Technology at the service of pedagogy

Exploring Educational Technologies for Mexico
Harvard University — LASPAU
Cambridge, MA, 31 January 2014

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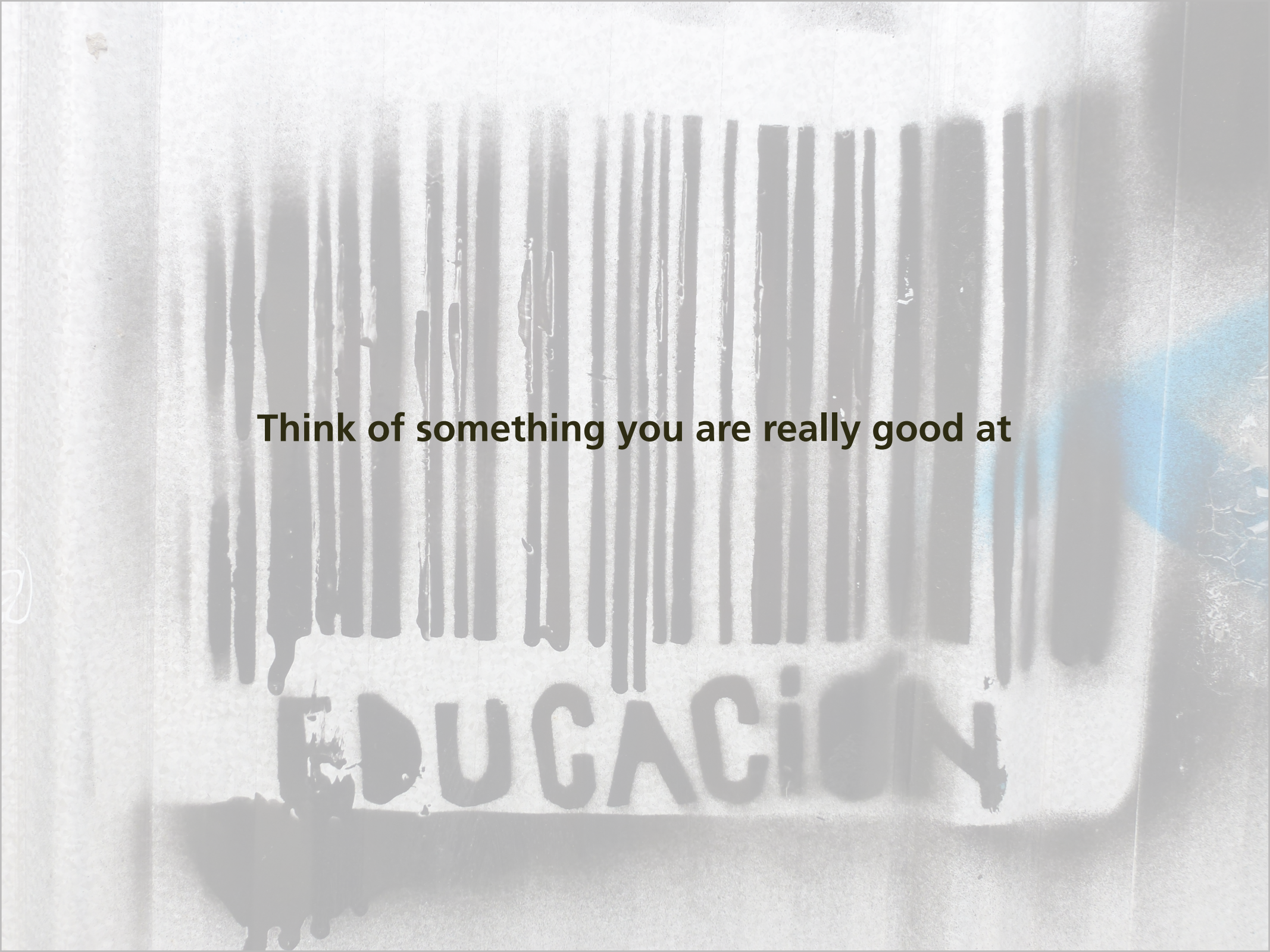

Think of something you are really good at
EDUCACION

Now think how you became good at it

1 lecture

1 lecture

2 PI

1 lecture

2 PI

3 PI 2.0

1 lecture

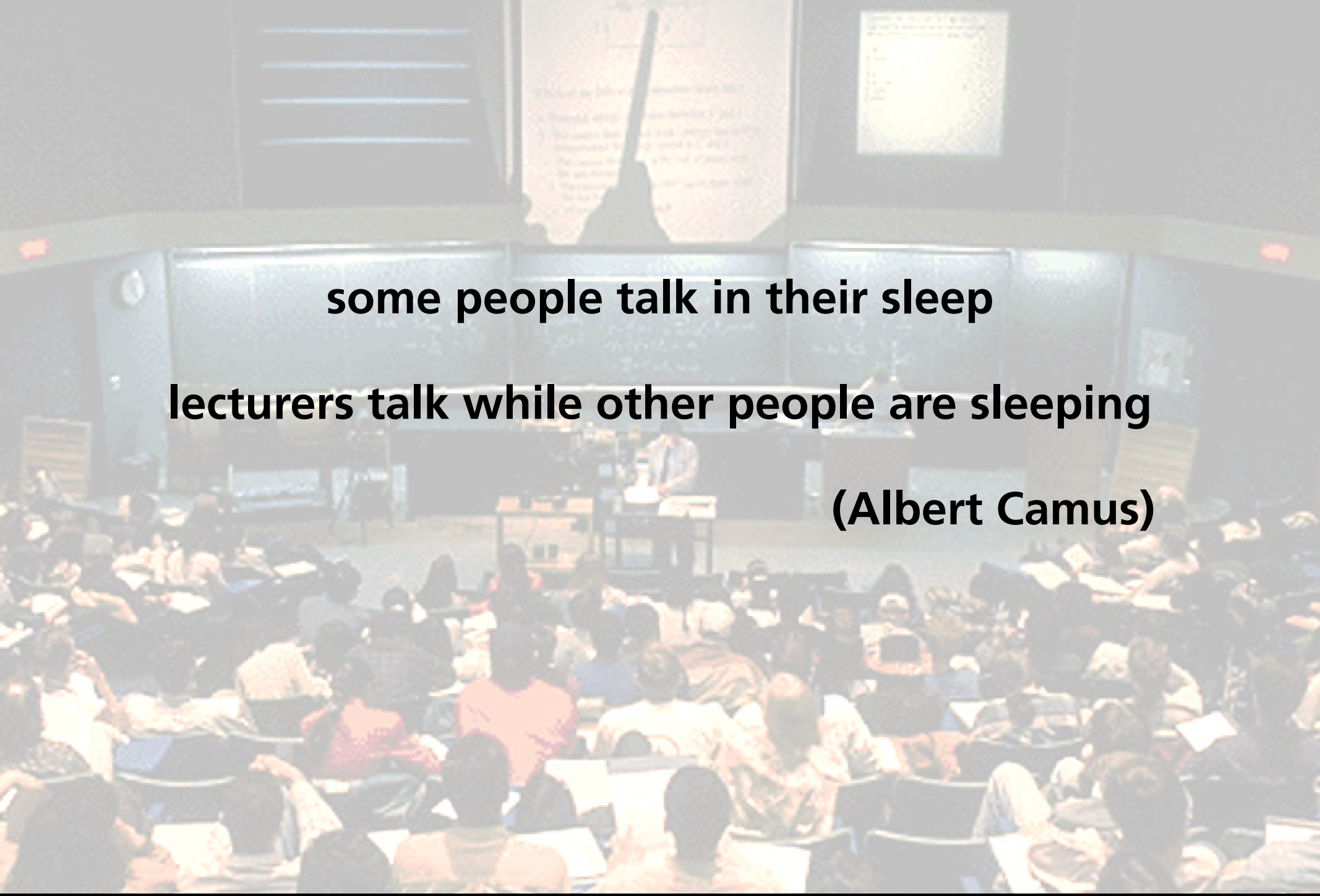
2 PI

3 PI 2.0


What happens
in a lecture?

1 lecture

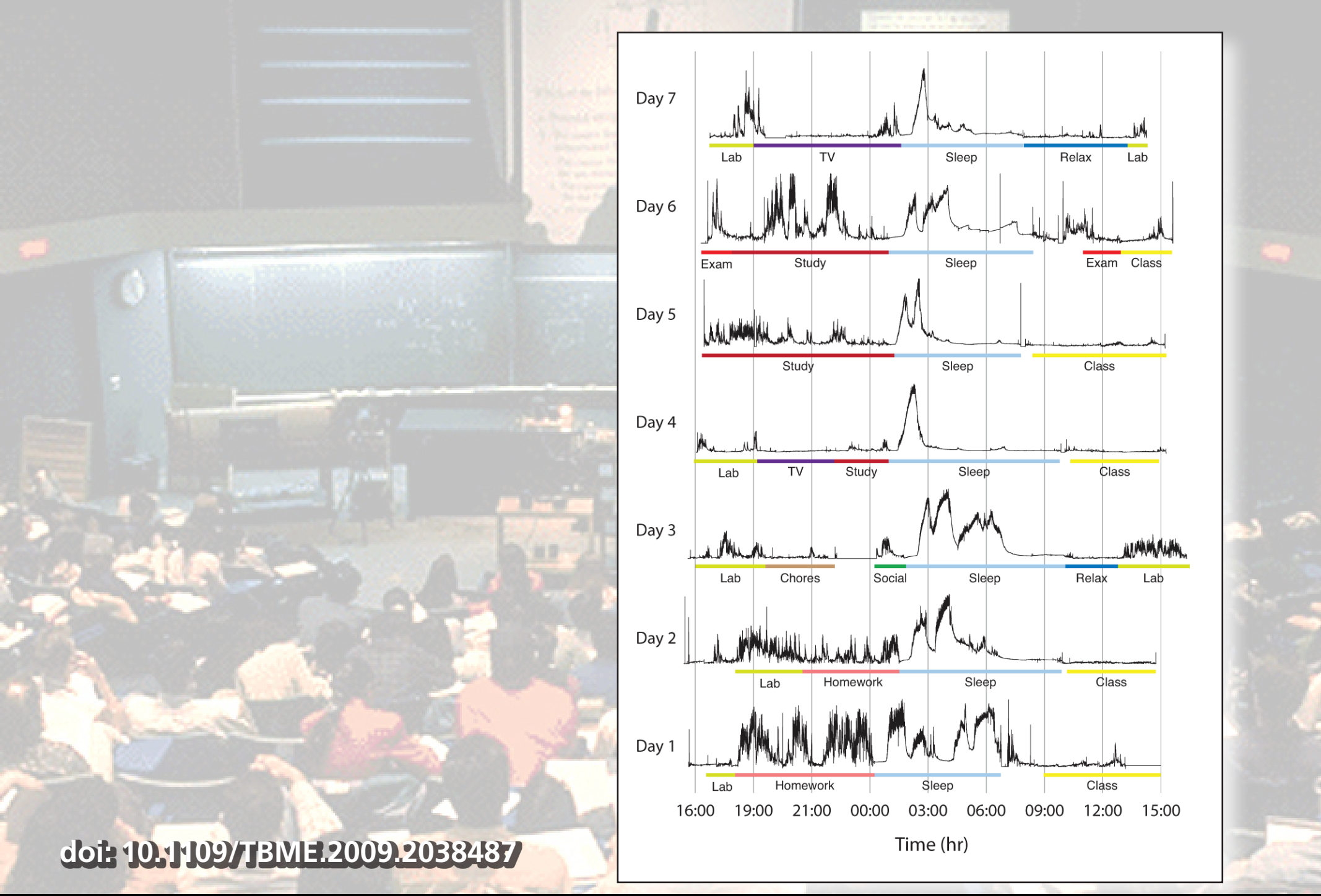
1 lecture



some people talk in their sleep

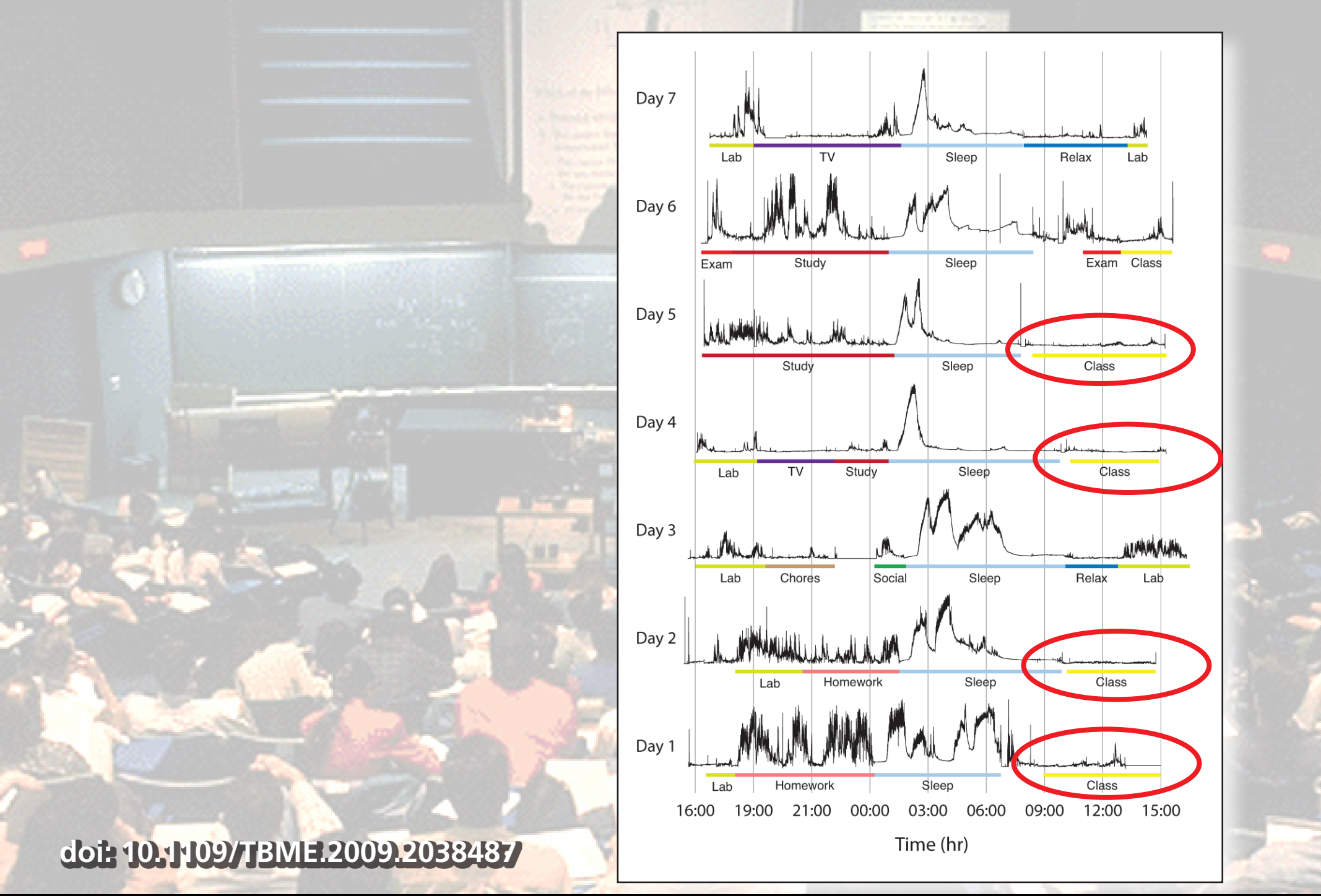
lecturers talk while other people are sleeping

(Albert Camus)



doi: 10.1109/TBME.2009.2038487

1 lecture



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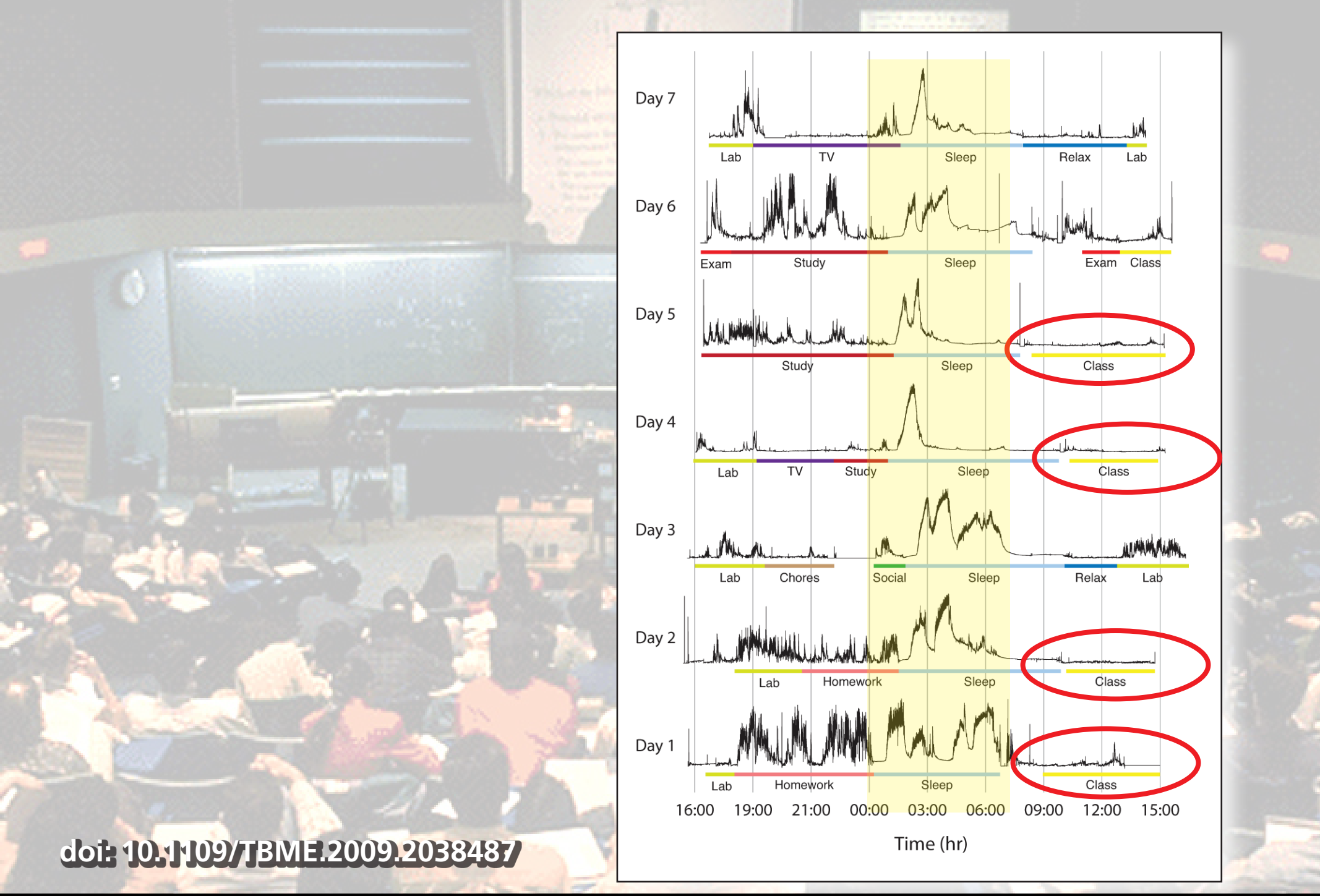
1 lecture



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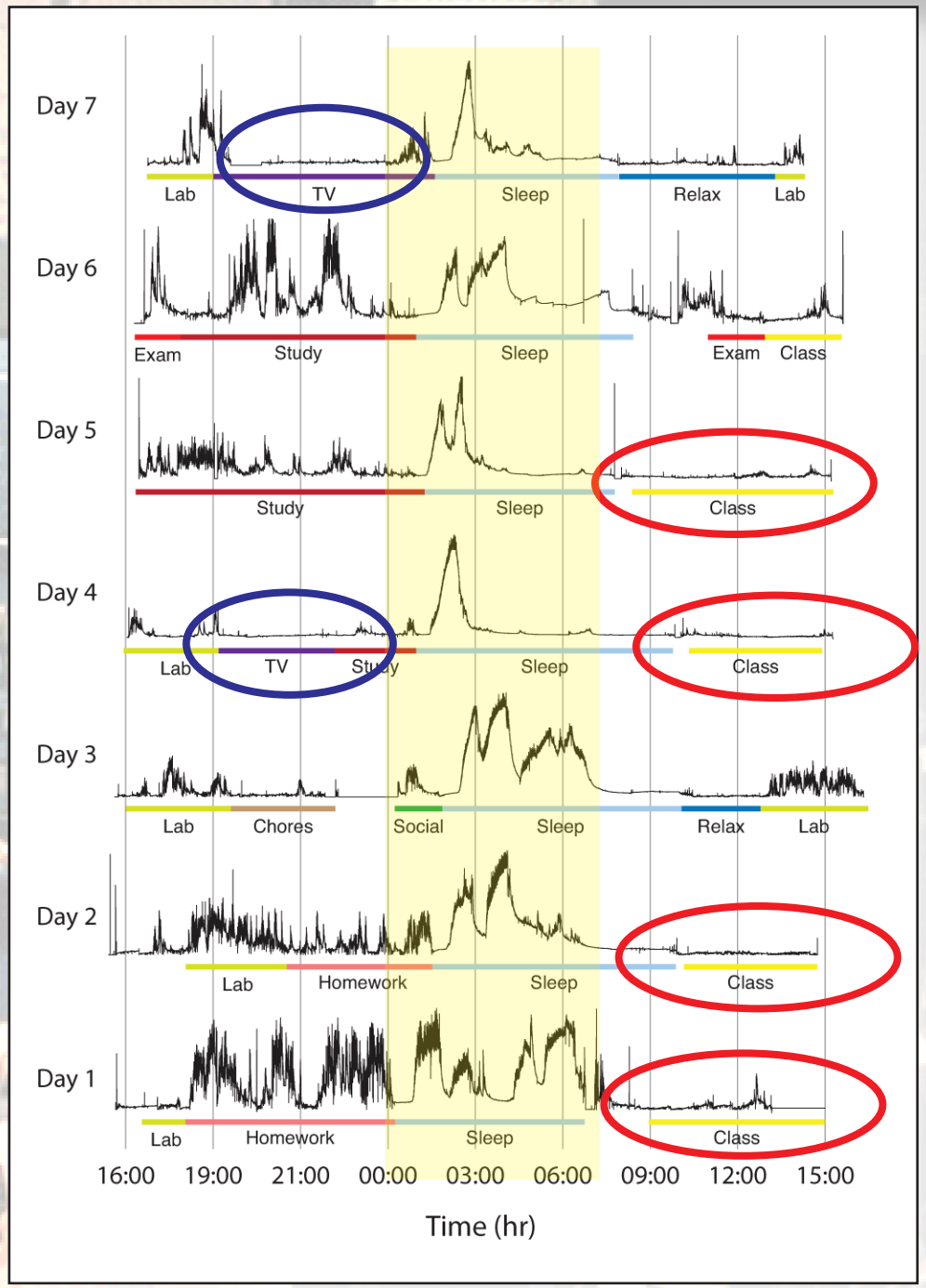
1 lecture



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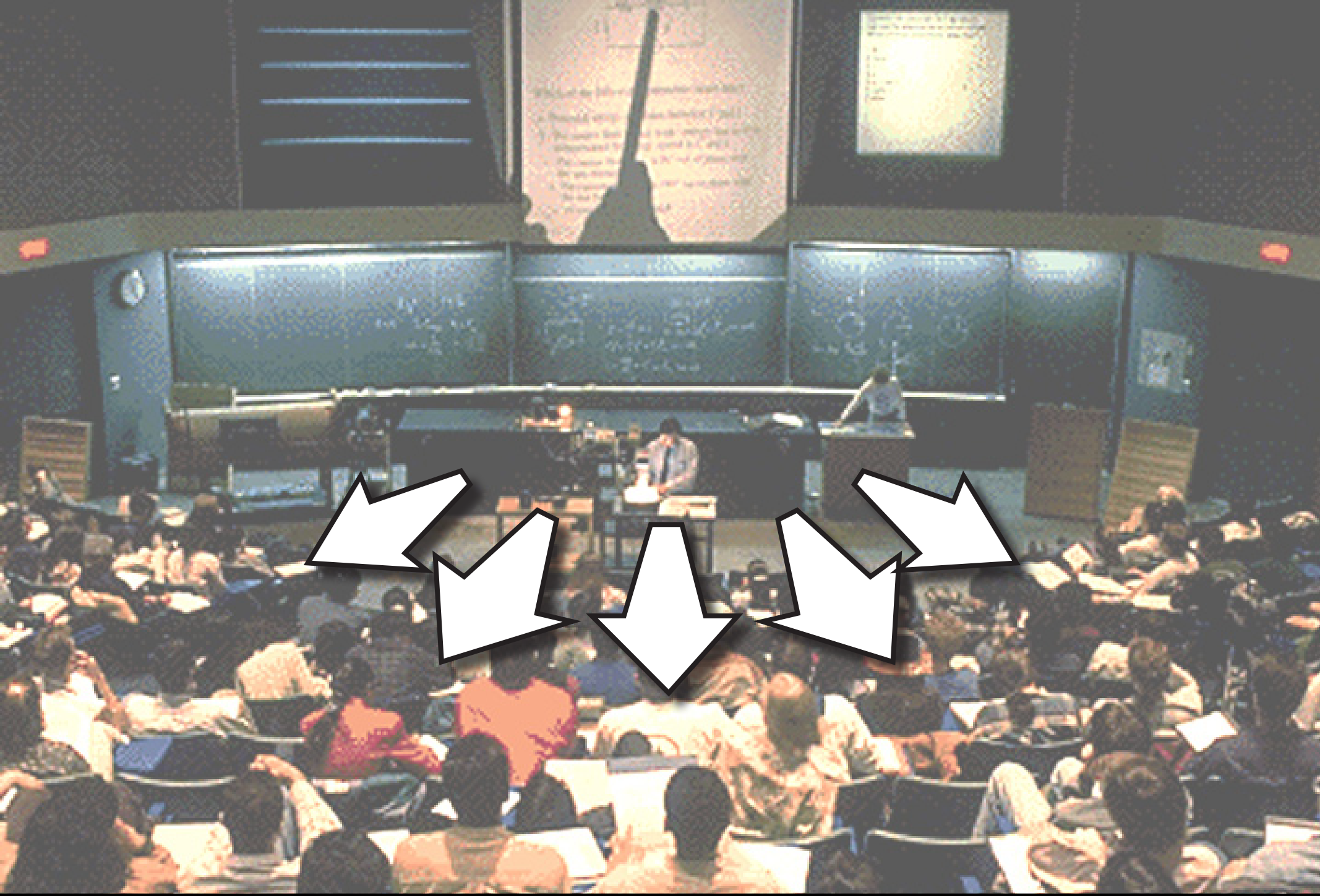
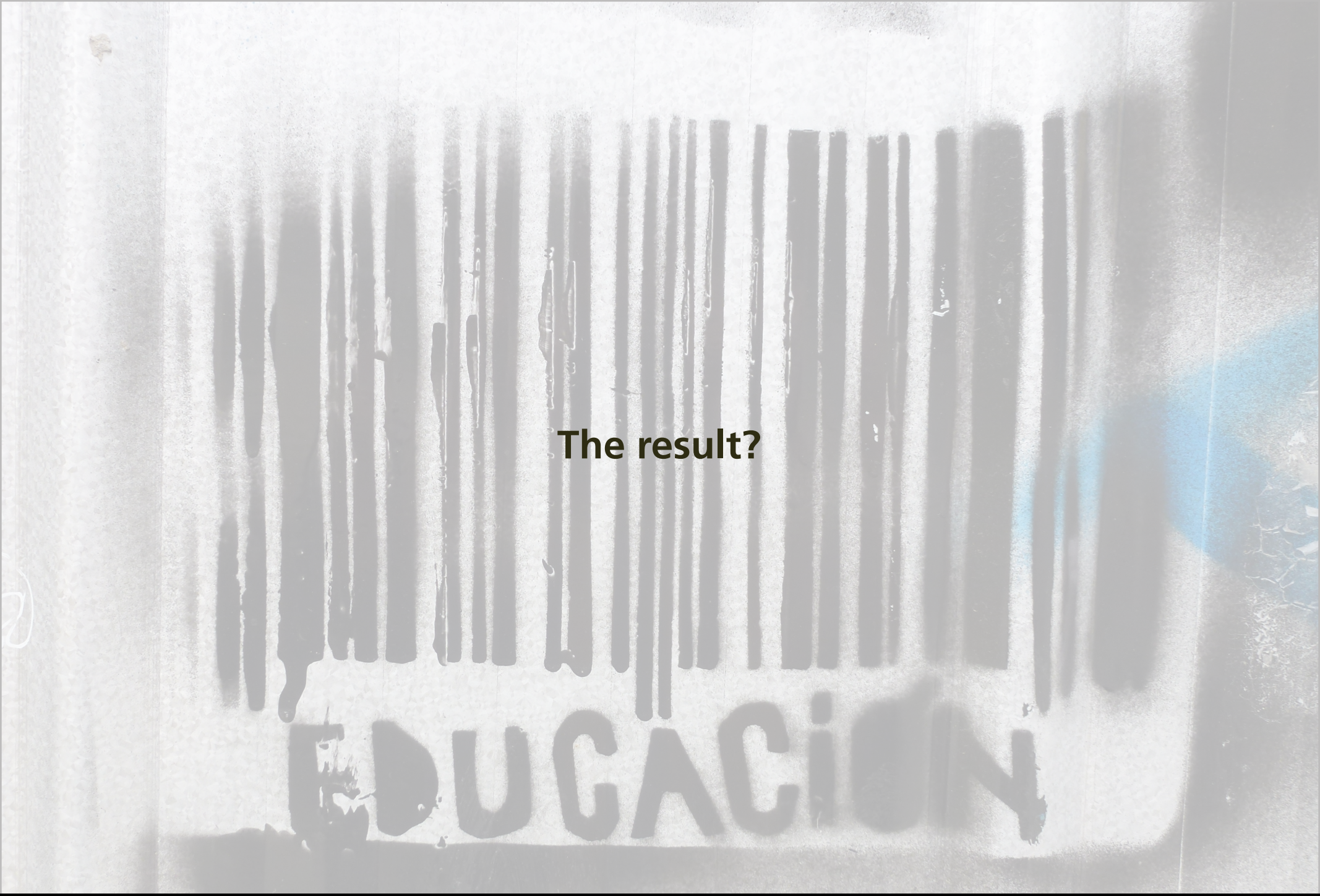
1 lecture

1 lecture



1 lecture



1 lecture

1 lecture

1 lecture

1 lecture

2 PI

1 lecture

2 PI

1. transfer of information

2. assimilation of that information

1 lecture

2 PI

1. transfer of information (in class)

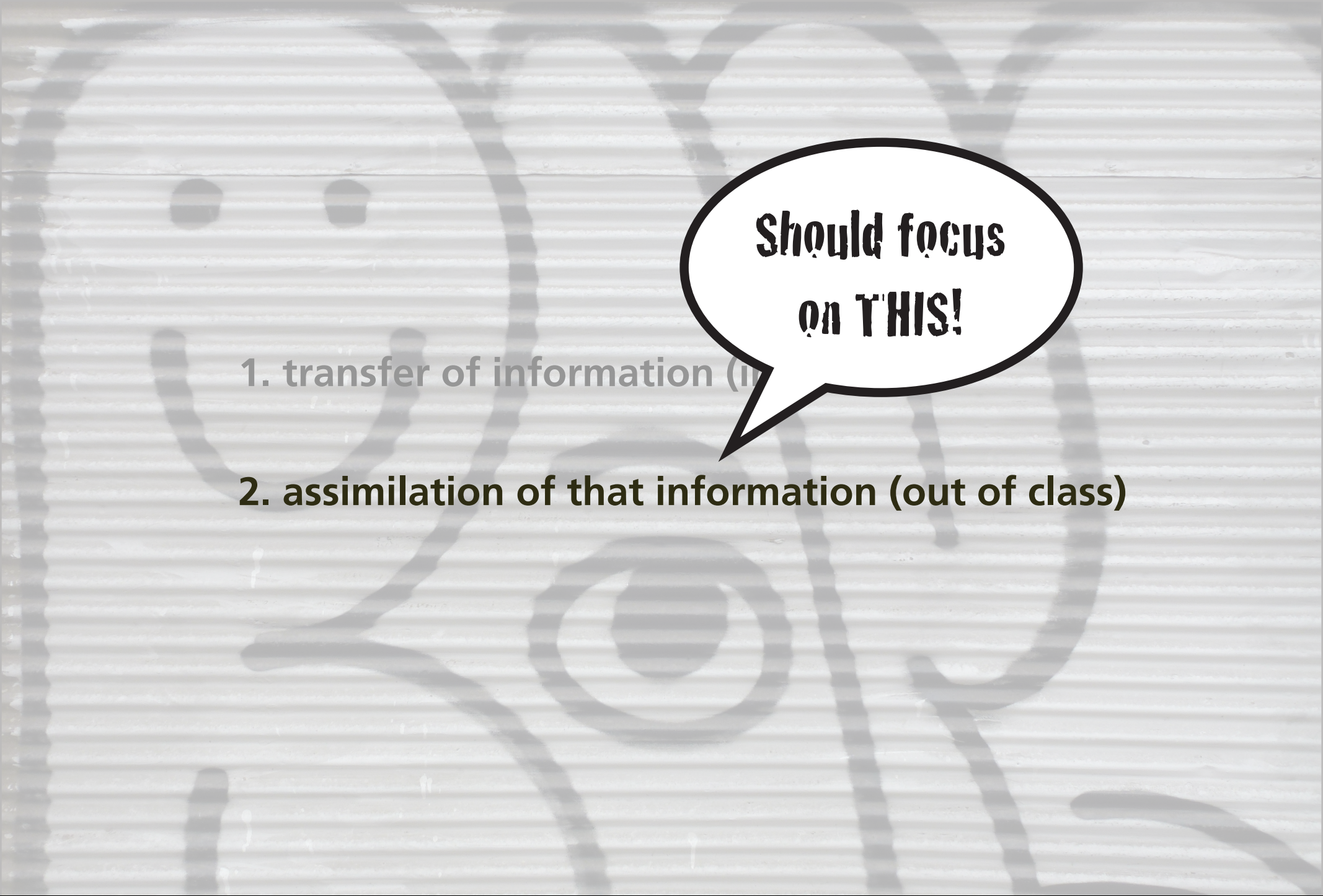
2. assimilation of that information

1 lecture

2 PI

1. transfer of information (in class)

2. assimilation of that information (out of class)



1 lecture 2 PI

1. transfer of information (in class)

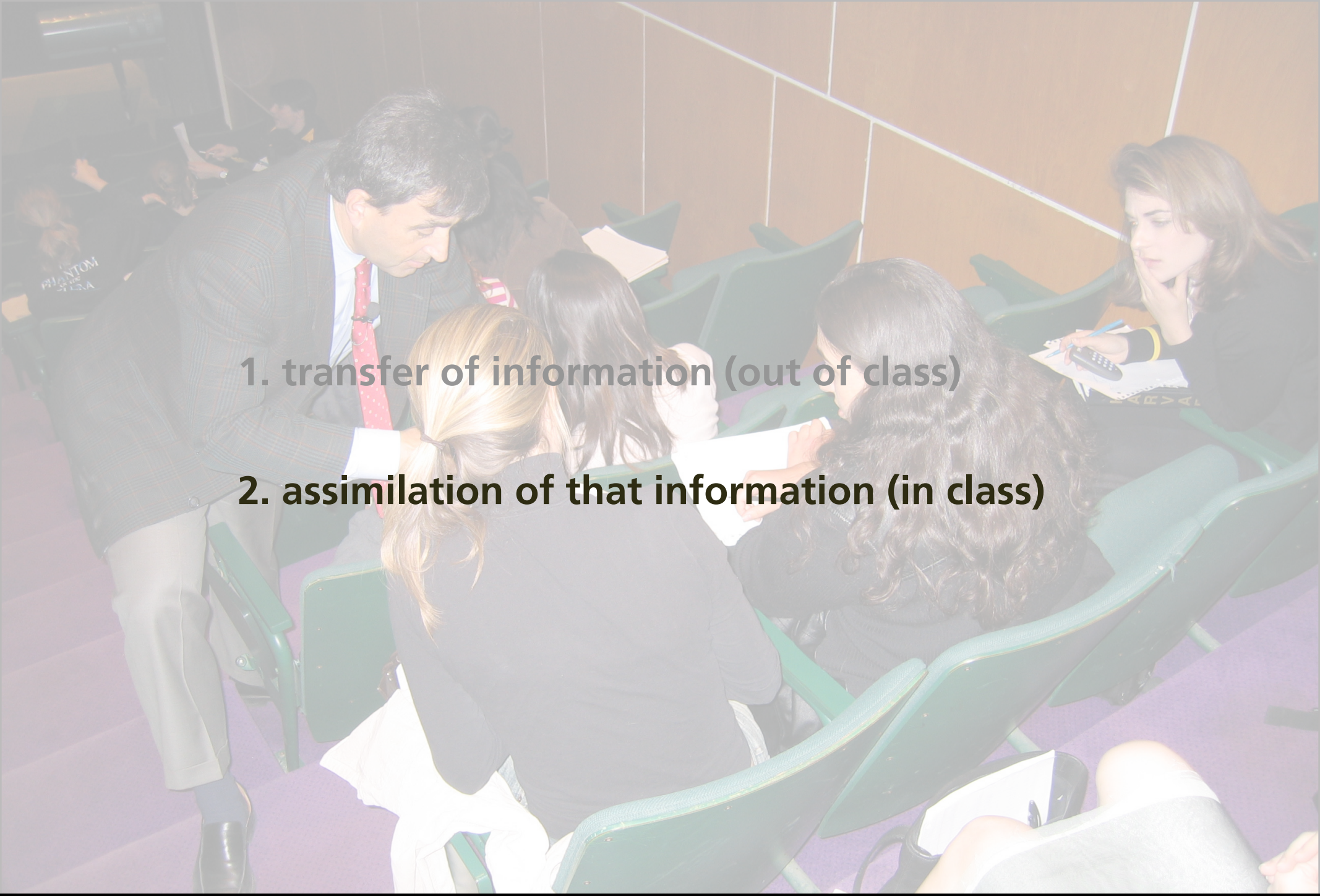
2. assimilation of that information (out of class)

1. transfer of information (out of class)

2. assimilation of that information (in class)

1 lecture

2 PI

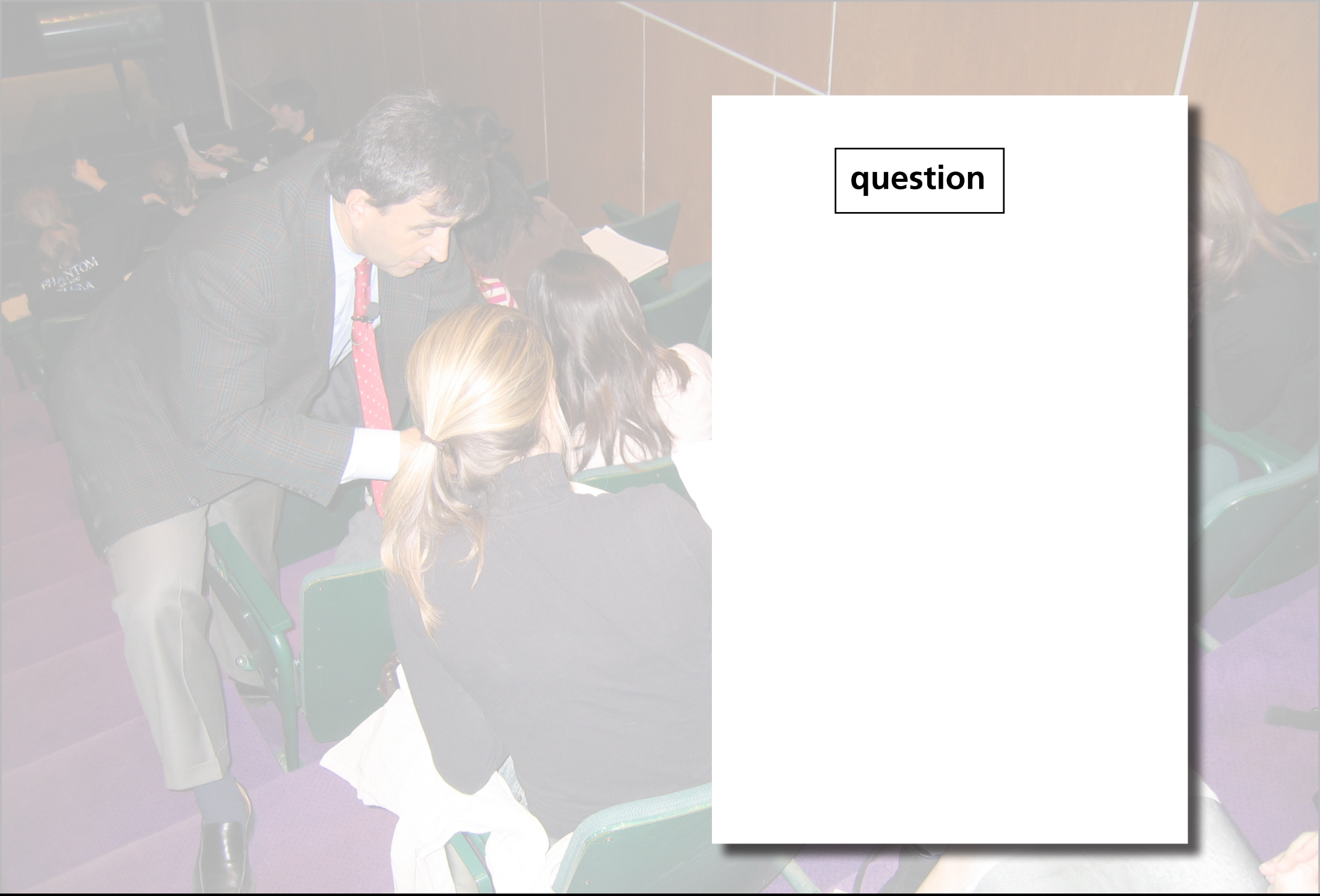


1. transfer of information (out of class)

2. assimilation of that information (in class)

1 lecture

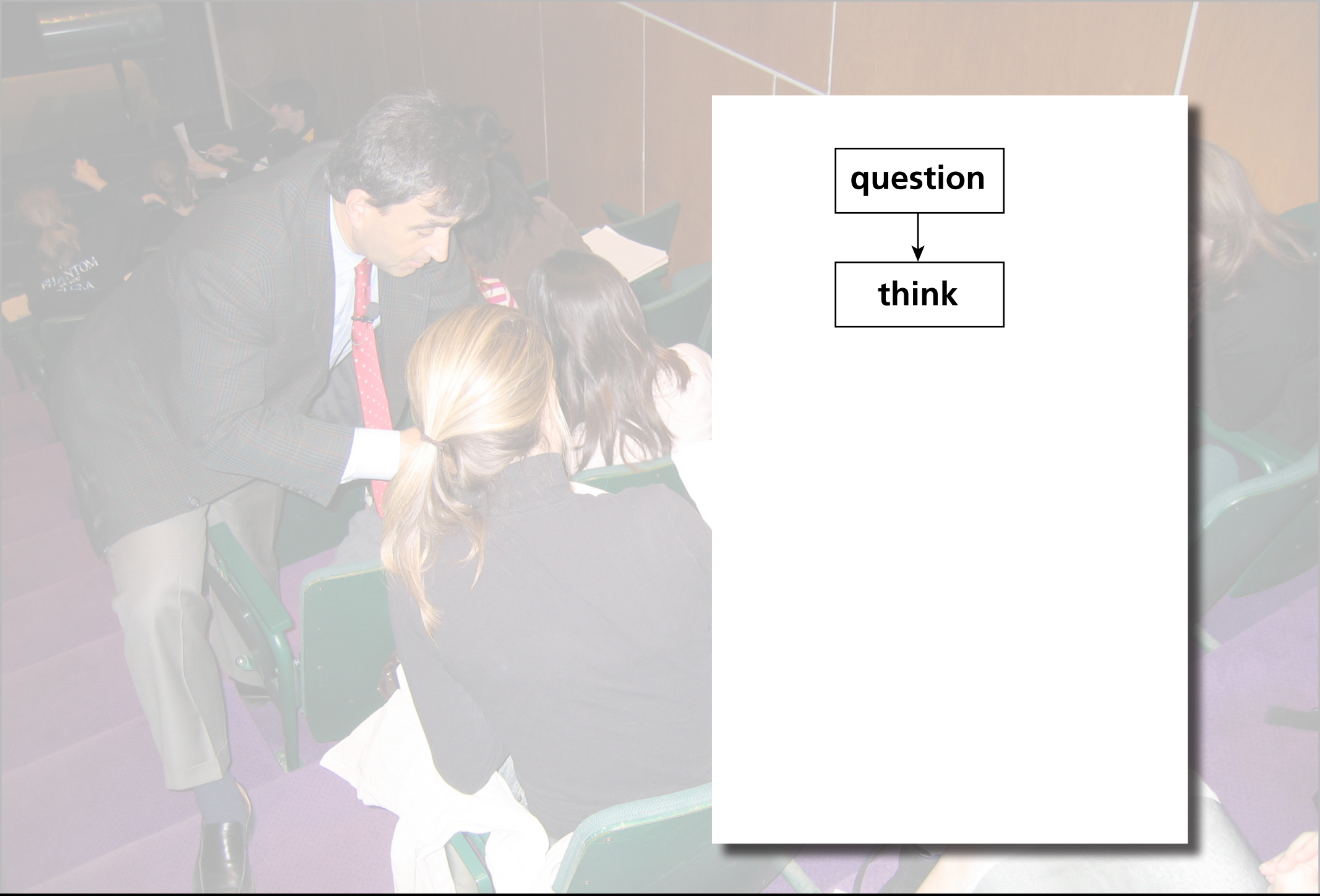
2 PI



question

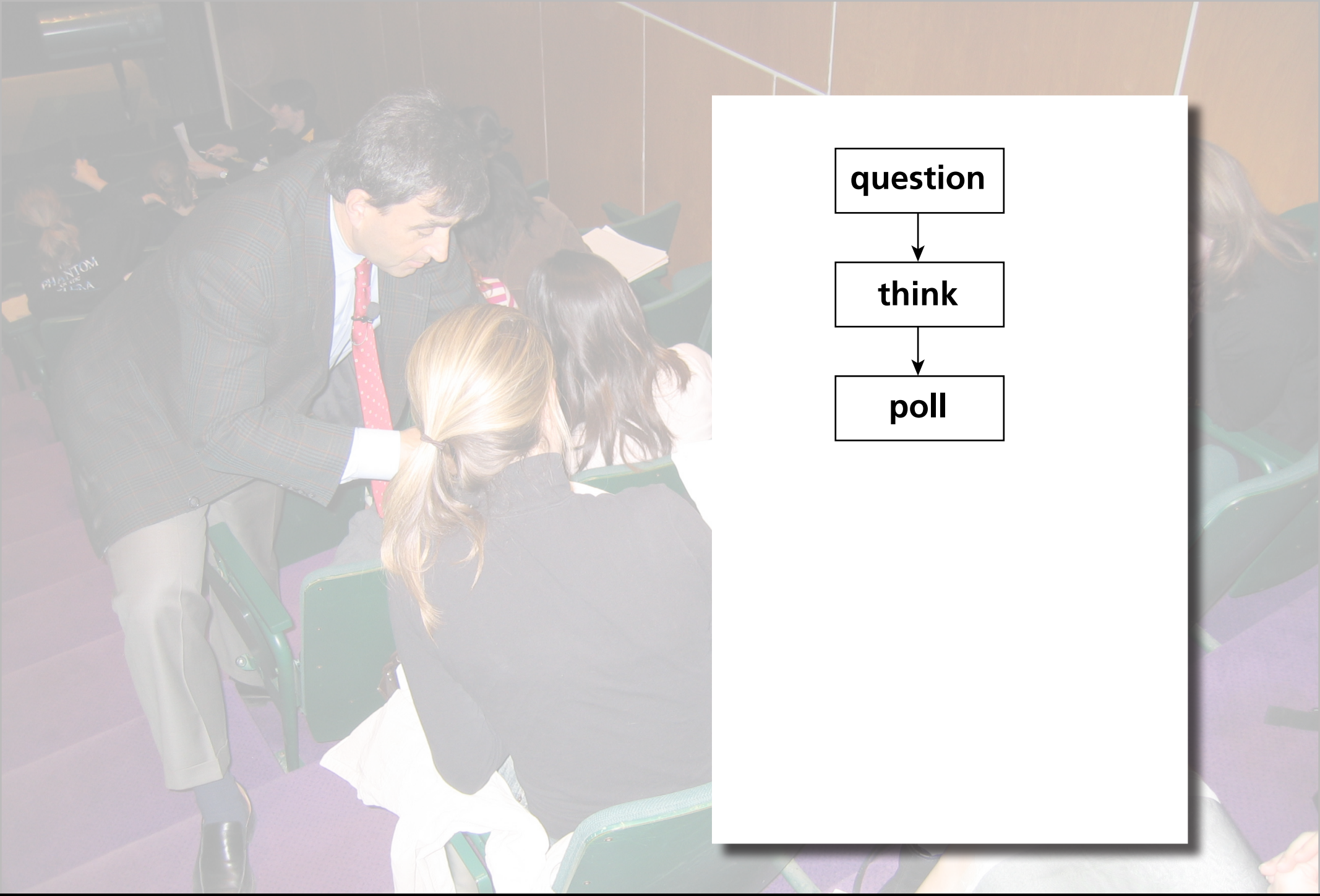
1 lecture

2 PI



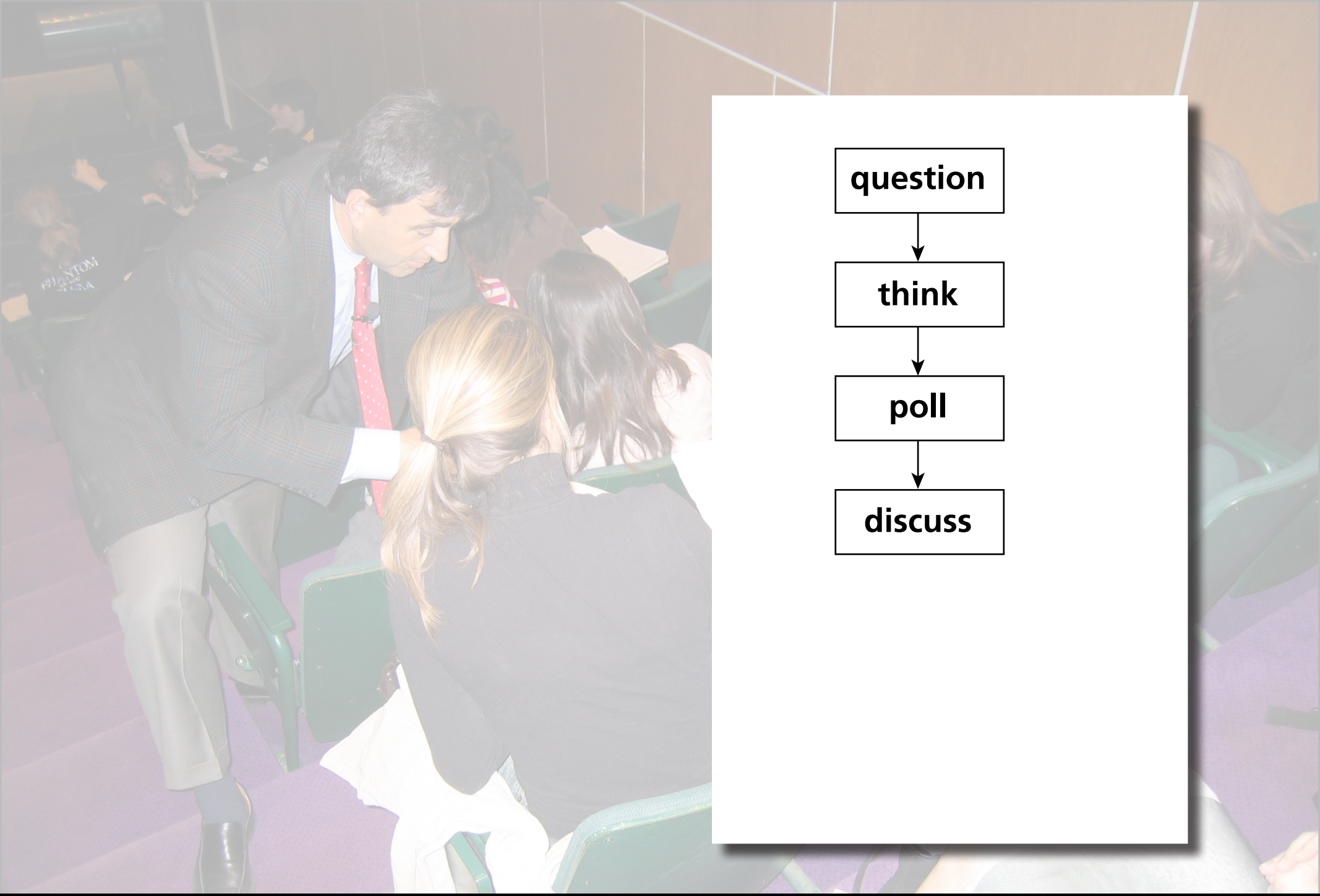
1 lecture

2 PI



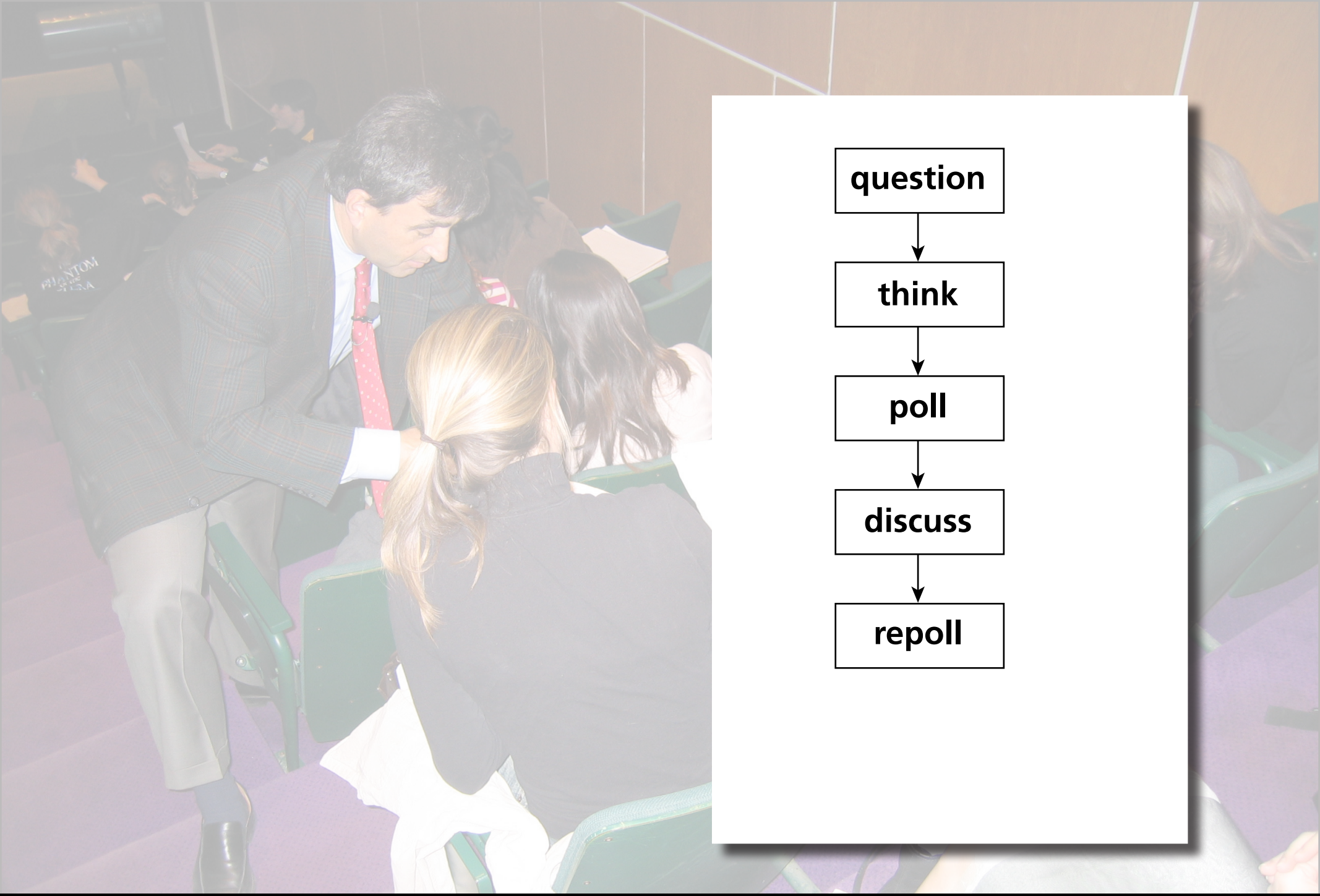
1 lecture

2 PI



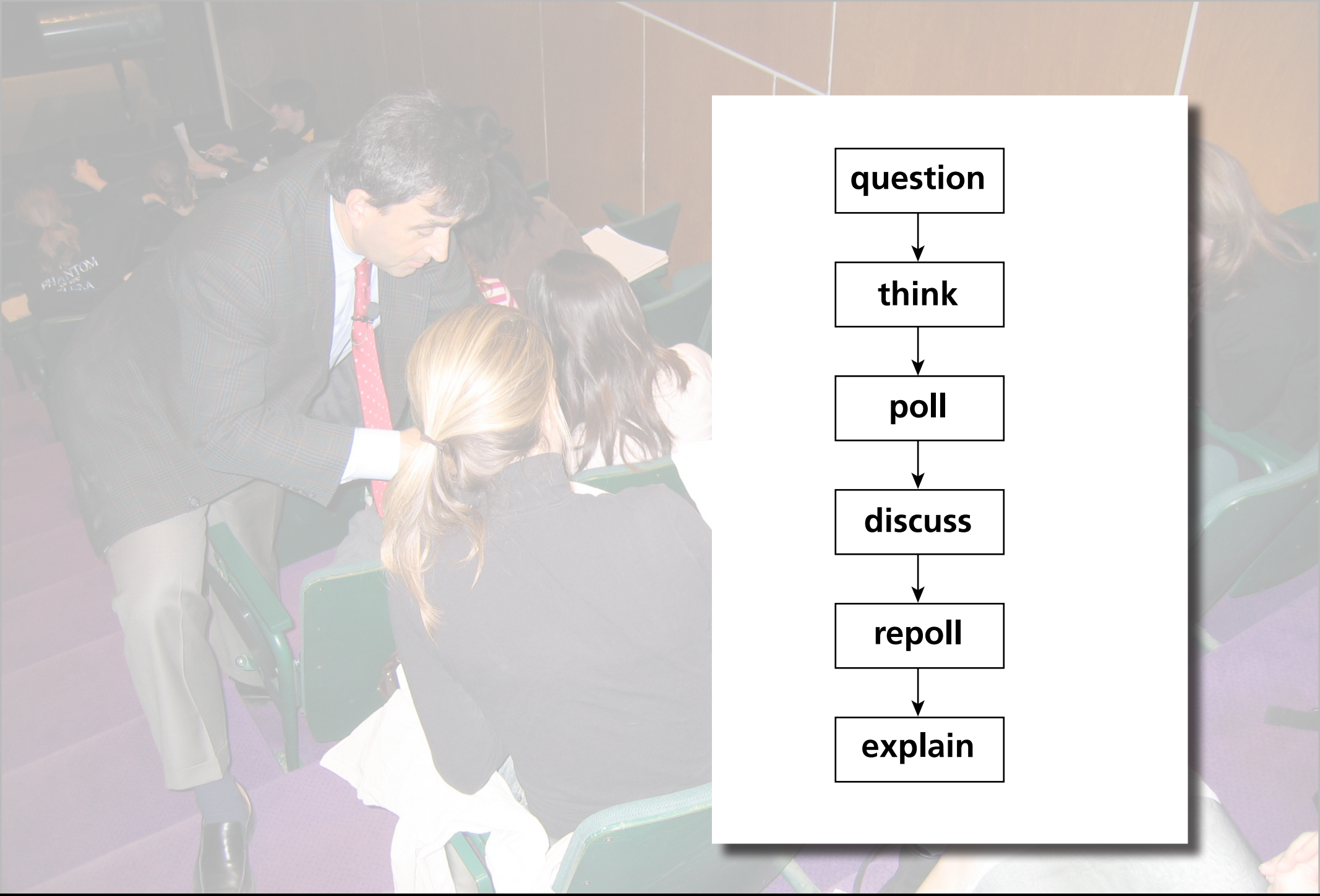
1 lecture

2 PI



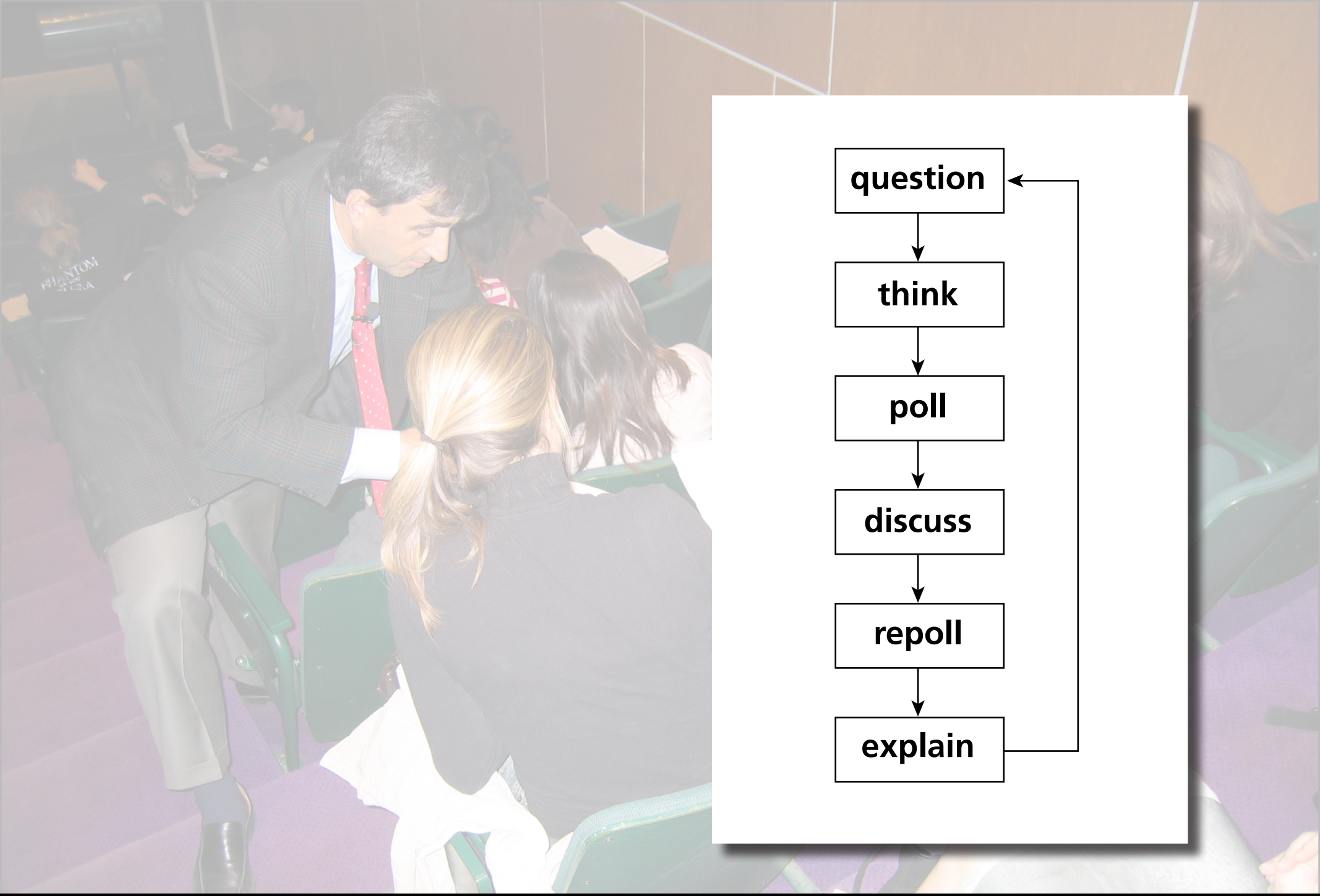
1 lecture

2 PI



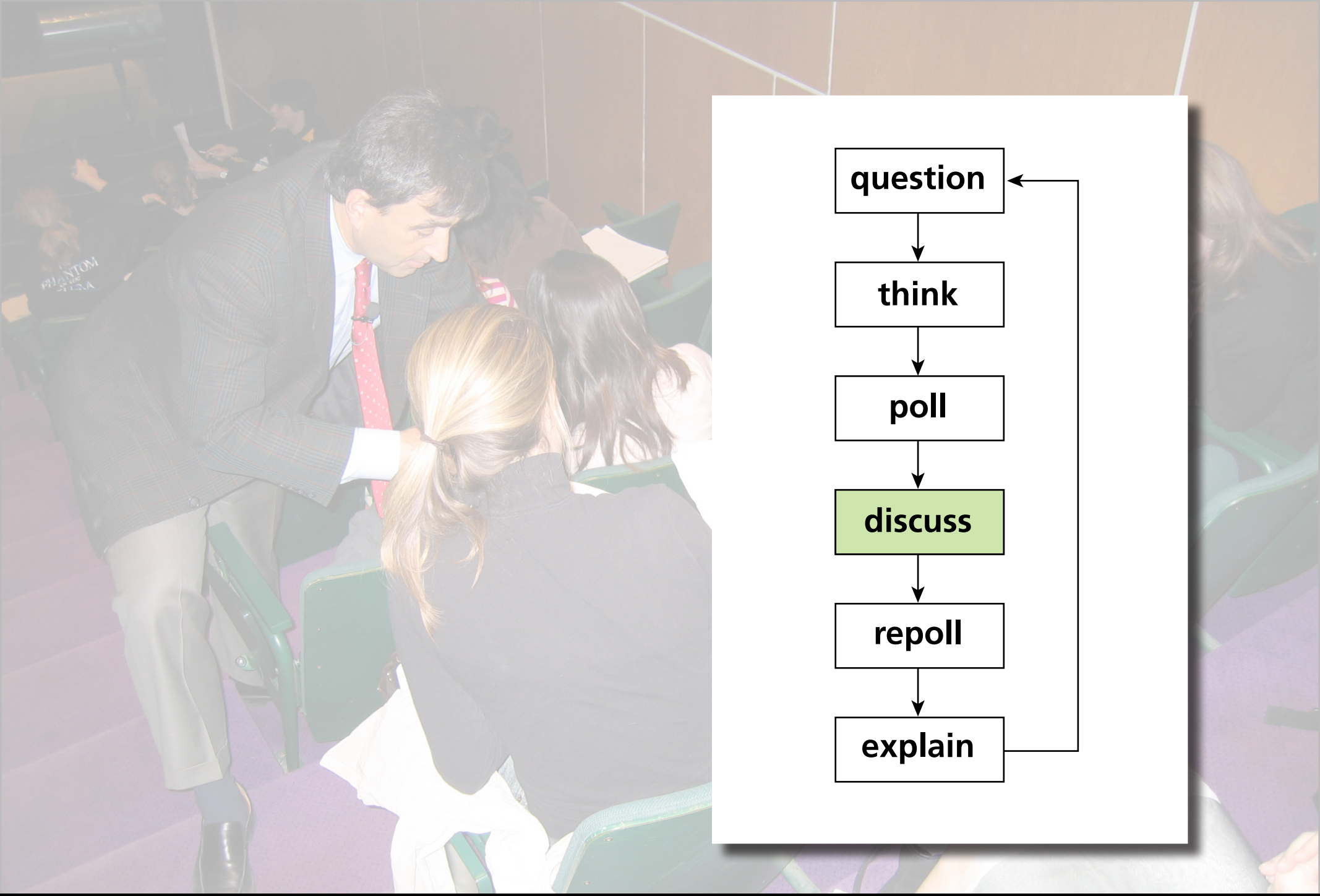
1 lecture

2 PI



1 lecture

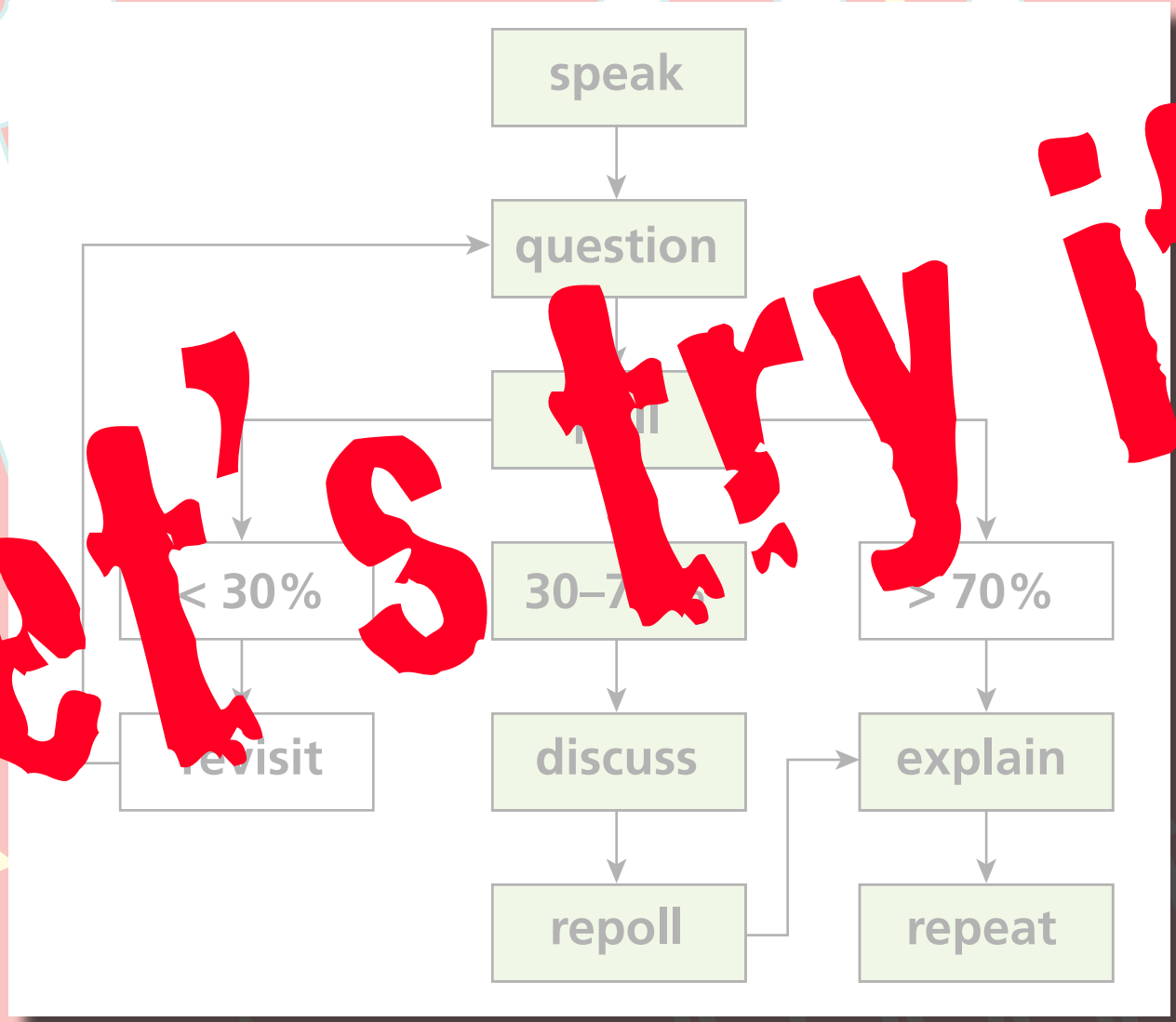
2 PI



1 lecture

2 PI

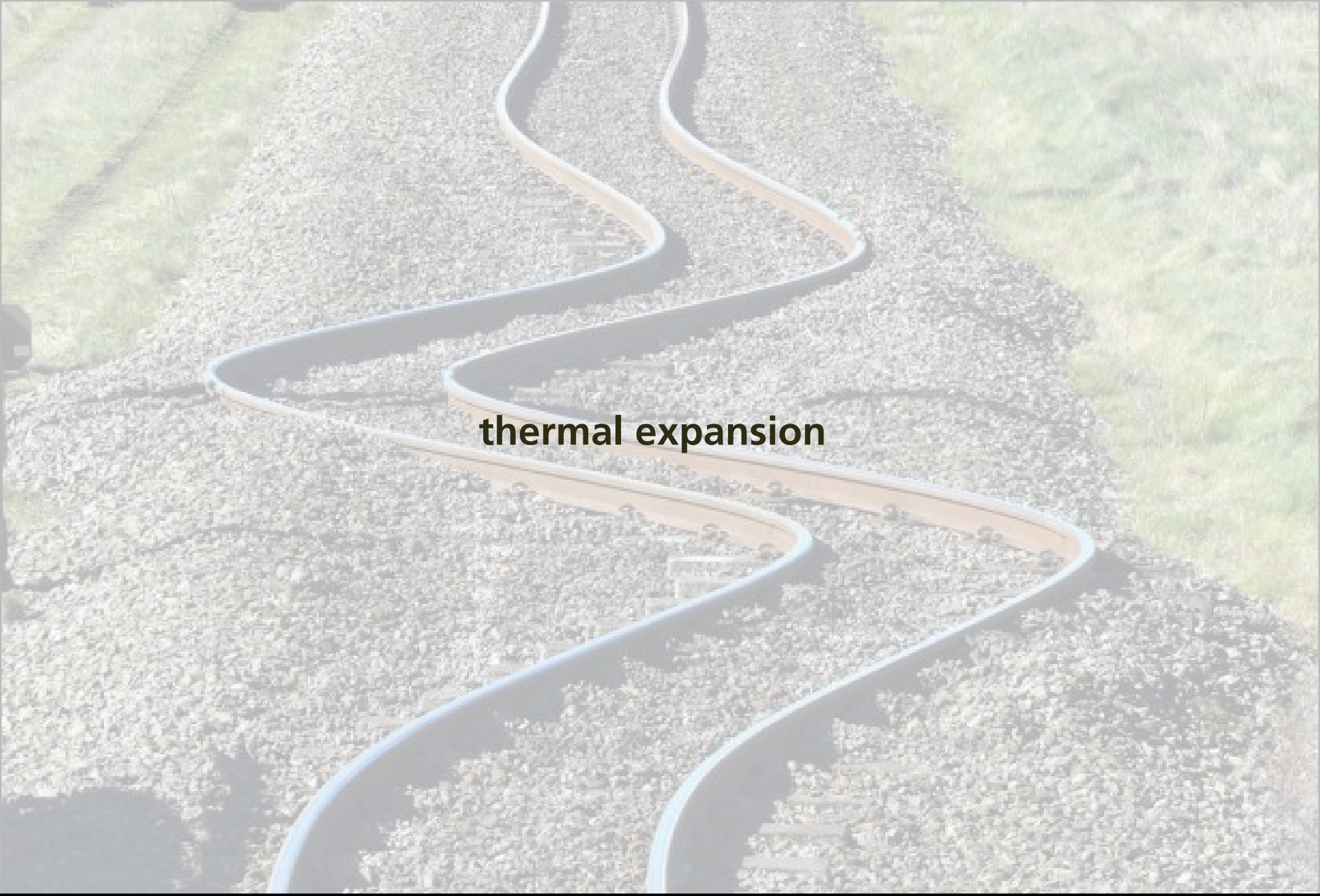

peer
INSTRUCTION
1 lecture
2 PI



Let's try it!

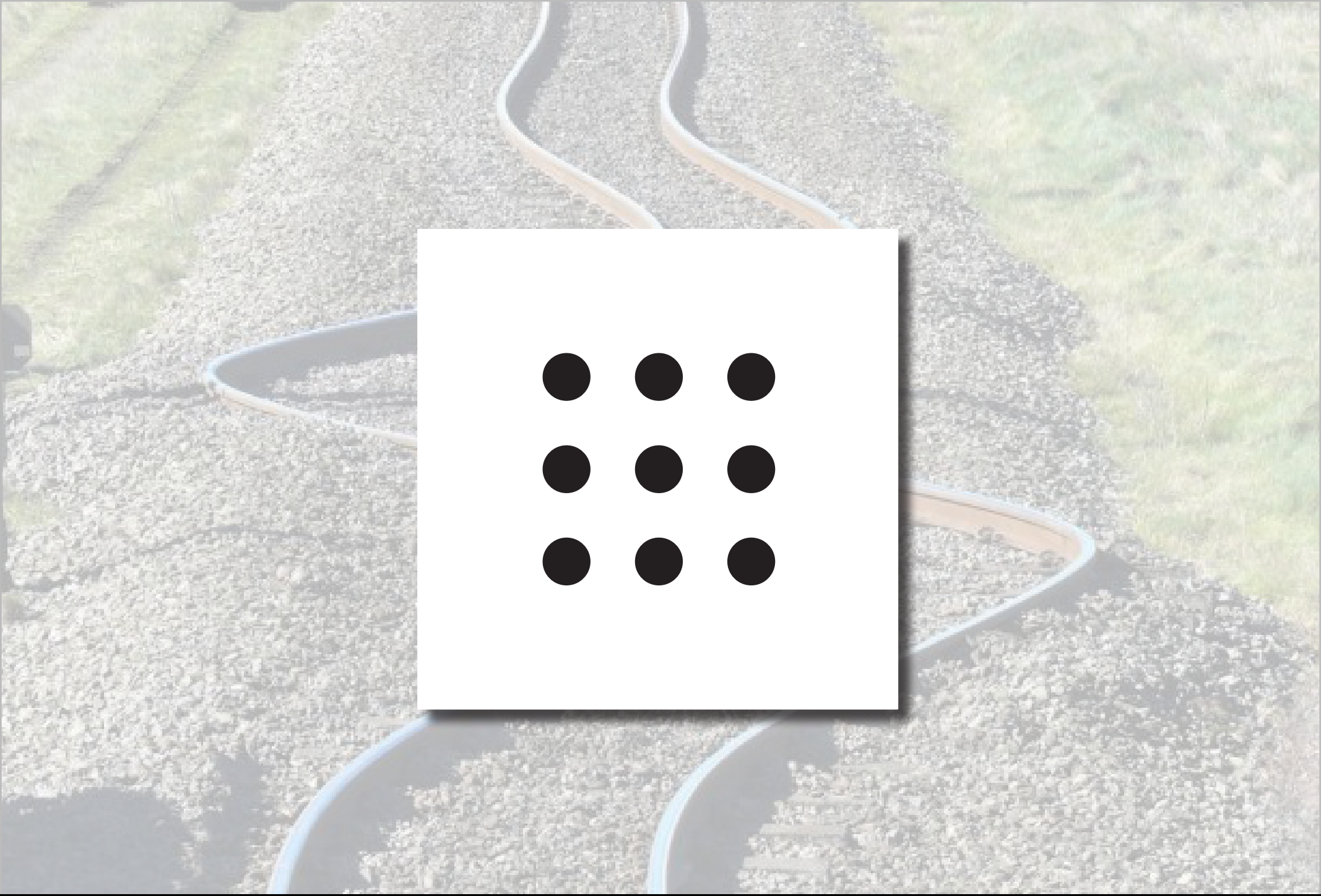
1 lecture

2 PI



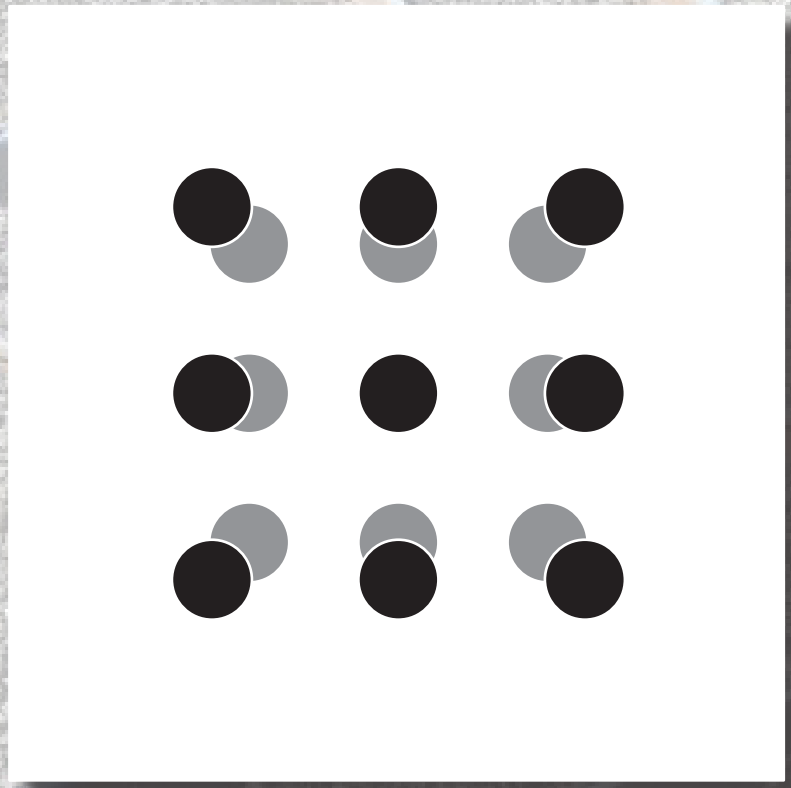
1 lecture

2 PI



1 lecture

2 PI



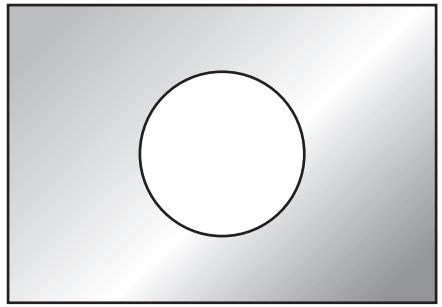
1 lecture

2 PI

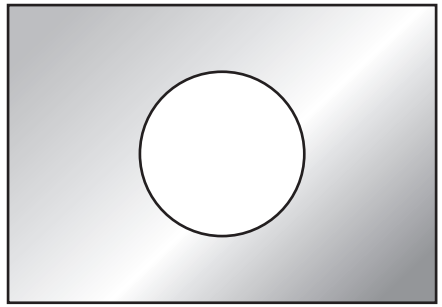
1 lecture

2 PI

Consider a rectangular metal plate with a circular hole in it.



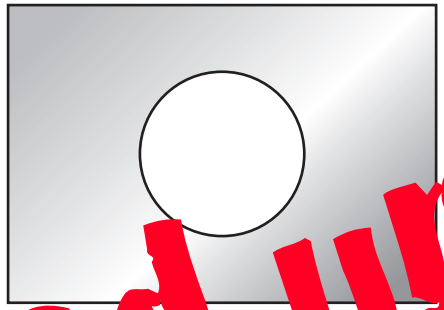
Consider a rectangular metal plate with a circular hole in it.



When the plate is uniformly heated, the diameter of the hole

1. increases.
2. stays the same.
3. decreases.

Consider a rectangular metal plate with a circular hole in it.

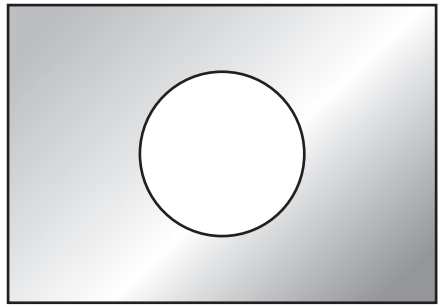


When the plate is uniformly heated, the diameter of the hole

1. increases.
2. stays the same.
3. decreases.

you got all fired up!

Consider a rectangular metal plate with a circular hole in it.



When the plate is uniformly heated, the diameter of the hole

1. increases.
2. stays the same.
3. decreases.

Before I tell you the answer, let's analyze what happened.

1 lecture

2 PI

Before I tell you the answer, let's analyze what happened.

You…

Before I tell you the answer, let's analyze what happened.

You…

1. made a commitment

Before I tell you the answer, let's analyze what happened.

You…

1. made a commitment
2. externalized your answer

Before I tell you the answer, let's analyze what happened.

You…

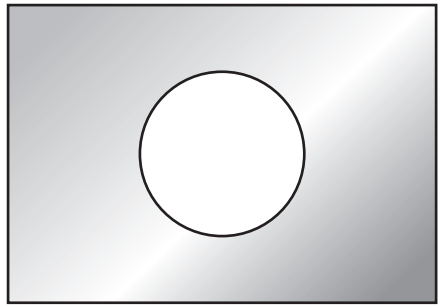
1. made a commitment
2. externalized your answer
3. moved from the answer/fact to reasoning

Before I tell you the answer, let's analyze what happened.

You…

1. made a commitment
2. externalized your answer
3. moved from the answer/fact to reasoning
4. became emotionally invested in the learning process

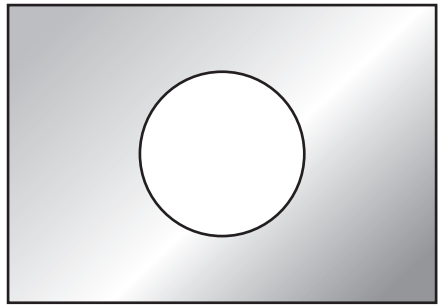
Consider a rectangular metal plate with a circular hole in it.



When the plate is uniformly heated, the diameter of the hole

1. increases.
2. stays the same.
3. decreases.

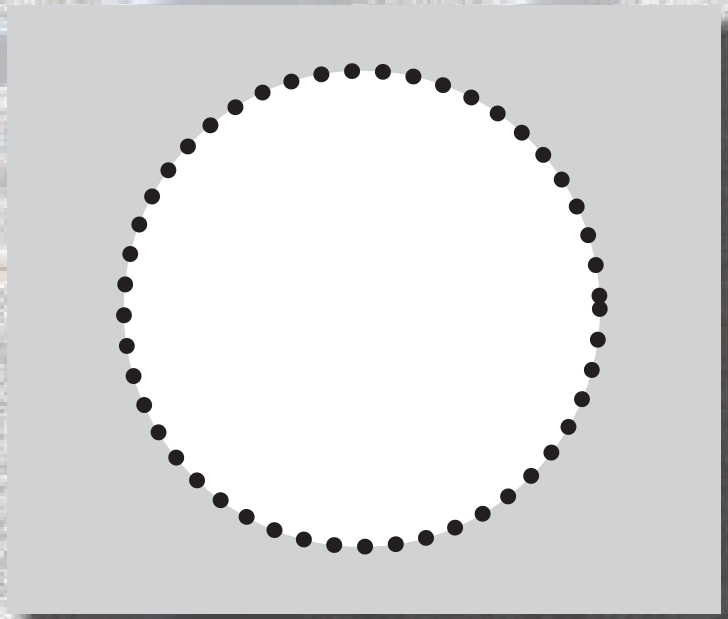
Consider a rectangular metal plate with a circular hole in it.



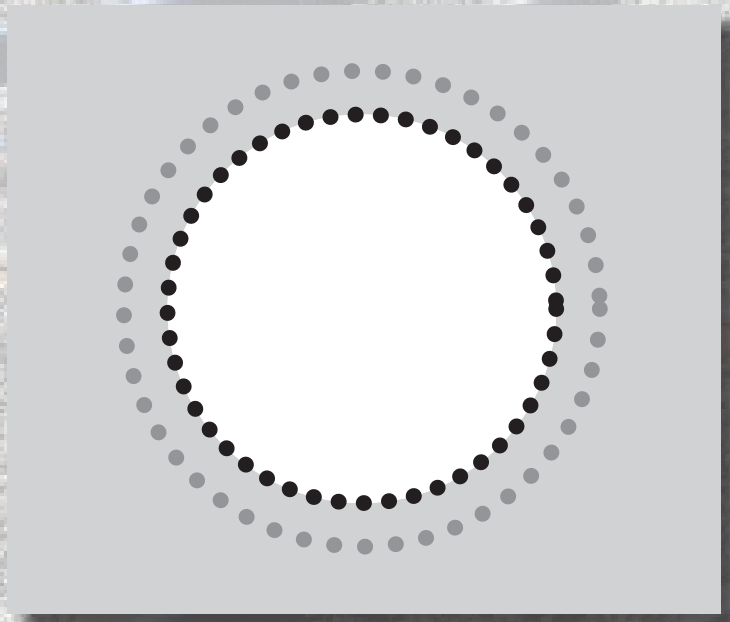
When the plate is uniformly heated, the diameter of the hole

1. increases. ✔
2. stays the same.
3. decreases.

consider atoms at rim of hole



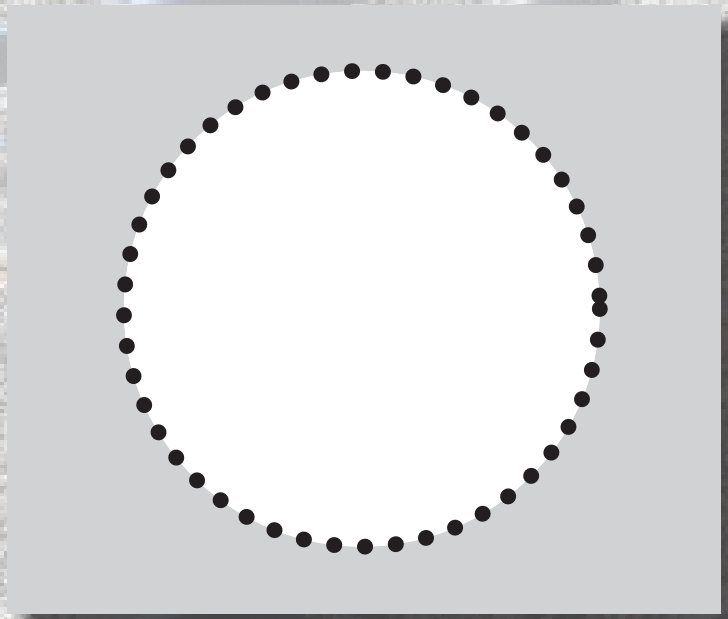
consider atoms at rim of hole



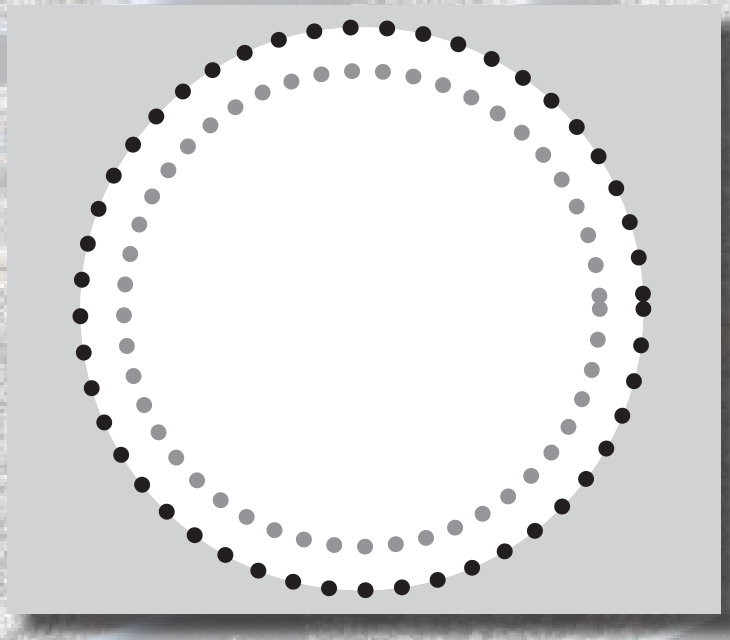
1 lecture

2 PI

consider atoms at rim of hole



consider atoms at rim of hole



1 lecture 2 PI

consider atoms at rim of hole

you won't forget this

1 lecture

2 PI

1 lecture

2 PI


Peer
Higher learning gains
INSTRUCTION
1 lecture
2 PI


Peer
Higher learning gains
Better retention
INSTRUCTION
1 lecture
2 PI

1 lecture

2 PI

3 PI 2.0

feedback

1 lecture

2 PI

3 PI 2.0


1991
1 lecture
2 PI
3 PI 2.0

1 lecture

2 PI

3 PI 2.0

1 lecture 2 PI 3 PI 2.0

1 lecture

2 PI

3 PI 2.0

1 lecture 2 PI 3 PI 2.0

How do I…

- design good questions?
- optimize the discussions?
- manage time?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1 lecture
2 PI
3 PI 2.0

Use intelligent algorithms and data analytics to…

- improve questioning
- manage discussions
- facilitate time management/flow

a. A 30-year fixed rate
b. A 15-year fixed rate mortgage at
c. A 30-year fixed rate mortgage at 12%
d. A 15-year fixed rate mortgage at 12%

2. The biggest factor that leads American companies to manufacture their products ov
India is:

a. Higher quality of craftsmanship
b. Lower labor costs
c. Decreased transportation costs
d. Effective legal systems

3. Which of the following correctly summarizes the accounting equation for a sole proprietorship?

a. Assets = Liabilities + Owners' equity
b. Liabilities = Assets + Owners' equity
c. Owner's equity = Assets + Liabilities
d. Revenue = Assets – Liabilities

4. In order to present a business plan to a group of potential investors, a businessperson would most likely use which

a. Powerpoint
b. Quickbooks
c. Peoplesoft
d. Excel

5. In order to start an online business, and individual would need all but which of the following:

business model

preciation?

extensible plug-in architecture for question types

1 lecture 2 PI 3 PI 2.0

Sample question types:

- direction
- mathematical expression
- long answer, short answer, word cloud
- numerical, data collection
- ranking, priority
- region (select point on image)
- sketch, composite sketch
- highlight passage

Sample question types:

- direction
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4. directi… …tle. The image provides several clues about the direction of prevailing … …n your screen.

Deliver Show all results

1 lecture

3 PI 2.0

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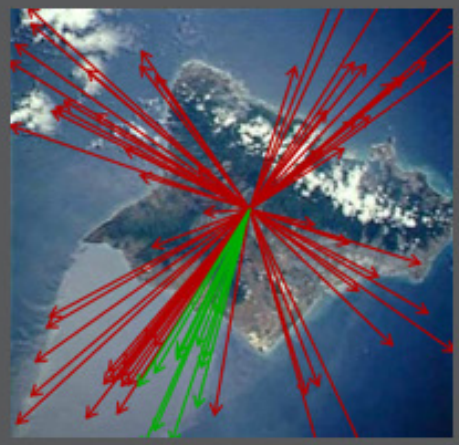
4. directi… prevailing …tle. The image provides several clues about the direction of …n your screen.

Deliver Show all results

Round 1

77 responses, 16% correct



17 get it now

3 still don't get it

1 lecture

3 PI 2.0

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4. direction Light enters horizontally into the combination of two perpendicular mirrors as shown below.

Deliver | Show all results

Indicate the direction of the incident light after it reflects off of both mirrors.

feedback & support

1 lecture 2 PI 3 PI 2.0

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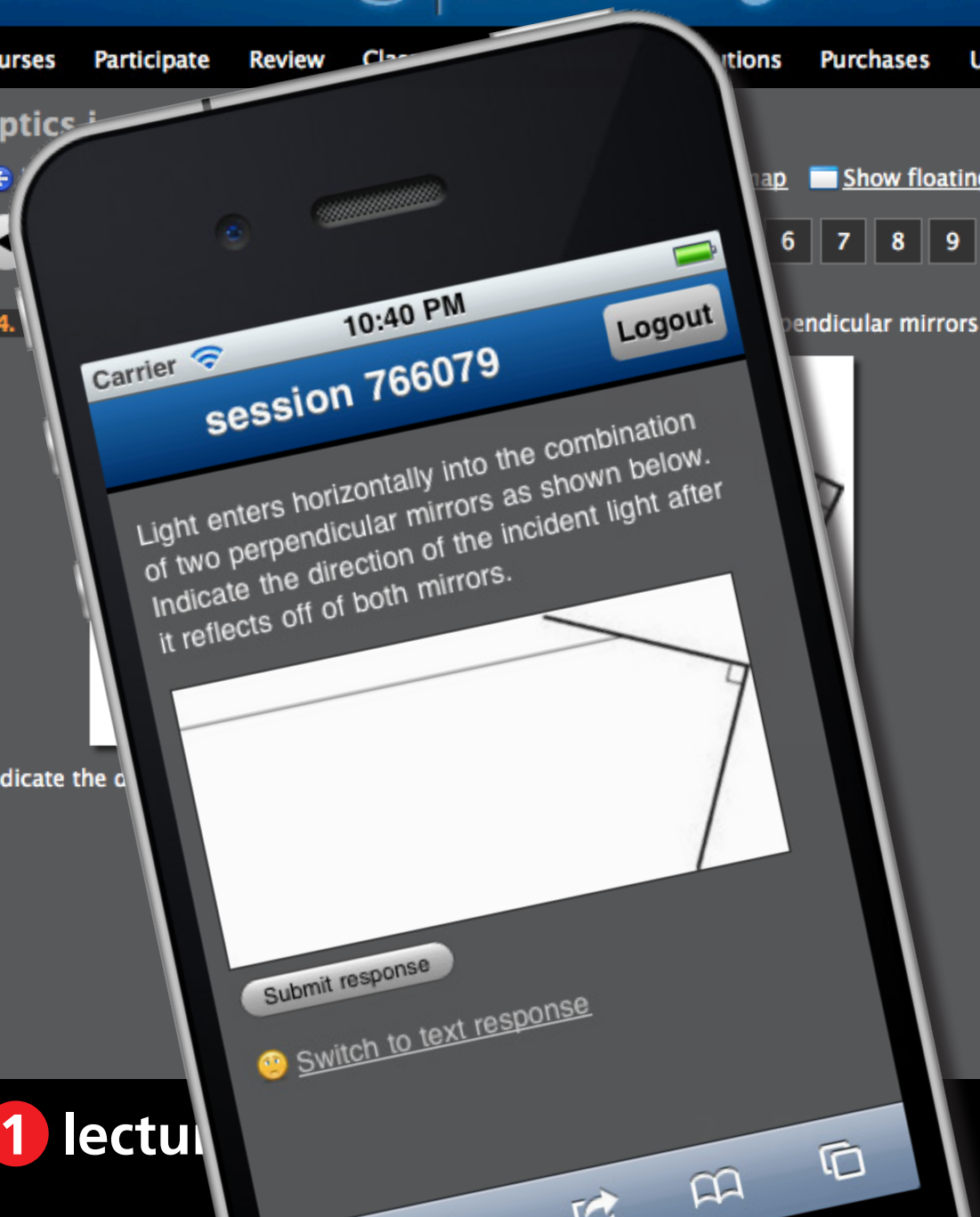
4. endicular mirrors as shown below.

Deliver Show all results

Indicate the d

feedback & support



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4.

endicular mirrors as shown below.

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Indicate the d

feedback & support

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current session: 766079 | 69 students

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6 7 8 9 10 11 12 13 14 15

4.

endicular mirrors as shown below.

Deliver Show all results

Round 1

57 responses, 58% correct

Indicate the d

feedback & support

1 lectu

3 PI 2.0

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6 7 8 9 10 11 12 13 14 15

4.

endicular mirrors as shown below.

Deliver Show all results

Round 1
57 responses, 58% correct

Round 2
51 responses, 73% correct

8 get it now
0 still don't get it

Indicate the d

feedback & support

1 lectu

3 PI 2.0

Sample question types:

- direction
- **mathematical expression**
- long answer, short answer, word cloud
- numerical, data collection
- ranking, priority
- region (select point on image)
- sketch, composite sketch
- highlight passage

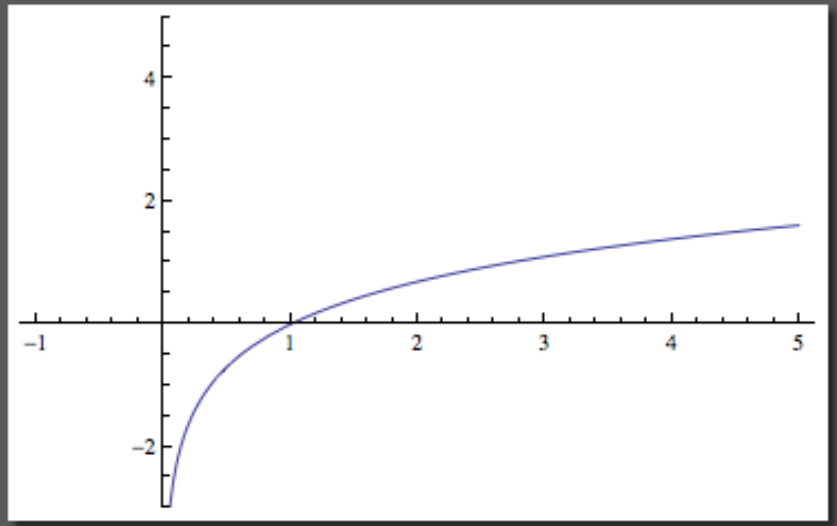
If $2x - y = 4$, then $x =$

1 lecture 2 PI 3 PI 2.0

Sample question types:

- direction
- mathematical expression
- long answer, short answer, word cloud
- numerical, data collection
- ranking, priority
- region (select point on image)
- sketch, composite sketch
- highlight passage

This is a graph of $f(x) = \ln x$. Sketch a graph of the derivative $f'(x)$.



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This is a graph of $f(x)$ =

1 lecture

3 PI 2.0


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Help
This is a graph of $f(x)$ =
Carrier
10:30 PM
Logout
Refresh
session 333281
This is a graph of $f(x) = \ln x$. Sketch a graph of the derivative $f'(x)$.
Round 1
15 responses
6 get it now
0 still don't get it
1 lecture
3 PI 2.0

Sample question types:

- direction
- mathematical expression
- long answer, short answer, word cloud
- numerical data collection
- ranking, priority
- region (select point on image)
- sketch, composite sketch
- highlight passage

data analytics

1 lecture

2 PI

3 PI 2.0

human interaction

1 lecture

2 PI

3 PI 2.0

Carrier 9:31 PM 100%

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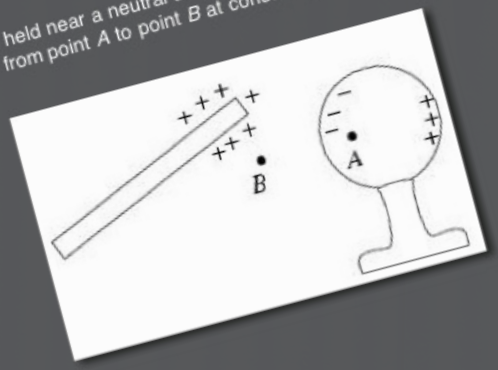
A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point *A* to point *B* at constant speed. The potential difference from *A* to *B* is



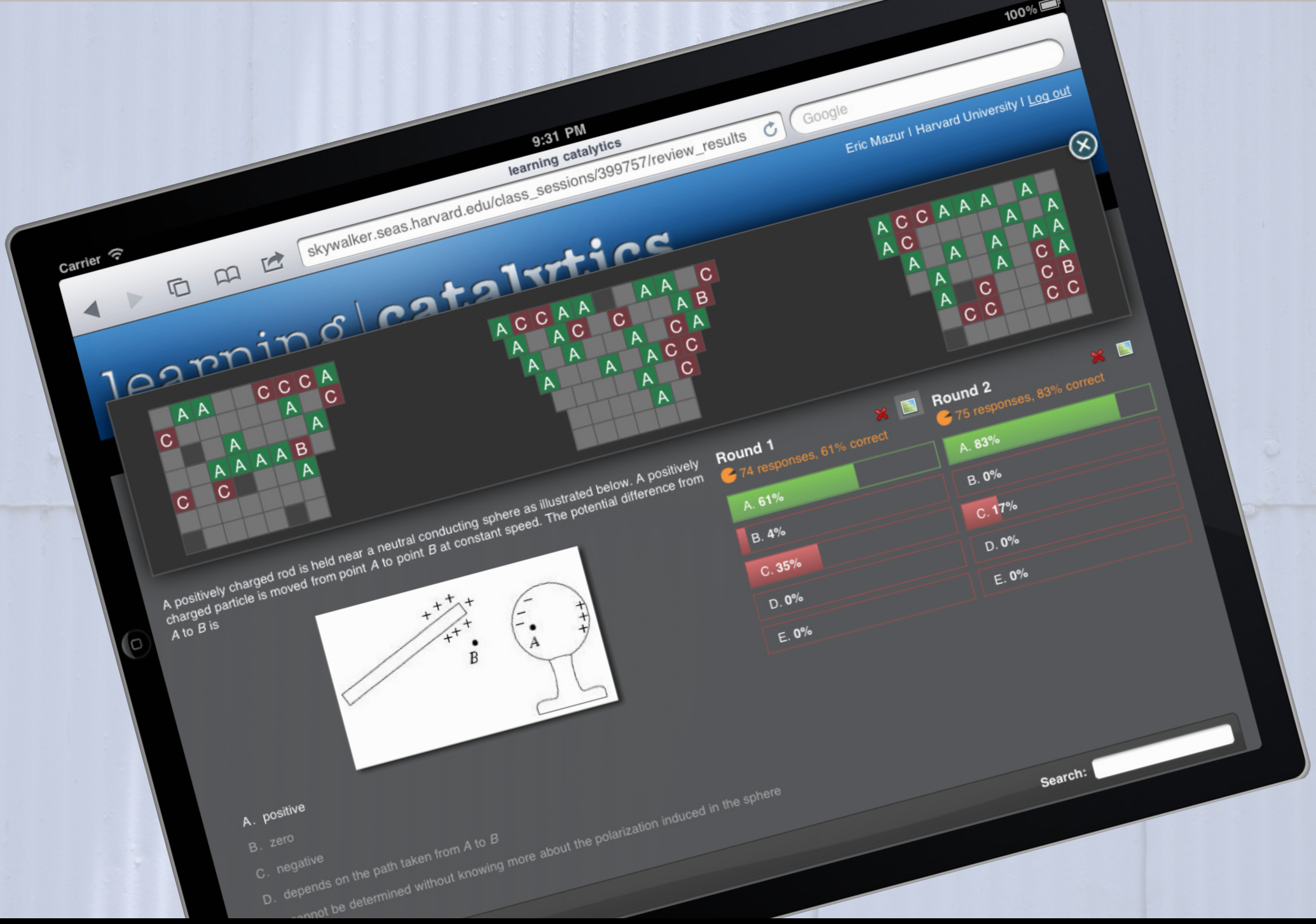
A. positive
B. zero
C. negative
D. depends on the path taken from *A* to *B*
cannot be determined without knowing more about the polarization induced in the sphere

Round 1
74 responses, 61% correct
A. 61%
B. 4%
C. 35%
D. 0%
E. 0%

Round 2
75 responses, 83% correct
A. 83%
B. 0%
C. 17%
D. 0%
E. 0%

Search:

1 lecture 2 PI 3 PI 2.0



1 lecture

2 PI

3 PI 2.0

Carrier 9:31 PM 100%

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review results for session 399757 in electrostatic work and energy ii

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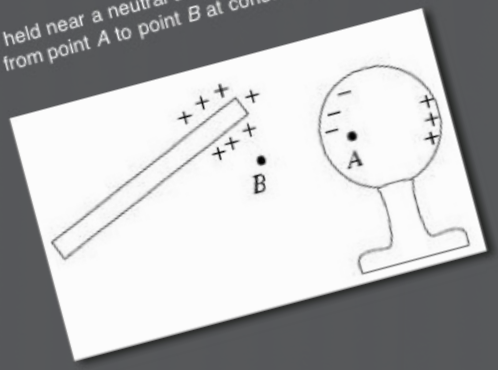
A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point *A* to point *B* at constant speed. The potential difference from *A* to *B* is



A. positive
B. zero
C. negative
D. depends on the path taken from *A* to *B*
E. cannot be determined without knowing more about the polarization induced in the sphere

Round 1
74 responses, 61% correct
A. 61%
B. 4%
C. 35%
D. 0%
E. 0%

Round 2
75 responses, 83% correct
A. 83%
B. 0%
C. 17%
D. 0%
E. 0%

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let system manage pairing

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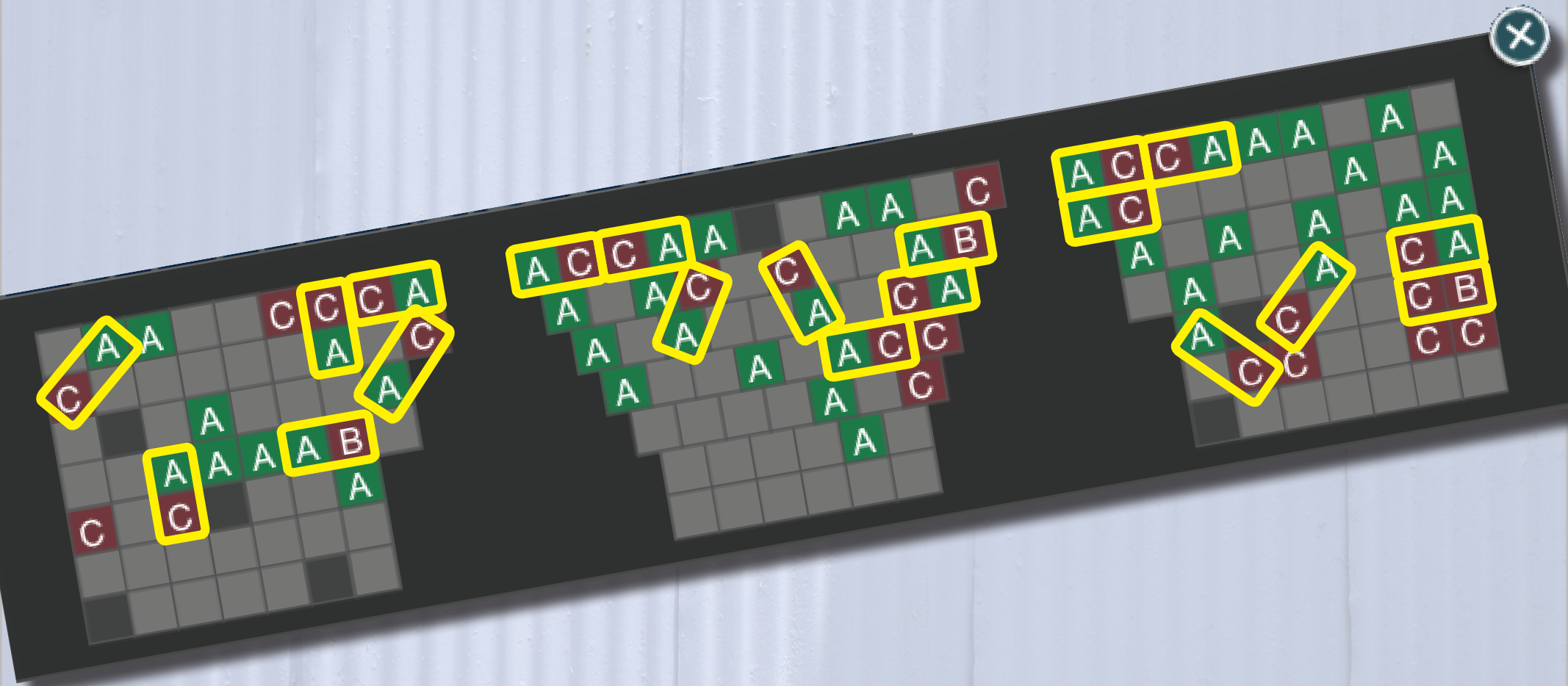

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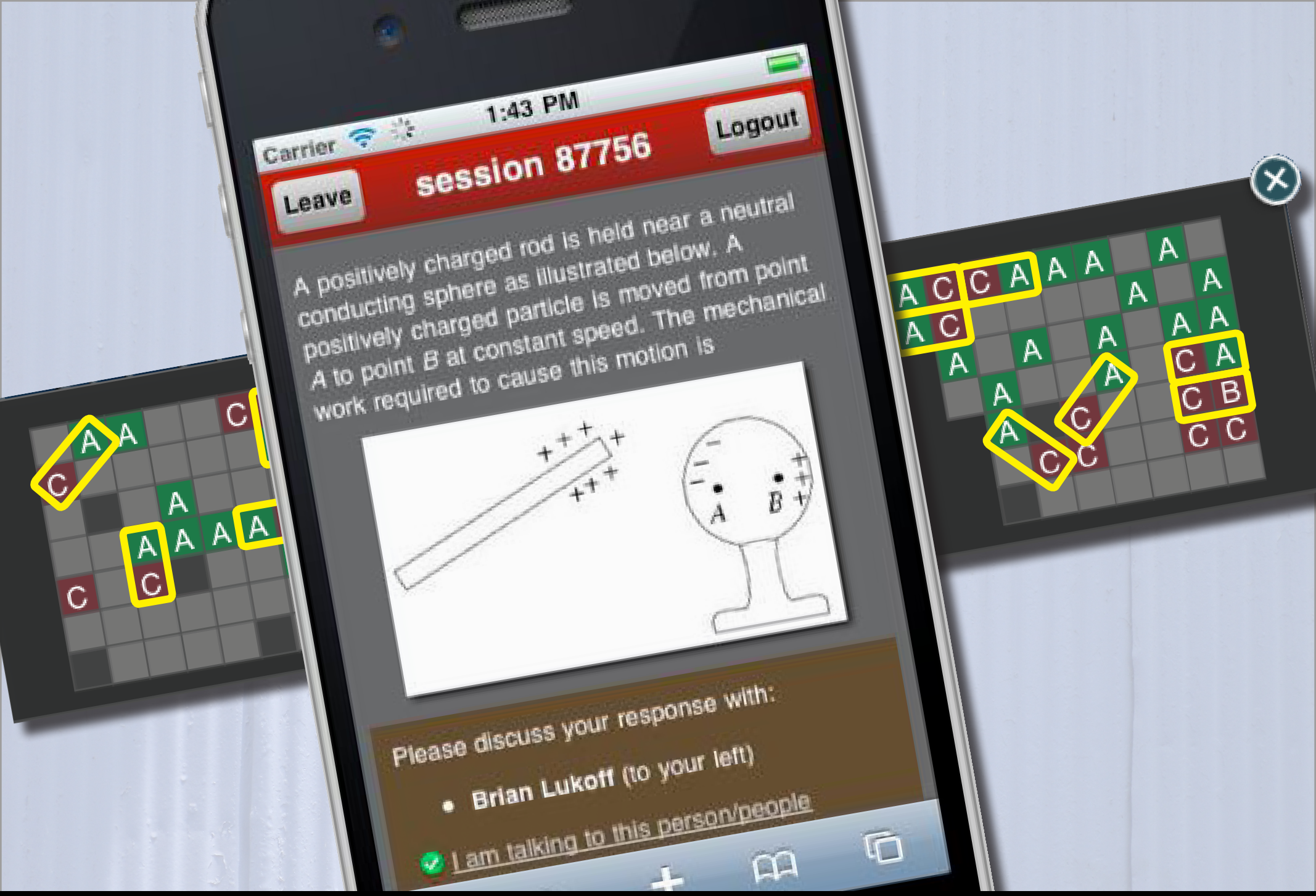

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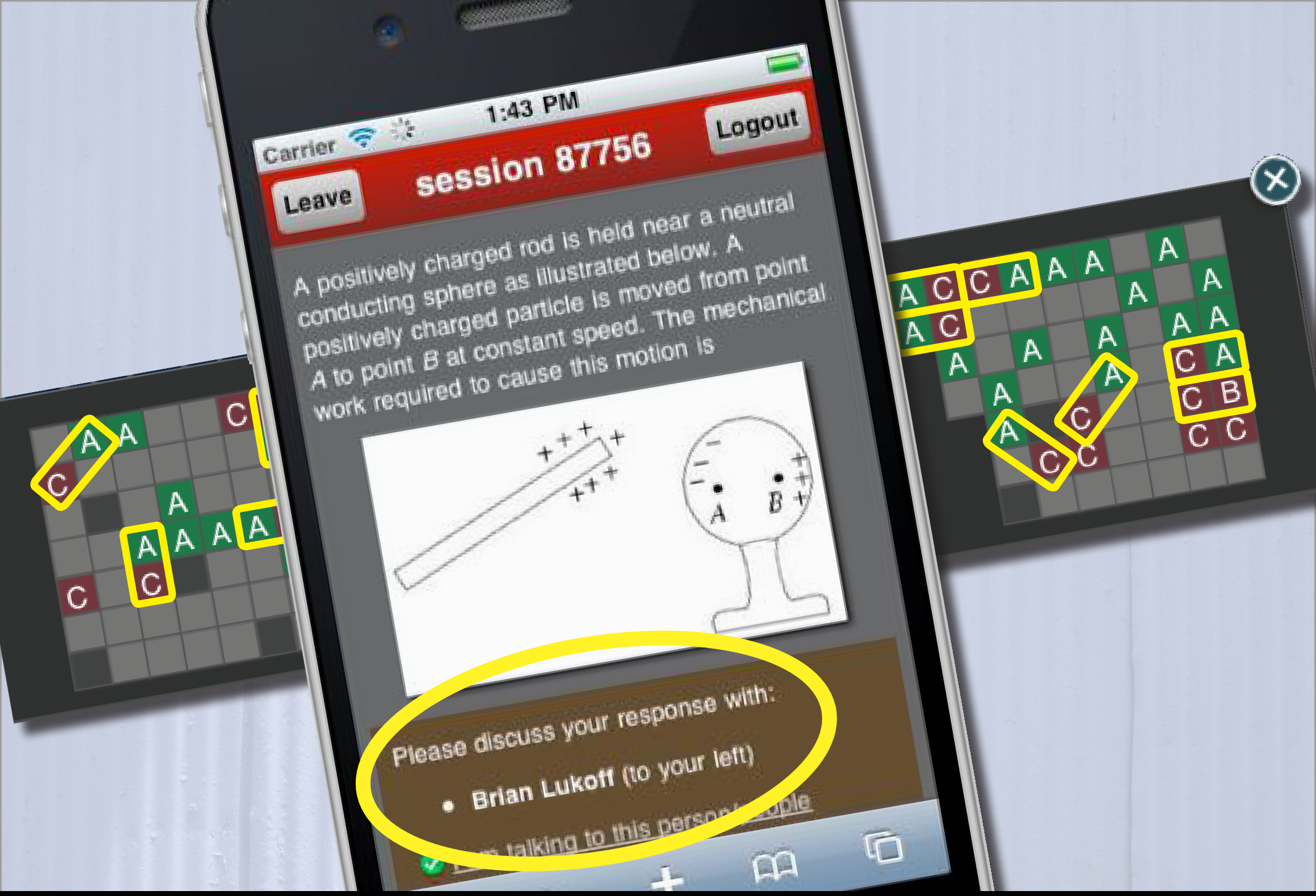

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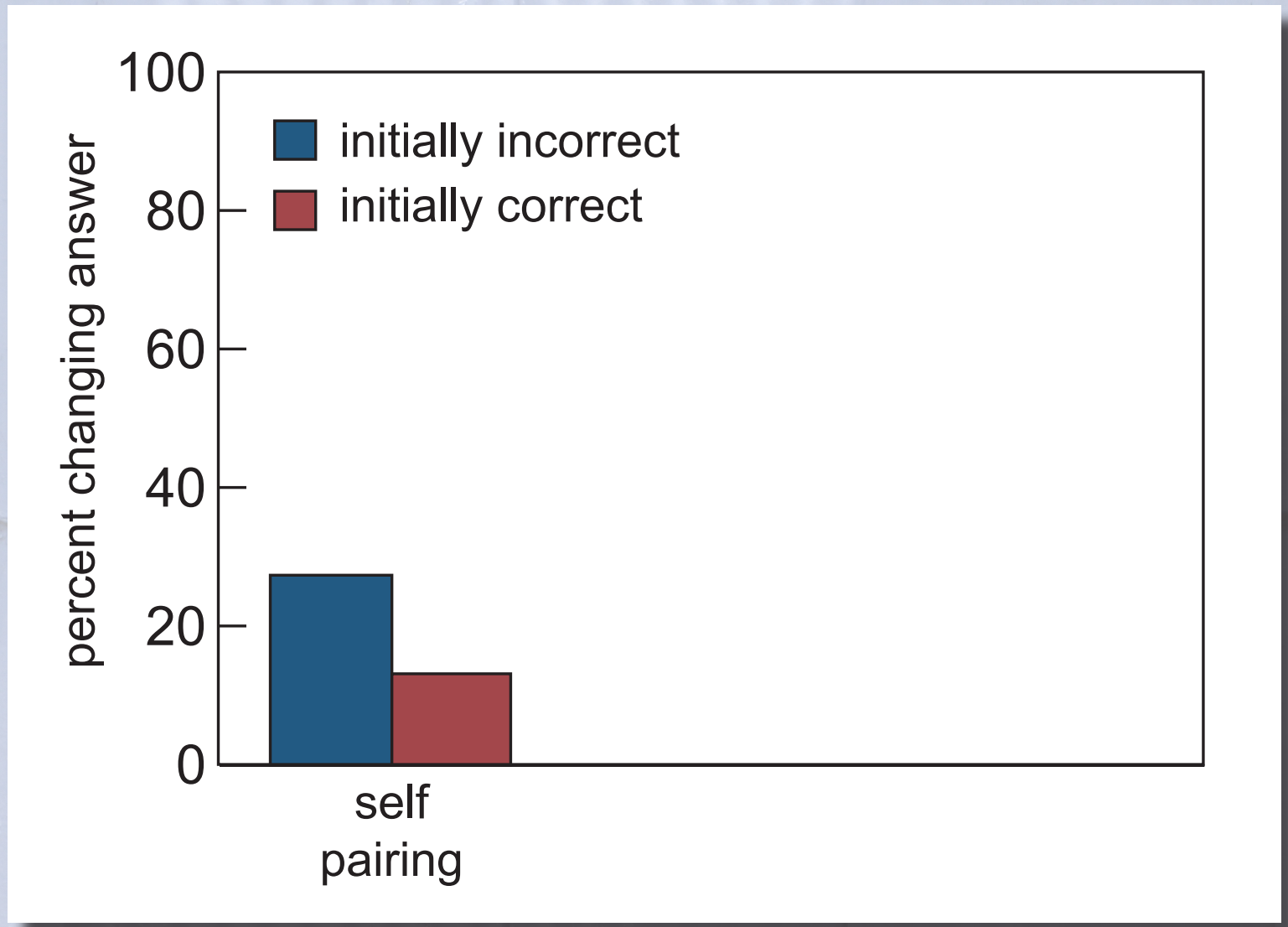
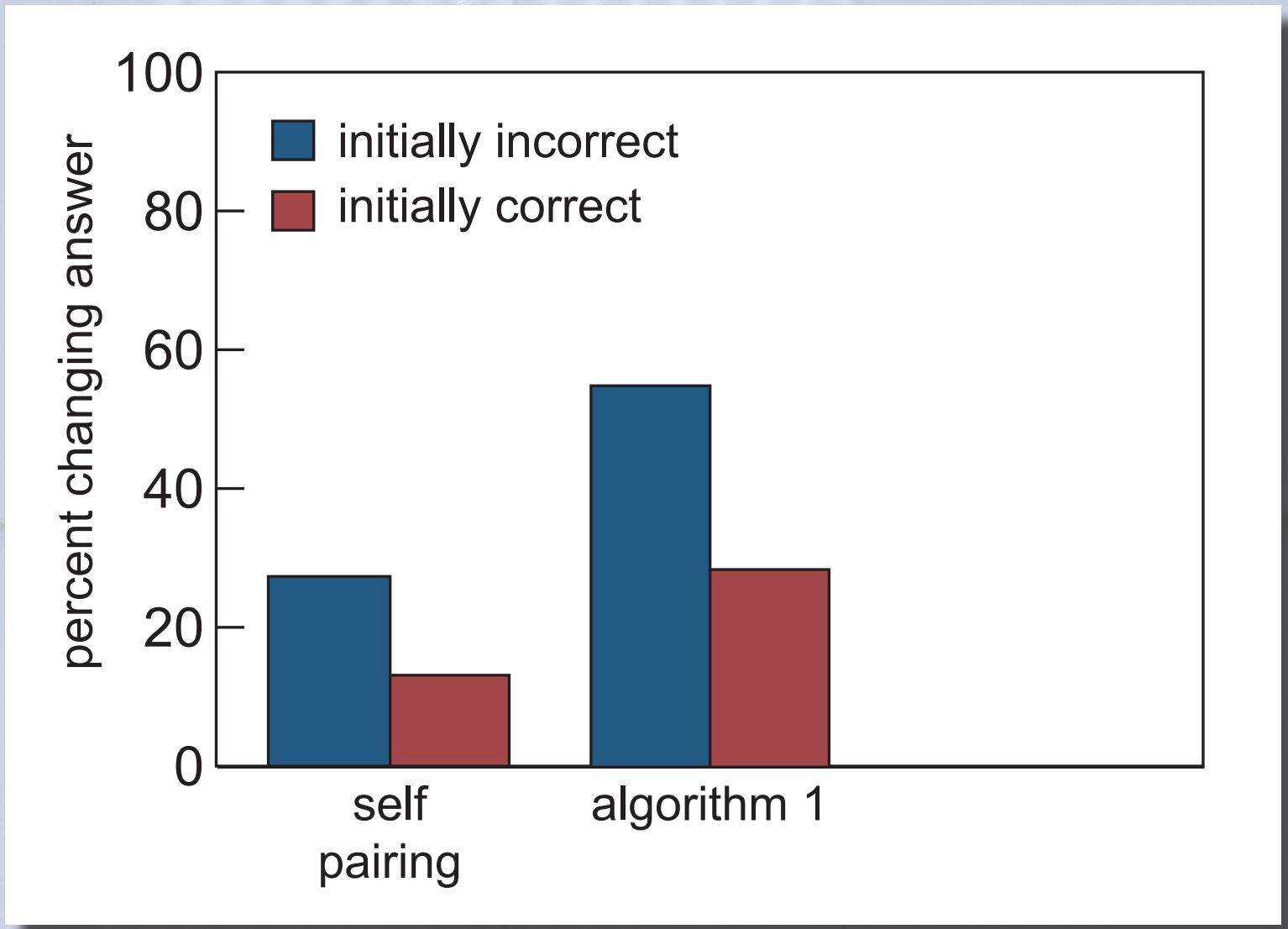

100
80
60
40
20
0
percent changing answer
initially incorrect
initially correct
self
pairing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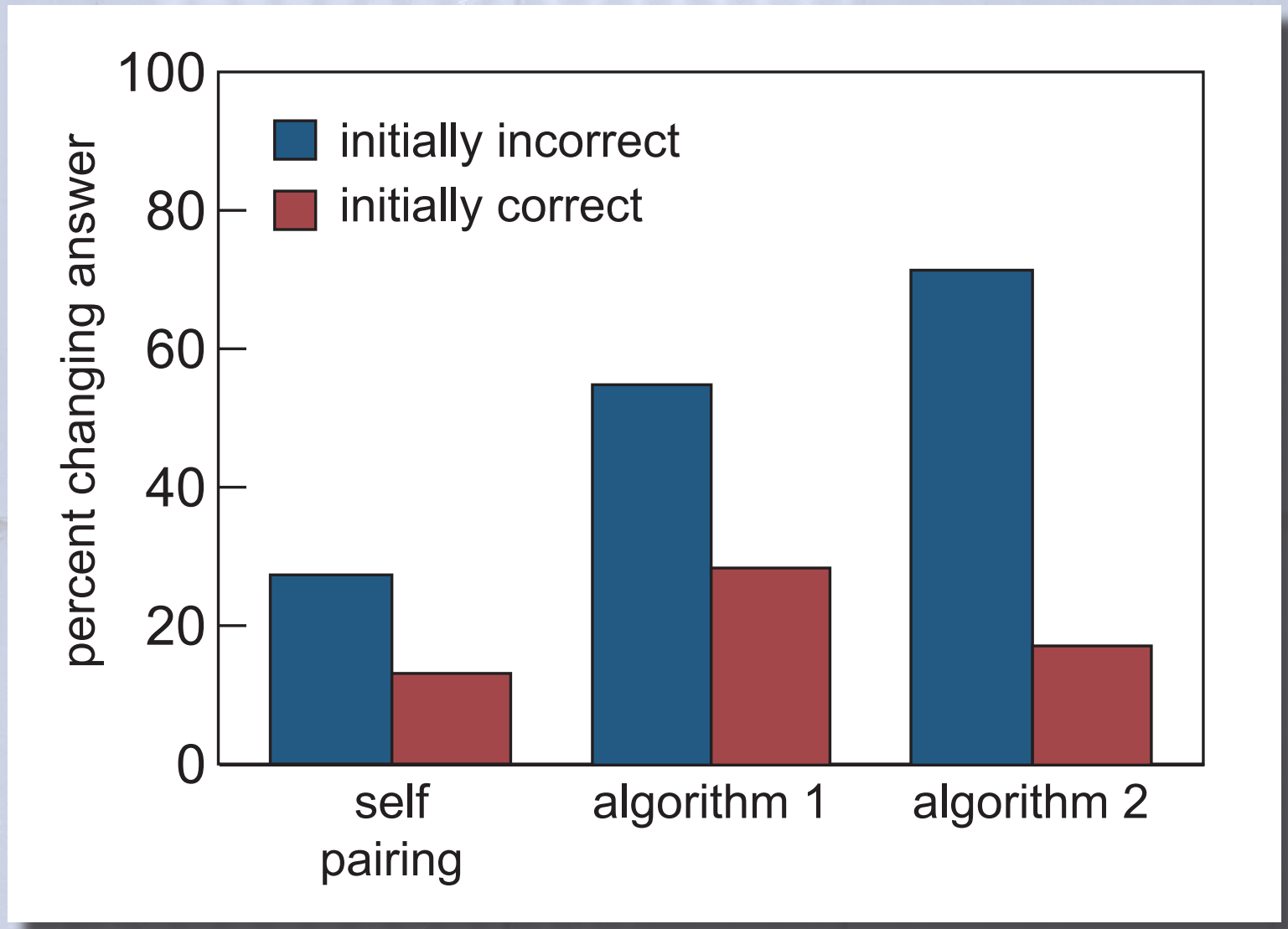
algorithm 1


100
80
60
40
20
0
percent changing answer
initially incorrect
initially correct
self pairing
algorithm 1
algorithm 2

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Education is not just about:

- transferring information
- getting students to do what we do

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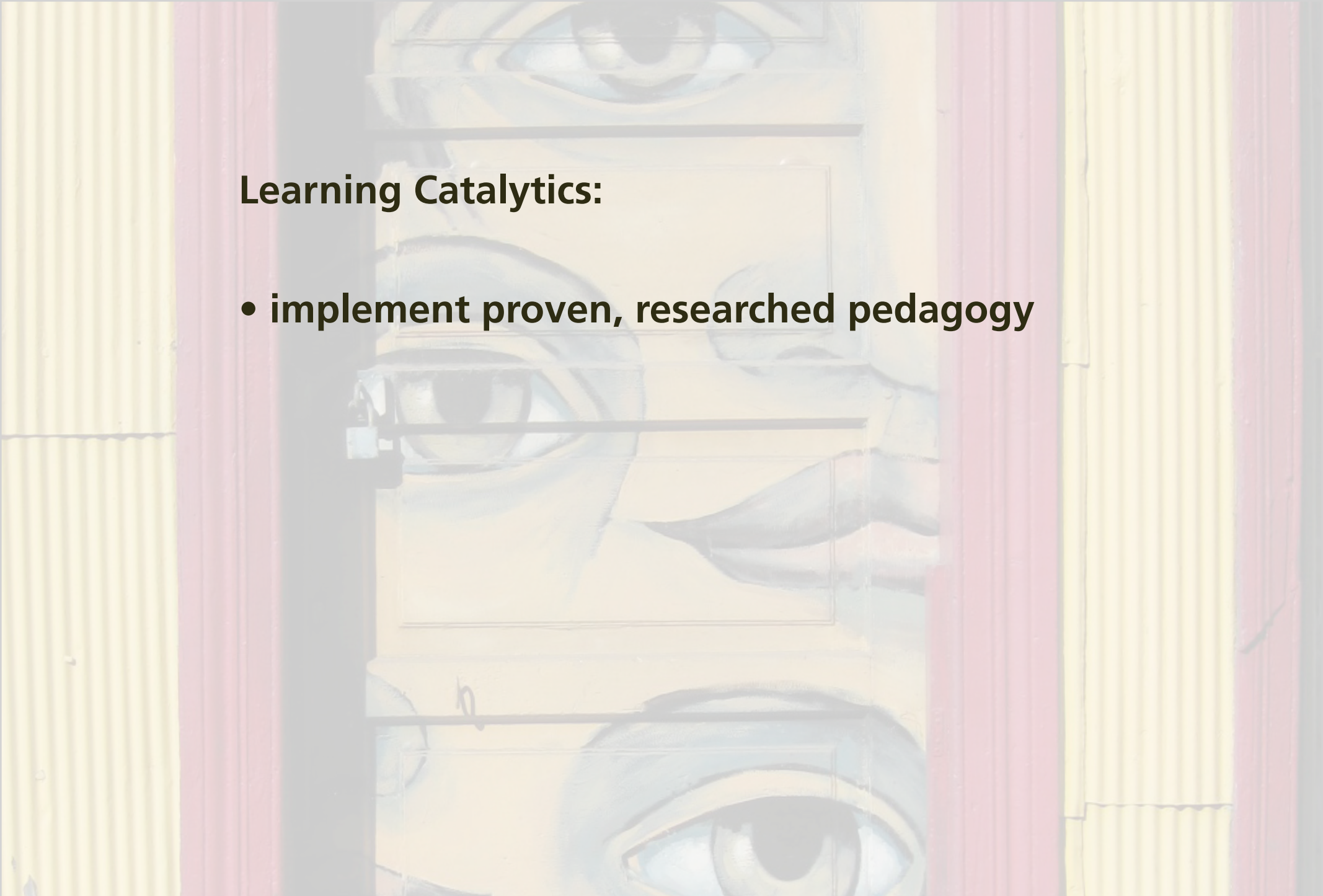
discovery & exploration a must!



Learning Catalytics:

- implement proven, researched pedagogy

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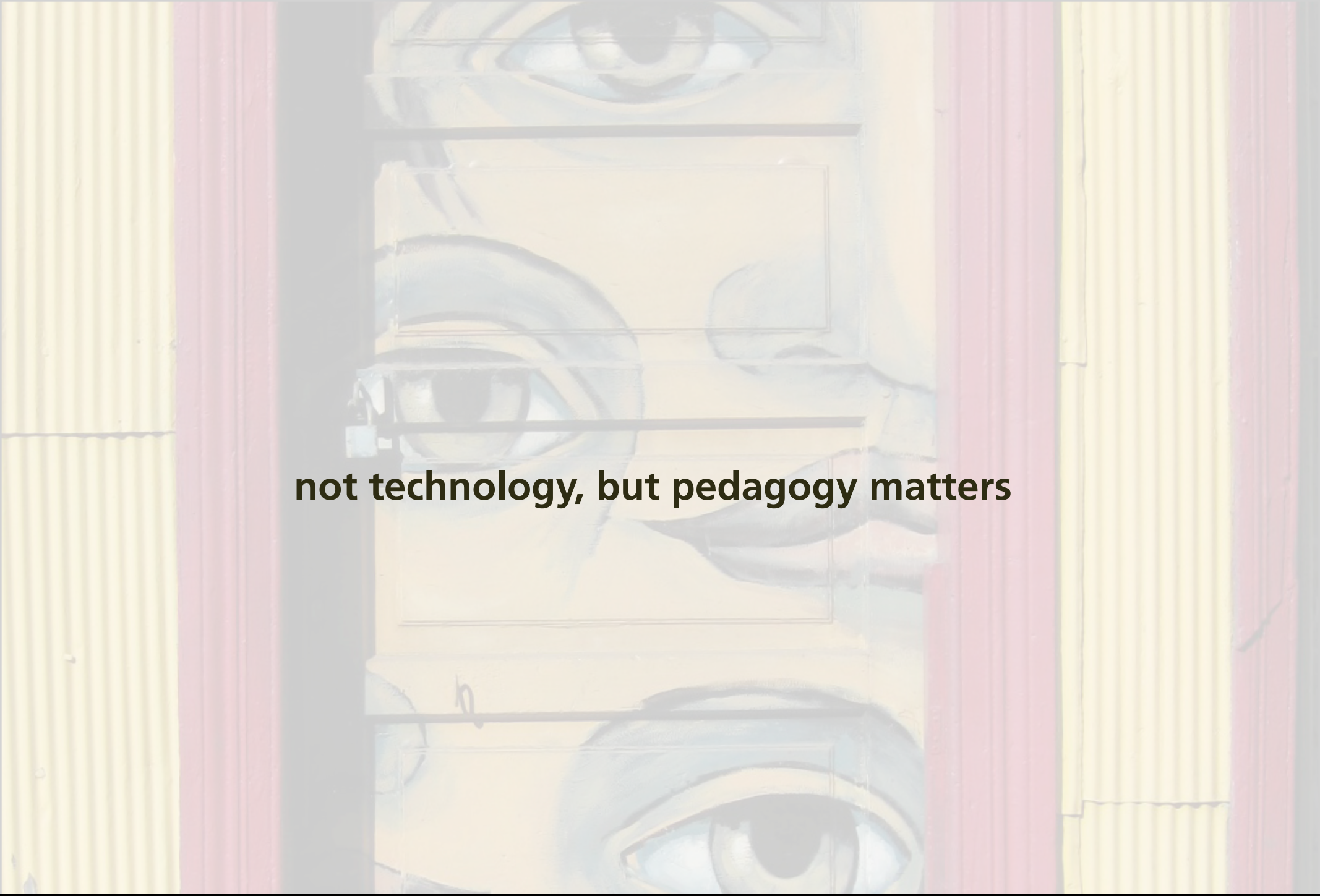
Learning Catalytics:

- implement proven, researched pedagogy
- use consumer devices
- avoid pitfalls of MC assessment
- create a smart classroom *anywhere*



not technology, but pedagogy matters

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Funding:

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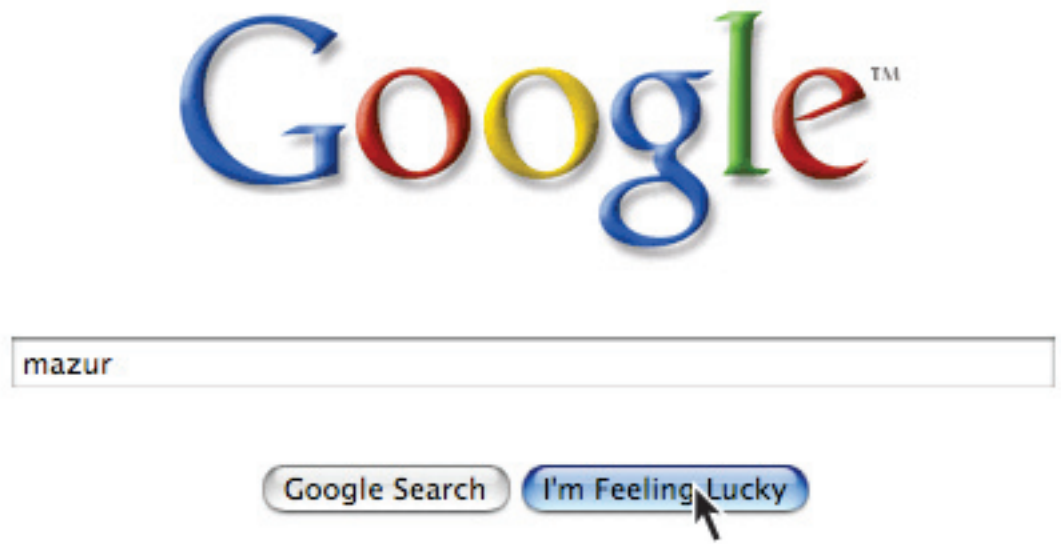
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