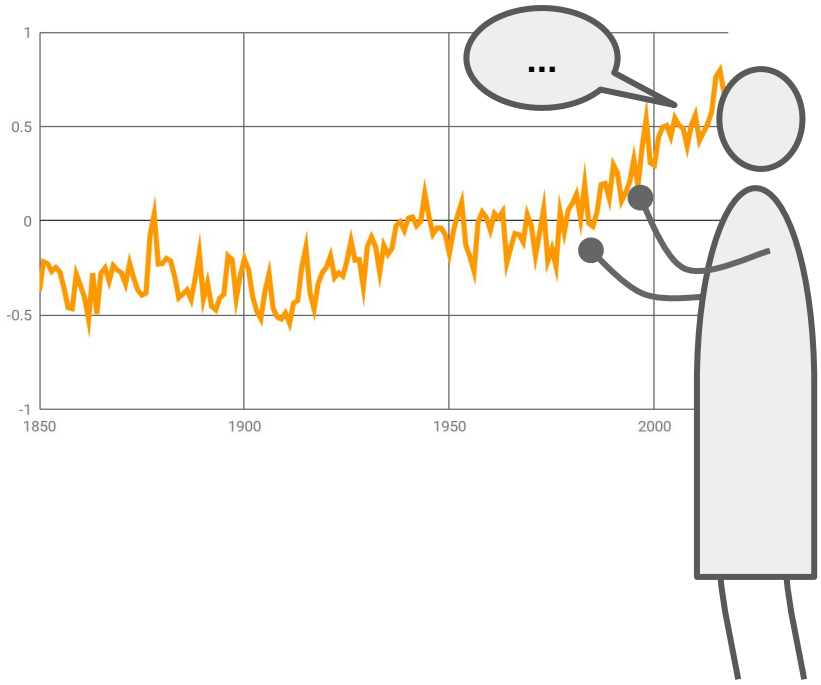
Making Learning Efficient with Visuals



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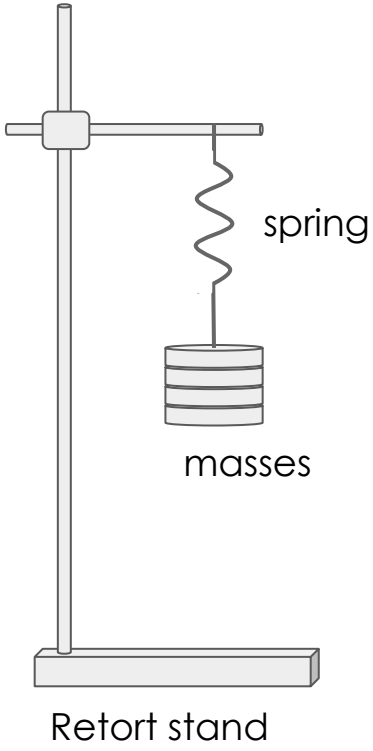
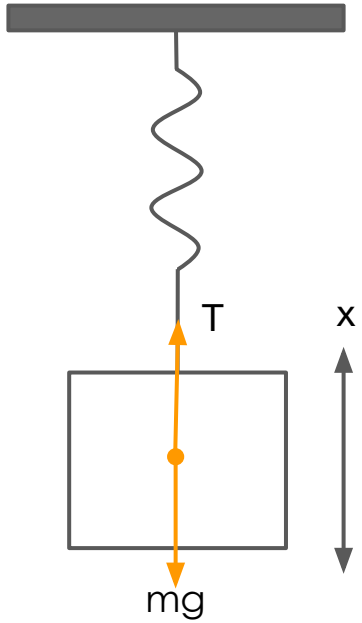
How much detail?

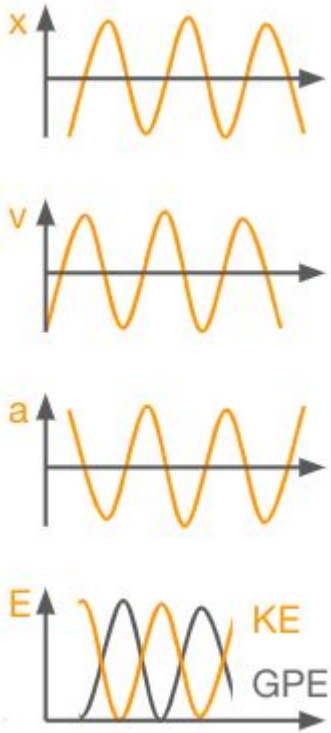
A demo, photo or video shows too much detail for a novice.



This is a **representational visual**: it shows where the parts go.



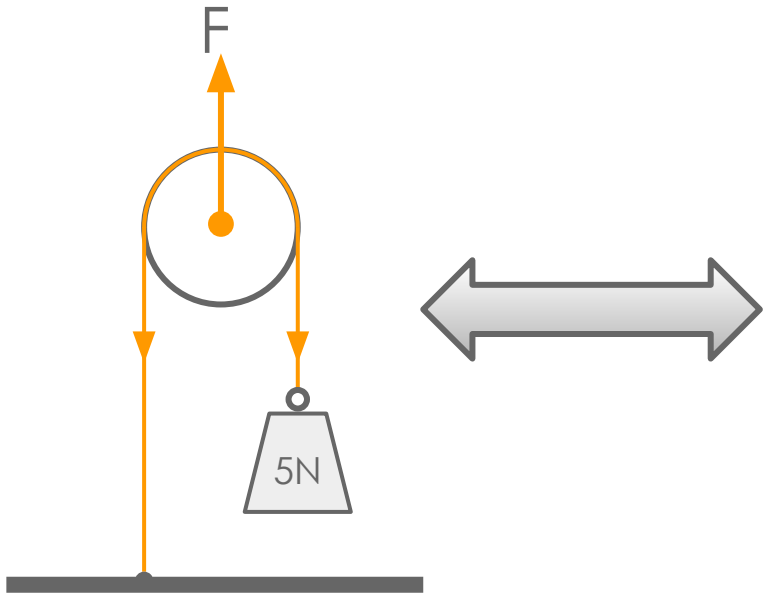
This is an **explanatory visual:** it shows the relationship between parts.



What we really want the learner to ‘see’.

Computational Efficiency:

Diagrams for solving problems: Larkin and Simon (1987)



One end of a rope is secured to the floor while the other end is passed through a pulley directly above. The free end of the rope is attached to a 5N weight. The weight is suspended by the rope.

What is the size of the force required to suspend the pulley?

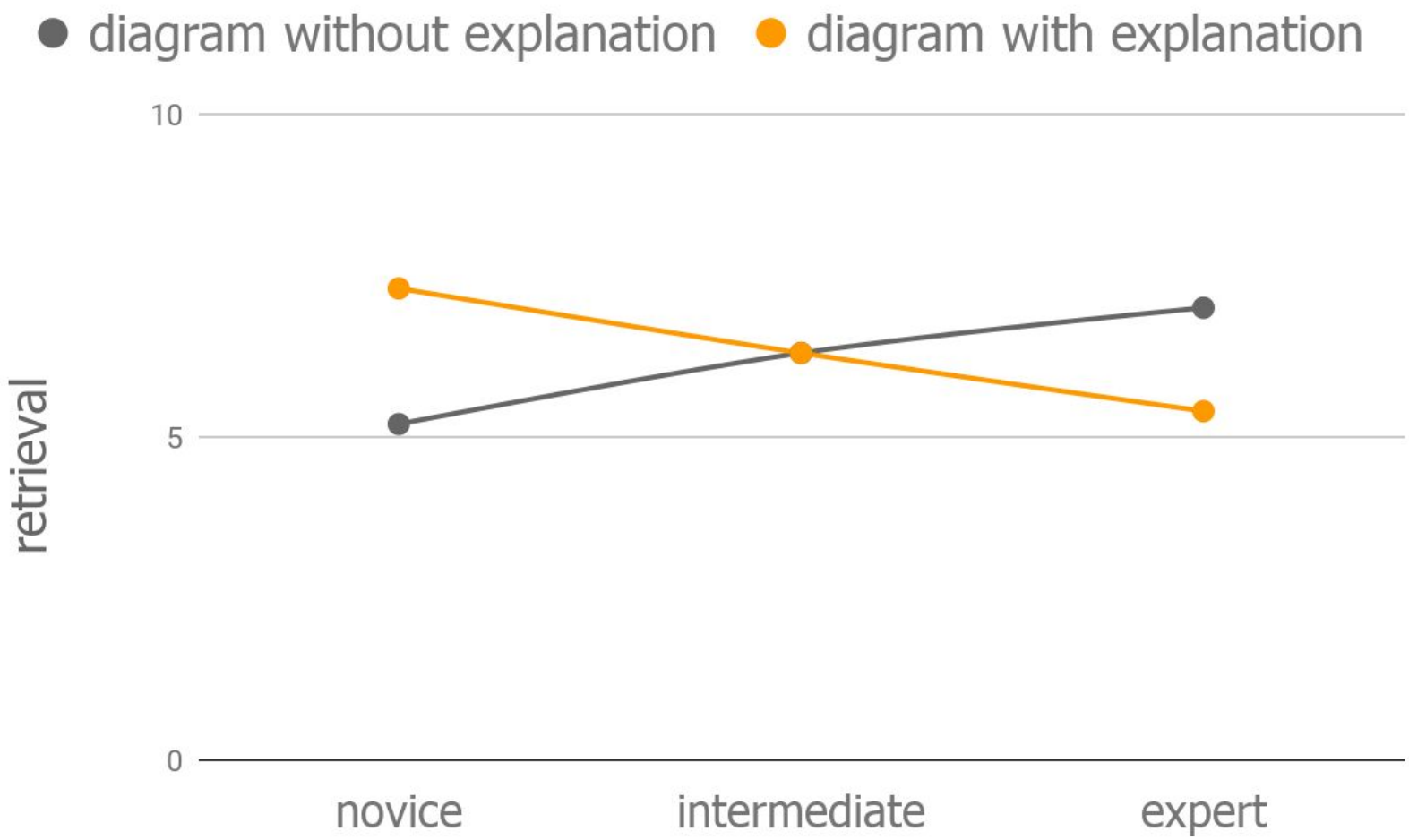
Search

The diagram requires less **search** to find the relevant details. It takes less time and cognitive effort to search for information.

Inference

The text causes the problem-solver to **infer** the positions of the pulley and rope causing additional cognitive load.

Should I explain my visual?



Source: Kalyuga, Chandler and Sweller (2000)

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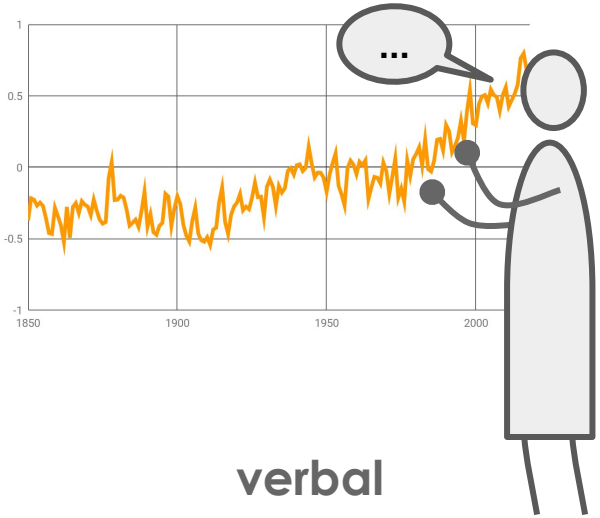
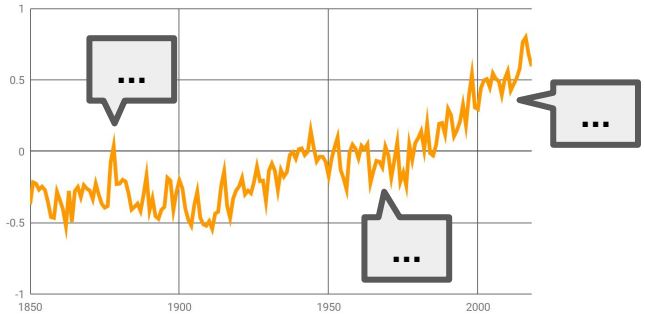
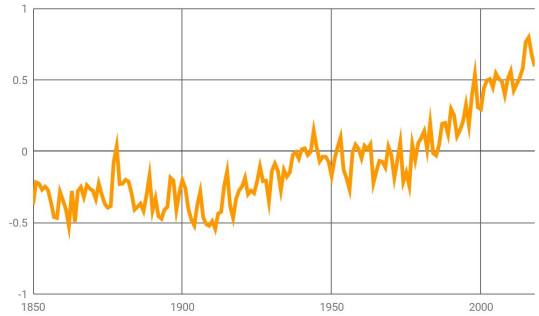
How should I explain my visual?



verbal

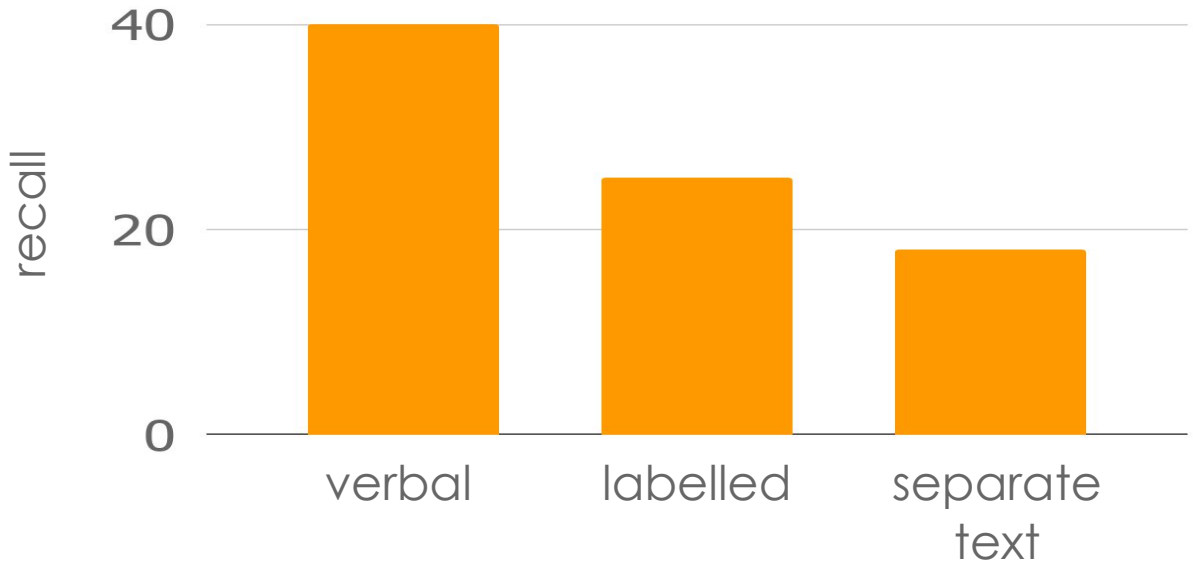


labelled



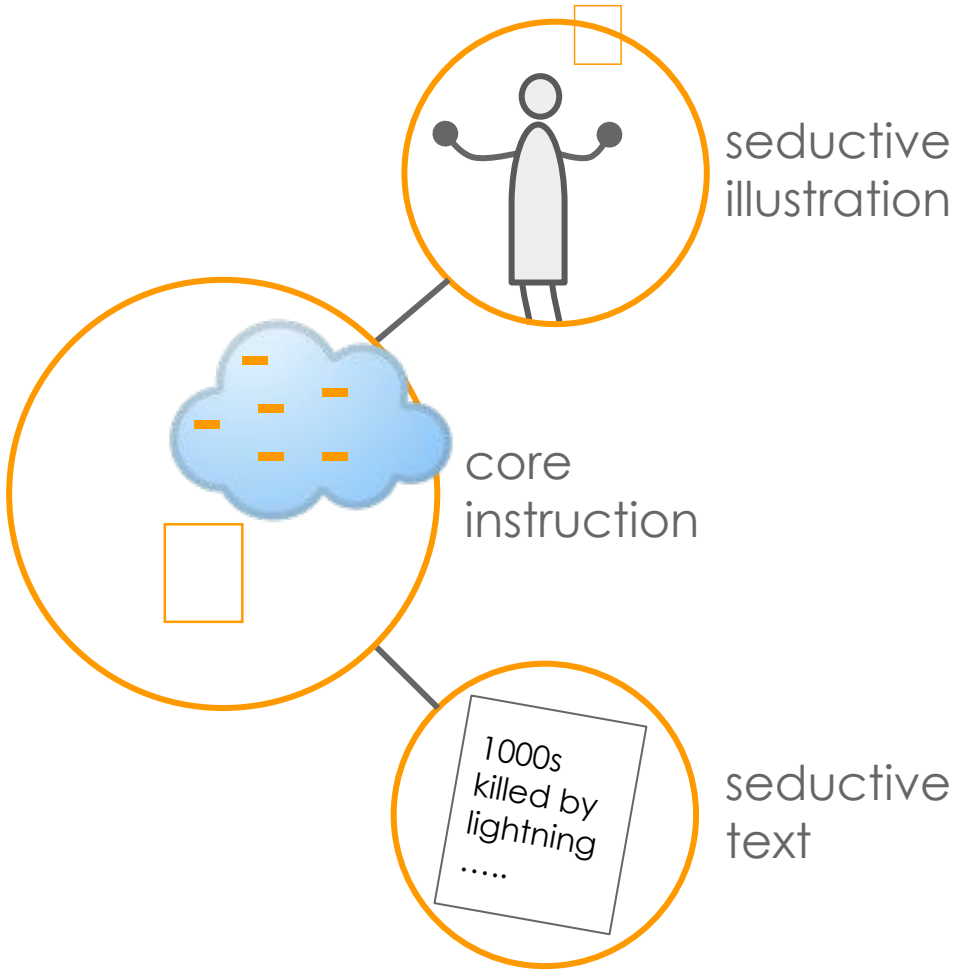
This chart shows the temperature level rise over the past 170 years. Scientists say this is at least in part attributable to human activity - the artificial increase in CO_2 levels globally.

separate text

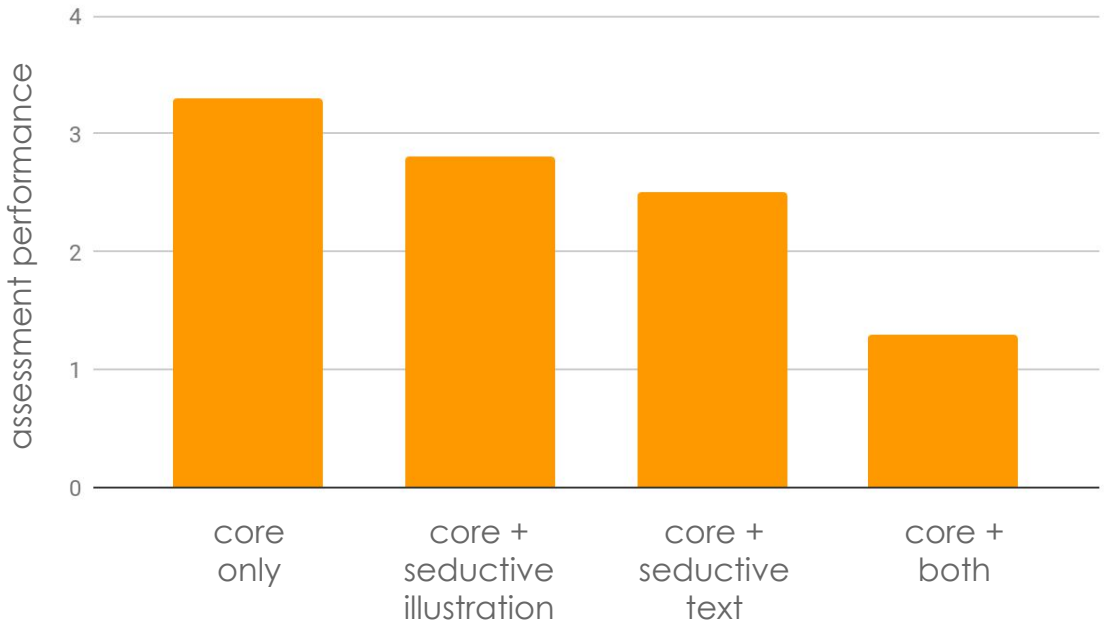


Source: Moreno and Mayer 1990

Should I add 'seductive' details?



Adding detail intended to motivate and engage has a detrimental effect on learning.



Source: Harp and Mayer 1997

References and further reading

Efficiency in Learning: **Clark, Nguyen and Sweller** (2006)

Dual Coding with Teachers: **Caviglioli** (2019)

A Split-Attention Effect in Multimedia Learning: Evidence for Dual Processing Systems in Working Memory: **Moreno and Mayer** (1990)

How Seductive Details Do Their Damage: A Theory of Cognitive Interest in Science Learning: **Harp and Mayer** (1997)

Incorporating learner experience into the design of multimedia instruction: **Kalyuga, Chandler and Sweller** (2000)

Why a Diagram is (Sometimes) Worth Ten Thousand Words: **Larkin and Simon** (1987)