

THE COUPLING OF EMOTION, EPISTEMOLOGY, AND SUBSTANCE OF STUDENTS' REASONING IN PHYSICS

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COGNITIVE PROCESSES ARE LINKED TO AFFECT

Mood affects attention, learning, memory, associations, evaluations, preferences & judgments

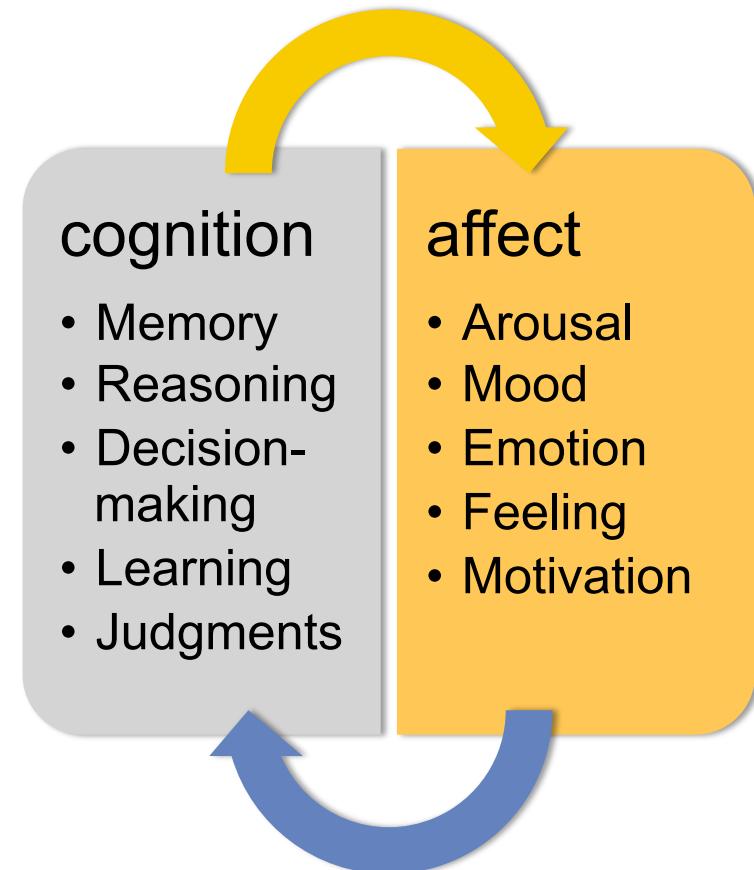
• (Bower &Forgas, 2000)

Emotion plays a role in decision-making, coloring the outcome

• (Damasio, 1994; Forgas, 1994)

Congruent mood valence can enhance recall

• (Blaney, 1986)



AFFECT INFLUENCES AND IS INFLUENCED BY LEARNING

Students' affectively charged motivational beliefs can greatly influence the process of conceptual change

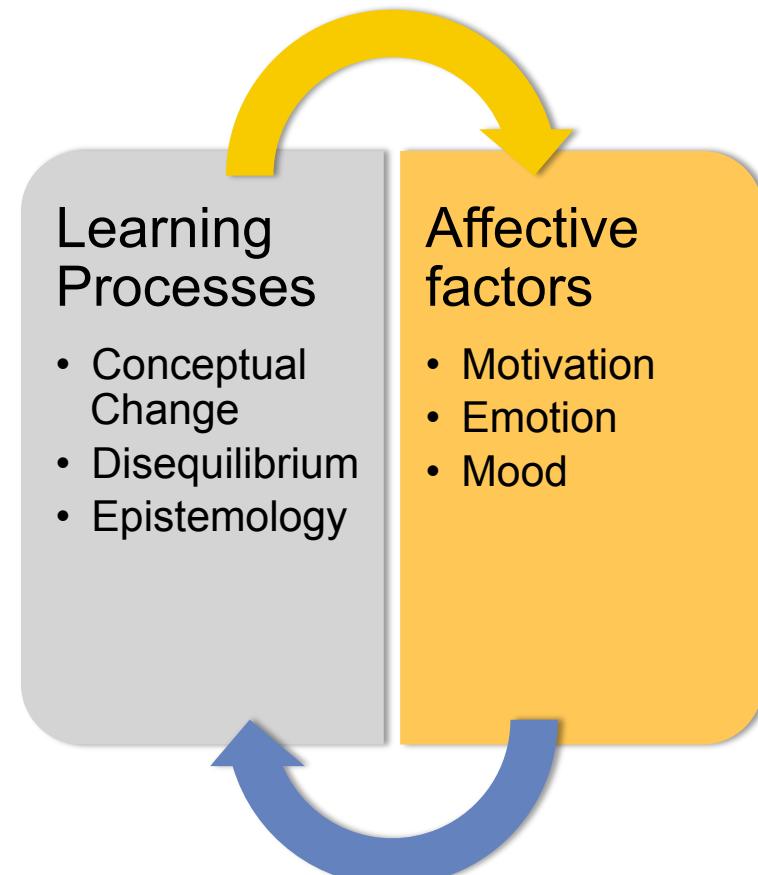
• (Pintrich et al., 1993)

Curiosity can be an indicator of motivation level

• (Bower & Forgas, 2000)

The affective states of confusion and perhaps frustration are likely to occur during cognitive disequilibrium

• (Kort et al., 2001a,b)



FEELING IS BELIEVING—THE CONNECTION OF AFFECT & EPISTEMOLOGY

Emotion is either a component of belief or at least is causally connected to belief

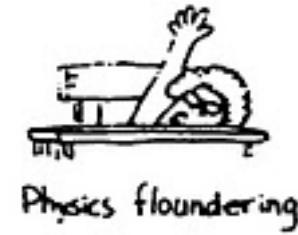
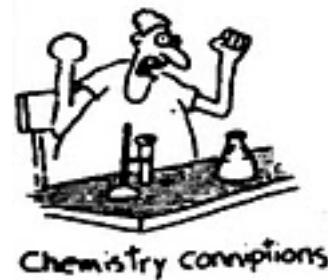
- (James, Burkhardt, Bowers, & Skrupskelis, 1981; Zagzebski, 1996)

Belief, certainty, confusion, conviction, doubt, knowing, understanding...

There is not enough work on how emotions affect epistemic practices

- (Chinn, Buckland, & Samarapungavan, 2010)

HOW DOES EMOTION INFLUENCE STUDENT THINKING MOMENT TO MOMENT IN SCIENCE CLASSROOMS?

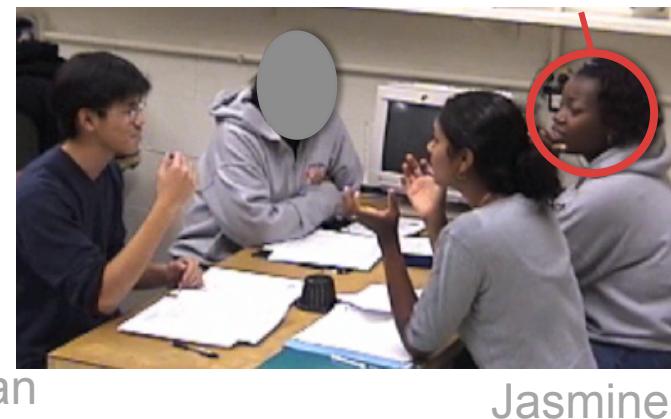


methodologies have been too coarse-grained to get at the particular roles that emotion plays in student thinking in science classrooms

HERE WE WILL PRESENT AN ILLUSTRATIVE CASE STUDY OF INTERTWINED AFFECT & EPISTEMOLOGY

Introductory algebra-based physics tutorial at the University of Maryland on Newton's 3rd law

Instructional goal:
Resolving intuitions with Newton's third law



Consider a heavy truck ramming into a parked, unoccupied car.



PART I: NEWTON'S 3RD LAW & COMMON SENSE

According to *common sense*, which force is bigger?

The truck, right?

The truck, yeah.

According to *Newton's 3rd law*, which force is bigger?

It says they're equal, right?

Yeah, should be equal.

I could never understand that, but...does this go against the law, or is it that they are equal but we just think it's the truck?

Does Newton's Law have to do with speed or anything or it's just ...

This law just says that the forces are equal.



Kendra's epistemological stance:

Her intuition can and should be resolved with Newton's 3rd law

PART II: WHAT TO DO WITH CONTRADICTION

3 – the contradiction between physics and common sense is so blatant that we have to accept it

2 – There's probably some way to reconcile common sense with Newton's third law, though I don't see how

You picked 3?

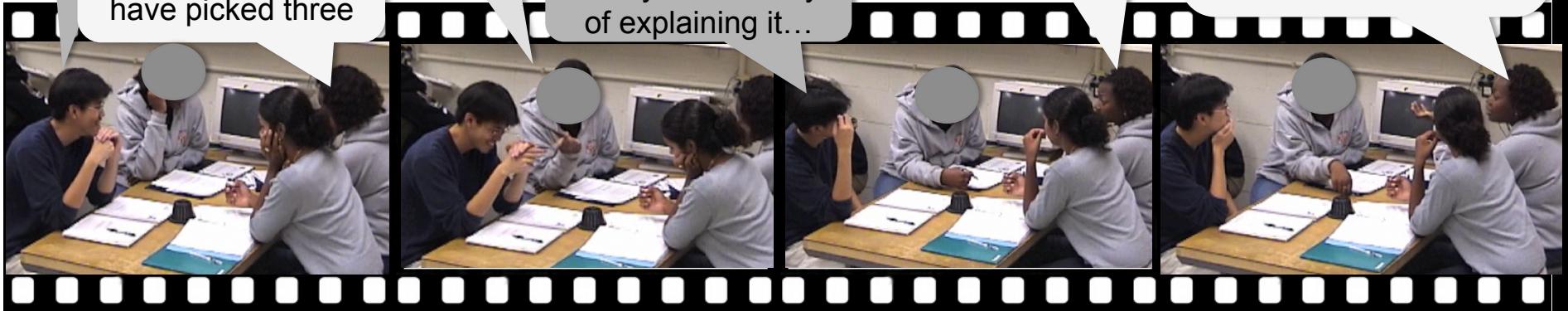
Hell, yeah! I'm *mad* so I would have picked three

Oh, you picked 2?

Yeah there's always some way of explaining it...

You think so?

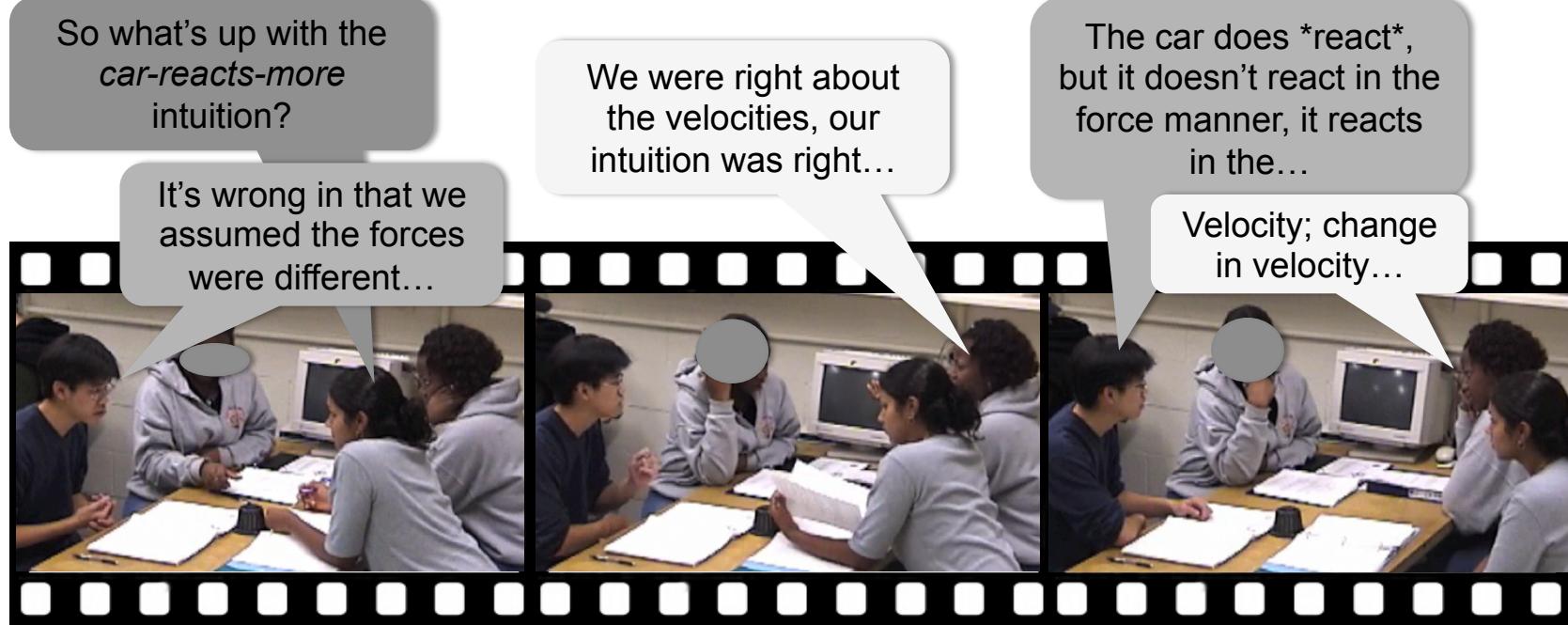
I don't think there's any way you can explain to me how a massive truck is going to have the same force



Kendra's Affect:
“*Mad*”

Kendra's epistemological stance:
Her intuition cannot be resolved with Newton's 3rd law

PART III: WHAT TO DO WITH THE “CAR REACTS MORE” INTUITION



Kendra's affect:
not mad

Epistemological stance:
Her intuition **can & should** be resolved with Newton's 3rd law

KENDRA'S EPISTEMOLOGY IS COUPLED WITH HER AFFECT

When kendra is calm, she tries to reconcile her intuition with newton's 3rd

When she goes back to being calm she once again attempts to reconcile

When she is mad, she says they can't be reconciled and stops searching



BROADER CLAIMS

**Epistemology & affect
are dynamic**

**These dynamics are
coupled**

**We need to do
microanalysis of
classroom
interactions to get at
this dynamic coupling**

LOOKING AHEAD...

nature of the coupling between affect and epistemology?

- What role does the valence of emotion play?
- How might the instructor encourage productive affective states? How might they defuse counterproductive ones?
- How do students in groups manage the affective & epistemological dynamics?

ACKNOWLEDGEMENTS

Thank you:

Jessica Watkins, Eric Kuo, Mike Hull, Jen Richards, Lama Jaber, and the members of the Physics Education Research Group at the University of Maryland, College Park.

Thanks go to NSF for funding



Reference List

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