PRODUCTIVE PHYSICAL INTUITIONS ABOUT PATTERNS OF MOTION
ELICITING AND REFINING INTUITIONS WITH BREACHING ARTIFACTS

with special thanks to Andrea A. diSessa
Dewey (1886): Every act of mind involves relation, ... dependence, ... [and] mediation. Intuition must be defined to include this factor.


You don’t have to know any formulas to see that ... God almighty! Of course it goes way down. You know. How could it do otherwise?

My intuition about that is that if you took the same wire that was fastened on the left here and doubled the length ..that ..it would bend considerably farther.
REFINING PHYSICAL INTUITIONS BY EXAMINING IDEAS ABOUT THE WORLD

REFINING (DISCIPLINARY) INTUITIONS BY MAKING THE FAMILIAR STRANGE

GARFINKEL’S BREACHING EXPERIMENTS
NOTICE THE SEEN BUT UNNOTICED ABOUT THE SOCIAL WORLD

SIT OVER THERE.

BREACHING EXPERIMENTS IN PHYSICS
NOTICE THE SEEN BUT UNNOTICED ABOUT THE PHYSICAL WORLD
PHYSICAL INTUITIONS ABOUT THE MOTION OF THE WEIGHTED WHEEL

I have a feeling when we put it on the piece of wood and we lift it up, it's gonna stay for a while.

Cuz it's heavy? And friction? I have n't that's all I know about physics. Something about friction.

°Cuz the center of mass isn’t in the center.º


• intuition report
• self-evaluated
• explanation unnecessary
• modest generality
• oriented to concrete objects
PHYSICAL INTUITIONS ABOUT THE MOTION OF THE WEIGHTED WHEEL

Would it not move? Physics! Will it move?

5 minutes later

PHYSICAL INTUITIONS ABOUT THE MOTION OF THE WEIGHTED WHEEL

That’s was a loud sound, so I am guessing it’s quite heavy.

It depends on how heavy the [pause] wheel is.

POW!

PHYSICAL INTUITIONS ABOUT THE MOTION OF THE WEIGHTED WHEEL

Oh my god you know: \( m \, g \, \sin(\theta) \). We could try it that way.

PHYSICAL INTUITIONS ABOUT THE MOTION OF THE WEIGHTED WHEEL

\( F_{\text{gravity}} \) \( F_{\text{friction}} \) \( F_{\text{gravity}} \) \( F_{\text{friction}} \) MASS!!!

"only a couple inches"
I think in this case though, it's more than just mass, we have to deal with like rotational inertia and stuff. If it was just like a block--

--it would be very different than like this where it's gonna tilt to one side and I know absolutely nothing about the rotational part of physics

Yeah like you were saying the center of mass, right? It's not evenly the mass isn't equally distributed throughout the whole wheel.

If we put it so that wasn't on the bottom, would it more likely roll? Cuz then it wants to put the heavy thing on the bottom, right?
PHYSICAL INTUITIONS ABOUT THE MOTION OF THE WEIGHTED WHEEL

CONCLUSIONS:
BREACHING ARTIFACTS

- elicit learners’ intuitions about the physical world by making seen-but-unnoticed features salient
- provide productive context for collaboratively examining those intuitions and refining them
- by themselves may not be enough