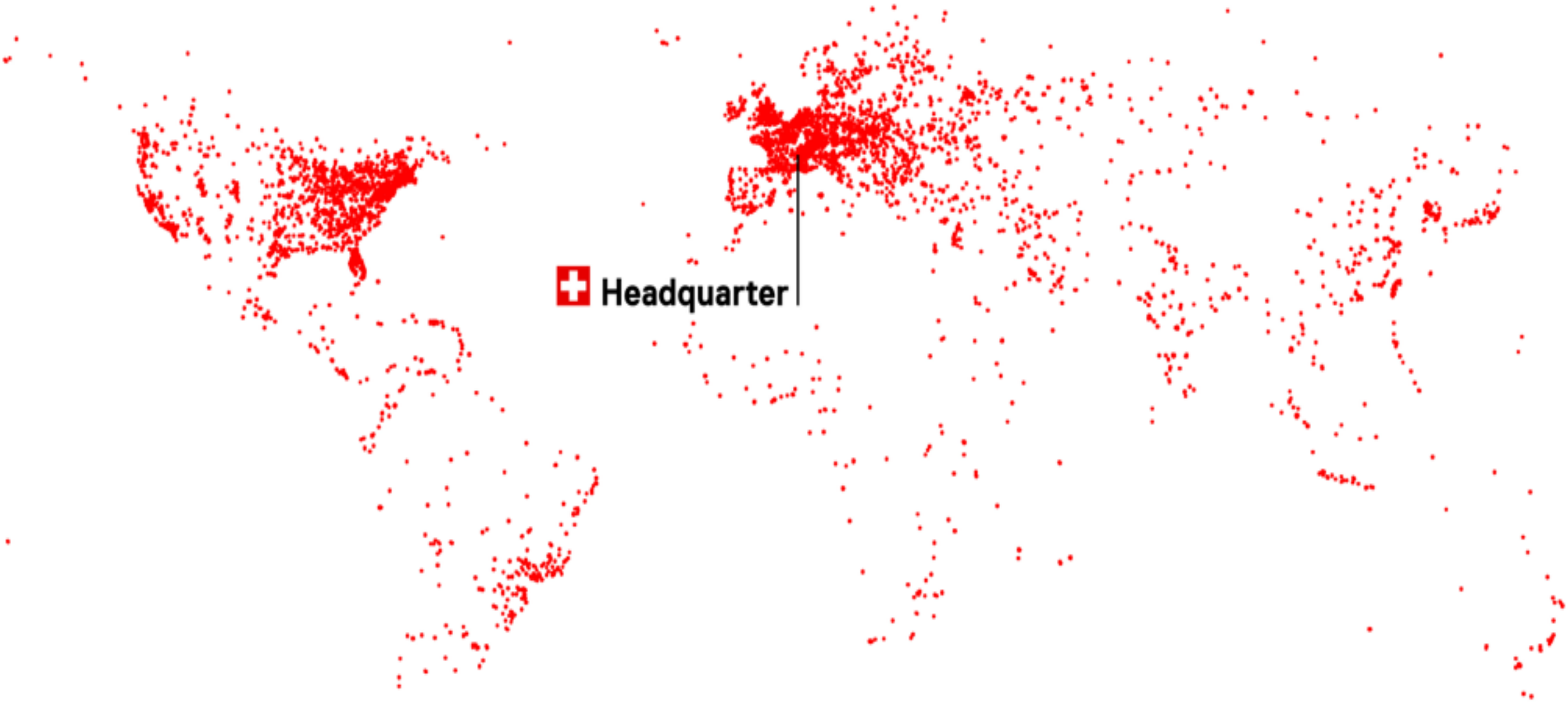
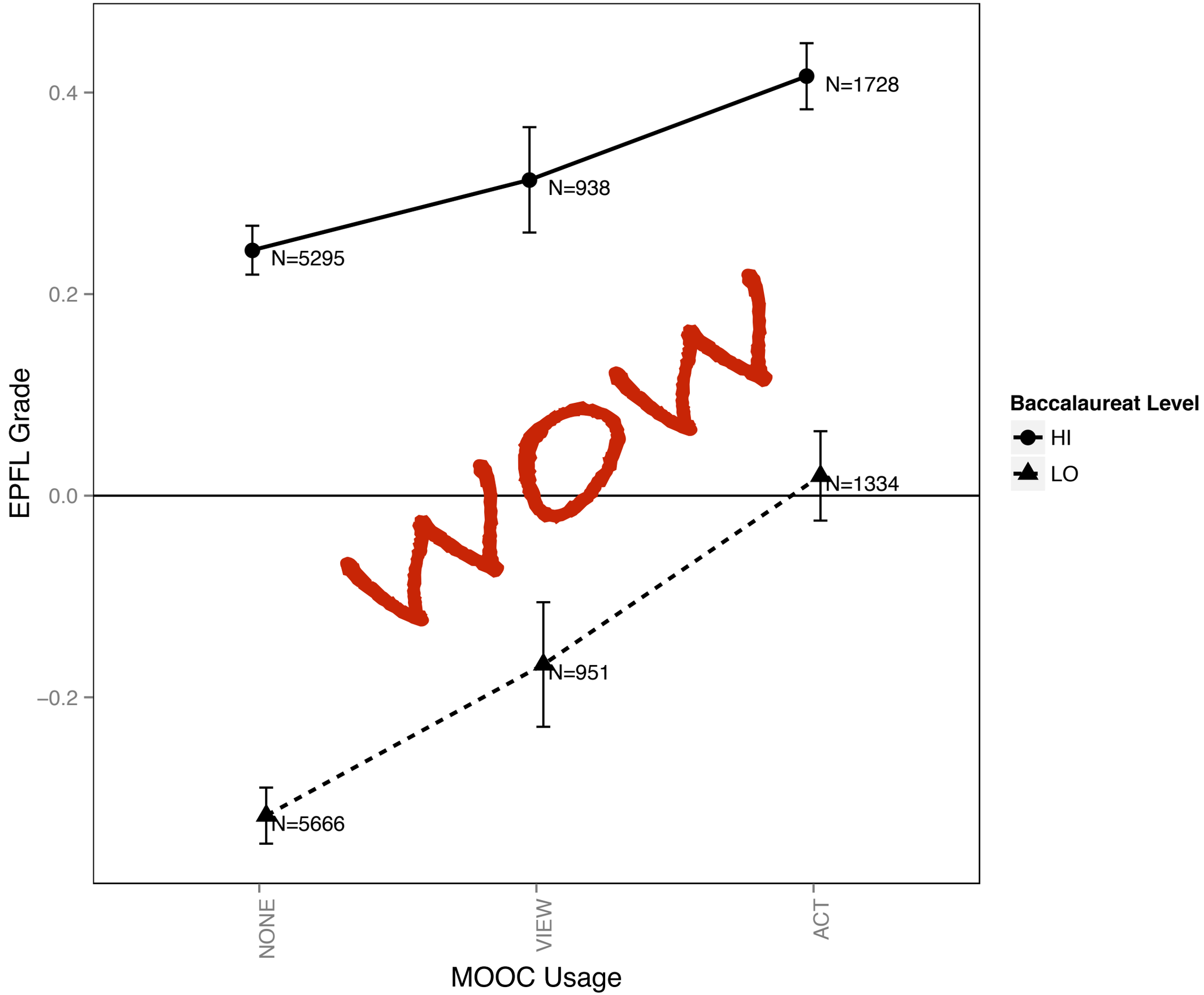
VR,AR, AW

After 'wow'

P. Dillenbourg, EPFL

EPFL CAMPUS



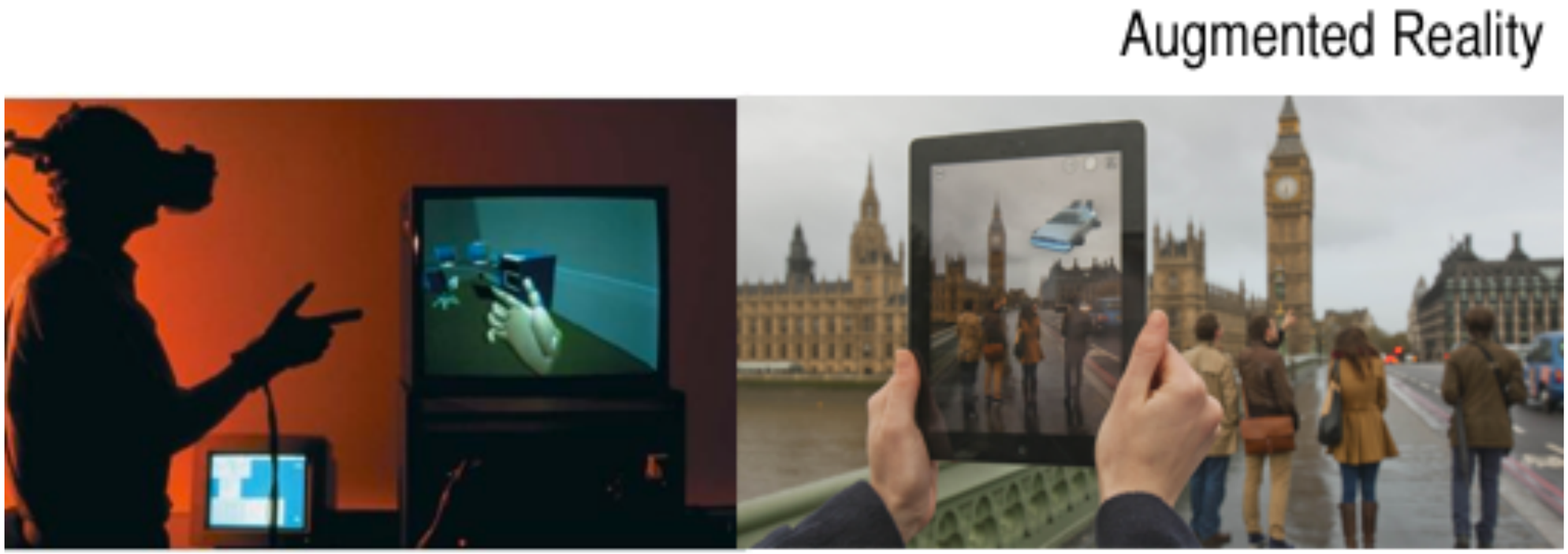


Patrick Jermann, Francisco Pinto (EPFL CEDE)

VR/AR

6 design dimensions

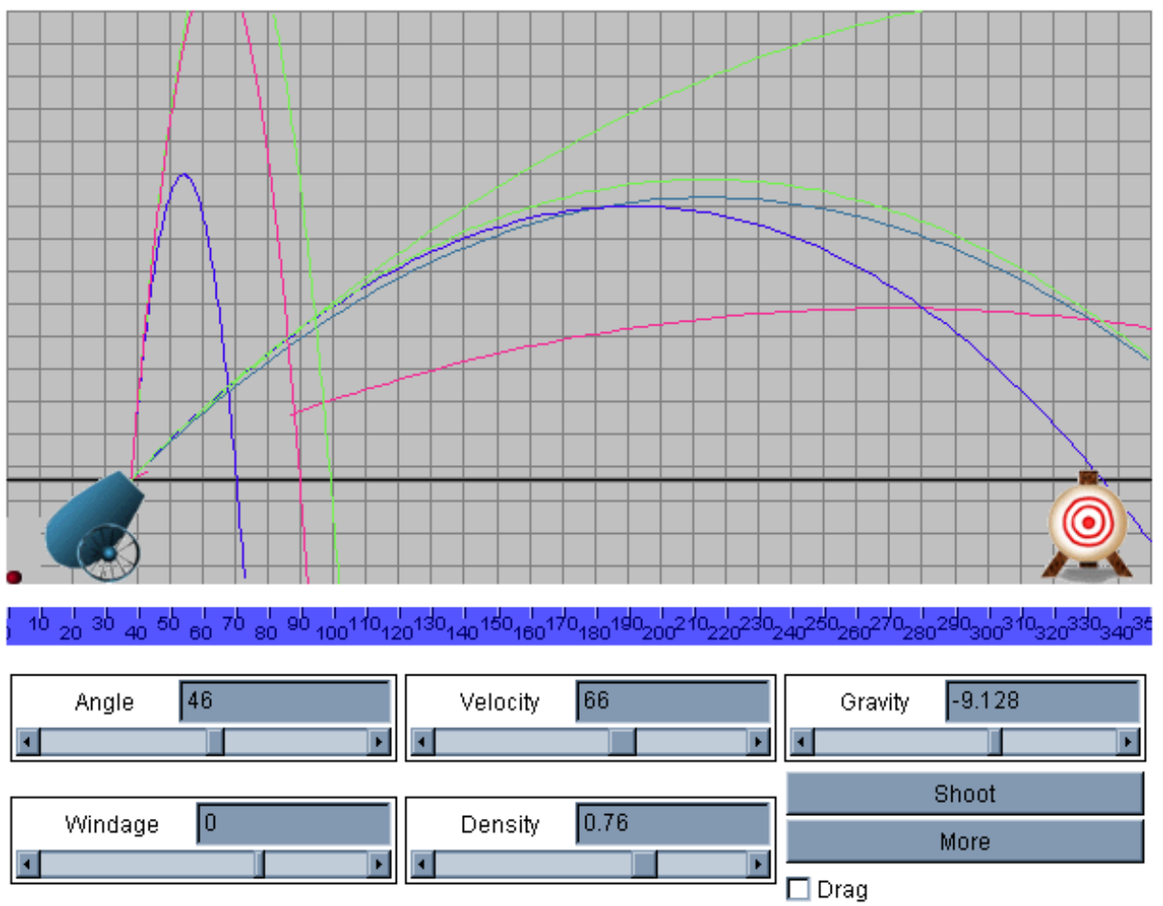
1) Virtual Reality versus Augmented Reality



https://augmentedstories.com/2015/01/30/arvsvr/

2) Performance versus Understanding

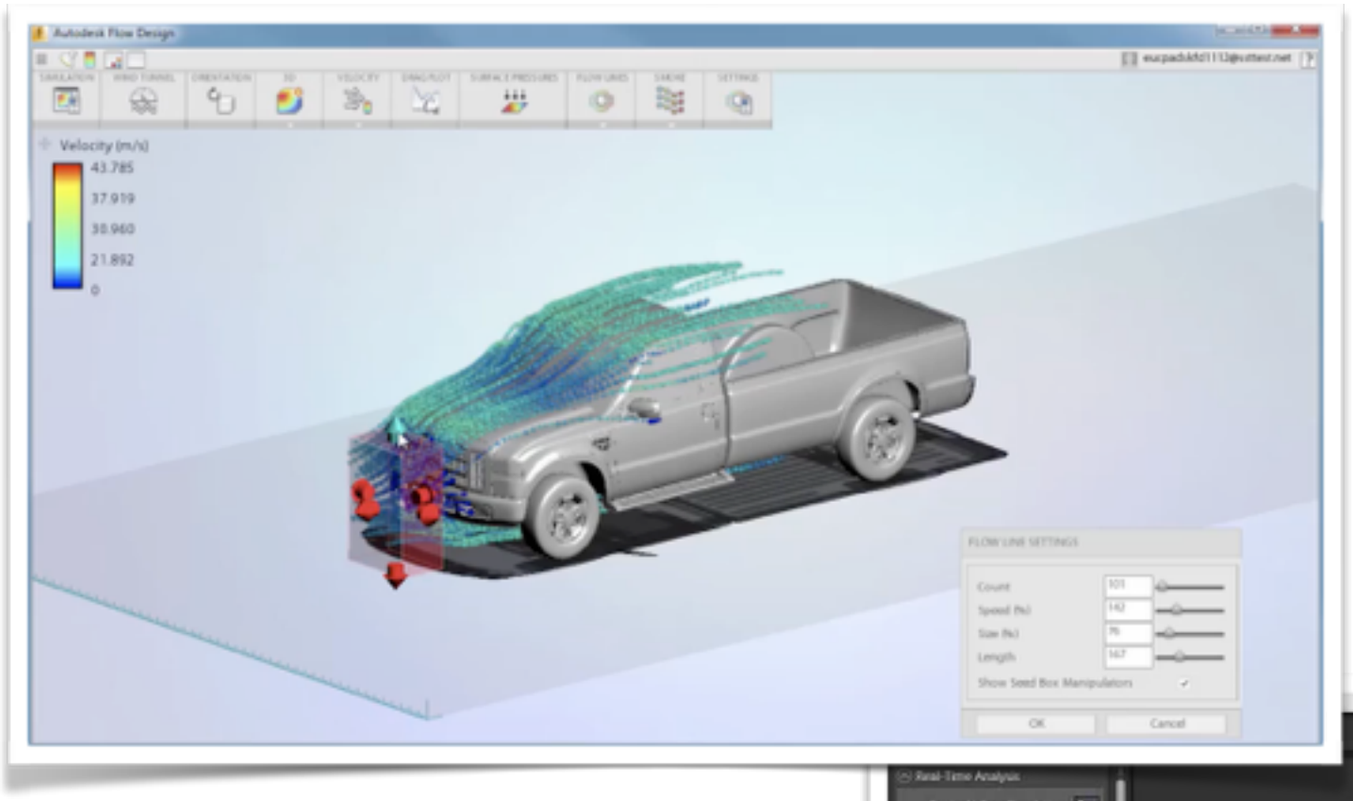
Simulations



Acquire Skills

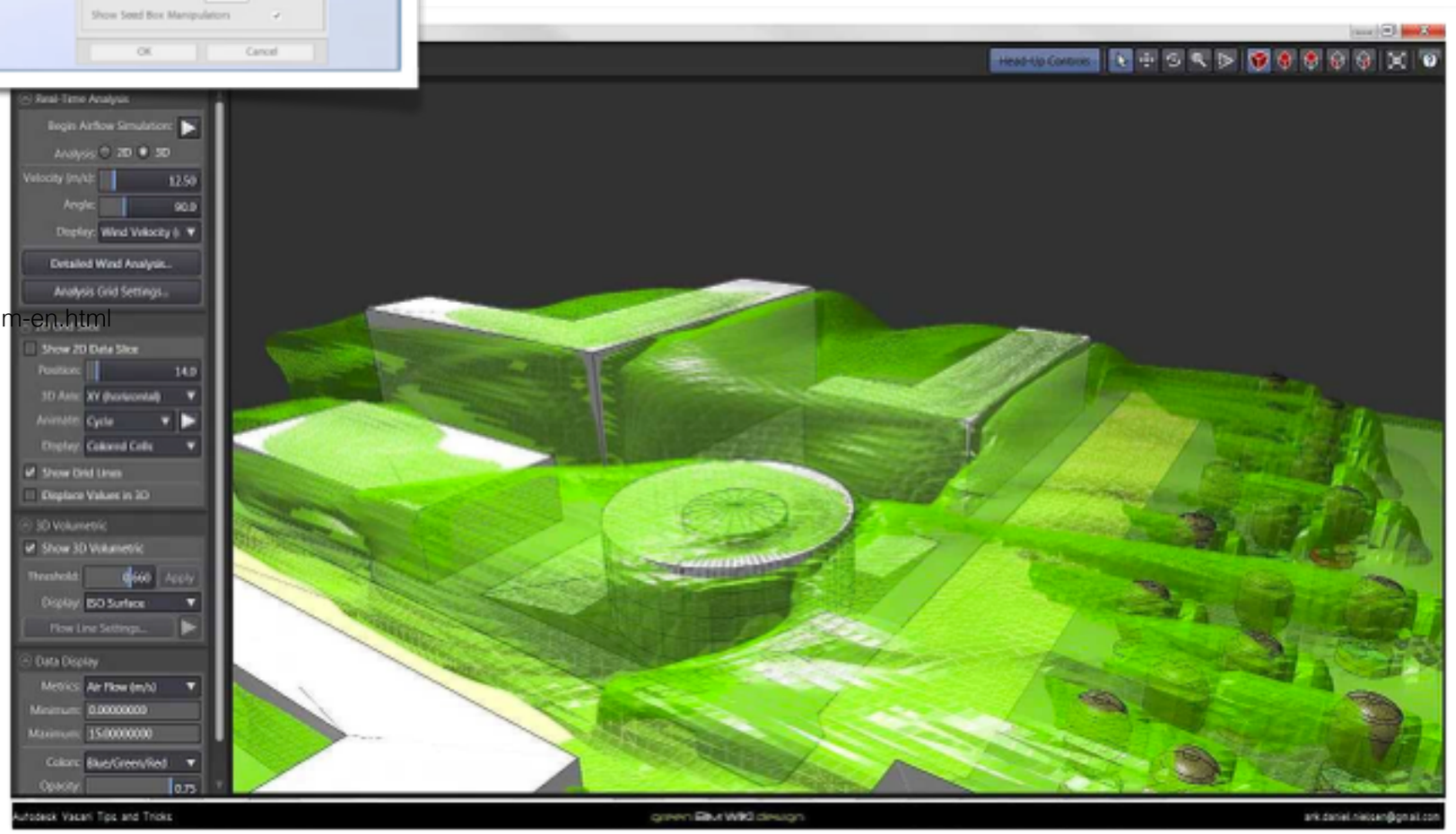
Discover underlying model

3) Exploration versus Construction



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

https://www.myphysicslab.com/pendulum/double-pendulum-en.html



3bis) Real World versus Fictitious World

https://www.fspilotshop.com/aerosoft-city-bus-simulator-new-york-gold-edition-p-5487.html

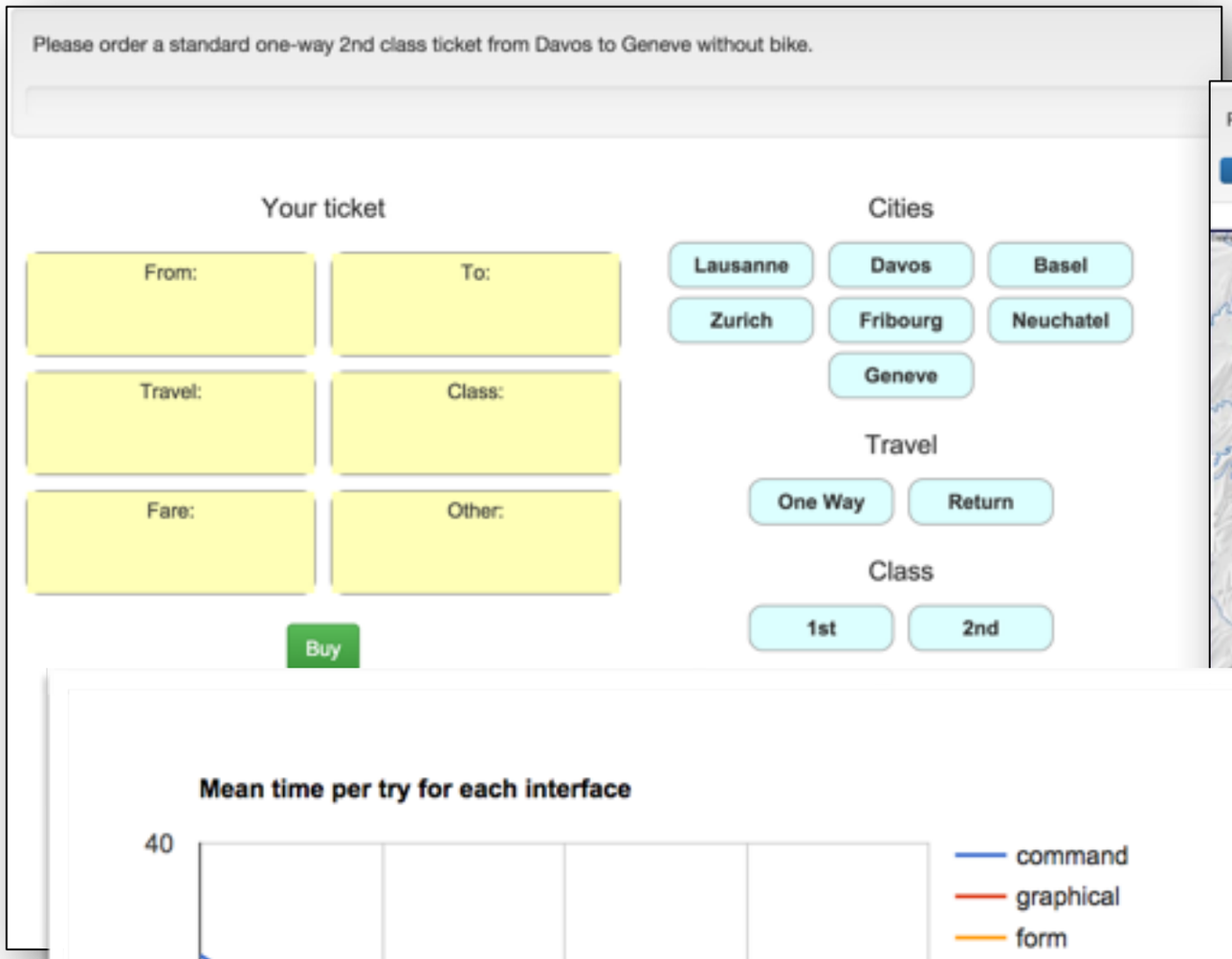
https://nowloading.co/posts/3888206

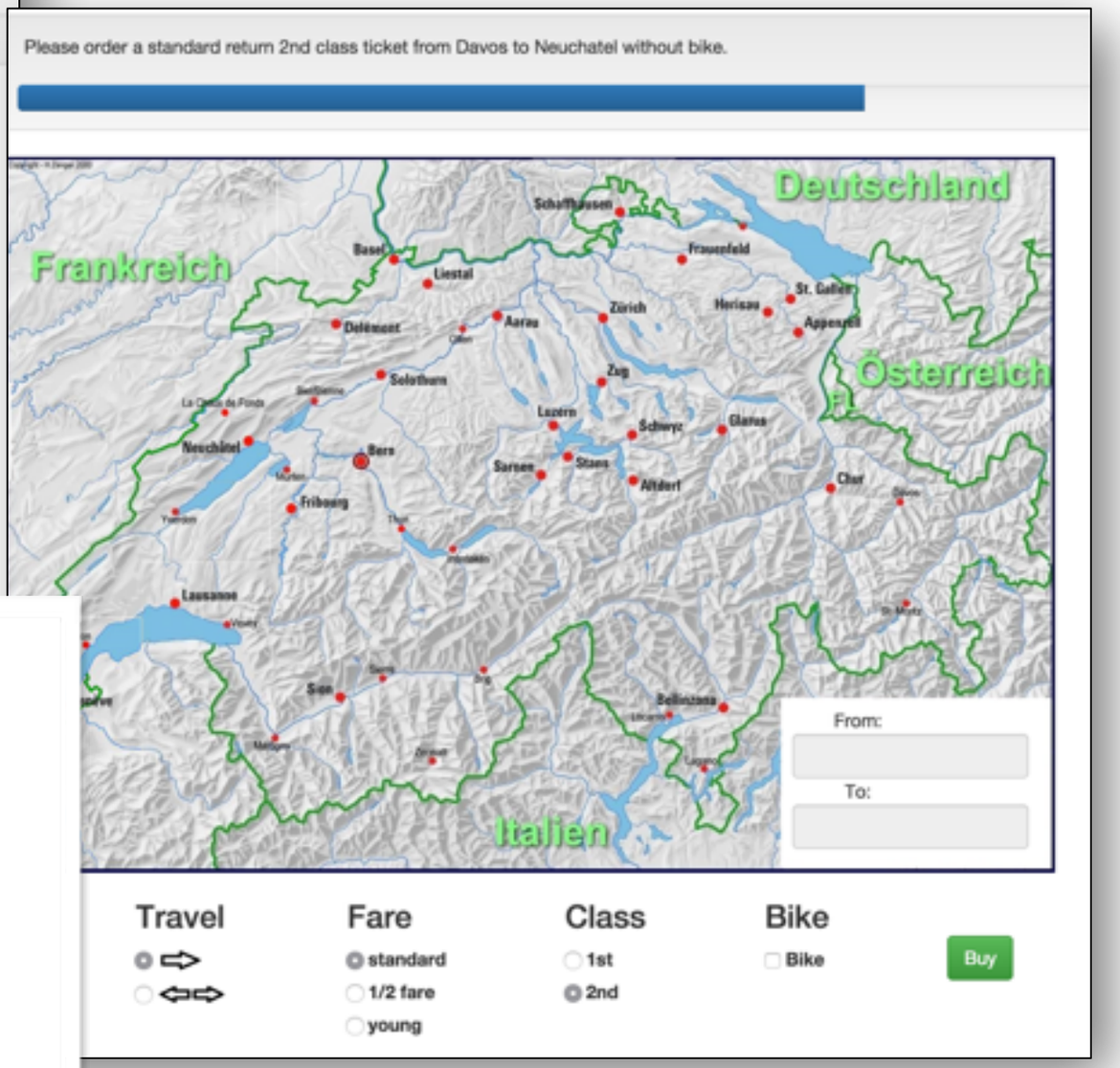
4) Individual versus Social

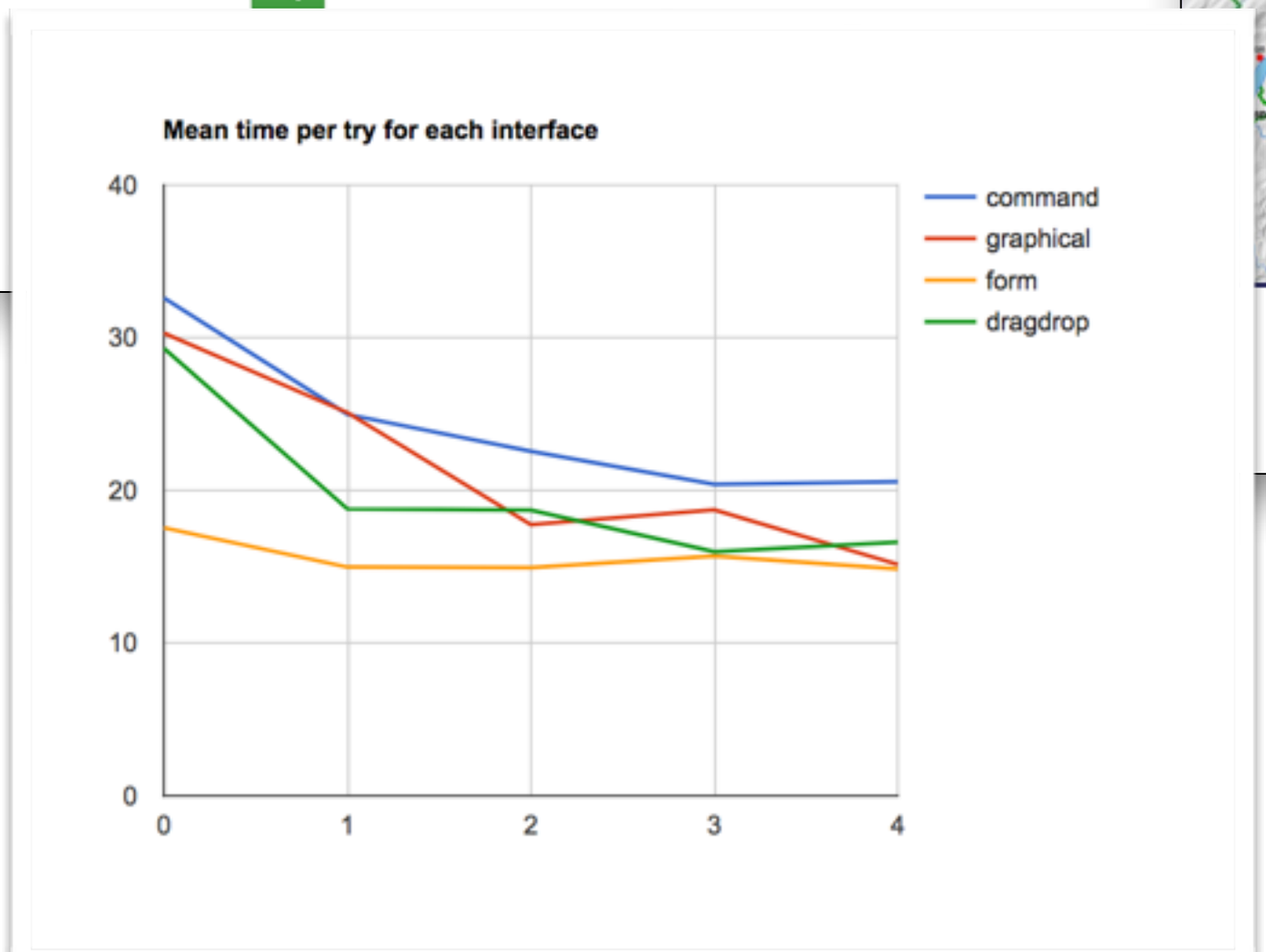
http://www.itechnews.net/2009/01/04/skigym-ski-simulator/

https://danielvoyager.wordpress.com/2015/03/25/group-selfie-in-second-life-with-lindens-and-sl-community/

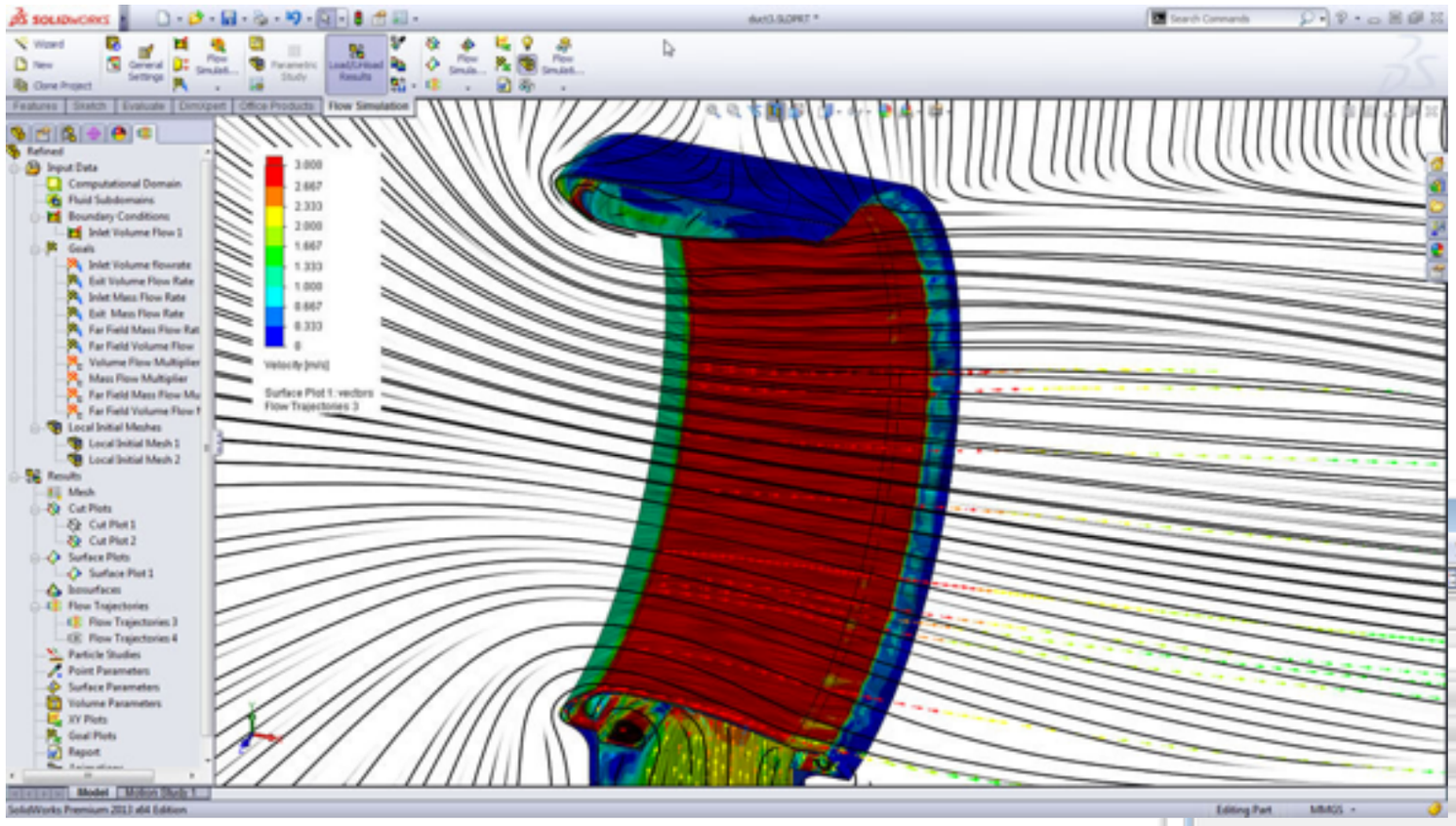
4b) .... or Participative



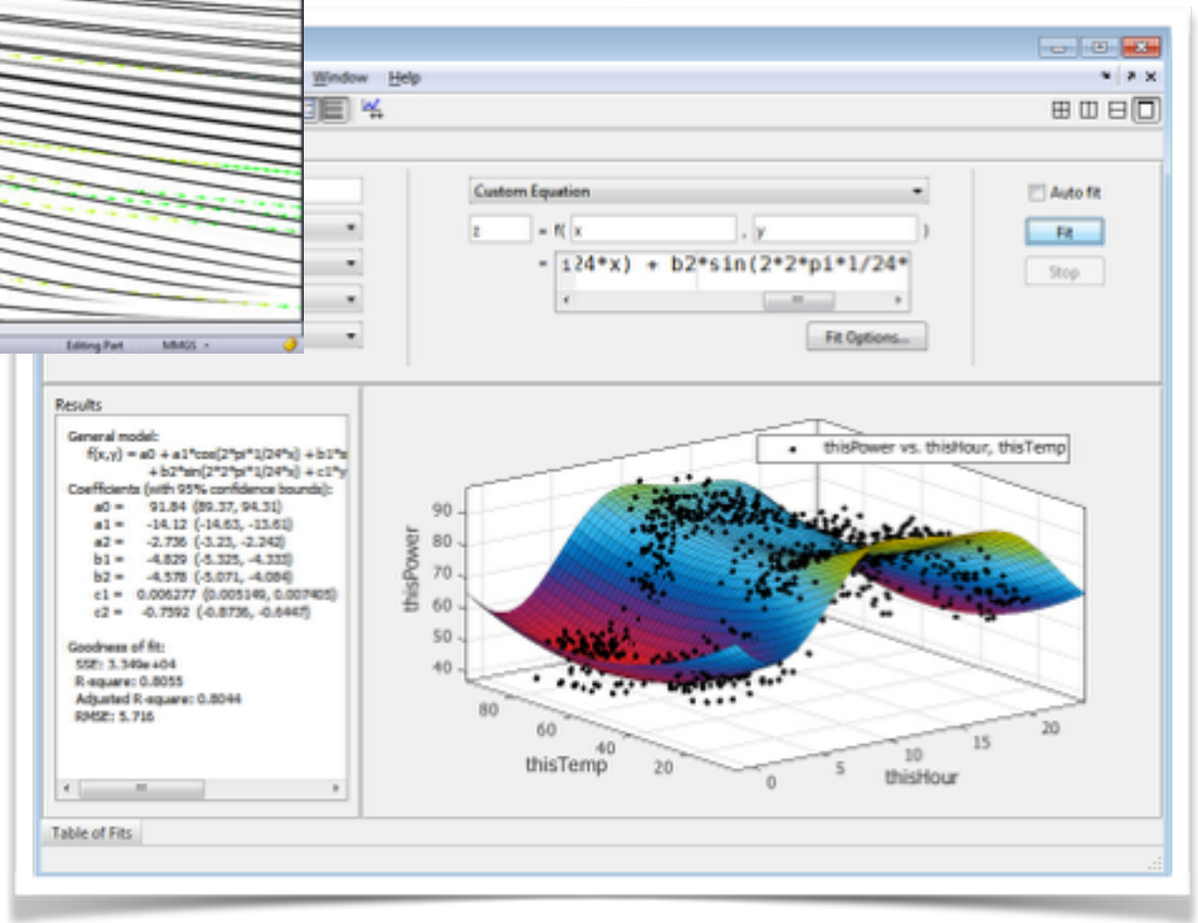




5) Simulation versus Modelling



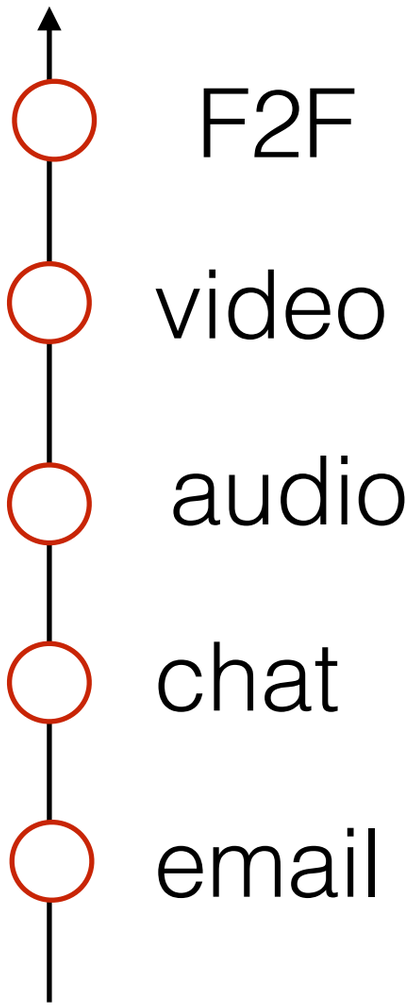
https://nowloading.co/posts/3888206



https://fr.mathworks.com/discovery/matlab-vs-r.html

6) Fidelity, Realism, …..

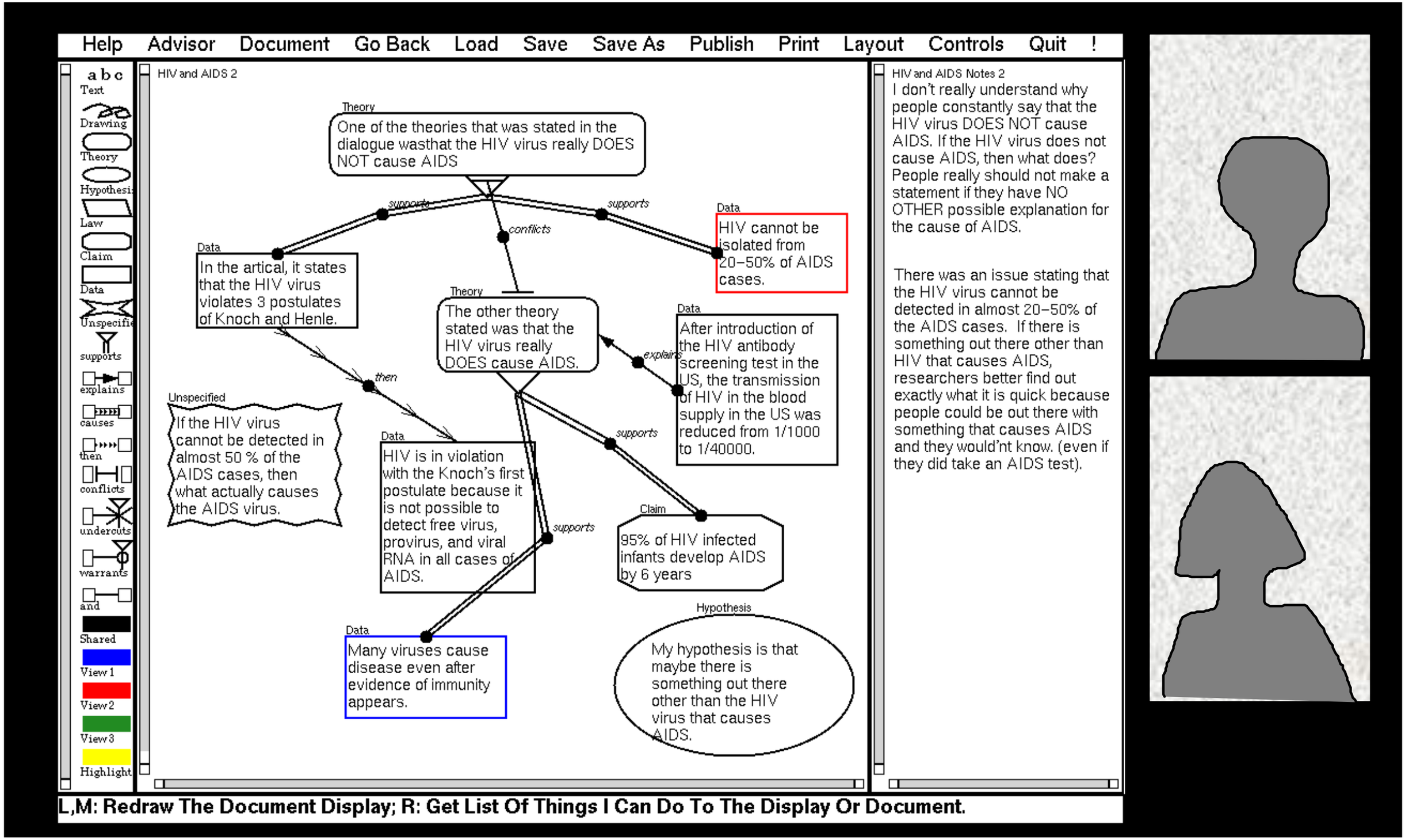
learning = *f* (media richness)



media richness hypothesis :

the more similar it is to face-to-face, the better it is

The myth of media richness

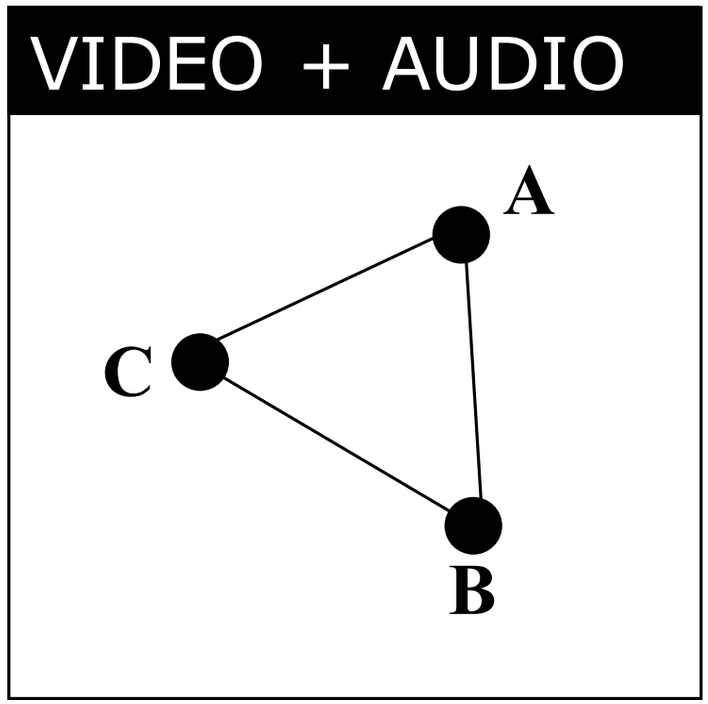


Belvedere

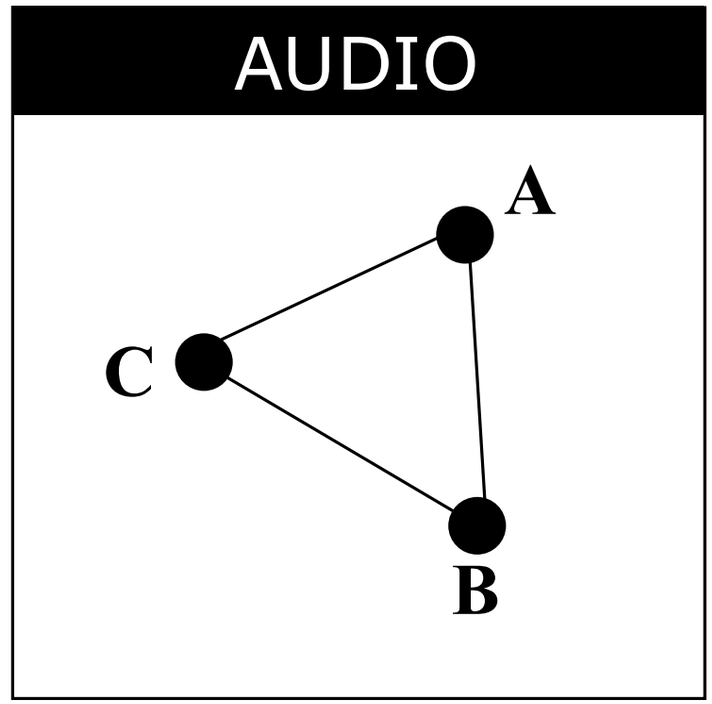
The myth of media richness

Perceiving my partner's emotions:

Is video better than audio ?



.62

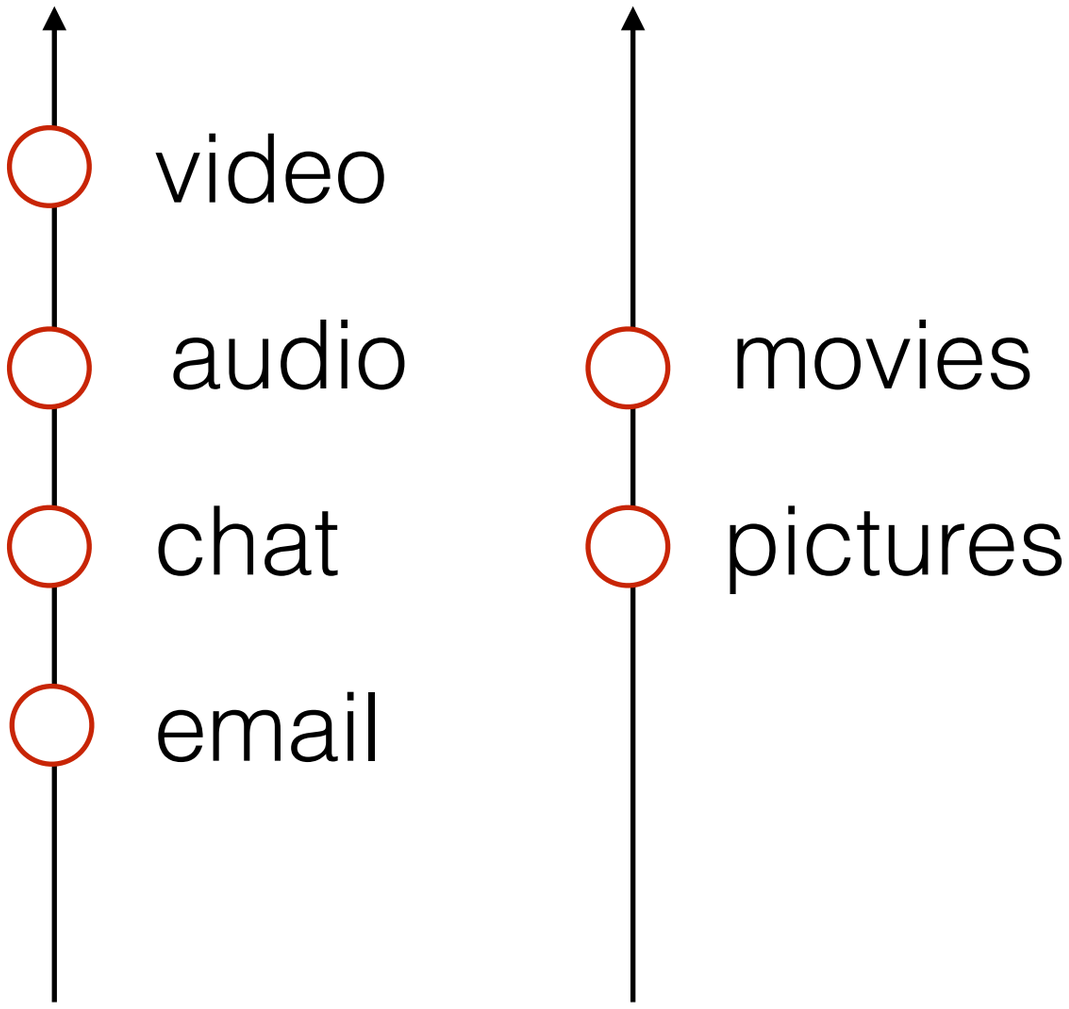


.70

Question to A: Were you nervous ? 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐

Question to B: Was A nervous ? 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐

learning = f (media richness)



media richness hypothesis :
the more similar it is to face-to-face, the better it is

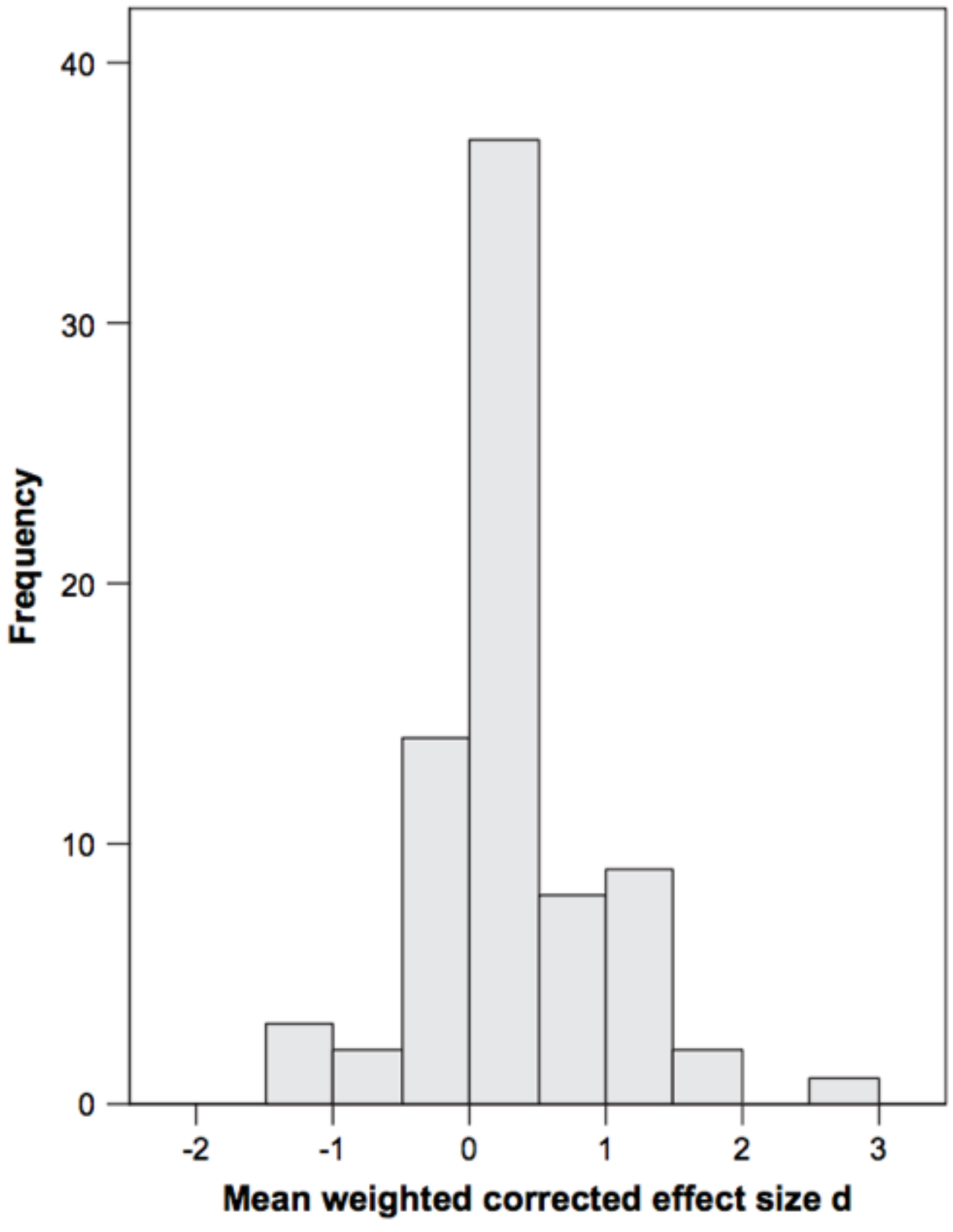
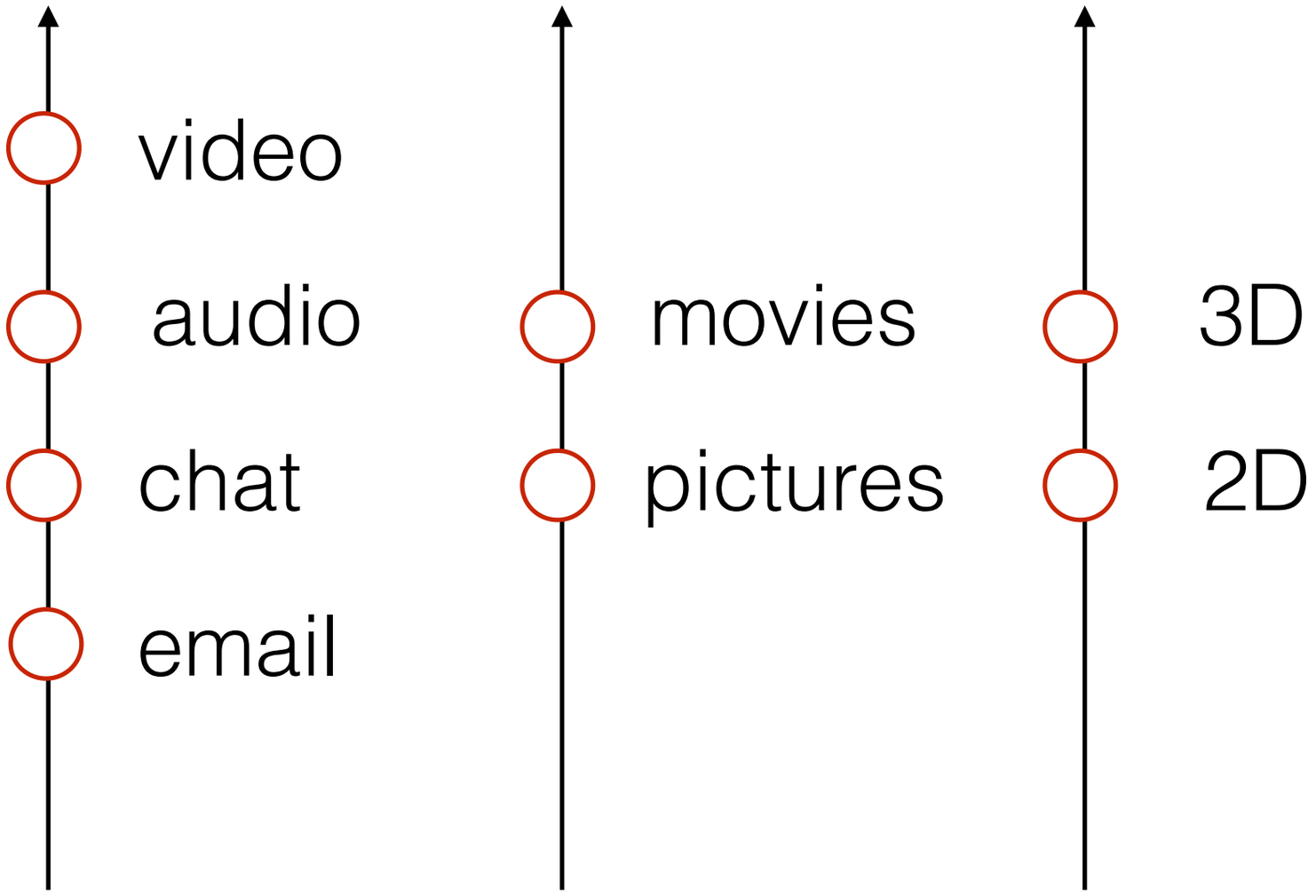


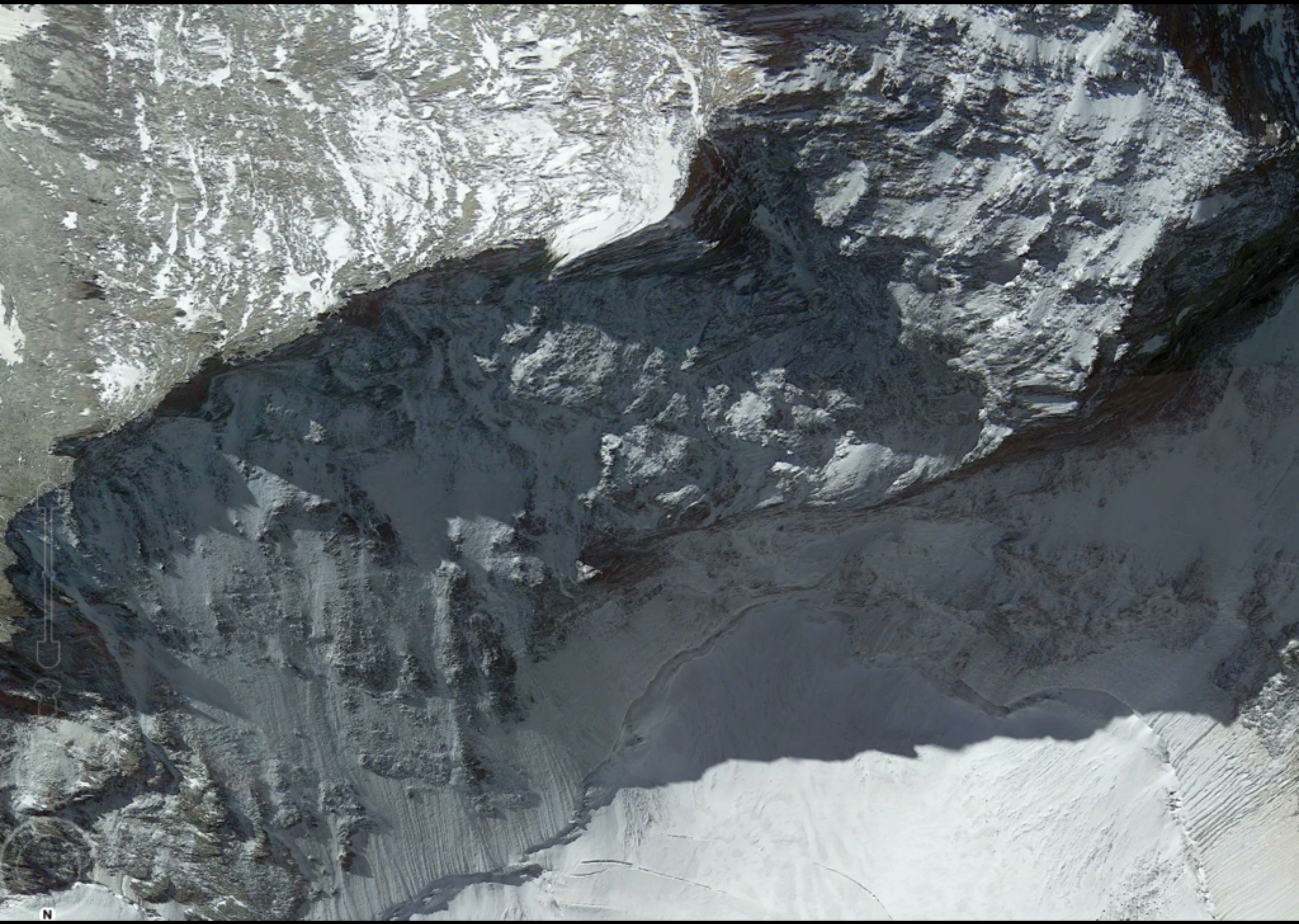
Fig. 1. Distribution of weighted effect sizes.

21 animated > static
53 animated = static
02 animated < static

learning = f (media richness)



media richness hypothesis :
the more similar it is to face-to-face, the better it is


N

media richness hypothesis :
the more similar it is to face-to-face, the better it is

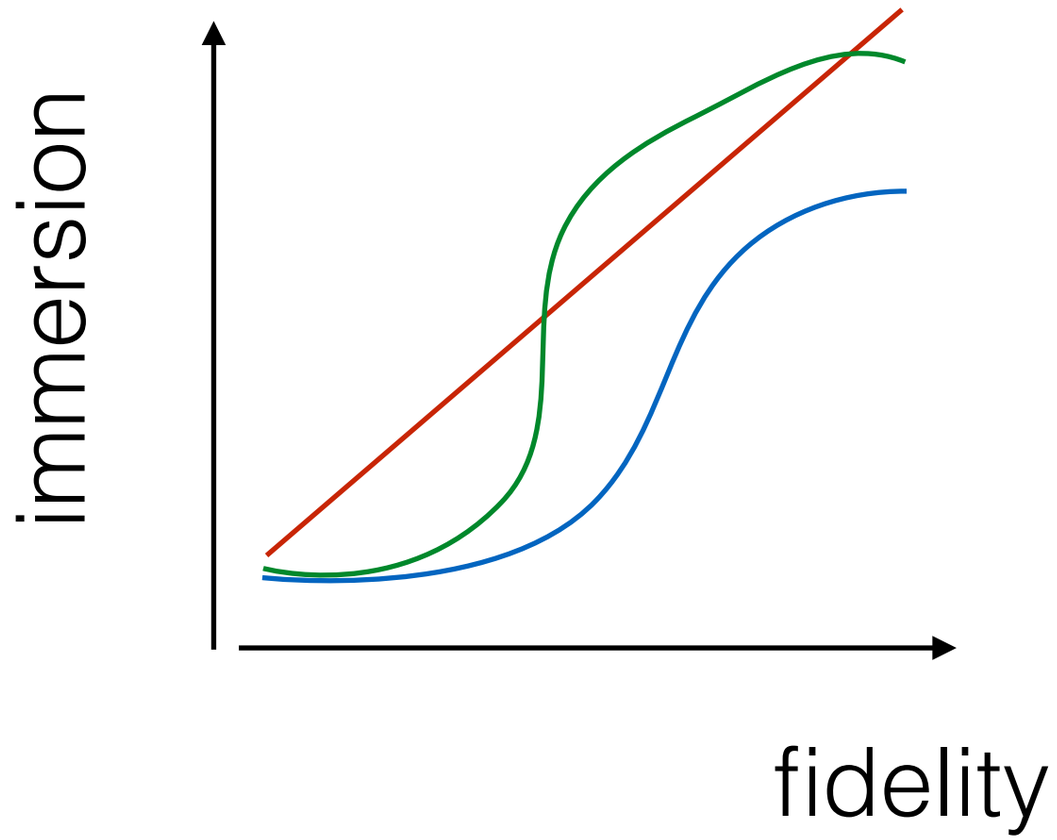
VR hypothesis :
the more similar it is to reality, the better it is

immersion = f (fidelity)

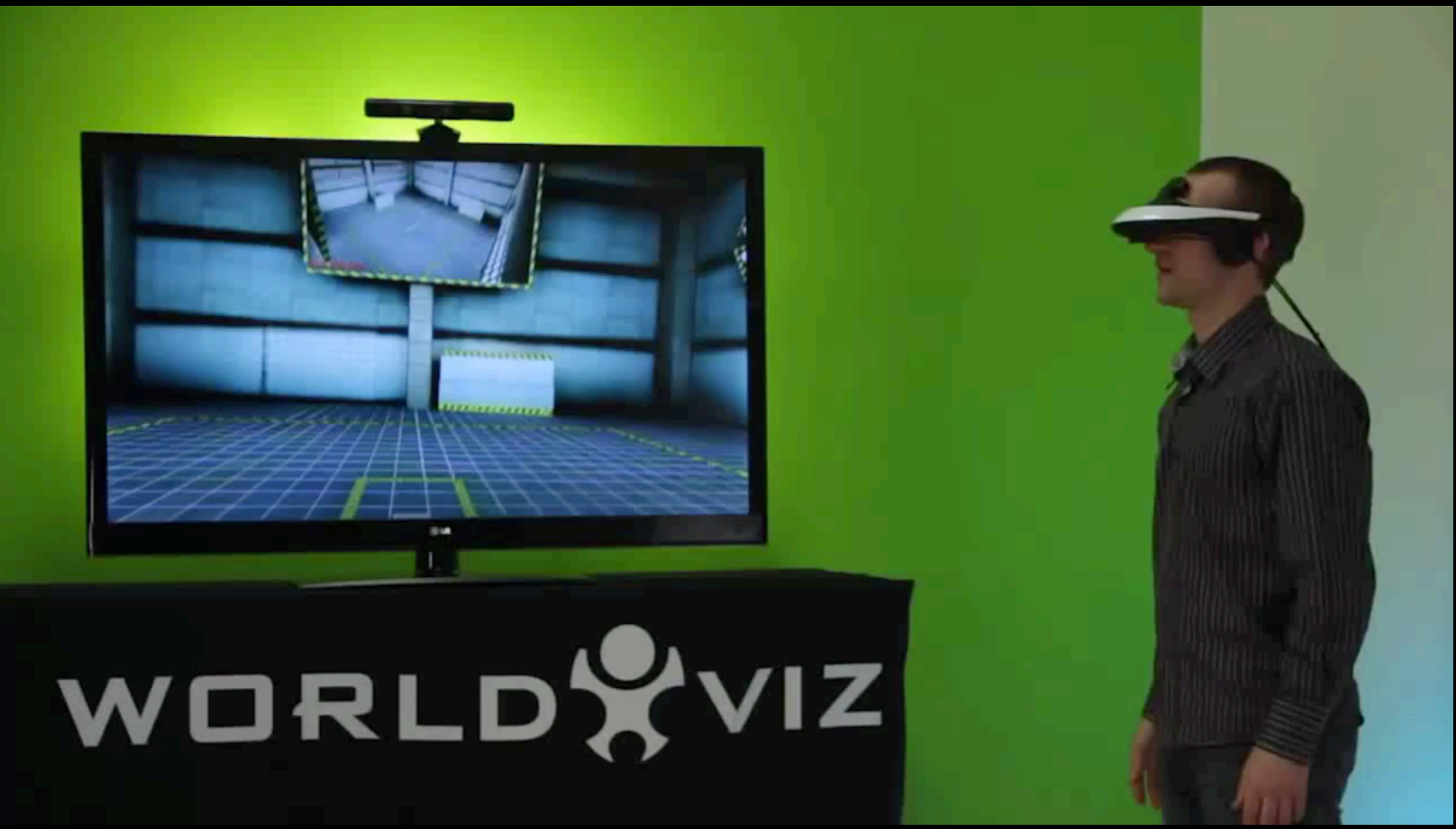
engagement = f (immersion)

learning = f (engagement)

immersion = f (fidelity)

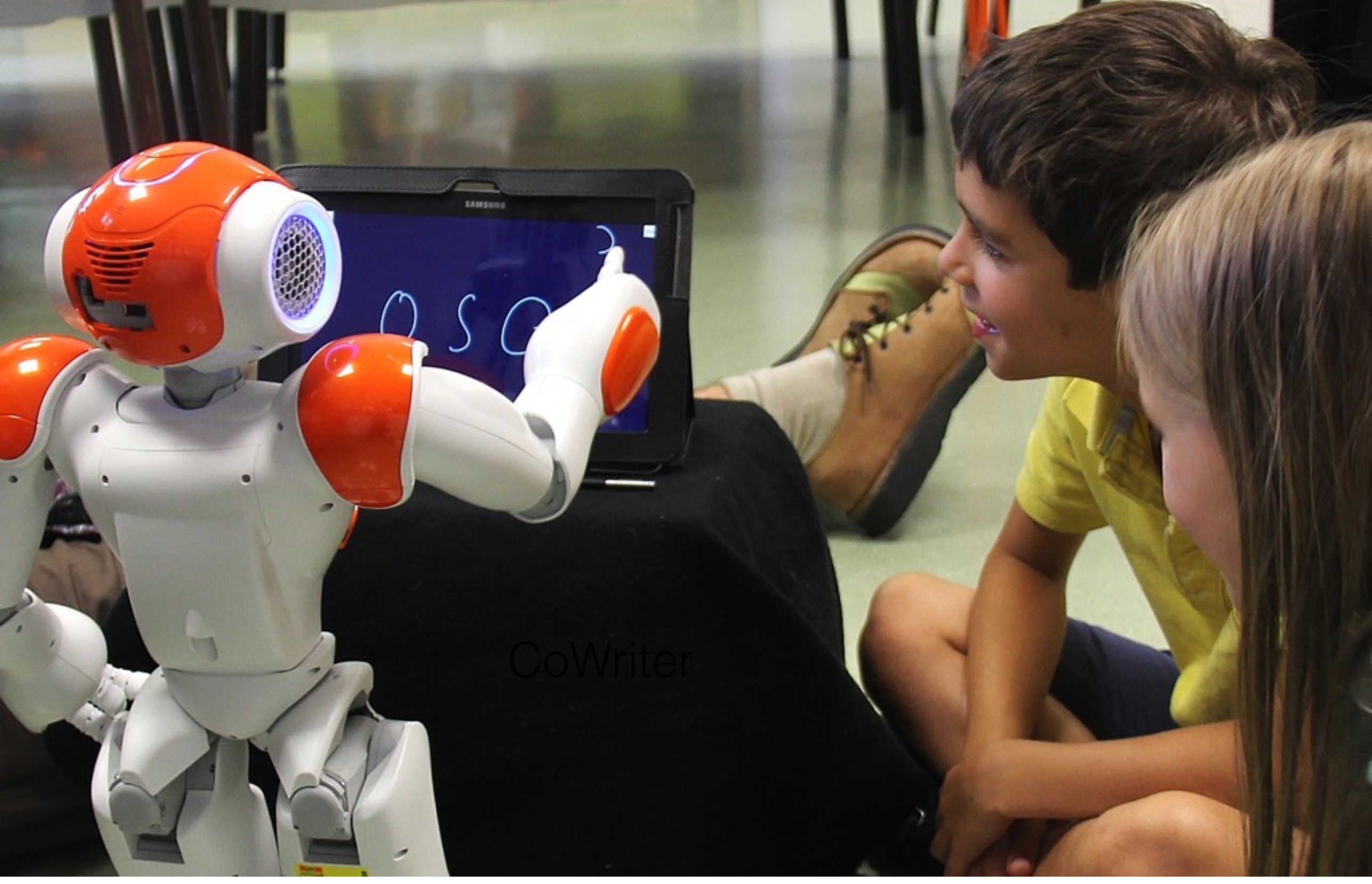


immersion = f (fidelity)



https://www.youtube.com/watch?v=hn2jsf6TiaM

immersion = f (fidelity) ?

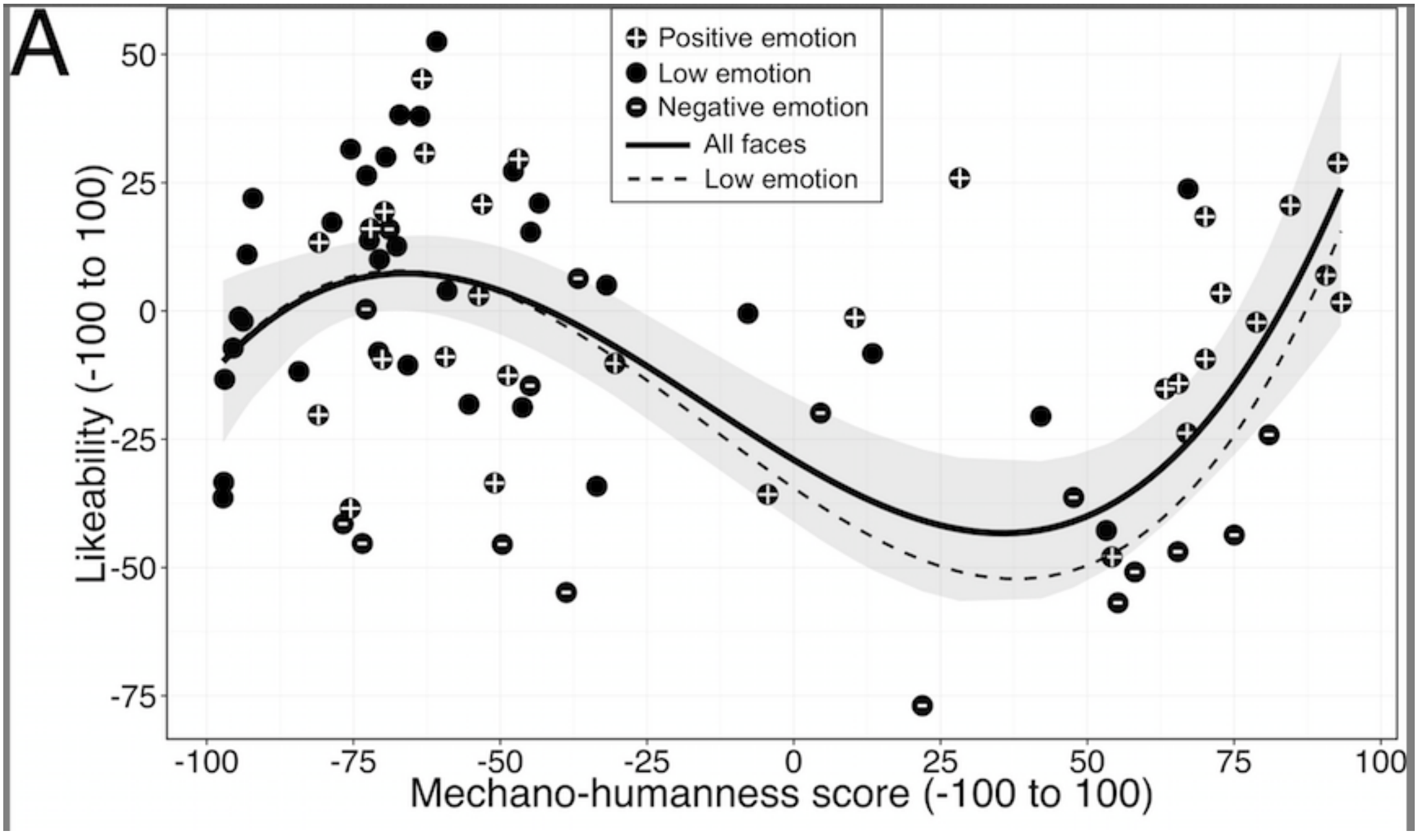


Johal, Lemaignan, Asselborn, Jacq, Billard, Paiva, Dillenbourg

robotics
Swiss National
Centre of Competence
in Research

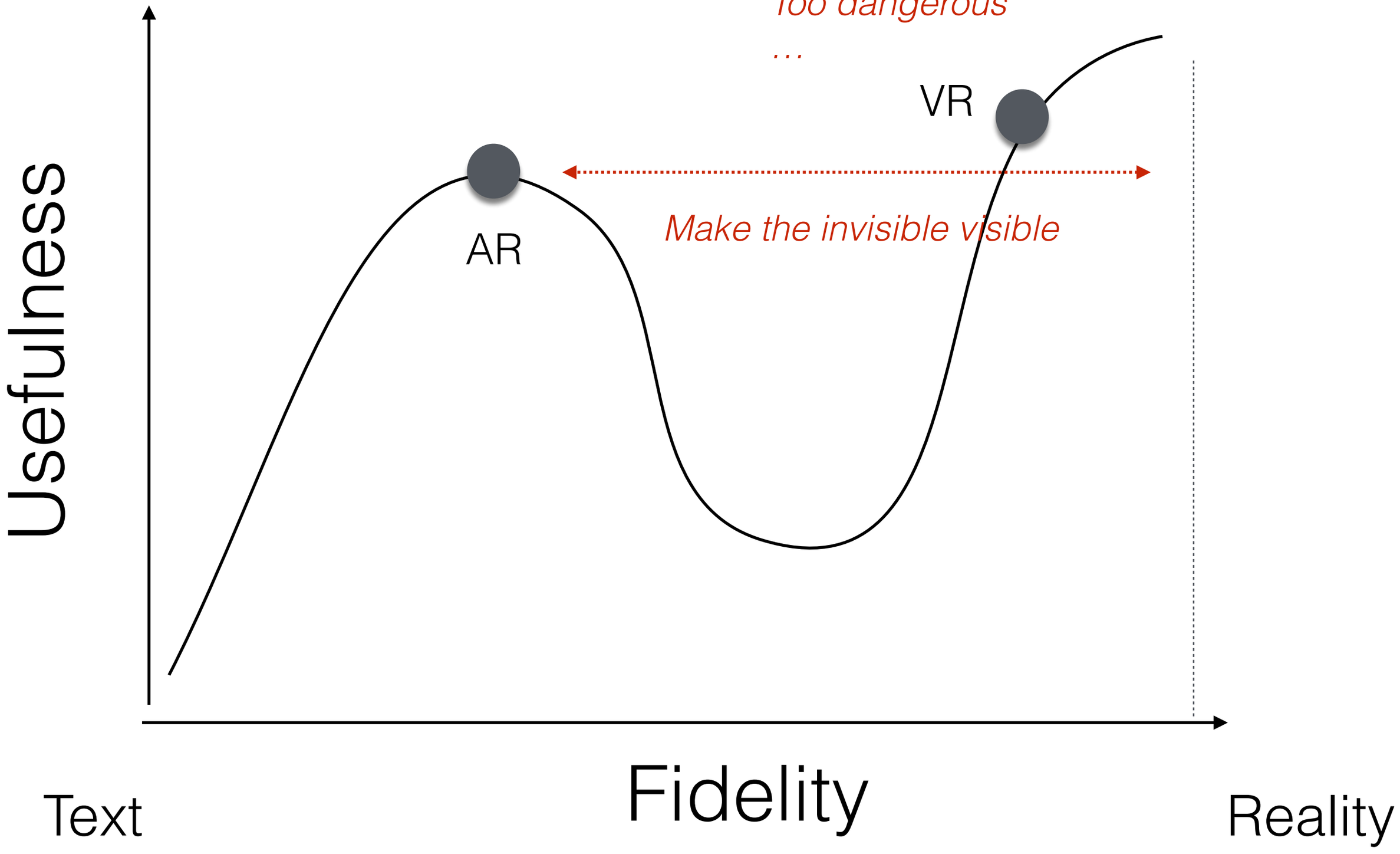
https://en.wikipedia.org/wiki/Uncanny_valley

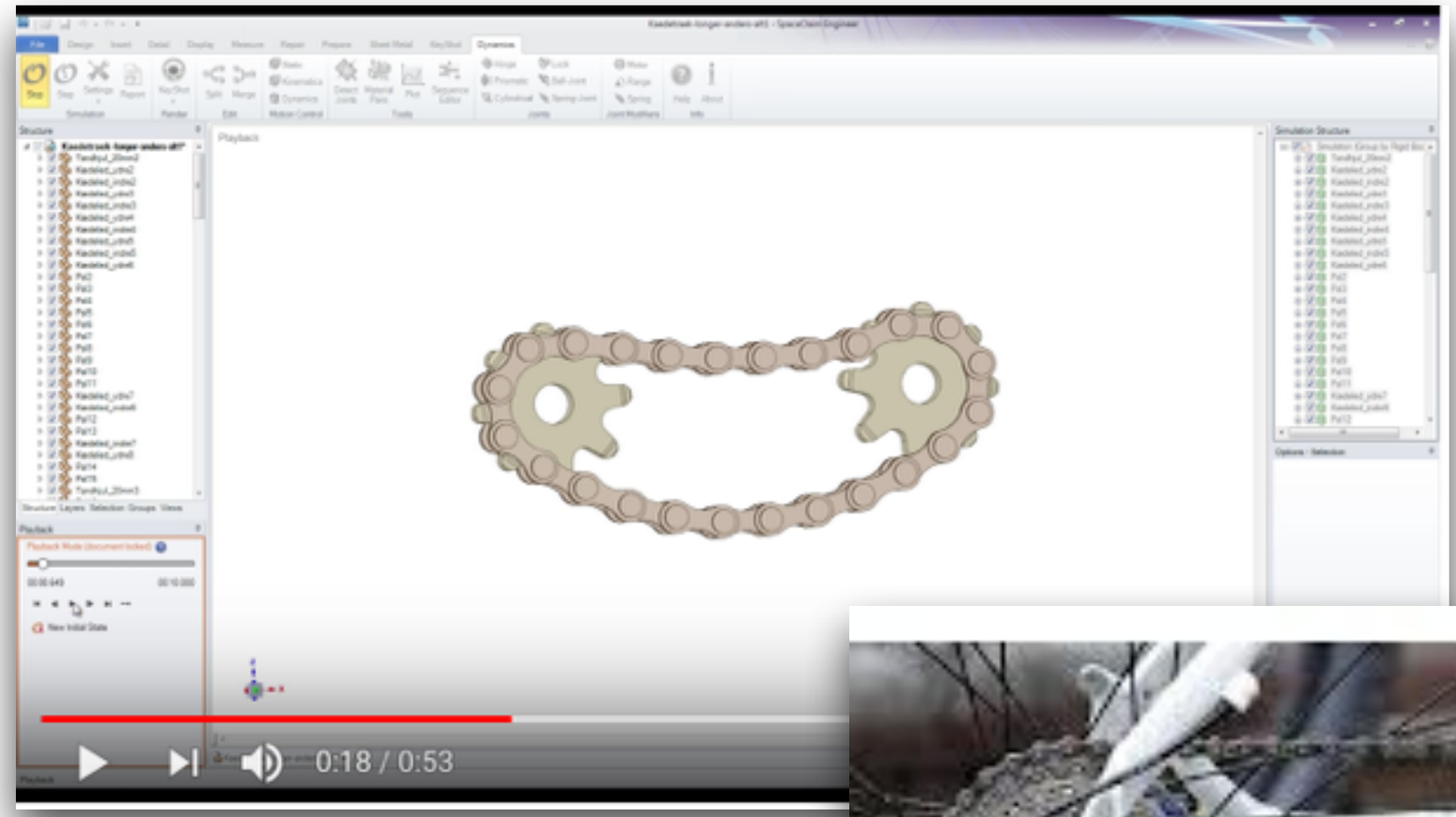
The uncanny valley



https://en.wikipedia.org/wiki/Uncanny_valley#/media/File:Uncanny_valley.png

Too small
Too expensive
Too fast
Too dangerous
…

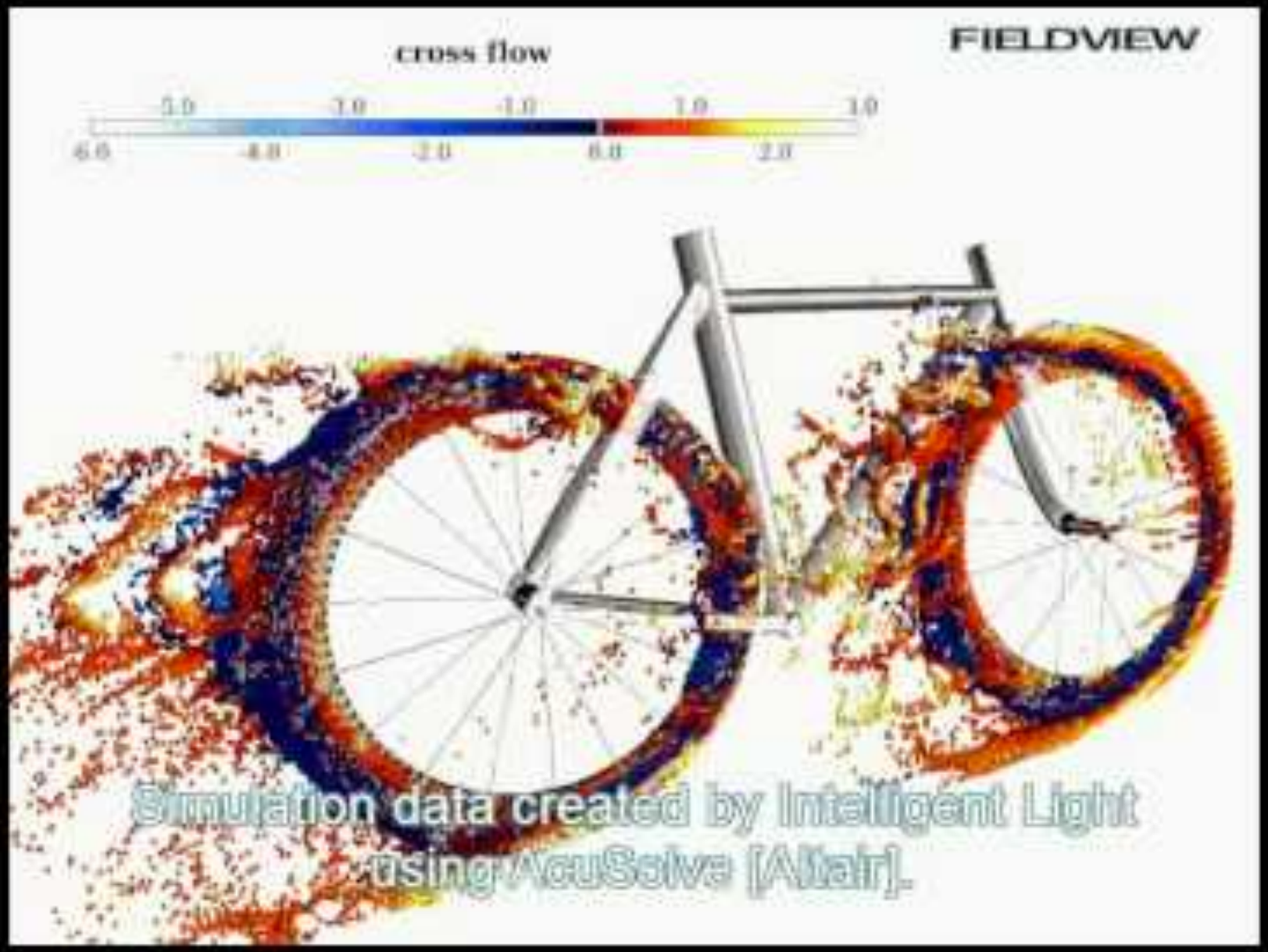




https://www.fasttech.com/product/7201300-authentic-shimano-ig51-8-speed-bicycle-chain

VR hypothesis :
the more similar it is to reality, the better it is

https://i.ytimg.com/vi/jUy6pyyZwzQ/hqdefault.jpg



Make the invisible visible: Air flow

Making the invisible visible: forces

Lorenzo Lucignano, EPFL

Make the invisible visible

Make the impossible possible

- Move the moon closer to Jupiter
- Add a leg to Usain Bolt
- Turn gravity negative
- Cool down the planet by 3 degrees
- Make a government with 20 parties
- …

± OK

immersion = f (fidelity)

?

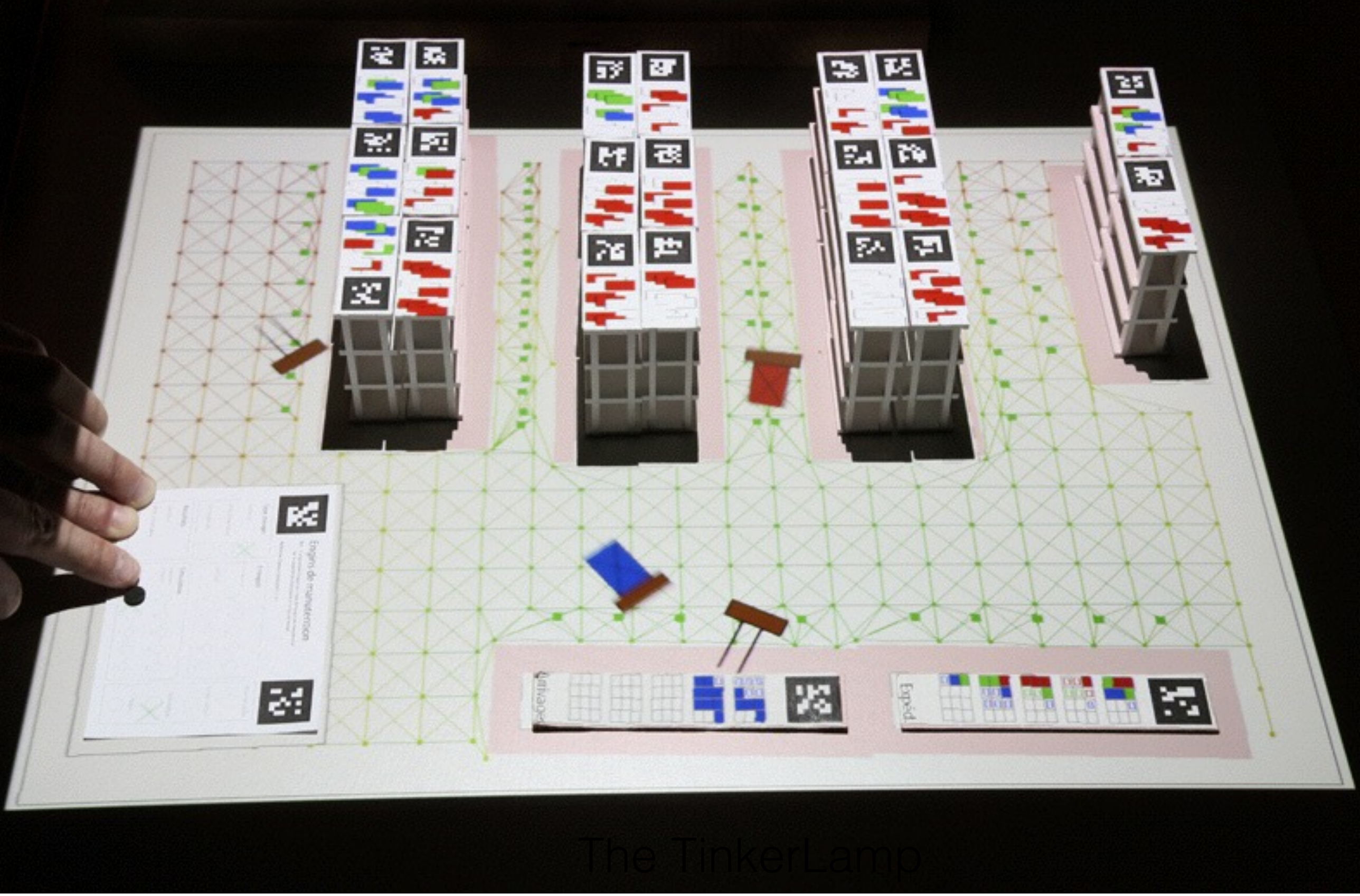
engagement = f (immersion)

learning = f (engagement)

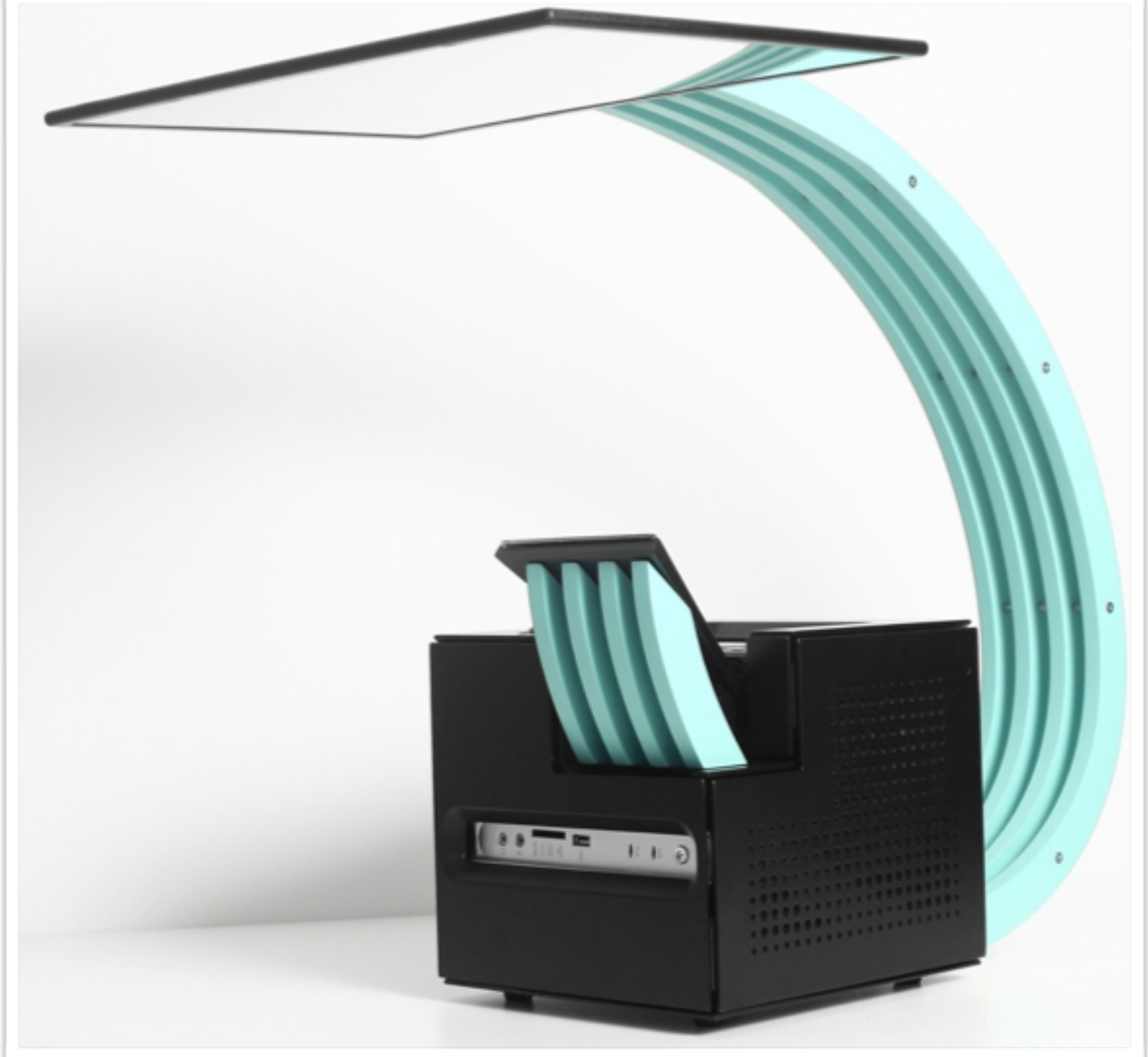
?

Logistics assistants (warehouse employees)


KOSMOS
KAEFER-ROBOTER
ART. NR. 658014
INHALT: 5 STK.
MADE IN CHINA
KOSMOS
GEHEIM-PERISKOP
ART. NR. 658618
INHALT: 5 STK.
MADE IN CHINA
Elektro-Krokodil



Guillaume Zufferey, Patrick Jermann, Pierre Dillenbourg (EPFL)



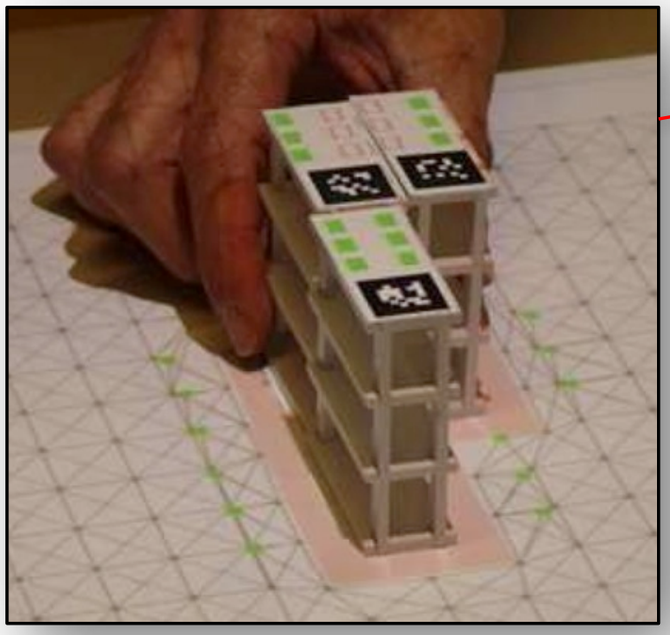

Simpliquity

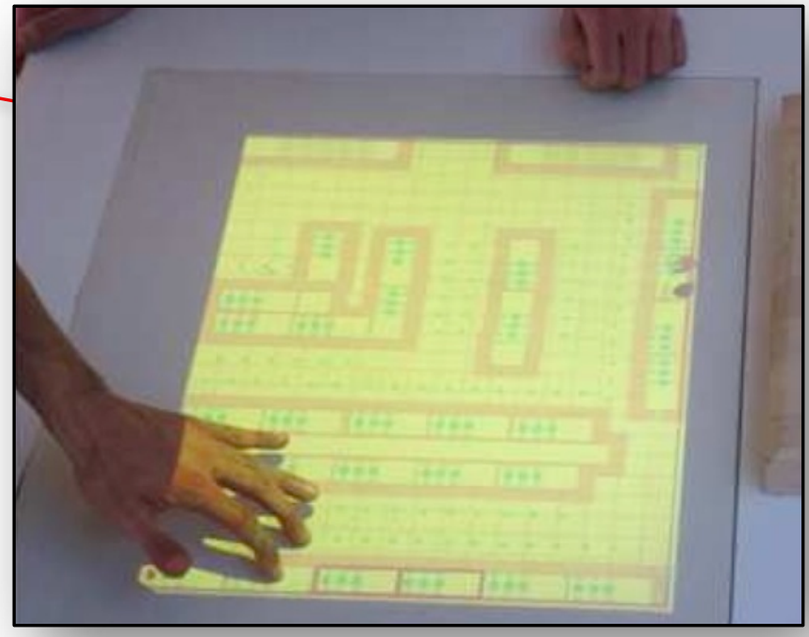
Is this realistic ?

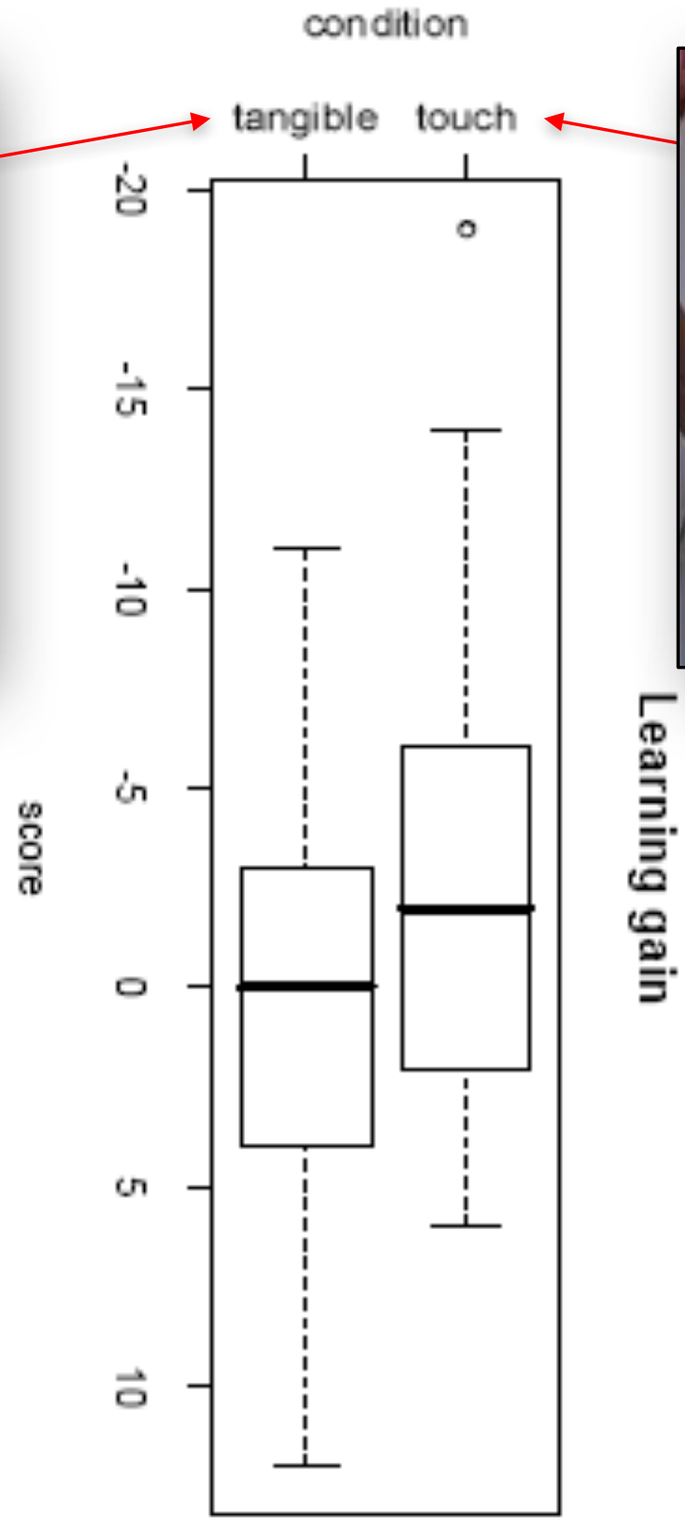
Not perceptually, but cognitively yes
(at some level of abstraction)

Is this engaging ?

Make the impossible possible
Make the complex simpler







$F(1,37) = 6.68, p < .05$

Bertrand Schneider, Aurelien Lucchi

Gerbeur

20 étages

20 mini

SB = 288 m²

SBST = 244 m²

Degré d'utilisation 84%

51 = 50m²

surface brut de stockage : 240m²

degré d'utilisation (1) : 83%

surface net de stockage : 68 m² 22ct. = 45 m² 15 étage.

20 mini

Degré 2 : 17%

Degré 3 = 20%

surface net de stockage / brut = 23%

net de stockage / brut de stockage = 28%

14m40

= 15 %

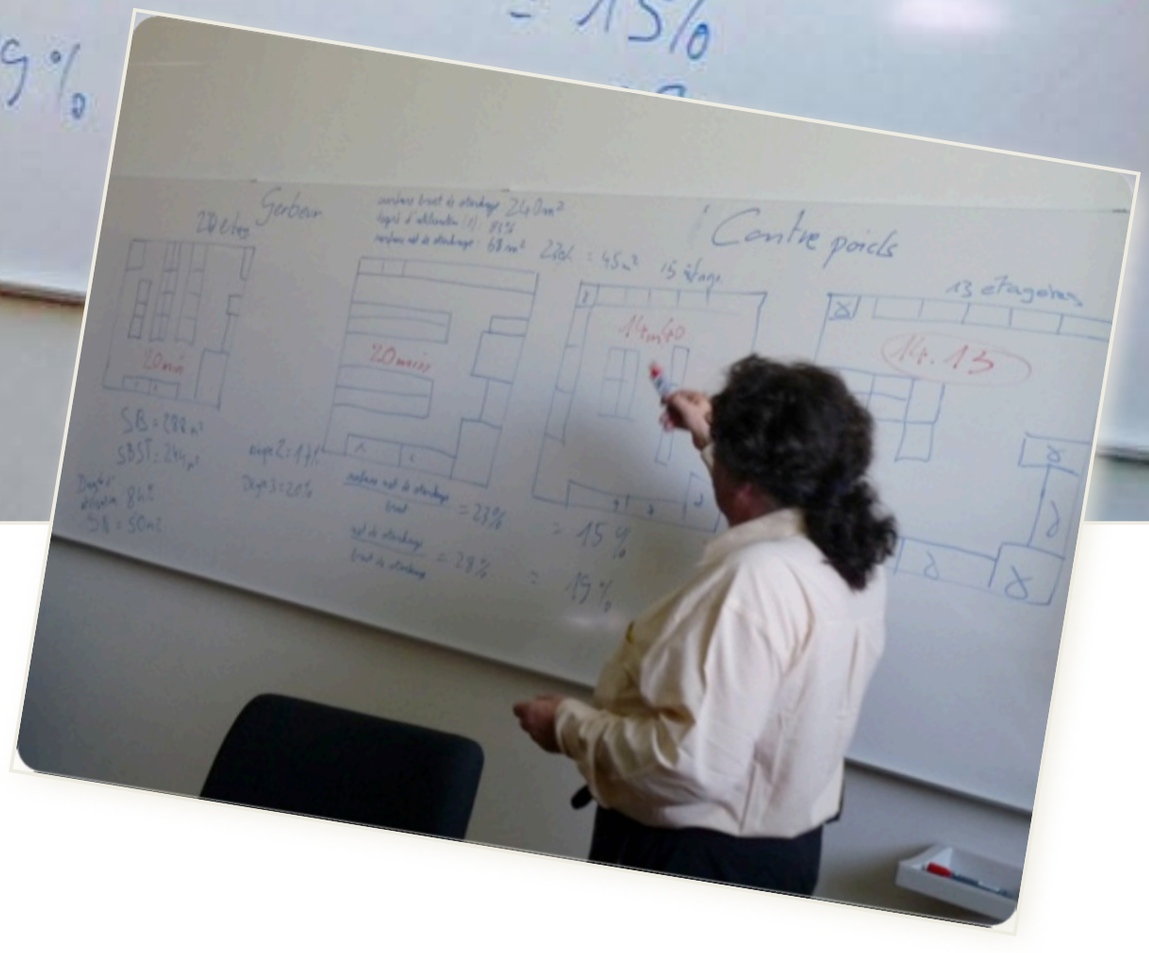
= 19 %

Contre poids

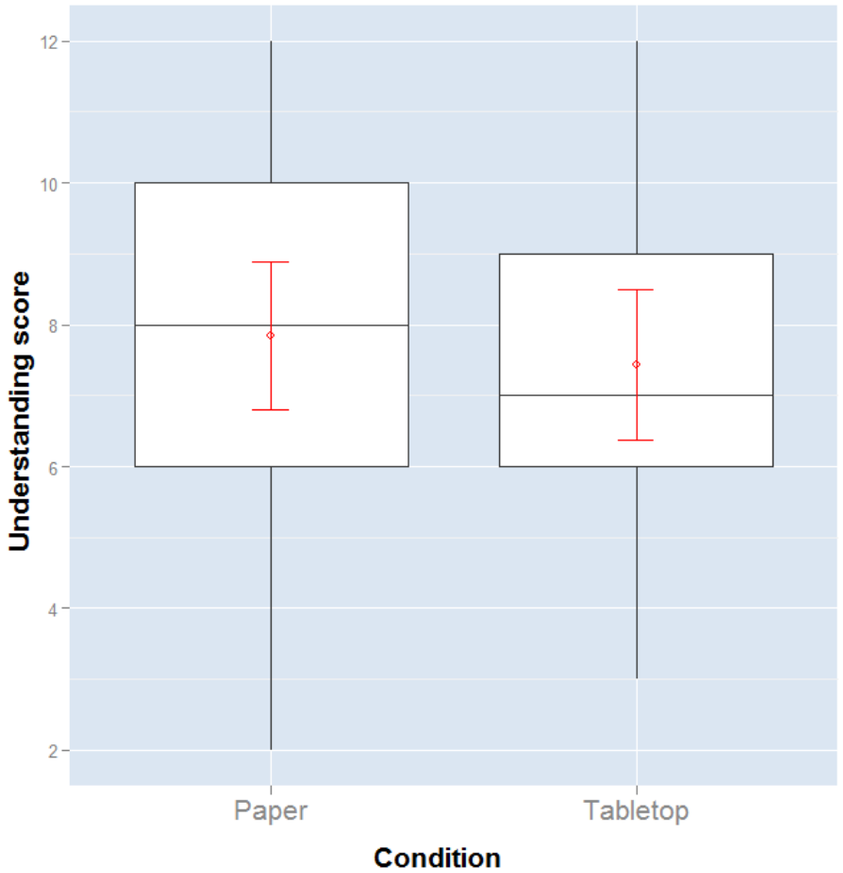
13 étageres

14.13

= 13%

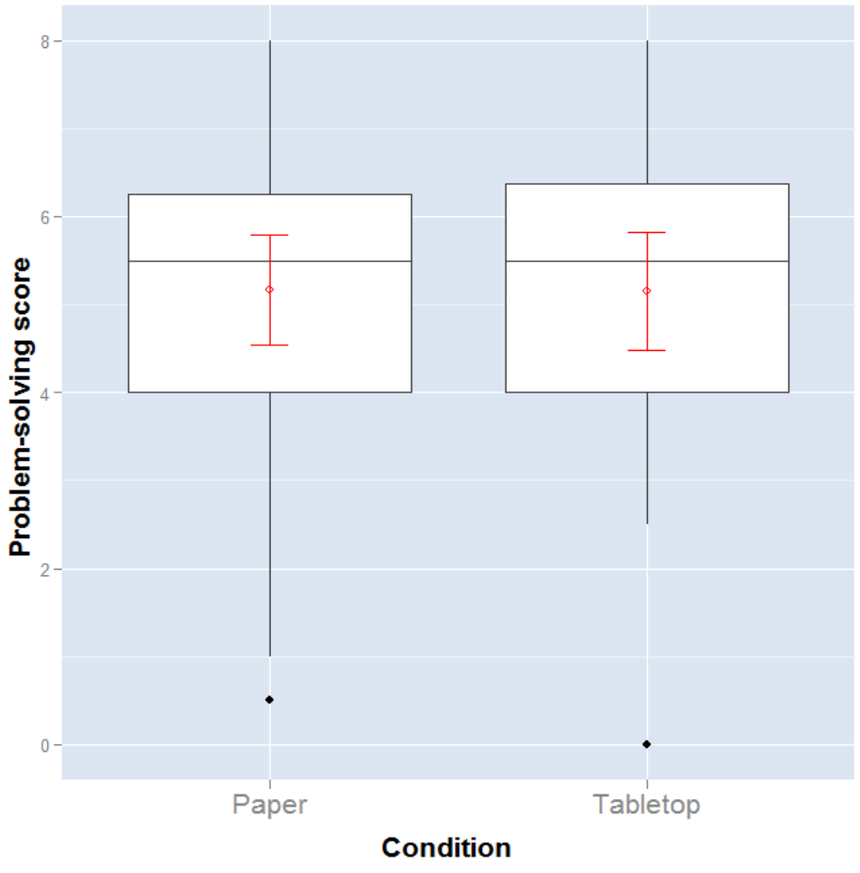


No sign. effect in understanding



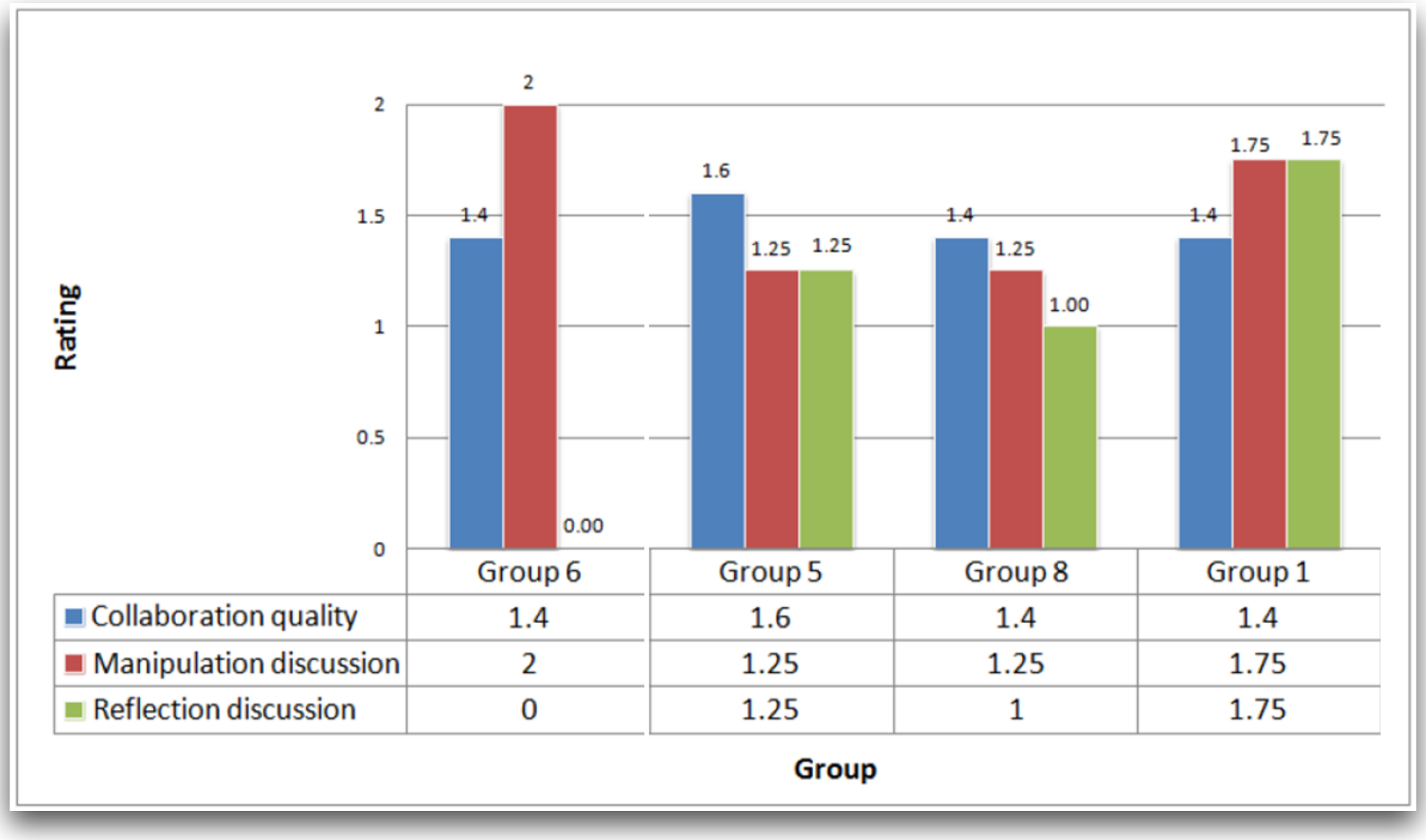
mean = 7.84 vs. mean = 7.43
F(1,14) = .25; p > .05

No sign. effect in problem-solving



mean = 5.16 vs. mean = 5.15
F(1,14)=.06, p>.05

Is this engaging ? Too much !



Fiche Simulation
Repartition des surfaces de stockage

Chariot élévateur
Gerbeur
Mat r
Contrepoid

Plan de l'entrepôt
Mise en place
Pré

Surface brute
25
m2
Surface brute sto ge
24
m2
Surface nette sto ge
21
m2

Sauver

Choisir
Effacer
Brute:
Brute stock:
Nette:
Degrée d'utilisation:
Chariot élé:
Temps/palette:
Choisir
Effacer
Brute:
Brute stock:

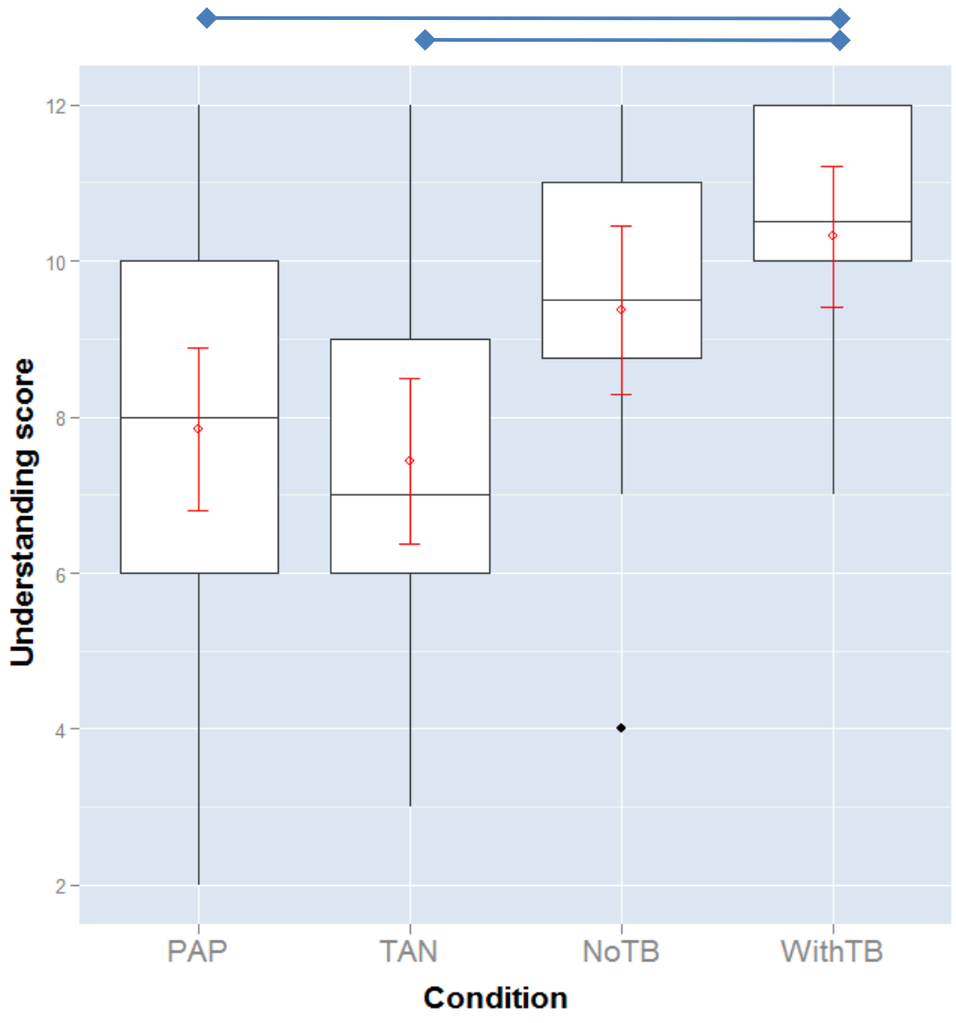
SIMULATE

GROUP

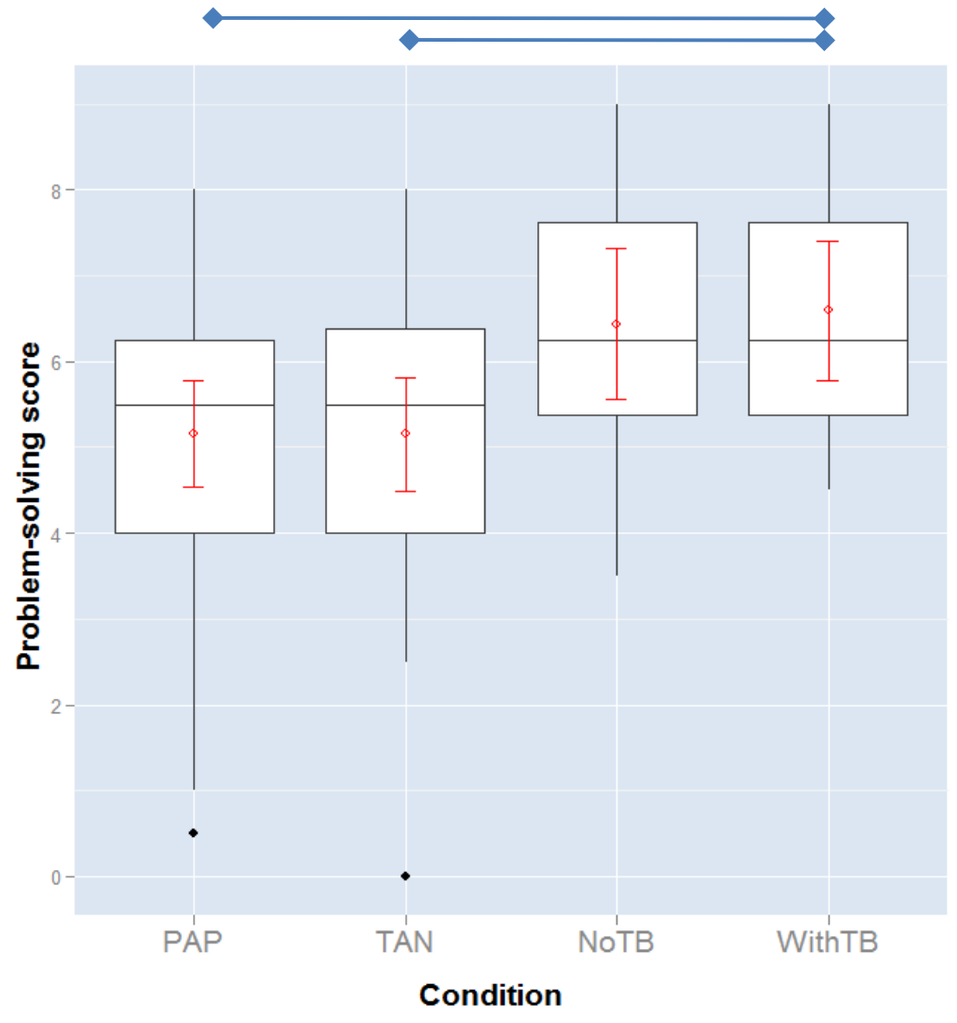
- Run a simulation of the current layout.
- Ask the students to predict before runni

Classroom Orchestration

Sign. effect in understanding



Sign. effect in problem-solving



immersion = f (fidelity)

engagement = f (immersion)

NO

yes

learning = f (engagement)

NO

Reflect
Predict
Explain
Disagree

Compare
Reformulate
Teach
Summarize
Translate

experience

learning

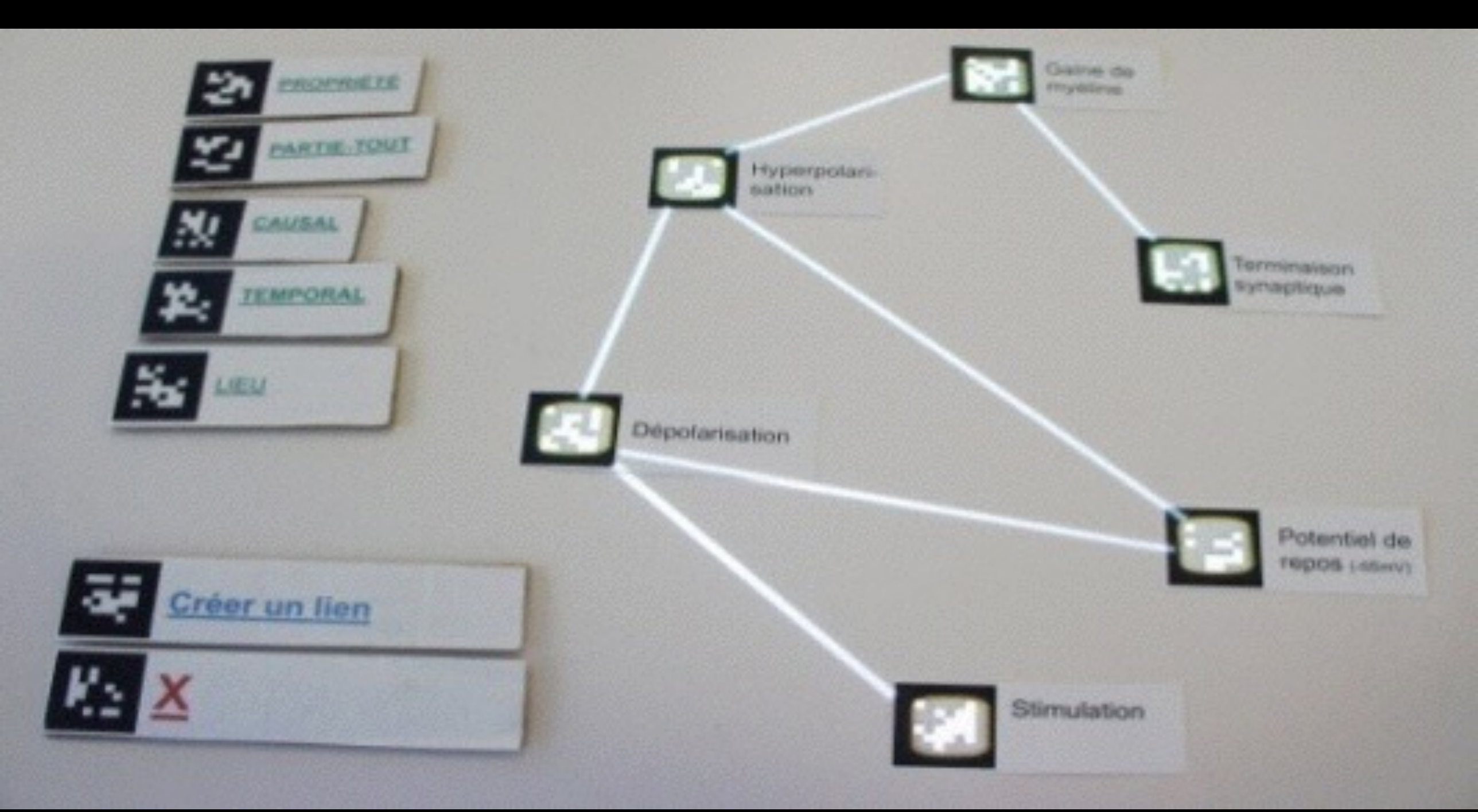
immersion = f (fidelity)

engagement = f (immersion)

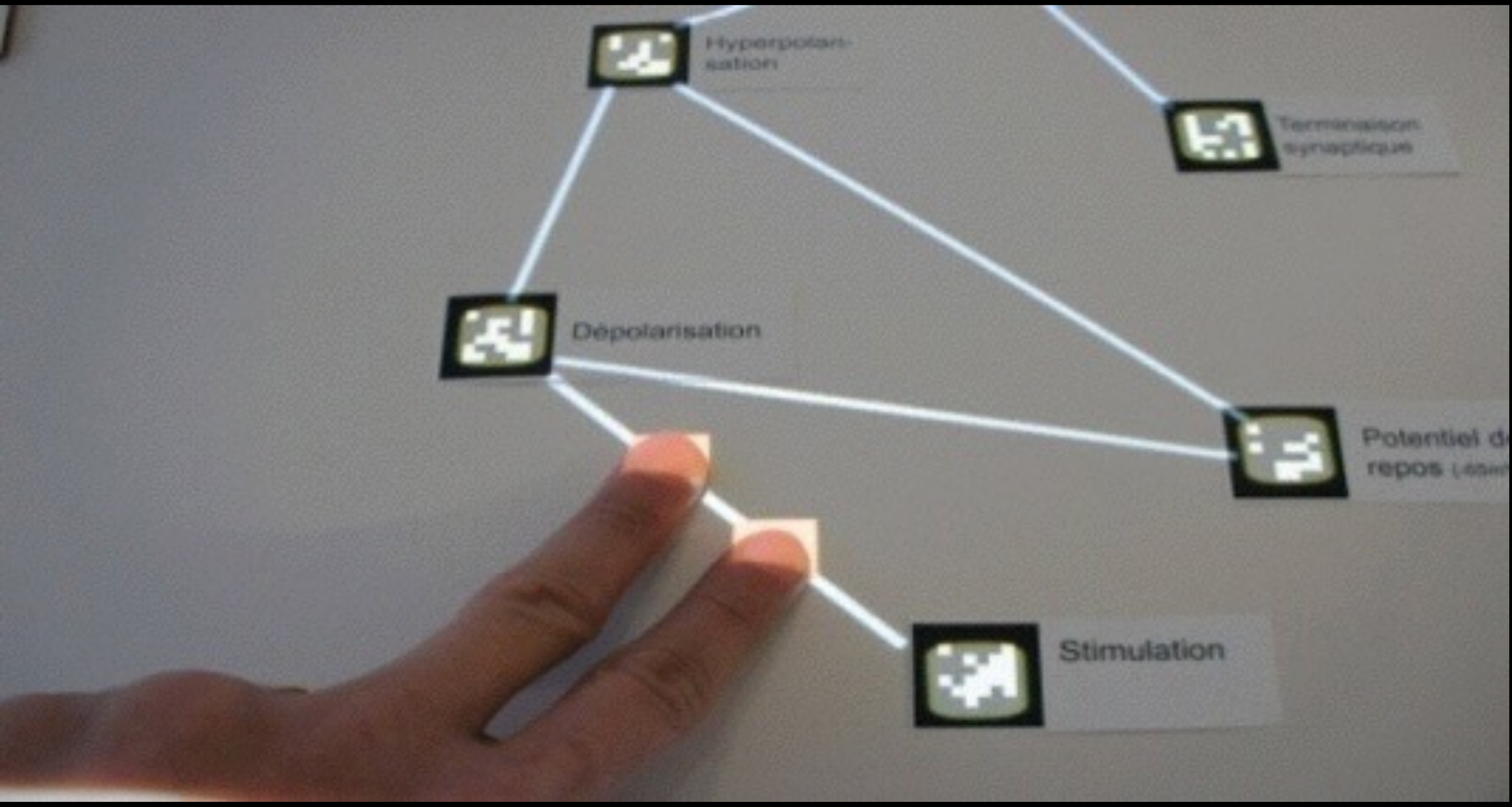
learning = f (engagement)

learning = f (cognitive effort)

learning = f(effort)



Concept Map: paper concepts, augmented links

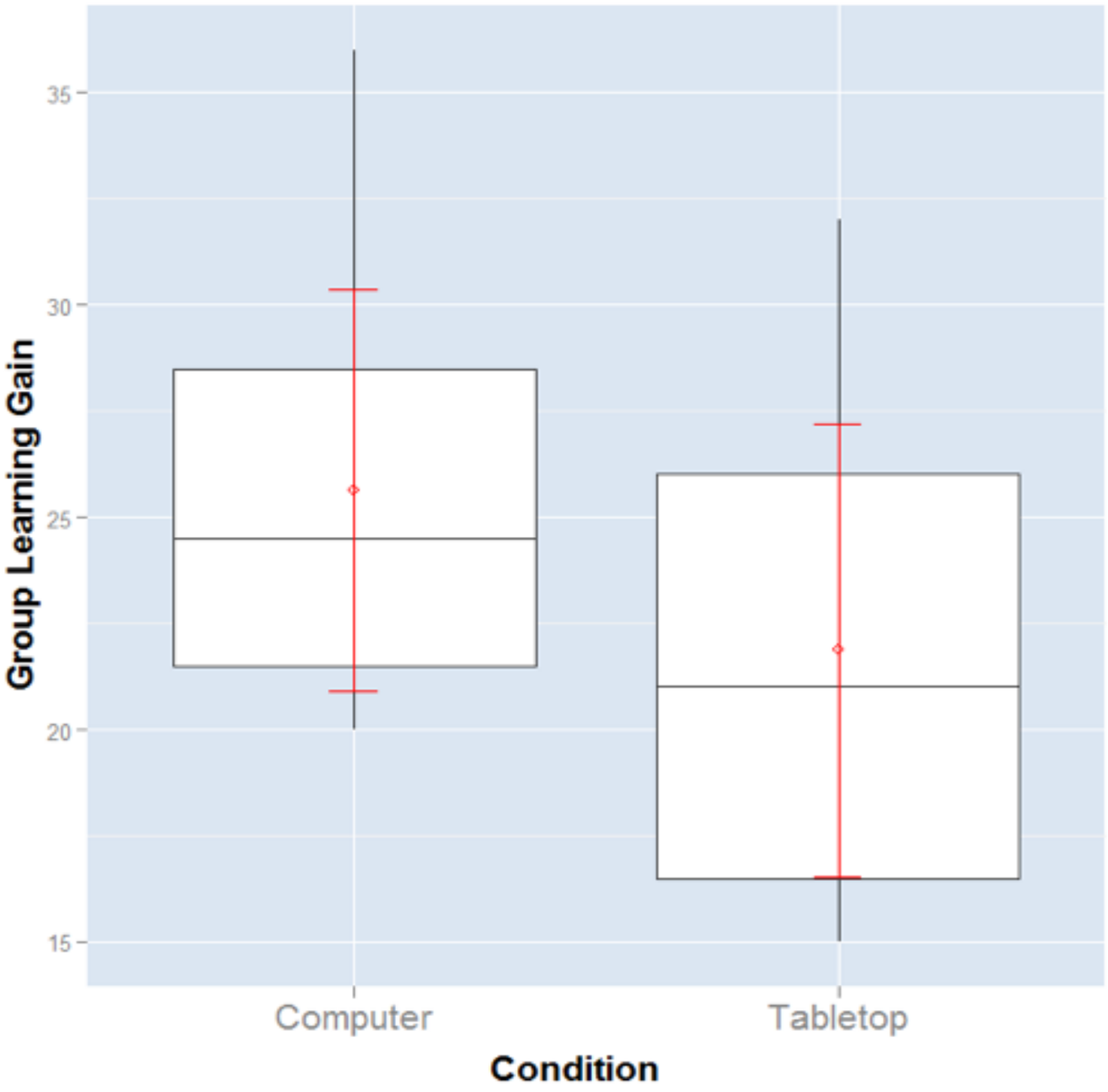


Concept Map: gestures (e.g. cut)

8 teams in the experimental condition

8 teams in the control condition

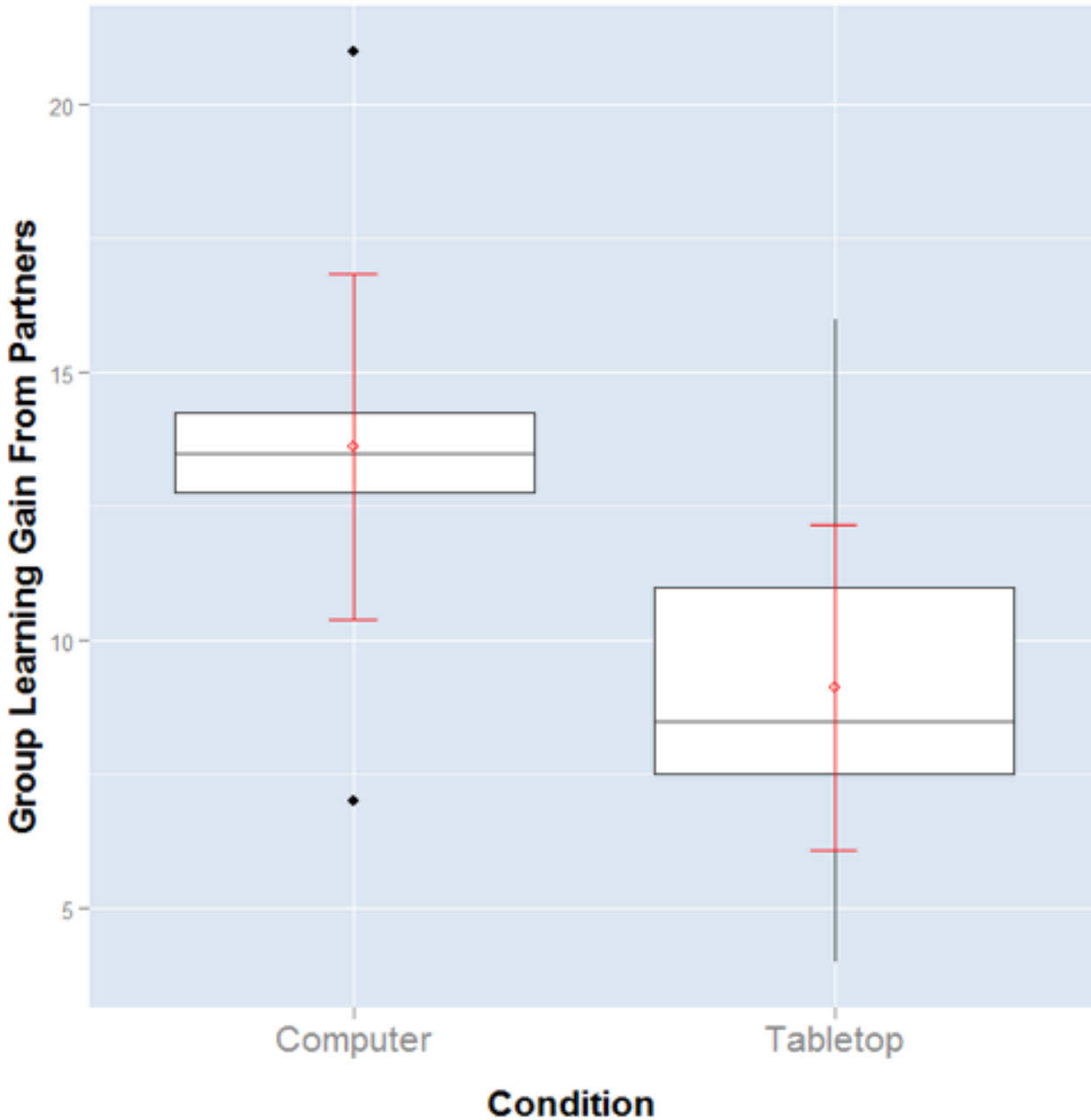
No effect in Learning Gain



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

Son Do Lenh

immersion = f (fidelity)

engagement = f (immersion)

learning = f (engagement)

learning = f (cognitive effort)

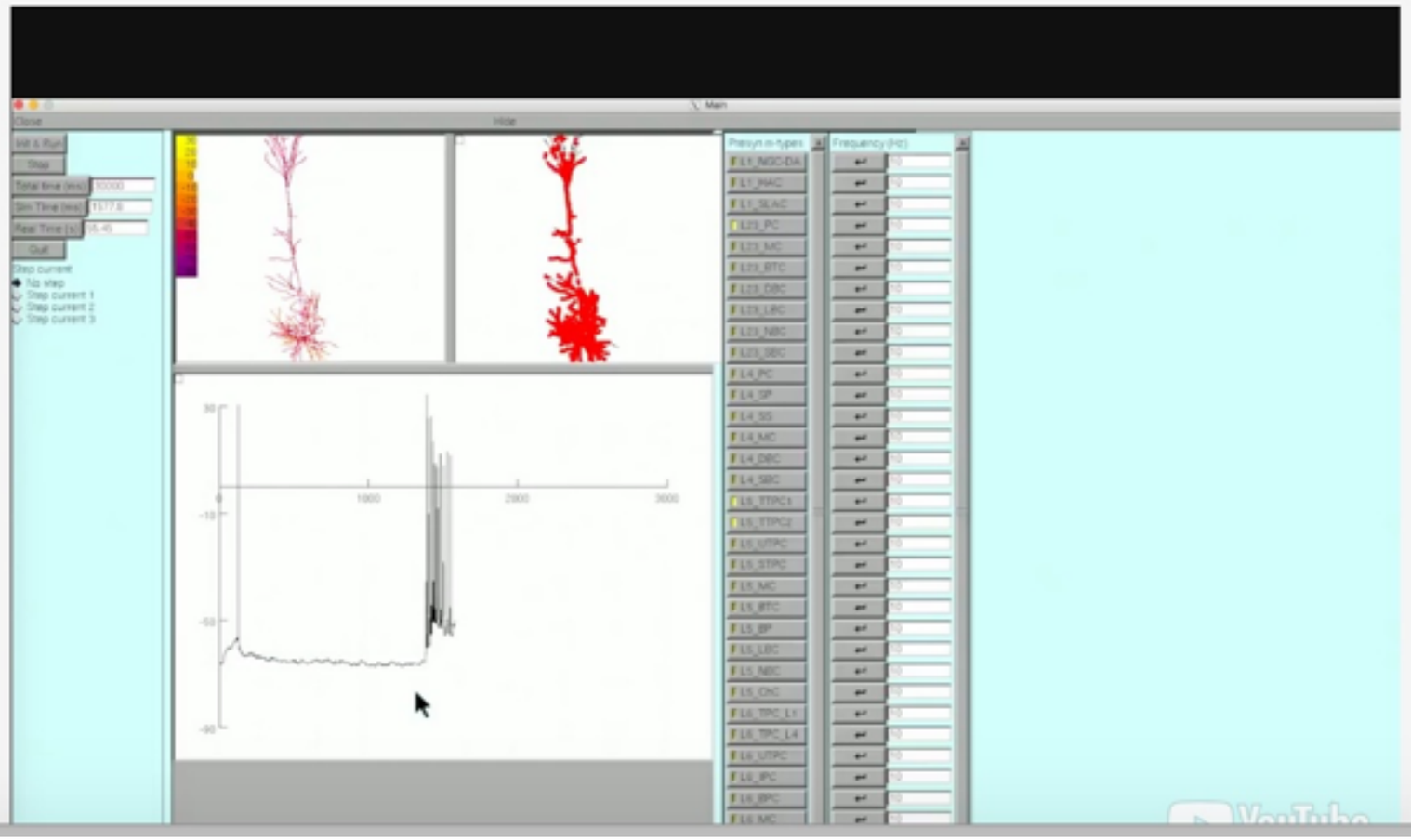
Social (peers, teachers)

Running models on your local computer

VIEW UNIT IN STUDIO

Bookmark this page

Video



that
trace is pretty noisy, because you have
a lot of cells injecting their events to our cell.
So in this case, all these L23PCs are
not strong enough to generate a one on one spike.
So we can actually create some more activity
by also activating all the layer 5 thick-tufted pyramidal cells
that are projecting to this cell, so for example
by activating all of them, you see that now we get a massive
input from pre-synaptic cells onto our cell
and you get a lot of spikes.
In this plot you can also see the voltage changing
while the simulation is running.
So another thing you can do in this interface is to
replicate the traces that are available

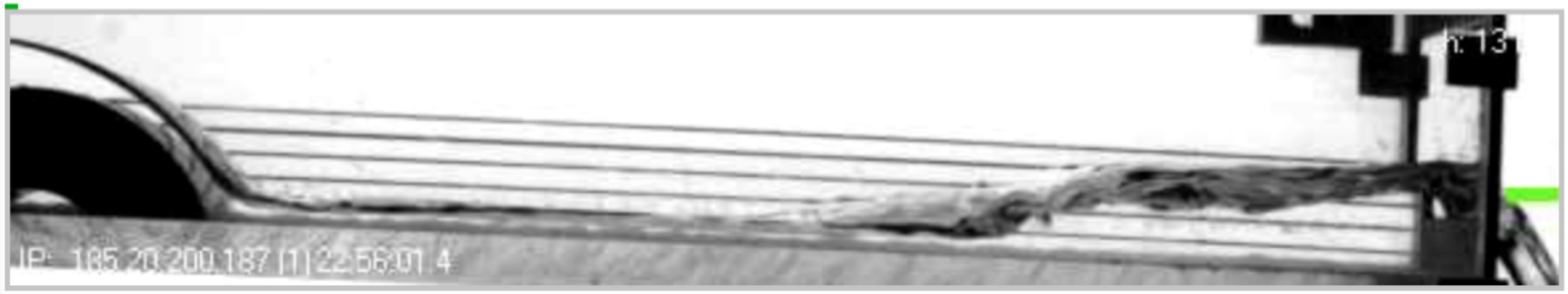
Brain Simulation MOOC (EPFL)

Neuron_Henry_3_B_V3.mp4

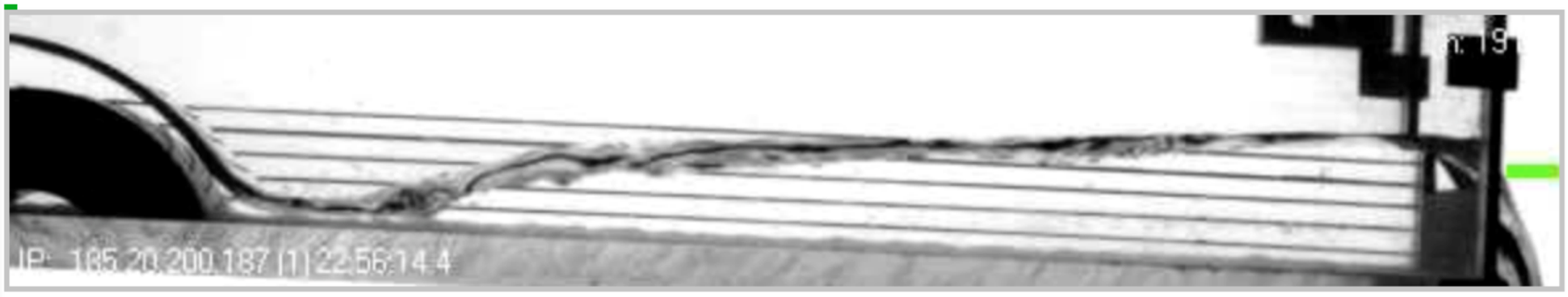
ion Channels – Combination Determines Behavior

Brain Simulation MOOC (H. Markram, EPFL)

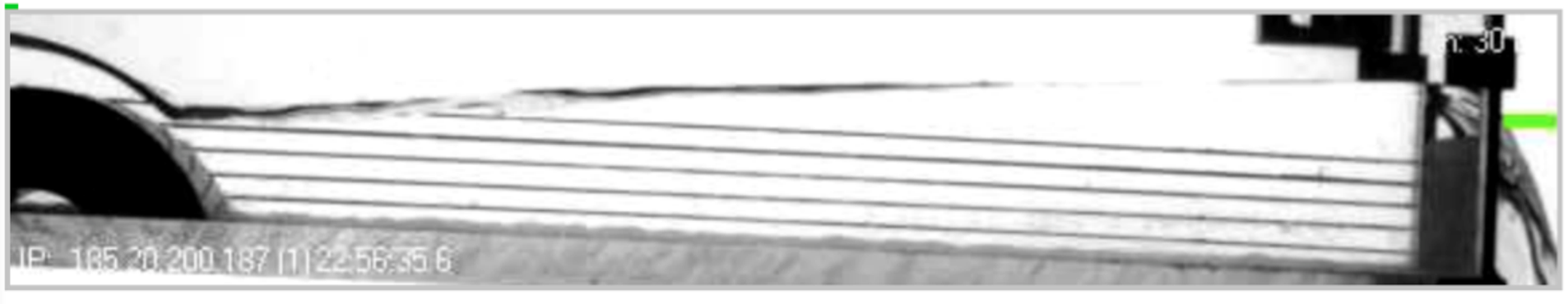
Fluid Dynamics MOOC (F. Gallaire, EPFL)



Position [mm] 13 Set Save



Position [mm] 19 Set Save



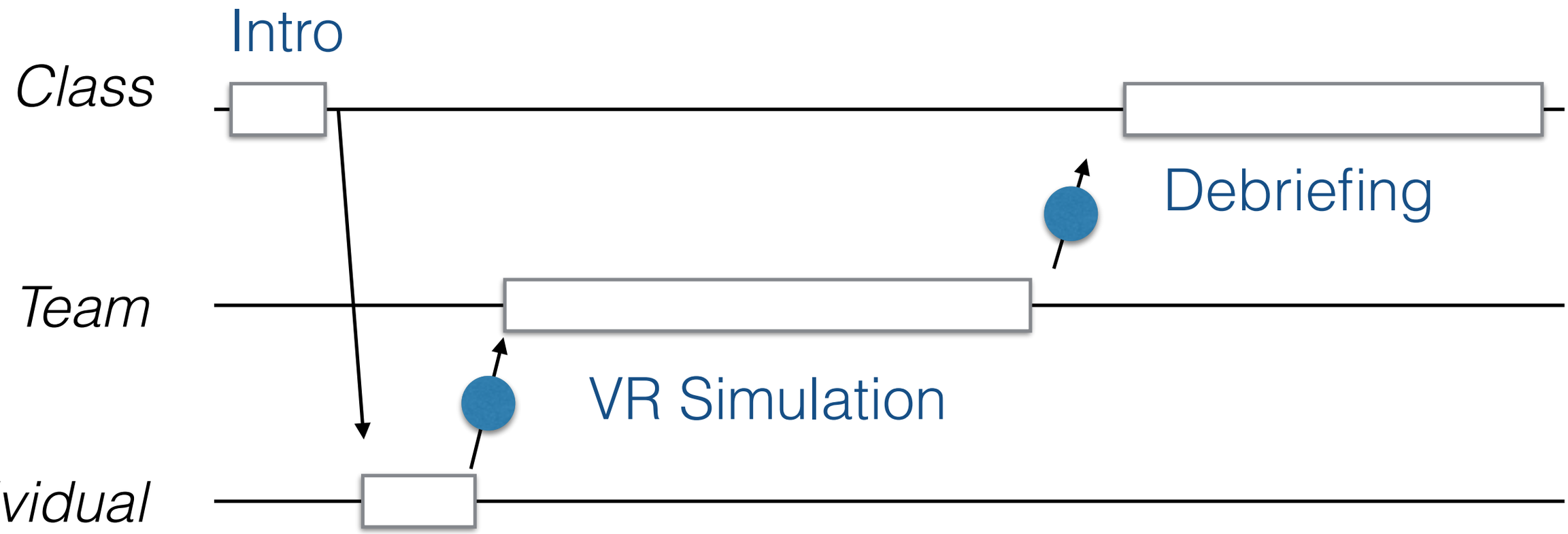
Position [mm] 30 Set Save

Reflect
Predict
Explain
Disagree

Compare
Reformulate
Teach
Summarize
Translate
Lectures

experience

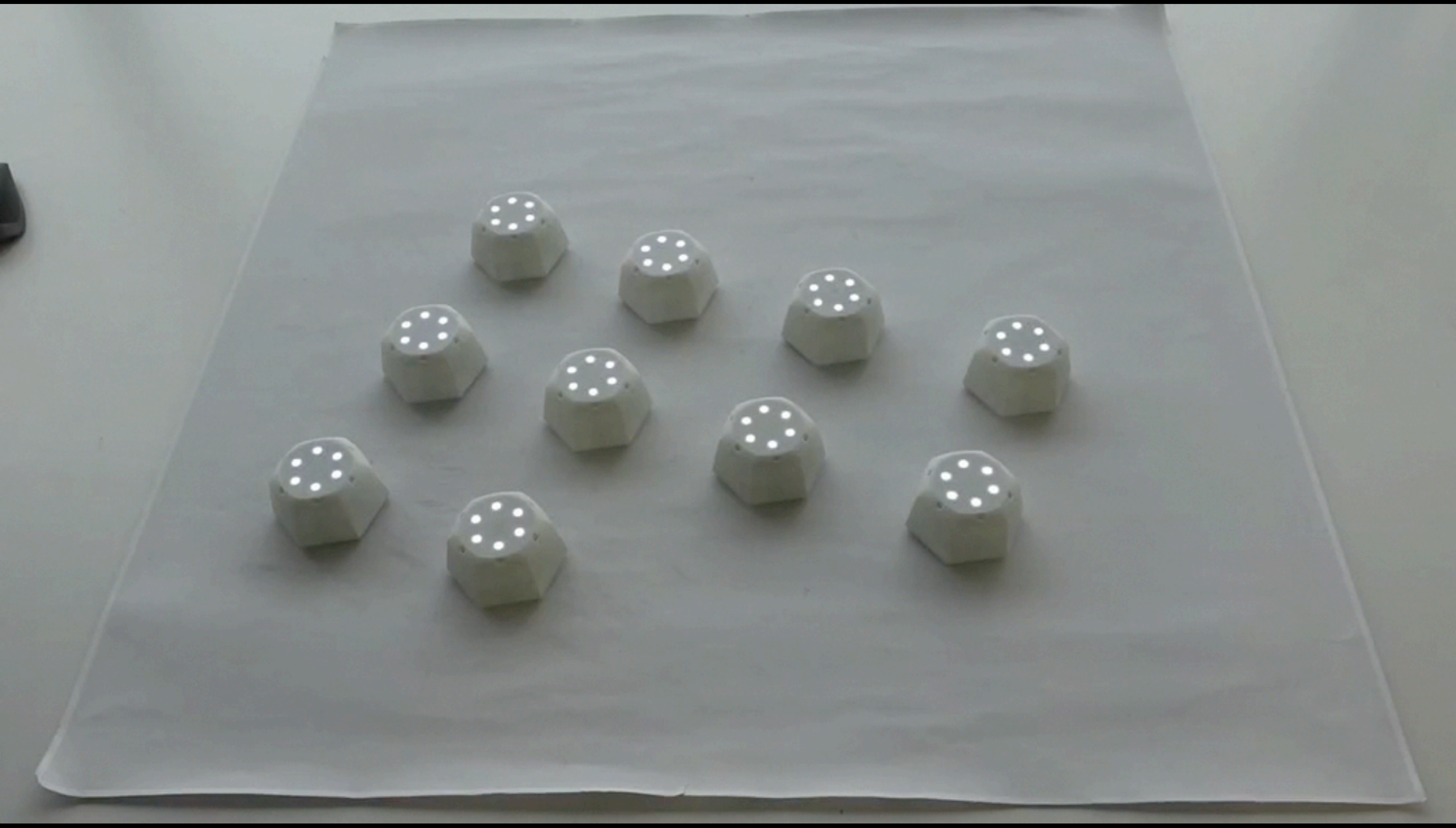
learning



Integrated Scenario
(Orchestration Graph)


MADRID
PARIS
BERN

Cellulo (Ayberk Ozgur, Wafa Johal)



Swarm Cellulo (Ayberk Ozgur, Wafa Johal)

Back to the ‘wow’ effect

does anyone have a iphone-6 charger ?

P. Dillenbourg, EPFL