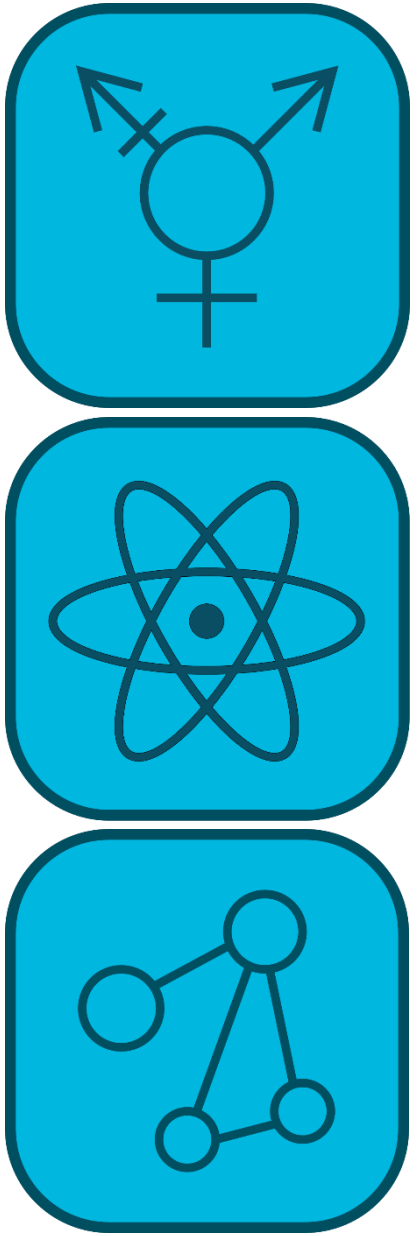
Counting and context: Gender, physics, and methods in tension

https://is.gd/TraxNORNDiP

Adrienne Traxler

NORNDiP Conference

University of Bergen, May 7, 2024



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Gender in PER:

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Networks of women and LGBTQ+ physicists:

Ramón Barthelemy, Charles Henderson, Camila Amaral, Madison Swirtz, Justin Gutzwa

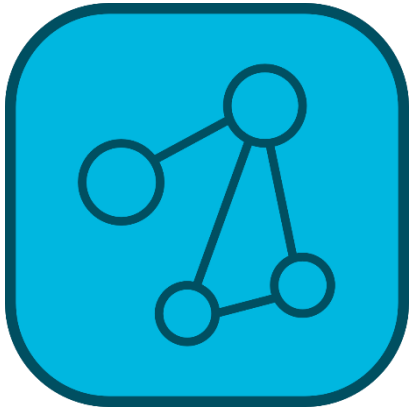
UNIVERSITY OF COPENHAGEN

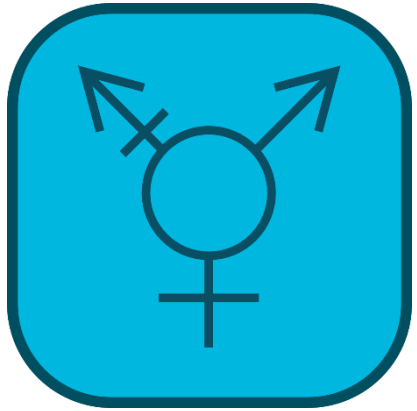
NSF DUE-2100024, 2055237, 2054920

My background

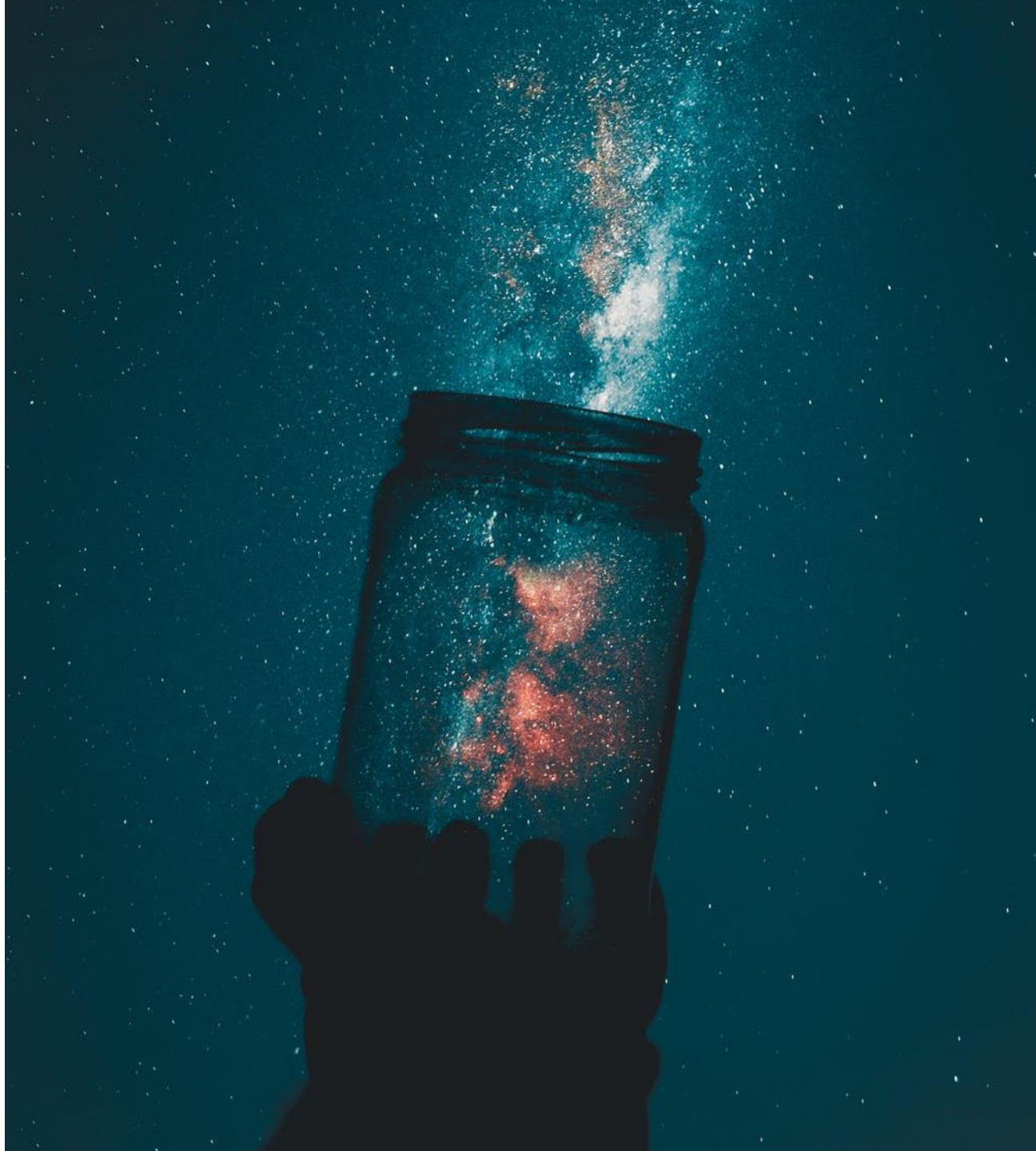
Physics -> physics education -> applied mathematics -> physics and science education

Now: network analysis, gender issues in physics





What the future could look like



A bias-free future?

Go to www.menti.com and enter code 7946 462 to add your thoughts.

Outline

Gender in physics

Counting and context

Tensions and possibility

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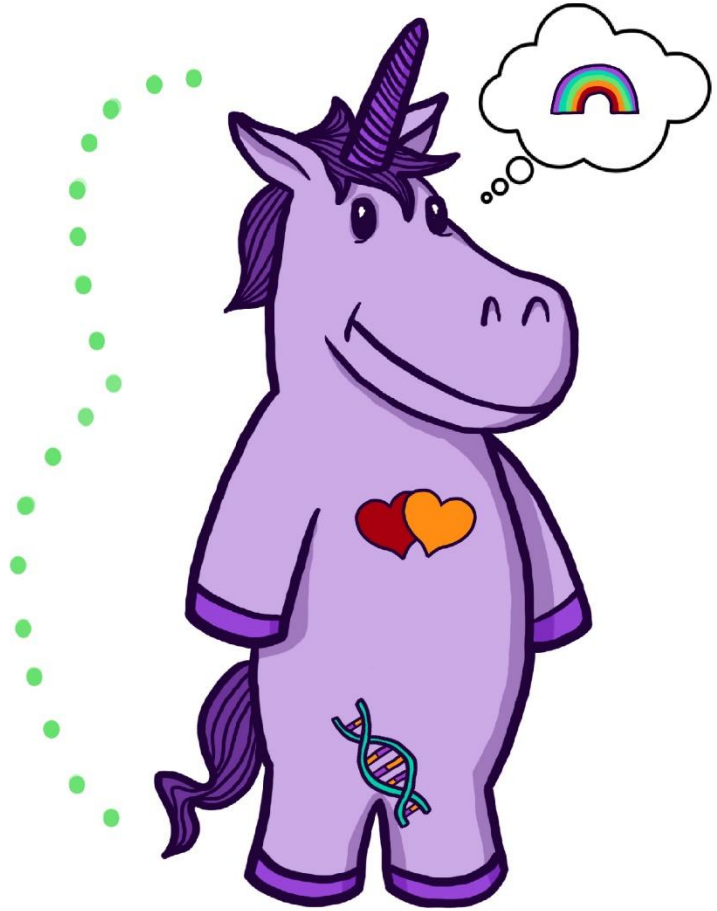
The Gender Unicorn

Graphic by:
TSER
Trans Student Educational Resources



Gender Identity

- Female/Woman/Girl
- Male/Man/Boy
- Other Gender(s)

Gender Expression

- Feminine
- Masculine
- Other

Sex Assigned at Birth

Female | Male | Other/Intersex

Physically Attracted to

- Women
- Men
- Other Gender(s)

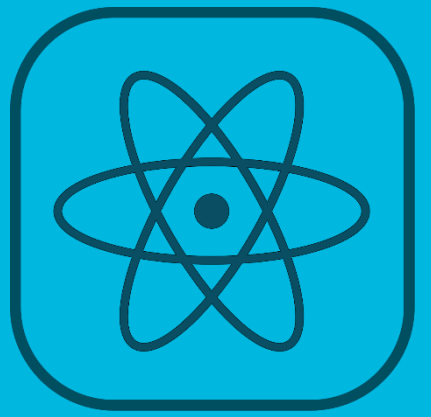
Emotionally Attracted to

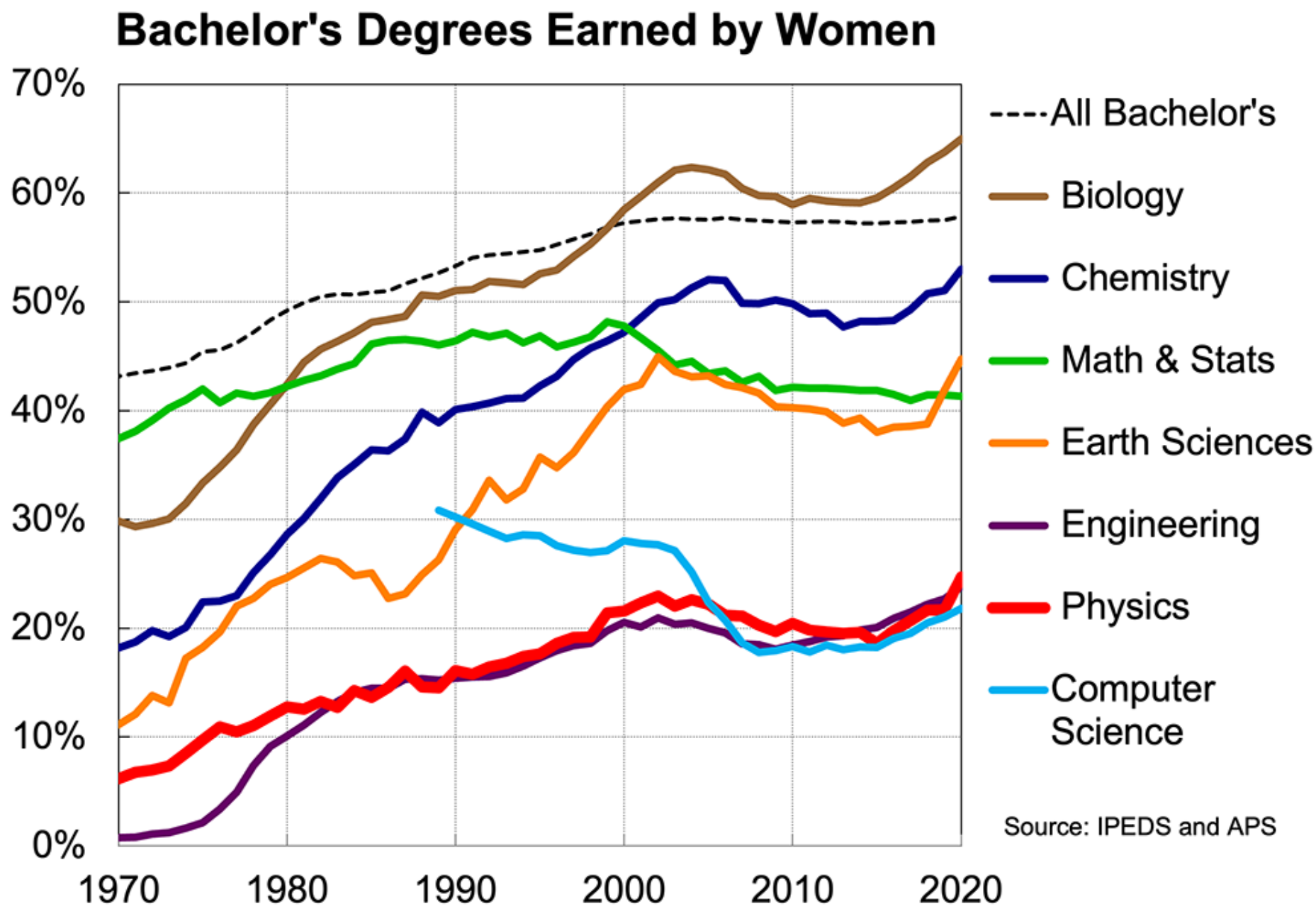
- Women
- Men
- Other Gender(s)

To learn more, go to:
www.transstudent.org/gender

Design by Landyn Pan and Anna Moore

Gender in physics




Bachelor's Degrees Earned by Women
70%
60%
50%
40%
30%
20%
10%
0%
1970
1980
1990
2000
2010
2020
All Bachelor's
Biology
Chemistry
Math & Stats
Earth Sciences
Engineering
Physics
Computer Science
Source: IPEDS and APS

Women faculty report fewer resources

Resource	% Women with access	% Men with access
Funding	52	60
Office space	72	77
Lab space	46	52
Equipment	58	64
Travel money	57	64
Clerical support	30	43
Employees or students	33	43

Ivie and Tesfaye (2012), Ivie (2018)

Widespread barriers

Sexual harassment

Hostile climate

Microaggressions

Aycock *et al.* (2016), Traxler (2020)

What are microaggressions?

"[B]rief and commonplace daily verbal, behavioral, or environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative . . . slights and insults."

Sue *et al.* (2007)

"My place in the lab can at times feel uncomfortable. . . I am basically the lab secretary."

"I felt they got a little confrontational, like why do you need this women in physics group?"

"I told the grad student under me that he should consider a certain factor in trying to make sense of his data. He said no and ignored me. When the other grad student/post doc suggested it, he was open to it right away."

—Female PhD students interviewed in Barthelemy *et al*. (2015)

Second-class citizenship

Assumption of inferiority

Restrictive gender roles

Invisibility

…

Barthelemy *et al*. (2016)

TABLE I. Gendered experiences.

		Positive	None	Microaggression	Hostile sexism
Physics	Janet			X	X
	Joan			X	
	Joni			X	
	Marie		X		
	Nancy			X	X
	Olivia			X	
	Stevie			X	X
	Susie			X	
	Taylor		X	X*	
	Tina			X	
	Tori			X	
Astronomy	Annie			X	
	Barbra			X	
	Bishi	X	X		
	Cyndi				X
	Janis		X		
	Kate			X	
	Melissa			X	X
	Pat	X	X		
	Paula			X	
	Sarah			X	

Gender in physics education research

Danielsson (2010) review

Comparisons of male and female students

Textbooks and tests

Classroom practices

Teachers' attitudes

Critical perspectives

What is your theoretical framework?

Traxler *et al*. (2016)

Binary deficit model

Back to the future…

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Qualitative and quantitative

Research questions and methods: two sides, same coin

PER skews quantitative (even vs. science ed)

What do you see with different lenses?

Gender and concept inventories

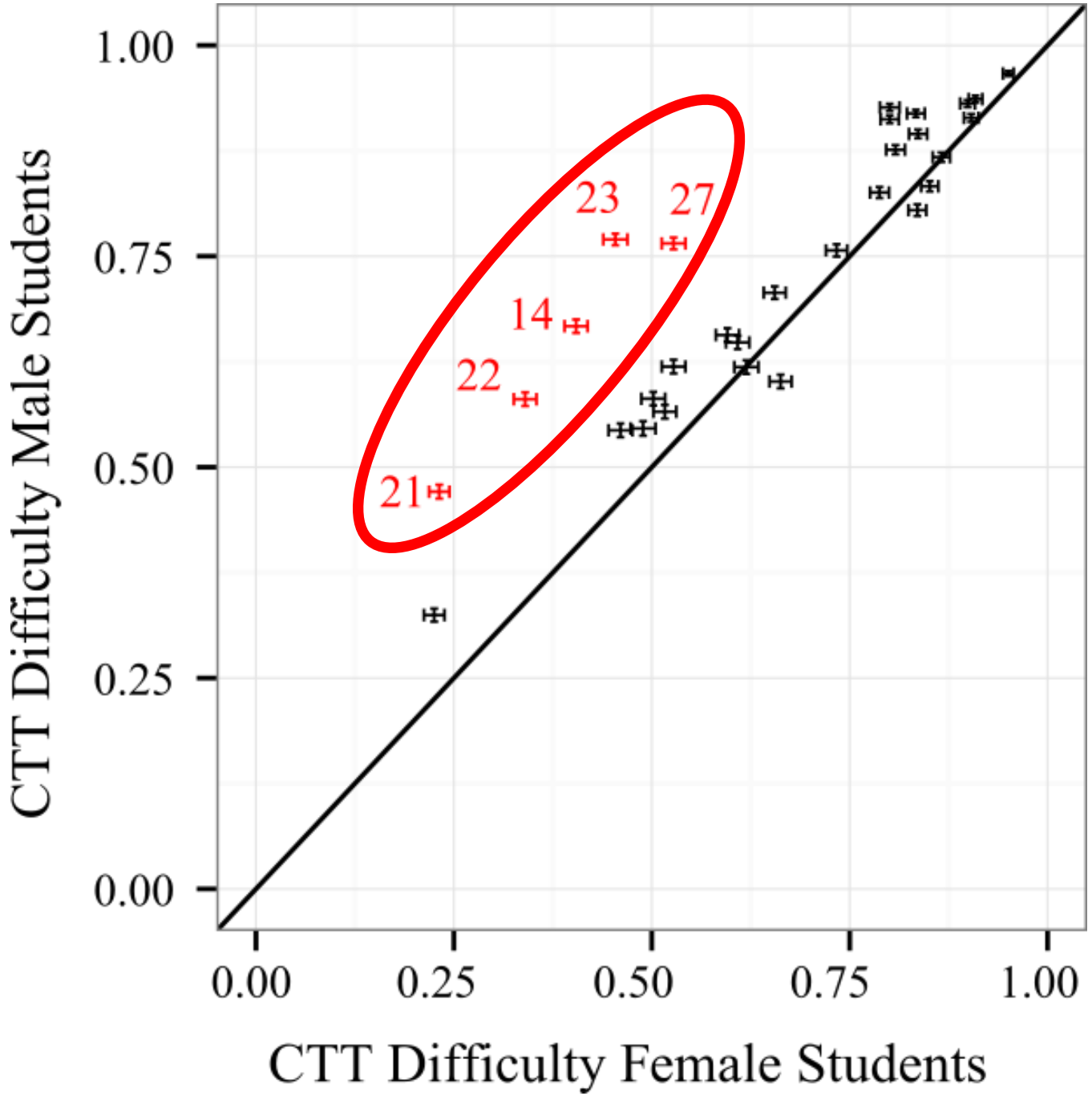
Many comparisons of tests or grades

Test validation lacking

Is the Force Concept Inventory gender fair?

Traxler, *et al.* (2018)

Comparing item difficulty



Traxler *et al.* (2018)

What's next?

Other inventories

Partitioning the gap

Next-gen instruments

Henderson *et al*. (2017, 2018, 2019)

Moss-Racusin et al. (2012)

Double-blind study, faculty evaluated resume

"Male" applicant more competent, hireable, mentor-worthy

…also paid $3700/year more

Competence as mediator

Bias independent of age, field, tenure status, gender

Qualitative examples

Depth and nuance

“Physics and the girly girl”

Different ways of finding recognition

Gonsalves (2014)

Routes to recognition

Regulating appearance

…and judging other women

Who gets to belong?

I regularly wonder about appropriate work attire, since being good-looking as well as female is often associated with not being intelligent.

Participant in Barthelemy *et al*. (2015)

Qualitative examples

- Insight into under-representation
- Intersectional identities

Ong (2005)

Fragmentation: hide who you are (speech, clothing…)

Multiplicity: embrace visibility (be loud)

Extra work either way!

Intersections of identity

Race x gender (Rosa & Mensah 2016, Hyater-Adams *et al*. 2018)

Gender x LGBTQ identity (Quichocho *et al*. 2020)

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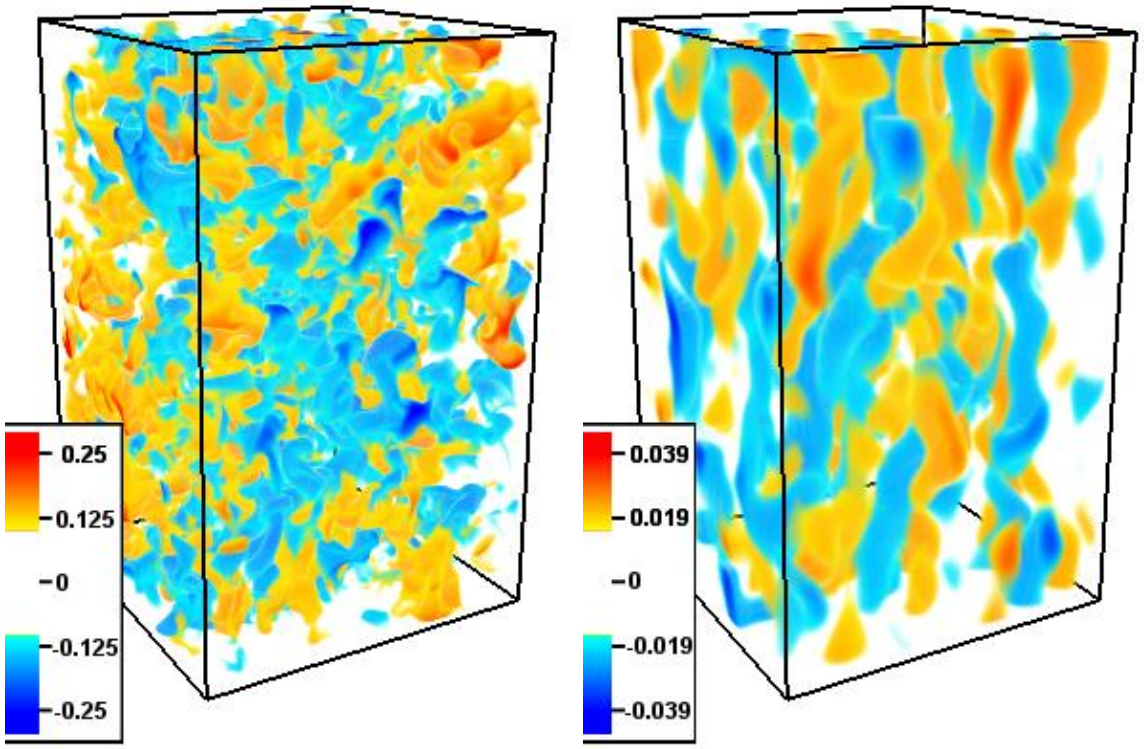
Lessons from complexity

Research instruments

Small to large, large to small

Tension and dialogue



Traxler *et al*. (2011) ☺

Activity: Asking questions

What do you want to know about gender in physics?

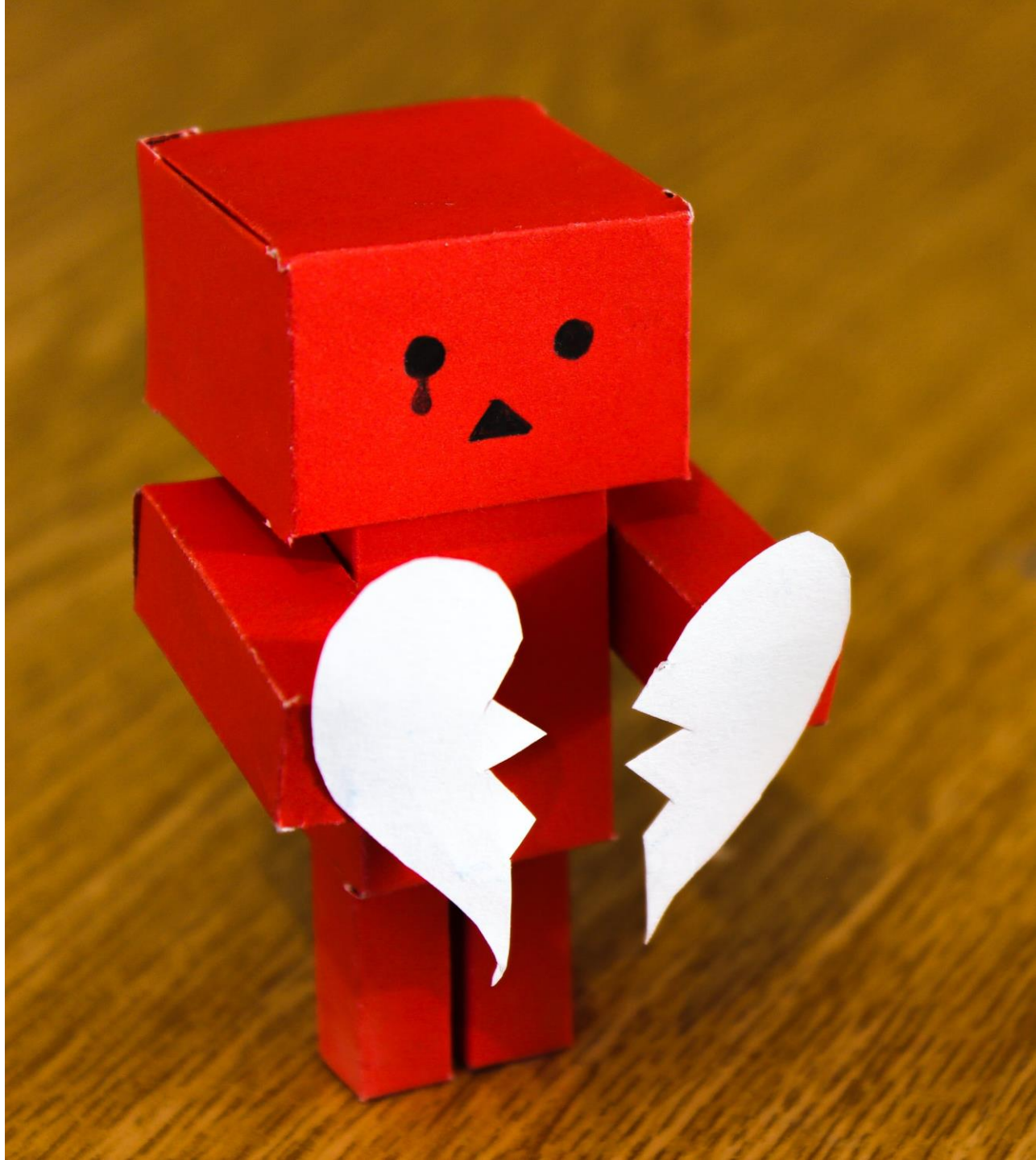
What methods would you use to investigate it?

Is it about small-scale stories, big-scale patterns, a mix…?

Talk to a neighbor!

Grappling with complexity

No optimal solution

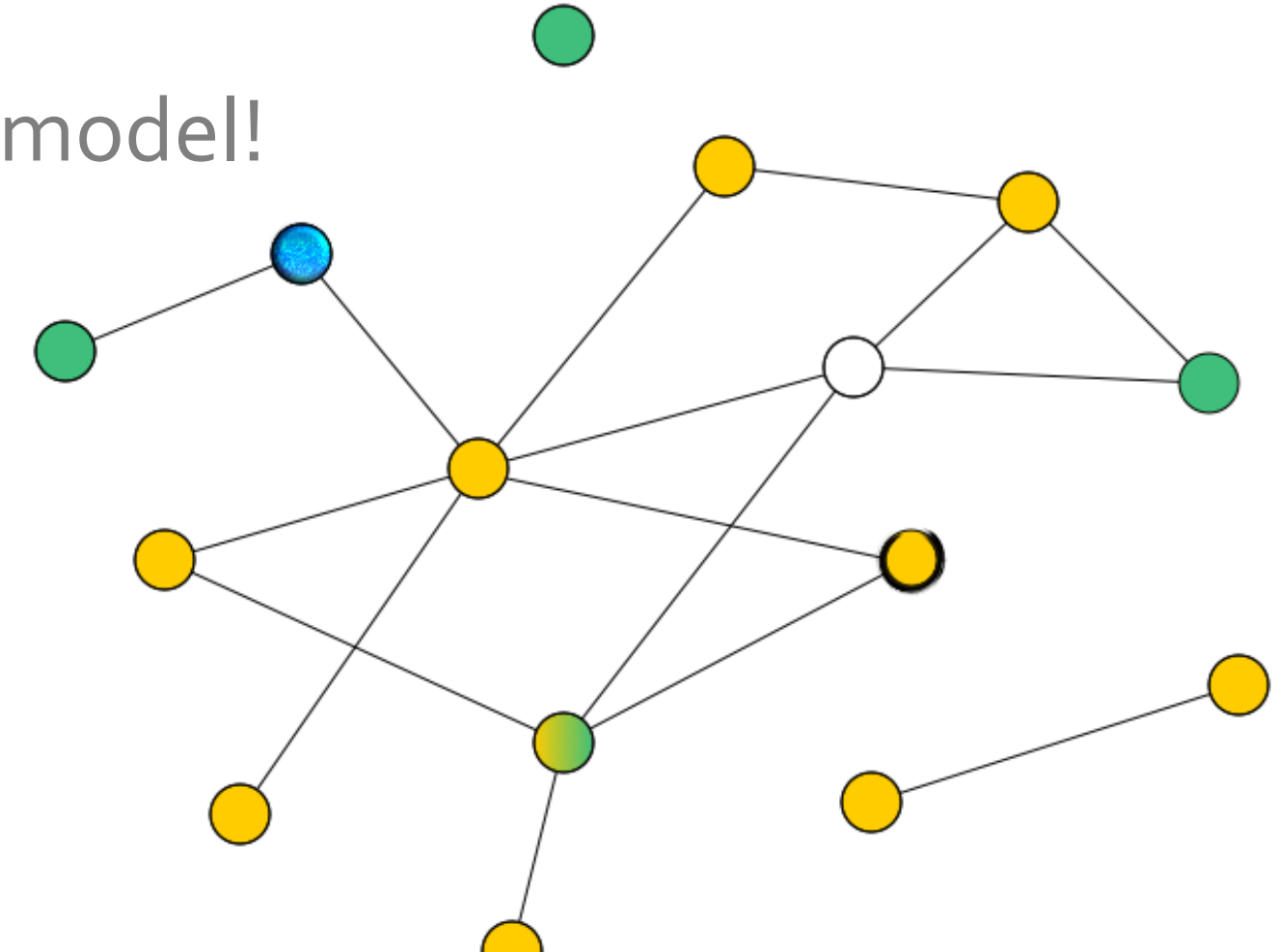


Methodological tensions

Gender differences in networks

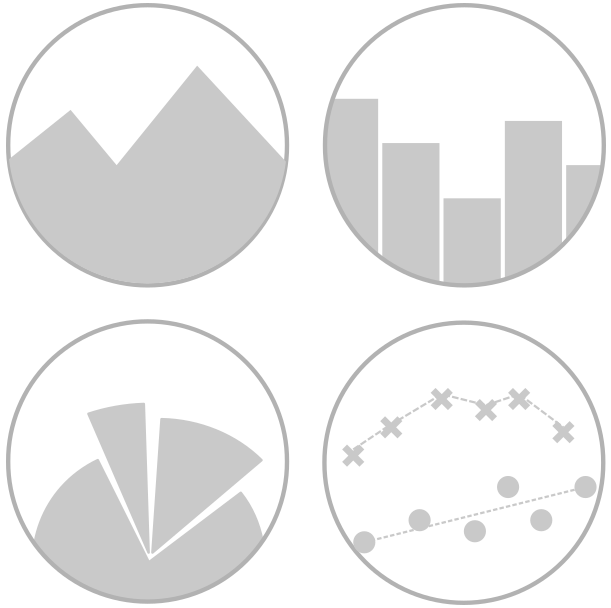
Binary attribute: easy to model!

Detail, accuracy, respect



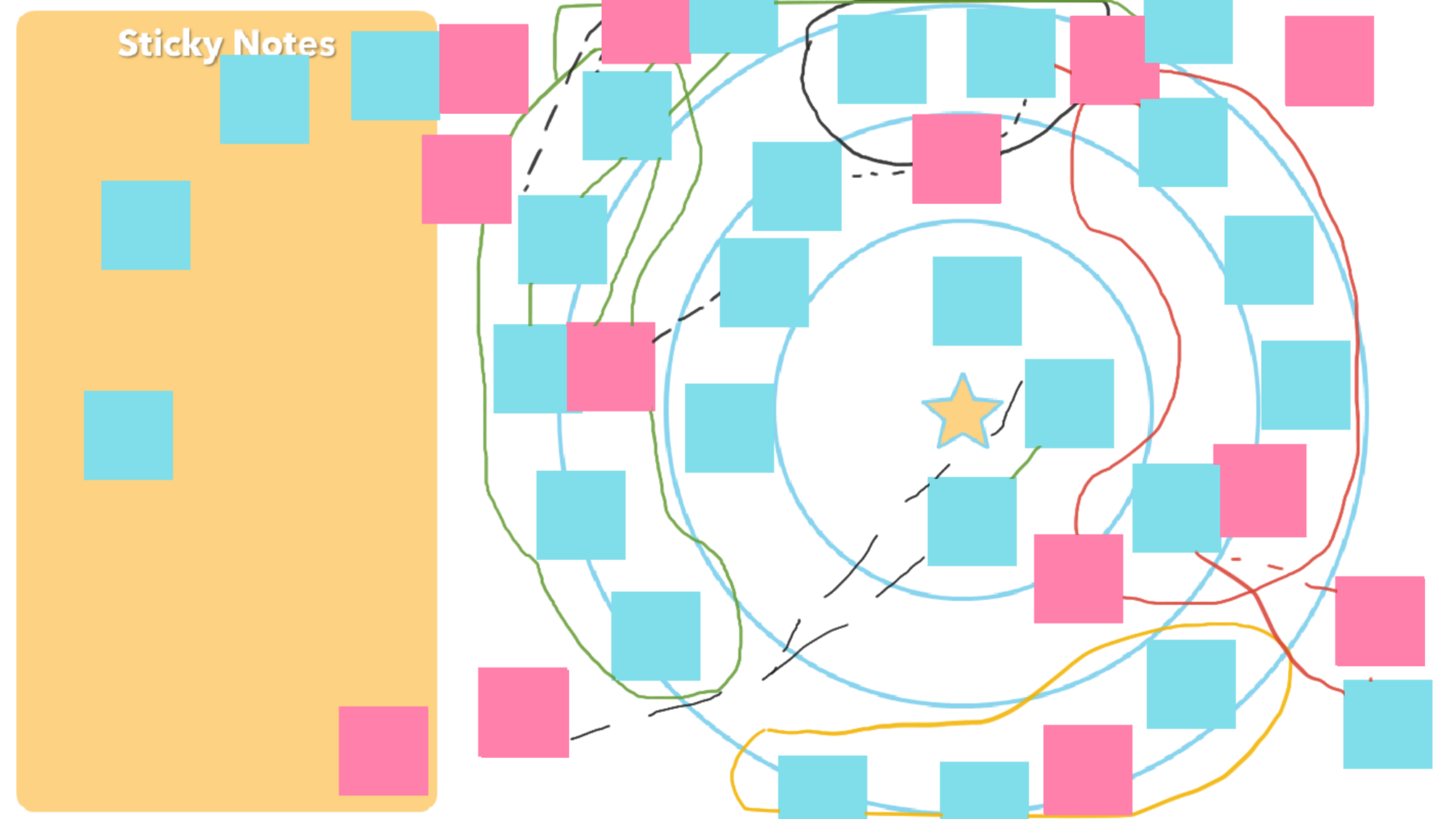
Rasmussen *et al.* (2019)

Example case in networks



Gutzwa and Barthelemy *et al.* (under revision), Traxler *et al*. (under review)

Sticky Notes



Nodes included…

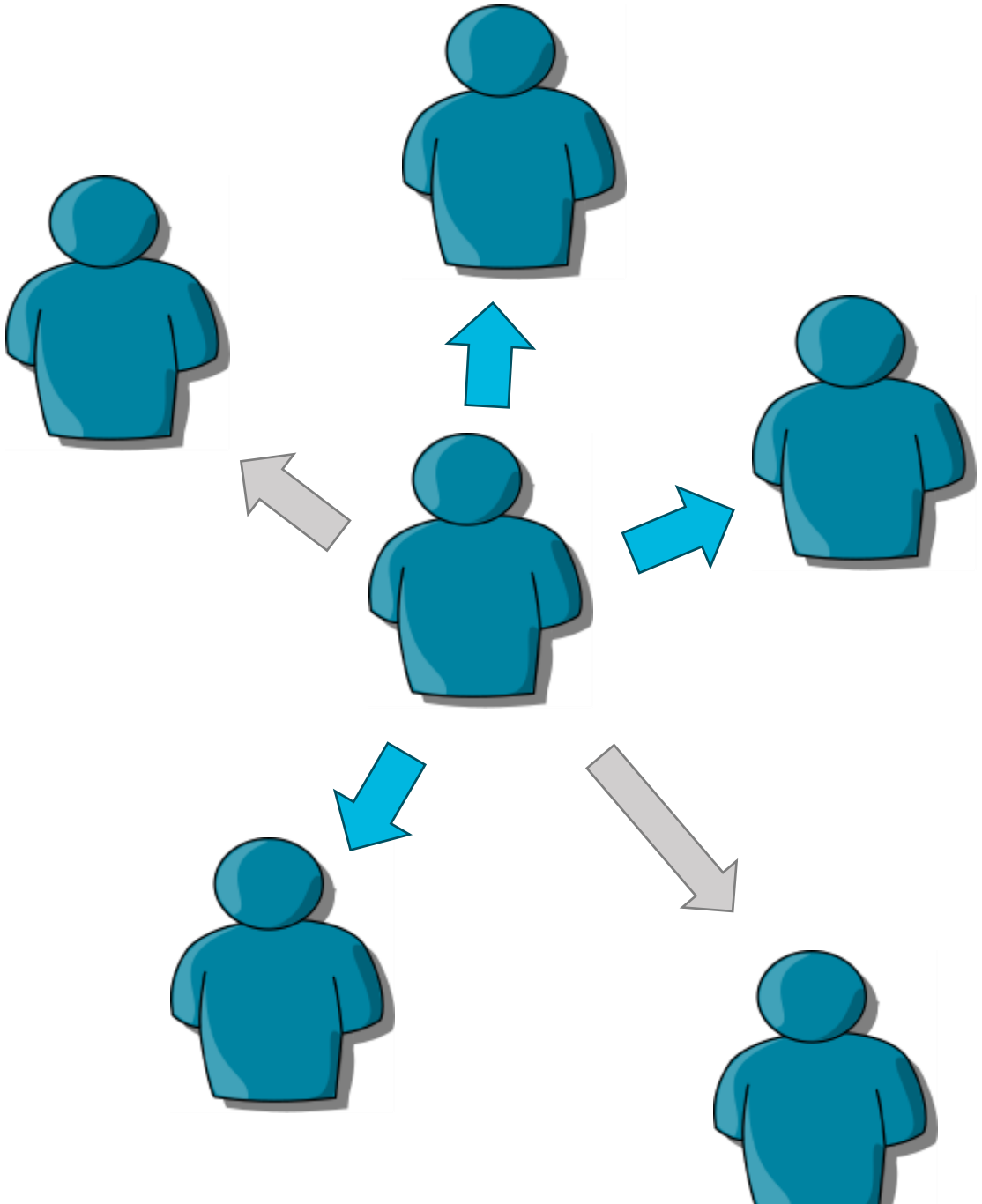
Coworkers

Past and present mentors

Outside-work social clubs

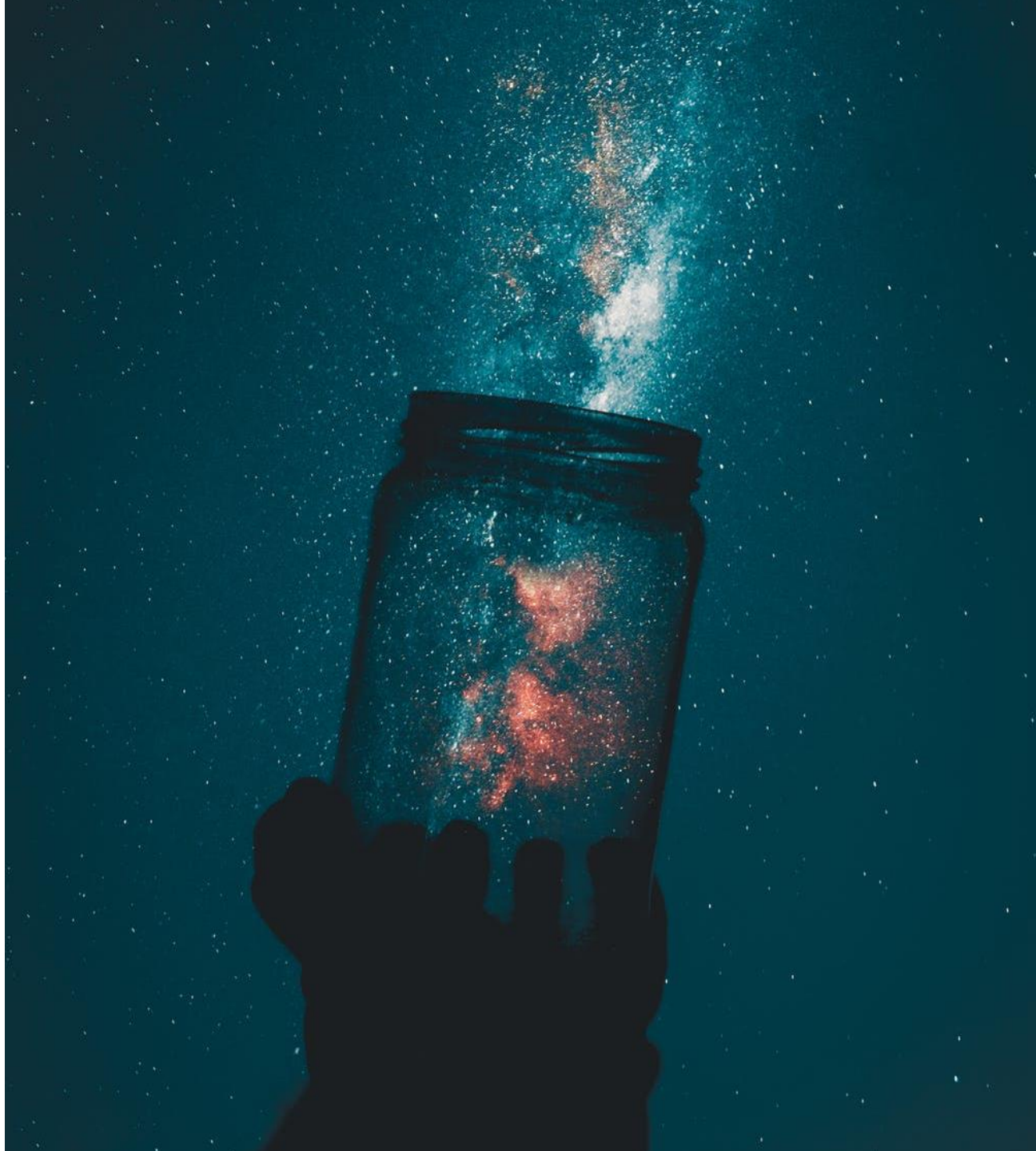
Toxic exes

Pets

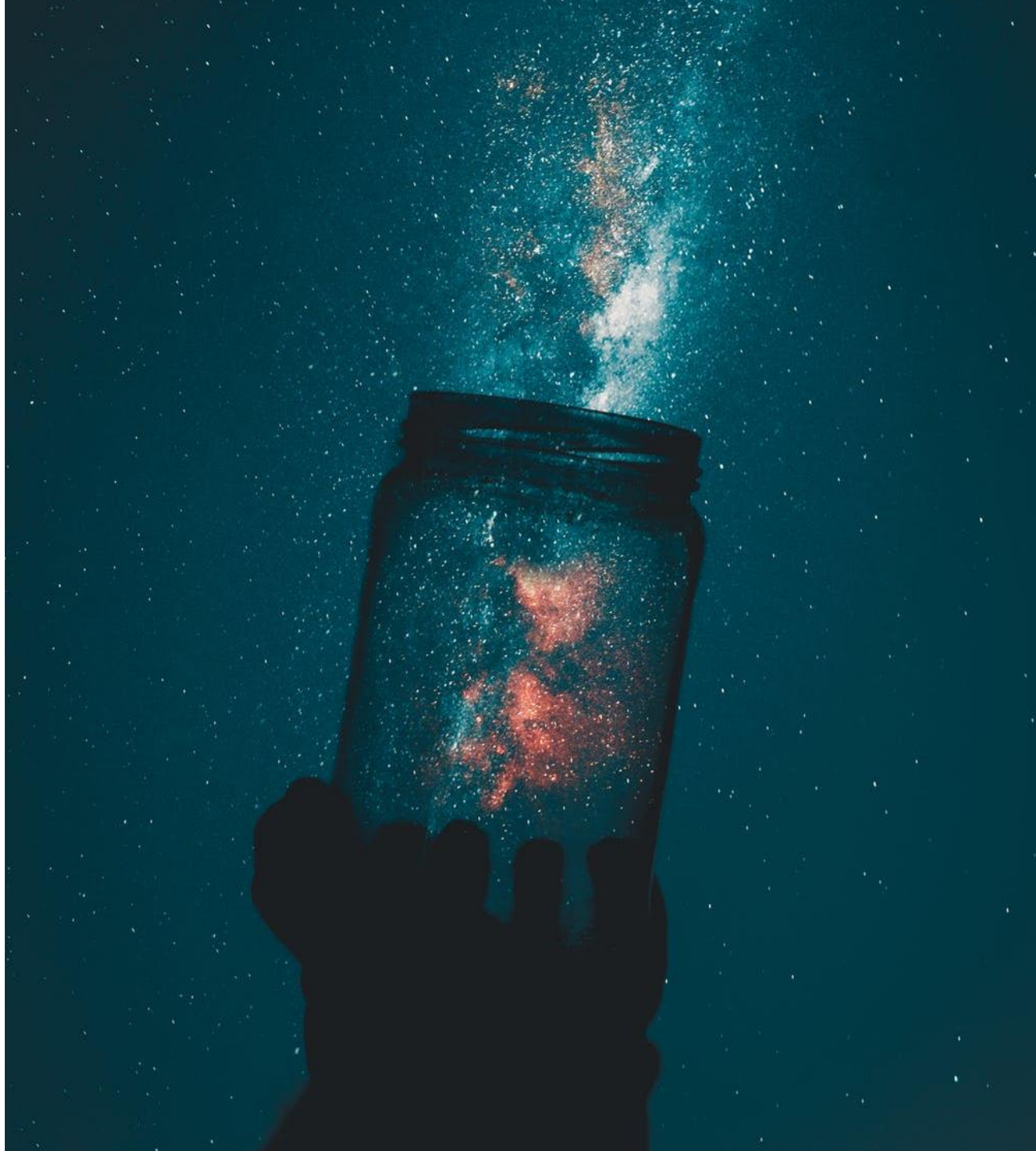


Who's in your network?

What the future could look like



Questions?



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