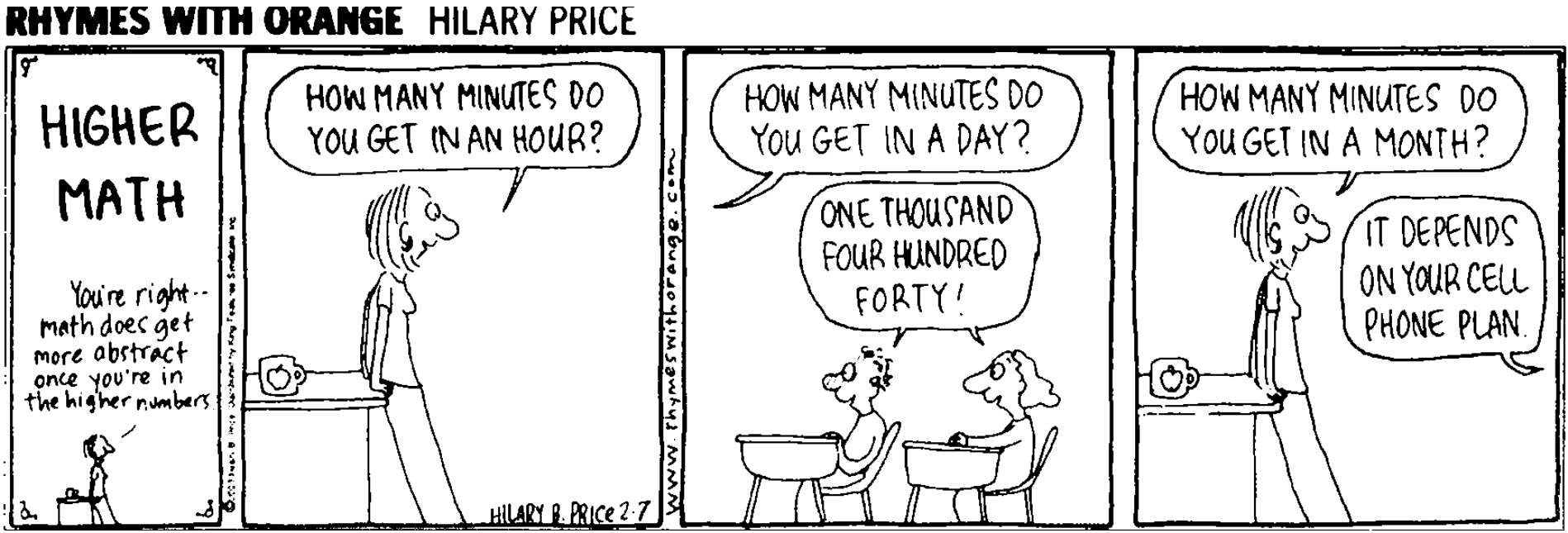
- **Topic: Ch1 – Units/Dimensions & Estimation**
- **Cartoon: Hilary Price**

Rhymes with Orange



Experiment :
Count the passes

Simons & Chabris (1999) Perception. 28:9, 1059-1074.

How many passes did you see?

A. 14 or fewer
B. 15
C. 16
D. 17 or more

How many gorillas did you see?

A. None!
   (You're kidding, right?)
B. One
C. More than one

How many players were
on the court
at the end of the video?

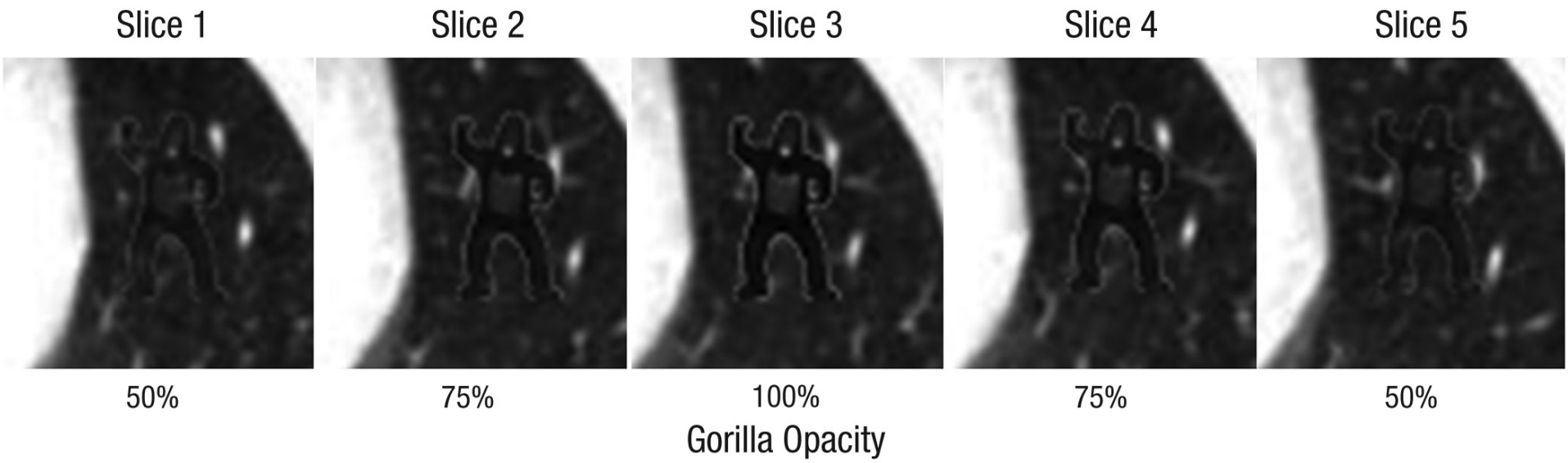
A. More than 6
B. 6
C. 5
D. 4 or fewer

What color was the curtain at the end of the video?

A. Red
B. Yellow
C. Blue
D. Black

Is this relevant to anything?

- In a study in *Psychological Science* (2013), Drew, Vo, & Wolfe had 24 radiologists perform a nodule detection task on x-rays that had a large (50X as an average nodule) imbedded gorilla. Only 4 saw it.
  (See *HDT* for a real medical example.)



Learning to think scientifically

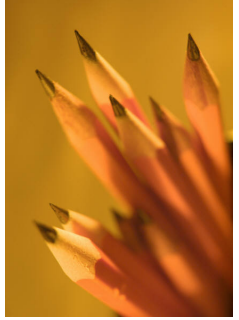
- Sometimes you're fighting your own brain!
  - We often assume an immediate recall ("**one-step thinking**") is right – and the quicker and easier the recall the more we trust it!
  - We often don't pay attention to the right things! ("**selective attention**")
  - We often assume our intuition ("**folk physics**") is correct but don't check that it makes sense with what we see or with other things we know!

Coherence – Your safety net

- We will be establishing fundamental principles that we can (almost) always trust as "**stakes in the ground**."
- The links among the different views creates a "**safety net**" that protects us against errors of recalled or reconstructed memory.
- We will use our coherence to "**reconcile**" what we know about the world with a coherent physics picture.

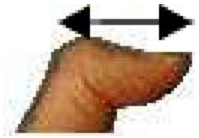
Announcements

- Don't forget to go to hands-on this week!
- Lon-Capa Ch1 HW due on Friday at midnight!
- Reading Questions for Ch2 due on Sunday at midnight!
  - If you need a refresher on adding/subtracting vectors read Ch 1.5
- Interested in an Honor's Option for this class?
  - Send me & Leanne an email by the end of the week!
  - Meet down in front at the end of class today!



Your personal scales

	inches	centimeters
First digit of thumb		
Open handspan		
Forearm (cubit)		
Full height		



Estimate the thickness of a page in a textbook.

A. 10^0 m

B. 10^{-1} m

C. 10^{-3} m

D. 10^{-5} m

E. Something else

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Estimate the number of cells in your body.

A. 10^3
B. 10^7
C. 10^{11}
D. 10^{13}
E. Something else

"An estiation of the number of cells in the huma body" Ann Hum Biol. 2013 Nov-Dec;40(6): 463-71. doi: 10.3109/03014460.2013.807878. Epub 2013 Jul 5.

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Dimensions and units

- The simplest mathematical model we use in science is we assign numbers to physical quantities by measurement.
- Each kind involves an arbitrary choice of scale.
  - Different types ⇔ **dimensions**
    - Distance, time, mass, …
  - Equations that represent physical relationships must maintain their equality even when we change our arbitrary choice.
- The quantity we create by adding a unit is NOT just a number but a blend.

Consider two mathematical models of real world things:

1. Distance
2. Time

We map positions and times into numbers.

What kinds of numbers are we mapping to?

A. All numbers
B. Non-negative numbers only
C. Positive only
D. Something else

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