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# CORDELEC



## A new mechanical analogy to learn electrocinetics

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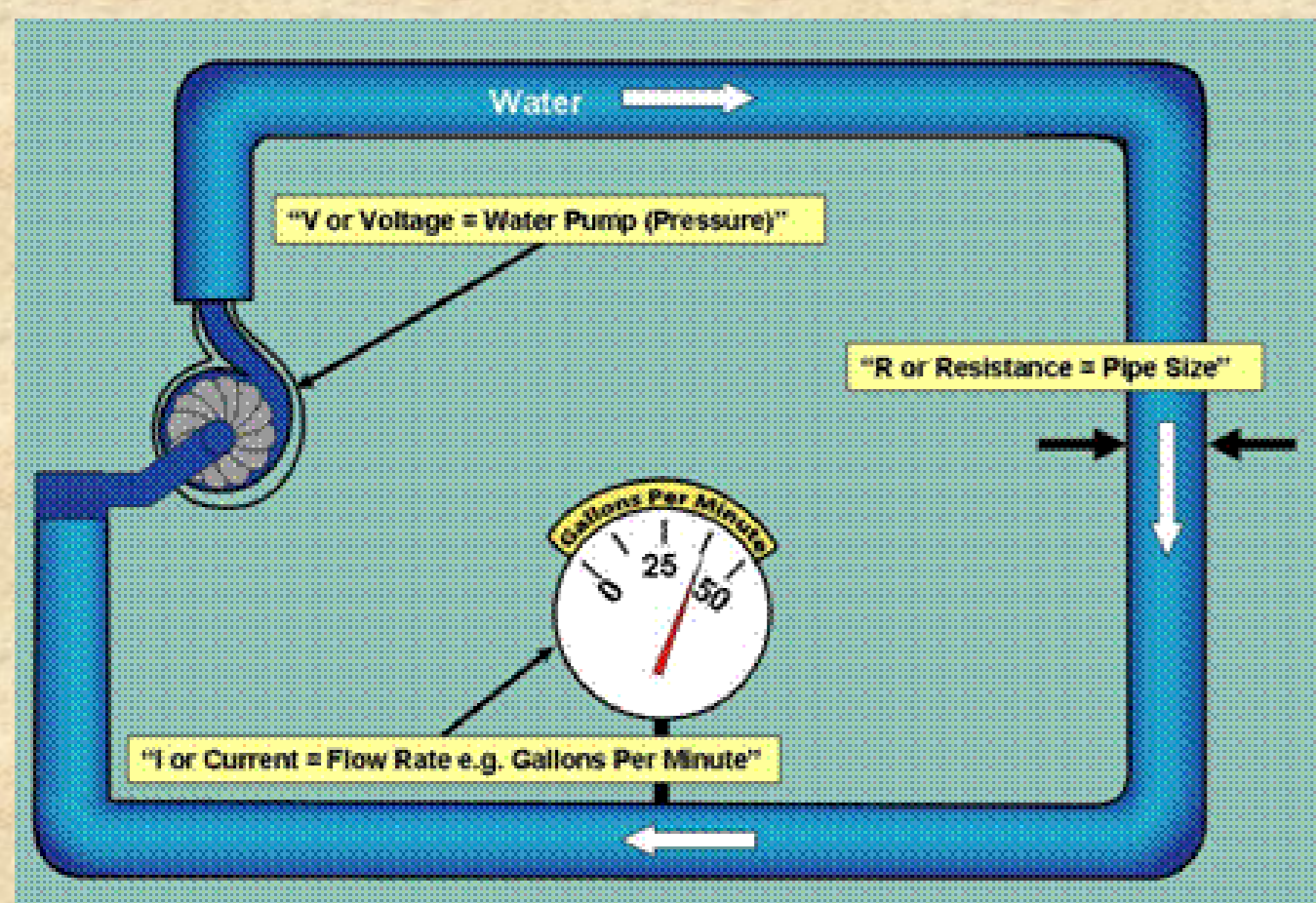
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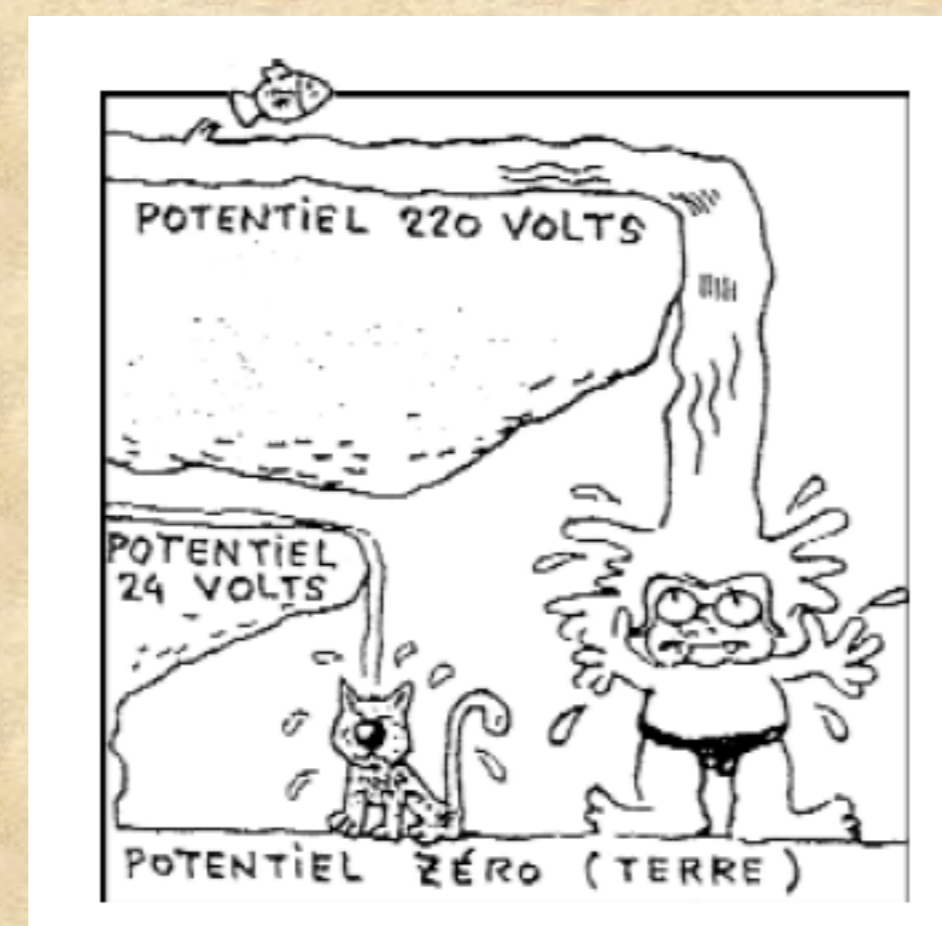
19th Conference of the European Society for Cognitive Psychology (ESCP). 17 – 20 September, 2015 in Paphos, Cyprus

## Previous analogies to teach electricity

### Hydrolic analogies



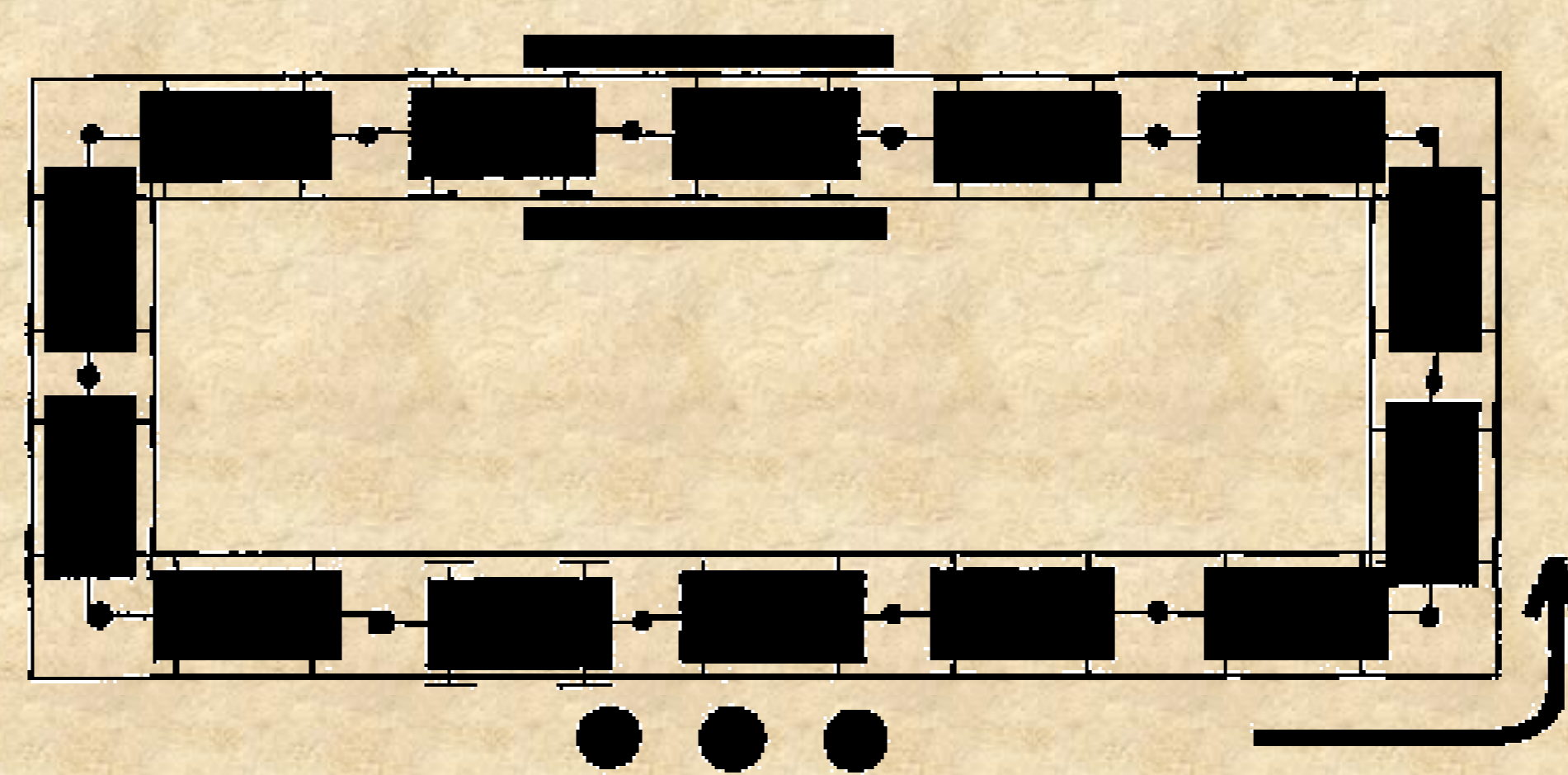
Wrong understanding of fluid pressure principles (Closset, 1992)



Constant amount of current even in the presence of a resistor

### Rail trucks analogy

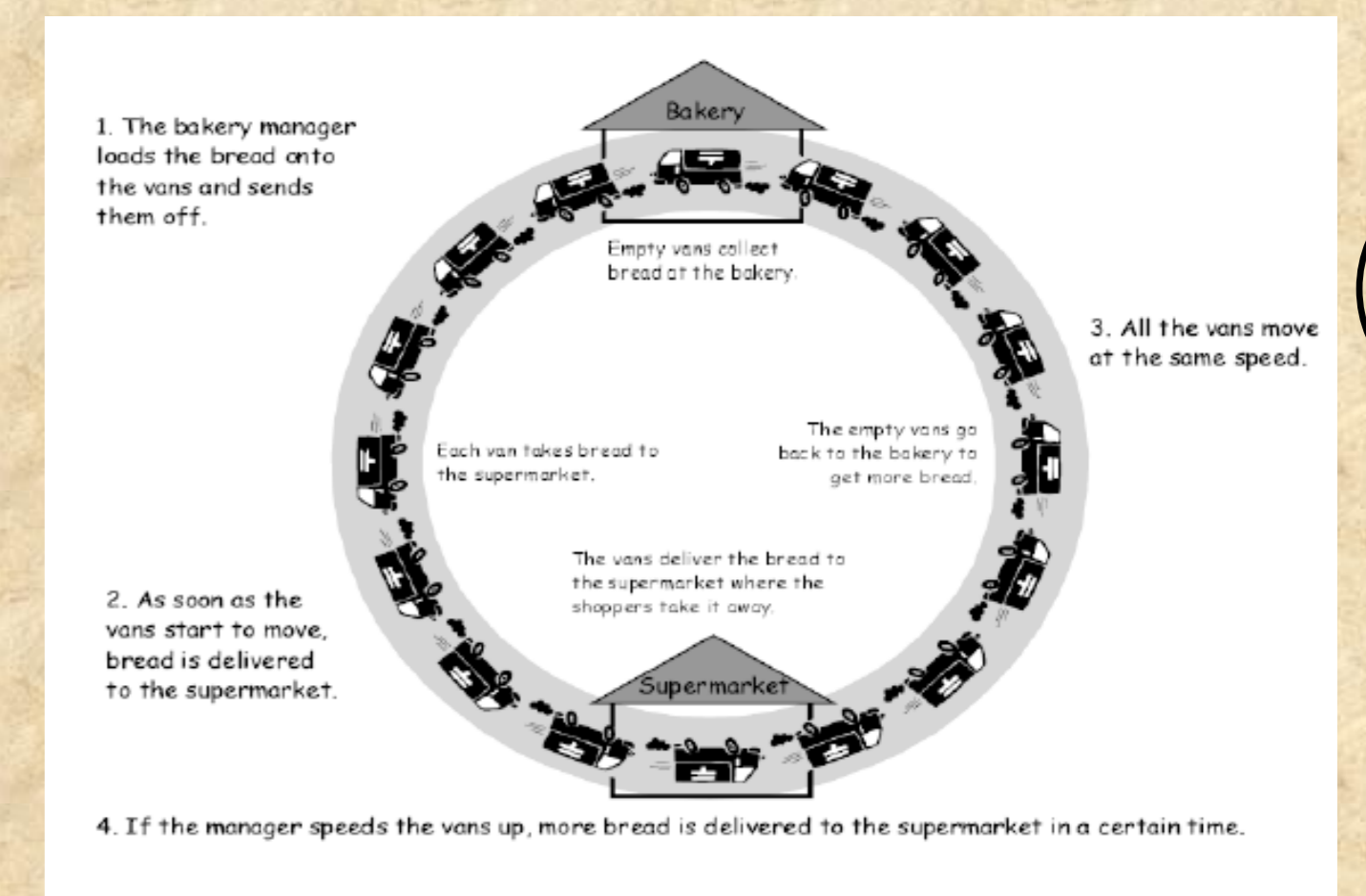
(Joshua & Dupin, 1989)



No difference between voltage and intensity

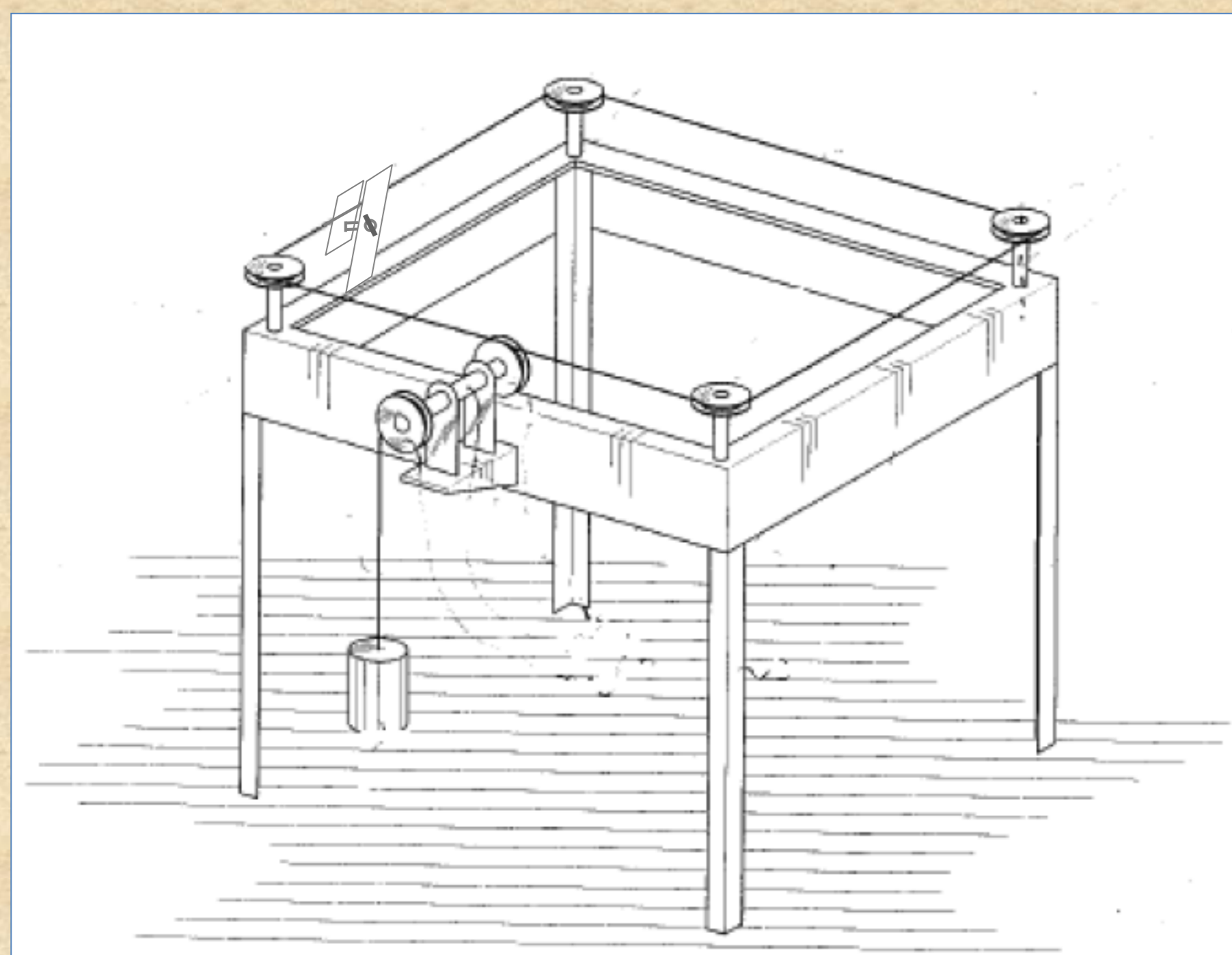
### Vans analogy

(Hind, Leach, Lewis & Scott, 2005)



Substantialization of energy

## CORDELEC\* analogy



### Electricity

Voltage  
Intensity  
Energy of the generator  
Battery strength  
Resistor/Resistance  
Temperature increasing by Joules effect  
Switch

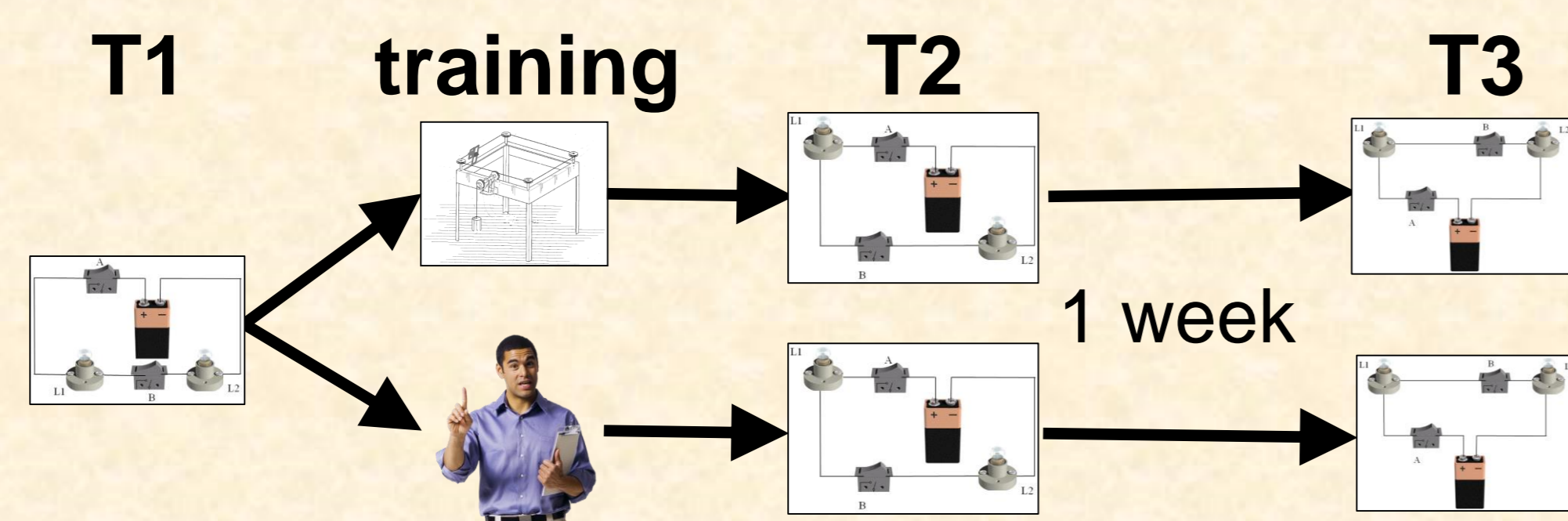
### CORDELEC

Difference in string tension  
Speed at which the string moves/goes round  
Energy of the mass of the mechanical generator  
Weight of the mass  
The string is pinched, causing friction  
Temperature increasing by mechanical rubbing  
Pliers

### Testing CORDELEC

2 groups: Gr. 1 trained with CORDELEC  
Gr. 2 trained without CORDELEC

Participants' knowledge on electrocinetics was tested just before (T1), just after (T2) and one week after (T3) the training.

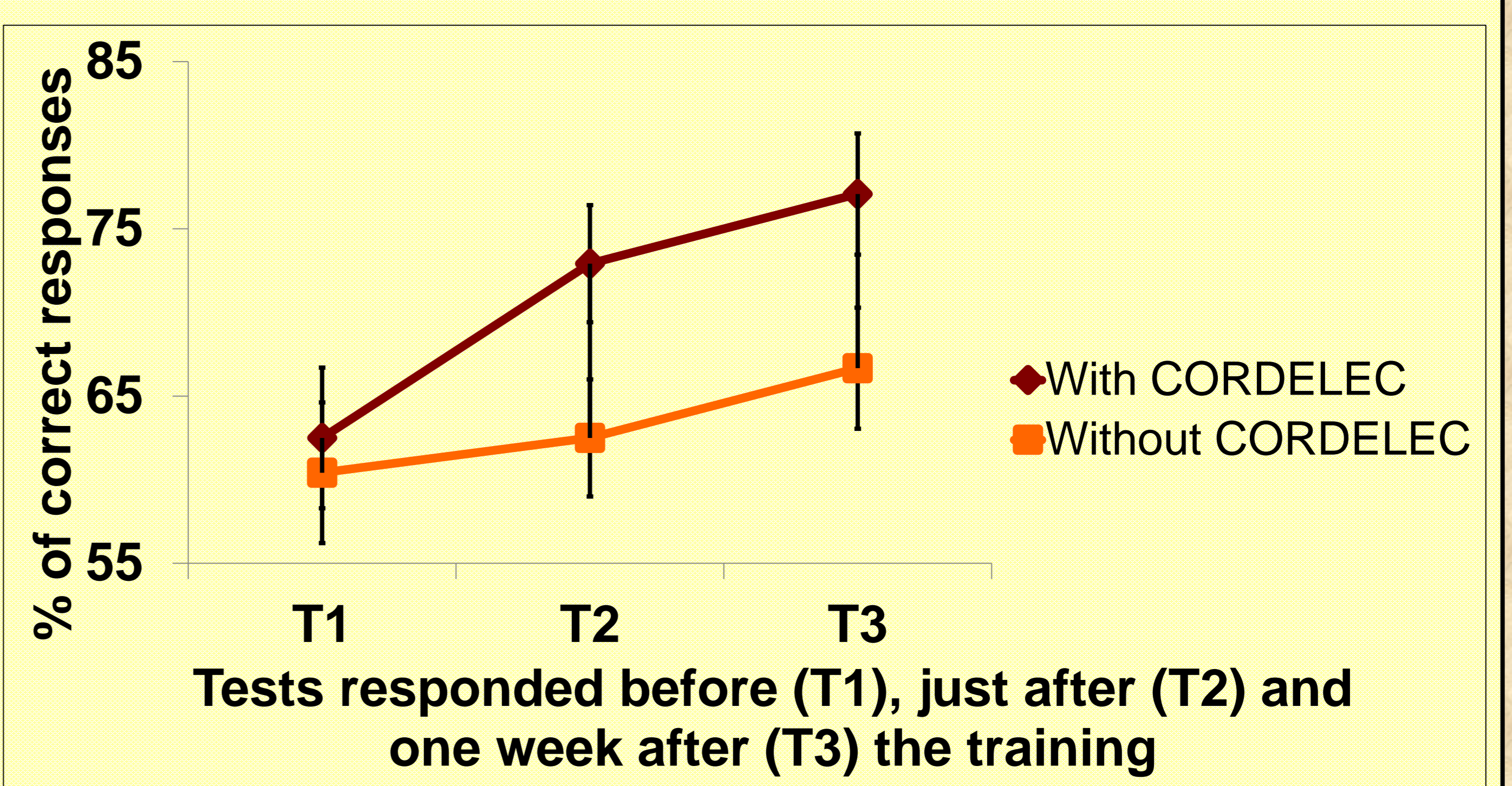


Example of one of the four possible questions:

If you turn on interrupters A and B, which of the following options is correct:

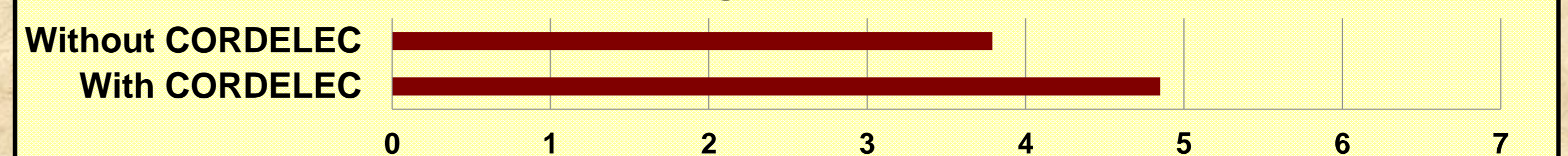
- 1. L2 and L1 will light up at the same time.
- 2. L2 will light up after L1.
- 3. L2 will not light up.

### Results



The answer to the previous example questions typically switched from "2. L2 will light up after L1" to "1. L2 and L1 will light up at the same time".

### Learning Impression



### Discussion

Participants showed a better learning when trained with compared to without the CORDELEC device.  
Participants also switched from a sequential to a systemic reasoning.  
CORDELEC might be a good analogy to teach electrocinetics in schools.

### References

- Closset, J.-L. (1992). Raisonnements en electricité et en hydrodynamique. *Aster*, 14(4), 143–155.
- Hind, A., Leach, J., Lewis, J., & Scott, P. (2002). A teaching scheme delopped from research evidence on student's learning about electric circuits. Retrieved October 30, 2012, from [www.education.leeds.ac.uk/research/cssme/ElecCircuitsScheme.pdf](http://www.education.leeds.ac.uk/research/cssme/ElecCircuitsScheme.pdf)
- Joshua, S. & Dupin, J.-J. (1989). *Représentations et modélisations: le "débat scientifique" dans la classe de l'apprentissage de la physique*. Berne: Peter Lang.

\*technology available for licensing