

Unconscious Bias- a barrier into STEM?

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What will you need?

- ✓ Pen
- ✓ paper

Who's in the room?

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Aims

Wednesday 4th March 2020

Address common
errors in thinking

Address the role of
unconscious bias
and stereotypes

Reflect on current
practice and policy
departments

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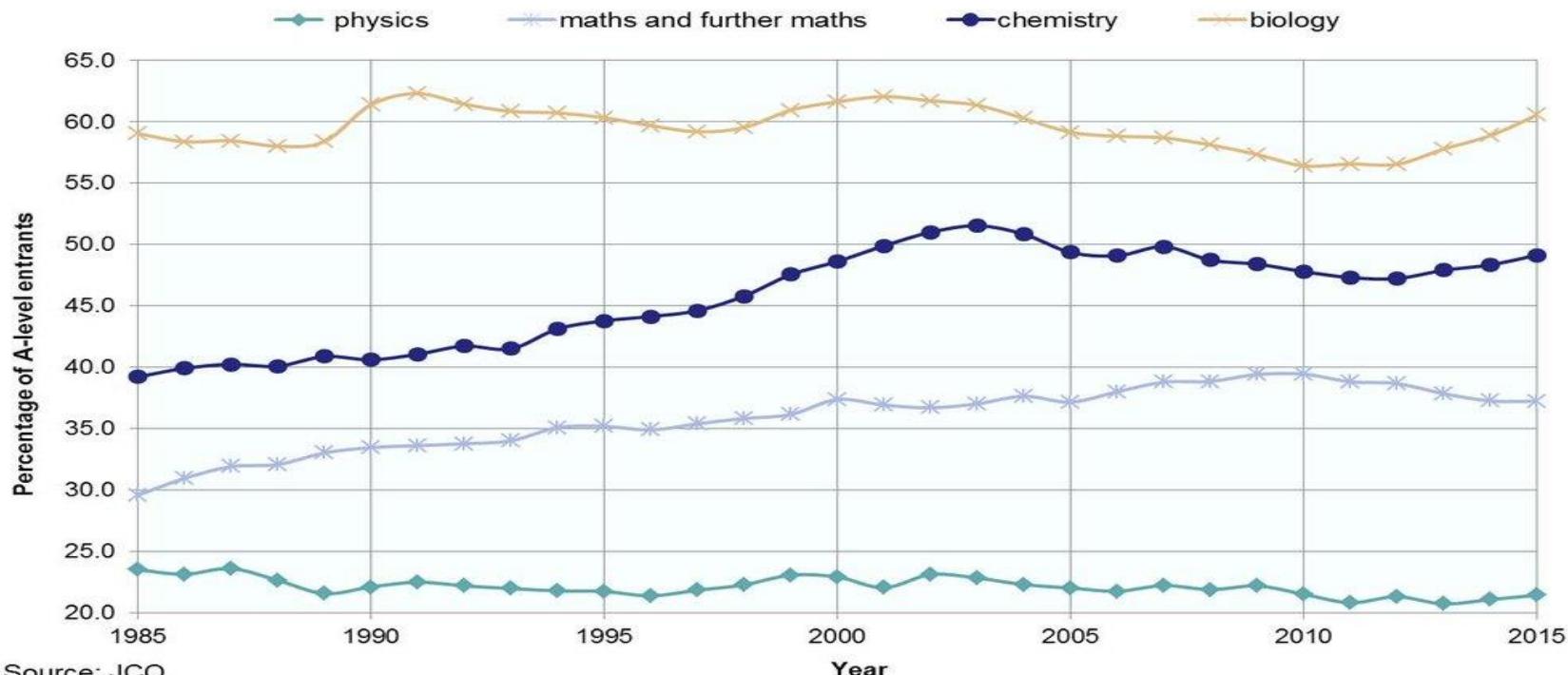
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The current position

Percentage of girls in STEM subjects

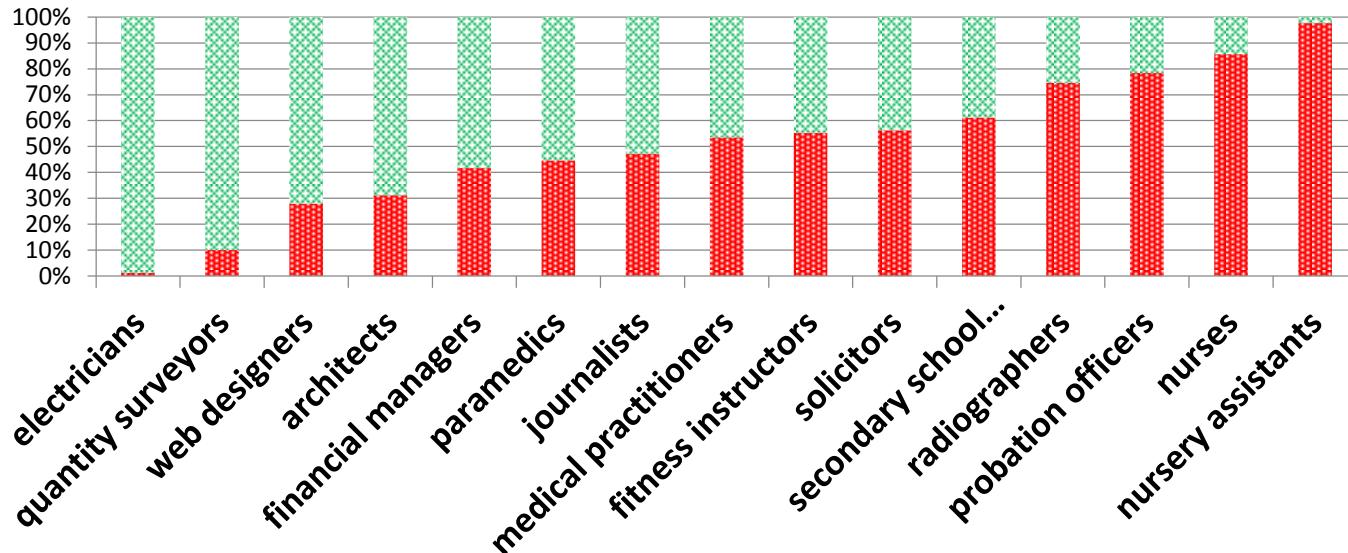


What is the issue and what is the IOP doing?

- The Institute of Physics is working to understand and address the issue of girls under representation in physics post-16.
- Nationally, around 20% of A level physics students are female and this hasn't changed for 30 over years
- We know that this is not about capability
- Our research shows that young people make very stereotypically gendered subject choices
- We believe that this has detrimental effect on both boys and girls.

Gendered Workforce- 2018

The Gendered UK Workforce using data from Working Futures 2018



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Subject Entry by Gender

Differences between male and female A level subject choices - Summer 2019



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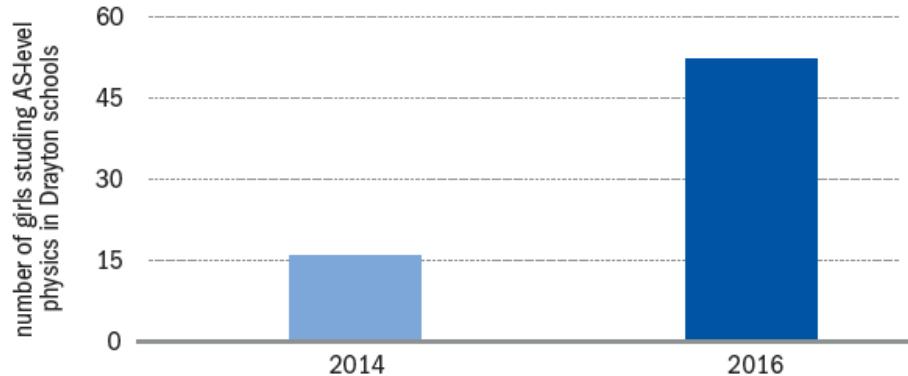
Our research



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Our impact

Drayton KPI: increase A-level physics uptake among girls.



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Errors in thinking

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Close your eyes



A builder is hard at work when a concrete slab falls on the worksite. The builder is injured but not seriously, a nurse on their way to work rushes to help with first aid. A doctor from the same hospital sees the commotion and runs to help as well. The builder's romantic partner is called and turns up to find a calm situation and thanks the doctor and nurse for their help. However, they were thanked differently, one with a handshake and one with a hug

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The logo for the Department for Education, featuring a crest with a figure and the text "Department for Education".



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Who is who?

| Person | Male | Female | Can't picture it |
|--------------------------|------|--------|------------------|
| The builder is | | | |
| The nurse is | | | |
| The Doctor is | | | |
| The Builder's partner is | | | |

Hug or a handshake?

A pattern making machine

Our brain is an awesome pattern-making machine

Prevents us from
receive

It may uncon

For example

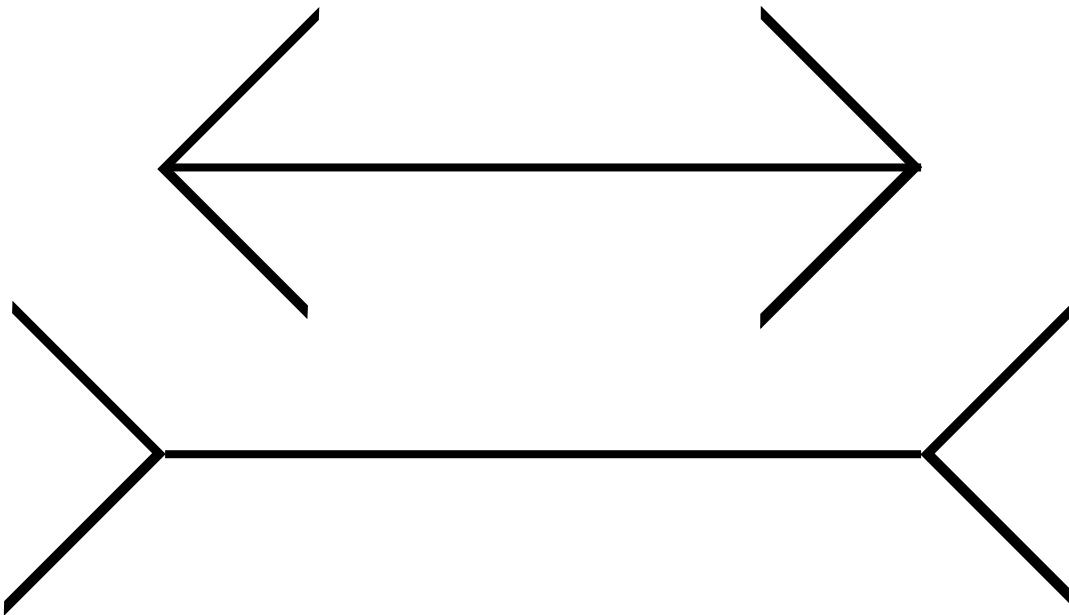
- Our assu
- Our expe
- How we tr



from the information we

our or decisions

Our brain tricks us



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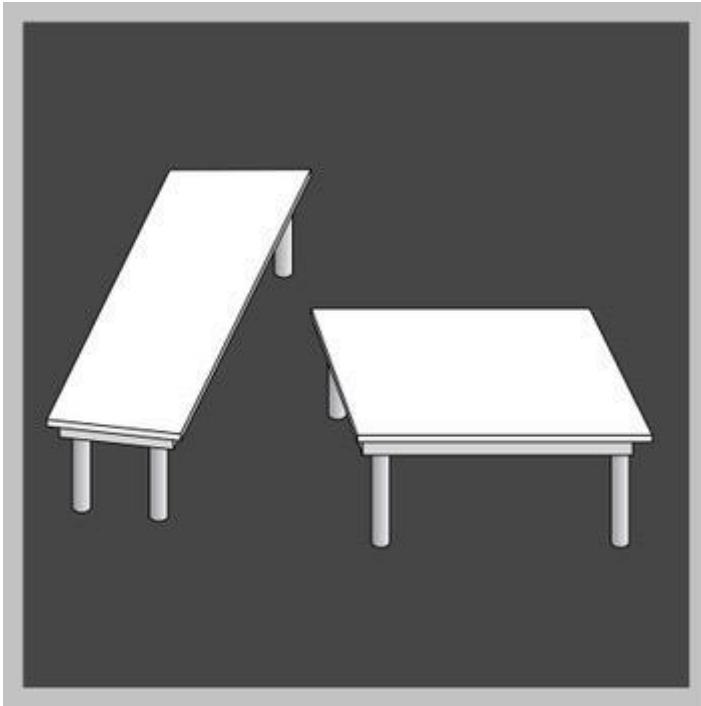
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Optical illusion



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Optical illusion

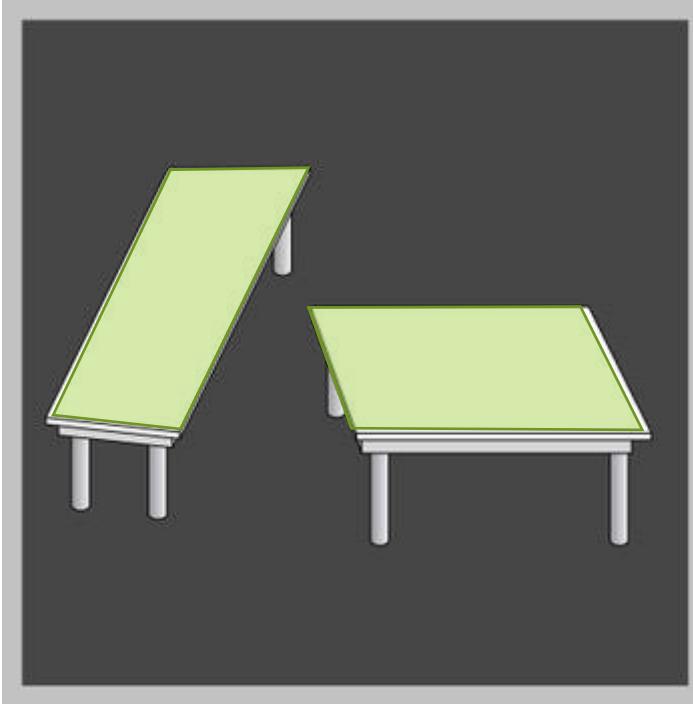


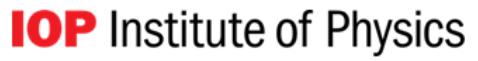
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Fundamental attribution error



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But when someone else behaves in the same way!



Fundamental attribution error

- When I do something unreasonable – there is a reasonable explanation
- When someone else does something unreasonable you ‘attribute’ it to their character – they’re an idiot etc
- You forget that they too might have a reasonable explanation for their behaviour

Ultimate attribution error

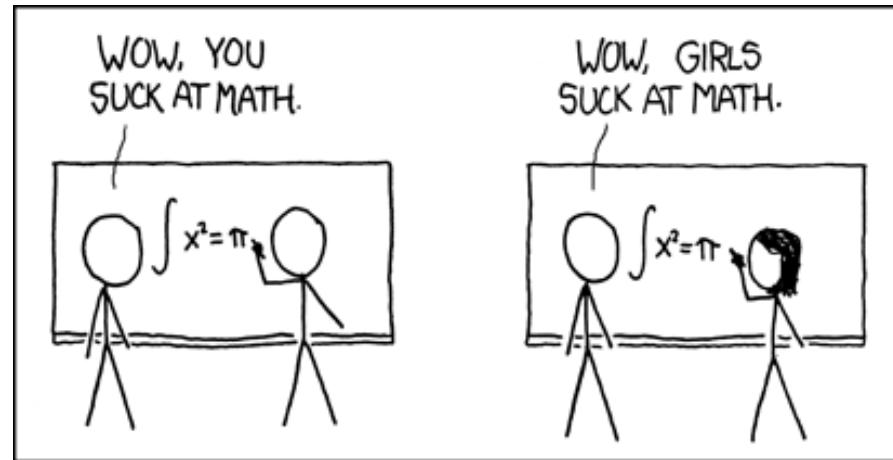
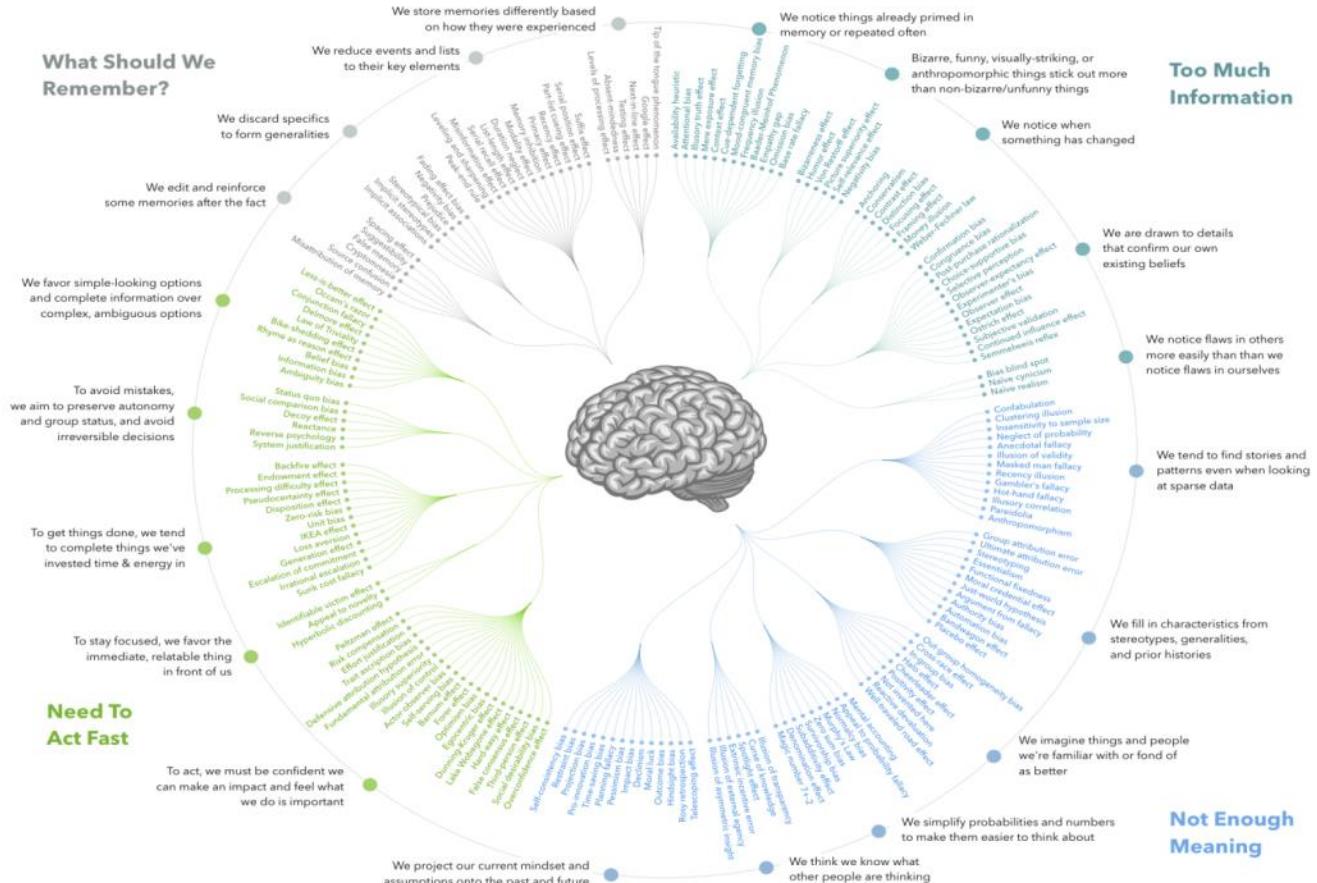


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<https://xkcd.com/385/>

COGNITIVE BIAS CODEX



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Physics

An experiment...

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Group 1 – read the next slide silently (green)

Group 2 – turn away now so you cannot see the screen (pink)

Group 1: Please read this silently

Question A:

Does this room cost
more than £50 per
night?

Write your answer on
your post it note.



Double bedroom suite, city centre location,
panoramic views, Manhattan, New York.

Swap over

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Group 2: Please read this silently

Question A:
Does this room cost
more than £5500 per
night?

Write your answer on
your post it note.



Double bedroom suite, city centre location,
panoramic views, Manhattan, New York.

Everyone Together

Answer the next question without talking to anyone in another group

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Please read this silently

Question B:

How much would you expect to pay for this room?

Write this down on your post it note



Double bedroom suite, city centre location, panoramic views, Manhattan, New York.

- Bring your post its to the front and line them up in order of price
- Is there a pattern?

Anchoring Bias

*Group 1:
Please read this
silently*

*Question A:
Does this room cost
more than £50 per
night?*

*Write this down on a
piece of paper.*



Double bedroom suite,
city centre location,
panoramic views,
Manhattan, New York.

*Group 2:
Please read this
silently*

*Question A:
Does this room cost
more than £5500 per
night?*

*Write this down on a
piece of paper.*

Unconscious Bias

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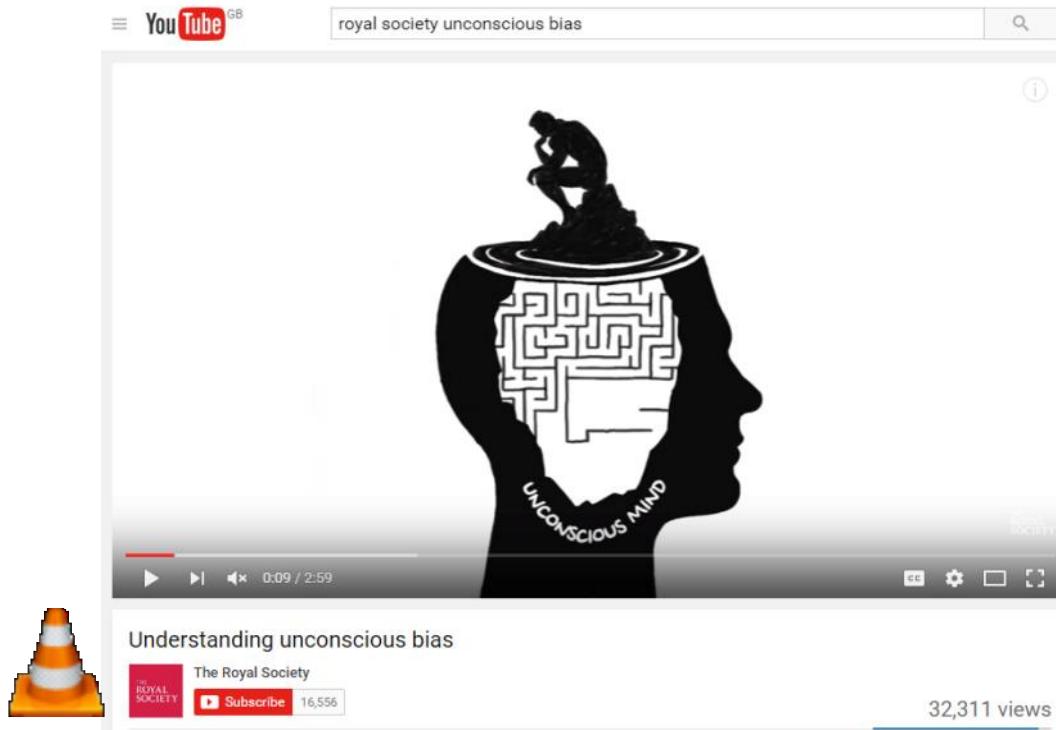
Question

A bat and a ball cost £1.10 in total

The bat costs £1 more than the ball

How much does the ball cost?

What is unconscious bias?



Understanding unconscious bias.mp4

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Unconscious biases

- Everyone has them.
- They are **NOT** your fault and do **NOT** make you a ‘bad’ person.
- Form pigeon holes and processing short
- Based on the sum of our experiences =
- Incredibly quick acting and ma
- Difficult to change but can be ma



Zero
Judgement

Conscious rationalisation needs concentration and energy

It is easier for us to let our minds make most decisions for us. Unfortunately we are prone to making systematic errors in thinking

Thinking systems in the brain

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Thinking systems in the brain

- **Unconscious** – quick decision making – intuitive
 - Makes sense of our world but often makes mistakes
- **Conscious** – rational
 - Less likely to make mistakes but takes time and energy



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Cognitive Effort is mildly unpleasant so we try to avoid it.

Many people are over confident and place too much faith in their intuitions

Thinking fast and slow. Daniel Kahneman

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Asking for advice

- Think of 5 people you would ask for advice
- Then write their initials underneath Person 1...5

| | Gender | Age | Educational level | Organisation | Distance from you (km) | Ethnic origin | First language | Marital status |
|----------|--------|-----|-------------------|--------------|------------------------|---------------|----------------|----------------|
| You | | | | | | | | |
| Person 1 | | | | | | | | |
| Person 2 | | | | | | | | |
| Person 3 | | | | | | | | |
| Person 4 | | | | | | | | |
| Person 5 | | | | | | | | |

Asking for advice

Now fill in the following information about yourself

| | Gender | Age | Educational level | Organisation | Distance from you (km) | Ethnic origin | First language | Marital status |
|-----------|--------|-----|-------------------|--------------|------------------------|---------------|----------------|----------------|
| Your name | Female | 30s | MSc | IOP | 0 | White British | English | Divorced |
| Person 1 | | | | | | | | |
| Person 2 | | | | | | | | |
| Person 3 | | | | | | | | |
| Person 4 | | | | | | | | |
| Person 5 | | | | | | | | |

Asking for professional advice

Go through the list, put a “-” if the person is the same as you or write in the difference

| | Gender | Age | Educational level | Organisation | Distance from you (km) | Ethnic origin | First language | Marital status |
|-----------|--------|-----|-------------------|--------------|------------------------|---------------|----------------|----------------|
| Your name | Female | 30s | MSc | IOP | | White British | English | Divorced |
| Person 1 | - | - | ? | - | 40 | - | - | Married |
| Person 2 | | | | | | | | |
| Person 3 | | | | | | | | |
| Person 4 | | | | | | | | |
| Person 5 | | | | | | | | |

Asking for professional advice

Go through the list, put a “-” if the person is the same as you or write in the difference

| | Gender | Age | Educational level | Organisation | Distance from you (km) | Ethnic origin | First language | Marital status |
|-----------|--------|-----|-------------------|--------------|------------------------|---------------|----------------|----------------|
| Your name | Female | 40s | Postgrad | IOP | | White British | English | |
| Person 1 | - | - | - | UoL | 200km | - | - | |
| Person 2 | - | - | - | - | 350km | White other | - | |
| Person 3 | - | 30s | ? | - | 350km | White other | Spanish | |
| Person 4 | Male | - | - | NU | - | - | - | |
| Person 5 | - | 60s | - | - | - | - | - | |

Asking for advice

Now if you crossed off everyone with 4 or more similarities to you how many people would you have left?



Human's do not like their belief systems challenged!

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Catherine na Nollag
@cafernblue

i still think my favourite thing that's ever happened to me on the internet is the time a guy said "people change their minds when you show them facts" and I said "actually studies show that's not true" and linked TWO sources and he said "yeah well I still think it works"

20:07 · 10 Dec 19 · Twitter for Android

9,164 Retweets 46.8K Likes



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Girls Toys vs. Boys Toys

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Experiments where babies are dressed up as the opposite sex show adults treat boys and girls quite differently

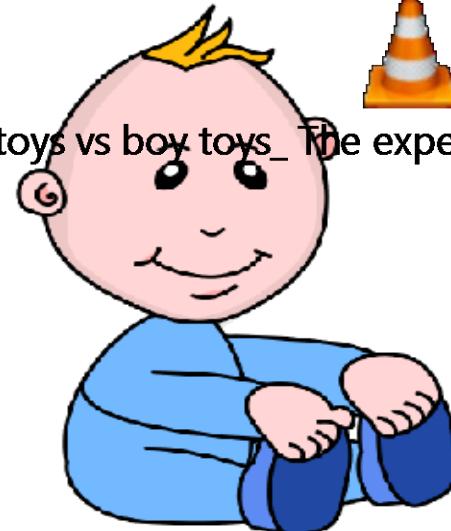
Babies thought to be boys were given cars, trucks and balls

Adults give babies different toys to play with if they think they are a boy or a girl

Babies thought to be girls were given dolls, prams and teddies



Girl toys vs boy toys_ The experiment - BBC Stories.mp4



Brain scans

- Regardless of the cause of observed sex/gender differences in brain and behaviour (nature or nurture), human brains cannot be categorised into two distinct classes of male or female
- Study of over 1400 MRI brain scans
(Joel et al ,2015)

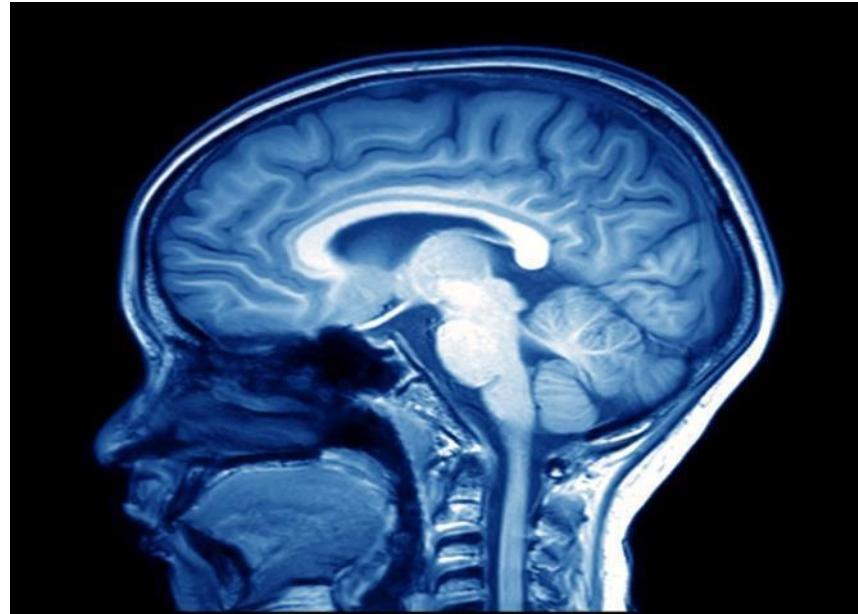
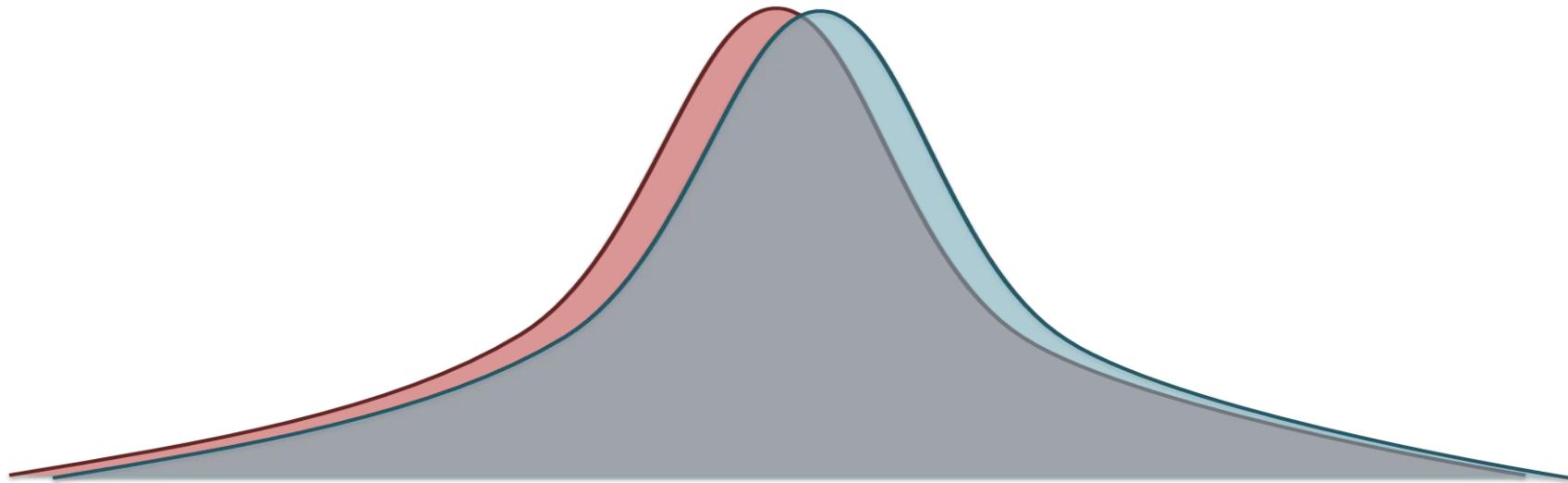


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Greater differences within the sexes than between them



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Where does our unconscious brain get it's information from?

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Pretty girls don't even need to be alive to get some hot princely action.

As a woman, your political worth is reduced to your marriageability.

If you're beautiful enough, you may be able to escape your terrible living conditions by getting a wealthy man to fall for you.

Appearances don't matter; what counts is what's in your heart. Unless you're the girl.

At first it may seem terrible, being so beautiful that other women get jealous enough to try and kill you. But don't worry, once your beauty attracts a man, he'll protect you.

It's okay to abandon your family, drastically change your body, and give up your strongest talent in order to get your man. Once he sees your pretty face, only a witch's spell could draw his eyes away from you.





- Moana and Merida are not too happy about how women are portrayed in traditional children's films!

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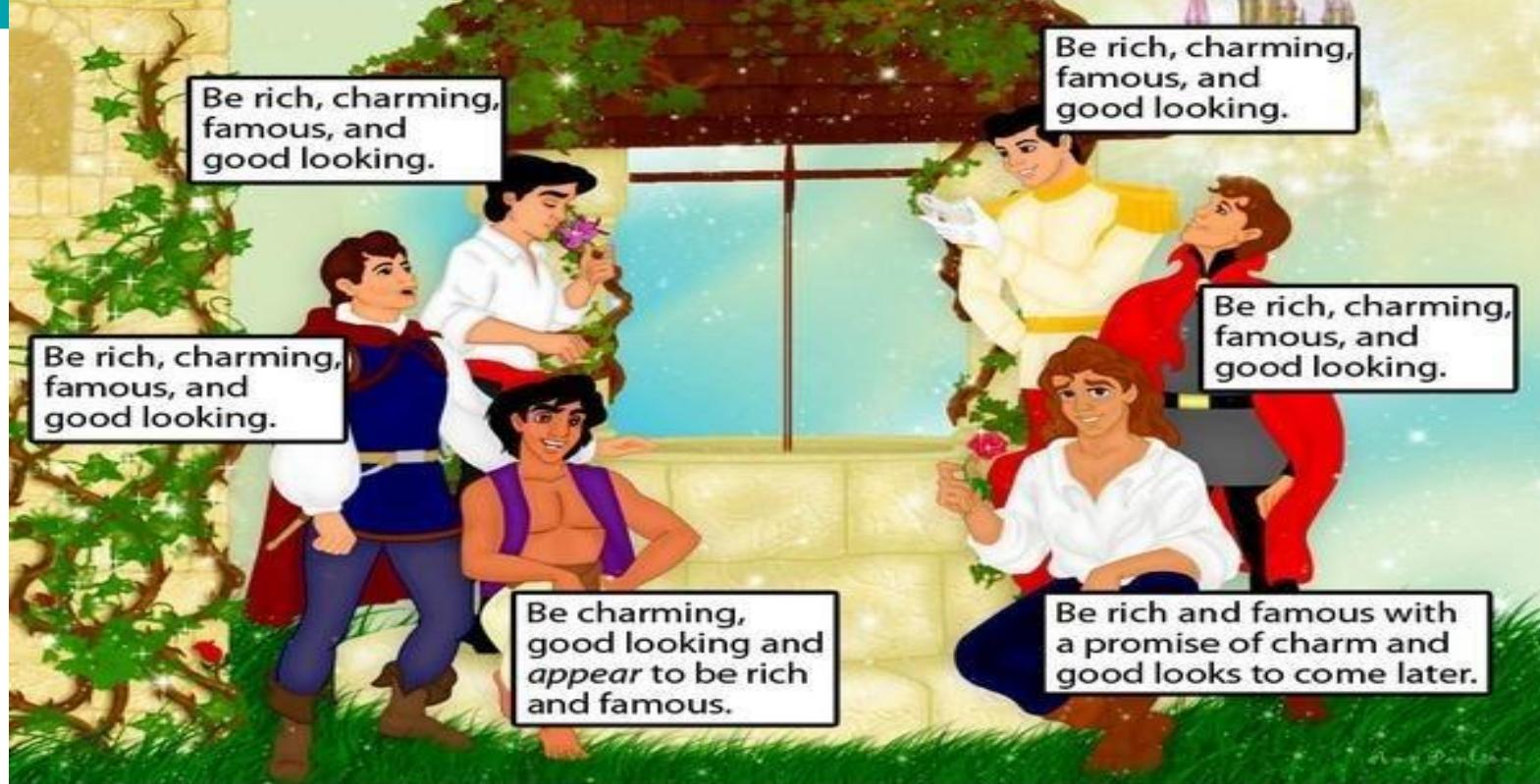
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What Disney princes teach men about attracting women:



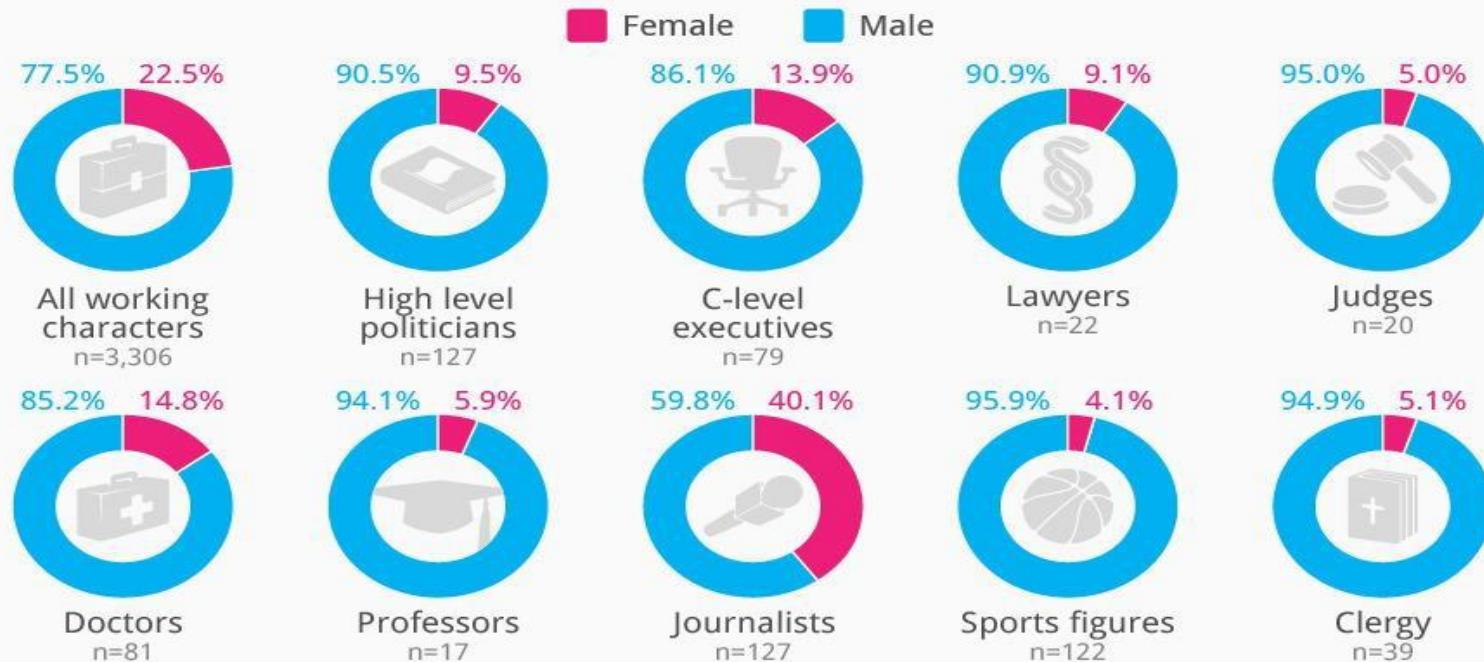
Bonus round: What are these guys' names? (Aladdin doesn't count.)
(Hint: the guy holding the rose is not named "Beast".)



- The Bechdel Test:
- 1. Has to have at least two named women in it
- 2. Who talk to each other.....
- 3. About something, besides a man!

Women Are Vastly Underrepresented in On-Screen Workforce

Workforce gender ratio as displayed in popular films (2010-2013), by occupation*



* Based on a sample of 5,799 speaking or named characters in 120 popular films across the 11 most profitable movie markets worldwide



Source: Geena Davis Institute on Gender in Media

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Mashable statista

The impact of unconscious bias in society

Why does it matter?

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CV
John

Over 100 professors were sent a fake CV to rate for a job



Half the professors were sent John's CV, half were sent Jennifer's CV.

The CVs were identical apart from the name

John was thought to be better at the job than Jennifer

It didn't matter if the professor was male or female

Jennifer was less likely to be hired

John was offered a higher starting salary (\$4000 per year)

The professors were less willing to mentor Jennifer

In schools:

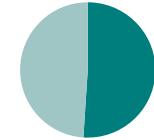


| | Criticised for | Praised for | Result |
|-------|---|--|---|
| Girls | (Receive less negative feedback in general than boys) Work content | Good behaviour Hard work | Loses confidence in academic abilities Blames self |
| Boys | Behaviour | Work content Ideas Understanding | Retains confidence in ability <i>despite</i> criticism Blames external factors |

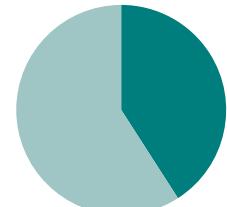
Where all children were given the sort of feedback most often given to girls, they tended to lose confidence in their academic abilities.

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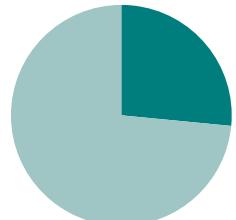
Number in Class



Answers from



Check ups



■ Girls
■ Boys

Why do we care? Musicians



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Why do we care? Healthcare



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Height (and weight) pay gap

- A 5'7" man earns £1,500 less per year than a 5'10" man
- 90% of CEOs are above average height
- A woman a stone heavier likely to earn £1,500 less per year than another woman of the same height



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Pedestrian crossings



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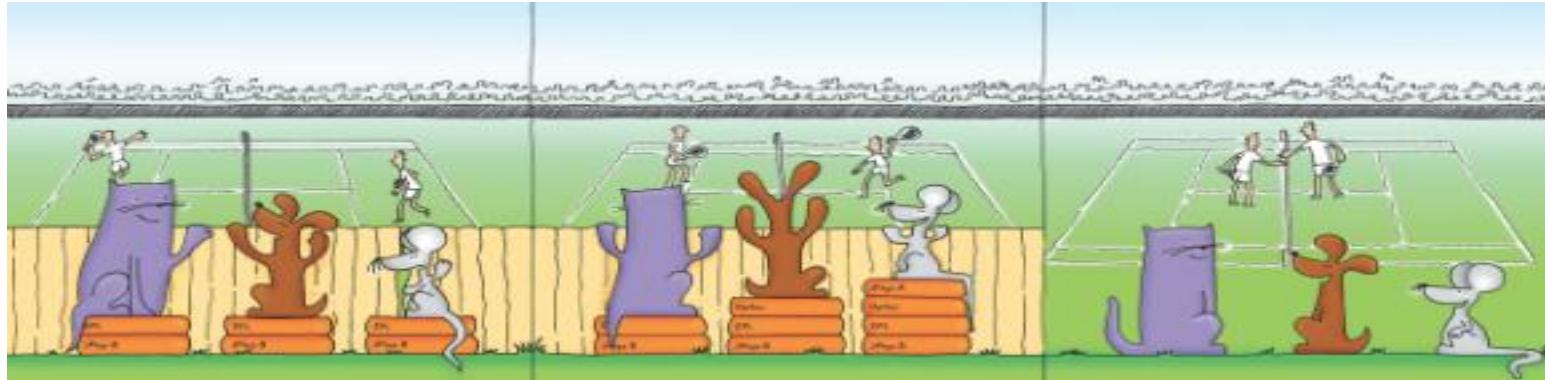
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First thoughts...what does this image show?



Equality

Equity

Barriers Removed

What does your company/department to be more inclusive and support diversity?



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Read the handout

What could you add to your approach? Feedback in groups

Note: not an IOP
Document

ADD STRUCTURE AROUND HIRING AND EVALUATING PEOPLE MANAGE UNCONSCIOUS BIAS

- Before making a decision, **start by telling yourself to be fair.**
- **Set clear hiring criteria** that are directly related to the performance of the job—before the selection process begins.
- Develop interview scripts with **consistent questions** for all job candidates.
- **Set clear goals and objective standards, in advance**, for evaluating performance and making project- assignment decisions. Make these transparent with teammates.
- **Stop and think** before making people decisions—especially when you're in stressful situations or under tight deadlines, which may exaggerate unconscious bias.
- **Don't assume** what others can or can't do when making assignments; give **them** the choice.
- Encourage **accountability** by all team members who have input into people-related decisions, such as hiring, evaluations, and peer reviews.

Recommended Further Reading



- Kahneman D, **Thinking Fast and Slow**. Penguin Books Ltd London 2011. [Www.penguin.com](http://www.penguin.com)
- Myers K et al, (2007) **Genderwatch Still Watching**. Trentham Books Limited (ISBN 978-1-85856-401-2)
- Fine C, 2011. **Delusions of Gender** (2010) Icon Books Ltd. (ISBN 978-184831-220-3)
- Bohnet, **Gender Equality by Design**. Cambridge Massachusetts: The Belknap Press of Harvard University Press, 2016.