

Teaching Clinical Reasoning

HOW EFFECTIVE
CLINICIANS THINK

The image shows a chalkboard with several mathematical derivations for the derivative of a function $f(x)$ using the limit definition. The derivations are written in white chalk on a dark background.

Top left: $y = g(x)$

Top center: $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

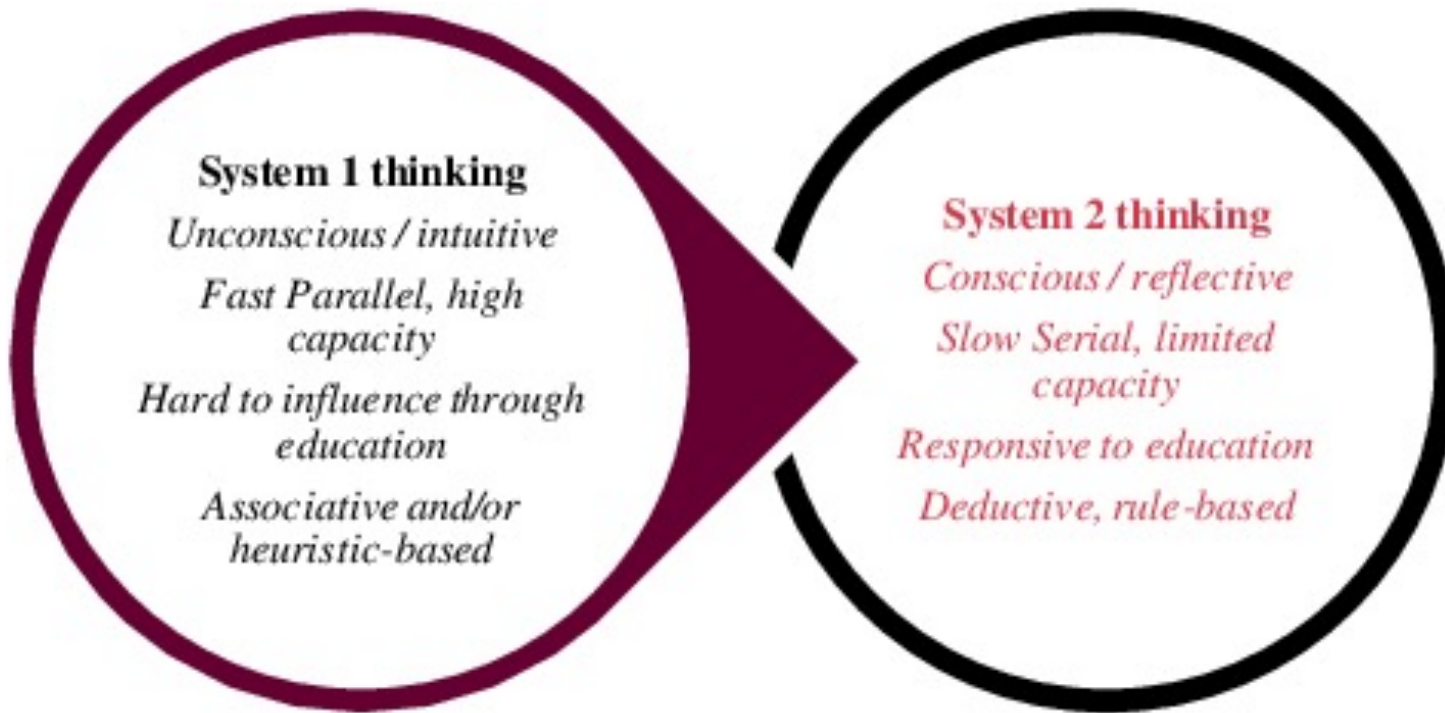
Top right: $= \lim_{h \rightarrow 0} \frac{h}{h(\sqrt{x+h} + \sqrt{x})} = \lim_{h \rightarrow 0} \frac{1}{\sqrt{x+h} + \sqrt{x}} = \frac{1}{2\sqrt{x}}$

Middle left: $f(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$

Middle right: $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - x^2}{h} = \lim_{h \rightarrow 0} \frac{2xh + h^2}{h} = \lim_{h \rightarrow 0} (2x + h) = 2x$

Bottom left: $f(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$

Bottom right: $f(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$



Dual Process Theory

67 yo female with 3 days of burning pain along her right side, now with vesicular rash.

44 yo male, HIV positive, with fever, weight loss, headache and diarrhea in the setting of recent travel to Southern India.

58 yo female, 3 days post-op, with sinus tachycardia, asymmetric lower extremity edema and hypoxia.

Diagnostic Errors

System 1: anchoring,
recency bias

System 2: black and white
thinking, heavy reliance on
testing, over-emphasis on
results

Concepts in Clinical Reasoning



**Problem
representation**

Illness Scripts

**Diagnostic
Schemas**

Problem Representation

1. Who is the patient?

2. What is the temporal pattern of illness?

3. What is the clinical syndrome?

Illness Scripts

Components of Illness Script	Community Acquired Pneumonia
Pathophysiology	Infection of lower resp tract Common bugs: Strep pneumoniae, atypicals
Epidemiology	Increased risk: Age, structural lung disease, immunodef
Time Course	Acute: days; progressive if not treated
Signs and symptoms	Fever, cough, SOB, tachycardia, tachypnea, hypoxia
Diagnostics	Leukocytosis, lobar infiltrate, positive sputum cx
Treatment	Antibiotics typically lead to improvement over days



Diagnostic schema

Cognitive tool to allow systematic approach to clinical problem

Tether diagnostic thinking to a logical framework

Avoid missing more complicated diagnosis or anchoring to the most familiar diagnosis

Trigger differentiating historical or PE findings to refine the differential

Teach others how to approach a clinical problem

CAP treatment failure

Wrong bug

- Endemic mycoses
- Gram neg
- Virus

Wrong drug

- Doxy resistant S pneumo

Wrong host

- Anatomic obstruction
- Immunocompromised
- Malignancy

Wrong diagnosis

- CHF
- Interstitial lung disease
- Pulmonary abscess
- Aspiration