

Research culture: Bias, inclusivity, and equality in science

SciLifeLab PULSE Workshop

SciLifeLab Training Hub
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This workshop has been adapted from the following works:

Johnson, A. (2024). How to design research-aligned DEI interventions in physics. Preprint at arXiv, https://doi.org/10.48550/ARXIV.2406.01390.

Carnes, M., Devine, P.G., Baier Manwell, L., Byars-Winston, A., Fine, E., Ford, C.E., Forscher, P., Isaac, C., Kaatz, A., Magua, W., et al. (2015). The Effect of an Intervention to Break the Gender Bias Habit for Faculty at One Institution: A Cluster Randomized, Controlled Trial. Academic Medicine *90*, 221–230. https://doi.org/10.1097/ACM.0000000000000552.

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Session Structure

Intended learning outcomes:

- Evaluate research culture in your own environment
- Identify types of bias in research-relevant scenarios
- Develop personal strategies to support equity and inclusivity

A note!
Many of the examples we discuss examine bias as it pertains to the axis of gender.

Racism, ablism, and other forms of discrimination are present in research culture. This is supported by the literature and importantly, the lived experience of many of our colleagues.

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What is research culture?







What do you notice about the personal interactions, features, and structures in these settings?
What do they tell you about what kinds of people might belong here?

- Intersectionality theory: people may experience the same setting differently depending on various personal characteristics. These distinct experiences are fundamentally unjust.
- Norm-critical theory: focuses on identifying inequalities in power relationships, and holds everyone responsible for change

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Johnson, A. (2020). An Intersectional Physics Identity Framework for Studying Physics Settings. In: Gonsalves, A.J., Danielsson, A.T. (eds) Physics Education and Gender. Cultural Studies of Science Education, vol 19. Springer, Cham. https://doi.org/10.1007/978-3-030-41933-2_4

Factors determining inclusive cultures

Uniqueness: Individuals feeling that they can be themselves and are valued for the perspectives, knowledge, experiences and information that they can bring to the group

Belonging: Individuals are encouraged to maintain their uniqueness **and** treated as an insider in the group.

Exclusion: Individuals are treated as if they do not add any value to the group. They do not feel like one of the group but they see that there are others who are accepted and feel a sense of belonging

A sense of belonging is associated with success in STEM fields.





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Fägerlind, G. (2024). Mångfald I praktiken. Handbok för inkluderande arbetsplatser.

Factors determining equality

Equality: all individuals should have the same rights, opportunities, and treatment, regardless of their race, gender or background.

In Sweden there are state-set regulations university employees must adhere to when it comes to proactively counteracting discrimination and promoting a safe and inclusive work environment.

Being a Swedish civil servants means having certain rights and responsibilities according to:

The Higher Education Ordinance (1993:100)
The Discrimination Act (2008:567)
The Work Environment Act (1977:1160)

Your respective host institutions also have their own internal goals and guidelines as well that apply to you, for example KTH has core values and ethical policy, as well as goals for gender equality, diversity and equal opportunities.

SciLifeLab has its own code of conduct.

Definition of equality: UNESCO

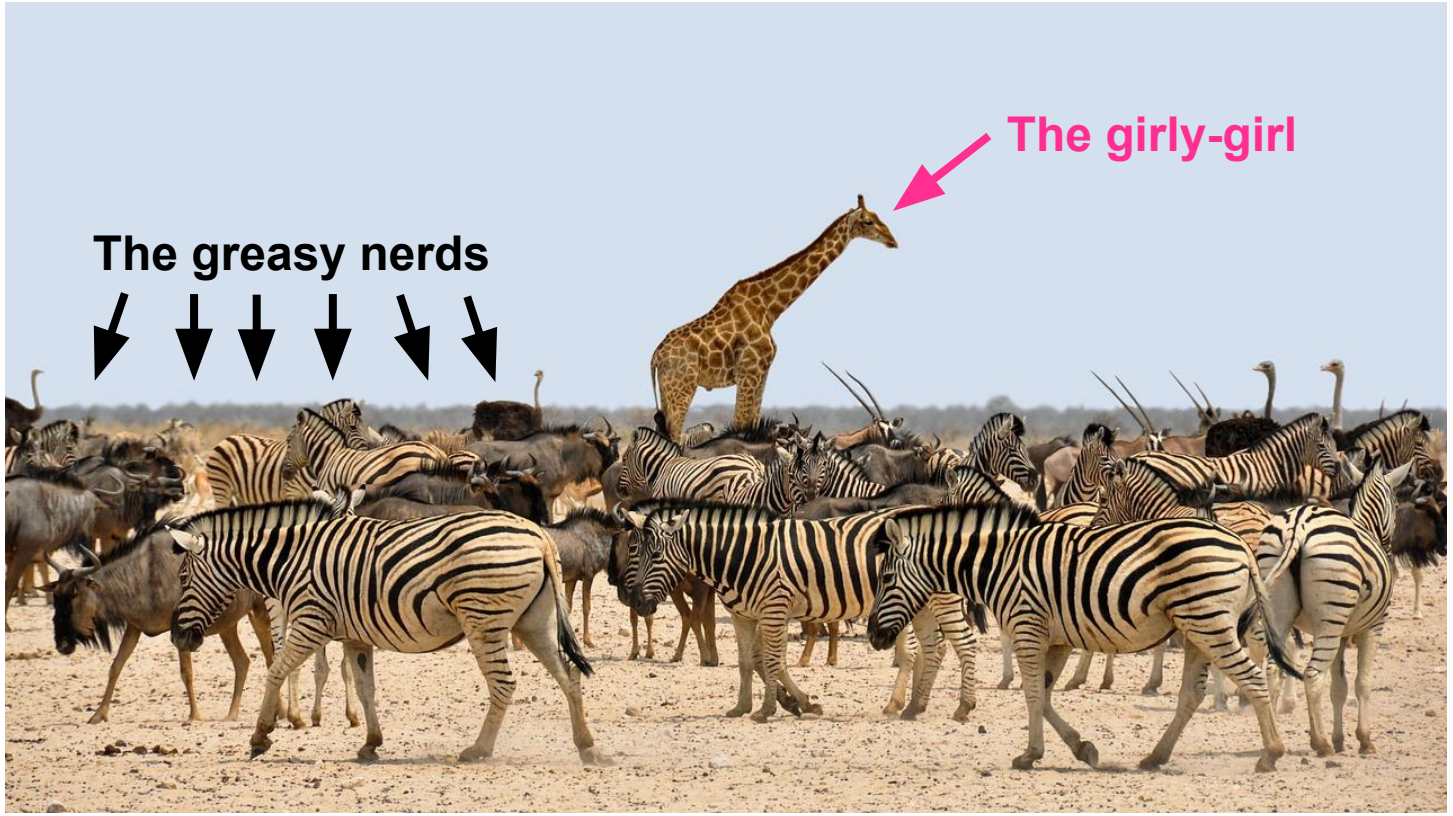
How do we create inclusivity and equality?



Said no one, ever…
(except maybe James Watson & Tim Hunt)

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How norms determine inclusivity and equality



"Hard-working theoretical physicists who get wrapped up in their work often look absent-minded because they don't pay much attention to their appearance—they are often seen with stains on their clothes"

Norms: a set of rules or expectations about how we should act or behave in relation to ourselves and each other

Norms affect how people are judged, described, treated, rewarded and punished, valued or devalued…

They are often invisible to the in-group.

Physics and computer engineering have been studied for their extreme gender norms.

Unless we make the norms of our environment visible, norm-breakers experience the friction of not belonging.

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Ottemo et al. 2021. (Dis)embodied masculinity and the meaning of (non)style in physics and computer engineering, Gender and Education, 33:8, 1017-1032, DOI: 10.1080/09540253.2021.1884197

What features do you associate with an inclusive research culture?

Reflect: Can you think of an environment where you are part of the norm? Where might you be a norm-breaker?

How would you define an inclusive research environment?

What benefits do you think there are to creating an inclusive research culture?

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The motivation for inclusion matters (and behavioural psychology is complex!)

The Business Case

"Diversity makes better science!"

A series of 5 pre-registered studies on job seekers showed:

- LGBTQIA+, women, and Black applicants thought they would experience a lower sense of belonging
- Bias increased amongst in-group members (!)

The Moral Case

"Inclusion is the right thing to do."

Do you like being included?

Do you want your trainees to reach their full potential?

Perspectives of inclusion *in* research can benefit marginalized groups in society impacted by the research results.

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Georgeac and Rattan, 2023. The business case for diversity backfires: Detrimental effects of organizations' instrumental diversity rhetoric for underrepresented group members' sense of belonging. Journal of Personality and Social Psychology 124(1), 69.

Bias as a habit

According to behavioural psychology, automatic implicit bias exists in everyone

But!

What determines the expression of bias is learned behaviour – the habit of challenging the automatic component of bias

Individuals can change the expression of bias in their institution by challenging it.



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Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology, 56*(1), 5–18. https://doi.org/10.1037/0022-3514.56.1.5

Challenging automatic bias: Research leaders as gardeners of research culture

We can still see the bias of the culture of previous decades:

"I think having all these women around makes it more fun for the men but they're probably less effective."

- James Watson, **2012.**

"Let me tell you about my trouble with girls. Three things happen when they are in the lab: you fall in love with them, they fall in love with you and – when you criticise them – they cry."

- Sir Tim Hunt, **2015**.



Without intentional work to create an inclusive culture, we risk replicating the unjust structures of the past by default.

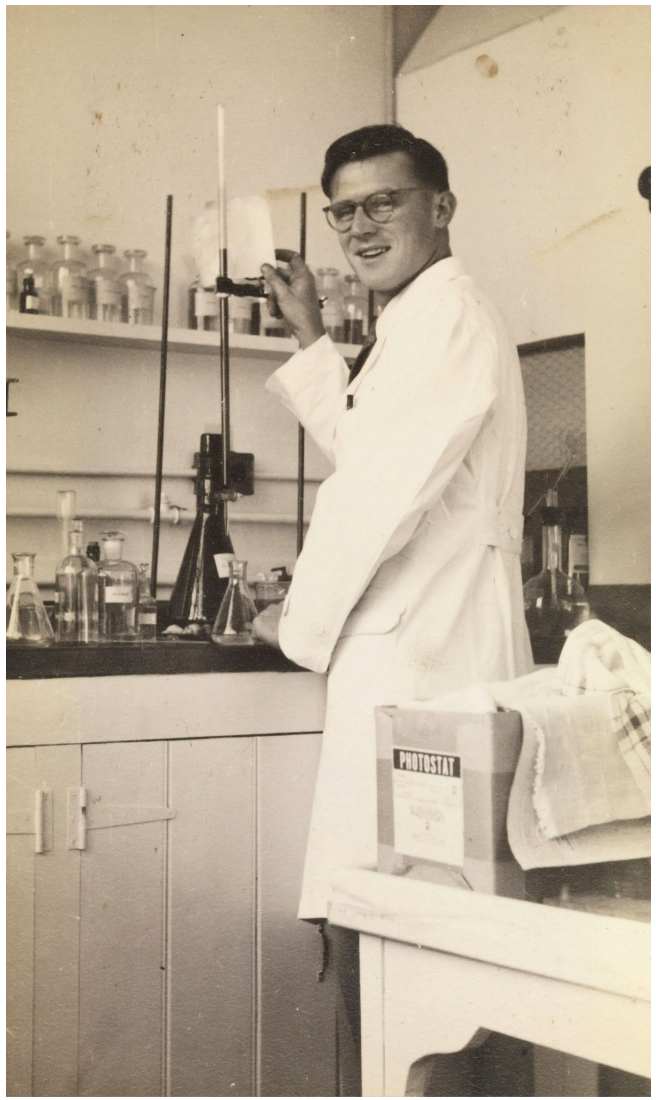
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How can we weed out expression of automatic bias?

- Learn 6 types of bias
- Practice identifying these
- Identify strategies for challenging automatic bias and intentionally creating more inclusive research cultures

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Scenario



Jim has received an ERC starting grant and can hire his first three PhD students!

What might he do to create an inclusive research culture in his lab?

What obstacles or challenges do you think he might encounter?

Norms that lead to stress, time pressure, poor sleep, burnout and substance abuse reduce the opportunity to challenge automatic bias.

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L. J. Gill and M. A. Olson (2023) A dual-process framework for diversity training to reduce discrimination in organizational settings *Social Issues and Policy Review* **17** (1), 79-103

Six types of bias

Bias	Definition	Sounds like…
1. Expectancy Bias	Bias in analysis or judgment caused by expecting an individual to behave in accordance with the group stereotype	“Women always put family before career.”
2. Prescriptive norms	Moves beyond expectancy bias based on stereotypes to include how an individual should or should not behave	“People from Canada should be nice and polite.”
3. Occupational role congruity	Qualities deemed to be essential for certain roles produce role congruity for those applying for and working in those positions, and disadvantage those who don’t conform	“I thought you were a PhD student. You’re too young to be a PI!”

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Six types of bias

Bias	Definition	Sounds like…
4. Reconstructing credentials	Inadvertently adjusting the value of applicant's credentials based on stereotype	"Steve has a PhD, but its from some rural American university I've never heard of."
5. Stereotype priming	When information is provided that activates a stereotype before a decision-making process, influencing the decision	"Malin is a compassionate and enthusiastic researcher." ***
6. Stereotype threat	When negative stereotypes associated with a group cause indivduals to perform below their actual abilities	"My work isn't good enough to apply for the oral presentation."

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***Chang, VY et al. (2023) Approaches to address bias in letters of recommendation Trends in Pharmacological Sciences, Volume 44, Issue 6, 321 - 323

Readers' Theatre – Identifying gender-based bias, case study #1

Roger



Jennifer

Brian

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Readers' Theatre – Identifying gender-based bias, case study #1

Expecting an individual to behave according to a stereotype

1. Expectancy bias

- How might expectancy bias have influenced these reactions to Janet leaving?
- Have you seen or heard of similar in your department, field, or university?

Prescribing an individual should behave according to a stereotype

2. Perscriptive norms and role incongruity

- How might prescribed gender norms and role incongruity have influenced Janet's position?
- What challenges might junior faculty face when negotiating the potential impact of prescriptive norms and role incongruity?
- Do senior faculty face similar or different challenges?

Disadvantaging individuals who don't conform to the qualities of a role.

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Fika break!



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Readers' Theatre – Identifying gender-based bias, case study #2

Daniel

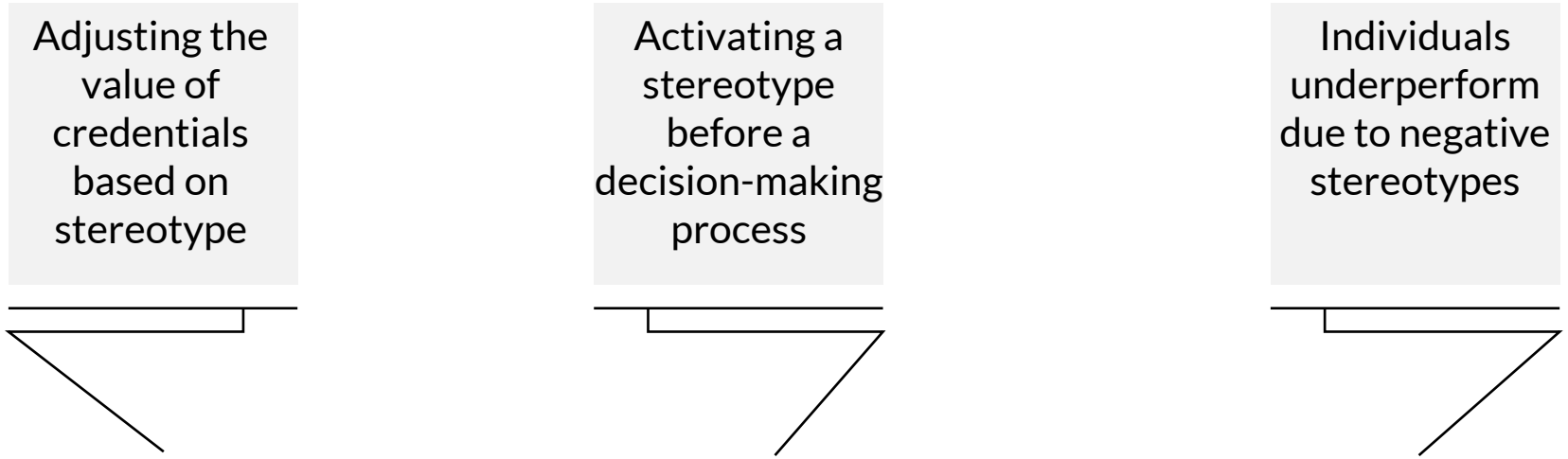
Melissa



Sandra

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Readers' Theatre – Identifying gender-based bias, case study #2



3. Reconstructing credentials, Stereotype priming, and stereotype threat

- How might stereotype priming have influenced the interview panel?
- How might stereotype threat have affected Dr. Thompson?
- To what extent might reconstructing credentials have been involved in the award decision?
- How might you alter the program announcement, the environment of the interview, or the review process to mitigate the impact of stereotypes?

Bias replacement strategy 1: Stereotype replacement

What to do

1. Recognize when you or someone else has a biased, stereotypic response
2. Identify the response as stereotypical, and any precipitating factors
3. Challenge the portrayal and replace with a non-stereotypic response

What it sounds like

"The prefect mentioned Anton being a very young PI as a reason for his grant application not to progress further."

"This sounds like reconstructing credentials, expectancy bias, role congruity, and prescriptive norms."

"Most of the previous recipients of this grant have been established scientists."

"Anton is a qualified scientist who has published some groundbreaking research. It's training and experience, not age, that predicts when people are ready to apply for grants."



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Bias replacement strategy 2: Positive counterstereotype imaging

What to do

1. Recognize when you or someone else has a biased, stereotypic response
2. Identify and label the cognitive processes that may be at work
3. Find several examples of people who counter this stereotype

What it sounds like

"Today I just assumed that group of girls would need help with fundamentals in my programming for biologists class."

"I might be reconstructing credentials, using role congruity, and using perscriptive norms."

"Looking at an article on influential women in computer science, Joy Buolamwini, Katherine Johnson, Jeanette Wing, Margaret Hamilton, and Sister Mary Kenneth Keller were all instrumental in this field! There are many examples of women doing brilliant computer science work."



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Bias replacement strategy 3: Individuating

What to do

1. Slow down and take your time to avoid biases that can have consequences for others

2. Get more information on qualifications, experience, and achievements of individuals

What it sounds like

"It might save time, but I won't ask Maisoora to write her own letter of recommendation. That risks stereotype priming and stereotype threat. She should be recommended based on the strengths of her PhD project."

"I'm going to ask my new colleagues to tell me about the research projects they've worked on at the departmental lunches."



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Bias replacement strategy 4: Perspective-taking

What to do

1. Adopt the perspective of someone in the stereotyped group to recognize how that person may be treated unfairly.

2. Seek out information from those with lived experience different to your own.

"Watch good movies, read good books!"

What it sounds like

"This article from a neurodivergent researcher says she struggles with overstimulation. If that were me, I can imagine our open office arrangement would be overwhelming to work in."

"Muslim researchers on Bluesky are talking about how it's frustrating when departmental social activities only revolve around drinking. I can imagine how isolating it would feel if that were me."

"Mia's masters' student had to correct people that South Africa is not a third world country in a departmental seminar about Open Access publishing. I would be annoyed and angry if I had to publically correct ignorance about simple facts!



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Bias replacement strategy 5: Increasing opportunities for contact

What to do

1. Seek out opportunities to be part of diverse groups –high authortity women, women of colour, people with disabilities, people of different religions, people from all over the world!

"Make new friends."

"I'm going to take the opportunity after her talk to meet with Emmanuelle Charpentier to discuss my research."

"I'm going to join the Diversity Equity and Inclusion committee to learn and work with my commitment to diversity."

"I'm going to ask the Queer in Science meetup organizers at this conference how I can support their meetup as an ally."



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What can we do right now?

- Take a few minutes to reflect individually
- Write down answers to the following questions with one way you can help overcome bias inside (and outside!) your current research environment

I commit to overcoming bias in my research environment in the following way…

I commit to overcoming bias in my personal life in the following way…

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M. Carnes et. al. (2015) Effect of an Intervention to Break the Gender Bias Habit for Faculty at One Institution: A Cluster Randomized, Controlled Trial, *Academic Medicine* **90** (2), 221-230.

Does this matter?

Sometimes you might hear “individual solutions cannot fix structural problems”

Controlled study of 92 STEM departments found:

- Structural problems require changes at multiple levels, but individuals in institutions drive change
- A few individuals working towards more inclusive environments can influence departmental practices and culture and leverage wider change.

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M. Carnes et. al. (2015) Effect of an Intervention to Break the Gender Bias Habit for Faculty at One Institution: A Cluster Randomized, Controlled Trial, *Academic Medicine* **90** (2), 221-230.