

Linking Intuition to Embodied Experience: The Case for Regaining Balance

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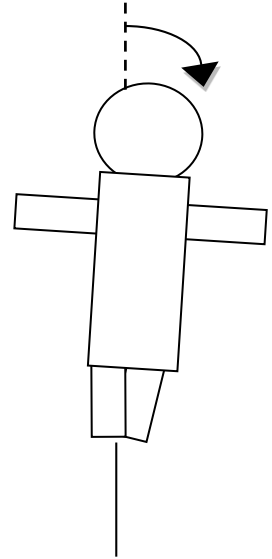


Physics Education Research

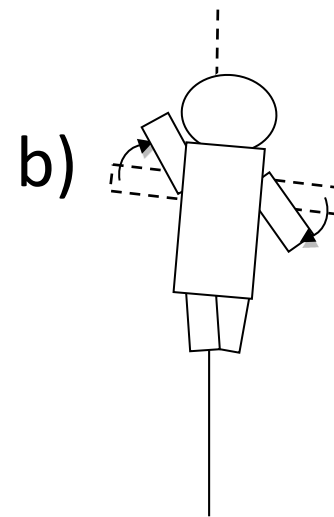
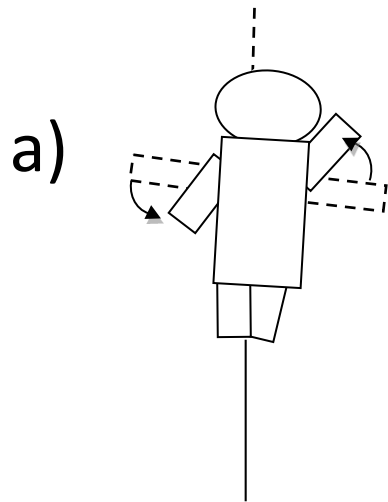
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Let's start with a question for the audience

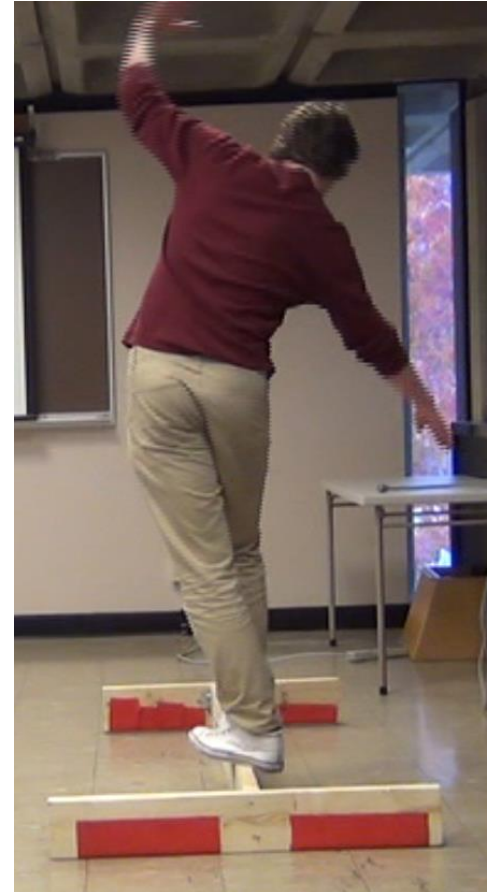
A person is balancing on a balance beam. You're looking from behind so that both of you are facing the same direction. The person starts to fall to the right as indicated in the diagram.



Which way does the person need to swing their arms to regain balance?



In case you haven't figured it out...this is a study about balancing on a balance beam



Theoretical perspective: Embodied Cognition

- Embodied cognition is a theory suggesting that conceptual understanding is grounded in embodied experiences and that the relationship between the body and the external world is central to processes of thinking and reasoning
- The BIG QUESTION we were interested in investigating:
Is intellectual knowledge linked to embodied knowledge for balancing on a balance beam?



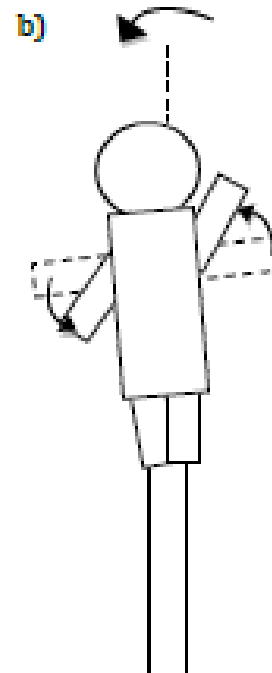
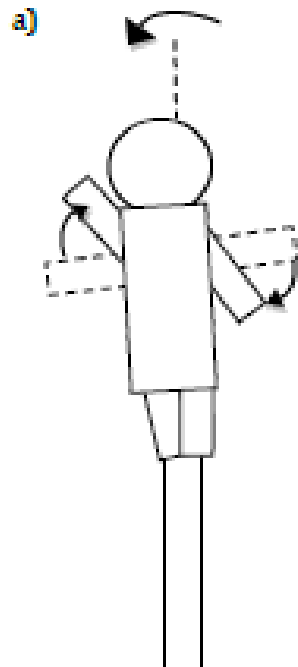
More specifically:

- Can people correctly recall which way their arms swing to regain their balance after doing a balancing activity?
- Does asking a question that elicits intellectual knowledge **BEFORE** doing a balancing activity affect individuals' ability to correctly recall which way their arms swing to regain their balance?
- Does asking a question that elicits intellectual knowledge **AFTER** doing a balancing activity, but **BEFORE** recall affect individuals' ability to correctly recall which way their arms swing to regain their balance?



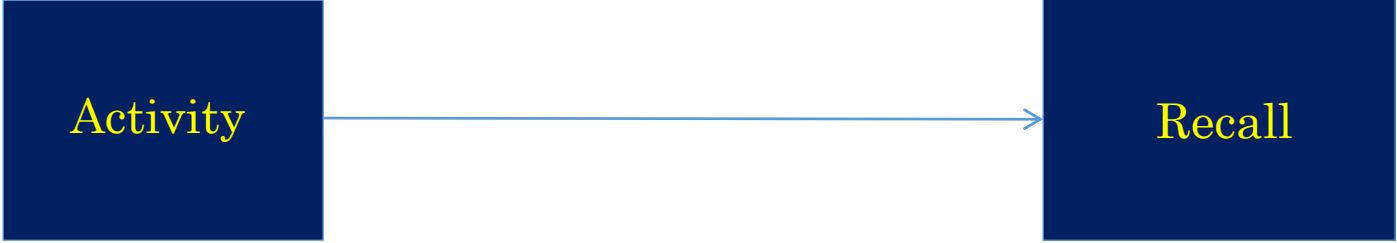
Recall question

You were just on the balance beam. The diagrams below show a view from the back. At one point, you started to fall to the left. When that happened, which way did you swing your arms to maintain your balance?



Experimental Procedure: 3 conditions

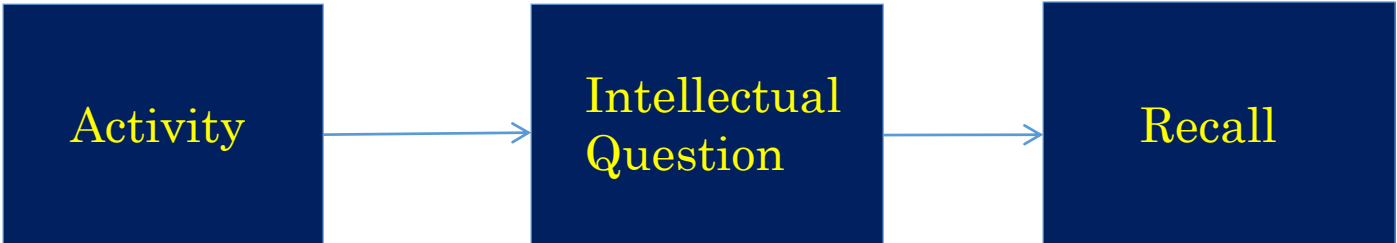
Balance
Only



Intellectual
First



Balance
First

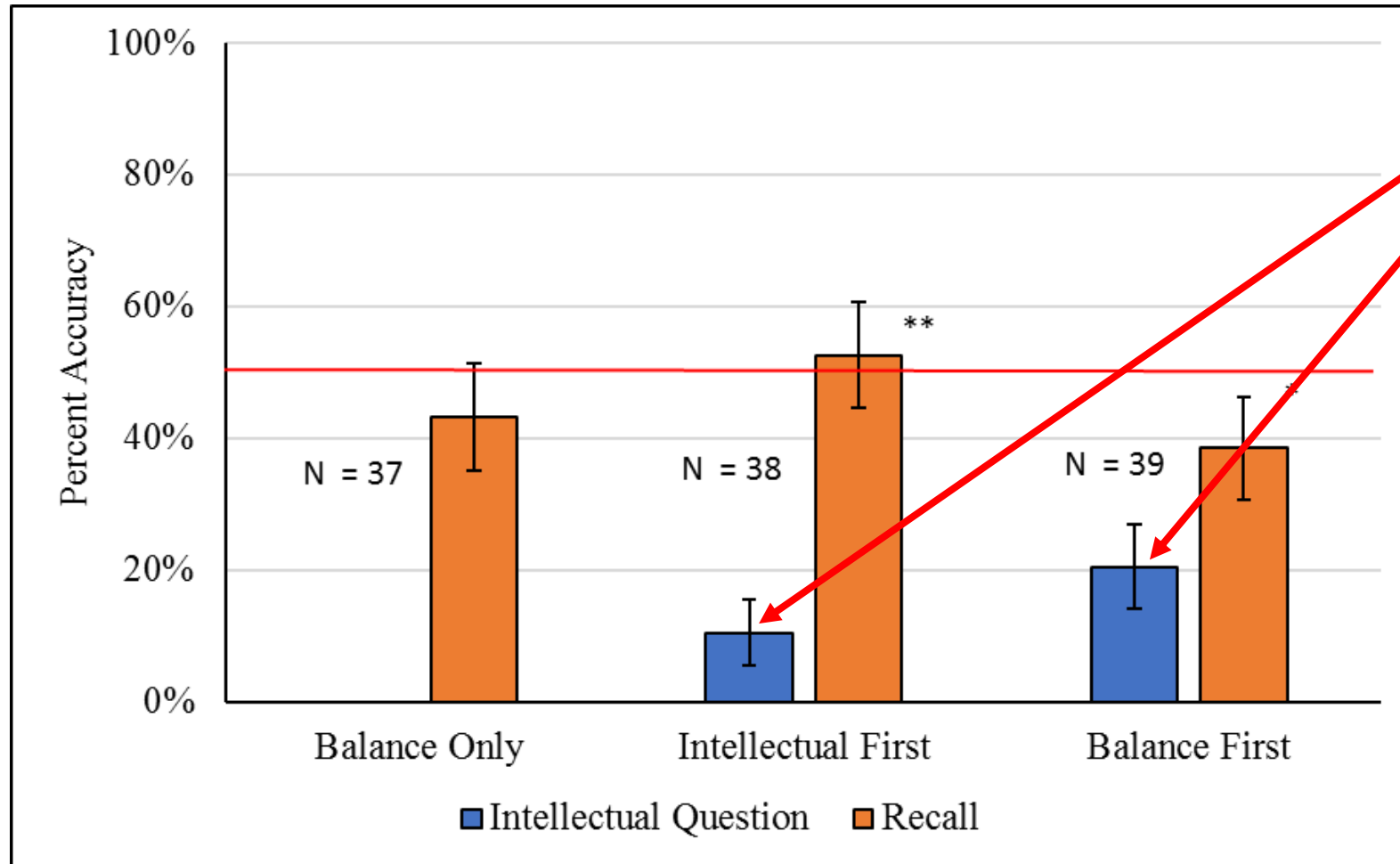


Subjects: 114 physics-naïve participants from the ed psych pool



Results

Accuracy at answering intellectual and recall questions



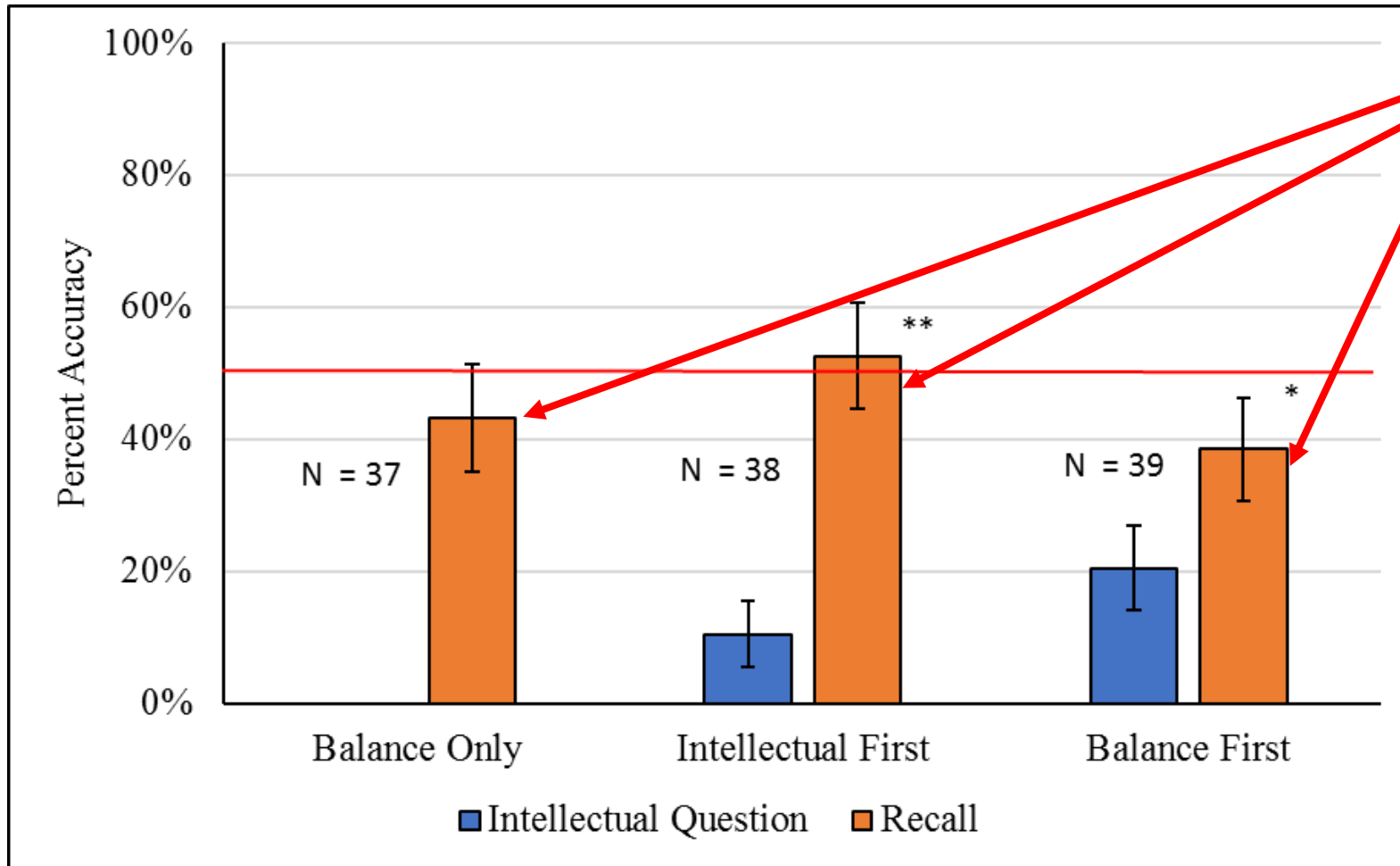
Intellectual performance sucks!

Note: There are no significant differences between the groups, however there are significant differences within the intellectual first and balance first groups.



Results

Accuracy at answering intellectual and recall questions

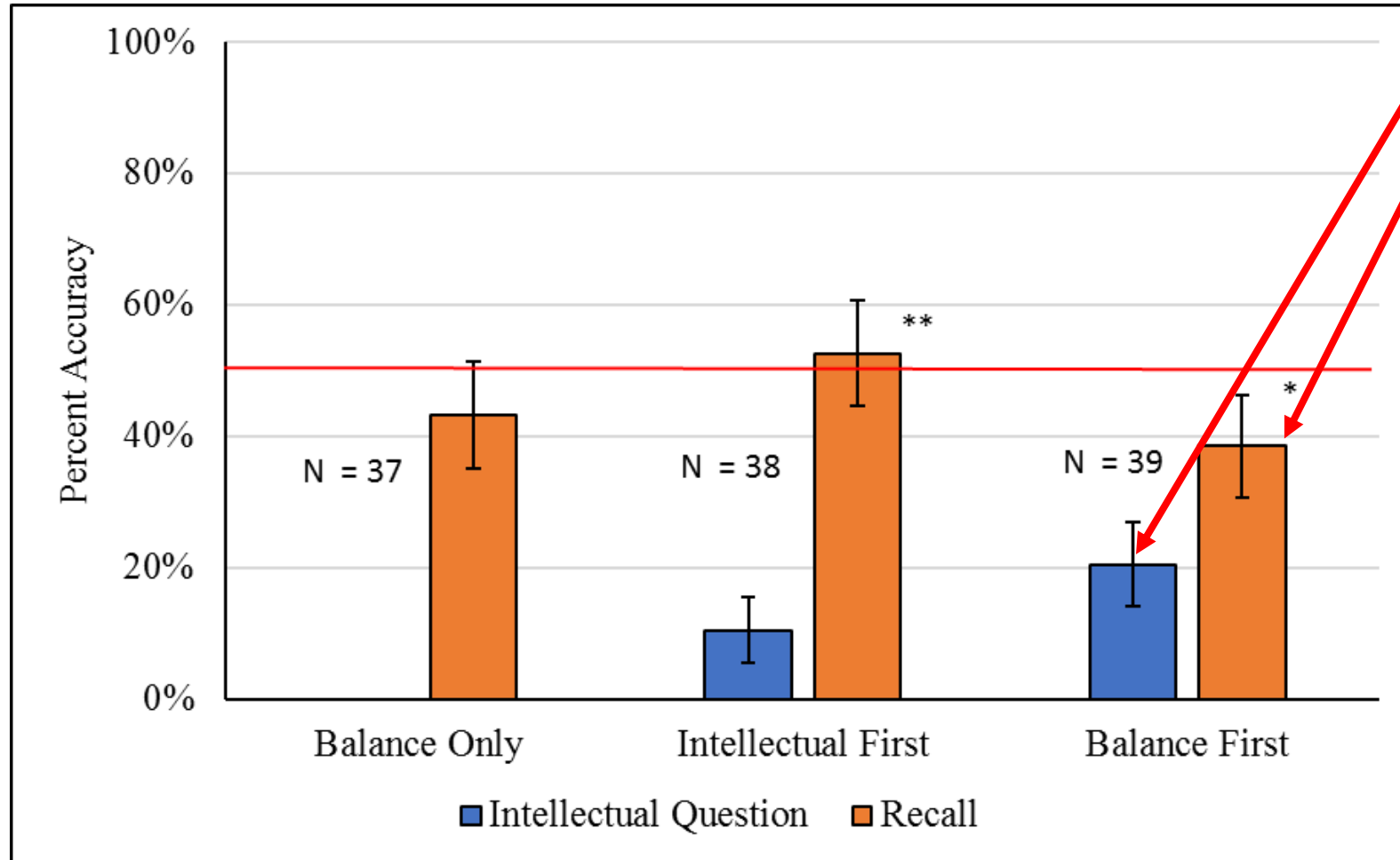


Recall performance, while a lot better than intellectual performance, is ~50%--random guessing!



Results

Accuracy at answering intellectual and recall questions



~19% difference in asking “same” question back-to-back.



Conclusions

- BIG QUESTION: Is intellectual knowledge linked to embodied knowledge for balancing on a balance beam?
Answer: Not according to our data (blue and orange bars significantly different)
- Can people correctly recall which way their arms swing to regain their balance after doing a balancing activity? **Answer: At the random level, yes (~50% accurate)**
- Does asking a question that elicits intellectual knowledge **BEFORE** doing a balancing activity affect individuals' ability to correctly recall which way their arms swing to regain their balance? **Answer: Not really—they do slightly better at recall (~8%) than not asking the question, but recall still at random level**
- Does asking a question that elicits intellectual knowledge **AFTER** doing a balancing activity, but **BEFORE** recall affect individuals' ability to correctly recall which way their arms swing to regain their balance?
**Answer: Yes, it somewhat adversely affects their ability to recall.
It's as if intellectual and embodied knowledge are competing.**



Future Directions

- We plan to study the role of imagery in recall.
- We plan to explore whether asking the intellectual question first prior to observing a video of somebody losing their balance on a balance beam affects people's ability to report accurately the direction of arm-swing movement they witnessed.

