

# IDENTITY AND BELONGING: ARE YOU A PHYSICIST (CHEMIST)?

<sup>a</sup>Sissi L. Li, and <sup>a,b</sup>Michael E. Loverude

<sup>a</sup>Catalyst Center, <sup>b</sup>Department of Physics, California State University, Fullerton, CA 92831

## Introduction

### Begin upper-division coursework

- Declaration of major becomes more concrete and meaningful as students have opportunities to interact more deeply with the community of their chosen discipline.

### Process of completing a major

- Students transition their identity towards being a member of their field. But what does it mean to be a chemist or physicist from the students' perspective?

### Journeyman stage of development

- Students are no longer novices, but also not yet experts. This is a delicate point in the students' paths where they have a desire to and foothold for advance in their careers. We want to examine this journeyman stage in order to better facilitate majors' identity development into members of their disciplinary communities.

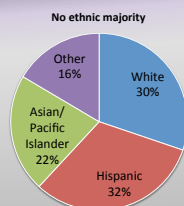
## Research questions

- What are the students' ideas about being and becoming a chemist or physicist?
- What are the ways in which students position themselves within the specific classroom, broader academic, and general science communities?
- In what ways do chemist and physicist identities develop similarly or differently?

## Study population

Undergraduate population:

- ~35,000 students
- 56% female
- >50% first generation college student



## Study participants

Upper-division chemistry and physics majors

## Method

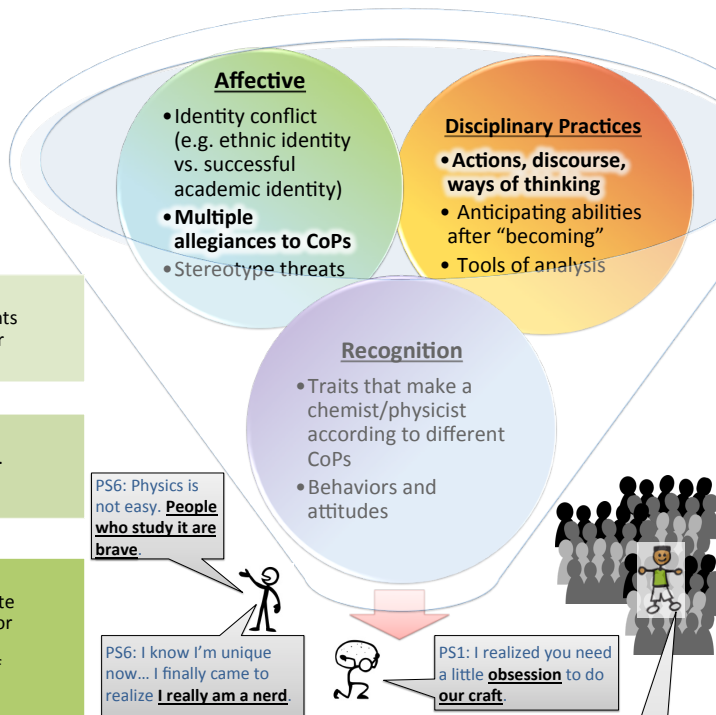
We collected data about chemistry and physics majors in their junior-level courses:

- Class observations
  - PHYS310: Thermodynamics, kinetic theory & statistical physics
  - CH361: Physical chemistry
- Individual semi-structured interviews following personal meaning maps (PMM)
- 6 physics majors and 1 minor; 4 chemistry majors

## Interview questions

- What is a physicist? What makes someone a physicist? What do they do?
- When/where do you get to be a physicist?
- Are there ways that being a physics person comes up when you are doing things that aren't related to your classes/research/etc? Outside the university/department?
- When do you think you started to feel like you could call yourself a physicist? What do you do that make you a physicist?
- What do physicists do that you like/dislike doing?

\* "physicist" replaced with "chemist" for chemistry students



## Finding: Communities

Expression of identity is context dependent and personal; Communities perceive students as "different" and students must juggle allegiance between their chemist/physicist identities and the social community.

CS14: [My family] have no clue what I'm talking about. They just know oh acetone is nail polish remover. That's it.



CS11: I feel like I think about it too much [...] mostly it's because my family's like 'ok you're annoying us now.' I'm like oh ok that must be bad. But I just, I really like it a lot and so I talk about it a lot.

A person who takes the metaphysical questions of the universe and actualizes them, turning them into physical—and therefore solvable—problems.

PS3: I view physicist as one who... really curious about the universe and understanding why it... how it works.

PS11: ... a respect and emphasis of that mathematical understanding of the universe [...] that's what physics does. And by having such an emphasis and such a respect for that [...] it also really validates um, the value of thinking and analyzing the universe and really trying to understand what's around us.

## Finding: Disciplinary

Chemists and physicists both engage in exploring and questioning the world. Physics students appeared to focus on the universe while chemistry students focused on the lived-in world such the environment and household chemistry.

CS12: I think chemistry really gives you sort of the basis of how things work. And especially [...] biology how cells work or how things affect you. And again, drugs, environment, heat... all that stuff is basically chemistry if you get down to it. So to me that's trying to understand how things really work is important.

CS14: Exploring a world that cannot be seen by the naked eye. That's what I like about chemistry. I mean we're working with tiny molecules. I mean even with an electron microscope, you still can't see some things, but how is it we can actually explain how a mechanism [...] It kind of amazes me how we can derive mechanisms when we can't see anything.



## Implications/Recommendations

- As recognized members of the academic and disciplinary communities, teachers and other mentors are in positions to help students understand the culture of the communities they are joining by pursuing their major.
- Situational nature of the way students view their identity as chemists/physicists suggests that we should be mindful of what support is appropriate rather than pushing a single best way.

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