

The Laws of Physics are not Enough for Social Justice

Dr Kenneth Y. Wertheim (they/them)

Also known as 11250205

29/09/2026 and 02/10/2026





Dr Kenneth Y. Wertheim (11250205)

- MEng (Hons), MS, PhD, PCAP, FHEA.
 - Aracial, acultural, and agender global citizen.
 - Pronouns: they/them.
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- Systems theorist researching biological, social, and intelligent systems.
- Lecturer in data science, artificial intelligence, and modelling.
- Social justice advocate and the school's equality, diversity, and inclusion (EDI) champion.
- Yoga teacher (200RYT).
- Mental health first aider (MHFAider®).



EDI shoe shop



Equality means everyone has a pair of shoes.

Equity means everyone has a pair of shoes that fit their feet.



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Diversity means everyone wears different shoes.



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Equity means everyone has a pair of shoes that fit their feet.

Diversity means everyone wears different shoes.

Inclusion means everyone is valued regardless of what shoes they wear.

A reputable shoe shop must
comply with legal requirements.



Equality Act 2010

2010 CHAPTER 15

An Act to make provision to require Ministers of the Crown and others when making strategic decisions about the exercise of their functions to have regard to the desirability of reducing socio-economic inequalities; to reform and harmonise equality law and restate the greater part of the enactments relating to discrimination and harassment related to certain personal characteristics; to enable certain employers to be required to publish information about the differences in pay between male and female employees; to prohibit victimisation in certain circumstances; to require the exercise of certain functions to be with regard to the need to eliminate discrimination and other prohibited conduct; to enable duties to be imposed in relation to the exercise of public procurement functions; to increase equality of opportunity; to amend the law relating to rights and responsibilities in family relationships; and for connected purposes.

[8th April 2010]

(Equality Act 2010)

Protected characteristics:

- Age.
- Race.
- Disability.
- Religion and belief.
- Sex (biological).
- Sexual orientation.
- Gender reassignment.
- Marriage and civil partnership.
- Pregnancy and maternity.



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Direct discrimination.



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Indirect discrimination.



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Direct discrimination.

Indirect discrimination.

Harassment.



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Direct discrimination.

Indirect discrimination.

Harassment.

Victimisation.

Why are equality/equity, diversity,
and inclusion so hard to achieve?



Universities violate the
cosmological principle

The cosmological principle states that the universe is homogeneous and isotropic.



- However, a university is **neither homogeneous nor isotropic** because it is both a product of and a contributor to an unequal society.



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- 2017–2020 survey of over 7000 US-based faculty members. Up to **25 times more likely to have a parent with a PhD** (Morgan *et al.*, 2022).



- However, a university is neither homogeneous nor isotropic because it is both a product of and a contributor to an unequal society.
- 2017–2020 survey of over 7000 US-based faculty members. Up to 25 times more likely to have a parent with a PhD (Morgan *et al.*, 2022).
- Students from **more affluent regions** in the South are **overrepresented at prestigious UK universities** than students from the deprived North (Edwards, 2025).

Merit does not follow the
Boltzmann distribution

The Boltzmann distribution says that two states with the same energy level are equally probable.

Shakuntala Devi (Jensen, 1990)



(Central News Agency, 1968)

-
- By contrast, two **equally talented** individuals are **not** **equally likely to succeed**.



(Central News Agency, 1968)

Shakuntala Devi (Jensen, 1990)

- Born in Bangalore in 1929.
- Advanced cognitive ability as a kid.
- Father was a magician. **Became a stage performer.**

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- Merit is contingent on **favourable circumstances**.



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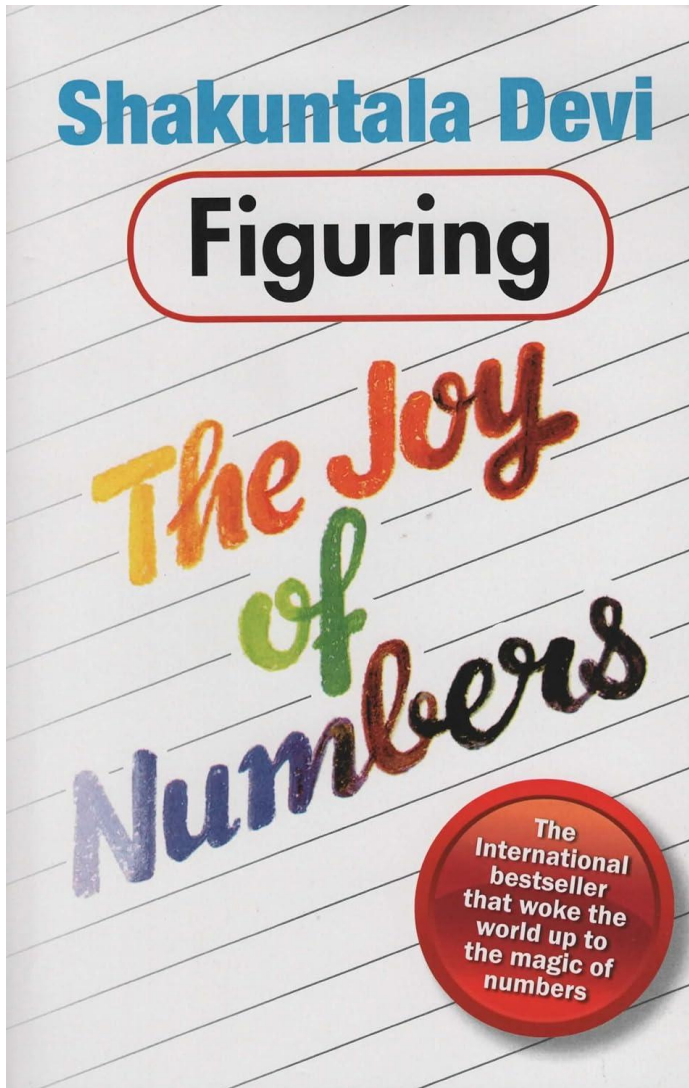
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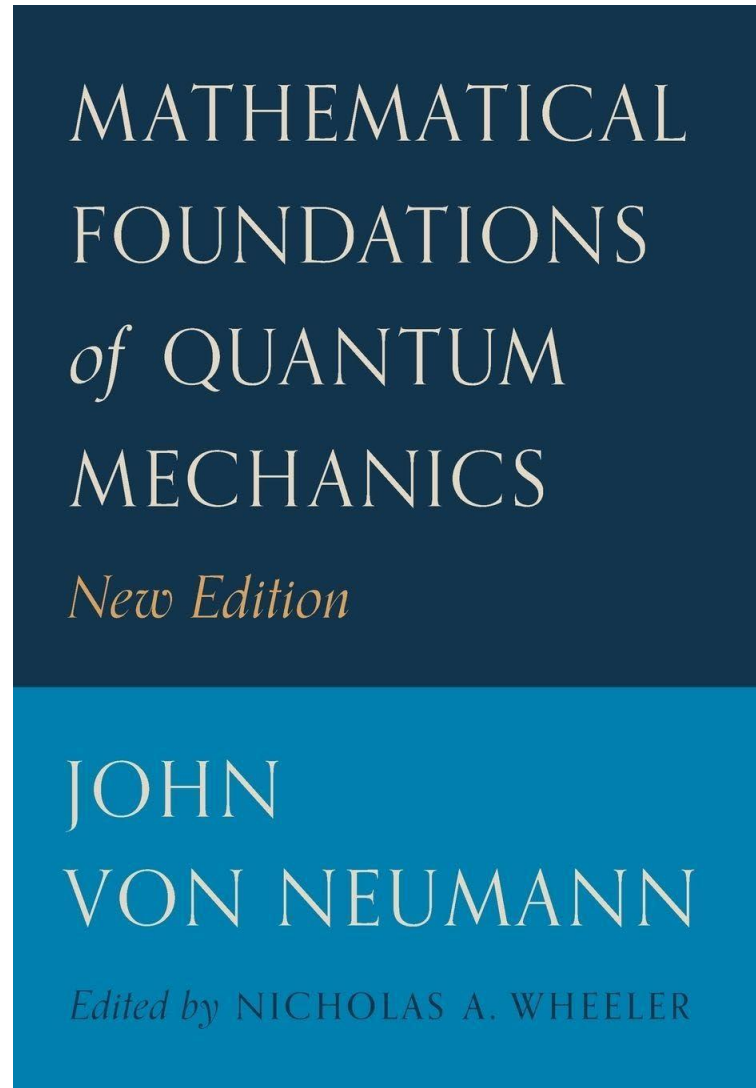
- Merit is contingent on favourable circumstances.

- Some people need **extra help (equity)**.

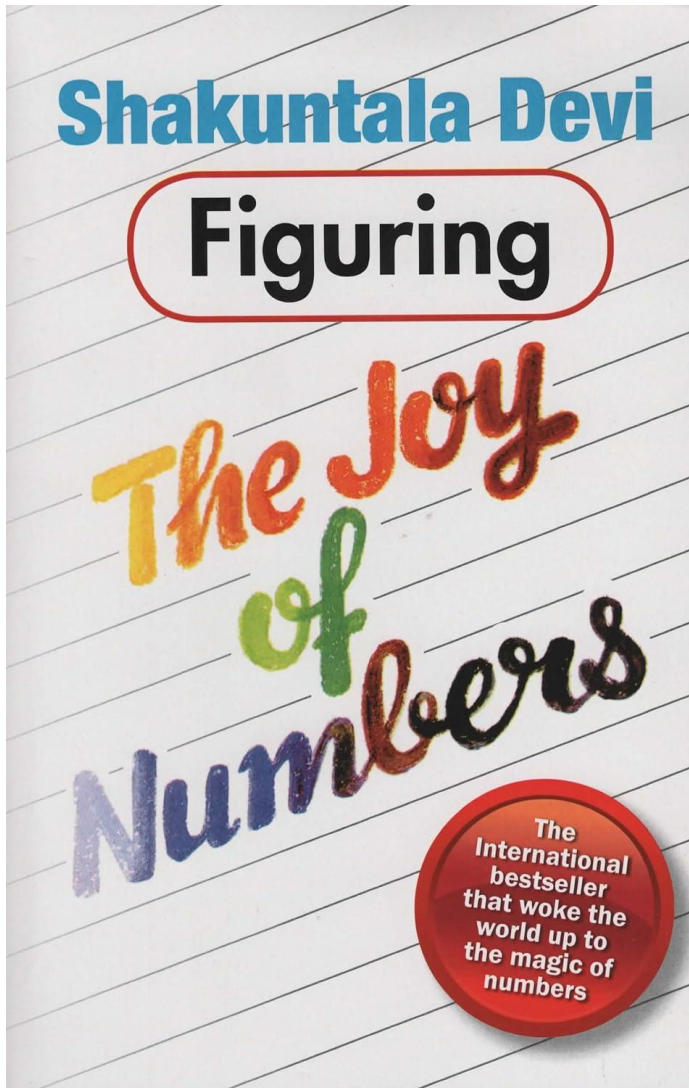
Besides, merit is not objectively defined or conserved like energy.



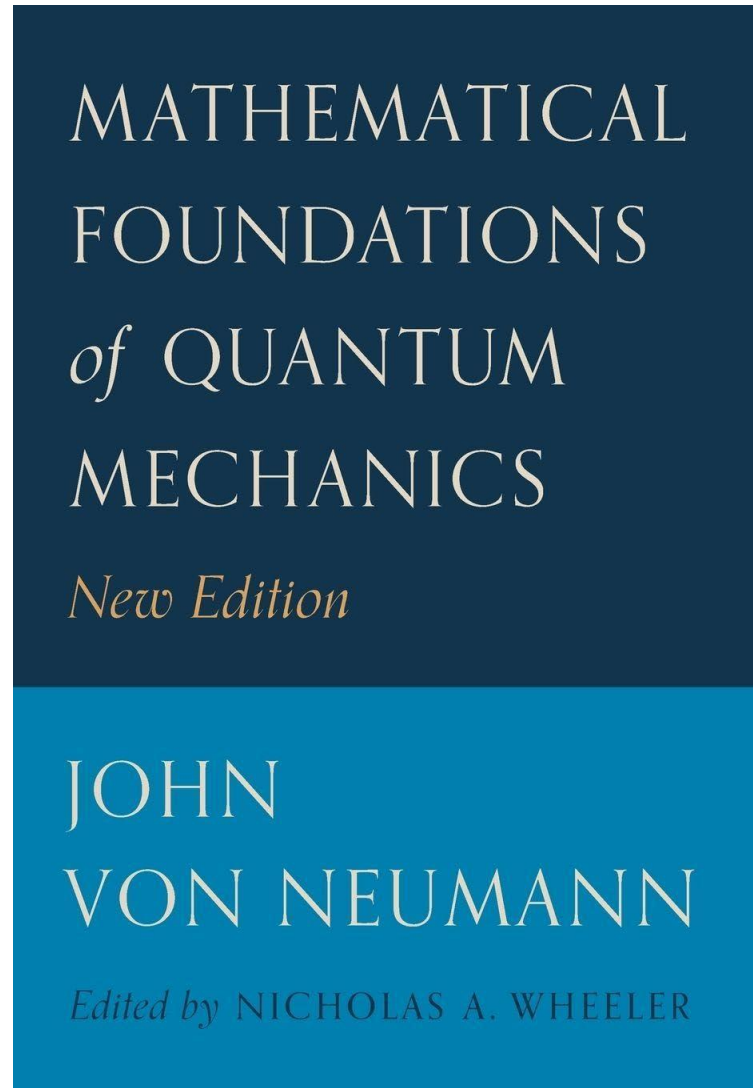
(Devi, 2005)



(Von Neumann, 2018)

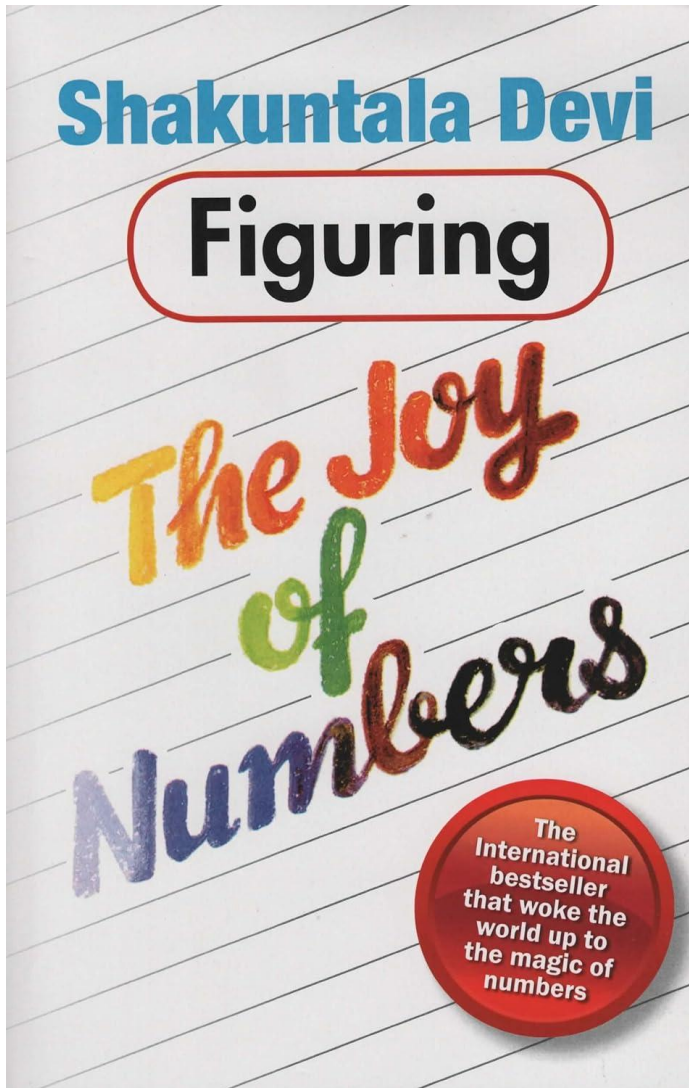


(Devi, 2005)

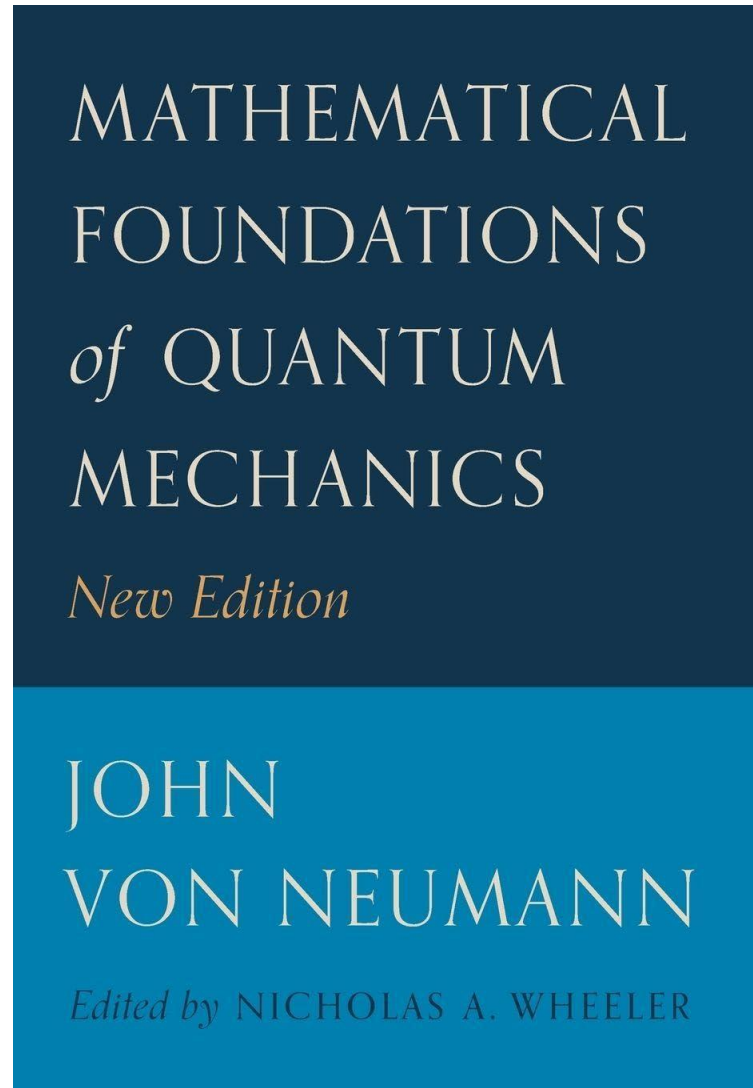


(Von Neumann, 2018)

- Society requires different contributions (diversity).



(Devi, 2005)



(Von Neumann, 2018)

- Society requires different contributions (diversity).
- Society needs to show more **appreciation for alternative contributions (inclusion)**.

Microaggressions do not
obey inverse-square
laws

Coulomb's law is an inverse-square law.

$$|F| \propto \frac{|q_1||q_2|}{r^2}$$

Microaggressions in Everyday Life

Race, Gender, and
Sexual Orientation

Derald Wing Sue

(Sue, 2010)

Microaggressions are the **concrete ways** in which **social injustices** such as racism **are delivered** in daily life (Pérez Huber & Solorzano, 2015).

- Way more complex than an inverse-square law.

Microaggressions in Everyday Life

Race, Gender, and
Sexual Orientation

Derald Wing Sue

Delivered in **many different forms**.
Verbal, behavioural, environmental,
and more (Sue *et al.*, 2007). **Resistant
to precise definition.**

- Way more complex than an inverse-square law.
- Examples: racial epithets, always assigning technical tasks to East Asian people, a building without an access ramp, and more.

Microaggressions in Everyday Life

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Derald Wing Sue

Brief, frequent, and cumulative indignities targeting minoritised groups (Pérez Huber & Solorzano, 2015; Sue et al., 2007). Attribution is challenging.

- Way more complex than an inverse-square law.
- Examples: racial epithets, always assigning technical tasks to East Asian people, a building without an access ramp, and more.
- Death by a thousand cuts.

Microaggressions in Everyday Life

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Derald Wing Sue

Sometimes **unintentional**, they often occur in **private and spontaneous** interactions (Sue *et al.*, 2007).
Complaint procedures are ineffective.

- Way more complex than an inverse-square law.
- Examples: racial epithets, always assigning technical tasks to East Asian people, a building without an access ramp, and more.
- Death by a thousand cuts.
- No clear motive and material evidence.

Microaggressions in Everyday Life

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Derald Wing Sue

(Sue, 2010)

They are hurtful because of **hidden and intersectional meanings** (Pérez Huber & Solorzano, 2015). **Interpretation of the incident is itself traumatising.**

Microaggressions in Everyday Life

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Derald Wing Sue

After a Maths exam and an English exam, an English student asks a Japanese student, 'How did you find English?'

Microaggressions in Everyday Life

**Race, Gender, and
Sexual Orientation**

Derald Wing Sue

After a Maths exam and an English exam, an English student asks a Japanese student, 'How did you find English?'

- Comparison with repeated and painful life experiences in similar situations.

Her Japanese accent has repeatedly been described as incomprehensible, but a classmate's French accent has been described as sexy by multiple popular classmates.

Hidden discriminatory meaning: 'Japanese people are third-class English users.'

Microaggressions in Everyday Life

**Race, Gender, and
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Derald Wing Sue

After a Maths exam and an English exam, an English student asks a Japanese student, 'How did you find English?'

- Comparison with other members of one's minoritised group despite differences.

Another Japanese student speaks English with an American accent. The English student does not question him.

Intersectionally discriminatory meaning: 'Some Japanese students are worth more and I get to decide.'

Microaggressions in Everyday Life

**Race, Gender, and
Sexual Orientation**

Derald Wing Sue

After a Maths exam and an English exam, an English student asks a Japanese student, 'How did you find English?'

- Contextualising the incident in institutional policies and dominant ideologies.

In Japan, she learnt English from a linguistic point of view. She just took an exam about Jane Austen.

Institutionally discriminatory meaning: 'The system was built for me, not for people like you.'

Did it happen? Can I prove it? Will a response or complaint be worth it? Inverse-square laws cannot answer these questions.

Construction workers do
not get paid more for
standing higher up on a
scaffold.



- Exams, assignments, and job applications are **scaffolds for self-improvement**.

Stephen Hawking was only awarded a first-class degree at his professors' discretion (Ferguson, 2011).



- Exams, assignments, and job applications are scaffolds for self-improvement.
- Your **position on a scaffold** does not determine the **value of the eventual flat**.



- Exams, assignments, and job applications are scaffolds for self-improvement.
- Your position on a scaffold does not determine the value of the eventual flat.
- **Unite with the other construction workers** to build a good house and dismantle the scaffold.

Bystanders are responsible for **microinterventions** to counter microaggressions.

Microaggressions in Everyday Life

**Race, Gender, and
Sexual Orientation**

Derald Wing Sue

(Sue, 2010)

Microaggressions hurt through hidden meanings, so **make the 'invisible' visible** (Sue *et al.*, 2019).

For example, a black patron is being ignored by a waiter in favour of a white patron who arrived second.

The white patron should say, 'This gentleman arrived before me.'

Microaggressions in Everyday Life

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Derald Wing Sue

Clearly offensive microaggressions should be **disarmed directly** (Sue *et al.*, 2019).

For example, a woman has been appointed CEO. Someone says, 'She only got the job because of her gender.'

A bystander should say, 'Ouch!'

Microaggressions in Everyday Life

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Derald Wing Sue

Preempt microaggressions by explaining why they are harmful in public (Sue *et al.*, 2019). **Discuss impact, not intent.**

For example, at the start of a trimester, a lecturer can tell a story about an autistic student being bullied in the previous year.

The lecturer can conclude, 'Autistic people bring unique strengths and insights to group projects. You don't want them to stop coming to class.'

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(Sue, 2010)

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The
Economist



THE NEW YORKER

Two useful resources for learning more about the state of this unequal world.

Microaggressions in Everyday Life

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Sexual Orientation

Derald Wing Sue

Social injustice is a **systemic problem**.
You cannot beat it on your own, so
building **support networks** is not
optional (Sue *et al.*, 2019).

Microaggressions in Everyday Life

Race, Gender, and
Sexual Orientation

Derald Wing Sue

Social injustice is a systemic problem. You cannot beat it on your own, so building support networks is not optional (Sue *et al.*, 2019).

Whether you are privileged or disadvantaged is relative to your social group.

If you do not feel valued in one group, find and spend more time in another group.

- Part-time job.
- Volunteer for a charity shop.
- Clubs and societies.
- Beginner language class.

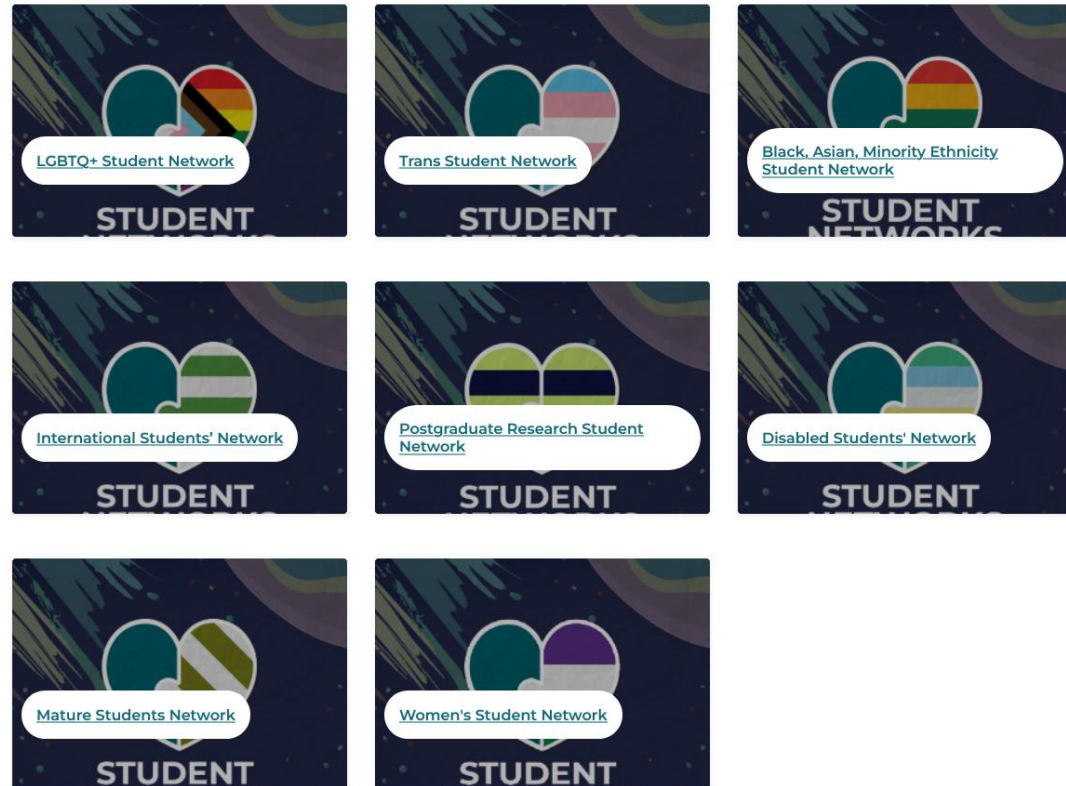
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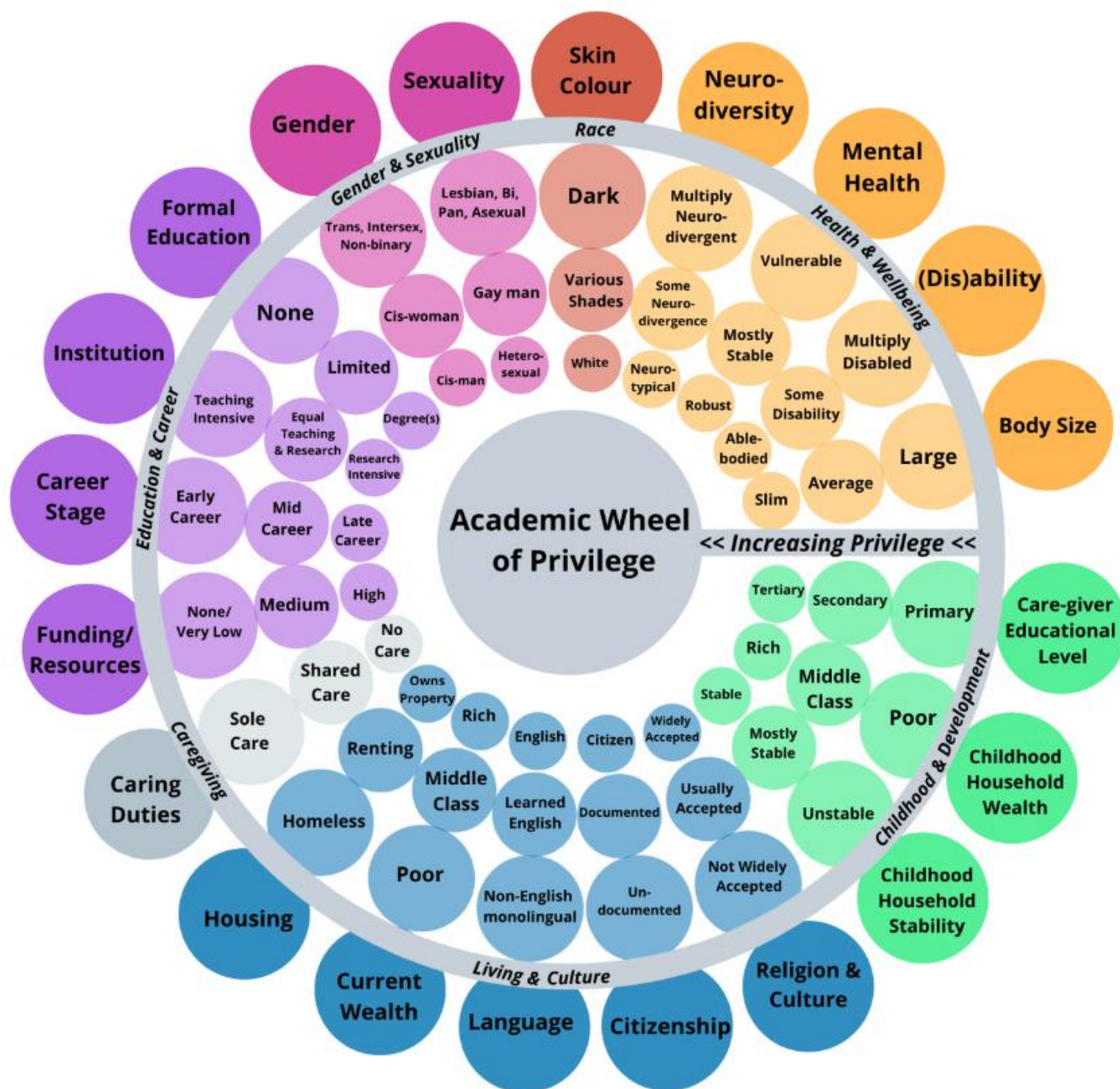
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Optional activity: wheel
of privilege.



- In what ways are you privileged and in what ways are you disadvantaged?
- What have you done to advance social justice?
- What can be done to improve equality/equity, diversity, and inclusion?

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