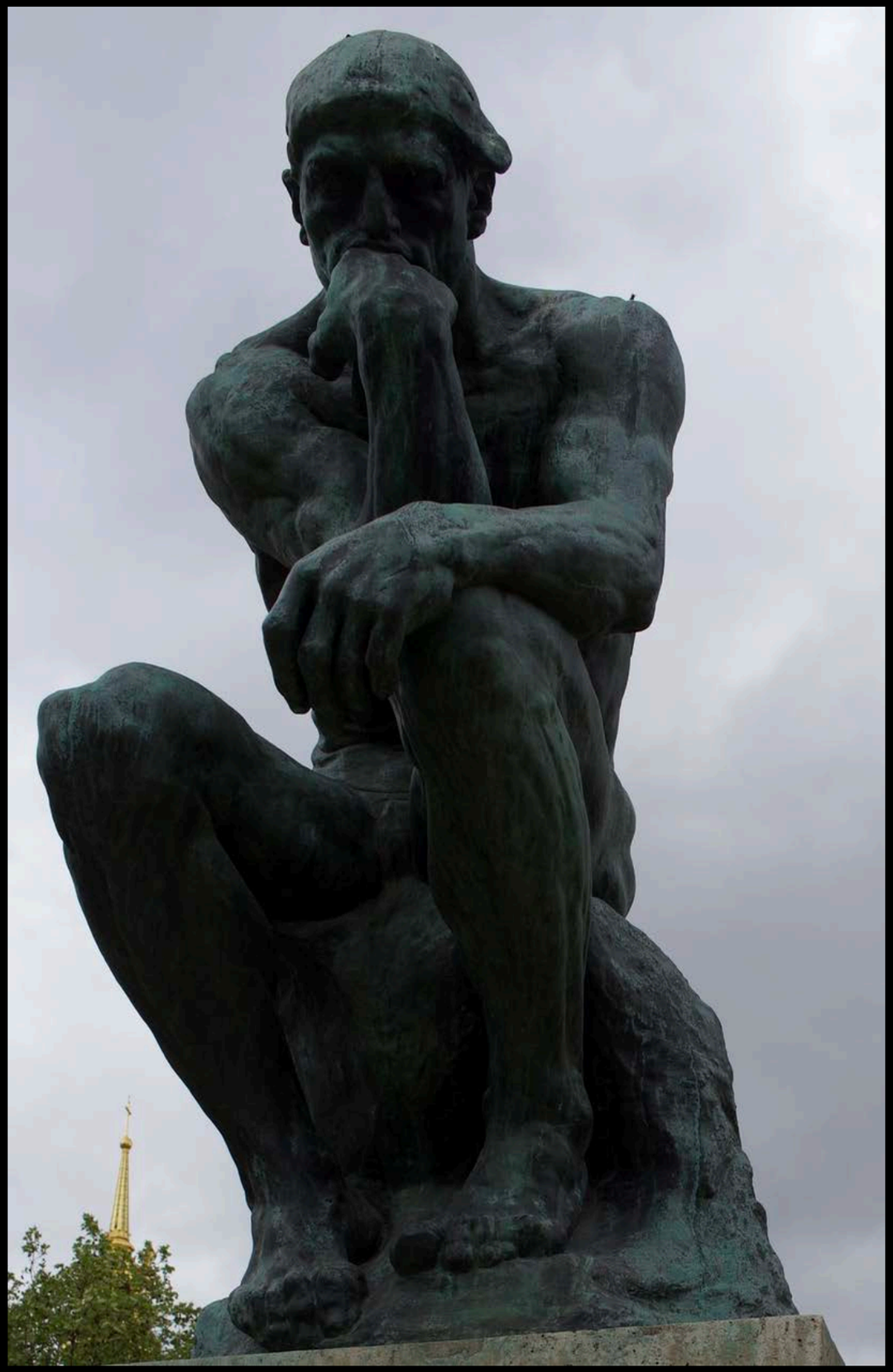

Asking Questions That Encourage Higher-Order Thinking

Boston Children's Hospital Academy Session

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Disclosures

- None

Objectives

- Why is asking questions important for learning?
- How do questions probe different types of knowledge?
- How do you craft questions that encourage higher-order thinking?

Why questions?

- Diagnose the learner
- Use as starting point
- Engagement
- More fun
- Stimulate curiosity
- Overcome cognitive errors

Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping

Jeffrey D. Karpicke* and Janell R. Blunt

11 FEBRUARY 2011 VOL 331 SCIENCE www.sciencemag.org

Different study scenarios

- Study text once
- Repeated studying
- Retrieval practice
- Concept Mapping

ANEMIA

DEFINED AS

L IN WOMEN
I MEN

IMPORTANT CONSIDERATIONS

MOST COMMON HEMATOLOGIC DISORDER

USUALLY REPRESENTS MORE SIGNIFICANT UNDERLYING PATHOLOGY

RISK FACTORS

WOMEN

EXTREMES OF AGE

PREGNANCY

LACTATION

MOST COMMONLY RECOGNIZED BY

CLASSIFICATIONS

SYMPTOMS

ANGINA

FATIGUE

DYSPNEA

SIGNS

HYPOTENSION

TACHYCARDIA

JAUNDICE

NIC DISEASE

BLASTIC ANEMIA

ISONING

MORPHOLOGICAL

BASED ON MCV

2 MOST COMMON INCLUDE

SPECIAL CLASSES

NORMOCYTIC

MACROCYTIC

EFINED AS

FURTHER DIVIDED INTO

DEFINED AS

MCV >100

ANTI-RETROVIRALS

FOLIC ACID DEFICIENCY

B12 DEFICIENCY

LIVER DISEASE

ALCOHOLISM

HYPOTHYROIDISM

DIFFERENTIAL INCLUDES

MYELODYSPLASTIC SYNDROME

RATIVE
NT

HYPOPROLIFERATIVE RETIC COUNT <2%

CHRONIC RENAL DISEASE

HYPOTHYROIDISM

ADRENAL INSUFFICIENCY

HYPOPITUITARISM

SED BY

SED

MOST COMMON

MICROANGIOPATHIC

DIFFERENTIAL INCLUDES

TTP

DIC

HUS

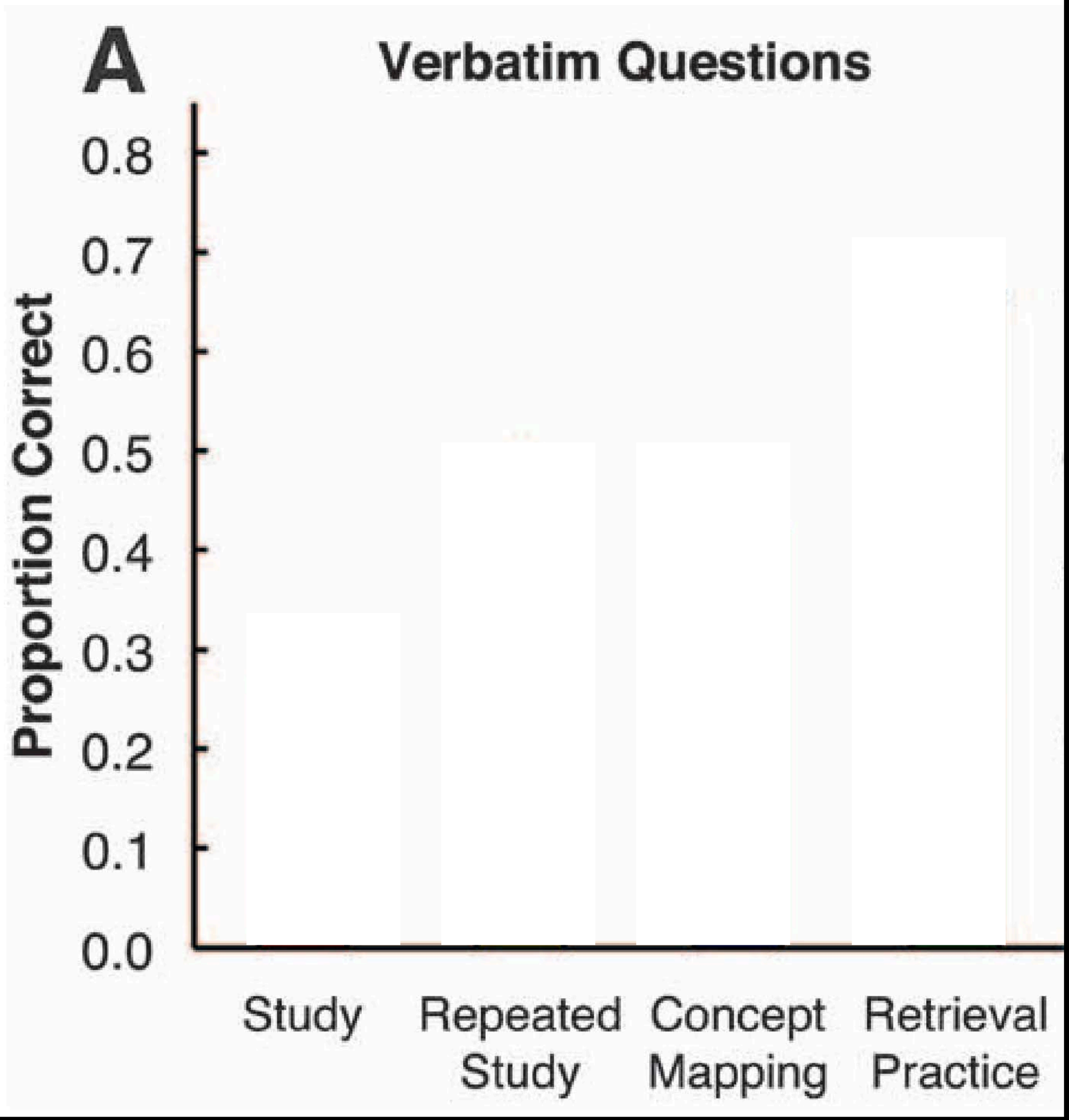
MENINGITIS

EVANS SYNDROME

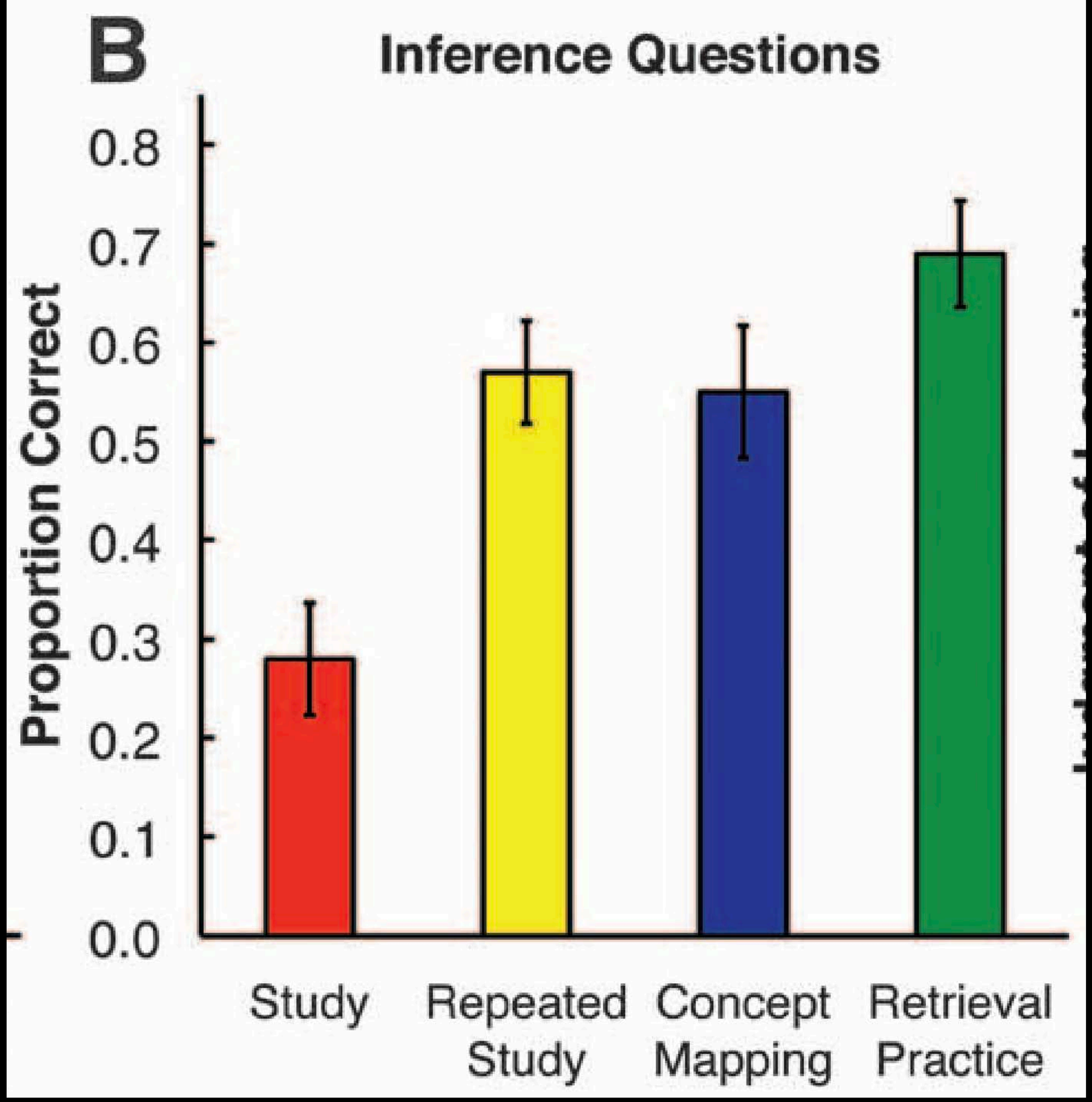
HEMMOCULT

BONE MARROW BIOPSY

http://cmapspublic3.ihmc.us/rid=1GRD5XD6L-H5Y5G5-GZ/ANE



Karpicke JD, Blunt JR (2011) Retrieval practice produces more learning than elaborative studying with concept mapping. 331:772–775.



Karpicke JD, Blunt JR (2011) Retrieval practice produces more learning than elaborative studying with concept mapping. 331:772–775.

Technique	Utility
Practice testing	High
Distributed practice	High
Interleaved practice	Moderate
Elaborative interrogation	Moderate
Self-explanation	Moderate
Summarization	Low
Highlighting	Low
The keyword mnemonic	Low
Imagery use for text learning	Low
Rereading	Low

Adapted from Dunlosky 2013.

Why not questions?

George & Green. JAMA 2015.

Why not questions?

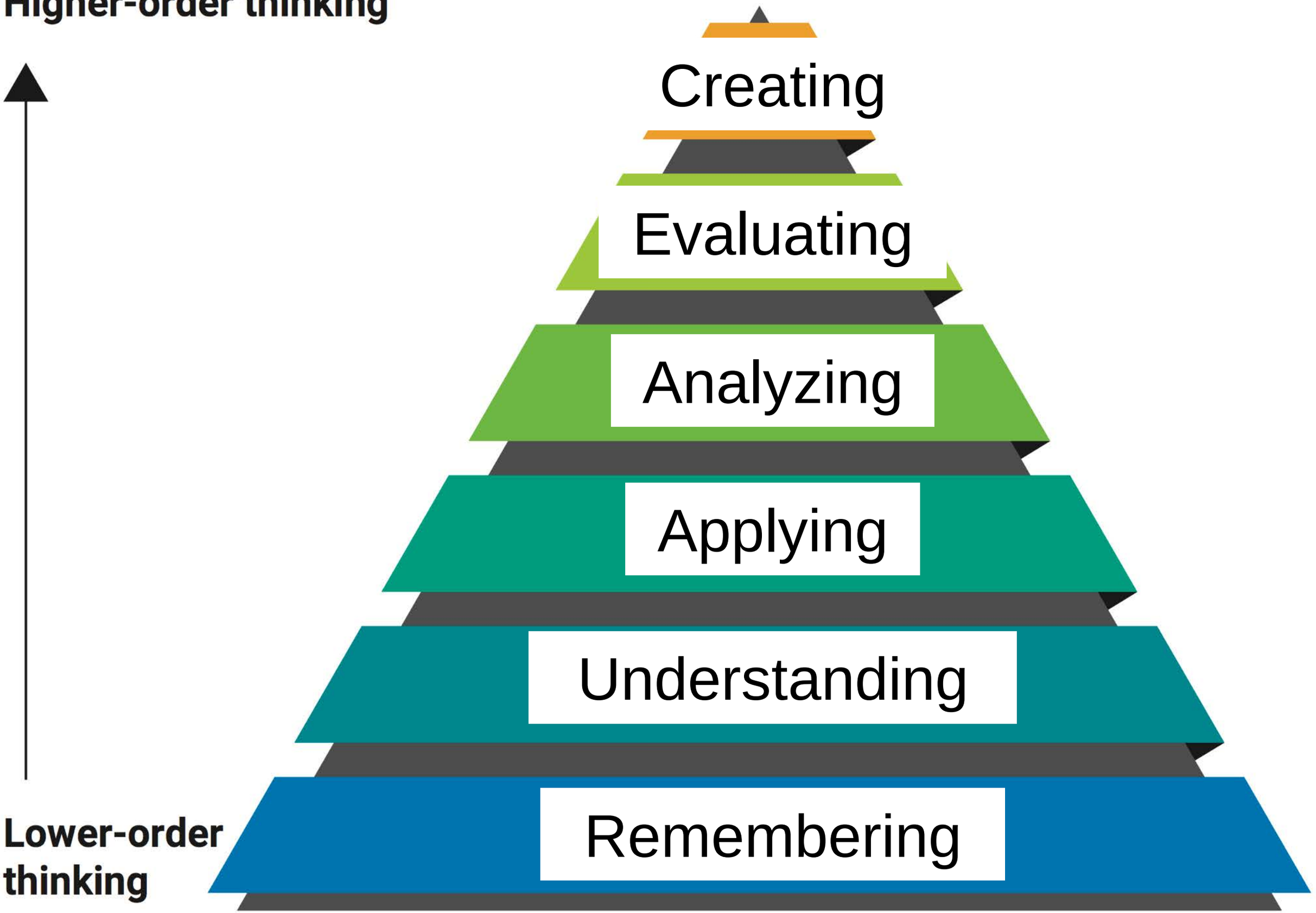
- “Pimping” used to:
  - humiliate
  - reinforce hierarchy
  - ego boost for teacher

Reifler DR. The Pedagogy of Pimping: Educational Rigor or Mistreatment? JAMA 2015;314(22):2355–6.

Case #1

- You are working in the inpatient service with one of your trainees.
- A 17 year-old female with depression is admitted to the hospital for management of anorexia. She states she is not eating because of abdominal pain. On exam, she is bradycardic and hypotensive.
- What questions will you ask your trainee to teach them in this setting?

Your questions…

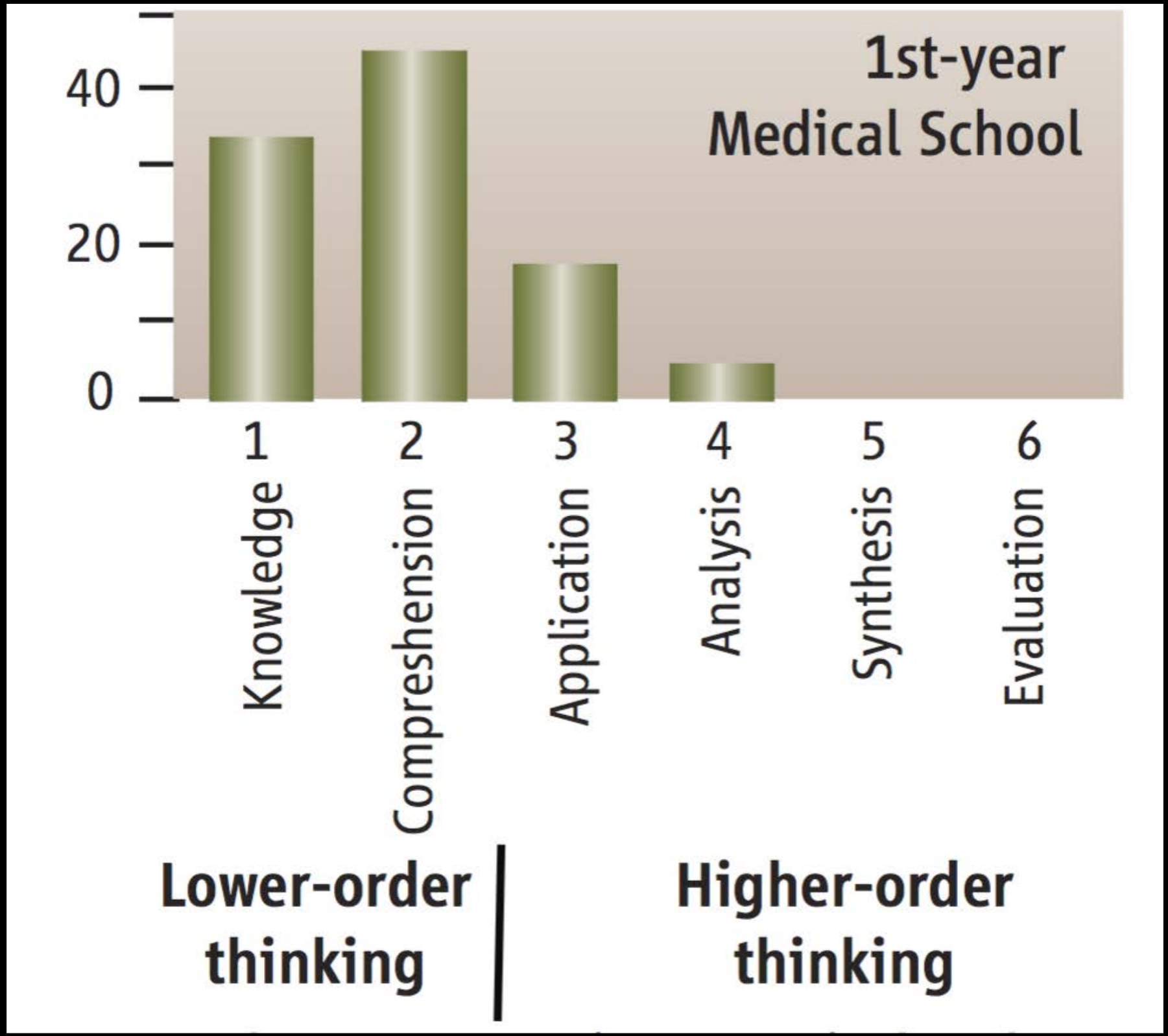


Adapted from: Anderson, L. W., Krathwohl, D. R. & Bloom, B. S. A taxonomy for learning, teaching, and assessing. (Allyn & Bacon, 2001).

HOT

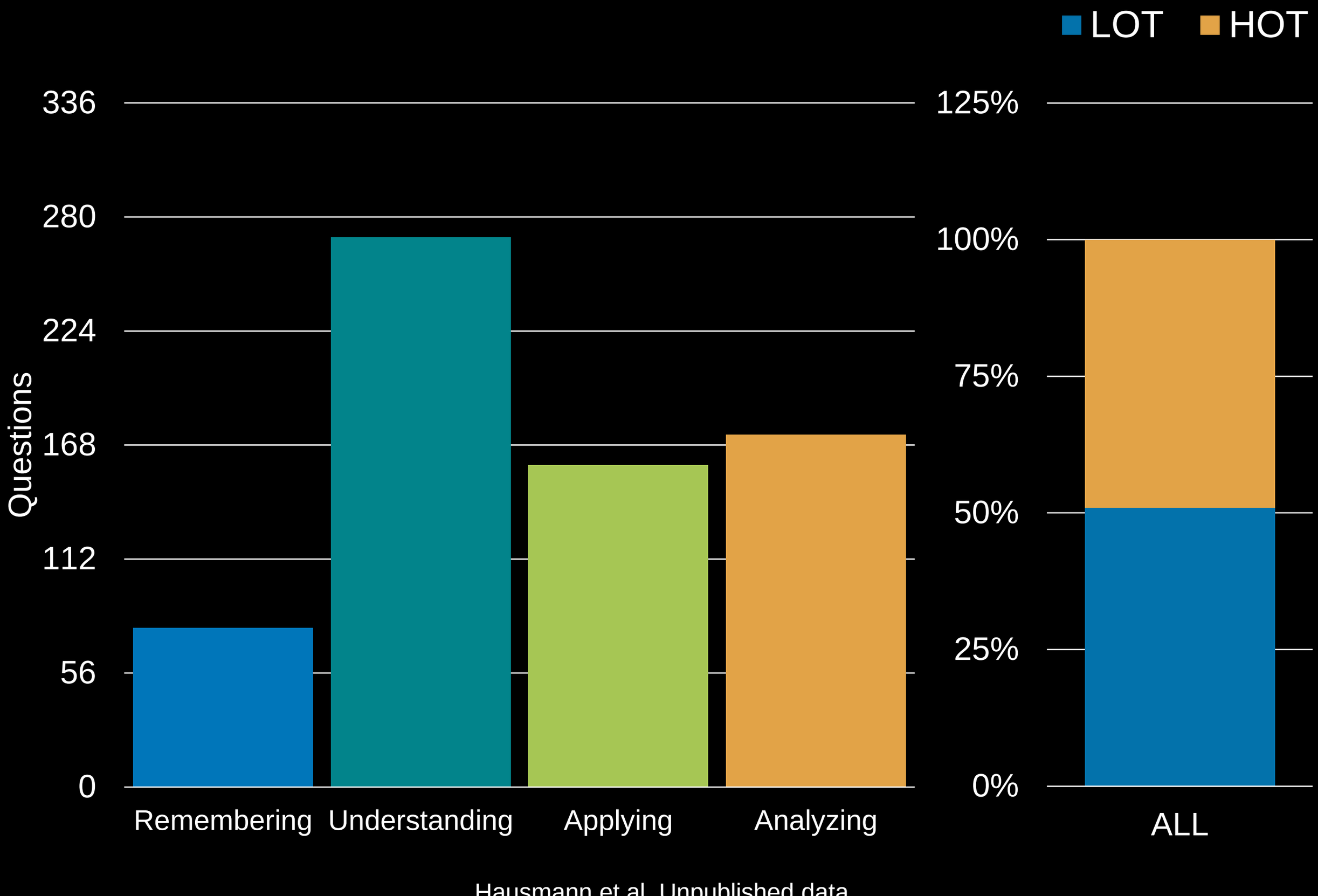
6	**CREATING** Developing new ideas, combining elements into new patterns	• How would you improve_____? • How could you create _____?
5	**EVALUATING** Making judgements based on criteria and standards	• How was _____ managed? • What is the evidence to support your treatment plan?
4	**ANALYZING** Interpreting data and selecting best conclusion, making a diagnosis	• How does _____ and _____ differ? • How would the treatment differ if the patient were_____?
3	**APPLYING** Carry out a procedure in a given situation, predict an outcome given perturbation in the system	• How do you interpret this patient's labs? • What is the recommended treatment for this patient?
2	**UNDERSTANDING** Determining the meaning of facts by building connections between new and prior knowledge	• How does _____ work? • Explain why_____? • Describe _____
1	**REMEMBERING** Retrieving, recalling, or recognizing factual information from long-term memory	• What is_____? • What are the most common causes of_____? • Where is_____ located?

LOT

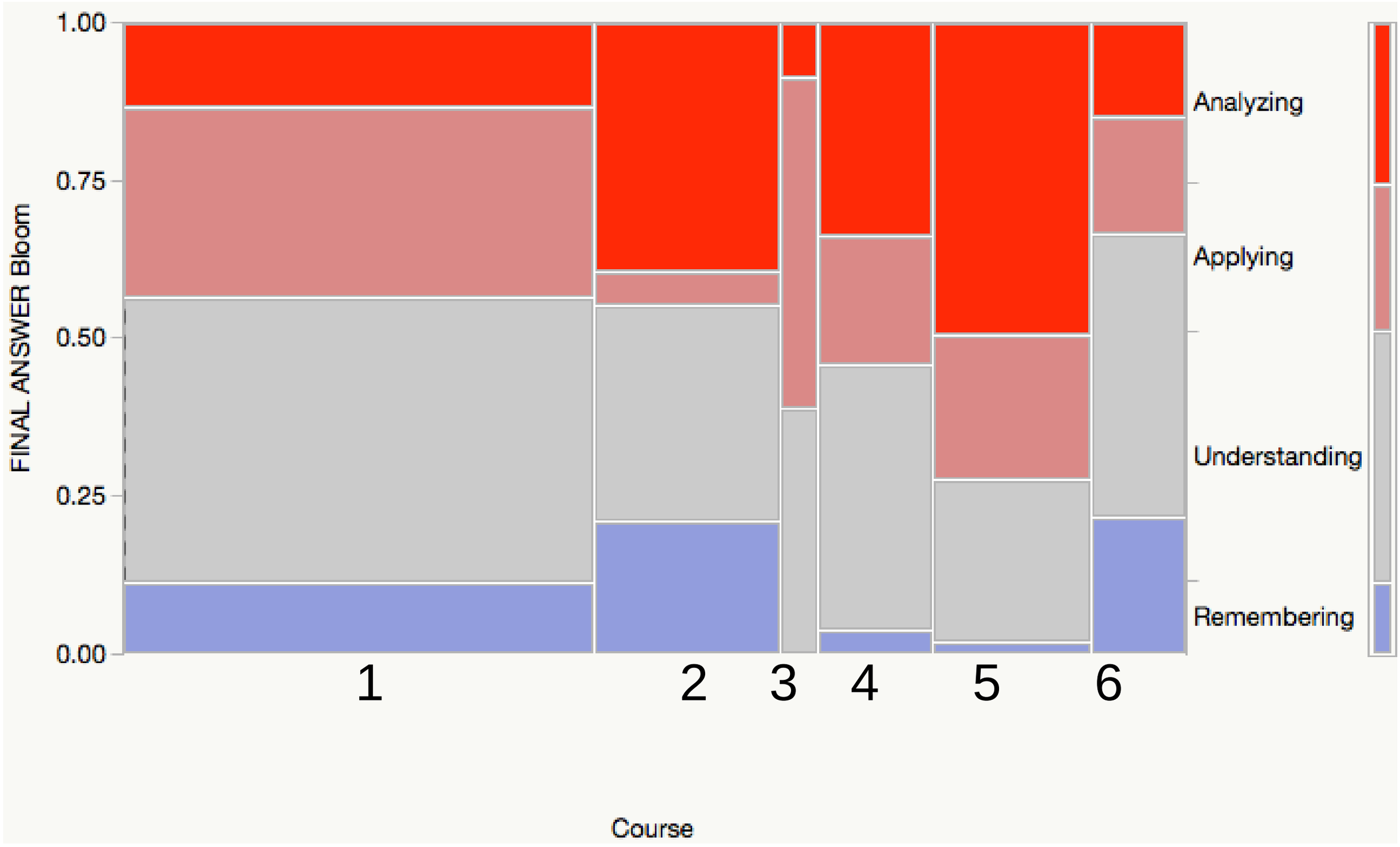


Zheng AY, Lawhorn JK, Lumley T, Freeman S. Application of Bloom's Taxonomy Debunks the 'MCAT Myth'. Science 2008;319(5862):414–5.

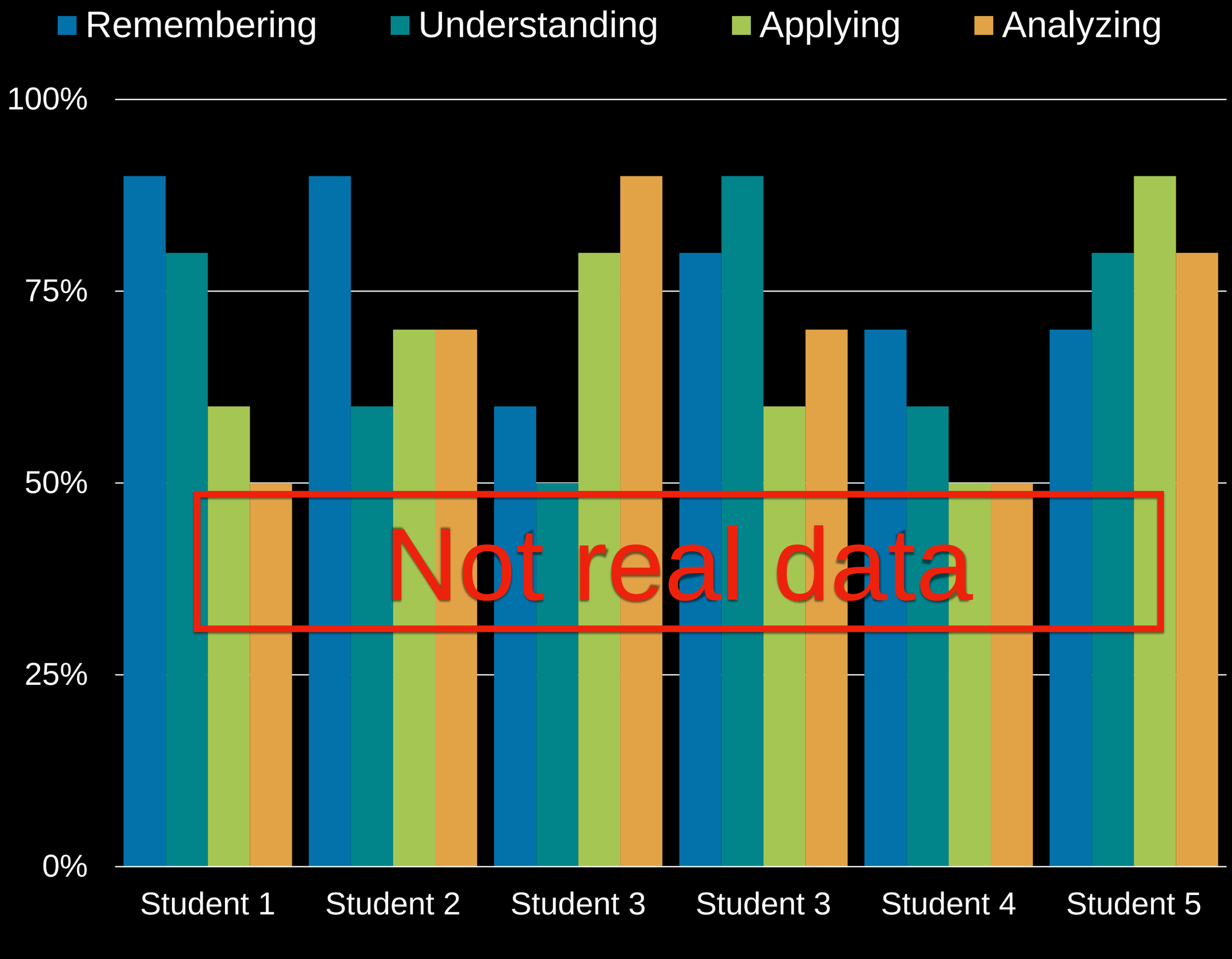
HMS 1st year quiz/exam questions



Hausmann et al. Unpublished data.



Hausmann et al. Unpublished data.

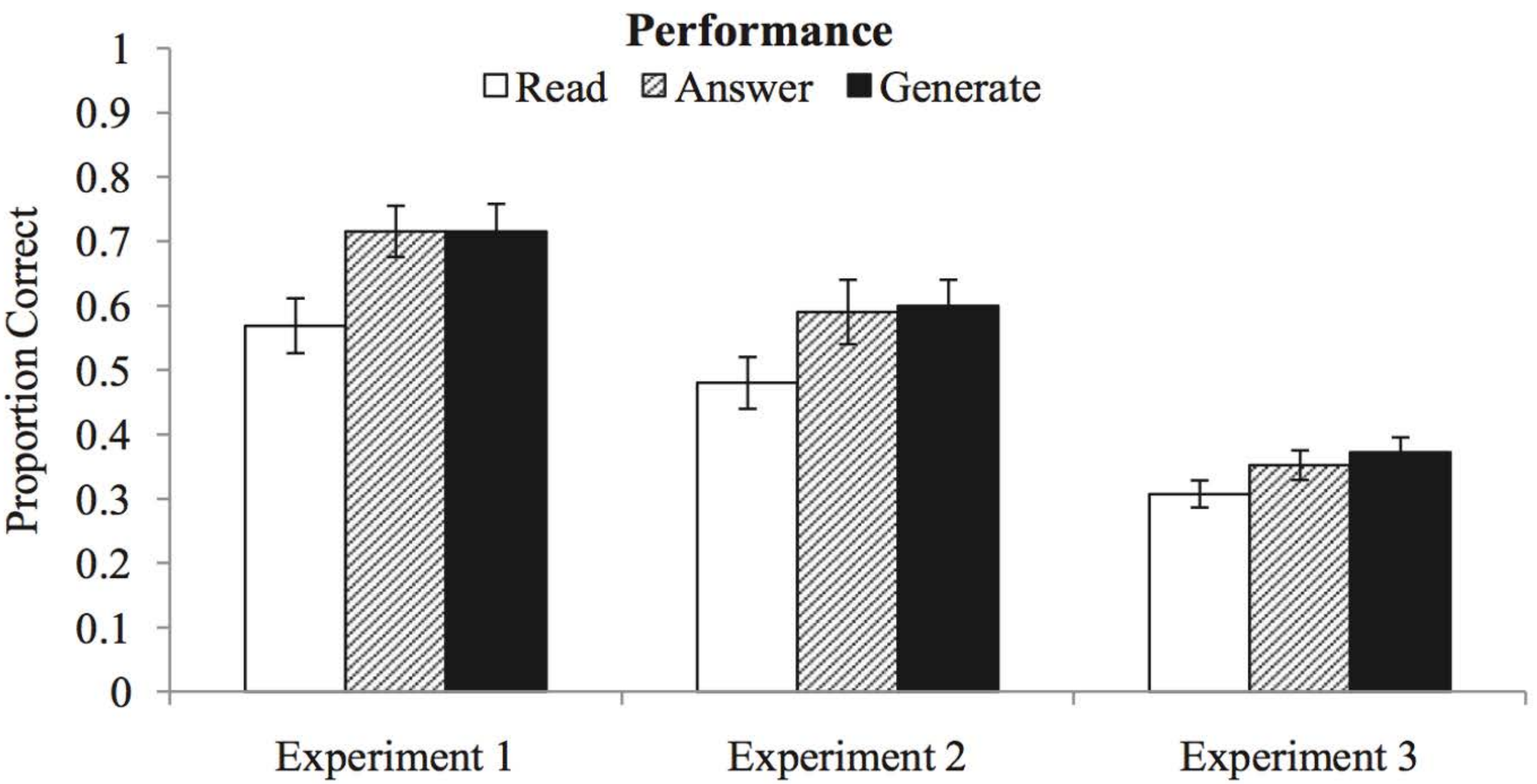

Remembering
Understanding
Applying
Analyzing
100%
75%
50%
25%
0%
Student 1
Student 2
Student 3
Student 3
Student 4
Student 5
Not real data

Case #2

- You are evaluating a patient in the emergency department with one of your trainees.
- A 6 year old male with asthma presents with respiratory distress.
- This is the third time in three months that the patient is seen in the emergency department.
- Both parents smoke and there are pets in the home. In reading the notes, you learn that adherence to his asthma inhalers has been an issue in the past.
- What questions will you ask your trainee to teach them during this situation?

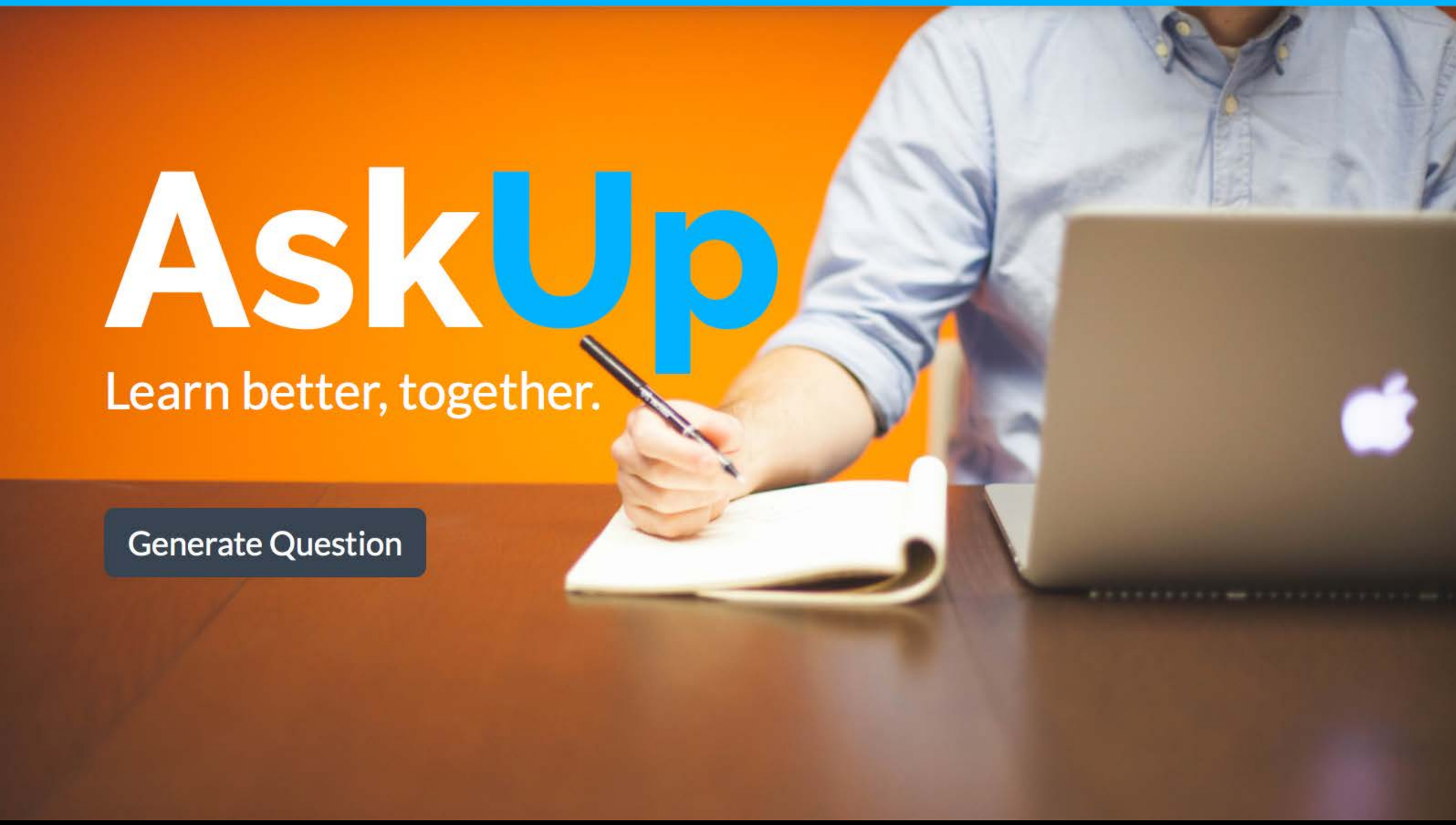
Your questions #2

Learner-generated questions are as good as teacher's questions



McDermott KB, Roediger HL. A comparison of study strategies for passages: Rereading, answering questions, and generating questions. Journal of Experimental Psychology: Applied 2010;16(3):308–16.

AskUp Review Questions Generate Question Feedback Sign In



AskUp.net

Four-question technique

- What one important concept, research finding, theory, or idea did you learn?
- Why do you believe this concept is important?
- How does what you learned apply to some aspect of your life?
- What questions has this activity raised for you? What are you still wondering about?

Dietz-Uhler B, Lanter JR. Using the four-questions technique to enhance learning. Teaching of Psychology. 2009.

Any questions

?

Take-home points

- Questions require retrieval practice, a strategy that is essential for learning
- Questions can assess for different types of knowledge in Bloom’s taxonomy
- 4 questions:
  - What one important concept did you learn?
  - Why do you believe this concept is important?
  - How does what you learned apply to some aspect of your life?
  - What questions has this activity raised for you?

The Critical Importance of Retrieval for Learning

Jeffrey D. Karpicke[1]* and Henry L. Roediger III[2]

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