ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

CS-411 : Digital Education & Learning Analytics

Chapter 5: Social Cognition

Pierre Dillenbourg, Patrick Jermann , Stian Haklev, Jennifer Olsen

WEEKS CS411

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14.

1.Specifications

2.Design

3.Implementation

4.Experiment

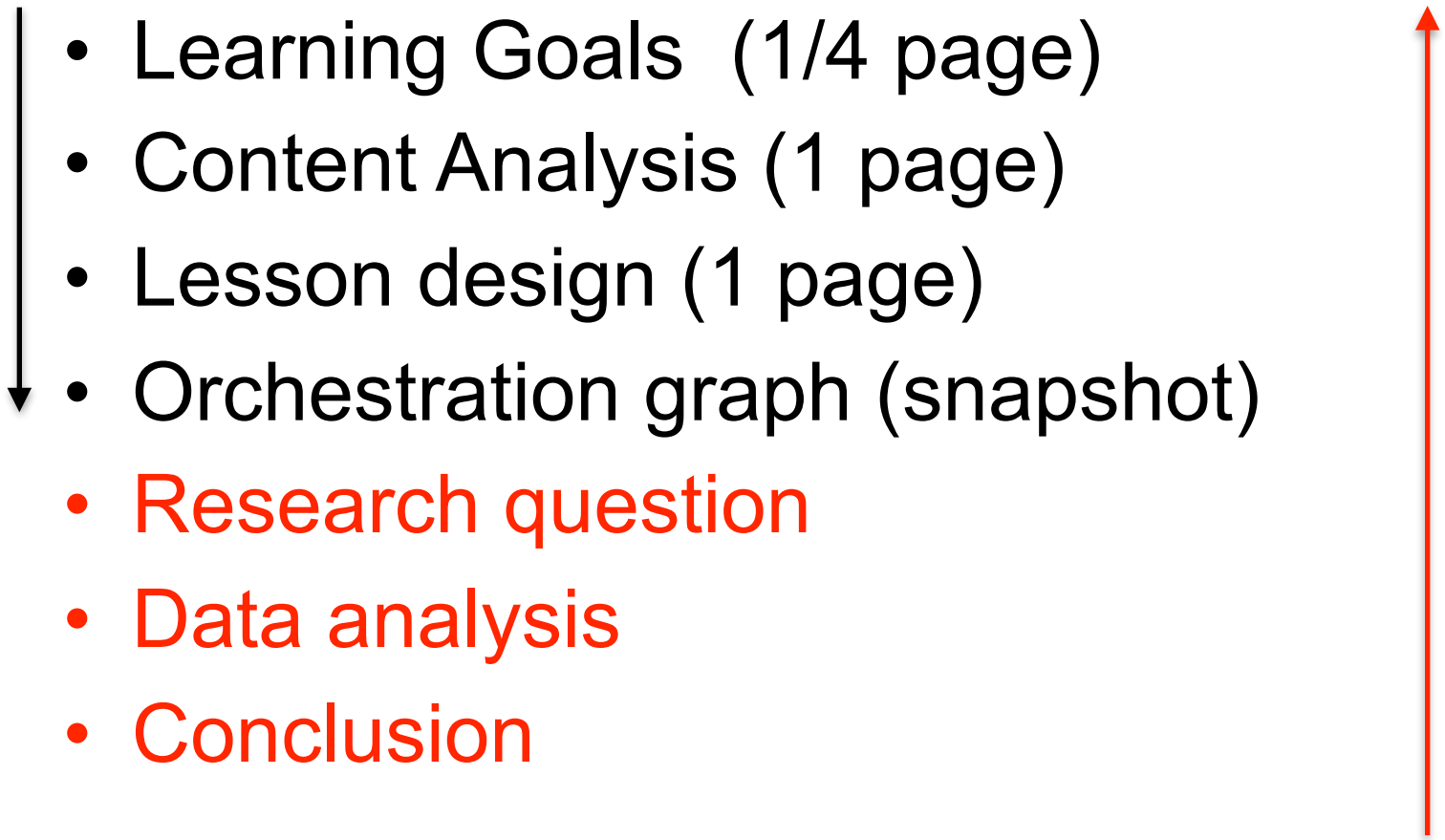
5.Data Analysis

6.Report

DESIGN PROCESS

Milestone 1 26/10

- Learning Goals (1/4 page)
- Content Analysis (1 page)
- Lesson design (1 page)
- Orchestration graph (snapshot)
- Research question
- Data analysis
- Conclusion



Final project 11/01

Visit of MOOC Studio

- Rolex Learning Center, CHILI lab
- Discover today
    - 10:15 Half of you
    - 11:15 Half of you
- If you plan to have videos in your orchestration graph, please take an appointment to record videos

How do people learn ?

Chapter 3: Skinner - Bloom

- by incremental mastery

Chapter 5: Vygotsky

- by verbal elaboration

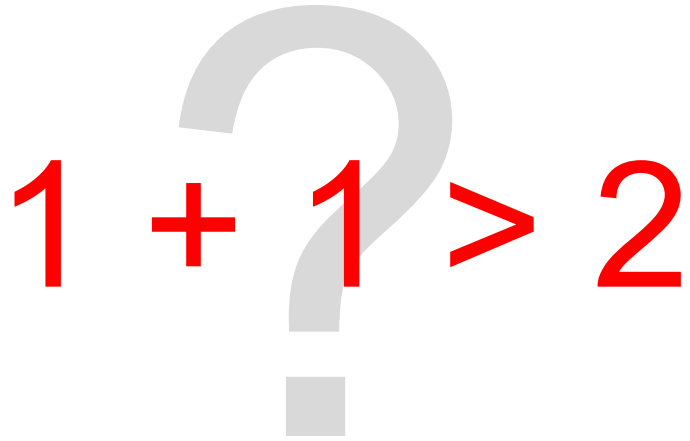
Chapter 6: Piaget

- by exploration, trial and error

Class Plane

Team Plane

Individual Plane



Is learning in teams
more effective
than learning alone ?

Question 1: Is Collaborative Learning Effective ?

	Learning Gains		
Meta-analyses: collaborative versus individual	>	=	<
Slavin, 1983.	**26**	14	1
Johnson & Johnson, 1989	**829**	645	109

Thanks to Fabrizio Butera

A decision maker could conclude that the probability that team learning is effective is high enough to use it.

A scientist would instead conclude that team learning is not effective per se, but depends on the conditions… see next slide

Teams can be a pain !

Photo (c) Juerg Kaufmann/ge4image.com

Pitfalls in Teamwork

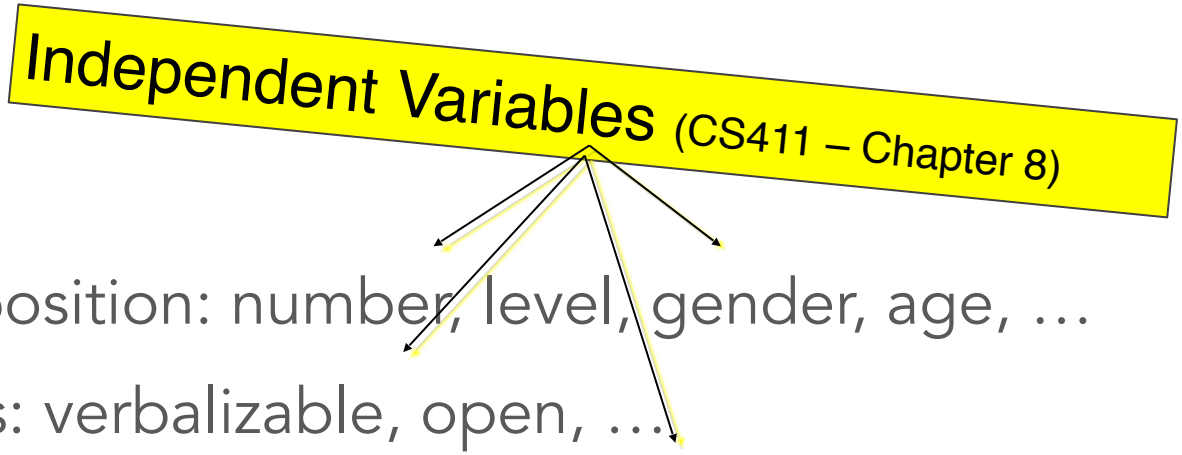
- 'GroupThink': pressure to consensus leads to suboptimal answers
- In education, as soon as they agree, learners return the solution to the teacher without checking if it is the best one

https://www.youtube.com/watch?v=gIUUmsBb_58

Pitfalls in Teamwork

- 'GroupThink': as soon as they agree, learners return the solution to the teacher without checking if it is the optimal solution
- Free-rider / Social Loafing: some teams members let the others do the work
- Domination: some team members dominate verbal interactions; contributions from some members are rejected or not taken into consideration
- Emotional (vs epistemic) conflict

Question 2: When is collaborative learning effective ?



Factors:

- Group composition: number, level, gender, age, …
- Task features: verbalizable, open, …
- Medium: face-to-face, synchro/not, text/audio/video,…
- Context: school/work

The effects of collaborative depends upon so many variables (plus their interaction effects) that it is impossible to predict that a given teamwork in a specific context will be effective

Question 3: Which interactions make collaborative learning effective ?

1. Elaborated explanations
2. Conflict resolution, Argumentation / Négociation
3. Mutual Regulation

Collaborative learning occurs when team members engage into the ‘productive interactions’ listed above.

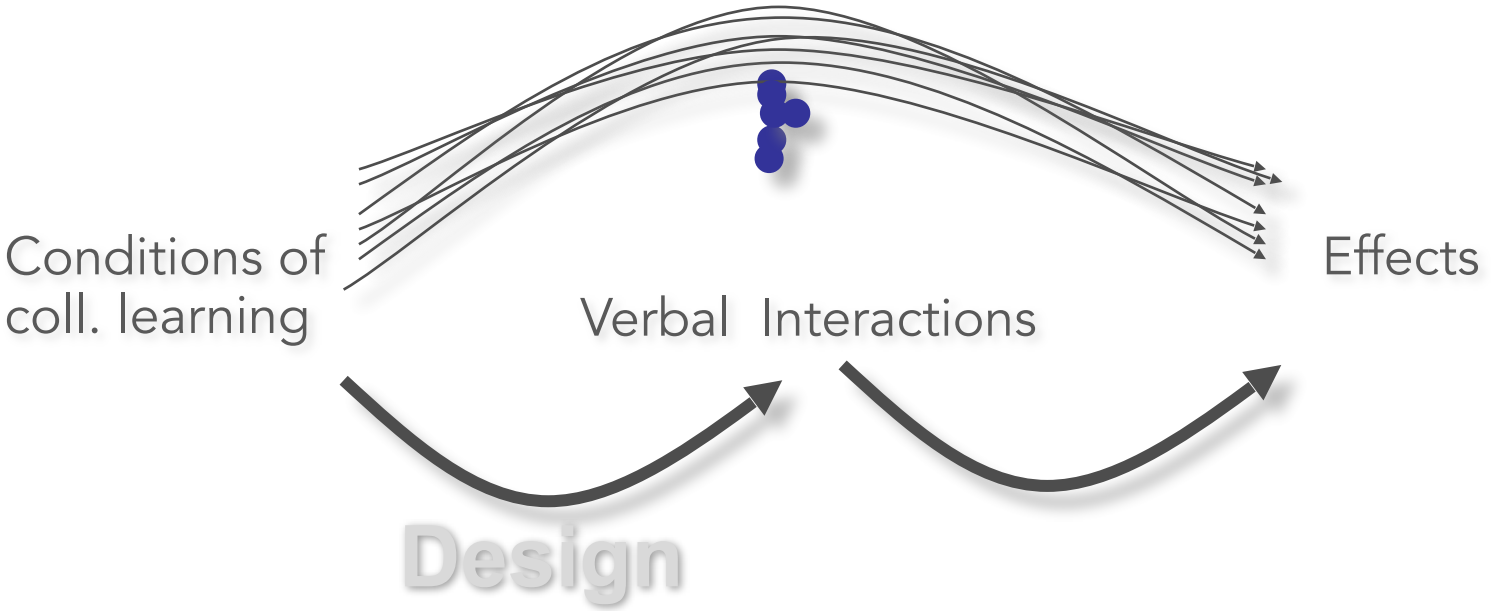
These interactions are summarized as “the effort” that team members engaged to reach and maintain a shared understanding of the task.

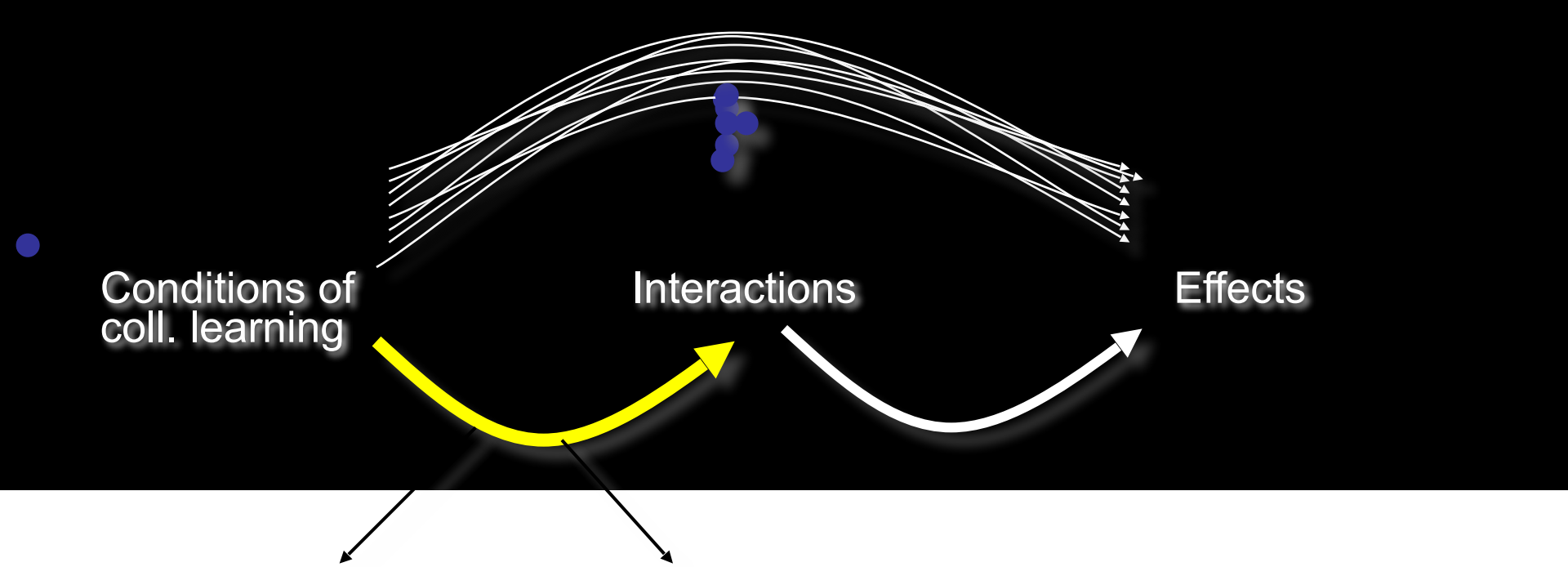
Collaborative learning occurs when team members engage into

rich verbal interactions

These interactions are summarized as “the effort” that team members engaged to reach and maintain a shared understanding of the task.

Question 4: Which design
increases the probabiliy that teams
produce rich verbal interactions
(that make collaborative learning effective) ?





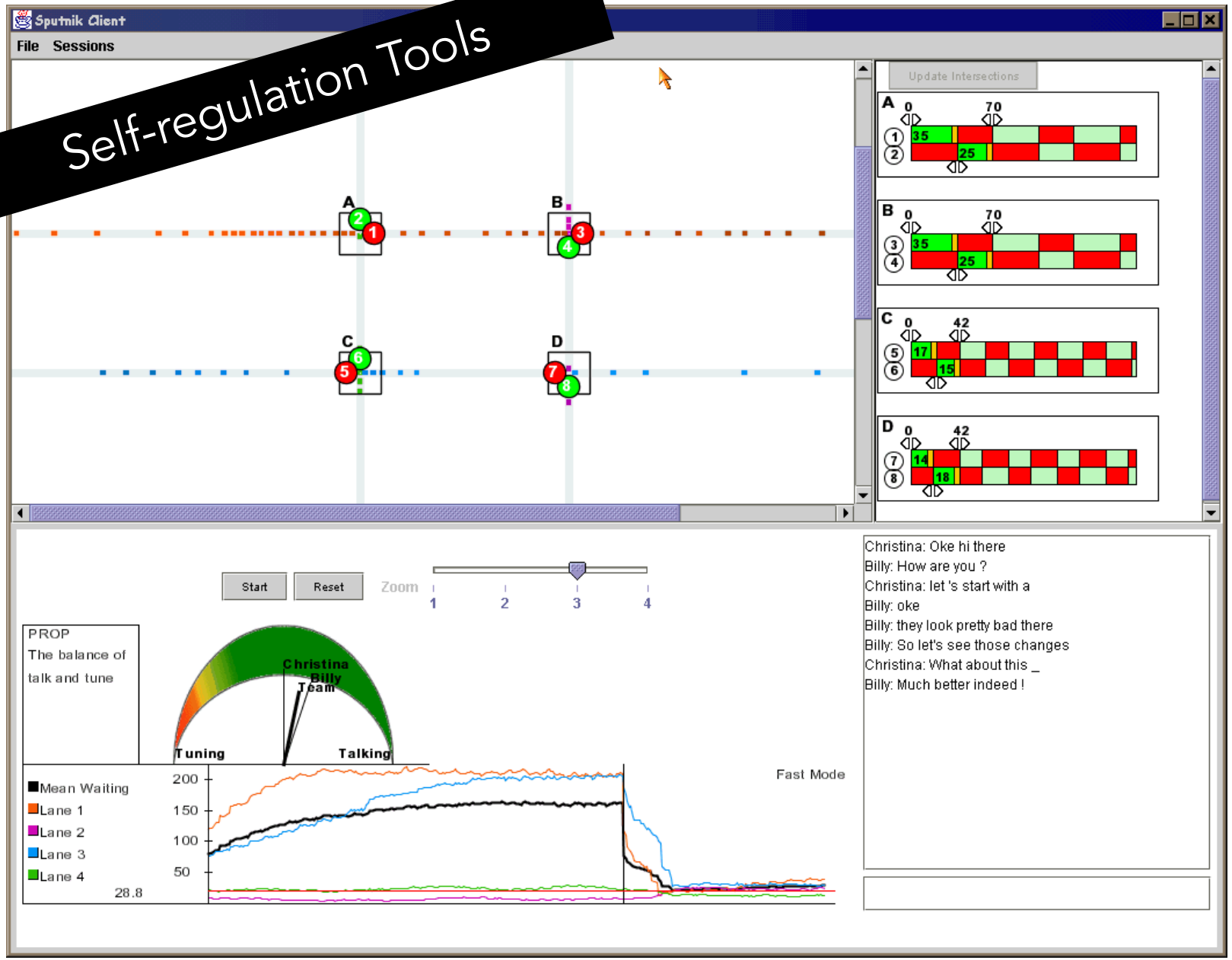
(proactive)

STRUCTURE

(reactive)

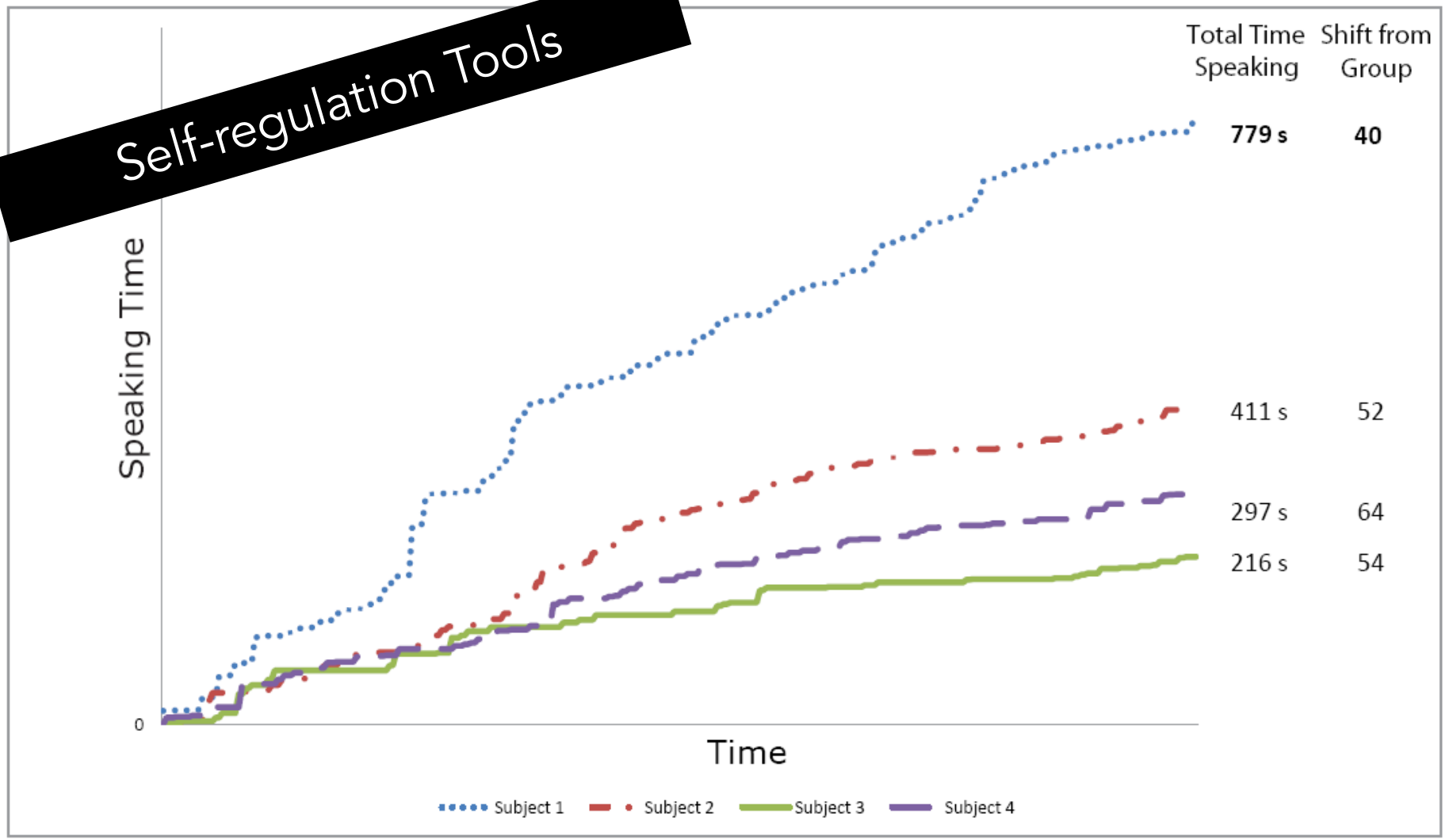
(self-) REGULATE

Self-regulation Tools



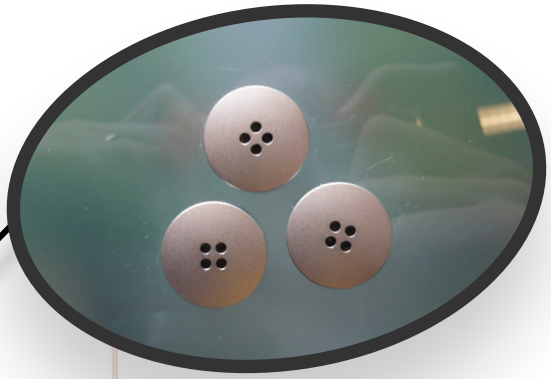
P. Jermann

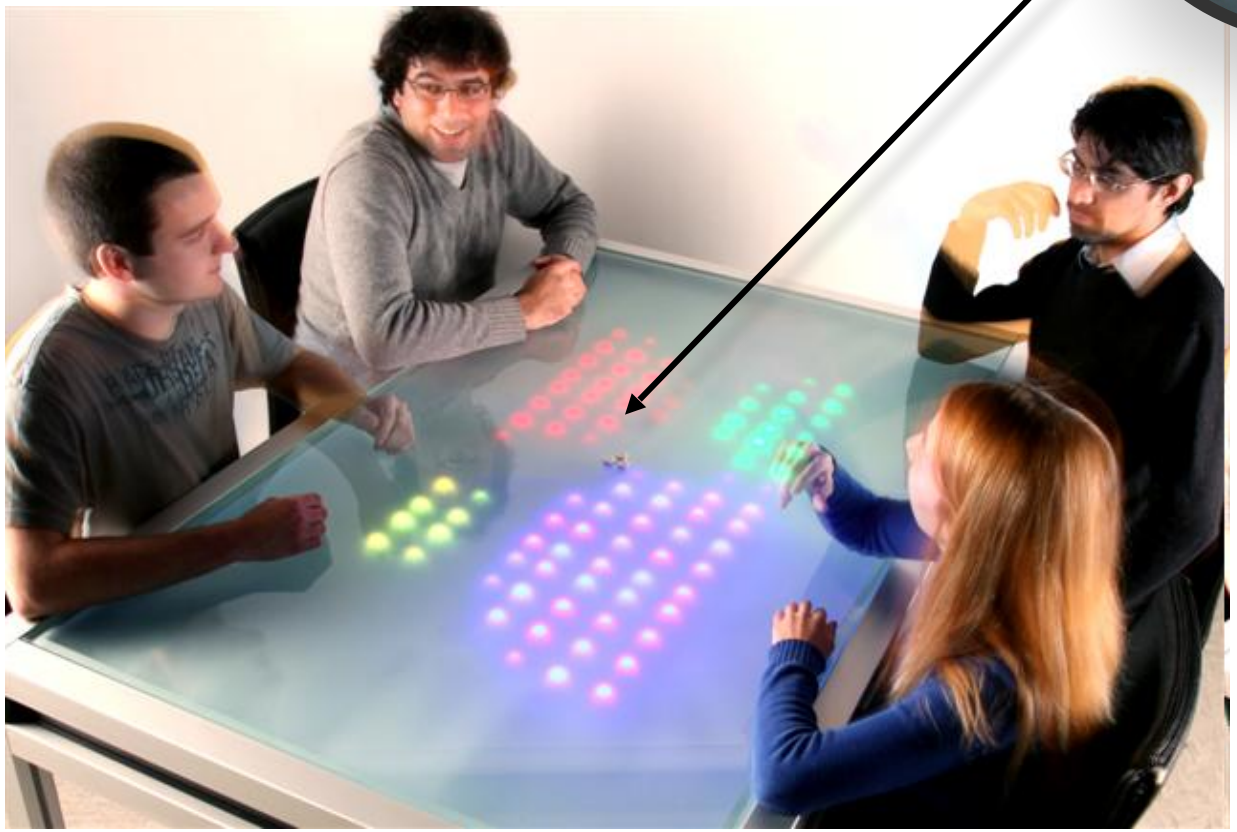
Self-regulation Tools



Example of domination in teamwork

Self-regulation Tools



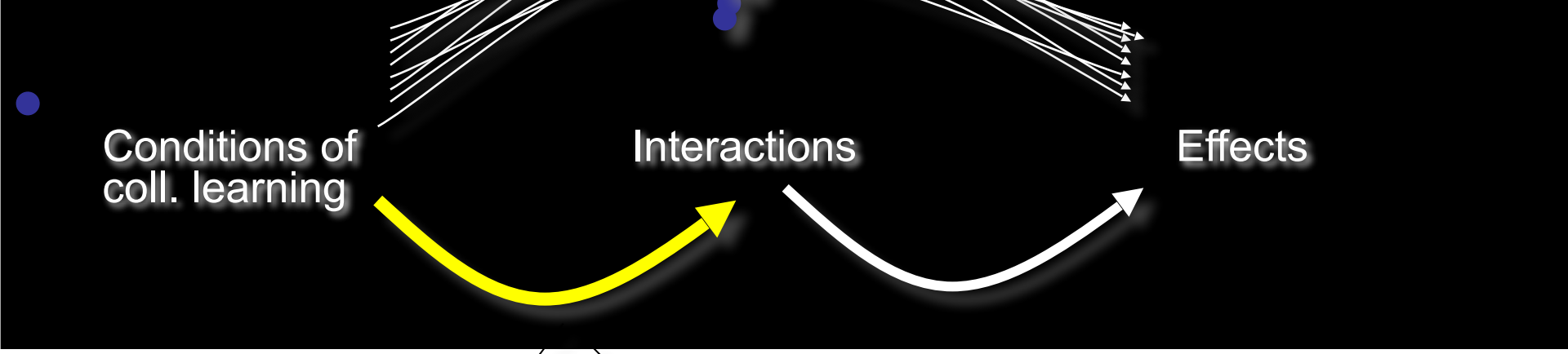


Reflect Table

•K. Bachour, F. Kaplan, W. Hokenmeier

Reflect

Self-regulation Tools

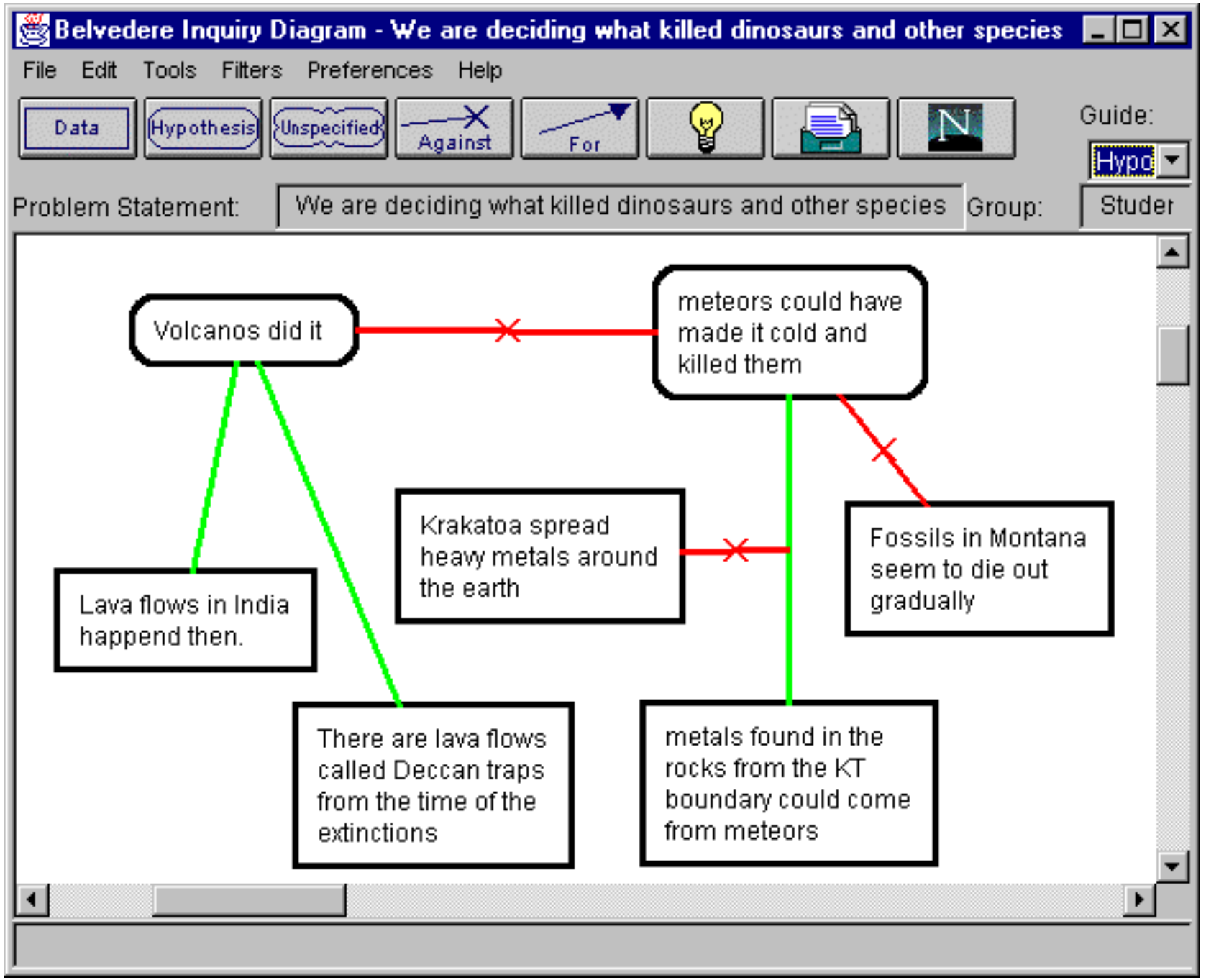


(reactive) REGULATE

(proactive) STRUCTURE

SCRIPTS

Semi-Structured Interfaces

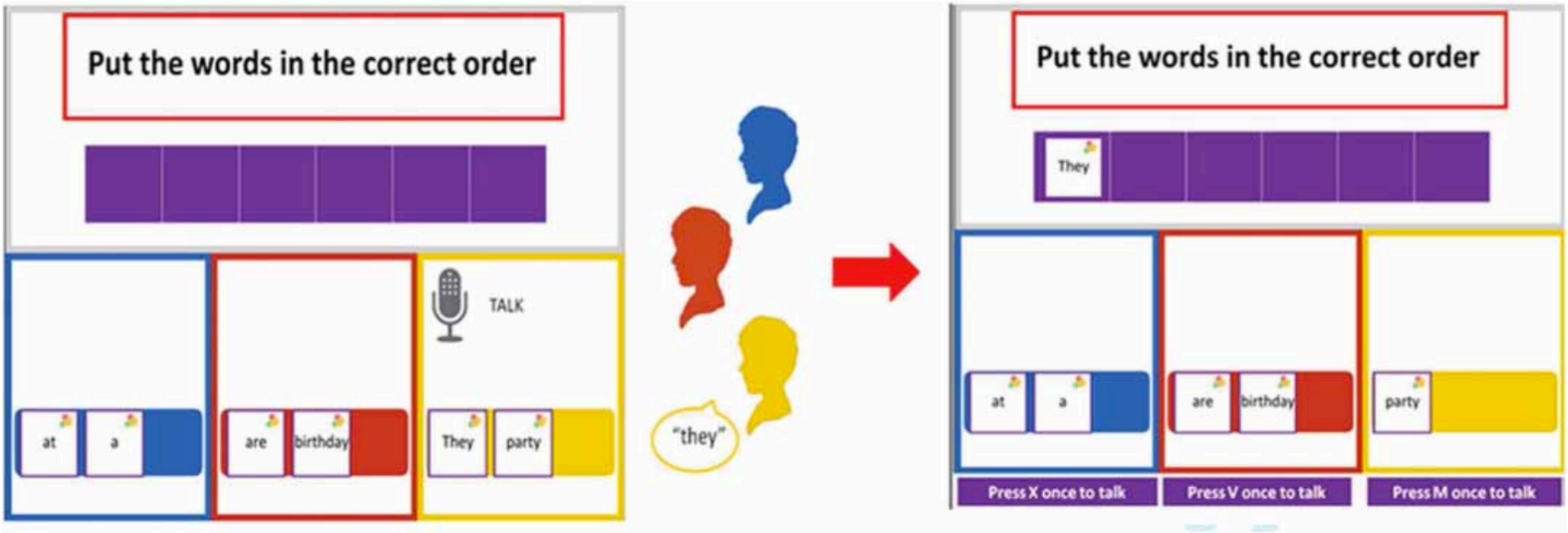


Belvedere (Suther et al.)

Multi Input Devices: the participation of each learner is "designed" because each mouse only access some screen functions
M. Nussbaum, UC Chile

Multi Input Devices:

the participation of each learner is “designed” because each mouse only access some screen functions



M. Nussbaum, UC Chile

"Computer-supported collaborative learning" (CSCL)

1990-2000: Technologies enable collaboration

2000-2010: Technologies shape collaboration (design)

•Conditions of coll. learning

•Interactions

•Effects

(reactive) REGULATE

(proactive) STRUCTURE

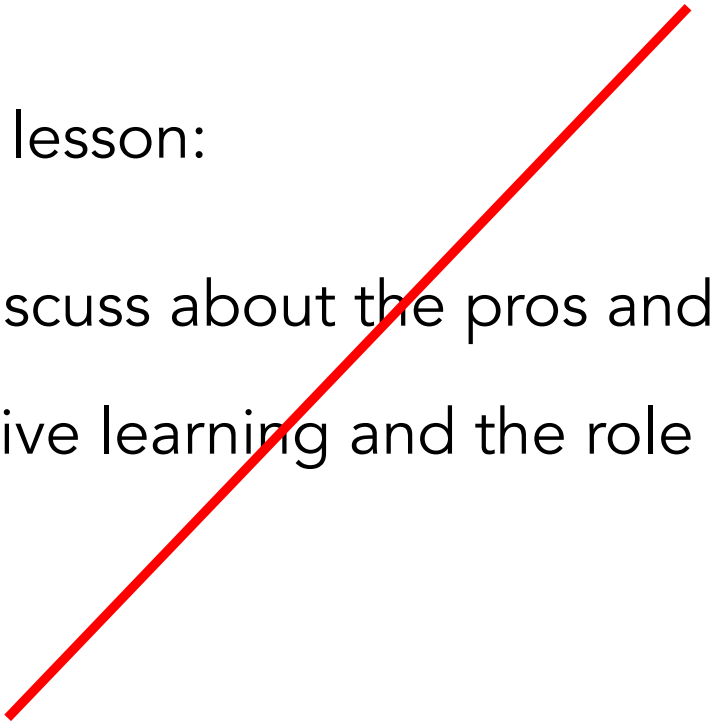
SCRIPTS

Semi-Structured Interfaces

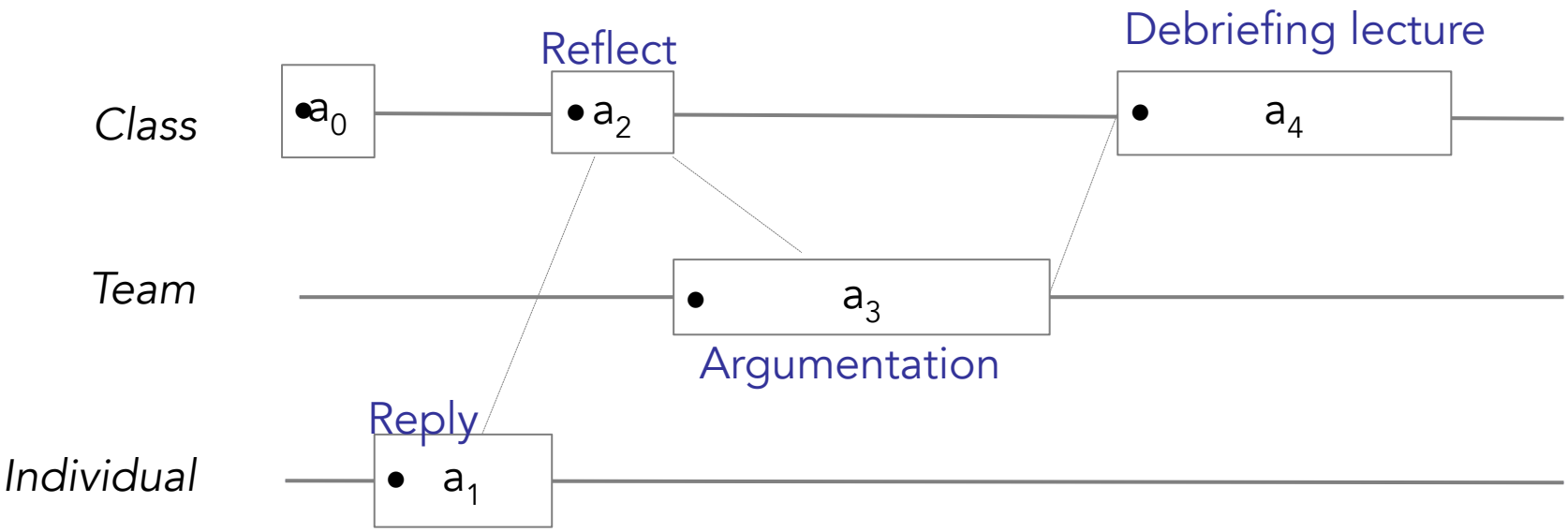
Pedagogical scenario for increasing the probability that interactions X,Y,Z occur in teamwork.

Last week lesson:

“Please discuss about the pros and cons of collaborative learning and the role of computers !”



Orchestration Graph

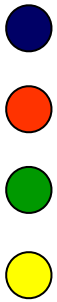


Collaboration Script: Pedagogical scenario for increasing the probability that interactions X,Y,Z occur in teamwork.

CSCL Script 2

"Jigsaw"

- Task: How to prevent a large earthquake ?
- Roles:
  - Maire of San Francisco
  - Insurance agent
  - Security officer
  - Geologist



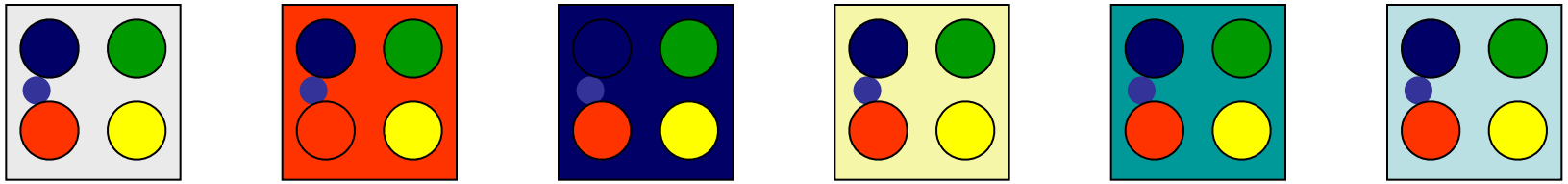
- Context: Previous experiments in Denver

In the Jigsaw script, every team member receives a subset of the information necessary to solve the task. This task cannot be solved without the contribution of each individual.

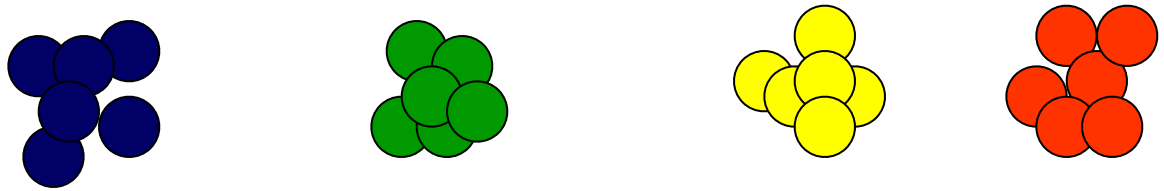
CSCL Script 2

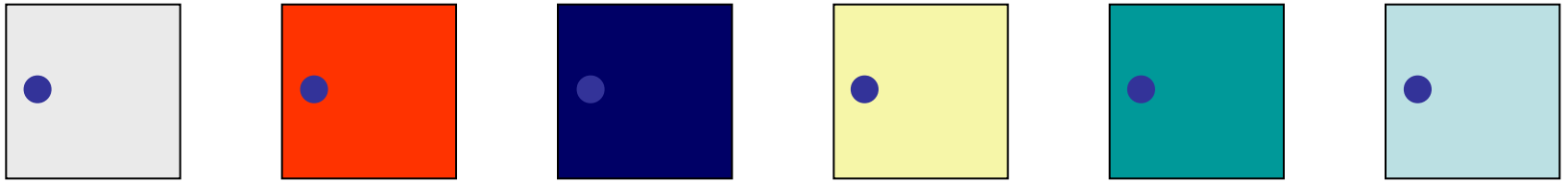
Jigsaw

Phase “Groups”



Phase “Experts”





CSCL Script 3

Grid

Place the concepts below o[illegible]n the link between two concepts to define their similitude or difference with the [illegible]s. You might change the concepts place to define other relations.

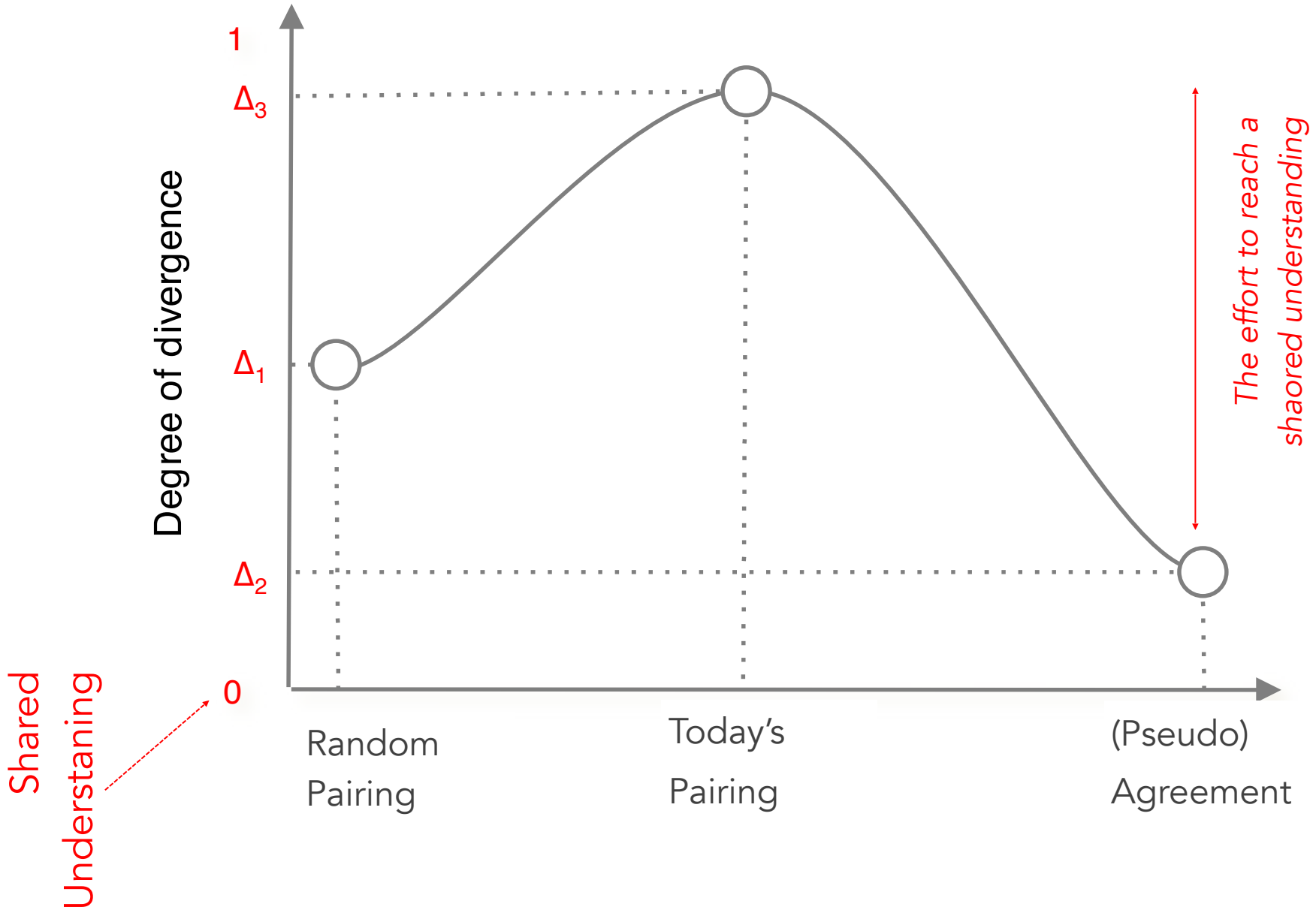
[illegible]	Legislative	Constituency	Target 3
Referendum	Democracy	Target 6	Target 7
Target 8	Election	parliament	Executive
Target 12	Target 13	Federalism	Target 15

"Democracy" vs "Election"

Relationship: Similar

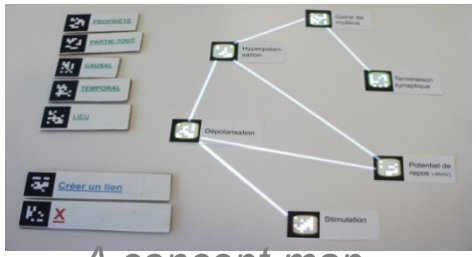
Comments: Democracy is a form of goverment in which it is recognized that ultimate authority belongs to the people, who have the right to participate in the decision-making process called elections, to appoint and dismiss their rulers.

Save Reset

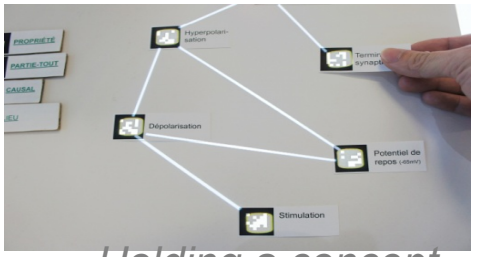

1
Δ_3
Δ_1
Δ_2
0
Degree of divergence
Shared
Understaning
Random
Pairing
Today's
Pairing
(Pseudo)
Agreement
The effort to reach a
shaored understanding

DockLamp

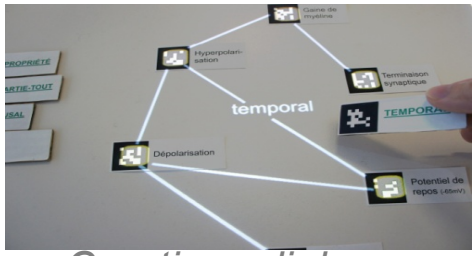
Son Do Lenh



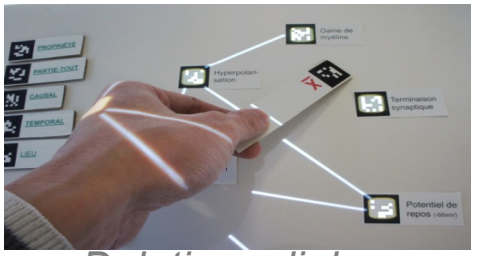
A concept map



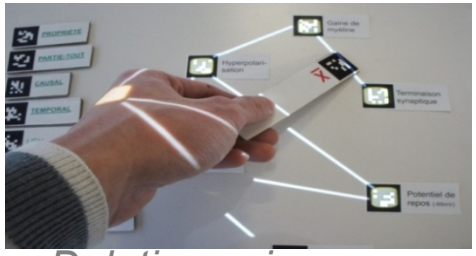
Holding a concept



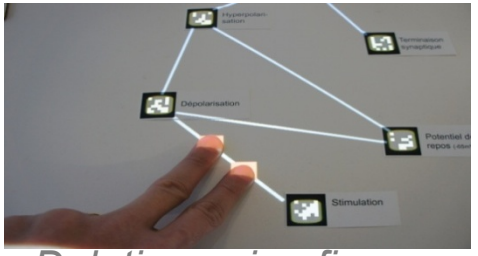
Creating a link



Deleting a link



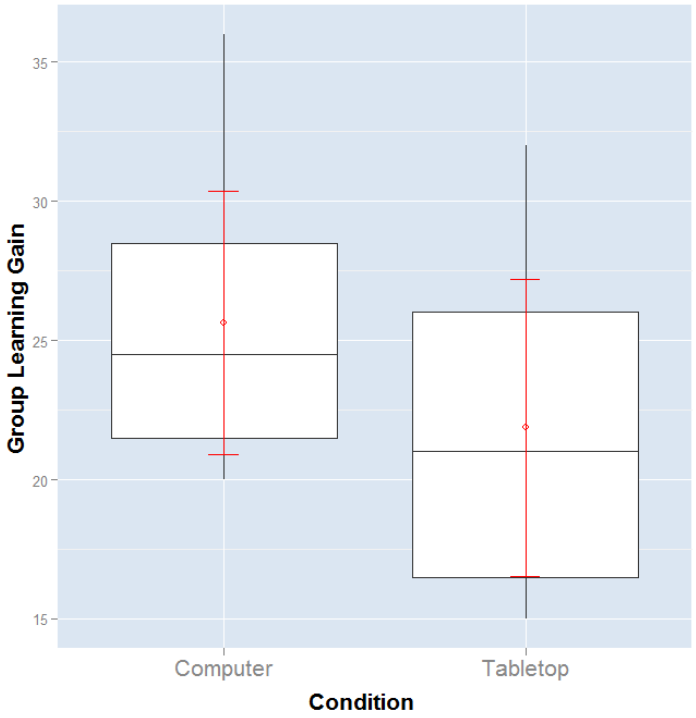
Deleting using paper



Deleting using fingers

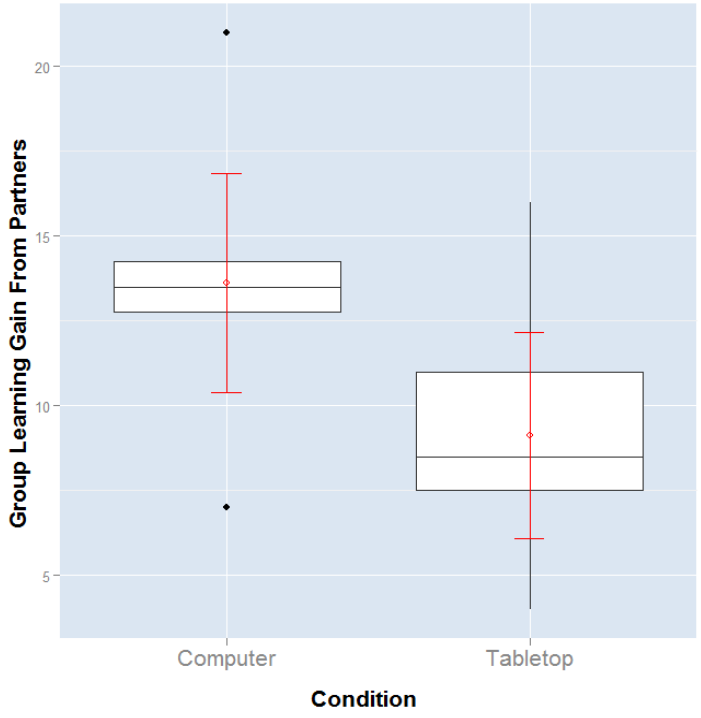
Post-test: The cool interface led to lower learning outcomes because there was no need for negotiation

- No effect in Learning Gain

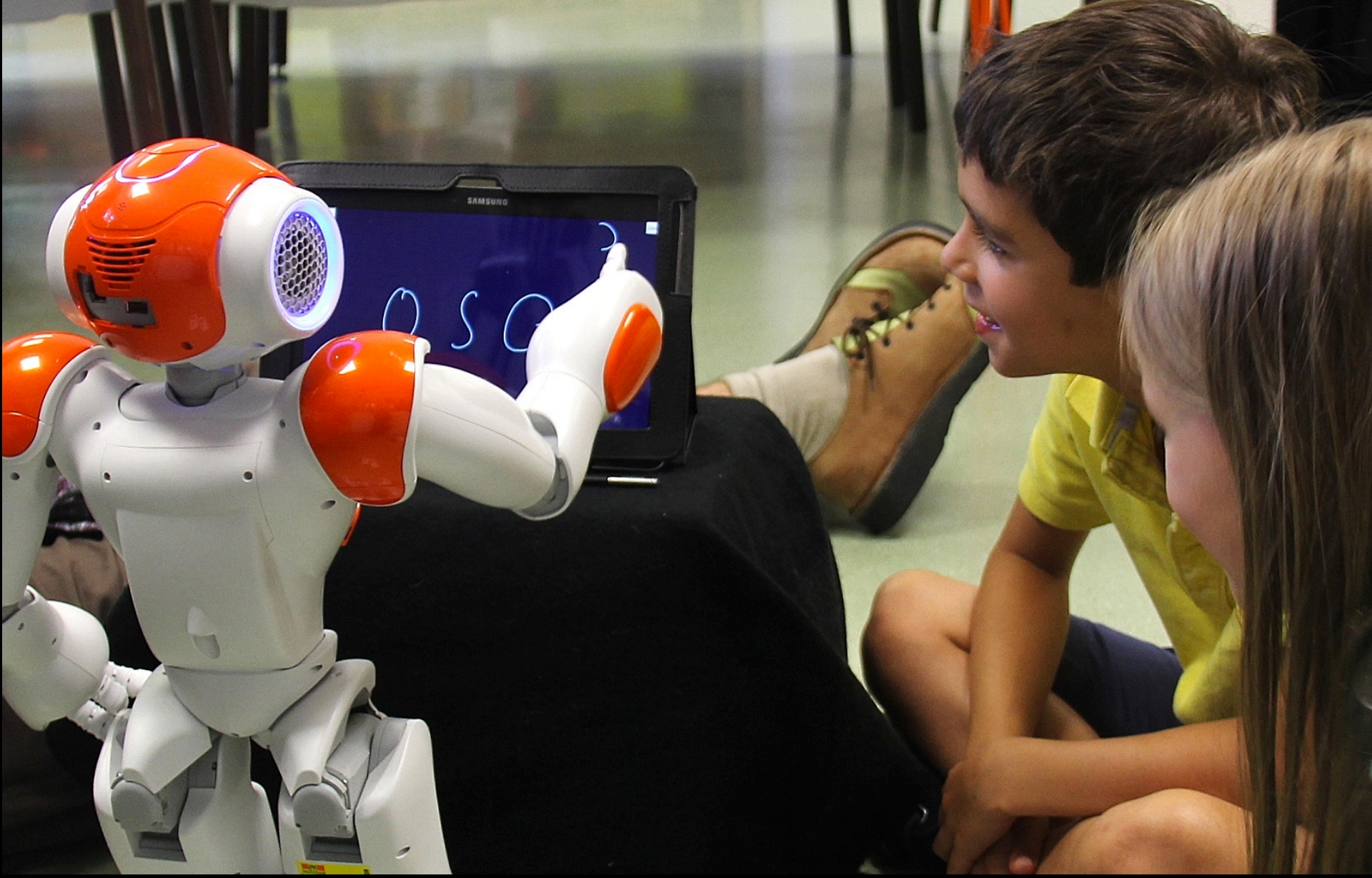


- m_{COM} = 25.63, m_{TAN} = 21.88,
- t(14) = 1.24,p>.05, two-tailed

- More Learning From Partners for **Computer**

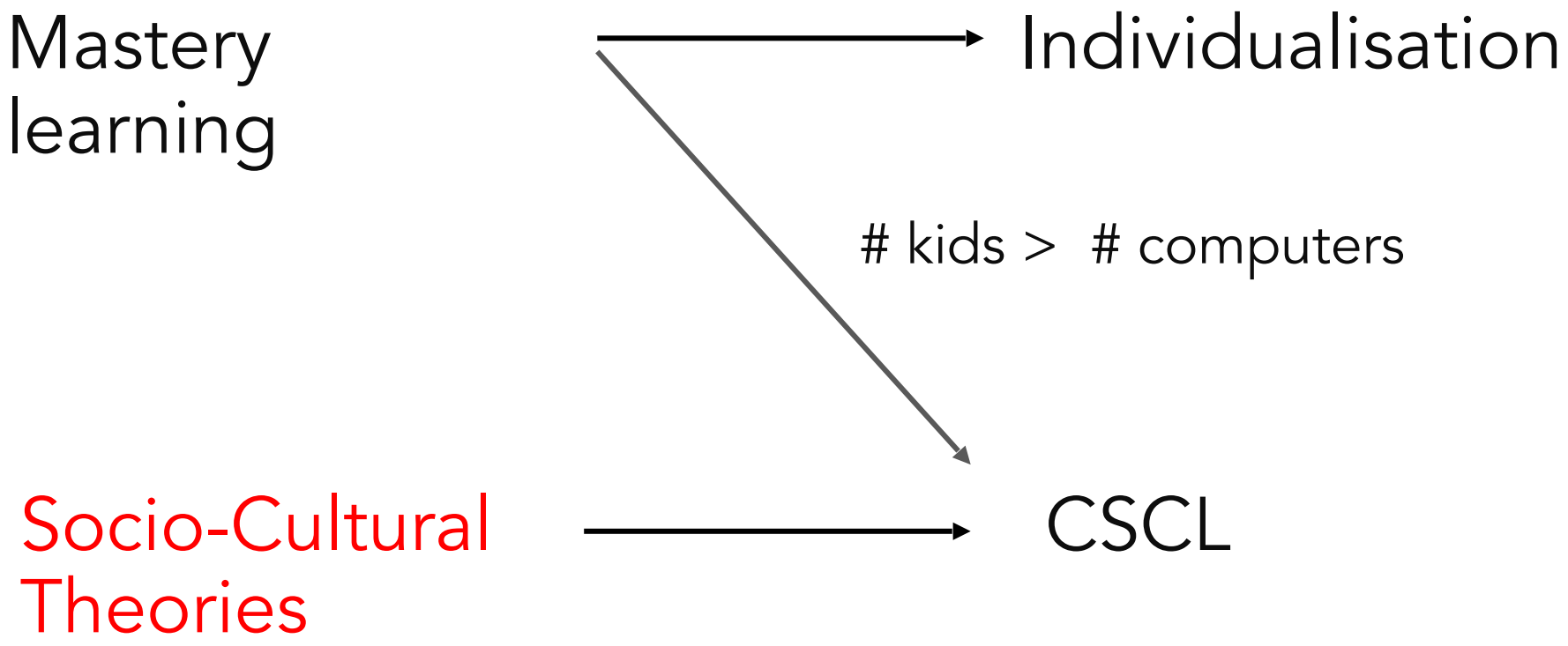


- m_{COM} = 13.63, m_{TAN} = 9.13,
- t(14) = 2.40,p <.05, two-tailed



Learning by Teaching

robotics


Mastery learning
Individualisation
kids > # computers
Socio-Cultural Theories
CSCL

Socio-Cultural Theories → Collaboration

Lev Vygotski
(1896-1934)

"Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals. »

Is this North-East?

What time is it ?

Not that way

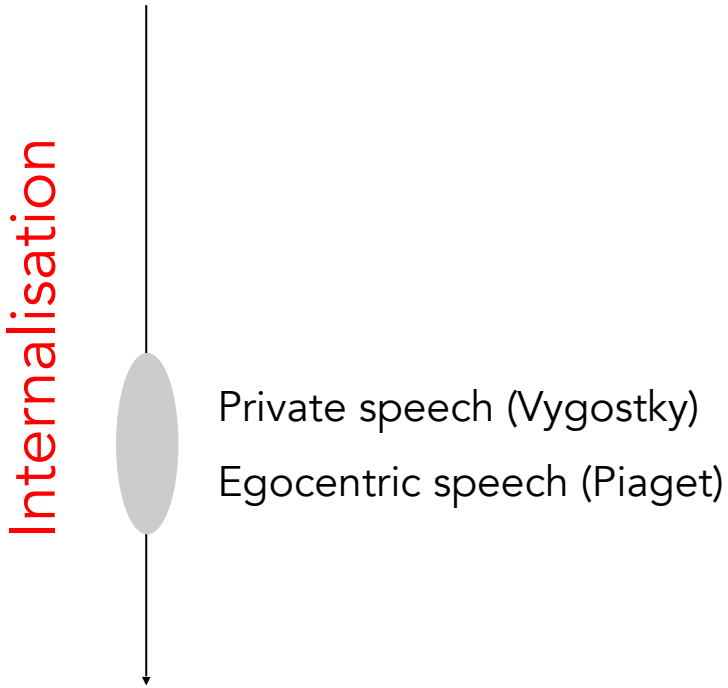
No

10:30

Internalisation

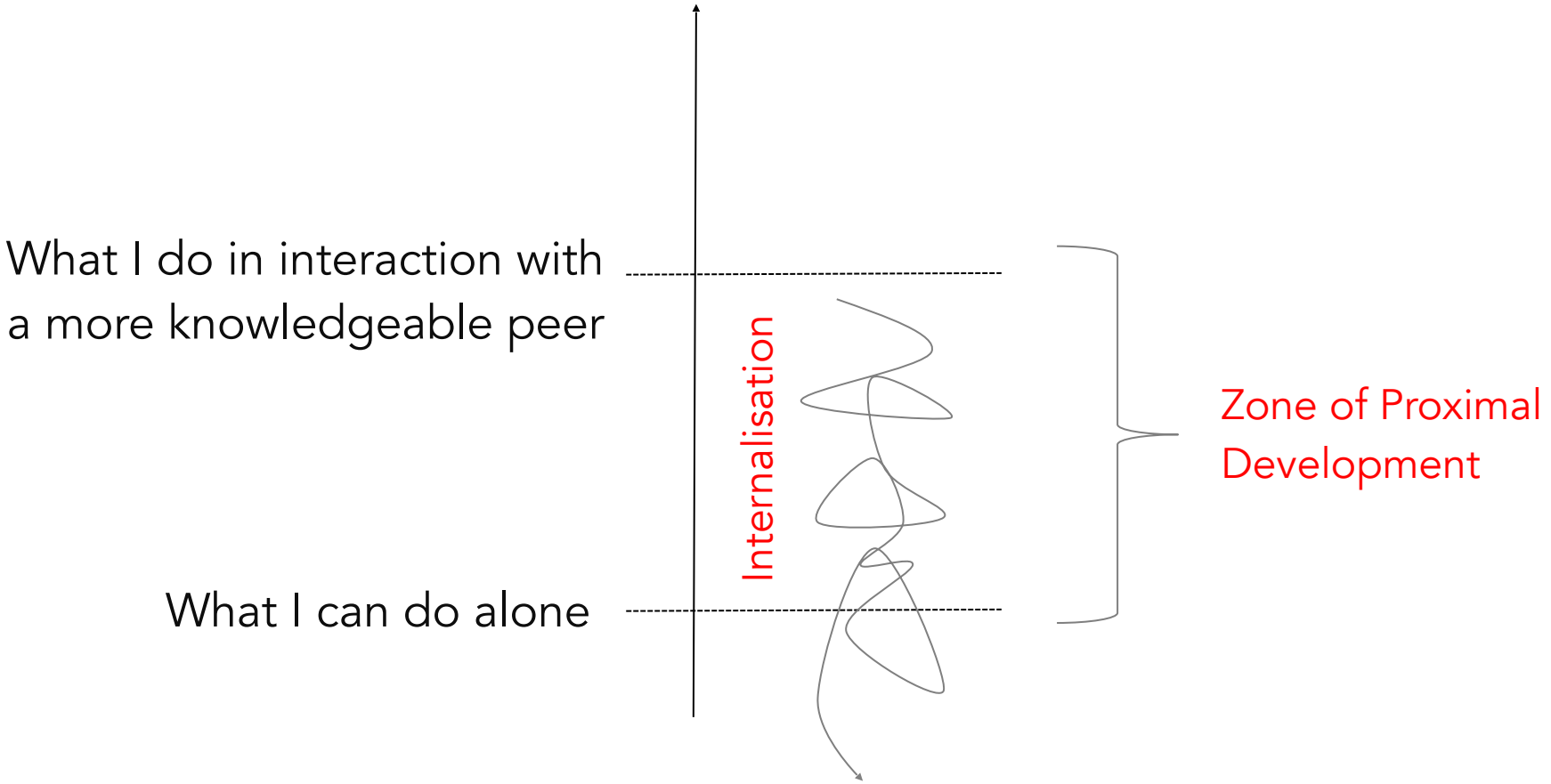
Side ? Time ? ok

Social Interaction



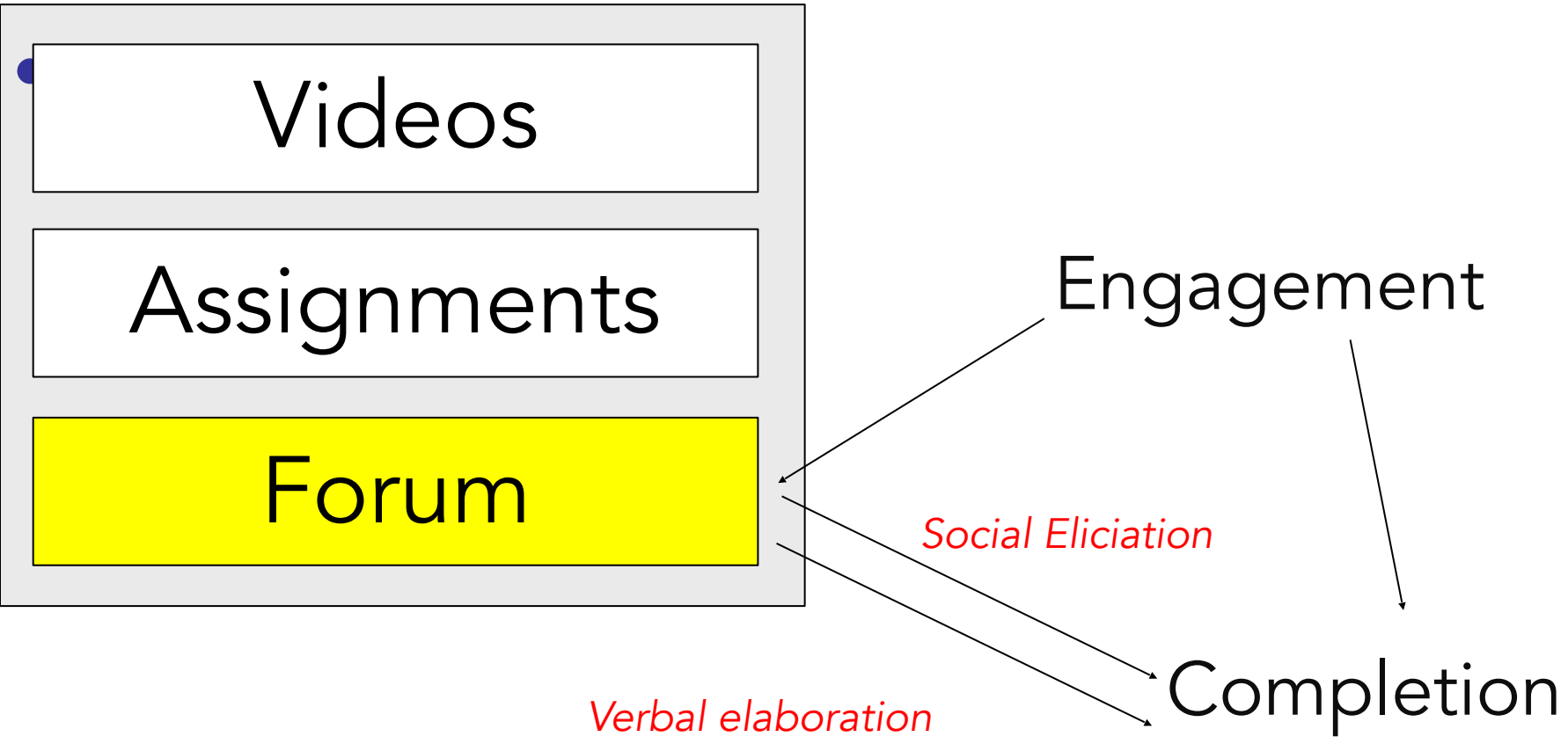
Thinking

We internalise social interaction because thinking is a dialogue with oneself .



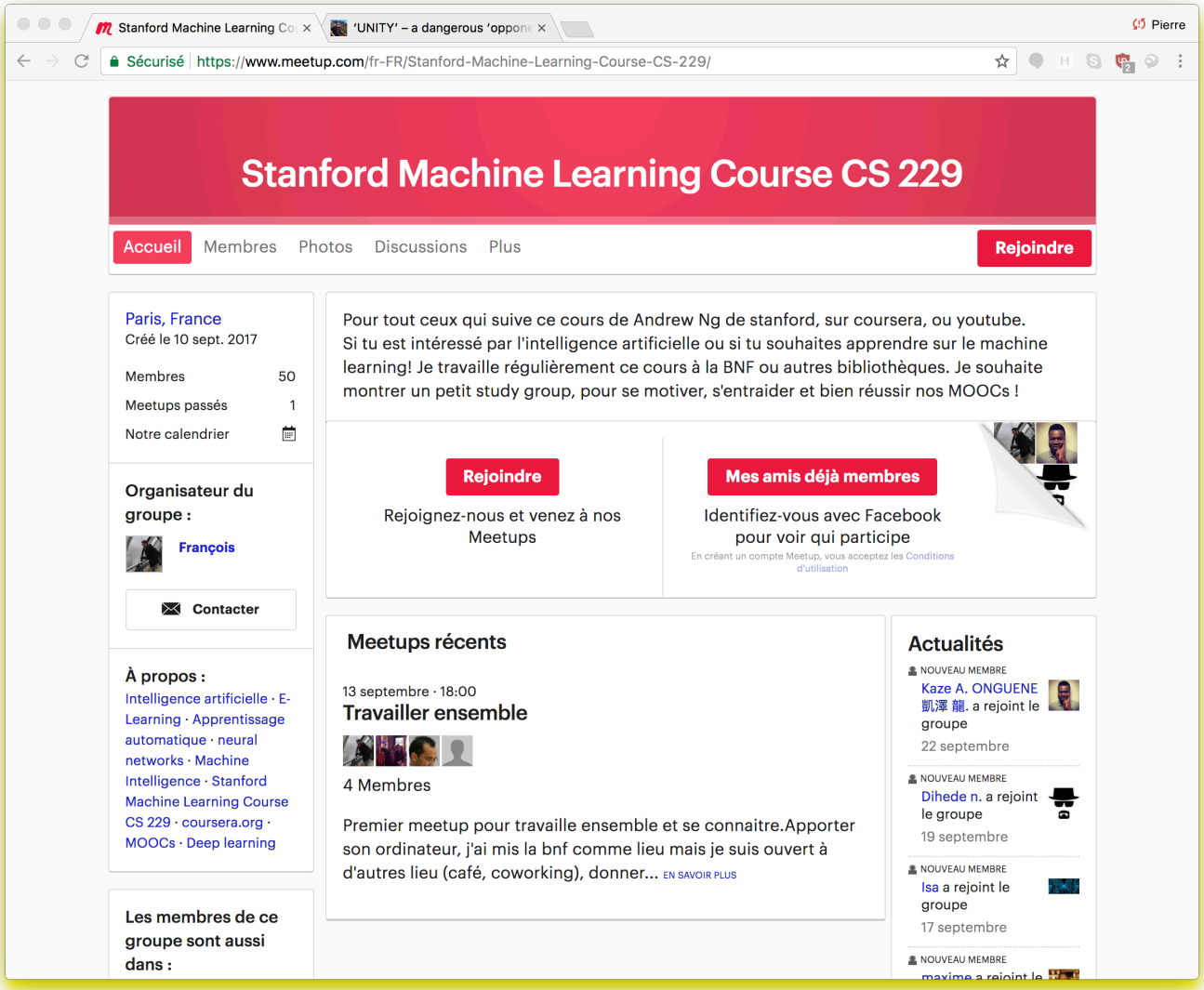
The zone of proximal development (ZPD) has been defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978, p. 86).

Social interactions in MOOC ?

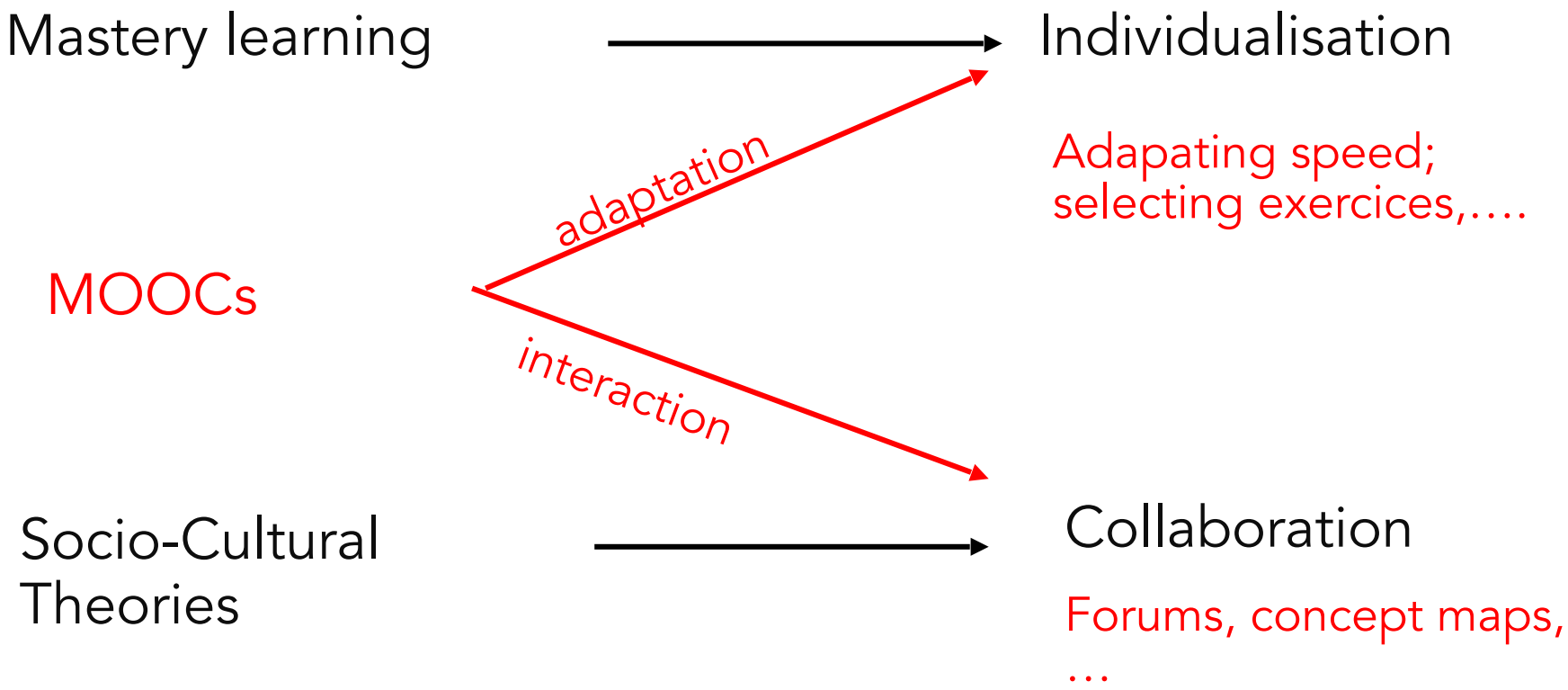


Social facilitation is the tendency for people to perform differently when in the presence of others than when alone (Wikipedai)

Social interactions in MOOCs ?



MeetUPs


Mastery learning
Individualisation
Adapating speed;
selecting exercices,….
adaptation
MOOCs
interaction
Socio-Cultural
Theories
Collaboration
Forums, concept maps,
…

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January 21, 2005 | FREE Health Newsletter | Email to a Friend

QUICK SEARCH GO

MULTIPLE SCLEROSIS

HEALTH CHANNELS

- Allergy
- Breast Cancer
- Cancer
- Cardiovascular
- Children's Health
- Cholesterol NEW!
- Diabetes NEW!
- Erectile Difficulties NEW!
- First Aid NEW!
- Flu
- Healthy Skin
- Low Testosterone NEW!
- Medications and You
- Men's Health
- Mental Health
- **Multiple Sclerosis**
  - About MS
  - 1-877-MS-INFO-5
  - Treatment Options
  - What to Ask Your MD
  - FAQ's About MS
  - Resource Centre
  - Related Conditions
  - Health Features
  - Community Support
  - Health News

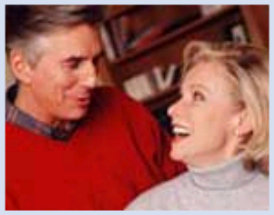
Multiple Sclerosis News

Select article from list below.

Page 1 of 6. 1 · 2 · 3 · 4 · 5 · 6

Emotional response to music can reduce pain, suggests Montreal study	Jan. 13, 2005
BioMS Medical receives approval for key multiple sclerosis trial in Britain	Dec. 10, 2004

Take control of your health. Subscribe to Multiple Sclerosis Monthly Newsletter for FREE!



Preferred Format ◉ HTML ○ Text

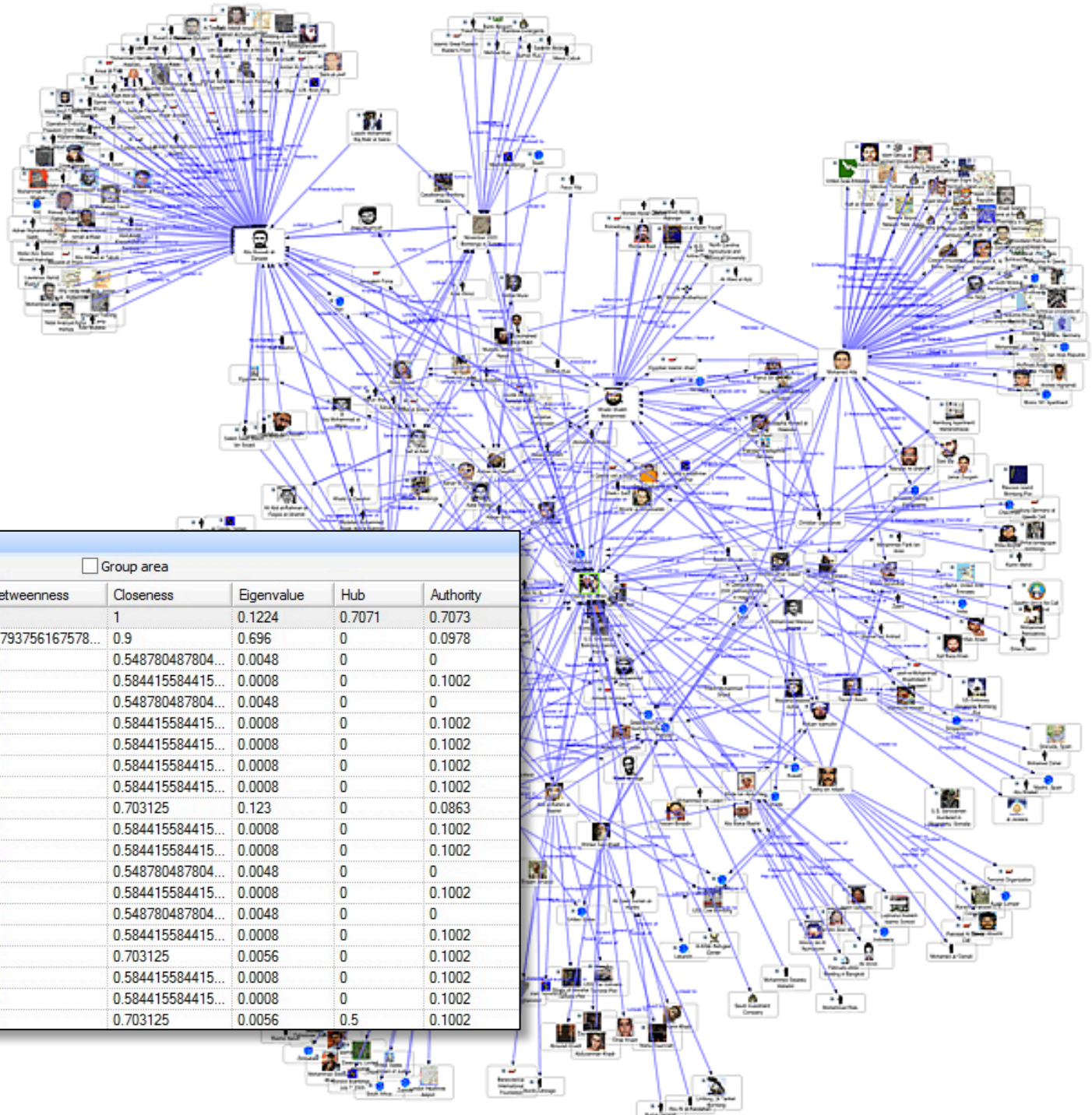
☐ I have read and accept terms of the Privacy Policy.

Email [ ] Sign up! ›

FDA approves new drug to treat multiple sclerosis	Nov. 24, 2004
Popular MS drug may lack evidence	Nov. 22, 2004
Jury begins deliberations in three-week assisted suicide trial	Nov. 3, 2004
Medical users spurning new batch of 'stronger' Health Canada marijuana	Jul. 12, 2004
U.S. Medicare lottery favours some, others must wait until 2006	Jun. 25, 2004
Bayer bids to market marijuana-based multiple sclerosis treatment in Canada	May. 11, 2004
Alberta Tories, families, question adequacy of $855 monthly disabled income	May. 9, 2004
Researchers set out to identify triggers for multiple sclerosis	May. 5, 2004
Nearly a third of legal marijuana users reject government pot	Apr. 29, 2004
Sick Kids researchers show strong association between MS,	Apr. 20, 2004

Online Learning Communities

Social Network Analysis



Network Metrics

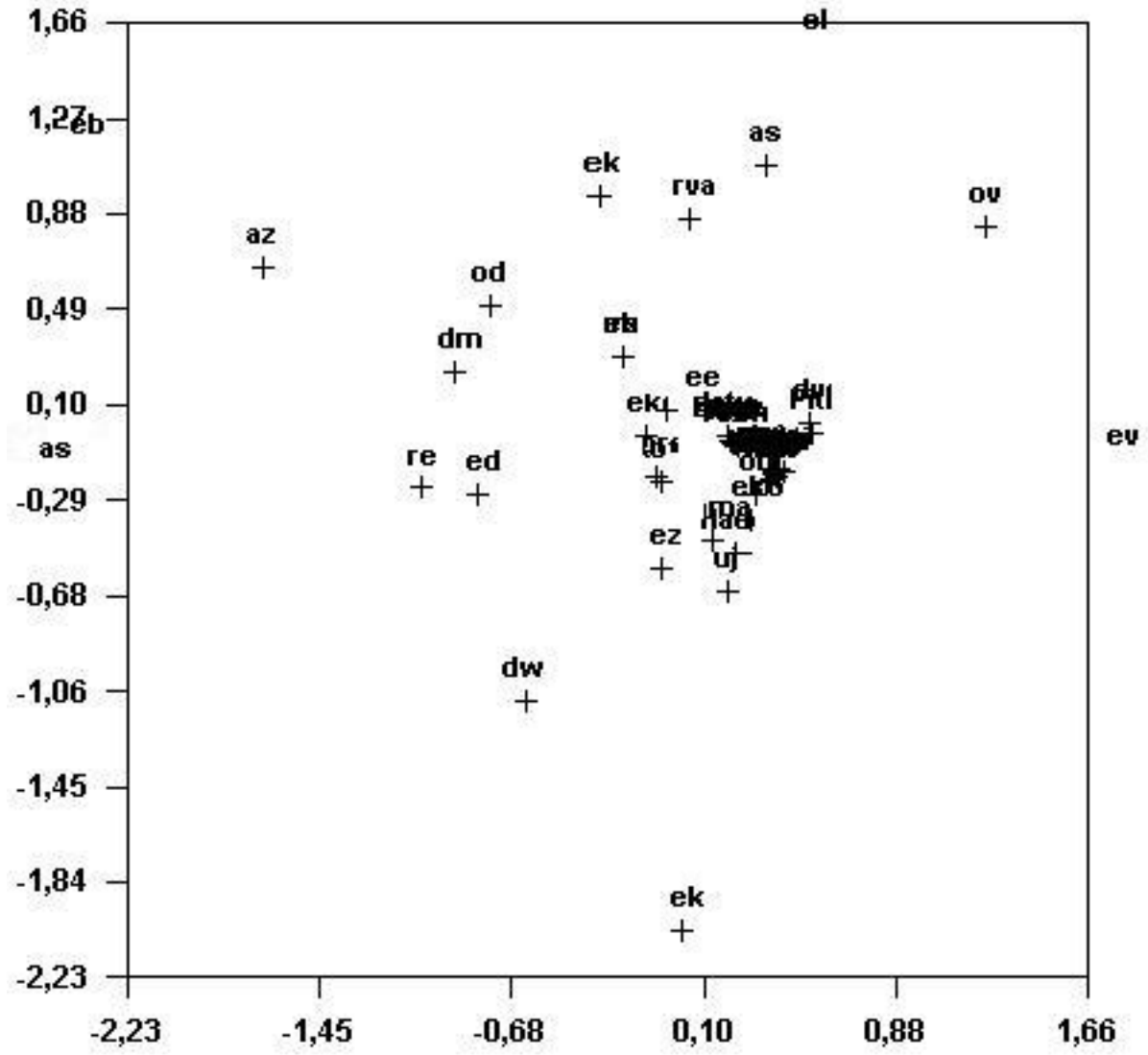
Calculate | CardView | TableView | Group area

Name	Type	Degree	Betweenness	Closeness	Eigenvalue	Hub	Authority
Mohamed Atta	Person	61	1	1	0.1224	0.7071	0.7073
Osama bin Laden	Person	44	0.793756167578...	0.9	0.696	0	0.0978
Abdallah Al-Halabi	Person	1	0	0.548780487804...	0.0048	0	0
Abdulaziz Alomari	Person	1	0	0.584415584415...	0.0008	0	0.1002
Abu Mussab al-Z...	Person	1	0	0.548780487804...	0.0048	0	0
Ahmed Alghamdi	Person	1	0	0.584415584415...	0.0008	0	0.1002
Ahmed Alnami	Person	1	0	0.584415584415...	0.0008	0	0.1002
Ahmed Ibrahim A...	Person	1	0	0.584415584415...	0.0008	0	0.1002
Ahmed Khalil Ibr...	Person	1	0	0.584415584415...	0.0008	0	0.1002
Al Qaeda	Terrorist Organiz...	2	0	0.703125	0.123	0	0.0863
Al Qaeda cell in ...	Terrorist Organiz...	1	0	0.584415584415...	0.0008	0	0.1002
American Airlines...	Airline Flight	1	0	0.584415584415...	0.0008	0	0.1002
Ayman Al-Zawahiri	Person	1	0	0.548780487804...	0.0048	0	0
Egyptian Islamic ...	Terrorist Organiz...	1	0	0.584415584415...	0.0008	0	0.1002
Enaam Amaout	Person	1	0	0.548780487804...	0.0048	0	0
Hamburg Apartm...	Location	1	0	0.584415584415...	0.0008	0	0.1002
Imad Eddin Bara...	Person	2	0	0.703125	0.0056	0	0.1002
Kafr al Sheikh, E...	Location	1	0	0.584415584415...	0.0008	0	0.1002
Khalid Almihdhar	Person	1	0	0.584415584415...	0.0008	0	0.1002
Khalid Shaikh M...	Person	3	0	0.703125	0.0056	0.5	0.1002

Online Learning Communities

Learning a culture by participation

Kim A. J. (2000) Community building on the web. Peachpit Press, Berkeley.



The social structure of a knowledge community is not flat

(Dutch policemen in charge of drugs)

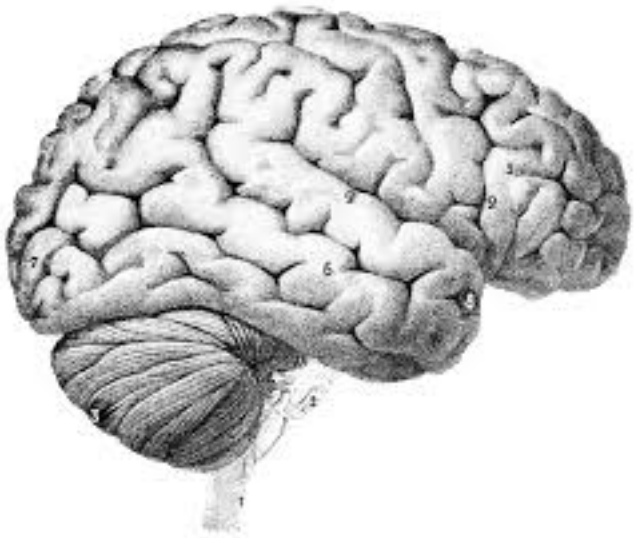
Social Network Analysis

Maarten de Laat (CSCL 2002)

Summary of chapter 5

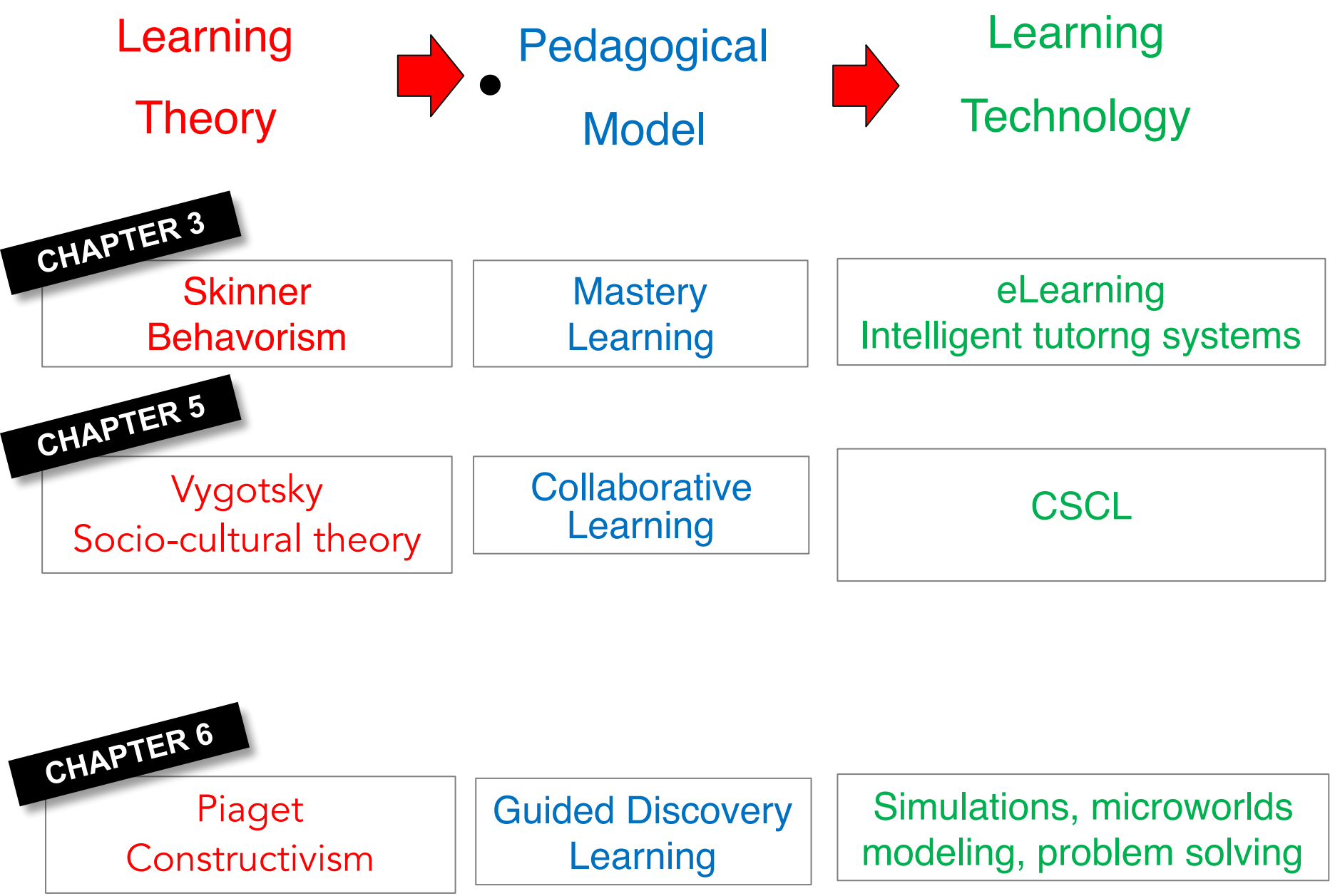
1. Collaborative learning is often effective, but not systematically.
2. Good tasks require some degree of interdependence
3. It is effective when rich verbal interactions occur such as explanation, argumentation, mutual regulation
4. To make it more effective, the script increases the necessity for students to produce these interactions
5. The theory behind emphasizes that cognition is inherently social because thinking mostly relies on language.

Social Cognition



The hardware is individual

but the software is social


Learning Theory
Pedagogical Model
Learning Technology
CHAPTER 3
Skinner Behavorism
Mastery Learning
eLearning Intelligent tutorng systems
CHAPTER 5
Vygotsky Socio-cultural theory
Collaborative Learning
CSCL
CHAPTER 6
Piaget Constructivism
Guided Discovery Learning
Simulations, microworlds modeling, problem solving

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