Interaction Synchronicity in Web-based Collaborative Learning Systems

Ari Bader-Natal
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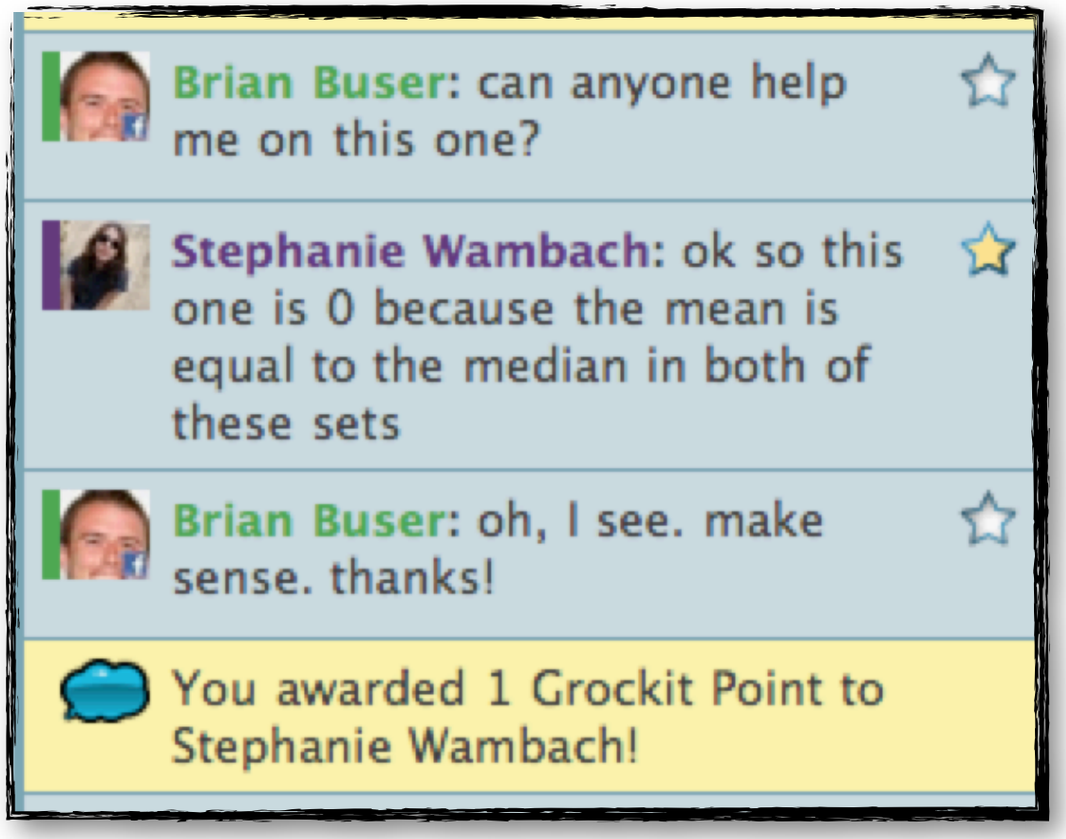
Grockit

October 27, 2009

E-Learn
World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education

Why support **synchronous** interactions among learners?



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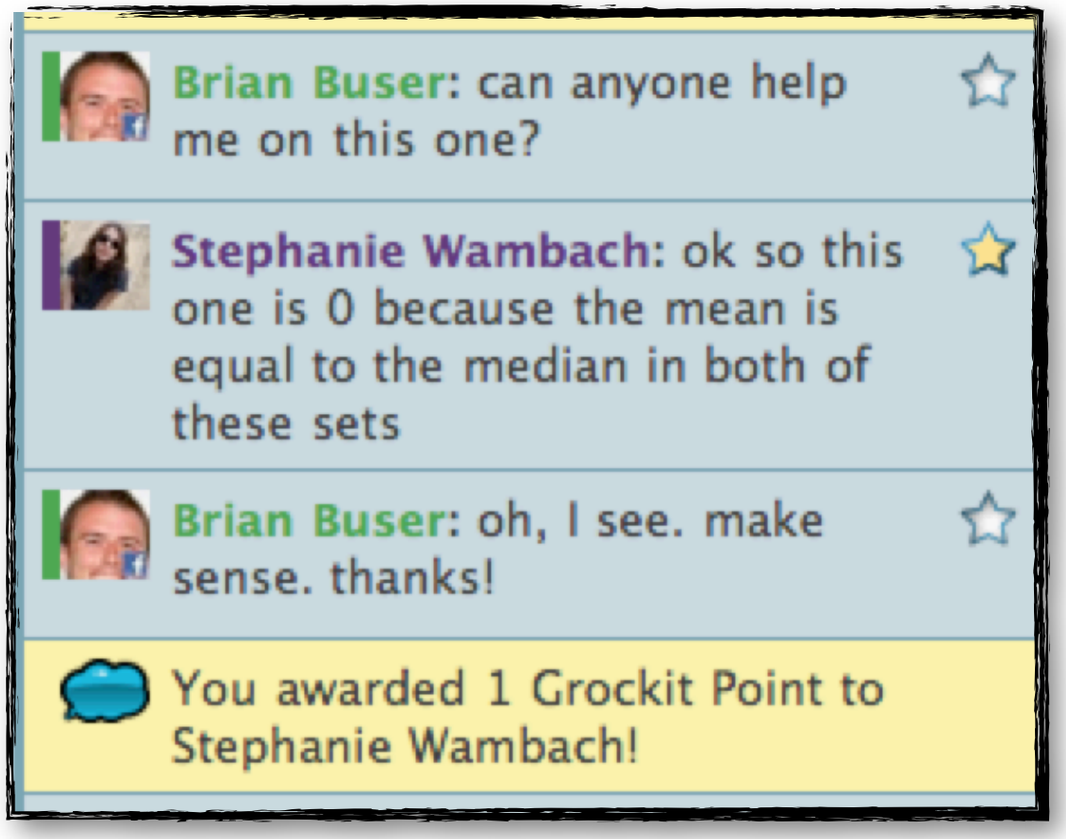

Social and motivational value of having a cohort of peers:

- opportunities to **ask for assistance** (just-in-time guidance)
- opportunities for **discussion** (both on-task and off-task)
- opportunities to **earn recognition** (for assisting others)

Why support **social** interactions among learners?

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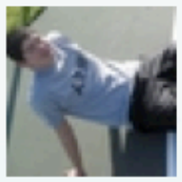
Elvin Unthiah 08/25/2009

has played 81 questions with Tiffany

Looking for someone who will make you feel comfortable while revising here in grockit? Someone who like chattering and helping others while not shifting away from our main objective(revision) ? Well, well, Tiffany is the right person XD it is always nice playing with her. XD



Eric Ng 08/23/2009

has played 27 questions with Tiffany

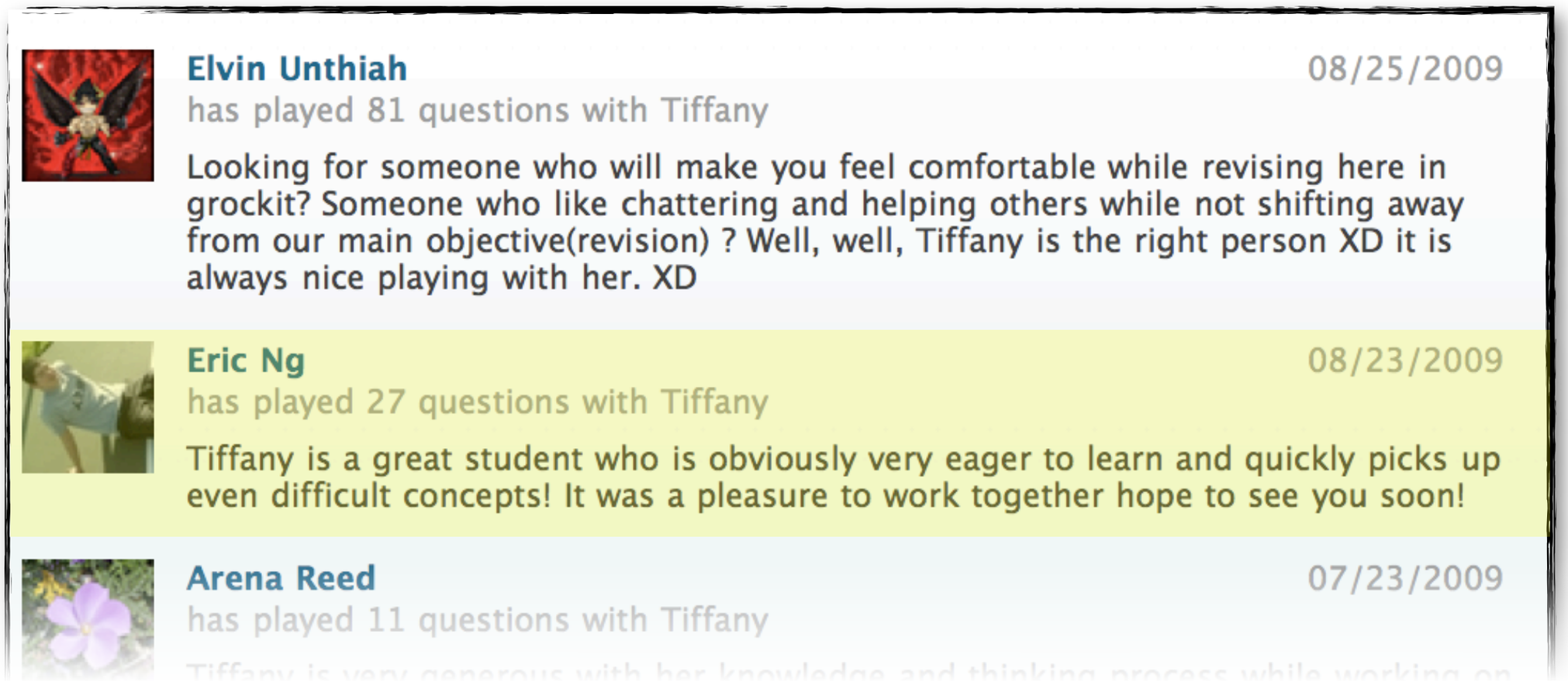
Tiffany is a great student who is obviously very eager to learn and quickly picks up even difficult concepts! It was a pleasure to work together hope to see you soon!

Arena Reed 07/23/2009

has played 11 questions with Tiffany

Tiffany is very generous with her knowledge and thinking process while working on questions. She welcomes other students to games and she happily helps the group figure out the best answer choice without just giving it away. People feel smart when they study with Tiffany!

Why support **social** interactions among learners?



Social and motivational value of having a cohort of peers:

- opportunities to **establish a reputation** *among* peers
- opportunities for **receive encouragement** *from* peers
- opportunities for a **study support system** *of* peers

Why **care** about the social/motivational needs of online learners?

Why **care** about the social/motivational needs of online learners?

Learning higher in *blended/online learning* vs. *classroom learning*.

- Increased effectiveness may be due to the additional time-on-task.
- Thought: Rather than *controlling* for this, view it as a new *opportunity:*
  Higher engagement ➔ more time-on-task ➔ higher learning rates

Outline

- ✓ Why support interaction synchronicity among learners?
- How do other learning systems address synchronicity?
- How does **Grockit** achieve web-based synchronicity?
- What have we learned from options in synchronicity?

Why **not** support synchronous interactions in web-based learning systems?

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It's difficult. Interaction patterns don't naturally match.

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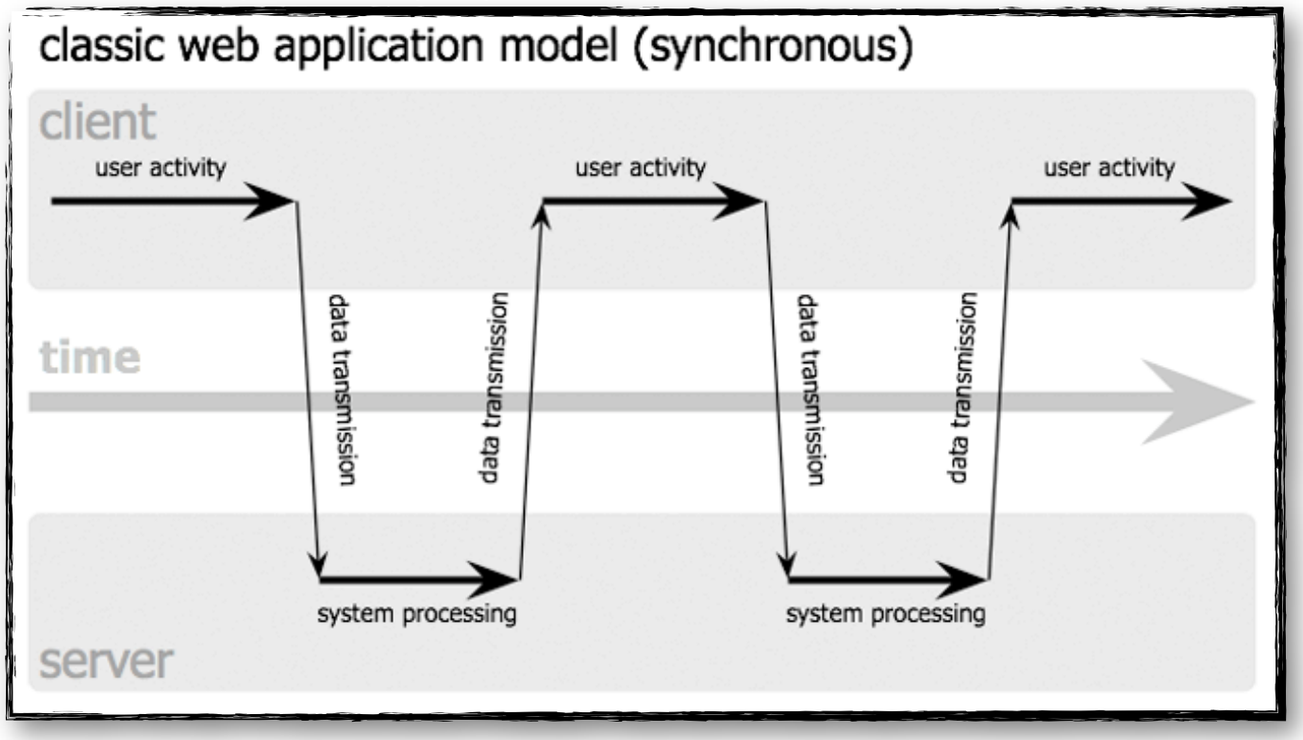
It's difficult. Interaction patterns don't naturally match.

http://www.adaptivepath.com/ideas/essays/archives/000385.php



Request/response
nature of the web

http://www.flickr.com/photos/ubclibrary/2701347277/

Social activity
nature of collaborative learning.

How do **existing** learning systems address synchronicity?

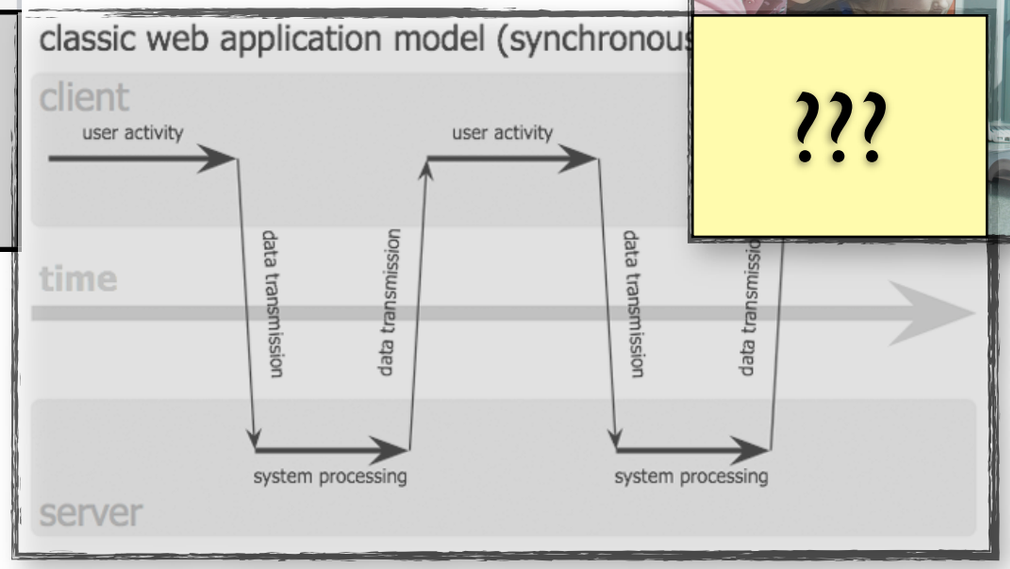
How do **existing** learning systems address synchronicity?

	Asynchronous *learner interactions*	***Synchronous*** *learner interactions*
Desktop-based *platform*	-	**Design** around the problem
Web-based *platform*	**Avoid** / Ignore the issue	**Engineer** a solution

Examples

	Asynchronous *learner interactions*	***Synchronous*** *learner interactions*
Desktop-based *platform*	email-based DE?	Skype, IM, Second Life
Web-based *platform*	(most) OER, wikis, blogs	**Grockit**, EduFire, DimDim, WiZiQ, etc.

How can **web-based** systems do **synchronous** interactions?

	Asynchronous *learner interactions*	***Synchronous*** *learner interactions*
Desktop-based *platform*		
Web-based *platform*		???

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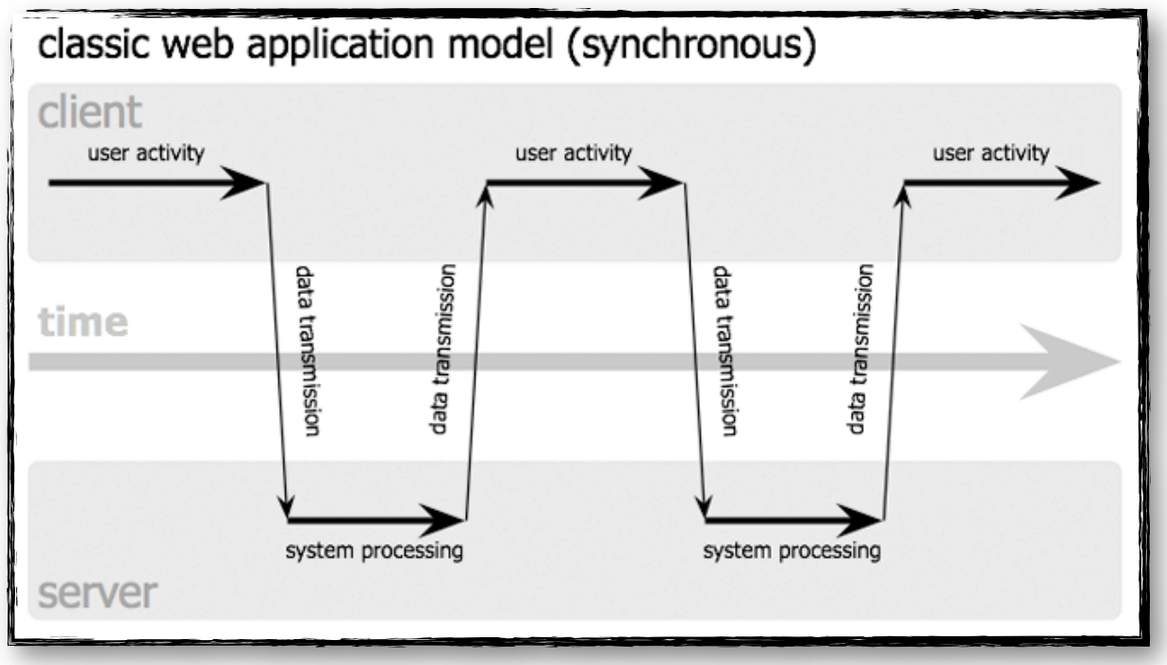
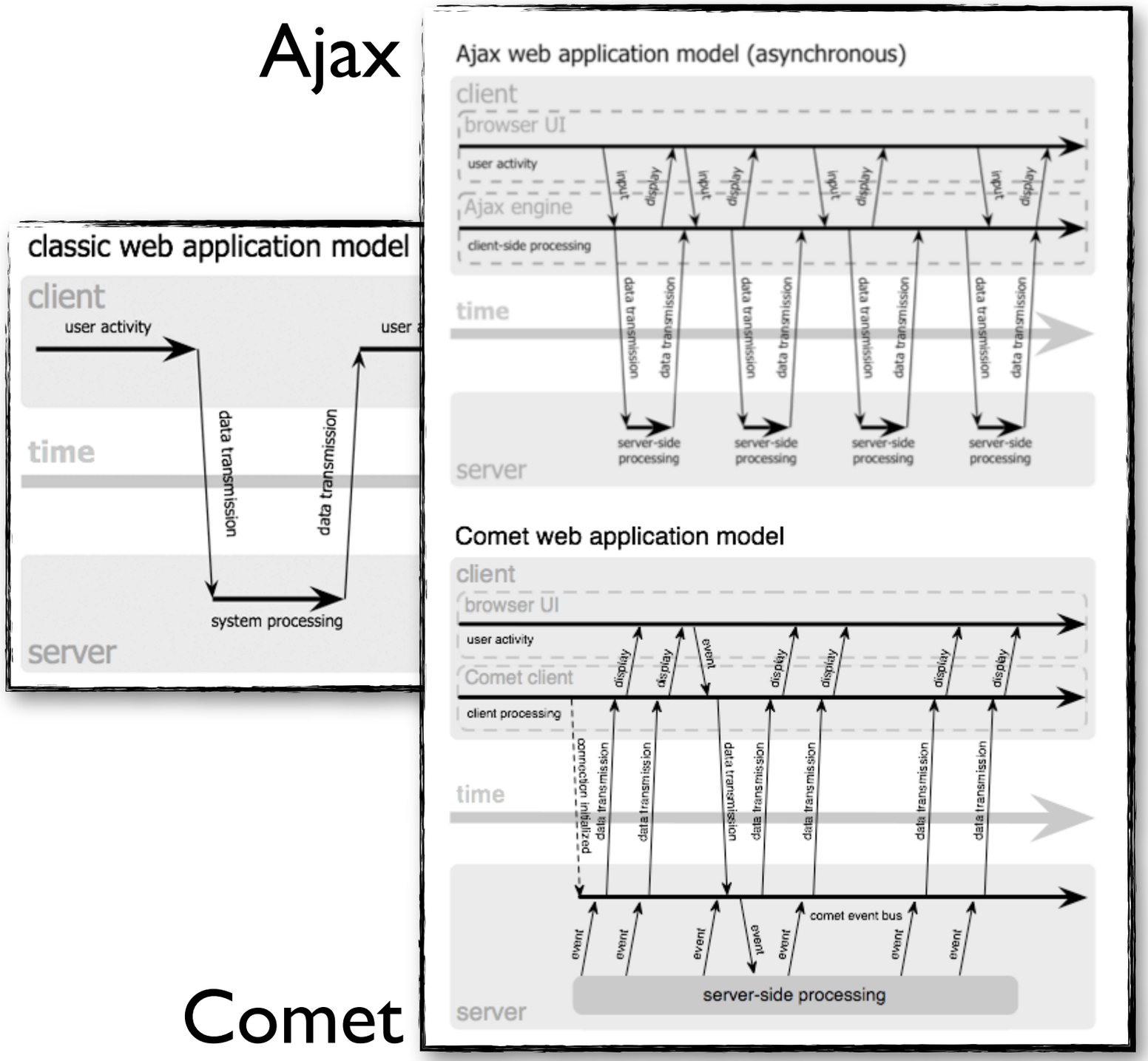


How can **web-based** systems do **synchronous** interactions?

Ajax



Comet

alex.dojotoolkit.org/2006/03/comet-low-latency-data-for-the-browser/

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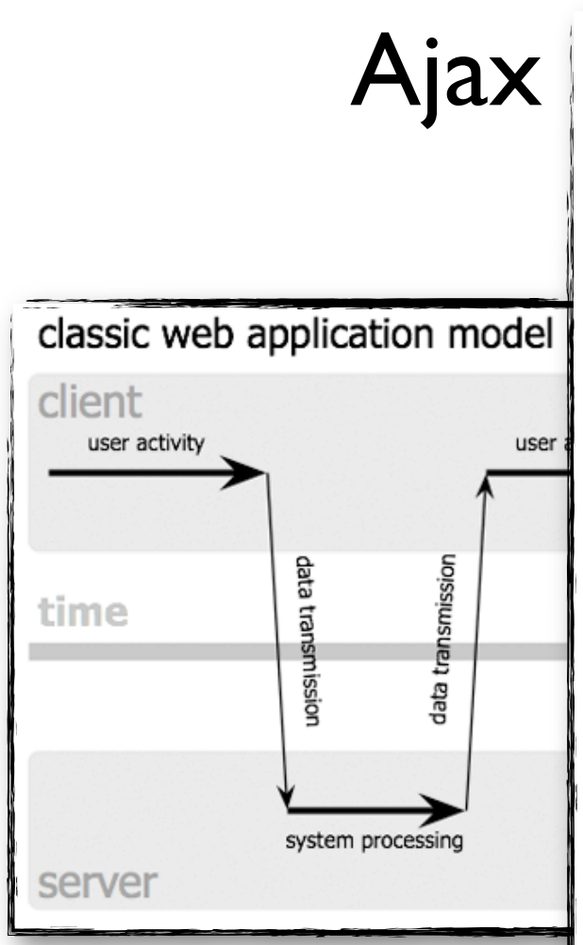

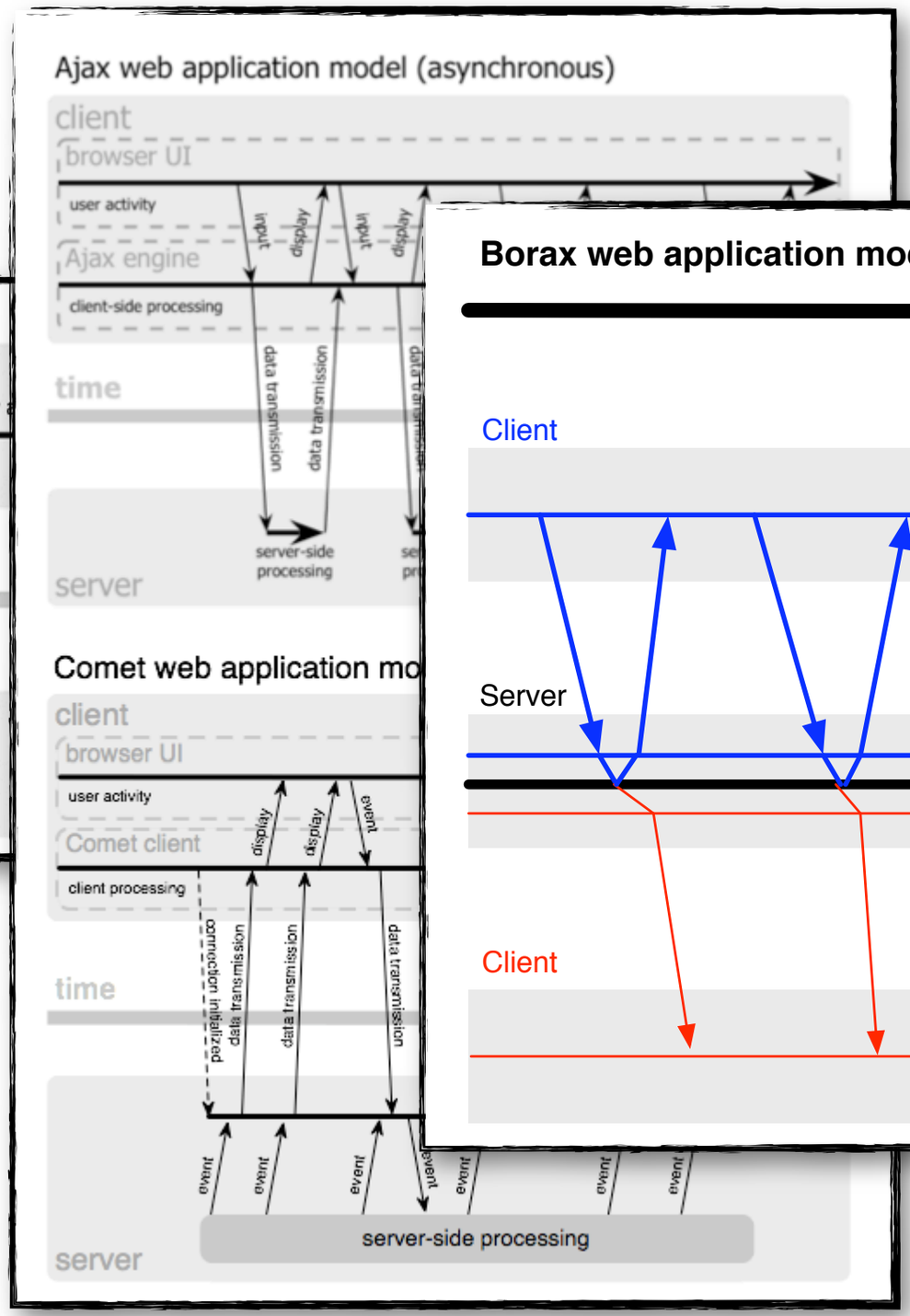

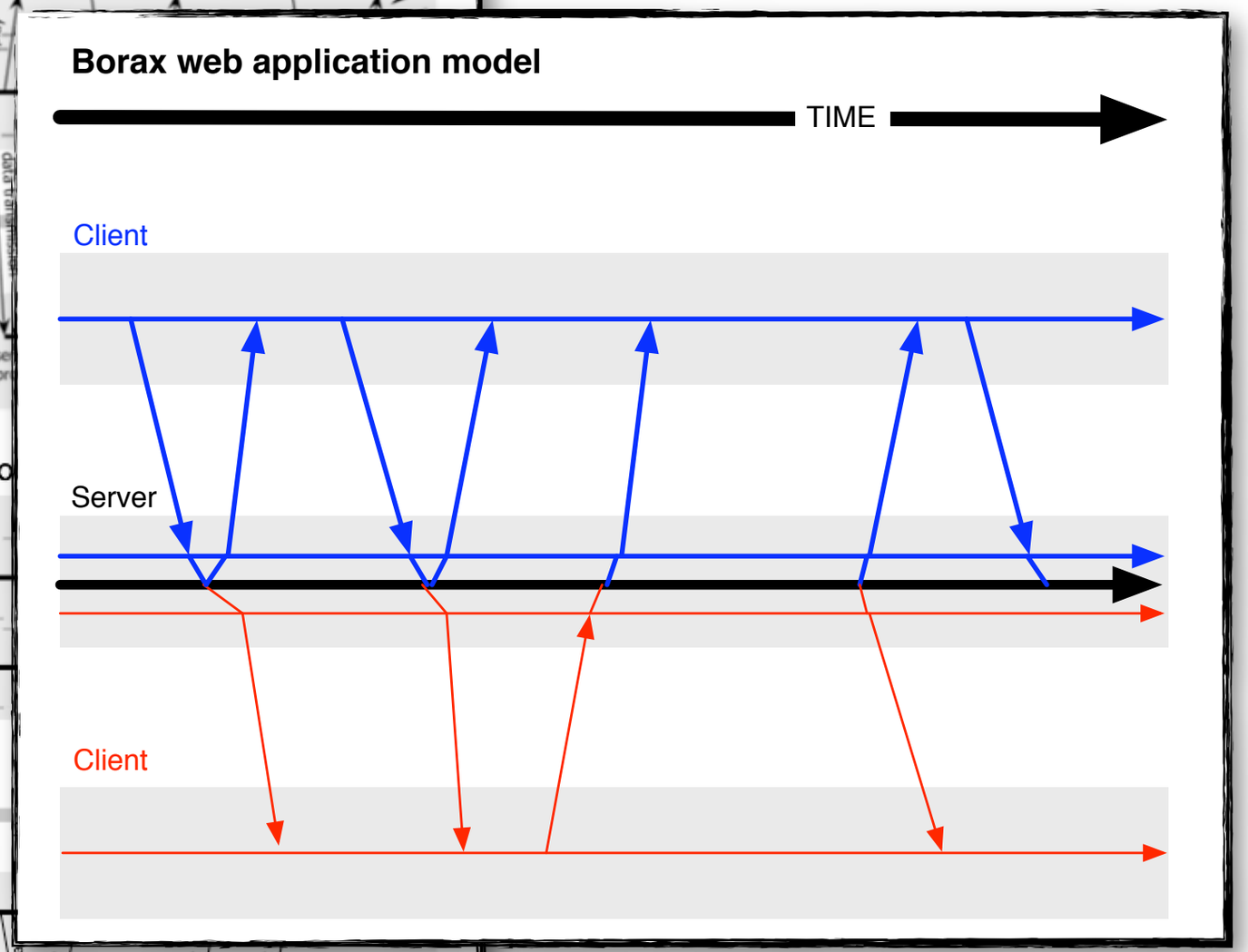

Comet

Boraxo

alex.dojotoolkit.org/2006/03/comet-low-latency-data-for-the-browser/

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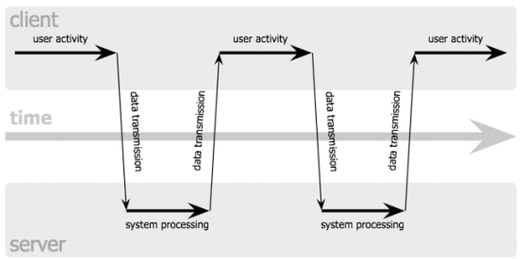

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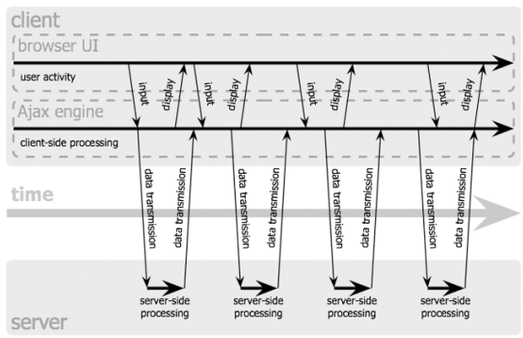

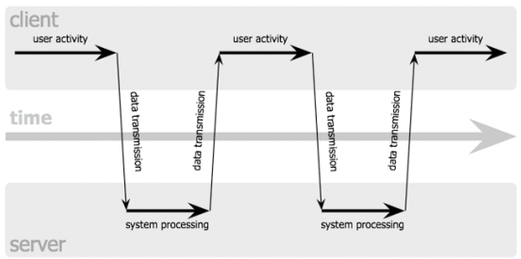

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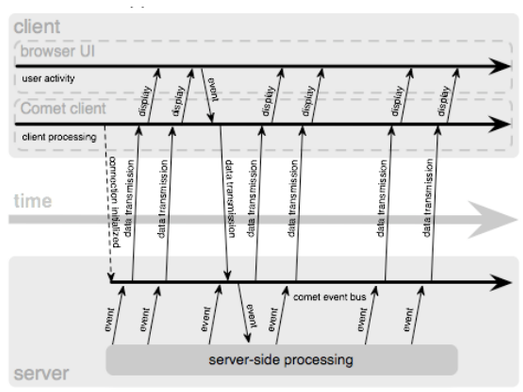

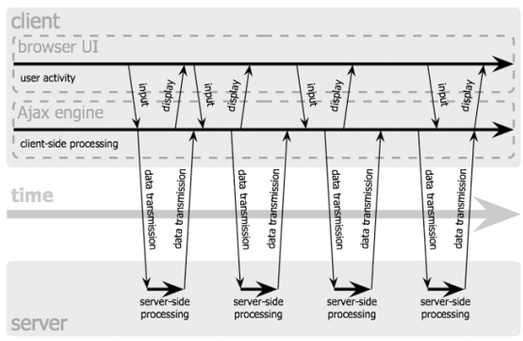

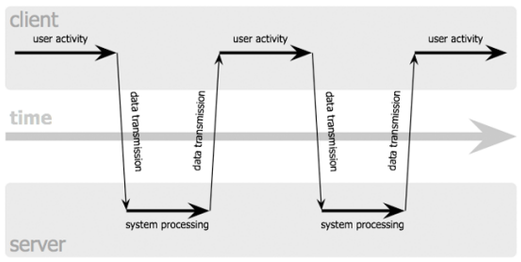

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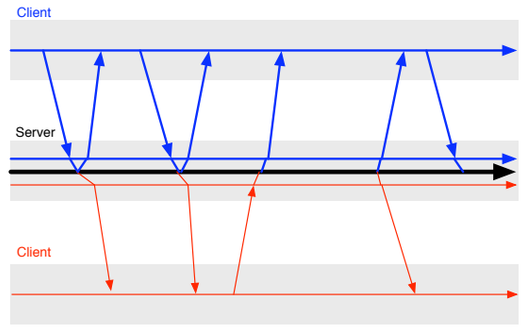

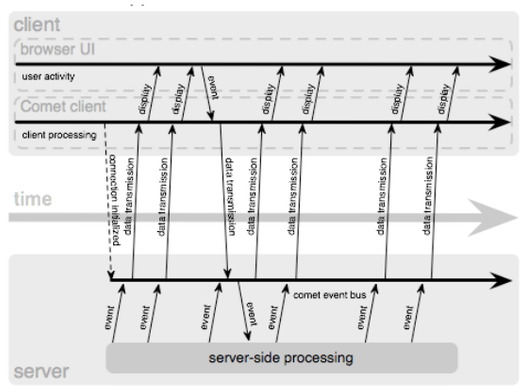

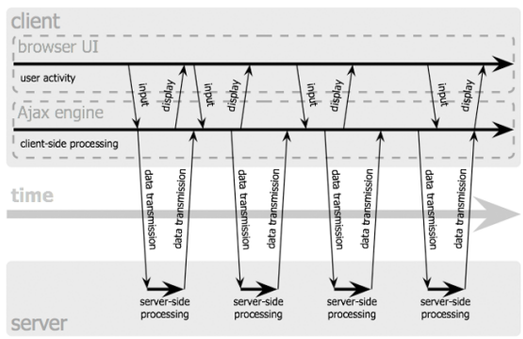

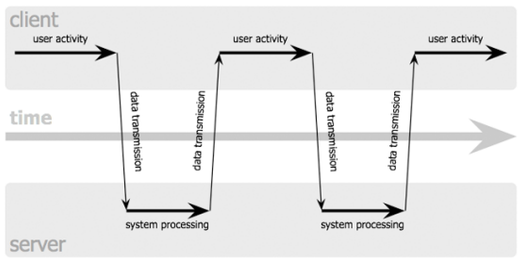

Interaction Synchronicity in Web-based Collaborative Learning Systems

MUD / MMO / MMOL

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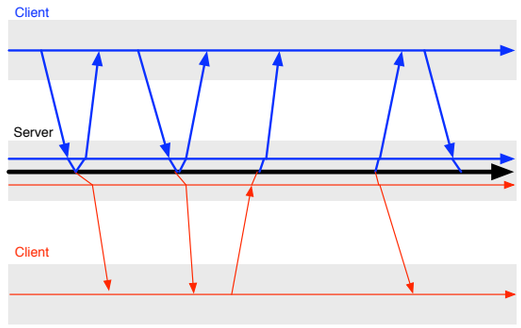
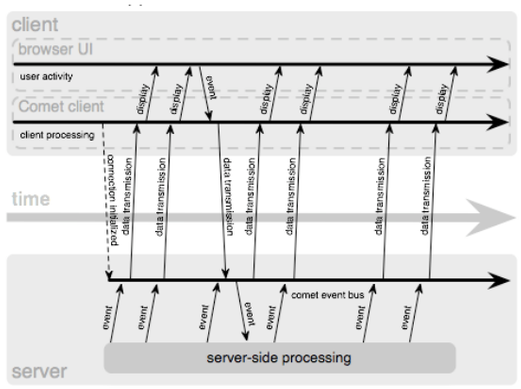
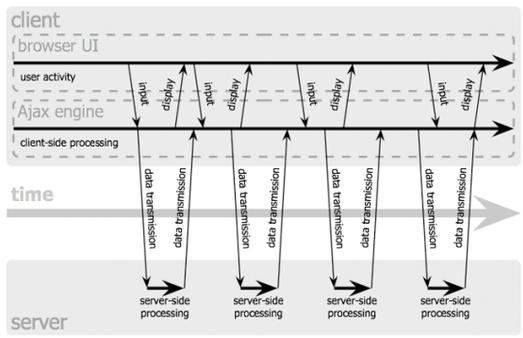
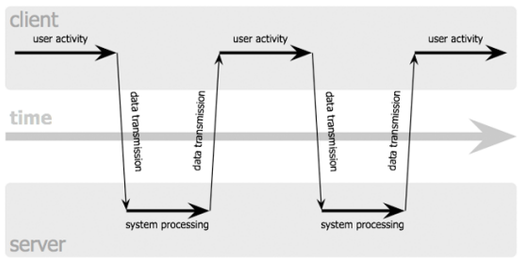








Given the ability to do synchronous **and/or** asynchronous interactions...

	Asynchronous *learner interactions*	***Synchronous*** *learner interactions*
Desktop-based *platform*		
Web-based *platform*		

Given the ability to do synchronous **and/or** asynchronous interactions...

	Asynchronous *learner interactions*	***Synchronous*** *learner interactions*
Desktop-based *platform*		
Web-based *platform*		

- Which interactions should be synchronous?
- Which should be asynchronous?
- Which should be a mix?
- What should that mix be?

Grockit offers:

- **Virtual study groups** for live collaborative learning
- A **social, game-like** environment for learners to **assist and discuss** with one another
- Skill-grained performance analysis to **help students decide** how to allocate their study time
- Adaptive problem selection techniques to help **personalize** study sessions based on prior experience and performance
- Support for both **synchronous** and **asynchronous** interactions among students

Lobby: **coordination** (Async+Sync)

Interaction Synchronicity in Web-based Collaborative Learning Systems

Game Round 1: **Problem solving** (Sync)

Interaction Synchronicity in Web-based Collaborative Learning Systems

Exit Game | Premium Member | Answer Mode: Chat and help each other out, then answer | 0:26

Grockit

Question

edit this question

Mary's employer reimburses her driving expenses according to a certain formula. Mary receives a fixed dollar amount for each day she drives for work, plus a certain dollar amount for each client she visits that day. If Mary visits 16 clients on one day, how much will she be reimbursed?

(1) Mary visited 12 questions clients last Monday.

(2) Mary's was reimbursed $76 for the driving she did last Monday.

Choices

A. Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.

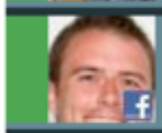
B. Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.

C. BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.

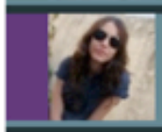
D. EACH statement ALONE is sufficient.

E. Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data are needed.

Ari Bader-Natal
★ 15 ● 45
• • • In Progress



Brian Buser
★ 0 ● 26
• • • In Progress



Stephanie Wambach
★ 16 ● 3955
• • • In Progress

Discussion

Stephanie Wambach: no worries, let's go on

Brian Buser: Thanks for the explanation Stephanie

Ari Bader-Natal: How did you know that the two together were not sufficient?

Ari Bader-Natal: I'll check that in reviews...

Stephanie Wambach: because you will have to look at the positive/negative signs

Stephanie Wambach: ok next question...

Stephanie Wambach: this is the other type of DS question

Stephanie Wambach: one that asks to find a specific value

Ari Bader-Natal: can we assume that the one day is Monday?

Share your thoughts... Submit

Game Round 2: **Discussion** and **reflection** (Sync)

Interaction Synchronicity in Web-based Collaborative Learning Systems

Exit Game | Premium Member | Review Mode: Review and discuss, continue when ready | 0:17

Grockit

Question

An explanation for this answer is available if you review this game.

Continue to Next Question

edit this question

If x is average (arithmetic mean) of the first 13 positive multiples of 6 and if X is the median of the first 13 positive multiples of 6, what is the value of $X - x$?

Choices

A. -6

B. 0

An explanation for this answer is available if you review this game.

Your response

C. 6

An explanation for this answer is available if you review this game.

D. 39

E. 42

Ari Bader-Natal
15 47
In Progress

Brian Buser
0 20
ready

Stephanie Wambach
17 3959
In Progress

Discussion

Brian Buser: is this a plug in answers question?

Stephanie Wambach: i think the trick here is that for any evenly distributed set the mean is equal to the median

Correct! You gained 8 XP.

Brian Buser: can anyone help me on this one?

Stephanie Wambach: ok so this one is 0 because the mean is equal to the median in both of these sets

Brian Buser: oh, I see. make sense. thanks!

You awarded 1 Grockit Point to Stephanie Wambach!

Stephanie Wambach: so the two sets are the same – the first positive 13 multiples of 6

Share your thoughts... Submit

Reviews: **Explanation / commenting** (Async)

Lobby Friends Profile Feedback Messages Find a Tutor Forums Groups Users Content Ari Bader-Natal | sign out

Grockit

Back to Reviews | Previous | Reviewing question 2 of 4 | Next

Grockit

Information

Acceptable answers are $^3/_2$ or 1.5.

First, multiply out the squares to get $16a^2 + 8ab + b^2 - (16a^2 - 8ab + b^2) \geq 36$. All of the squares cancel out and you are left with $16ab \geq 36$. So, $ab \geq {}^{36}/_{16}$. This fraction reduces and we have $ab \geq {}^9/_4$. Now, since it is given that a is not negative and that b is at least equal to a, we know that the least possible value for b occurs when b is equal to a (and not greater than a), and when $ab = 36$ and is not greater than 36. So, since $a=b$, we need to solve for $b^2 = {}^9/_4$. To find that least possible value for b, then, we can take the square root of $^9/_4$, which is $^3/_2$ (remember, it is given that b is not negative, so we are looking for the positive square root). The answer can be grid as $^3/_2$ or 1.5.

Question

edit this question

Given the following statements, what is the least possible value of b?

$b \geq a \geq 0$

$(4a + b)^2 - (4a - b)^2 \geq 36$

Answer

Correct Answers

1.5, 3/2

Responses

1.50

4

Discussion

Ari Bader-Natal: tada

Ari Bader-Natal: ab >= 36/16.

guest 1621324565: if you guess wrong its negative points so i left it blank

Joseph Feinstein: anyone no t his

guest 1621324565: cancels to what?

Ari Bader-Natal: !

Ari Bader-Natal: so, 8ab+8ab = 16ab.

Ari Bader-Natal: then, b^2 >= 36/16.

Ari Bader-Natal: so, at the least, b=6/4 = 3/2 = 1.5

Jazzmond S. Jones: not a clue

Comments About This Question

Khuong Le Delete this comment Sunday at 10:07PM

thank! your explanation is really helpful

Tiffany Riley Delete this comment Saturday at 02:52PM

thanks- every step is explaned and the reason behind the procedures.

EL MALIKI Sofia (FBS) Delete this comment Friday at 12:07PM

Thanks y'all!!! Very helpeful!!!

Jazzmond S. Jones Delete this comment Saturday at 04:59PM

still confused don't know where the 8ab came from

Anantharam Peesapati Delete this comment Monday at 09:08AM

really good explanation. thanks!! ;)

kumar manish Delete this comment Thursday at 12:05PM

good explanation!

odarri Lewis Delete this comment Friday at 09:27PM

thank you!

Sherzod Kutfiddinov Delete this comment Tuesday at 02:15AM

nice

Sara Gennaro Delete this comment Tuesday at 03:02PM

i had no idea how to do the problem beforehand, and the explanation was very thorough and helped a lot!!

Sidak Singh Dhillon Delete this comment Saturday at 09:48AM

that's a really good question.

Sidak Singh Dhillon Delete this comment Saturday at 09:49AM

Luke Drakas: wow my multiplication skills arehorrible...

guest 1621324565: guess not

Ari Bader-Natal: (4a+b)^2 - (4a-b)^2 mostly cancels out.

Luke Drakas: ohhhh k thanks i understand now

Luke Drakas: i got that far (16ab)

guest 1621324565: i simplified to ab is greater than or equal to 4

Ari Bader-Natal: divide both sides by 16, and you get...

Ari Bader-Natal: here's an explanation:

Ari Bader-Natal: since b is, at the least, equal to a, let's assume that it is A.

Joseph Feinstein: so it is four?

Ari Bader-Natal: square root of both sides, and you get b>=6/4

Luke Drakas: .how did u get 1.5?

Ari Bader-Natal: you're left with (4ab*2) - (-4ab*2)

Ari Bader-Natal: hope that helps!

guest 1621324565: smart man

Lessons learned regarding interaction synchronicity:

- implications of question complexity
- implications of activity visibility
- implications of continuous communication
- implications for discussion comments reuse
- implications of group size on discussion dynamics
- implications of community size on group formation

Implications of **question complexity**

Implications of **question complexity**

- Should long passages be visible/included during synchronous interactions?

Implications of **question complexity**

- Should long passages be visible/included during synchronous interactions?

Question

You're probably itching to make a sketch, but that's a total waste of time here. There are far too many possible triangles to sketch even a few out, so let's think up another way to work this one out.

Rather than working out all the triangles, if we work out the plot points of the given points, based on the limitations provided, then we'll know how many triangles can fill the requirements.

Let's start by calculating the number of possible points where angle *A* could be placed in the coordinate system. Given: $-6 \le x \le 2$ ... we know there are 9 possible *x*-coordinates for point *A*... and given $4 \le y \le 9$ ... we know there are 6 possible *y*-coordinates for point *A*.

Now we can determine that there are a total of (9)(6) = 54 possible plot points where point *A* could lie within the limitations provided for the *xy*-coordinate system.

Now let's figure out where point *B* could lie. We're told that *AB* is parallel to the *y*-axis, so point *B* will have the same *x*-coordinate as point *A*, but it will have a different *y*-coordinate. We know that there are 6 different permissible *y*-coordinates, but point *A* will be occupying one of those, so there will be 5 possibilities left for point *B*.

Here we can calculate the number of different possible incarnations of line segment *AB*: 54 possible points for *A* × 5 possibilities left for point *B* in each of those = 270 possible variations of line segment *AB*.

Finally, we have to calculate the possibilities for point *C* and multiply that by the 270 possibilities for line segment *AB*. Since we know that *AB* is parallel to the *y*-axis and angle *A* is a right angle, we can figure out that *AC* will be parallel to the *x*-axis. This means that point *C* will have the same *y*-coordinate as *A*, but it will have a different *x*-coordinate.

Of the nine possible *x* values, *A* is already taking one up. So we're left with 8 possibilities for *C* in each of the 270 incarnations of line segment *AB*, bringing our total possible triangle variations within these limitations to a grand total of 2,160.

edit this question

Right triangle *ABC* is to be drawn in the *xy*-plane so that the right angle is at *A* and *AB* is parallel to the *y*-axis. If the *x*- and *y*-coordinates of *A*, *B*, and *C* are to be integers that are consistent with the inequalities $-6 \le x \le 2$ and $4 \le y \le 9$, then how many different triangles can be drawn that will meet these conditions?

Choices *Click to reveal explanations*

A. 54

B. 432

C. 2,160

This one is correct. (9)(6) = 54
possibilities for point *A* × 5 possibilities left for point *B* × 8 possibilities left for point *C* = 2,160 triangles.

D. 2,916

If you got this answer, you forgot to subtract the points that are already occupied by another point before you multiplied. 9*6 = 54
possibilities for point *A* × 5 possibilities left for point *B* × 8 possibilities left for point *C* = 2,160 triangles.

E. 148,824

This is the number of different triangles within the prescribed perimeter, but if you got this value, you ignored the restriction that angle *A* is a right angle and line segment *AB* is parallel to the *y*-axis.

Implications of **question complexity**

- Should long passages be visible/included during synchronous interactions?

Group size	Avg wait, seconds
2	13.9
3	27.8
4	32.4
5	36.0

SAT Reading data from Aug 2009

Implications of **question complexity**

- Should long passages be visible/included during synchronous interactions?

Question

An explanation for this answer is available if you review this game. Continue to Next Question

edit this question

If x is average (arithmetic mean) of the first 13 positive multiples of 6 and if X is the median of the first 13 positive multiples of 6, what is the value of $X - x$?

Choices

A. -6

B. 0

An explanation for this answer is available if you review this game.

Your response

C. 6

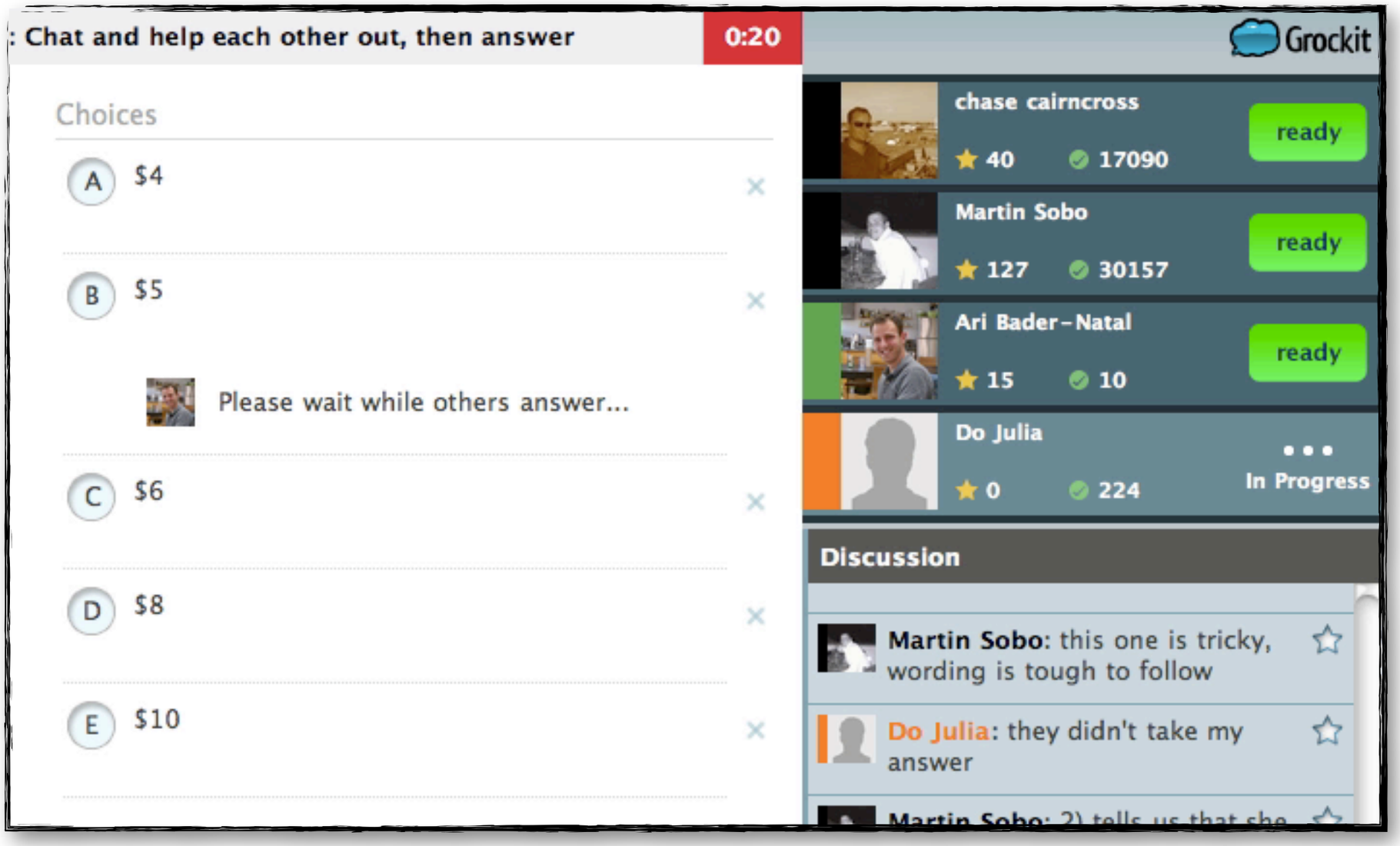
An explanation for this answer is available if you review this game.

Implications of **activity visibility**

- Should all student activity be visible immediately?

Implications of **activity visibility**

- Should all student activity be visible immediately?



Implications of **continuous communication**

- Should students be able to chat while answering questions?

Implications of **continuous communication**

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SAT Reading data from Aug 2009

Implications for discussion **comments reuse**

- If a student identifies a comment as ``useful", can that comment be reused later, in a different context?

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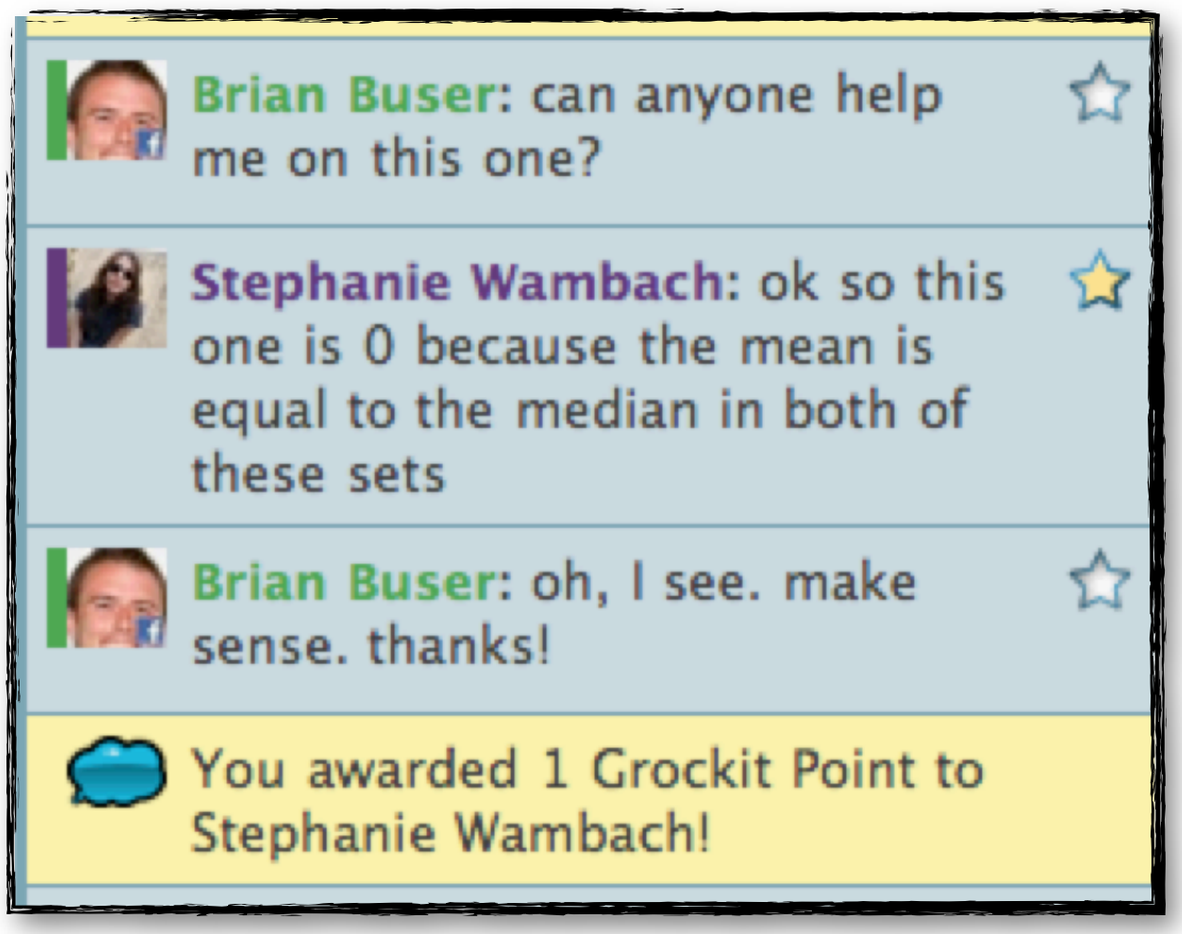

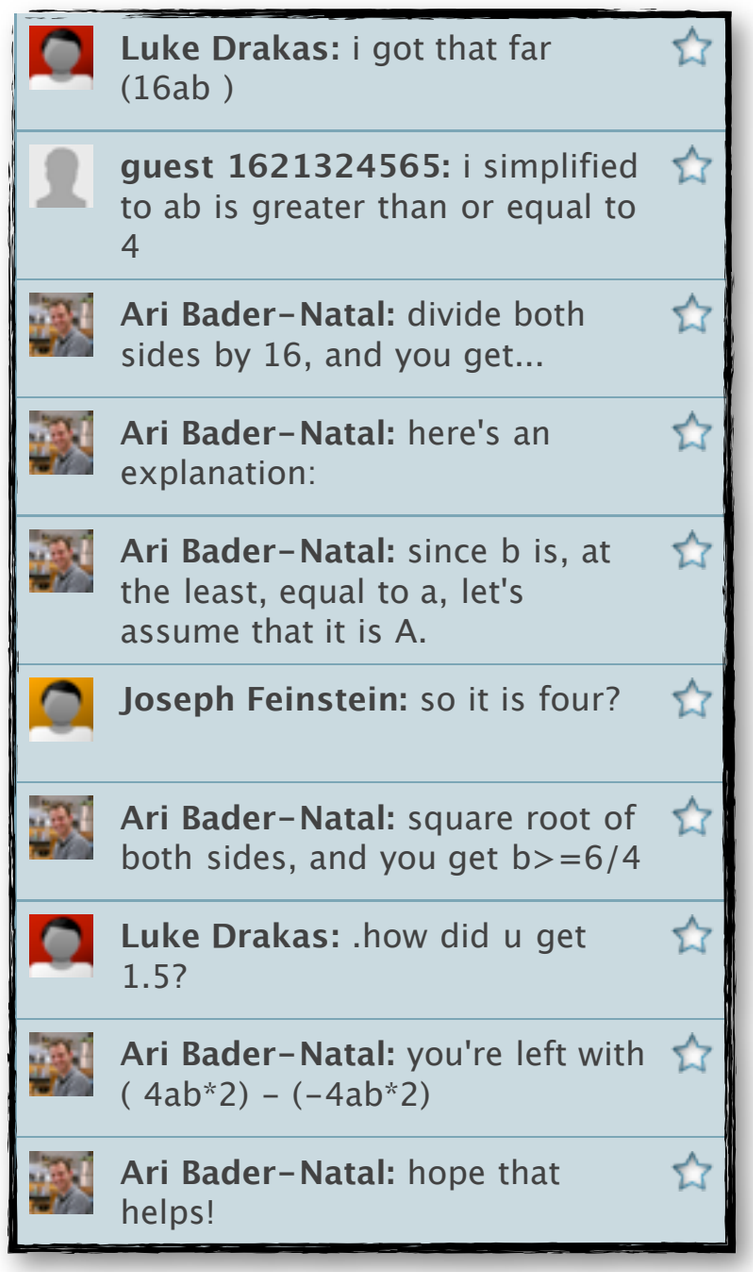

Implications of **group size** on discussion dynamics

- Should the number of students in the activity be limited?

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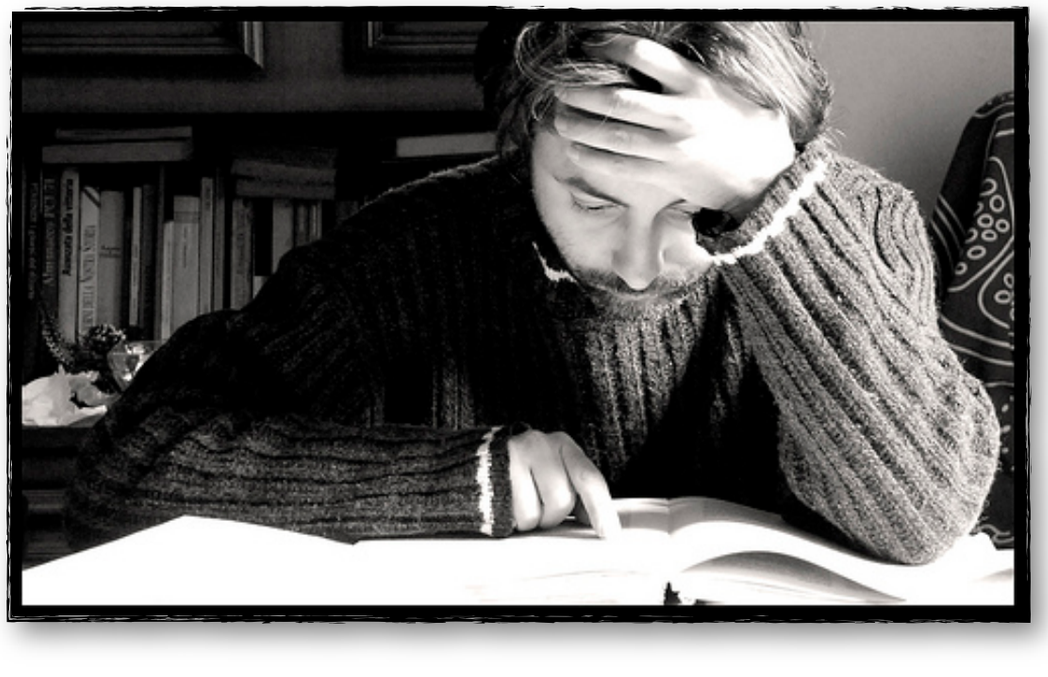

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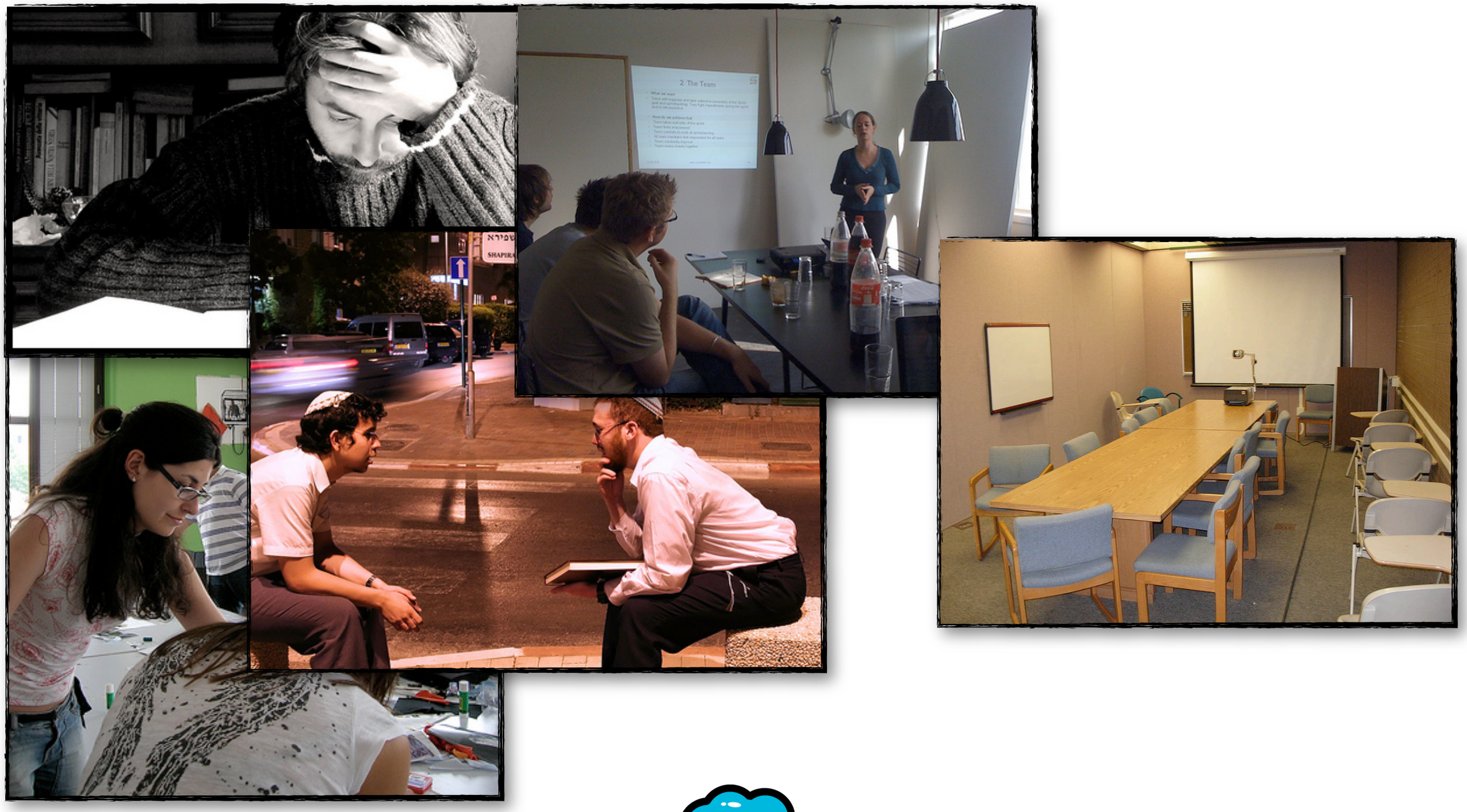

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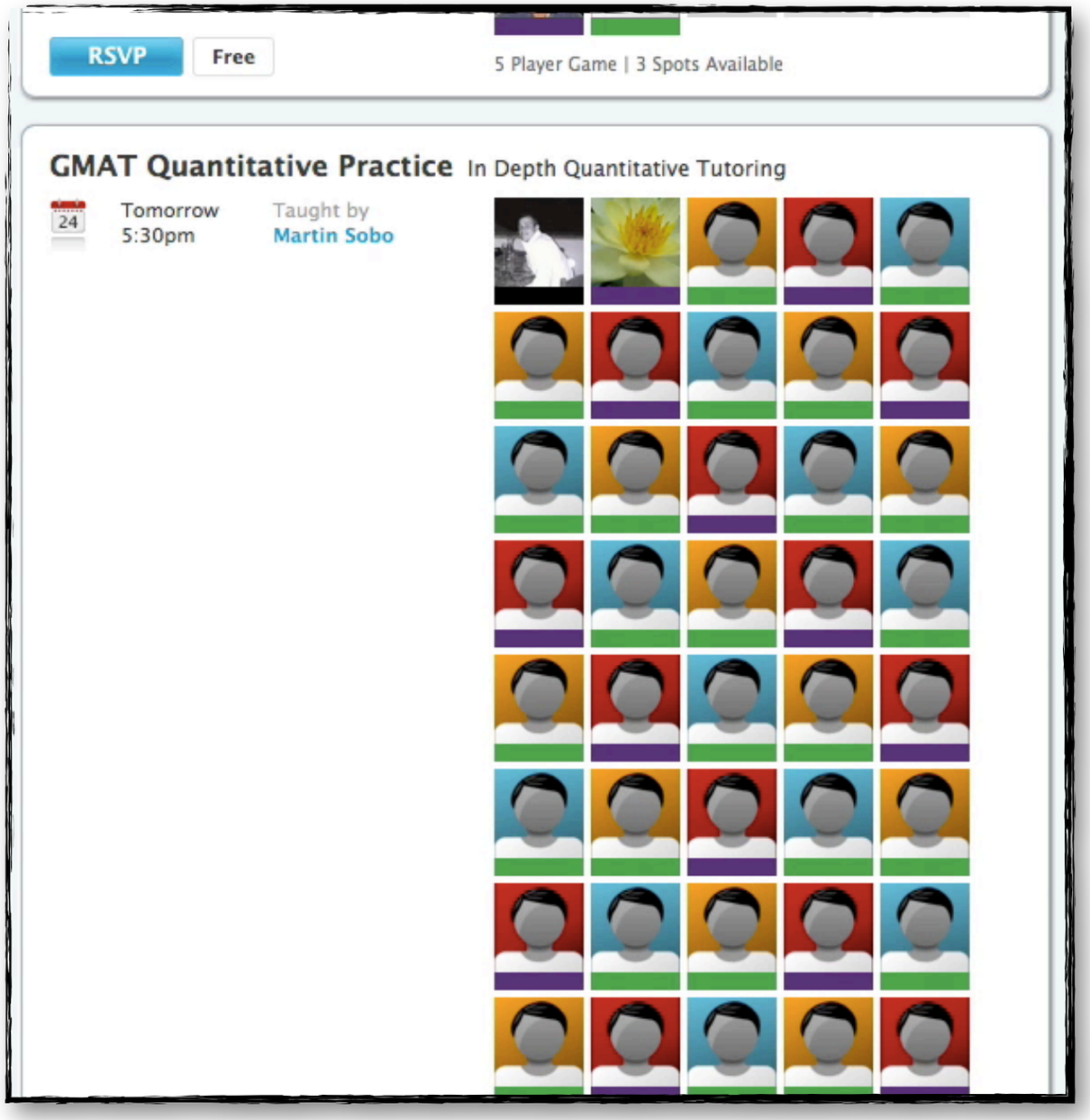

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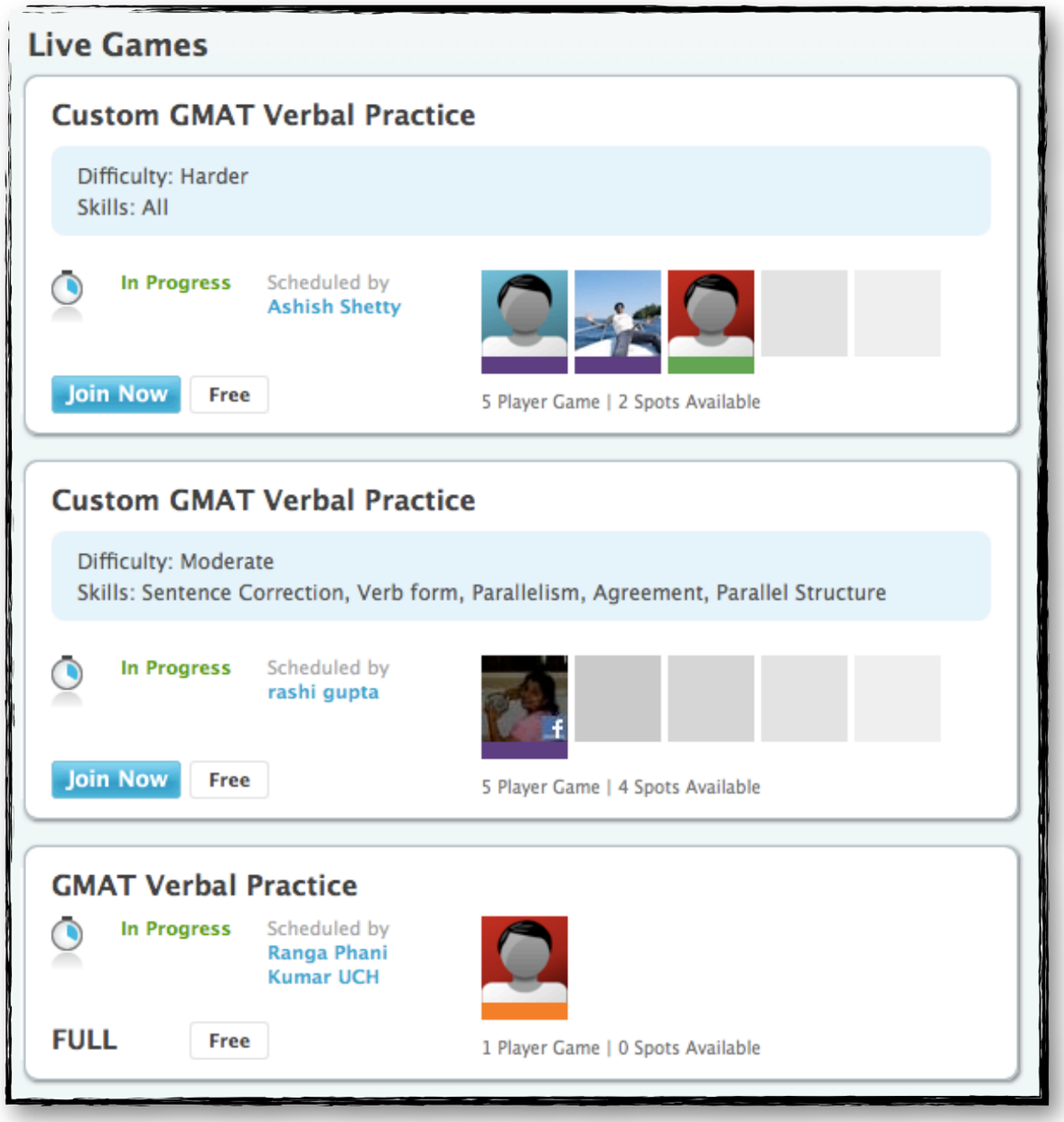

Implications of **community size** on group formation

- How can a learning environment reach the critical mass necessary to sustain synchronous activities?

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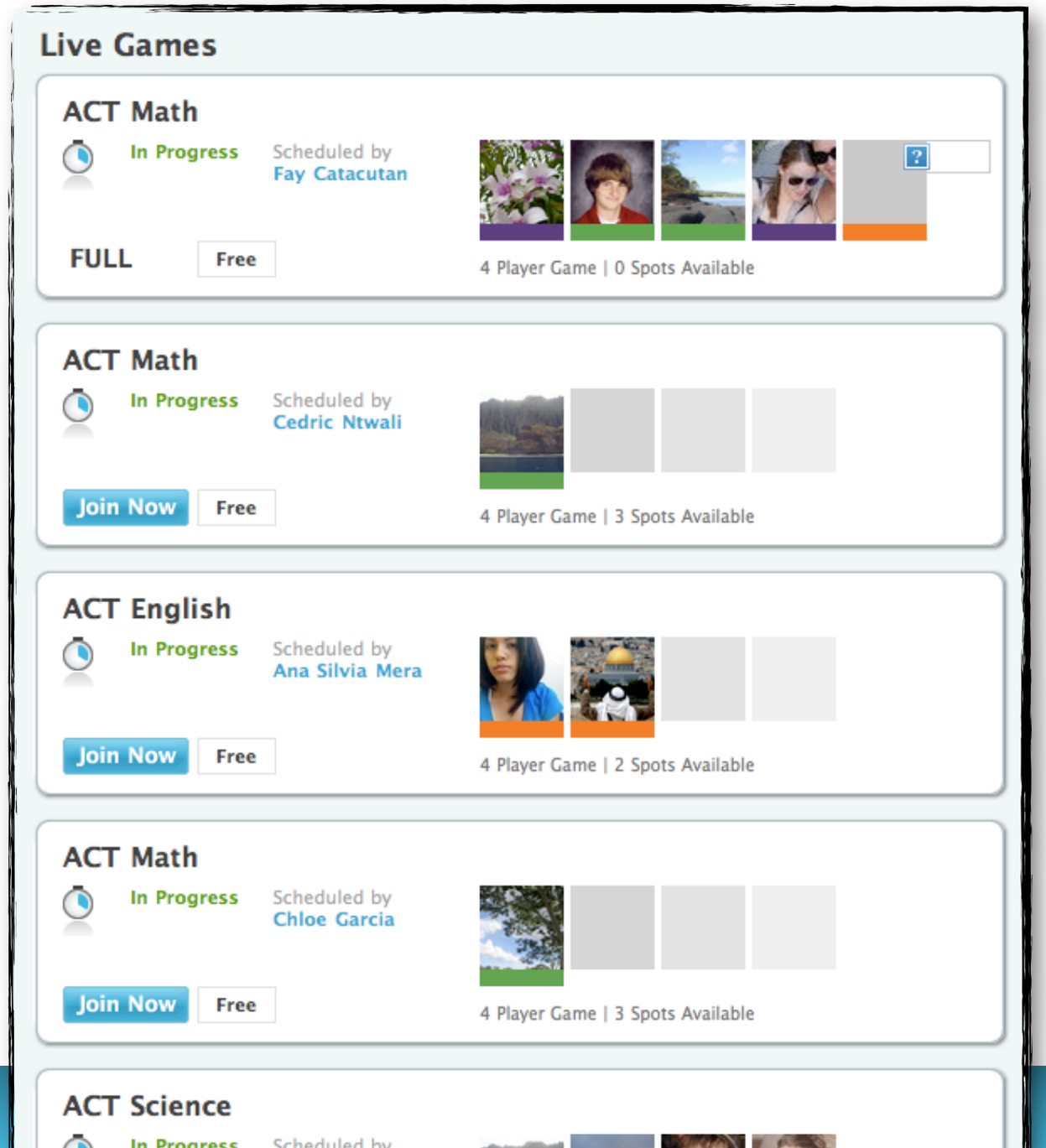

Implications of **community size** on group formation

- How can a learning environment reach the critical mass necessary to sustain synchronous activities?

http://commons.wikimedia.org/wiki/File:Clock_UT%2B1.png

Discussion & **Conclusion**

- Why support interaction synchronicity among learners?
- How do other learning systems address synchronicity?
- How does Grockit achieve web-based synchronicity?
- What have we learned from options in synchronicity?
  - implications of question complexity
  - implications of activity visibility
  - implications of continuous communication
  - implications for discussion comments reuse
  - implications of group size on discussion dynamics
  - implications of community size on group formation

Credits:

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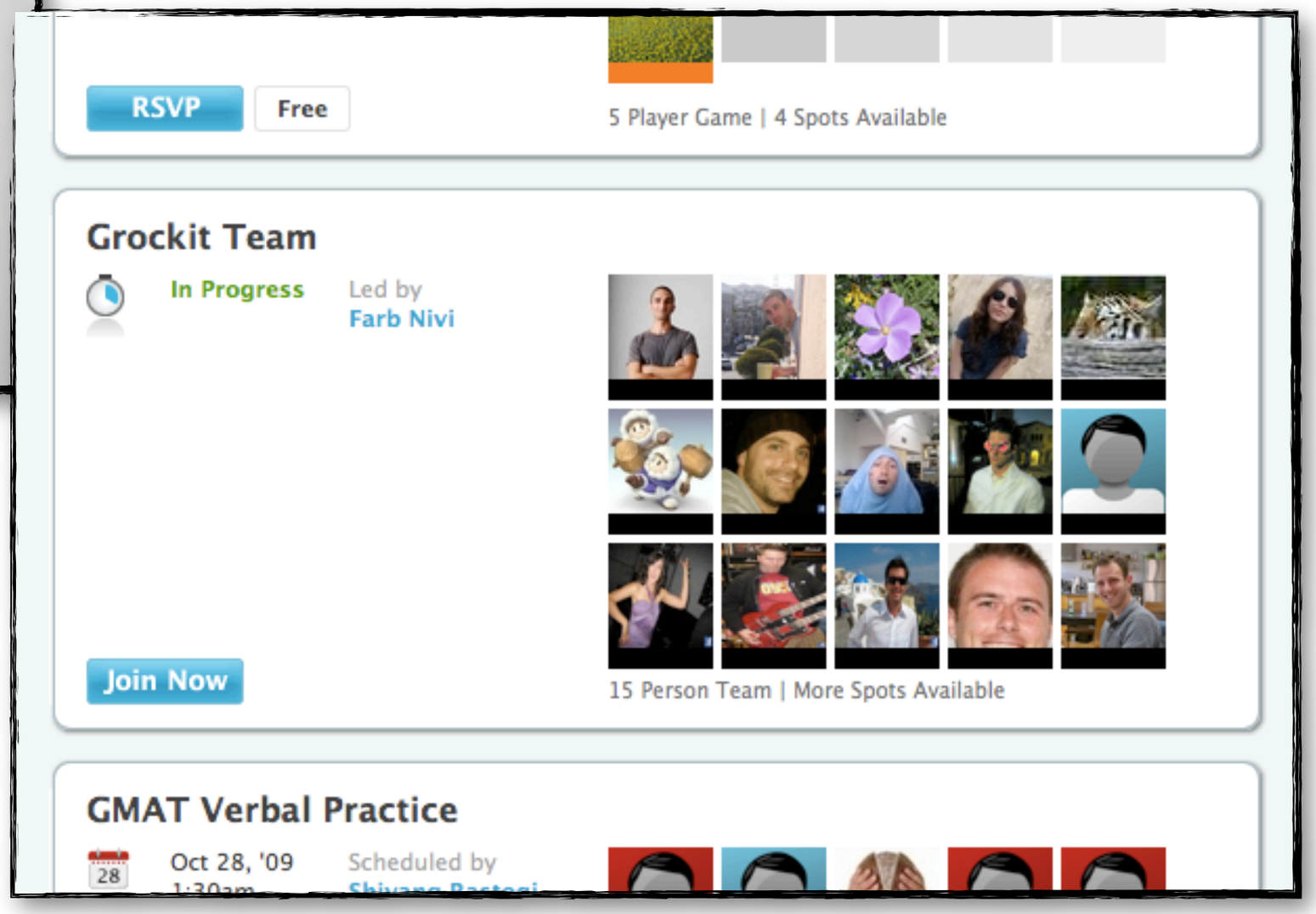

Grockit
team

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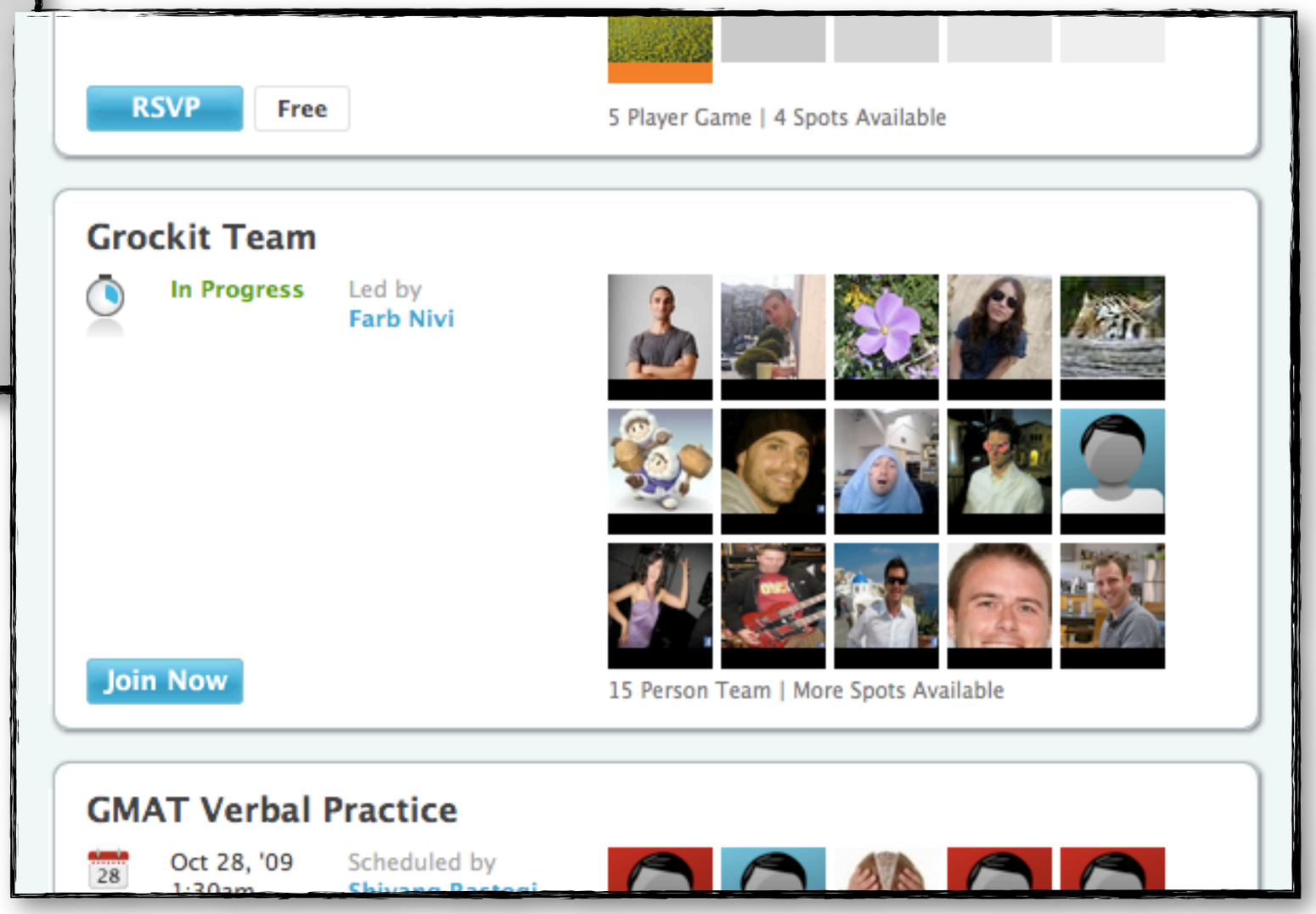

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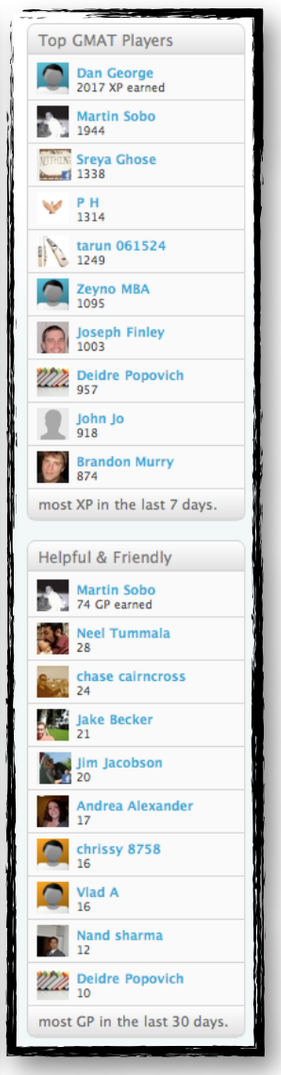

Grockit
students

Interaction Synchronicity in Web-based Collaborative Learning Systems

Ari Bader-Natal
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Grockit

October 27, 2009

E-Learn
World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education