Teaching Clinical Reasoning

Faculty Development Series for Clinical Teachers 201

September 23, 2021

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Acknowledgements

- **The Teaching Academy** at LCOM
- **Deirdre O'Reilly,** MD, University of Vermont
  - Course Director of Resident and Student as Teacher
- **Gaby Berger**, MD, University of Washington
  - JGIM Exercises in Clinical Reasoning Editorial Board
- **Dennis Beatty**, MD, University of Vermont

Objectives:

Following this session, attendees should be able to:

- Define clinical reasoning
- Utilize the following tools 1) Illness Scripts 3) Diagnostic Schema 3) Problem Representation
- Describe how clinicians at different levels of experience may use the above concepts differently
- Utilize the "Assessment of Clinical Reasoning Tool" and the "One-Minute Preceptor"

Definition

Clinical reasoning involves the "synthesis of myriad clinical and investigative data to generate and prioritize an appropriate differential diagnosis and inform safe and targeted management plans."

Thampy et al 2019

So. Much. Theory.

Bayes Theorem

Causal reasoning

Diagnostic discrimination
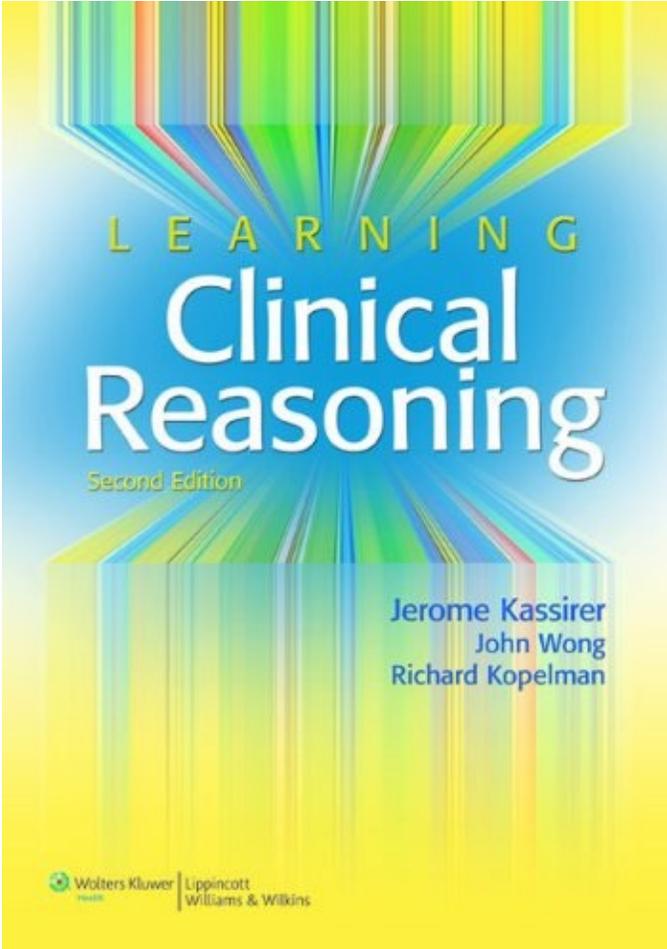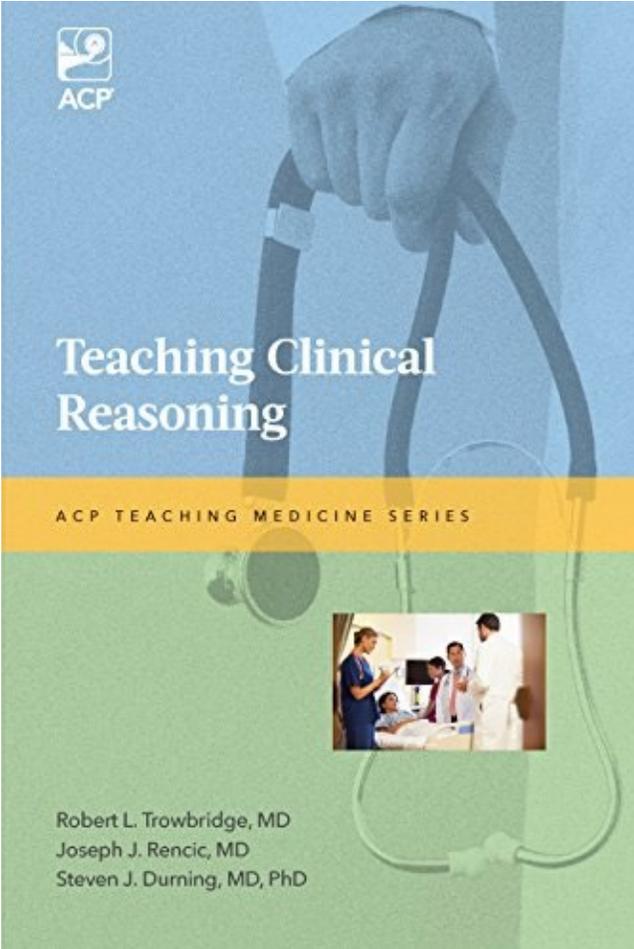
Cognitive Biases

Diagnostic Verification

Let's simplify to three basic tools
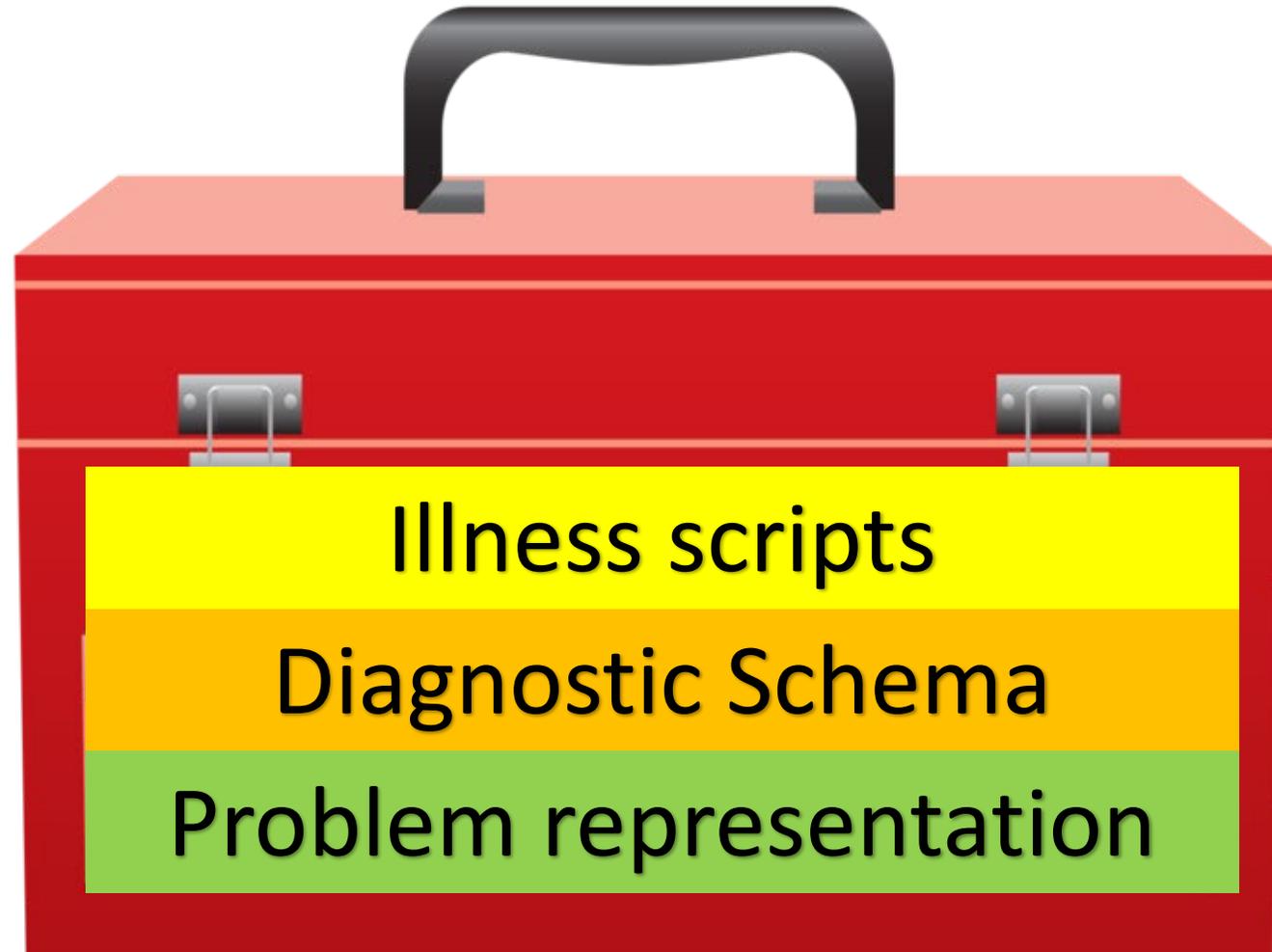
Dual Process Theory
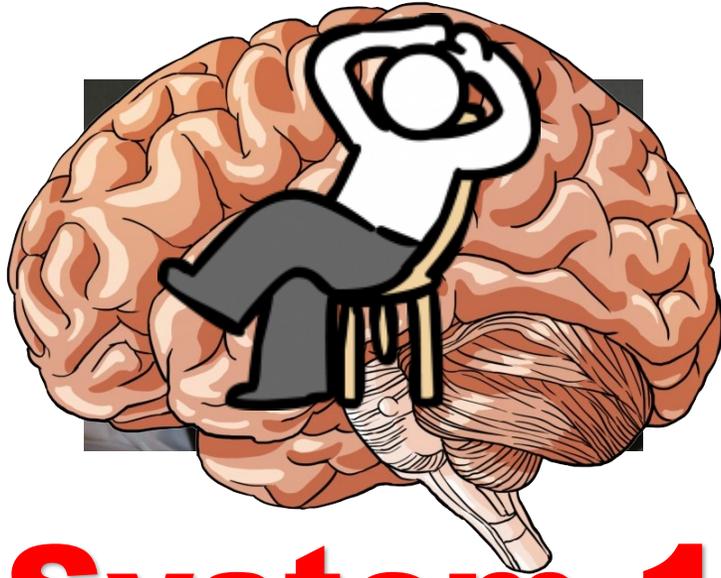
System 1
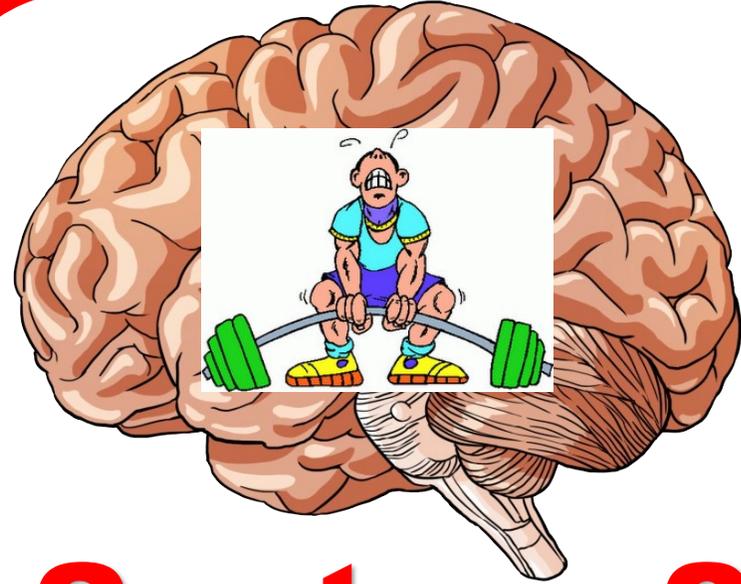
System 2

# Dual Process Theory
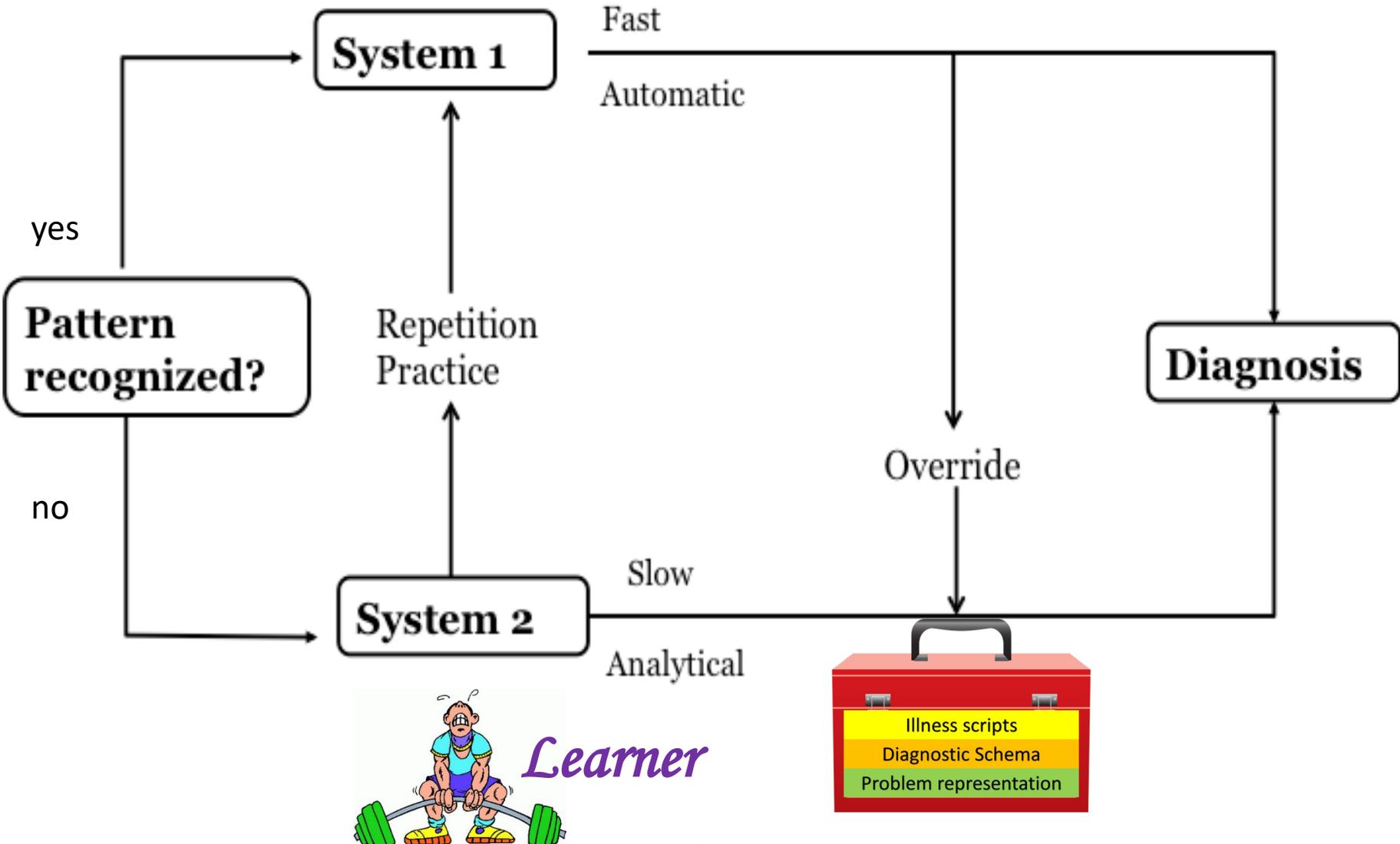
Adapted from: Clinical Decision Making, Karolina Kucybala, MD and Gaby Berger, MD, University of Washington, 2020
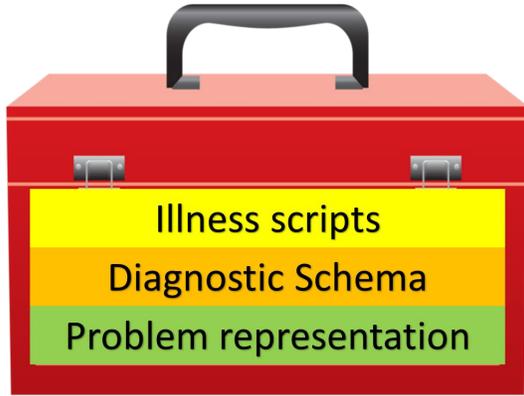
Illness scripts

The typical presentation of a disease

"What's the typical story of this disease?"
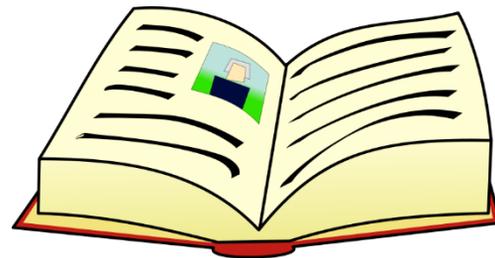
Illness scripts

1. **Predisposing conditions**
   Epidemiology
   Risk Factors
2. **Pathophysiologic insult** –
   Pathophysiology
   Time Course
3. **Clinical Consequences** –
   Signs and Symptoms
   Diagnostics
   Treatments

Diagnosis	Migraine
Predisposing Condition	Onset teens to 40's Female > Male Genetic predisposition Many possible triggers (dietary factors, sleep disruption, bright lights, etc)
Pathophysiologic Insult	Aura caused by spreading cortical depression Vasodilation/Vasoconstriction Trigeminovascular reflex Decreased serotonin levels Lasts 4-72 hrs
Clinical Consequences	Often unilateral Throbbing/pulsating pain Light and/or sound sensitivity Aura in 20% Abortives: NSAIDS, triptans, ergots. Prophylaxis: beta blockers, TCAs, Ca channel blockers, etc

25 y/o female presents with recurrent right frontal headaches

|	1	2	3	4
Diagnosis	Tension-type Headache	Migraine	Cluster Headache	Trigeminal Neuralgia
Predisposing Condition	Most common primary headache Multiple triggers: Stress, viral infection, poor posture, caffeine, eye strain, fatigue	Onset teens to 40's Female > Male Genetic predisposition Many possible triggers (dietary factors, sleep disruption, bright lights, etc)	Onset age late 20's-30's Male > Female Common triggers: Alcohol, lack of sleep, REM sleep	Usually Age > 50 Female > Male
Pathophysiologic Insult	Muscle contractions in the head and neck regions	Aura caused by spreading cortical depression Vasodilation/Vasoconstriction Trigeminovascular reflex Decr serotonin levels	Hypothalamic dysfunction Elevated neuropeptides (calcitonin gene-related peptide)	Severe Neuropathic pain in 5th cranial nerve (Trigeminal nerve) Nerve injury or compression
Clinical Consequences	Bilateral, band-like pain Mild to mod intensity Lasts 30 min to 4 hrs Scalp muscle tenderness Light or sound sensitivity, but NOT BOTH Not worsened by exertion	Often unilateral Throbbing/pulsating pain Lasts 4-72 hrs Aura in 20% Prodrome in 1/3 Light and/or sound sensitivity	Unilateral temporal/orbital severe pain Rapid onset, lasts 45-90 min Agitation and restlessness Ipsilateral autonomic symptoms Circadian periodicity	Unilateral severe shock-like pain Lasts seconds Can be triggered by facial stimuli
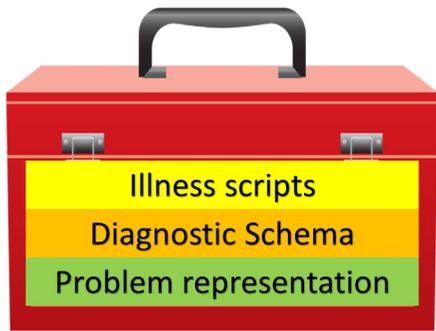
Diagnostic Schema

Systematic approaches to a clinical problem

"What's your approach to this clinical problem?"

AKI   Day 1 = Victim

Extrinsic

Prerenal
- ↓ Volume
- ↑ Volume

- Shunting
  - HRS
- Meds
  - ACE/ARB
  - NSAIDs

Postrenal

Bladder PVR⊕   Ureter PVR⊖
- BPH   - External
                     Compression

⊖

Intrinsic
ATN > Others

Platelets MAHA
Paraprotein Myeloma
Pigment Hemolysis
         Rhabdo
Pointy   Tumor lysis
Things   Ethylene Glycol
Crystals
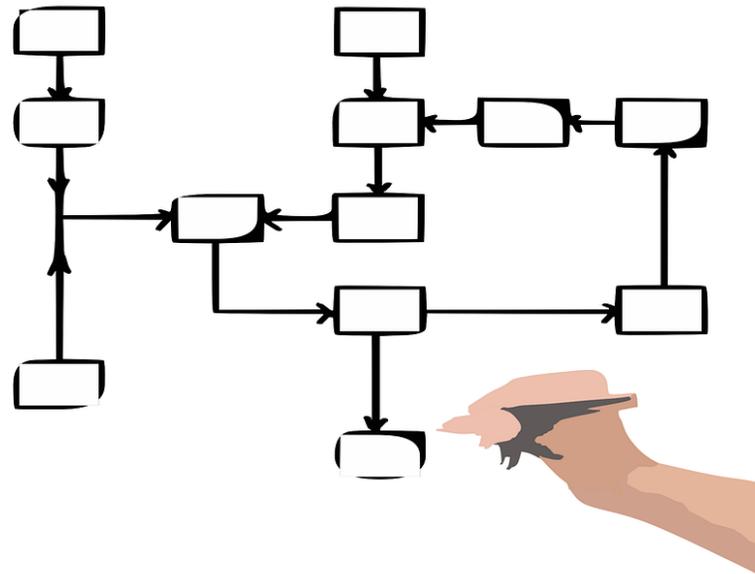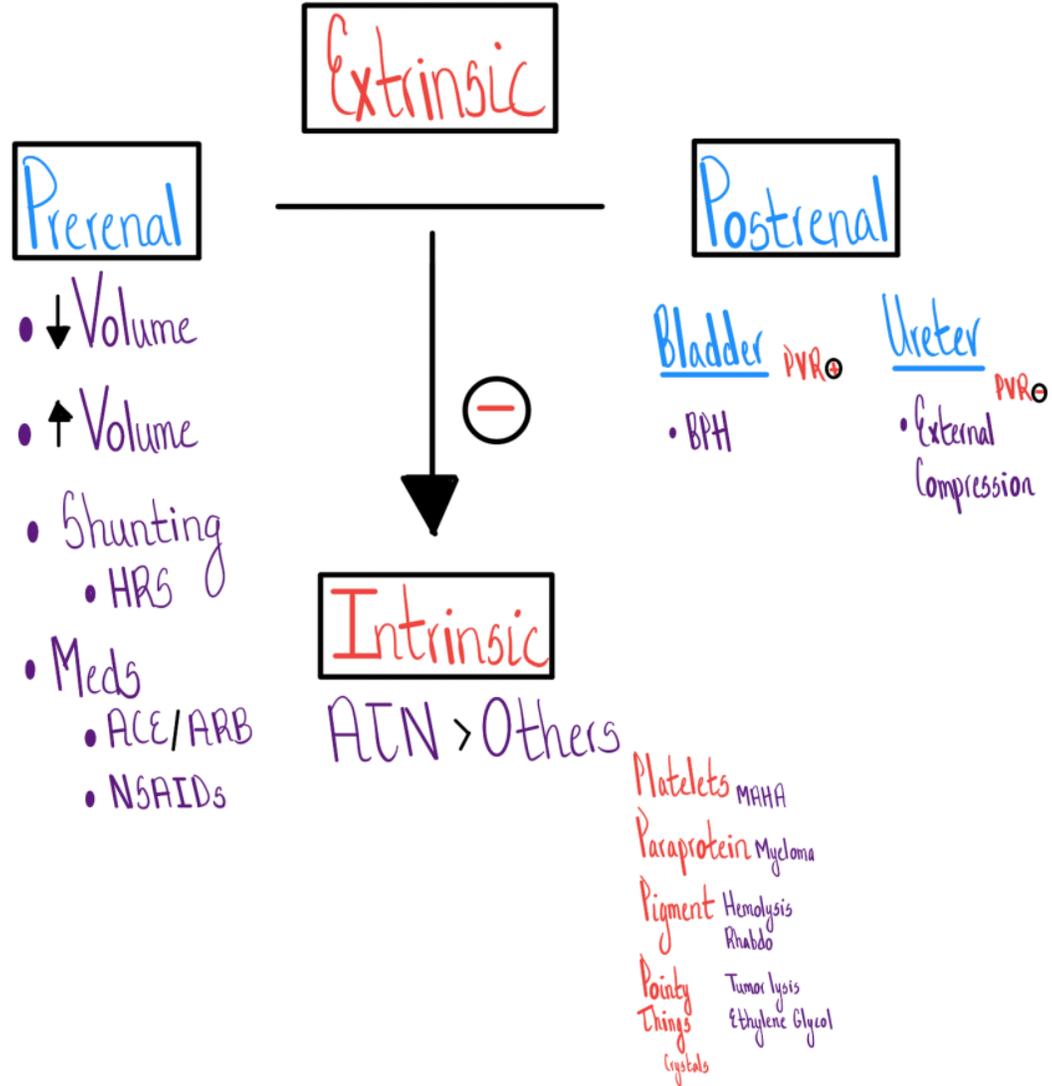
Anemia

⬇ PRODUCTION	⬆ DESTRUCTION	BLOOD LOSS
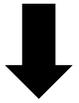
Lack of nutrients
 B12, iron, folate
Bone marrow disorders
Aplastic anemia, bone marrow infiltration
Bone marrow suppression
Drugs(EtOH), chemotherapy
Decreased trophic hormones EPO
Anemia of chronic disease
Myelodysplastic sydromes

Extravascular
Intrinsic RBC defects
HS, SCD, PKD, G6PD, thalassemia

Extrinsic RBC defects
Liver disease, hypersplenism, infections, autoimmune hemolytic anemia

Intravascular
Microangiopathic hemolytic anemia, PNH, Transfusion reactions

Diagnostic Schema: TEACHING TIPS!

- Great tool when
  - Your learner "gets stuck" building a differential or is anchoring
  - You have down time and nothing prepared
- MANY possible diagnostic schema for a given sign or symptom
- Teach YOUR approach
- Try winging it!
- Write it down and hand it to your learner afterward

A diagnostic schema on the fly
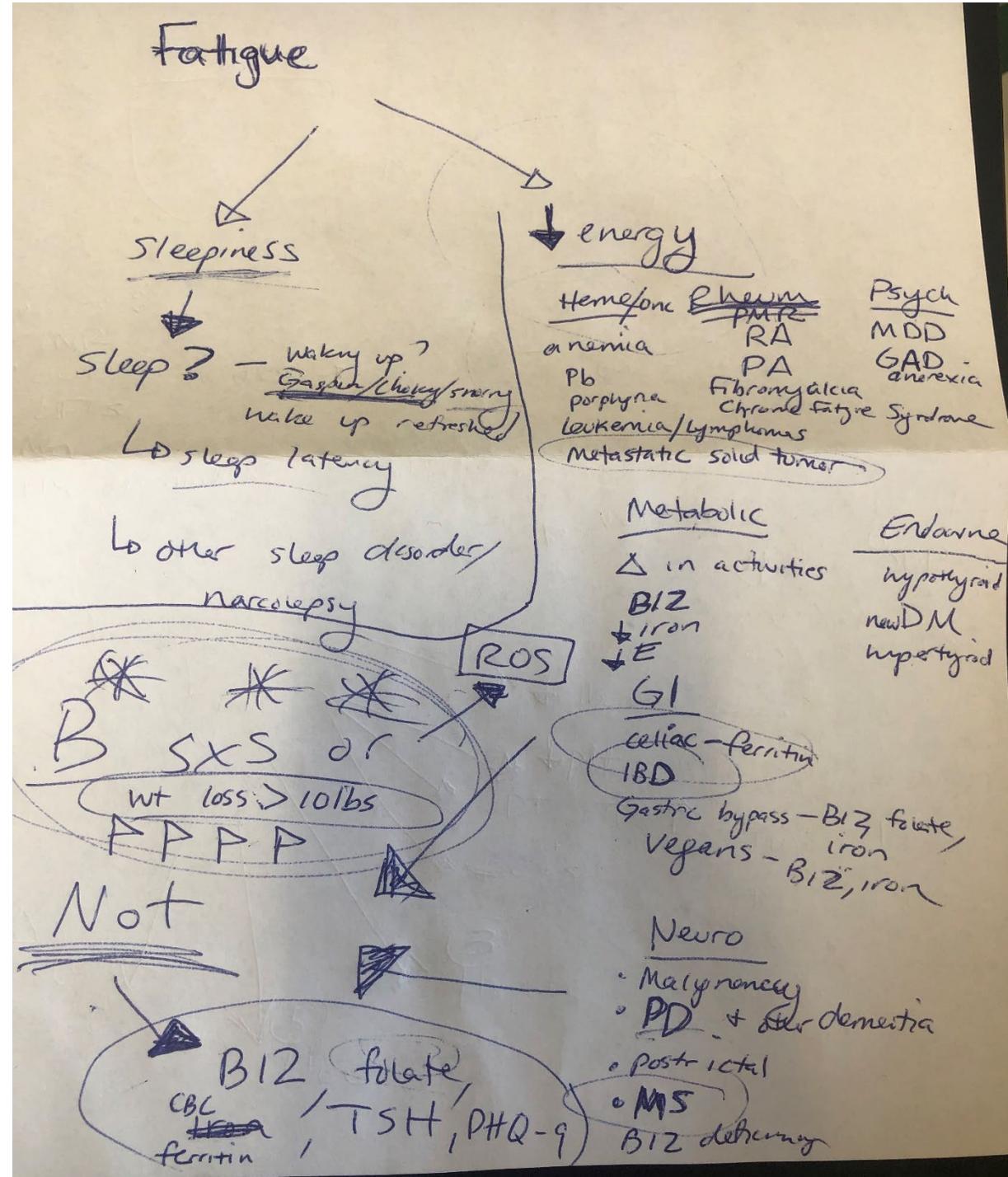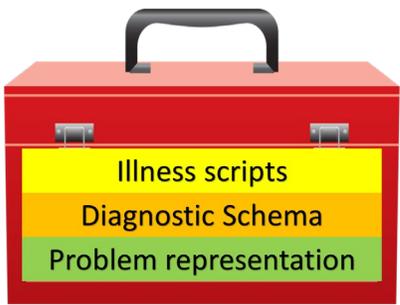
Problem representation

The one-liner, but MORE!

"Framing the clinical problem"

Problem representation

One sentence summary of case that addresses:	
1) Who is the patient?	Demographics & Pertinent risk factors
2) Temporal pattern of illness	Length: hyperacute, acute, subacute, chronic Tempo: stable, progressive, resolving, intermittent, waxing and waning
3) Clinical syndrome	Key symptoms and signs

Problem representation

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A 60 yo man from rural Maine with a history of hypertension, hyperlipidemia, COPD, and a 40 pack year smoking history presents to the ER complaining of two days of increasing productive cough and dyspnea on exertion. He denies fever, sick contacts, recent travel, orthopnea, or weight changes. His initial vital signs reveal that he is afebrile and normotensive with a HR of 100, RR of 32, and SpO2 of 85% on RA. He appears dyspneic using accessory muscles, and his lung exam reveals decreased breath sounds throughout with occasional end expiratory wheezes.

Problem representation 1:
This is a 60 man with a history of COPD, a 40 pack year smoking history who presents with acute shortness of breath, tachycardia, hypoxia, and wheezing.

Problem representation 2
This is a 60 man with a history of COPD who presents with acute hypoxic respiratory failure

Case:

30 yo F presents to clinic with palpitations and shortness of breath worsening over the last 3 months. The palpitations occur intermittently, start suddenly, and last 30-45 min at a time. Yesterday she had an episode that lasted all day, so she made an appointment to be evaluated. During the episodes, she feels lightheaded and short of breath, which is scary. She has a history of major depression treated with citalopram. She recently started a new job and describes significant stress at work. She denies ankle edema and orthopnea. Her brother had sudden cardiac death while in high school.

Problem representation #1

30 yo F with history of major depression and recent job stress presents with chronic intermittent and progressive palpitations, lightheadedness, and shortness of breath

Problem representation #2

30 yo F with family hx of sudden cardiac death and on QT-prolonging medication presents with chronic intermittent and progressive palpitations, lightheadedness, and shortness of breath

Problem representation #3

30 yo F with major depression, recent job stressors, family hx of sudden cardiac death, on a QT-prolonging medication presents with chronic intermittent and progressive palpitations, lightheadedness, and shortness of breath

Problem Representation: One sentence summary of case that addresses:	
1) who is the patient?	Demographics & Pertinent risk factors
2) the temporal pattern of illness	Length: hyperacute, acute, subacute, chronic; Tempo: stable, progressive, resolving, intermittent, waxing and waning
3) clinical syndrome	Key symptoms and signs

1: Major depression
2: Generalized anxiety
3: Panic disorder

1: Congenital long QT syndrome
2: Brugada syndrome
3: Structural heart disease

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Teaching tips:

1) Accuracy and conciseness depends on the level of the learner

2) Including and excluding certain clinical components will trigger different illness scripts and diagnostic schema

Dual Process Theory

Master clinician

Learner

Illness scripts
Diagnostic Schema
Problem representation

Clinical Decision Making, Karolina Kucybala, MD and Gaby Berger, MD, University of Washington, 2020

Illness scripts

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Problem representation

The one-liner, but MORE!
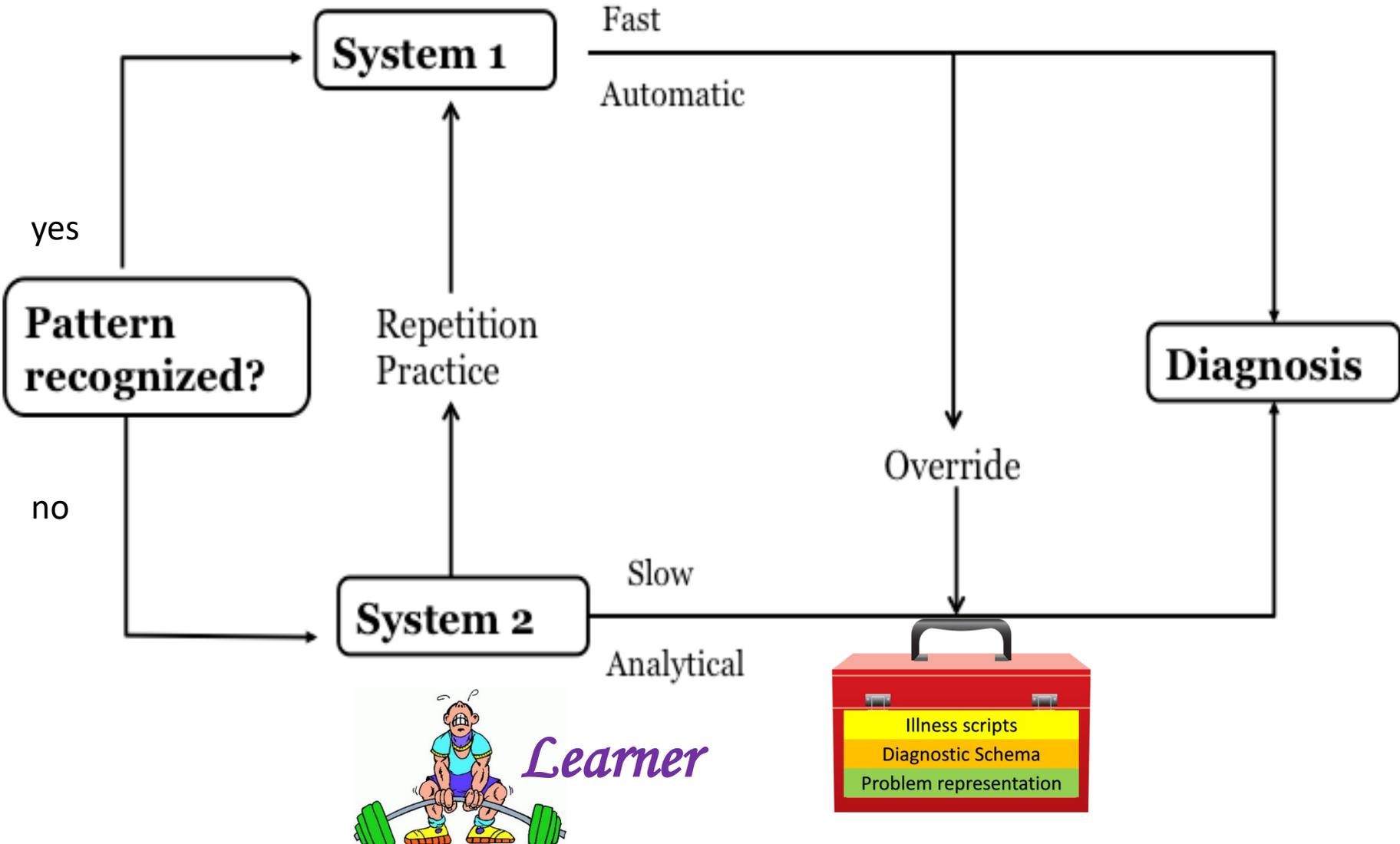
Breakout room – 5 min:

Discuss:

1) An example of when you already use one of these tools

2) An opportunity in your work where you can use one

# Breakout Room Debrief

Assessing Clinical Reasoning
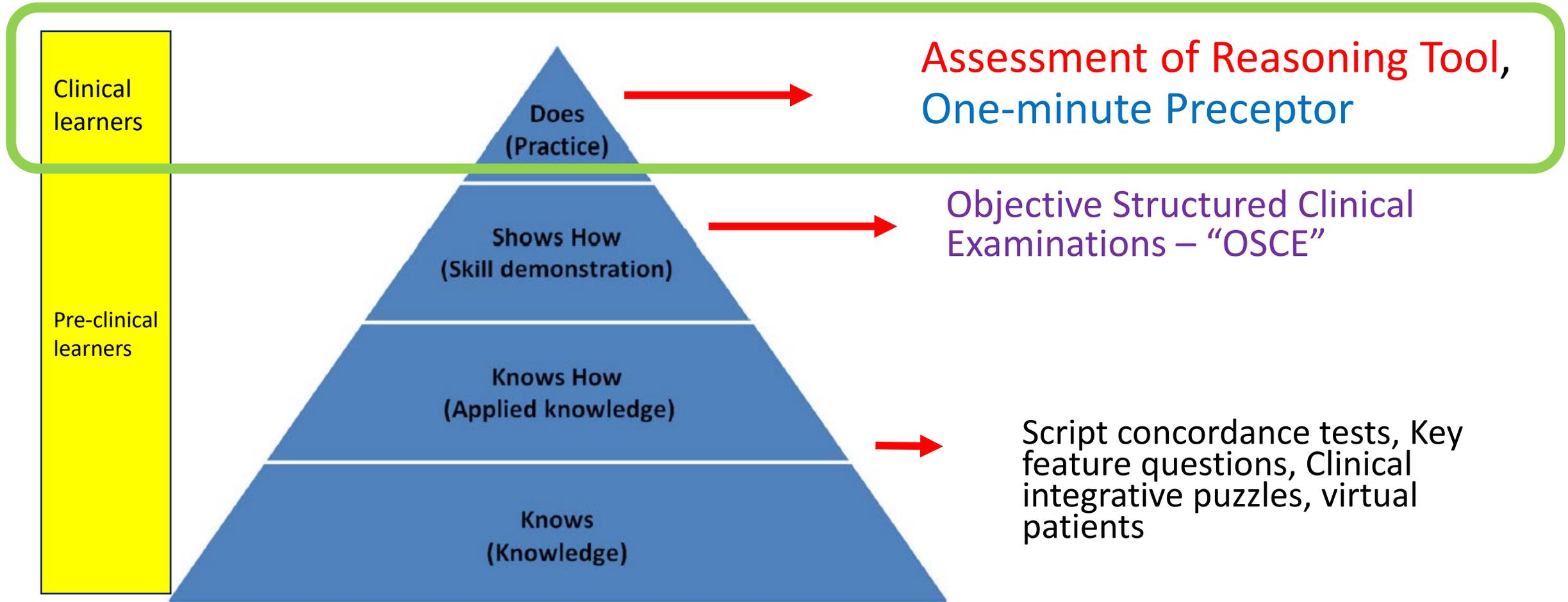
Figure 1 Miller's pyramid of clinical competence (supplied also as a .tif file). Adapted from Miller[2].

Thampy et al 2019. Assessing Clinical Reasoning: Targeting the Higher Levels of the Pyramid

ASSESSMENT of REASONING TOOL

Learner: _____   Evaluator: _____

Did the Learner…	Assessment		
	Minimal	**Partial**	**Complete**
Collect/report history and examination data in a **hypothesis-directed manner**?	• Non-directed in questioning and exam • Asked questions without clear focus on potential diagnoses	• Questioning and exam generally reflective of potential diagnoses, but some less relevant or tangential questions	• Followed clear line of inquiry, directing questioning and exam to specific findings likely to increase or decrease likelihood of specific diagnoses
Articulate a complete **problem representation** using descriptive medical terminology?	• Included extraneous information • Missed key findings • Did not translate findings into medical terminology	• Generally included key clinical findings (both positive and negative) but either missed some key findings or missed important descriptive medical terminology	• Gave clear synopsis of clinical problem • Emphasized important positive and negative findings using descriptive medical terminology
Articulate a **prioritized differential diagnosis** of most likely, less likely, unlikely, and "can't miss" diagnoses based on the problem representation?	• Missed key elements of differential diagnosis, including likely diagnoses or "can't miss" diagnoses	• Gave differential diagnosis that included likely and "can't miss" diagnoses but either missed key diagnoses or ranked them inappropriately	• Gave accurately ranked differential diagnosis including likely and "can't miss" diagnoses
Direct evaluation/treatment towards **high priority diagnoses**?	• Directed evaluation and treatment toward unlikely/unimportant diagnoses • Did not evaluate or treat for most likely/"can't miss" diagnoses	• Major focus of evaluation and treatment was likely and "can't miss" diagnoses but included non-essential testing	• Efficiently directed evaluation and treatment towards most likely and "can't miss" diagnoses • Deferred tests directed towards less likely or less important diagnoses
Demonstrate the ability to **think about their own thinking** (metacognition)? Consider asking: *Is there anything about the way you are thinking or feeling about this case that may lead to error?*	• Not able to describe the influence of cognitive tendencies or emotional/situational factors that may have influenced decision-making	• Can name one cognitive tendency or emotional/situational factor that may have influenced decision-making	
OVERALL ASSESSMENT	**NEEDS IMPROVEMENT** ☐	**MEETS COMPETENCY** ☐	**EXCELLENCE** ☐

Comments:

One-Minute Preceptor

Authored by: PAEA's Committee on Clinical Education

PUBLISHED FEBRUARY 2017

Microskills

1 Get a Commitment

Focus on one learning point. Encourage students to develop their critical thinking and clinical reasoning skills. Actively engage the student, establishing their readiness and level of competence. Push the student just beyond their comfort zone and encourage them to make a decision about something, be it a diagnosis or a plan.

Ex: "So, tell me what you think is going on with this patient."

2 Probe for Supporting Evidence

Uncover the basis for the student's decision — was it a guess or was it based on a reasonable foundation of knowledge? Establish the student's readiness and level of competency.

Ex: "What other factors in the HPI support your diagnosis?"

3 Reinforce What Was Done Well

The student might not realize they have done something well. Positive feedback reinforces desired behaviors, knowledge, skills, or attitudes.

Ex: "You kept in mind the patient's finances when you chose a medication, which will foster compliance, thereby decreasing the risk of antibiotic resistance."

4 Give Guidance About Errors/Omissions

Approach the student respectfully while concurrently addressing areas of need/improvement. Without timely feedback, it is difficult to improve. If mistakes are not pointed out, students may never discover that they are making these errors and hence repeat them.

Ex: "I agree, at some point PFTs will be helpful, but when the patient is acutely ill, the results likely won't reflect his baseline. We could gain some important information with a peak flow and pulse ox instead."

5 Teach a General Principle

Sharing a pearl of wisdom is your opportunity to shine, so embrace the moment! Students will apply what is shared to future experiences. Students tend to recall guiding principles, and often the individual patient may serve as a cue to recall a general rule that was taught.

Ex: "Deciding whether or not someone with a sore throat should be started on empiric antibiotics prior to culture results can be challenging. Fortunately, there are some tested criteria that can help…"

Summarize

Consider summarizing or concluding, ending with next steps (e.g., plan for the patient, reading assignment for the student, schedule for follow-up with the student, etc.).

Neher and Stevens 2003

Assessing Clinical Reasoning at the Program Level

Society to Improve Diagnosis in Medicine, 2019:

Individual competencies for diagnosis (I-competencies)

I. Demonstrate clinical reasoning to arrive at a justifiable diagnosis (an explanation for a health-related condition)

I-1. Accurately and efficiently **collect key clinical findings** needed to inform diagnostic hypotheses. Use these tools appropriately and efficiently in the diagnostic process: effective interpersonal communication skills, history-taking, the physical examination, and record review, diagnostic testing, and the electronic health record and health IT resources.

I-2. Formulate, or contribute to, an accurate **problem representation** expressed in a concise summary statement that includes essential epidemiological, clinical, and psychosocial information.

I-3. Produce, or contribute to, a correctly prioritized, relevant **differential diagnosis [diagnostic schema]**, including "can't-miss" diagnoses.

I-4. Explain and justify the prioritization of the differential diagnosis by **comparing and contrasting the patient's findings and test results with accurate knowledge about prototypical or characteristic disease manifestations [illness scripts]** and atypical presentations, and considering pathophysiology, disease likelihood, and clinical experience.

I-5. Use **decision support tools**, including point-of-care resources, checklists, consultation, and second opinions to improve diagnostic accuracy and timeliness.

I-6. Use **reflection**, surveillance, and critical thinking to improve diagnostic performance and mitigate detrimental cognitive bias throughout the clinical encounter. Discuss and reflect on the strengths and weaknesses of cognition, the impact of contextual factors on diagnosis, and the challenges of uncertainty. Demonstrate awareness of atypical presentations, information that is missing, and key findings that don't "fit."

e.g.

ACGME Internal Medicine Residency Milestones:

Patient Care 3: Clinical Reasoning				
Level 1	Level 2	Level 3	Level 4	Level 5
Organizes and accurately summarizes information obtained from the patient evaluation to develop a clinical impression	Integrates information from all sources to develop a basic differential diagnosis for common patient presentations	Develops a thorough and prioritized differential diagnosis for common patient presentations	Develops prioritized differential diagnoses in complex patient presentations and incorporates subtle, unusual, or conflicting findings	Coaches others to develop prioritized differential diagnoses in complex patient presentations
	Identifies clinical reasoning errors within patient care, with guidance	Retrospectively applies clinical reasoning principles to identify errors	Continually re-appraises one's own clinical reasoning to improve patient care in real time	Models how to recognize errors and reflect upon one's own clinical reasoning

Comments:

Not Yet Completed Level 1
Not Yet Assessable

Olson et al 2019, ACGME 2020

Summary

- **Clinical reasoning** involves the "synthesis of myriad clinical and investigative data to generate and prioritize an appropriate differential diagnosis and inform safe and targeted management plans."

Summary cont.

Dual Process Theory
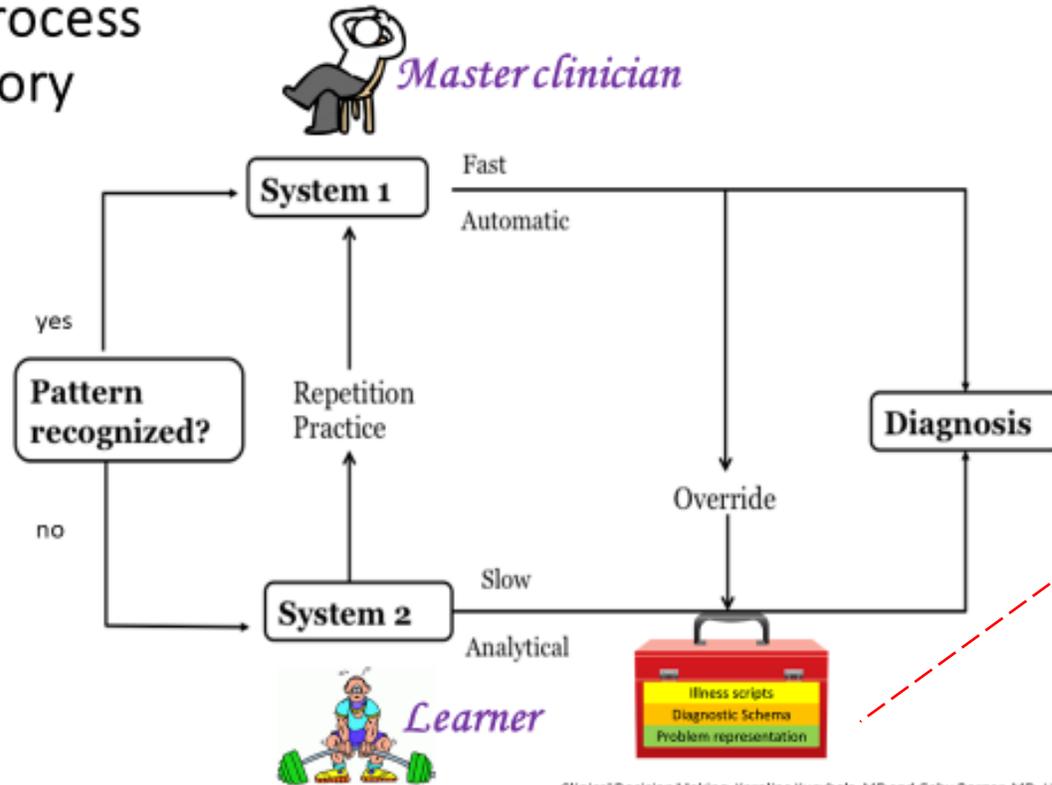
Master clinician

- System 1 — Fast, Automatic
- Pattern recognized? — yes / no
- Repetition Practice
- System 2 — Slow, Analytical
- *Learner*
- Override
- Diagnosis

Illness scripts, Diagnostic Schema, Problem representation

Clinical Decision Making, Karolina Kucybala, MD and Gaby Berger, MD, University of Washington, 2020

Illness scripts
The typical story of a disease

Diagnostic Schema
Systematic approach to a clinical problem

Problem representation
The one-liner, but MORE!

Summary cont.

- Try "winging it" with a **diagnostic schema** when your learner "gets stuck"
- **Problem representations** will develop with experience to be inclusive yet succinct
- Try out the **One-Minute Preceptor** this week!

Thank you!

- Questions?
- Comments?

References

- Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Straus and Giroux.

- Neher JO, Stevens NG. The one-minute preceptor: shaping the teaching conversation. Fam Med. 2003;35(6):391–3.

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