoning
  - Diagnosis

- Type 2 processes
  - Heuristics
  - Inductive reasoning
  - Abductive reasoning
  - Deductive reasoning
  - Categorical reasoning

- Diagnosis
- Type 1 override
- Working diagnosis
- Refinement
- Final diagnosis

- Something doesn’t fit
  - Different from illness script
  - Not following predicted clinical course
  - Doubt from colleague

- Hypothesis generation
- Hypothesis modification

- Intellectual ability
- Education
- Training
- Critical thinking
- Logical competence
- Rationality
THE TOS STUDY

BMJ Qual Improv Report 2015;4: doi:10.1136/bmjquality.u209610.w4063

BMJ Quality Improvement Programme

Improving the likelihood of neurology patients being examined using patient feedback

Jason Philip Appleton, Andreea Ilinca, Arne Lindgren, Andreas Puschmann, Majed Hbahbihi, Khurram A. Siddiqui, Rajith de Silva, Matthew Jones, Richard Butterworth, mark willmot, Tom Hayton, Michael Lunn, David Nicholl

Author Affiliations

Correspondence to
Jason Philip Appleton jasonappleton@doctors.org.uk

Received 30 September 2015
Revision requested 23 October 2015
Revised 3 November 2015
Published 6 November 2015

Abstract
We aimed to establish whether recall of elements of the neurological examination can be improved by use of a simple patient assessment score.
Appleton et al, 2015

% indicate proportion of patients who recall being examined

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T</strong></td>
<td>264</td>
<td>119</td>
</tr>
<tr>
<td><strong>%</strong></td>
<td>64.86</td>
<td>29.24</td>
</tr>
<tr>
<td><strong>Post</strong></td>
<td>298</td>
<td>149</td>
</tr>
<tr>
<td><strong>%</strong></td>
<td>76.21</td>
<td>38.11</td>
</tr>
<tr>
<td><strong>p Value</strong></td>
<td>p&lt;0.001</td>
<td>p=0.009</td>
</tr>
</tbody>
</table>
SO THERE IS FAIRLY WIDESPREAD EVIDENCE THE BASICS AREN'T BEING DONE

Evidence based neuro exam via @TOSStudyGroup
A CASE.....

In the US.....“Of 350 patients in an emergency department, whose symptoms would necessitate ophthalmoscopy (predominantly headache), only 14% of patients were examined with an ophthalmoscope.”

.....in Nicholl & Appleton JNNP 2015
The backup of blood flow could have caused a stroke or hemorrhage, according to Greenwald.

"Imagine this vein, where all the cerebral spinal fluid inside the head and spine no longer flows through this area," he said. "You get a big back up and that itself could cause a stroke. In the long-term ... the venous system can’t get the blood out of the brain. It's like a Lincoln Tunnel back up."

A transverse sinus thrombosis is a clot arising in one of the major veins that drains the brain. It is an uncommon but serious disorder.

According to Greenwald, the clot was most likely caused by dehydration brought on by the flu, perhaps exacerbated by a concussion she recently suffered.

"The only time I have seen it happen is when people are severely dehydrated and it causes the blood to be so thick that it causes a clot in the area," said Greenwald. "It's one of the long-term effects of a viral illness."

Drs. Lisa Bardack of the Mt. Kisco Medical Group and Dr. Gigi El-Bayoumi of George Washington University discovered the clot during a routine follow-up MRI on Sunday.

"This is a clot in the vein that is situated in the space between the brain and the skull behind the right ear," they said in a statement today. "It did not result in a stroke, or neurological damage. To help dissolve this clot, her medical team began treating the secretary with blood thinners. She
July 28, 2015

Healthcare Statement
RE: Hillary Rodham Clinton
Date of birth: 10/26/47

This letter summarizes the health history and current medical evaluation of Hillary Rodham Clinton. I am an internist and the Chairman of the Department of Medicine at the Mount Kisco Medical Group in Mount Kisco, New York. I have served as Mrs. Clinton's personal physician since 2001, during which time I have been involved in all aspects of her healthcare.

Mrs. Clinton is a healthy 67-year-old female whose current medical conditions include hypothyroidism and seasonal pollen allergies. Her past medical history is notable for a deep vein thrombosis in 1998 and in 2009, an elbow fracture in 2009 and a concussion in 2012.

In December of 2012, Mrs. Clinton suffered a stomach virus after traveling, became dehydrated, fainted and sustained a concussion. During follow up evaluations, Mrs. Clinton was found to have a transverse sinus venous thrombosis and began anticoagulation therapy to dissolve the clot. As a result of the concussion, Mrs. Clinton also experienced double vision for a period of time and benefited from wearing glasses with a Fresnel Prism. Her concussion symptoms, including the double vision, resolved within two months and she discontinued the use of the prism. She had follow-up testing in 2014 which confirmed the resolution of the effects of the concussion as well as resolution of the sinus venous thrombosis.
• So assuming you DO take a history and examine the patient, how can clinical reasoning help & how can we teach it?
CLINICAL REASONING - A DEFINITION

• The thinking and decision-making processes associated with clinical practice.

• The core elements include: evidence-based clinical skills, use & interpretation of diagnostic tests, understanding cognitive biases, human factors, metacognition (thinking about thinking), and patient-centred evidence-based medicine.

• Errors in reasoning play a significant role in diagnostic error.

• Sound clinical reasoning is directly linked to patient safety and quality of care.

The elements involved in clinical reasoning, underpinned by a knowledge of basic and clinical sciences.
Fig 2
Clinical reasoning in multiple problem spaces: factors influencing clinical decision making
The Institute of Medicine (IOM) released a report in 1999 entitled “To Err is Human: Building a Safer Health System”. The report stated that errors cause between 44,000 and 98,000 deaths every year in American hospitals, and over one million injuries.

### Box 2

**Root causes of diagnostic error**

<table>
<thead>
<tr>
<th>Error category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>No fault</td>
<td>Unusual presentation of a disease</td>
</tr>
<tr>
<td></td>
<td>Missing information</td>
</tr>
<tr>
<td>System errors</td>
<td>Technical e.g. unavailable tests/results</td>
</tr>
<tr>
<td></td>
<td>Organisational e.g. poor supervision of junior staff, error-prone processes, impossible workload</td>
</tr>
<tr>
<td>Human cognitive error</td>
<td>Faulty data gathering</td>
</tr>
<tr>
<td></td>
<td>Inadequate reasoning</td>
</tr>
</tbody>
</table>
Textbooks present 15 traditional physical findings of pneumonia *(left)*, along with the assumption that each finding has similar diagnostic weight. The evidence-based method *(right)*, based on study of actual patients, shows that 5 findings accurately increase probability of pneumonia, and only 1 finding decreases it.
Likelihood ratios – definition and examples

Likelihood ratio = \[
\frac{\text{Probability of finding}}{\text{Probability of finding}}
\text{in patients with disease}
\text{in patients without disease}
\]

Examples:

(1) *Detecting pneumonia:* In patients with acute respiratory complaints, "percussion dullness" is found in 18% of patients with pneumonia and in 6% of patients with another cause of respiratory distress. Therefore,

\[
LR \left( \text{for percussion dullness} \right) = \frac{18}{6} = 3.0
\]
• https://medicinainternaucv.files.wordpress.com/2013/02/jama-the-rational-clinical-examination.pdf
Chapter 10

THE BOTTOM LINE

Physicians frequently disagree about the presence or absence of individual findings on chest examinations of patients with respiratory illnesses, including community-acquired pneumonia.

Individual symptoms and signs have inadequate test characteristics to rule in or rule out the diagnosis of pneumonia. Decision rules that use the presence or absence of several symptoms and signs to modify the probability of pneumonia are available, the simplest of which requires the absence of any vital sign abnormalities to exclude the diagnosis. There are no combinations of medical history and physical examination findings that confirm the diagnosis of pneumonia. If diagnostic certainty is required in the treatment of a patient

pneumonia was consistently higher than 20% for all cases, increasing to more than 60% for bacteremic cases. Since the introduction of antibiotics, no one has reported results from large-scale studies comparing antibiotic therapy to nonantibiotic therapy for patients with pneumonia. As a result, such therapy is universally recommended and has become a standard of care for all patients with pneumonia. No such study.
CHAPTER 34

Does This Patient Have Myasthenia Gravis?

Katalin Scherer, MD
Richard S. Bedlack, MD, PhD
David L. Simel, MD, MHS

CLINICAL SCENARIOS

CASE 1 A 45-year-old man has a 2-month history of fluctuating double vision, a droopy right eye that improves with rest, and a complaint that food gets stuck halfway down. Your examination confirms severe right eyelid ptosis that dramatically improves with rest. His right eye adduction and up gaze are markedly impaired. The left eye demonstrates complete horizontal ophthal-moplegia. The limb muscle strength and reflexes are normal. You wonder whether there is an accurate and clinically useful bedside test to help confirm the diagnosis of myasthenia gravis.

CASE 2 A 69-year-old man has a 2-month history of intermittent spells of double vision, generalized weakness that worsens toward the evening, and unspecified dizziness. Although he has normal strength and reflexes and no ophthalmoplegia, he does report fluctuating diplopia during the examination. As in case 1, you must decide whether to perform additional bedside tests, obtain electrodiagnostic or acetylcholine antibody testing, or pursue a broader diagnostic evaluation of the various causes of dizzy spells and fatigue.
### Table 34-1  Characteristics of Studies That Include Patients With Myasthenia Gravis, as Well as Controls

<table>
<thead>
<tr>
<th>Source, y</th>
<th>Prospective/Consecutive</th>
<th>Patient Selection</th>
<th>Patients With Myasthenia Gravis, No./ Overall (%)</th>
<th>Diagnostic Criteria for Myasthenia Gravis</th>
<th>Symptom or Sign Studied (Inclusion Criteria)</th>
<th>Enrolment Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Küblis et al., 2000</td>
<td>Prospective/Consecutive</td>
<td>Consecutive</td>
<td>10/25 (40)</td>
<td>ACHR Ab or SFEMG</td>
<td>Ice test, rest test (ptosis)</td>
<td>Neuro-ophthalmology clinic</td>
</tr>
<tr>
<td>Eras et al., 1994</td>
<td>Prospective/Consecutive</td>
<td>Unclear</td>
<td>12/27 (44)</td>
<td>Overall clinical impression</td>
<td>Ice test, edrophonium, or neostigmine test (ptosis)</td>
<td>Neurology clinic</td>
</tr>
<tr>
<td>Zaplinksi et al., 2003</td>
<td>Prospective/Consecutive</td>
<td>Unclear</td>
<td>5/10 (50)</td>
<td>ACHR Ab and RNS</td>
<td>Ice test, edrophonium test (ptosis)</td>
<td>Neurology clinic</td>
</tr>
<tr>
<td>Sethi et al., 1987</td>
<td>Prospective/Consecutive</td>
<td>Unclear</td>
<td>10/17 (59)</td>
<td>Overall clinical impression</td>
<td>Ice test, edrophonium test (ptosis)</td>
<td>Neurology clinic</td>
</tr>
<tr>
<td>Orel et al., 1991</td>
<td>Prospective/Consecutive</td>
<td>Unclear</td>
<td>42/66 (62)</td>
<td>Edrophonium test</td>
<td>Sleep test (ptosis or ophthalmoplegia)</td>
<td>Neuro-ophthalmology clinic</td>
</tr>
<tr>
<td>Golink et al., 1999</td>
<td>Prospective/Consecutive</td>
<td>Unclear</td>
<td>20/40 (50)</td>
<td>ACHR Ab or edrophonium test</td>
<td>Ice test (ptosis)</td>
<td>Neuro-ophthalmology clinic</td>
</tr>
<tr>
<td>Ellis et al., 2000</td>
<td>Prospective/Consecutive</td>
<td>Unclear</td>
<td>15/30 (50)</td>
<td>Overall clinical impression</td>
<td>Ice test (ptosis or abnormal extraocular movements)</td>
<td>Ophthalmology clinic</td>
</tr>
<tr>
<td>Latchavankul et al., 2001</td>
<td>Prospective/Consecutive</td>
<td>Unclear</td>
<td>20/40 (50)</td>
<td>EMG or neostigmine test</td>
<td>Ice test (ptosis)</td>
<td>Ophthalmology clinic</td>
</tr>
<tr>
<td>Osborn and Kaplan, 1952</td>
<td>Prospective/Consecutive</td>
<td>Unclear</td>
<td>15/50 (30)</td>
<td>Overall clinical impression</td>
<td>Edrophonium test</td>
<td>Neurology clinic, hospital</td>
</tr>
<tr>
<td>Yee et al., 1976</td>
<td>Prospective/Consecutive</td>
<td>Unclear</td>
<td>10/18 (56)</td>
<td>Edrophonium or neostigmine test</td>
<td>Gu Werner movements (ophthalmoplegia)</td>
<td>Ophthalmology clinic</td>
</tr>
<tr>
<td>Osher and Griggs, 1979</td>
<td>Prospective/Consecutive</td>
<td>Consecutive</td>
<td>25/275 (9)</td>
<td>Overall clinical impression with 1 positive test result</td>
<td>Peak sign (pupilcular ocular fatigue)</td>
<td>Ophthalmology clinic</td>
</tr>
<tr>
<td>Nicholson et al., 1997</td>
<td>Prospective/Consecutive</td>
<td>Consecutive</td>
<td>46/75 (61)</td>
<td>Overall clinical impression with 2 positive test results</td>
<td>Edrophonium test</td>
<td>Neurology clinic</td>
</tr>
<tr>
<td>Batocchi et al., 2000</td>
<td>Prospective/Consecutive</td>
<td>Consecutive</td>
<td>39/72 (54)</td>
<td>ACHR Ab + SFEMG</td>
<td>Edrophonium or pyridostigmine test</td>
<td>Ophthalmology clinic</td>
</tr>
<tr>
<td>Paclu et al., 2000</td>
<td>Prospective/Consecutive</td>
<td>Consecutive</td>
<td>29/69 (42)</td>
<td>Overall clinical impression</td>
<td>Food in mouth after swallowing, unintelligible speech after provoc</td>
<td>Ophthalmology clinic</td>
</tr>
<tr>
<td>Weijnen et al., 2000</td>
<td>Unclear</td>
<td>Unclear</td>
<td>60/80 (75)</td>
<td></td>
<td></td>
<td>Neurology clinic</td>
</tr>
</tbody>
</table>
IN THE REAL WORLD…

One of the characteristics of a medical professional is ‘judgement in the face of uncertainty’ (RCP London, 2005) (aka Hickam’s dictum)

• 2013- 45 year old woman referred as SOB to neurology ?MG

• PMH- Bad asthma

• 2002- chest pain- Diagnosed thymoma;

• 2007- pleural mets

• EMG- myasthenia; AChR a’body 176 nmol

**But is her dyspnoea due to her asthma or MG?**
45 Y OLD WOMAN
HISTORY

• 8y ago malignant thymoma with pleural mets, asthma, SOB and +AchR antibodies- MG or asthma?
  • -ask re diurnal variation, wheeze (LR+ 36)
  • LFTs- obstructive vs restrictive

• May 2015- worse, SOB, dysarthria, fatiguable proximal weakness
  • MG relapse- admit (end of June 2015)
  • Started Pyridostigmine & Pred- improved.
  • BUT on last day- mentions THIS
WHAT DO YOU DO?

1) FOB HER OFF
2) KEEP HER IN
3) REVIEW IN 2 WEEKS

• Anchoring heuristic
  • “relying on initial impressions and not adjusting diagnostic probabilities with new data”
• Google vs Dr Nicholl
  • “myokymia + malignant thymoma” = 1st hit
• Blind obedience (SpR)
  • “undue deference to authority”
WHAT ACTUALLY HAPPENED…

• Came back to clinic 2 weeks later
• “still got those spasms”
• Arranged a CT thorax- shows recurrence
• VGKC antibodies -ve
• EMG (incomplete) normal (Occam’s razor)
• if a test to detect a disease whose prevalence is 1:1000 has a false positive rate of 5%, what is the chance that a person found to have a positive result actually has the disease, assuming you know nothing about the person's symptoms or signs?

• Just under half replied with the answer 95%.

(from ABC of Clinical Reasoning, 2016)

<table>
<thead>
<tr>
<th></th>
<th>Disease</th>
<th>No disease</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual</td>
<td>1</td>
<td>999</td>
<td>1000</td>
</tr>
<tr>
<td>Positive test</td>
<td>1</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Negative test</td>
<td>0</td>
<td>949</td>
<td>949</td>
</tr>
</tbody>
</table>

The question tells us that 50/1000 people will have a false positive result. But only 1/1000 has the disease. This means the chance of having a positive result and actually having the disease is 1 out of 51 – or 2%. This example illustrates the importance of understanding prevalence (or the denominator in probability terms).
How Neurologists Think
A Cognitive Psychology Perspective on Missed Diagnoses

Barbara G. Vickrey, MD, MPH,¹,² Martin A. Samuels, MD,³ and Allan H. Ropper, MD³

Physicians use heuristics or shortcuts in their decision making to help them sort through complex clinical information and formulate diagnoses efficiently. Practice would come to a halt without them. However, there are pitfalls to the use of certain heuristics, the same ones to which humans are prone in everyday life. It may be possible to improve clinical decision making through techniques that minimize biases inherent in heuristics. Five common clinical heuristics or other sources of cognitive error are illustrated through neurological cases with missed diagnoses, and literature from cognitive psychology and medicine are presented to support the occurrence of these errors in diagnostic reasoning as general phenomena. Articulation of the errors inherent in certain common heuristics alerts clinicians to their weaknesses as diagnosticians and should be beneficial to practice. Analysis of cases with missed diagnoses in teaching conferences might proceed along formal lines that identify the type of heuristic used and of inherent potential cognitive errors. Addressing these cognitive errors by becoming conscious of them is a useful tool in neurologic education and should facilitate a career-long process of continuous self-improvement.

ANN NEUROL 2010;67:425-433
<table>
<thead>
<tr>
<th>Heuristic or Phenomenon</th>
<th>Pitfall</th>
<th>Corrective Strategies</th>
<th>Clinical Maxims</th>
<th>Illustrative Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framing Effects</td>
<td>Being swayed by subtle wording to focus on certain aspects of a case more than others</td>
<td>Examine case from alternative perspectives and re-evaluate different pieces of clinical information</td>
<td>Deliberately consider from another angle: “Let’s play devil’s advocate” or “Let’s re-review elements of the history”</td>
<td>Cartmill, R.S.V. &amp; Thornton, J.G; Lancet, 1992 McNeil et al; NEJM, 1982</td>
</tr>
<tr>
<td>Anchoring Heuristic</td>
<td>Relying on initial impressions and not adjusting diagnostic probabilities properly with new data</td>
<td>Formally estimate probabilities in light of new data or second opinion; look up selected probability data on Pubmed; do this with own patient as you would when giving second opinion</td>
<td>“If the patient is not responding to treatment or is worsening, is one possibility that this is the wrong diagnosis? Have I properly weighed key clinical data in making a diagnosis?”</td>
<td>Tversky and Kahneman; Science, 1974</td>
</tr>
<tr>
<td>Availability Heuristic</td>
<td>Judging by ease of recalling past cases based on recency or impact</td>
<td>Verify with legitimate statistics from the literature</td>
<td>“Am I unduly influenced by my experience with one memorable or recent case?”</td>
<td>Salem-Schatz et al; JAMA, 1990</td>
</tr>
<tr>
<td>Representative-ness Heuristic</td>
<td>Ignoring prior probabilities and base rate frequencies of related events</td>
<td>Formally incorporate prior probability into considerations;</td>
<td>Pay attention to base rates: “If you hear hoof beats, think about horses not cattle”</td>
<td>Kahneman &amp; Tversky; Psychol Review, 1973</td>
</tr>
<tr>
<td>Availability Heuristic:</td>
<td>Judging by ease of recalling past cases based on recency or impact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Representative-ness Heuristic:</td>
<td>Ignoring prior probabilities and base rate frequencies of different diagnoses that seem to match the patient’s pattern of presentation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formally incorporate prior probability into considerations; look up literature on prevalence and occurrence of diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blind Obedience:</td>
<td>Showing undue deference to authority or technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Look up diagnostic test performance characteristics in medical literature using PubMed or other sources</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

“A cracking podcast by one of the authors

Martin Samuel’s “How neurologists think”

<table>
<thead>
<tr>
<th>1. Anchoring bias.</th>
<th>People are over-reliant on the first piece of information they hear. In a salary negotiation, whoever makes the first offer establishes a range of reasonable possibilities in each person’s mind.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Availability heuristic.</td>
<td>People overestimate the importance of information that is available to them. A person might argue that smoking is not unhealthy because they know someone who lived to 100 and smoked three packs a day.</td>
</tr>
<tr>
<td>3. Bandwagon effect.</td>
<td>The probability of one person adopting a belief increases based on the number of people who hold that belief. This is a powerful form of groupthink and is why meetings are often unproductive.</td>
</tr>
<tr>
<td>4. Blind-spot bias.</td>
<td>Failing to recognize your own cognitive biases is a bias in itself. People notice cognitive and motivational biases but not in others.</td>
</tr>
<tr>
<td>5. Choice-supportive bias.</td>
<td>When you choose something, you tend to feel positive about it, even if that choice has flaws. Like how you think your dog is awesome—even if it bites people every once in a while.</td>
</tr>
<tr>
<td>6. Clustering illusion.</td>
<td>This is the tendency to see patterns in random events. It’s like you’re in a casino losing money at the blackjack table but you think you see a pattern because you see winning streaks.</td>
</tr>
<tr>
<td>7. Confirmation bias.</td>
<td>We tend to listen only to information that confirms our preconceptions—no matter how many reasons it’s so hard to believe that the Earth is round because we maintained their earlier understanding that the planet was flat.</td>
</tr>
<tr>
<td>8. Conservatism bias.</td>
<td>Where people favor prior evidence over new evidence or information that has emerged. People were slow to accept that the Earth was round because they maintained their earlier understanding that the planet was flat.</td>
</tr>
<tr>
<td>9. Information bias.</td>
<td>The tendency to seek information when it doesn’t affect action. More information is not always better. With less information, people can often make more accurate predictions.</td>
</tr>
<tr>
<td>10. Ostrich effect.</td>
<td>The decision to ignore dangerous or negative information by “burying” one’s head in the sand, like an ostrich. Research suggests that investors check the value of their holdings significantly less often during bad markets.</td>
</tr>
<tr>
<td>11. Outcome bias.</td>
<td>Judging a decision based on the outcome—rather than how exactly the decision was made in the moment. Just because you won a lot in Vegas doesn’t mean gambling your money was a smart decision.</td>
</tr>
<tr>
<td>12. Overconfidence.</td>
<td>Some of us are too confident about our abilities, and this causes us to take greater risks in our daily lives. Expect more prone to this bias than laypeople, since they are more convinced that they are right.</td>
</tr>
<tr>
<td>13. Placebo effect.</td>
<td>When simply believing that something will have a certain effect on you causes it to have that effect. In medicine, people given take pills often experience the same physiological effects as people given the real thing.</td>
</tr>
<tr>
<td>14. Pro-innovation bias.</td>
<td>When a proponent of an innovation tends to overvalue its usefulness and undervalue its limitations. Sound familiar, Silicon Valley?</td>
</tr>
<tr>
<td>15. Recency.</td>
<td>The tendency to weigh the latest information more heavily than older data. Investors often think the market will always look the way it looks today and make unwise decisions.</td>
</tr>
<tr>
<td>16. Salience.</td>
<td>Our tendency to focus on the most easily recognized features of a person or situation. When you think of a dog, you might think of a cute puppy, but to a farmer, a brown cow might be more salient, statistically more likely, in a car accident.</td>
</tr>
</tbody>
</table>
Why do radiologists miss dancing gorillas?
By Lorna Stewart
Health Check, BBC World Service

80% of radiologists & 100% of general public - missed the ‘diagnosis’

Cognitive debiasing

1. Understanding of nature and extent of biases
2. Metacognitive awareness of bias in own decision making
3. Motivation to change
4. Action plan and mindware in place
5. Execute and sustain debiasing
SO HOW SHOULD WE TEACH THIS STUFF…
DO YOUR WORK PLACE BASED ASSESSMENTS FEEL LIKE THIS???
HOW DO WE TEACH CLINICAL REASONING?

- From ABC of Clinical Reasoning (2016)
- Reflection
- Grand rounds
- Stop & Think framework
## 'Stop and Think' Framework

### Name the problem
- What have I noticed?
- What are my initial thoughts?
- What are my underlying feelings about the situation?

### Reframe the problem
- How else can I think of this problem?
- What have I already identified?
- What is the likely effect of this problem?

### Generate hypotheses
- What else could be going on? (Consider surgical sieve, pathophysiological mechanisms, epidemiology, patient co-morbidities and medications, psychological factors, context)
- What is the worse case scenario?

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Supportive findings?</th>
<th>Opposing findings?</th>
<th>What symptoms or signs should be present but aren’t?</th>
</tr>
</thead>
</table>
TEACHING CLINICAL REASONING

• Hi-fidelity simulation
WHERE DID IT ALL GO WRONG??

• About 1986…
Dr McCoy “Fundoscopic examination- we are dealing with medievalism here”
Dr McCoy’s kit-

We don’t know the evidence base
False +ve, false -ve
Clinical Validation of a Smartphone-Based Adapter for Optic Disc Imaging in Kenya

Andrew Bastawrous, MBChB, BSc(Hons), FHEA, MRCPhtth; Mario Ettore Giardini, PhD; Nigel M. Bolster, MEng; Tunde Peto, MD, PhD; Nisha Shah, MSc; Iain A. T. Livingstone, FRCOphth; Helen A. Weiss, PhD; Sen Hu, MSc; Hillary Rono, MBBS; Hannah Kuper, ScD; Matthew Burton, PhD, MA, MBChB, MRCP, MRCPhtth, DTM&H.


3. ABC of Clinical Reasoning, Cooper & Frain (2016)
CHOOSING WISELY

• https://www.youtube.com/watch?v=FqQ-JuRDkI8&feature=youtu.be&a