

My Active Learning Guru's

Timeline for Biochemistry 2011

8/11 – Hilser prepares (brilliant) lectures.

9&10 /11 - Hilser delivers (brilliant) lectures.

9&10 /11 – Students learn from (brilliant) lectures.

1/12– Hilser receives student evaluations.

1/12– Hilser learns that students did not learn from ~~(brilliant)~~ lectures.

Teacher Effectiveness:

School Avg: 4:05

Hilser: 3.73



Dr. Kathryn Tifft Oshinnaiya



Dr. Emily Fisher

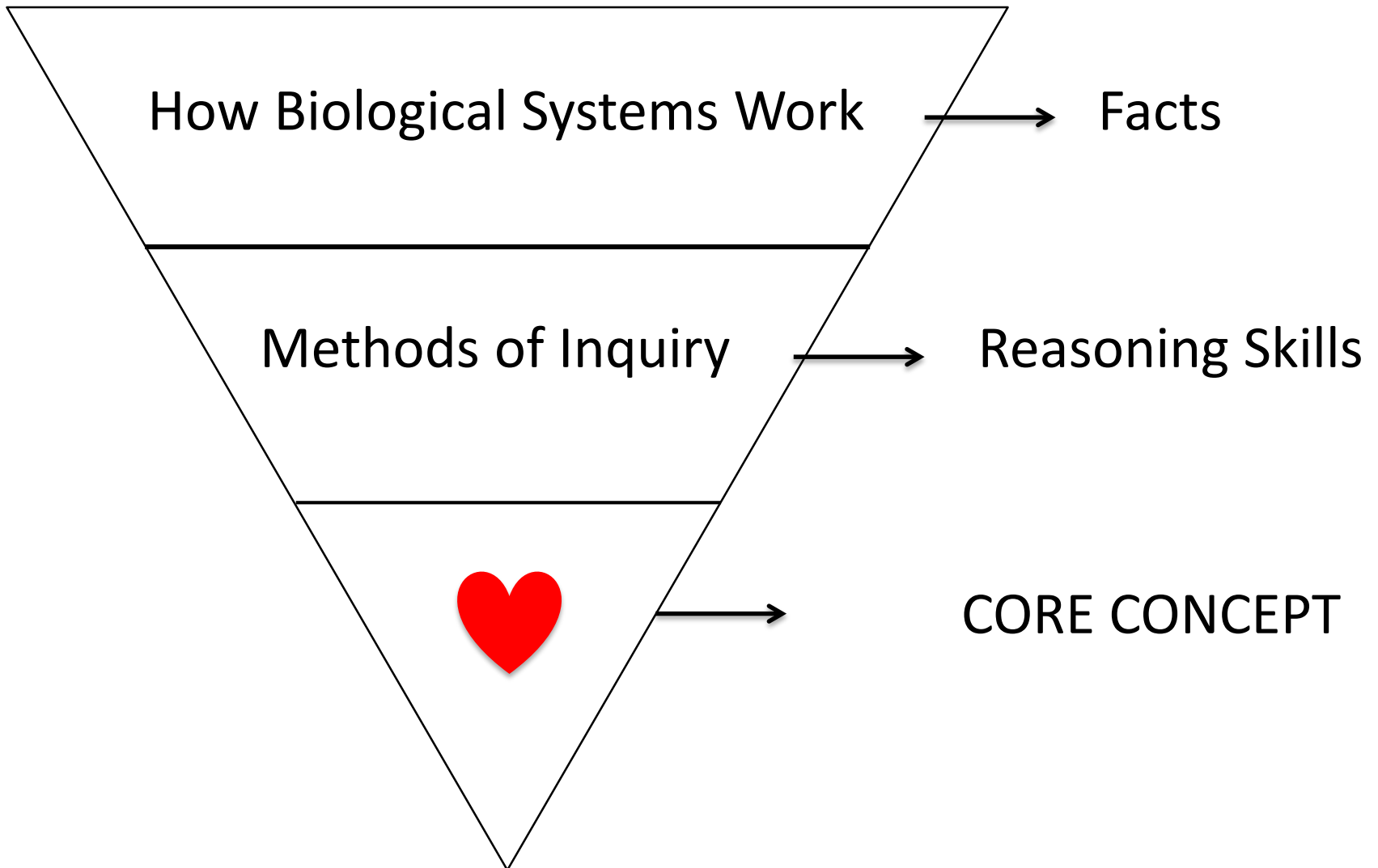
Biochemistry at JHU

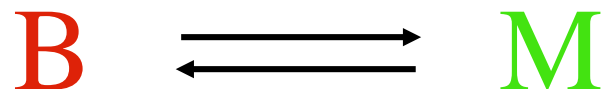
(One of) The largest single section STEM courses



~ 400 students

What is Biochemistry?





$$\Delta G = \Delta G^{\circ} + RT \cdot \ln \frac{[C_M]}{[C_B]}$$

At equilibrium $\Delta G = 0$

$$\Delta G^{\circ} = -RT \cdot \ln \frac{[{}^{\text{eq}}C_M]}{[{}^{\text{eq}}C_B]}$$

$$\Delta G = -RT \cdot \ln \frac{[{}^{\text{eq}}C_M]}{[{}^{\text{eq}}C_B]} + RT \cdot \ln \frac{[C_M]}{[C_B]}$$



The Treachery of Images - Magritte

"This is not a pipe."

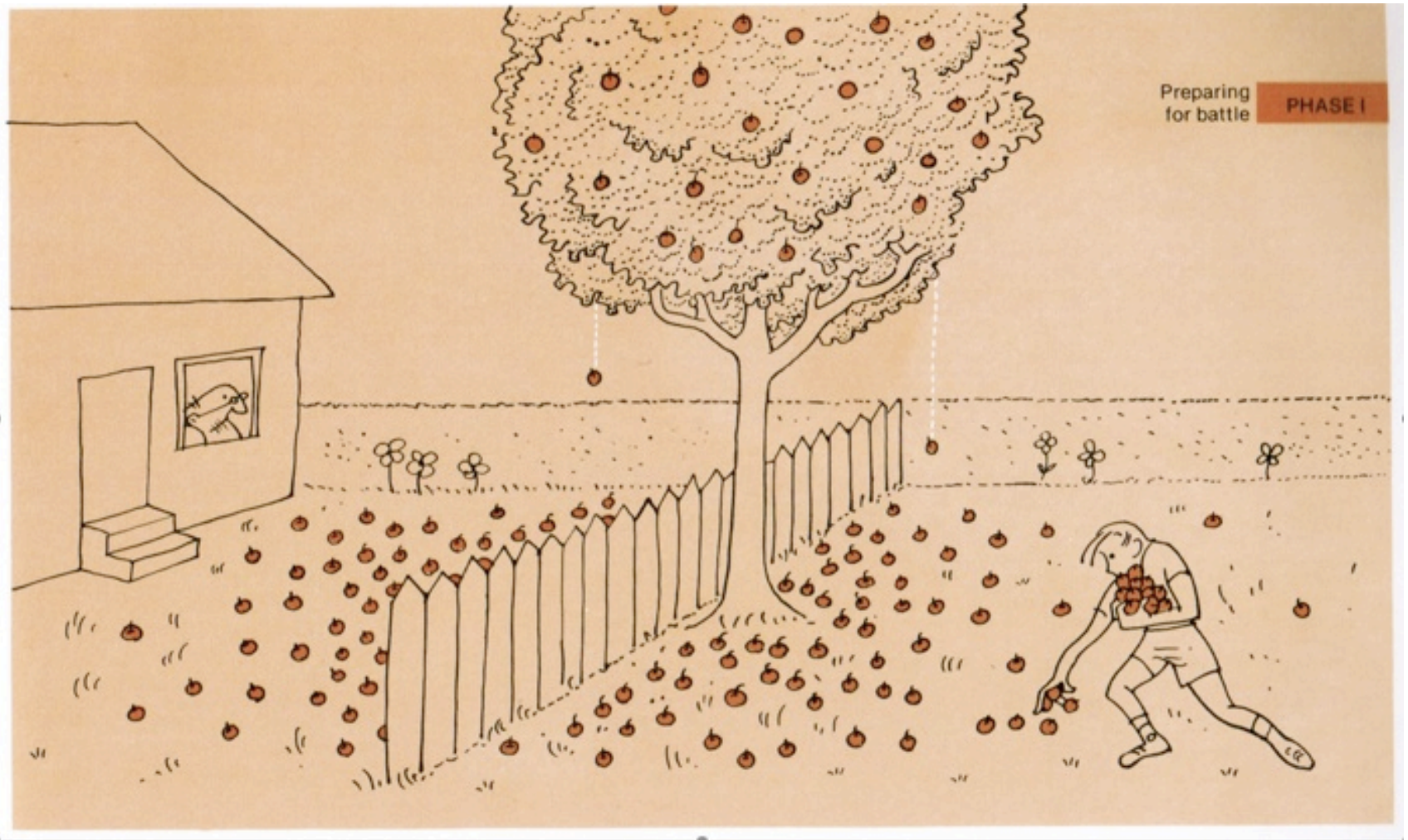
"This is not an equilibrium."

$$\Delta G = -RT \cdot \ln \frac{[C_M]^{eq}}{[C_B]^{eq}} + RT \cdot \ln \frac{[C_M]}{[C_B]}$$

Can we see a real equilibrium?

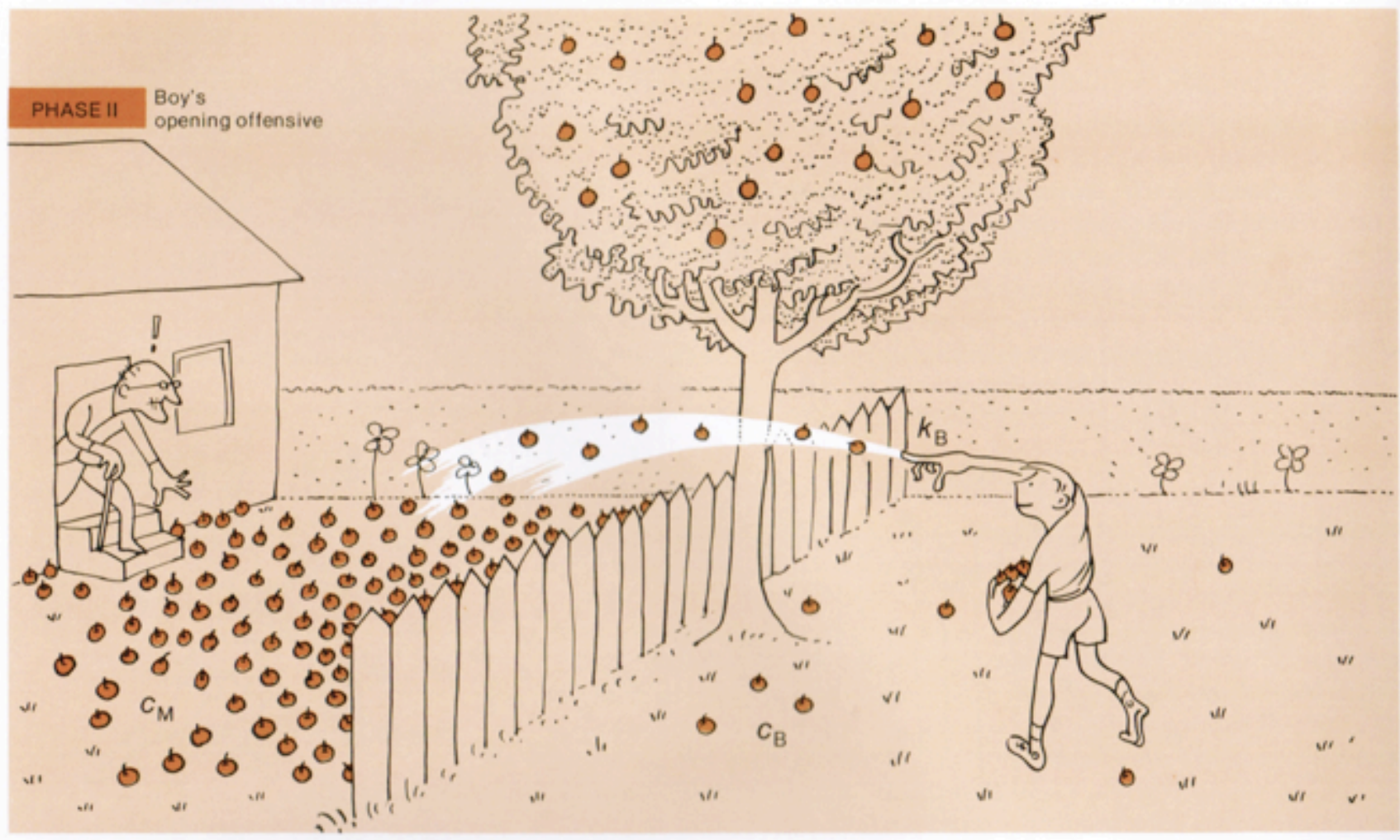
Apple wars:

A Demonstration of Equilibrium



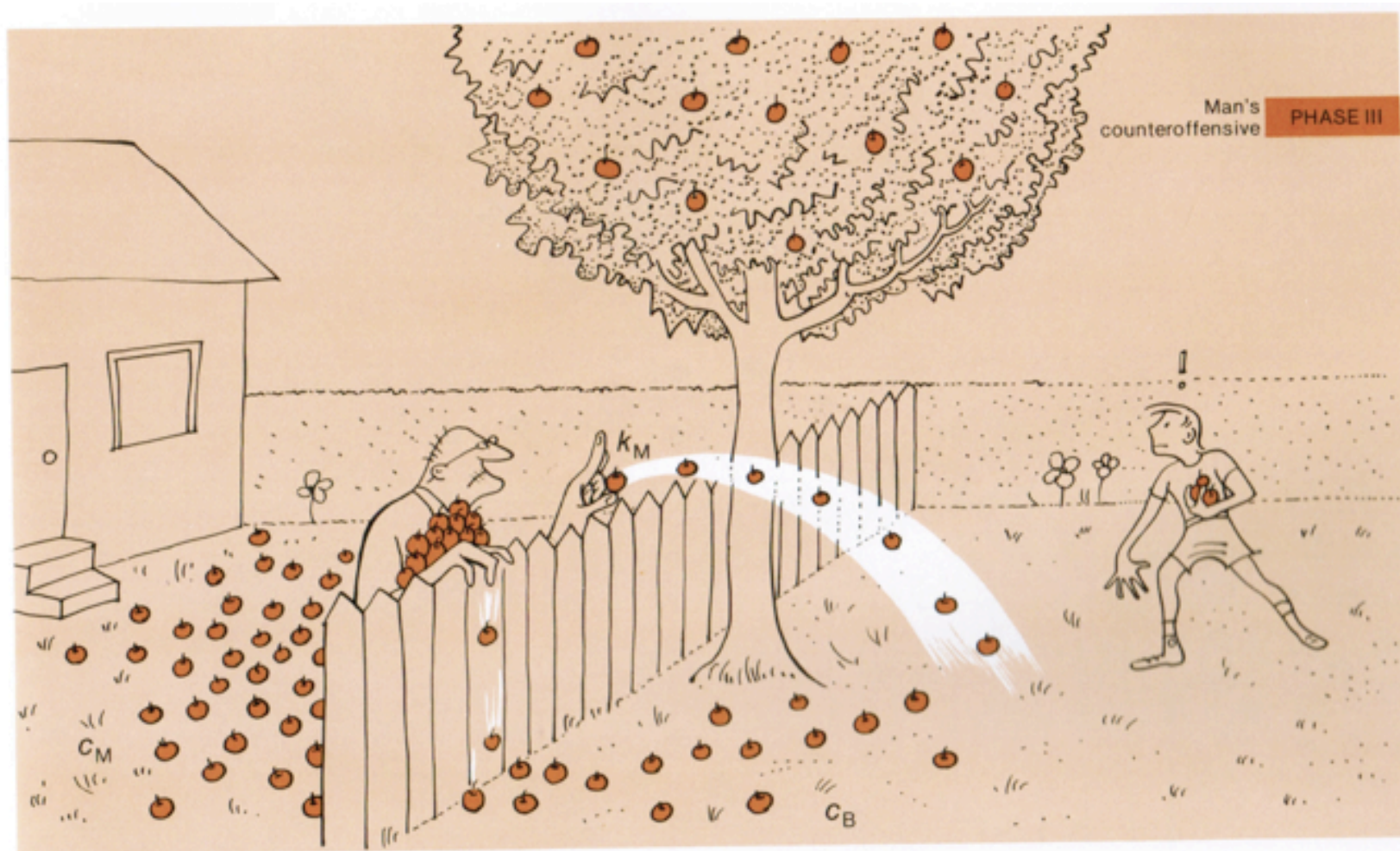
Images from Dickerson and Geis (1976), *Chemistry, Matter, and the Universe*

Apple wars: A Demonstration of equilibrium and kinetics



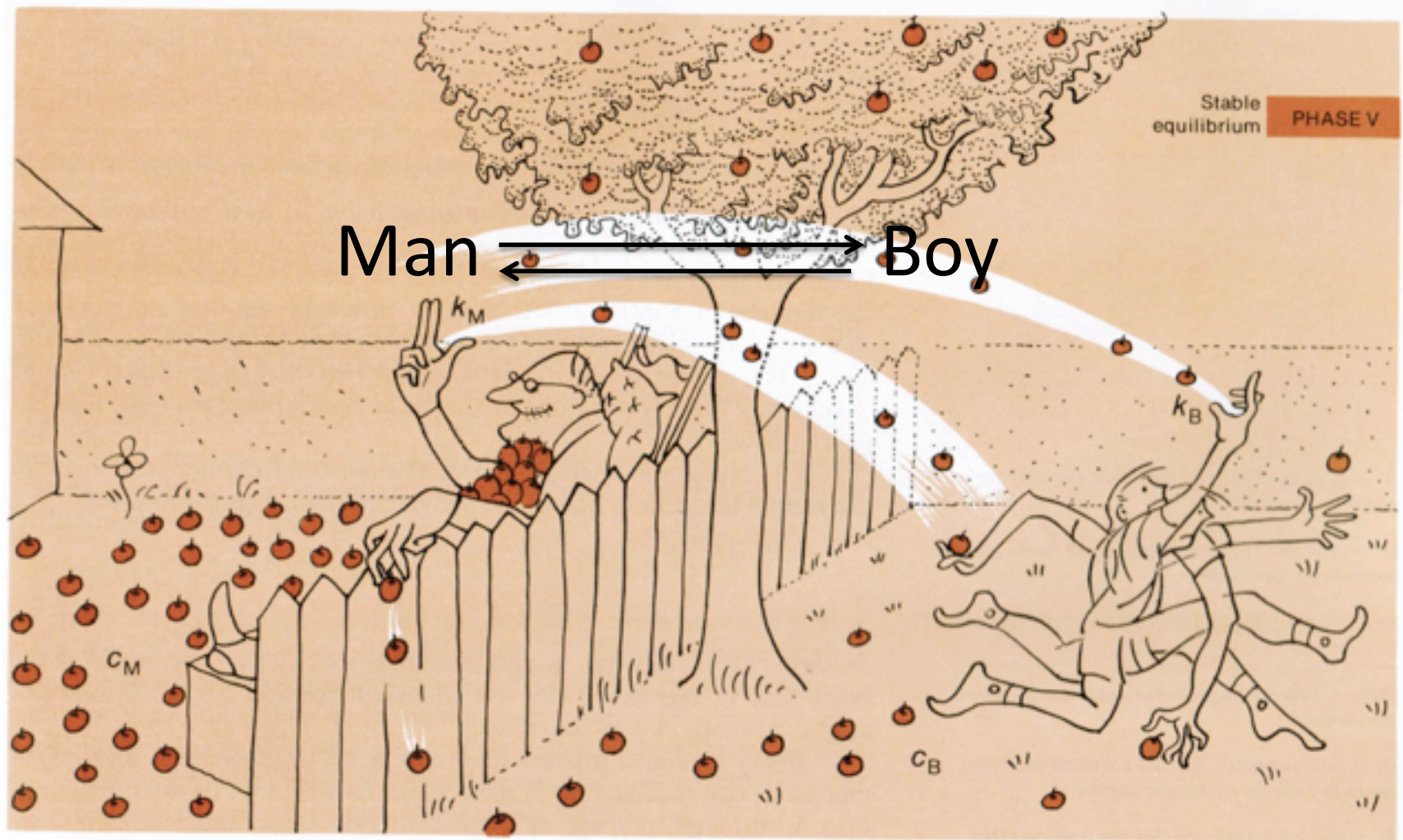
Images from Dickerson and Geis (1976), *Chemistry, Matter, and the Universe*

Apple wars: A Demonstration of equilibrium and kinetics



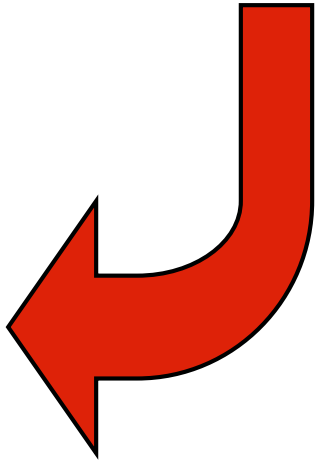
Images from Dickerson and Geis (1976), *Chemistry, Matter, and the Universe*

Apple wars: At equilibrium



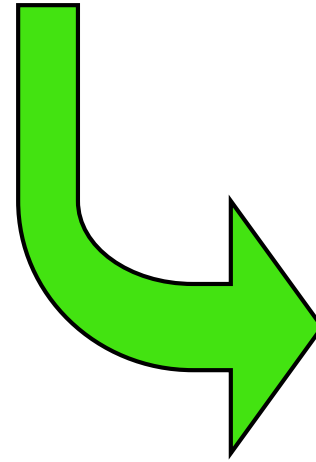


Boy's side



Fetch and throw with
BOTH hands

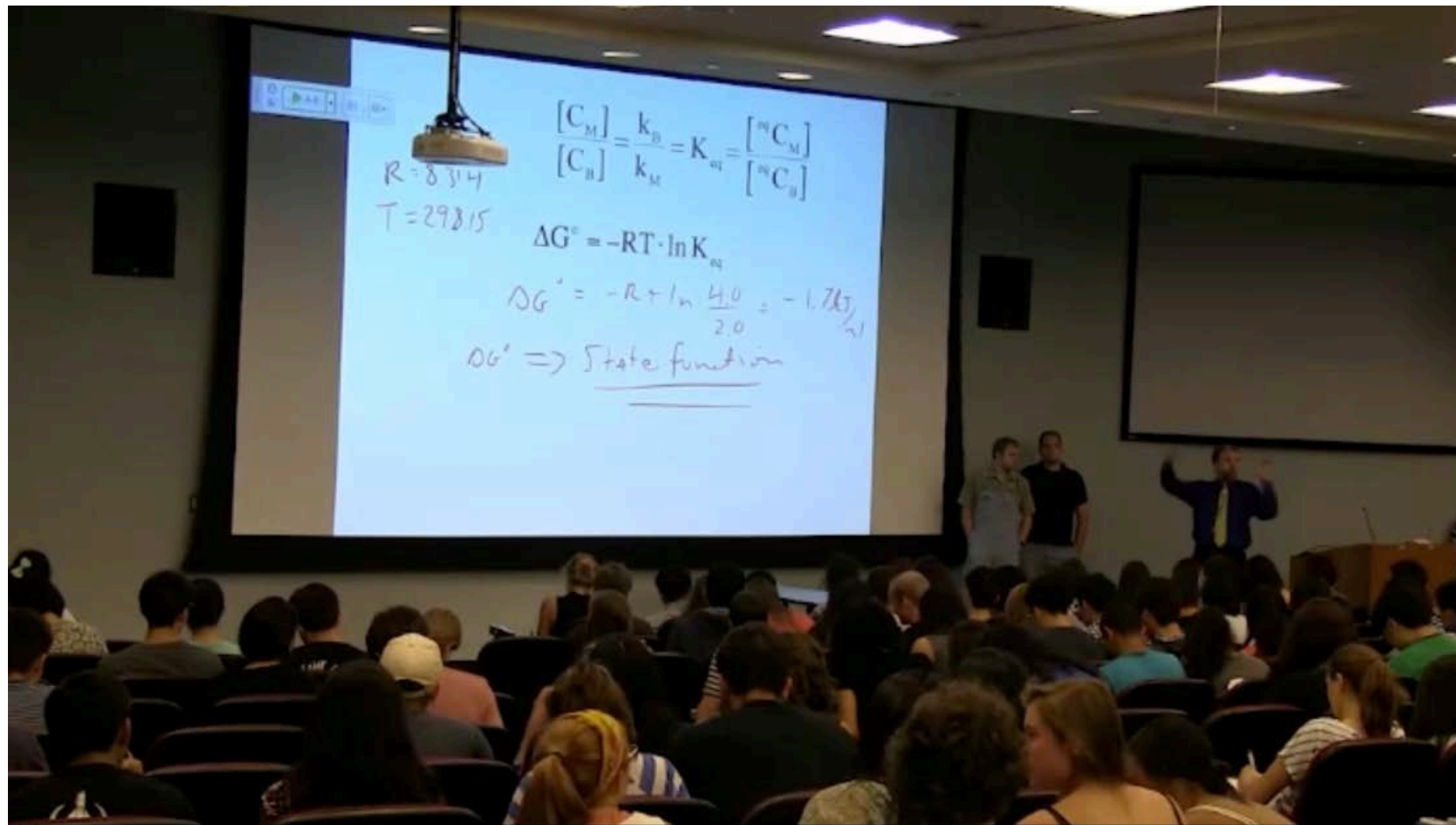
Old man's side



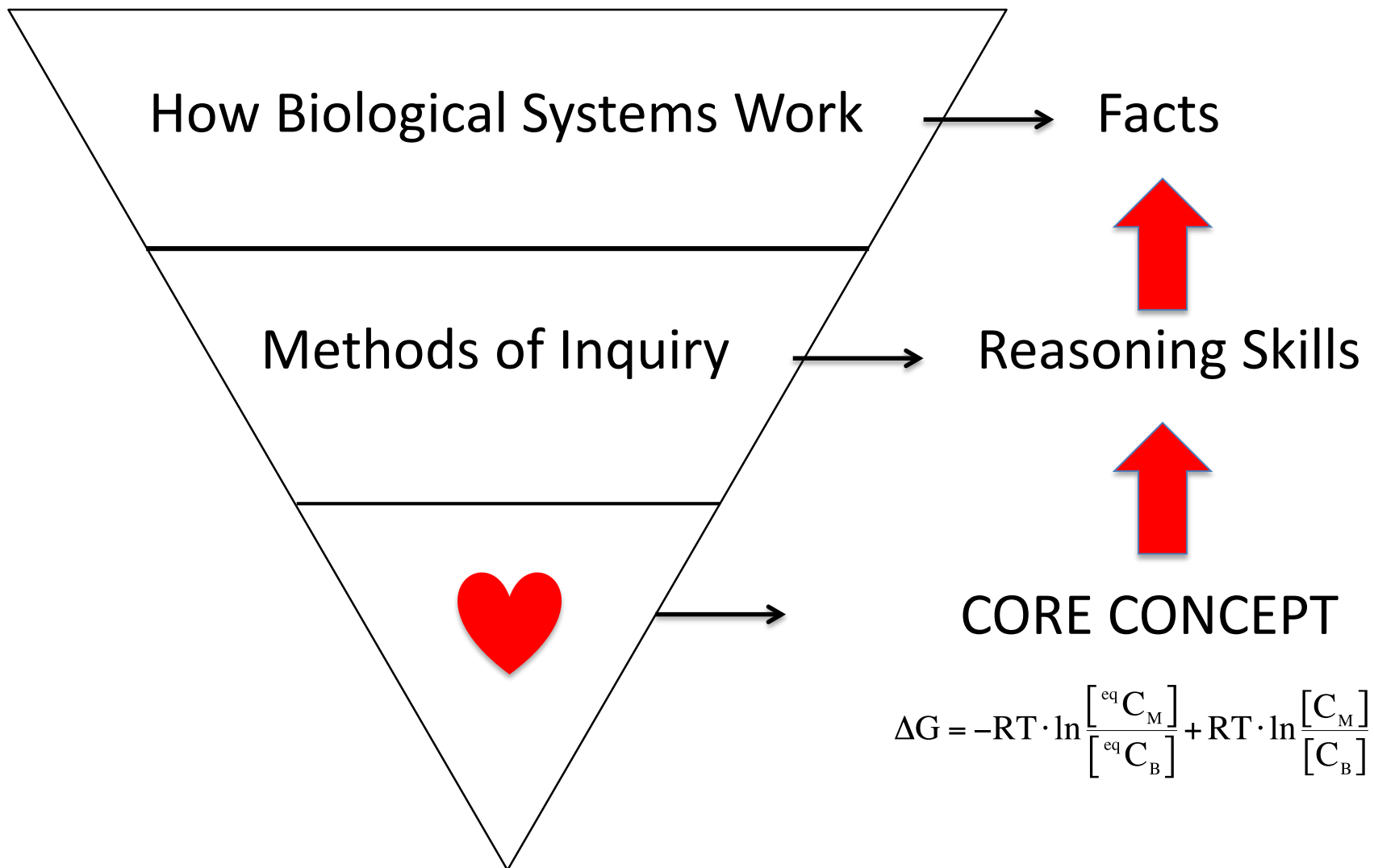
Fetch and throw with
LEFT hand ONLY



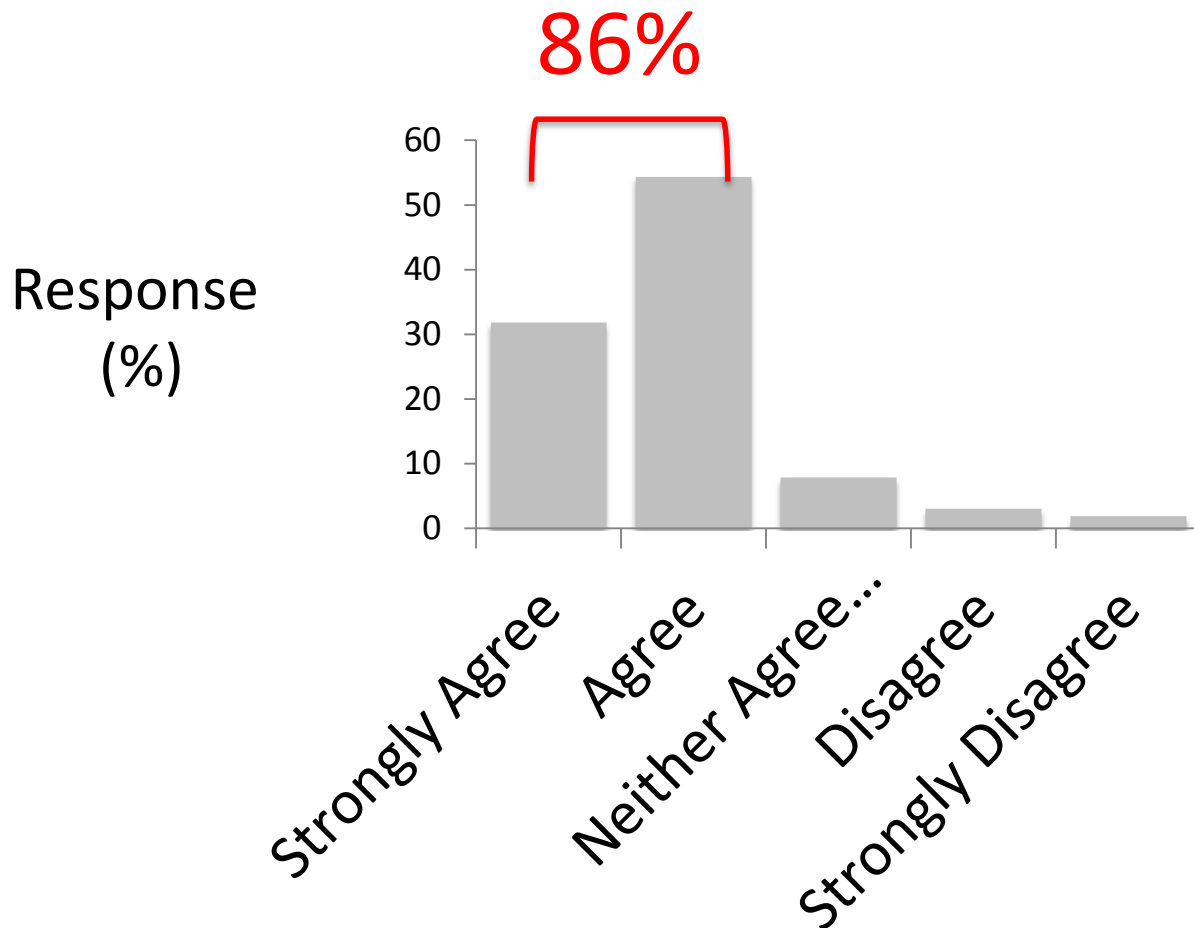
Calculation of ΔG



What is Biochemistry?



The apple wars demonstration was effective at helping me understand and apply the concept of chemical equilibrium.



Apple Wars: Student Feedback

“It wasn't until this demonstration that I had a really firm grasp [of equilibrium].”

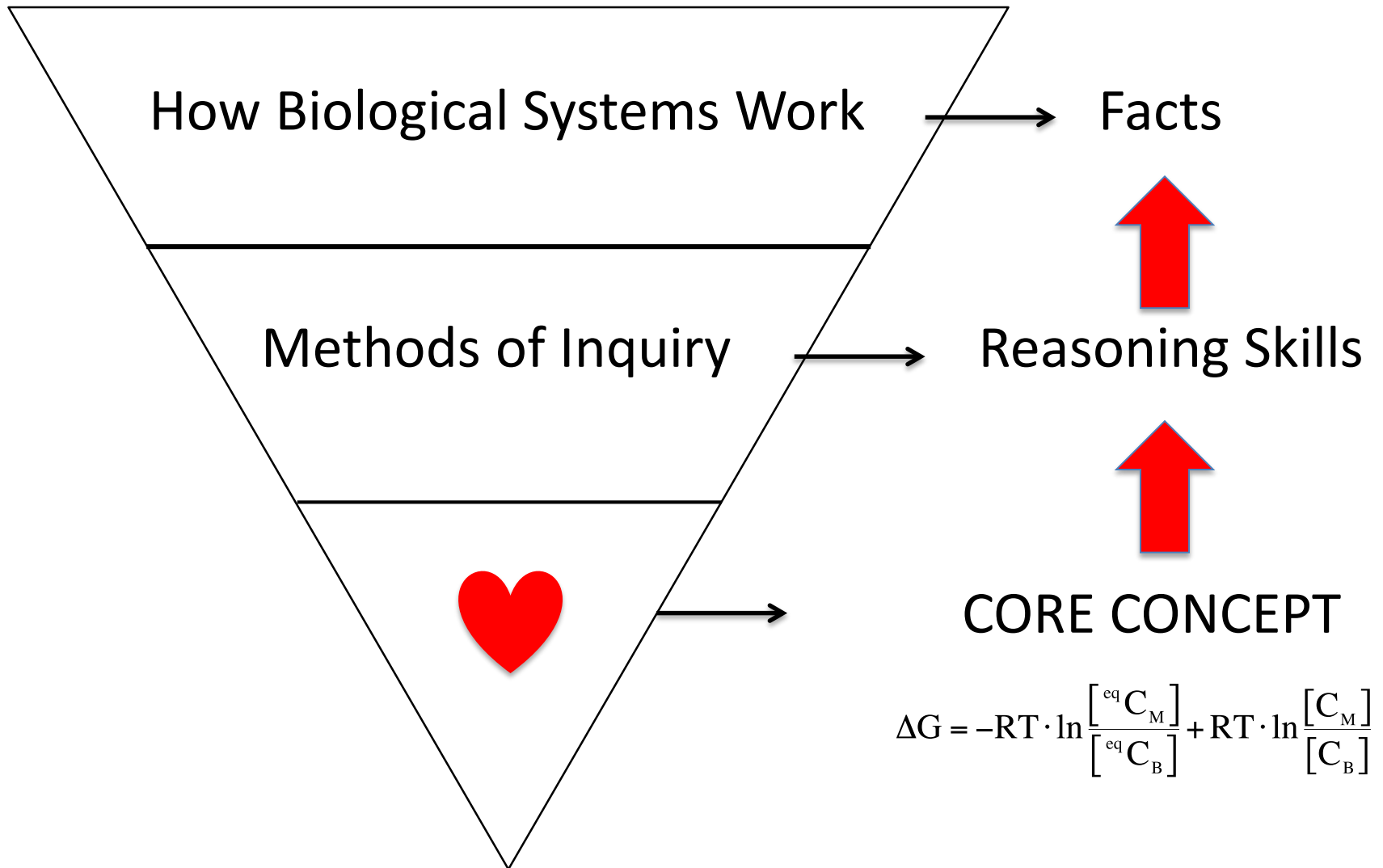
“When we actively participate it is so much easier to remember and fully understand the information.”

“This is the first time I've actually been able to see [equilibrium] - it's not something that I will forget.”

“I wouldn't have trusted the facts unless they were proven.”

“Really made me believe that ... organized randomness occurs in nature.”

What is Biochemistry?



Follow-up Clicker Questions

apples--boy's side

When we started with 600 ball and 1 balls on the boy's side, the reaction shown above approx

a) The net flow of apples was
b) The net flow of apples was
c) The net flow of apples was
d) The net flow of apples was
e) There was no net change in apples (reaction was stopped).

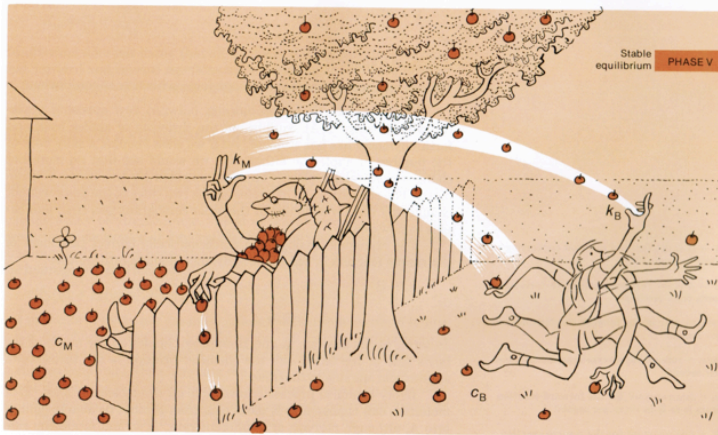
Scenario	Net Flow of Apples (%)
A	40.00%
B	70.00%
C	10.00%
D	40.00%
E	1.00%

The image shows a lecture hall with a large screen displaying a presentation. A lecturer is standing at the front, pointing at the screen. The screen shows a bar chart and a list of clicker questions. The bar chart has five bars labeled A, B, C, D, and E. The y-axis is labeled 'Net Flow of Apples (%)' and ranges from 0 to 100. The bars have the following values: A (40.00%), B (70.00%), C (10.00%), D (40.00%), and E (1.00%). The text on the screen describes a reaction between apples and balls, with initial values of 600 balls and 1 apple on the boy's side. The questions ask for the net flow of apples for each scenario.



The Treachery of Images - Magritte

"This is not a pipe."



"This is not an equilibrium either."

Can we see a real equilibrium?