Using a Recognition Memory Test to Measure Expert-Novice Differences in the Encoding of Physics Diagrams

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Physics Education Research

Diagram pairs that include a physics difference

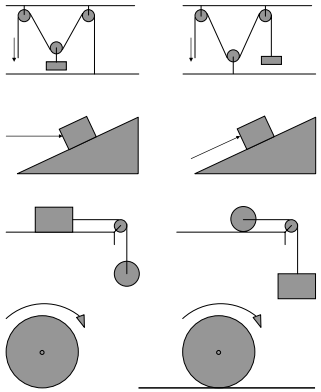
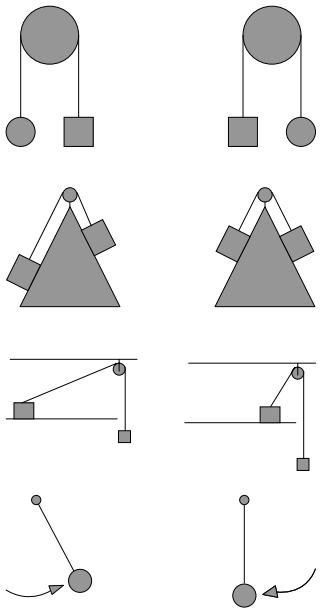


Diagram pairs that differ on surface features only



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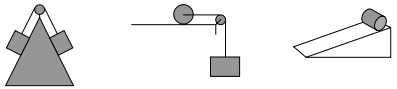
Method:

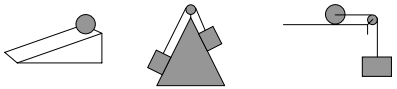
Study-portion

- Subjects shown a slideshow of 20 diagrams
- Each diagram shown for 10 seconds
- Subjects give a short verbal description



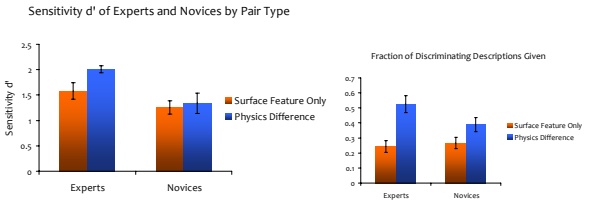
Test-portion

- Subjects shown either the same diagram or the other diagram from each pair
- Subjects respond "old" or "new" to each diagram shown

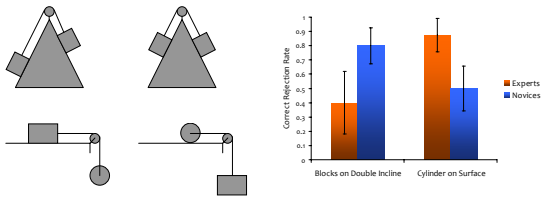


Results:

- Novices perform equally well on the two types of diagram pairs
- Experts perform significantly better on pairs that include a physics difference



Notable Pairs:



Signal Detection Theory :

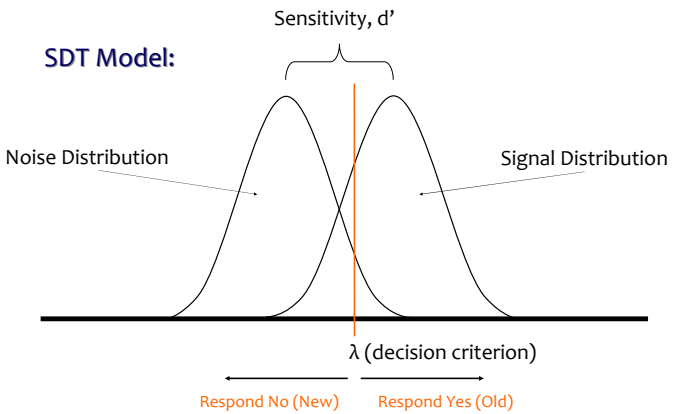
- SDT is widely used to measure performance in recognition memory tests
- By using both the Hit rate and False Alarm rate, a measure of sensitivity, d', is not dependent on a subject's tendency to answer "old" or "new" when unsure of the answer

		Picture on test:	
		New	**Old**
Subject's answer choice:	**New**	Correct Rejection (CR)	Miss
	Old	False Alarm (FA)	Hit

- The four possible outcomes for a single trial of the recognition memory test

- For a complete introduction to SDT, see: T. D. Wickens, *Elementary Signal Detection Theory* (Oxford University Press, New York, 2002).

SDT Model:



- Changing the decision criterion, λ, can affect the percentage of correct responses, but the underlying ability of the observer to distinguish between signal and noise is not affected by the placement of the decision criterion