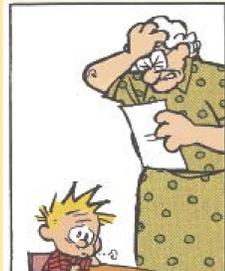


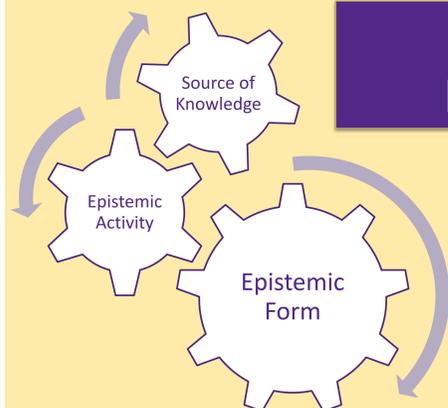
A Challenge for Physics Assessment

When students complete assessments, they often do so in ways that seem absurd. *from the perspective of instructors/researchers.*¹



Our Theoretical Claim: Connecting Epistemic Resources and Framing to Assessment Features

1. Assessment features send epistemological messages about which specific knowledge-building resources are appropriate to use.
2. This shift in resources can result in a shift of frame.



Our Hypothesis

Students are sensibly engaging in the assessment based on their understanding of what they are supposed to be doing, i.e. their framing.¹

Demonstrating the Plausibility of Our Theoretical Claim



“...Assume the Ferris wheel is rotating with angular velocity ω and the diameter of the wheel is D . At what point in the motion does the rider feel ‘heaviest’ and ‘lightest?’”

Statement- Lisa	Resources
Consider a Ferris Wheel... a nice colored picture, wow. A Ferris Wheel is this thing. The seat can freely rotate. Assume the wheel is rotating. At what point in the motion does the rider feel heaviest and lightest? Um... (picks up equation sheet) Where's centripetal force? (Writes down centripetal force equation) Hm... (looks at problem)	Nature of Knowledge: Propagated Source of Knowledge: Problem and Equation Sheet Epistemic Activity: Accumulating Epistemic Form: Number
...not given any numbers. It's just weird to me because it seems like nothing is changing. I mean, this is just going to be D over 2 . The mass of the person isn't changing. Angular velocity is not changing. Um... (Looks at equation sheet) All I'm thinking about is that your potential energy is going to be the highest when you're at the top, lowest at the bottom, so I think those are going to be the points at which you're going to be feeling heaviest, and those are the points... I don't know why I'm thinking this but I just keep thinking of a clock and a pendulum swinging or anyone being on a swing and your... the points where you feel like you're accelerating the fastest are the ones where you're crossing this vertical axis. But I couldn't tell you why.	Nature of Knowledge: Fabricated Source of Knowledge: Self Epistemic Activity: Forming Epistemic Form: Reasoning

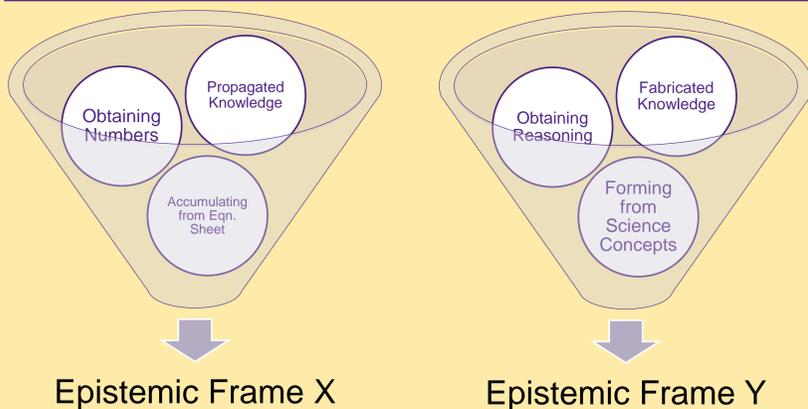
Assessment Feature: No Numbers

Shift in resource: epistemological form

Frame shift X \rightarrow Y

Statement- Jack	Resources
We'll see, the angular velocity equation. I should look for the angular velocity equation. I should, yeah. (Flips through equation sheet) It's this one. Moment of inertia. Um, it doesn't tell you the mass.	Nature of Knowledge: Propagated Source of Knowledge: Equation Sheet Epistemic Activity: Accumulating Epistemic Form: Number
So, I guess because this is a conceptual question. I am going to guess, for that, um, okay, so the greatest force you would be feeling (points upward) since you're going up, that means you would feel the lightest at the top, and the heaviest at the bottom. Because, like, you're going, accelerating faster at the bottom, and your mass is the same, so like the force would be greater at the bottom than it would be at the top. Because you're accelerating faster at the bottom than at the top. So, yeah, that's my answer.	Nature of Knowledge: Fabricated Source of Knowledge: Self Epistemic Activity: Forming Epistemic Form: Reasoning

Theoretical Framework: Epistemic Resources and Frames²



Using Epistemic Framing to Understand the Challenge

Instructors send messages about what epistemic resources are appropriate to use.²

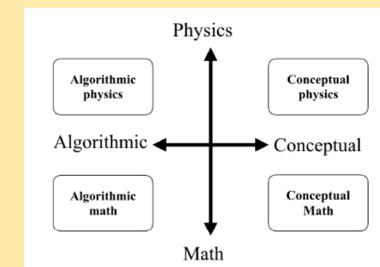
Activities are most productive when students are framing the activity as intended by the instructor.¹

We may be sending inappropriate epistemological messages with our assessments.

Future Work and Questions

Future research will investigate:

- Other assessment features that activate resource shifts
- Better defining frames³



Questions for Feedback:

1. Are you convinced of both of our claims? What evidence would convince you?
2. What other features of assessments might trigger a shift in resources?

References

1. P. Hutchison, D. Hammer (2009)
2. S. Rosenberg (2006)
3. D. N. Chari et al (2017)



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