

# 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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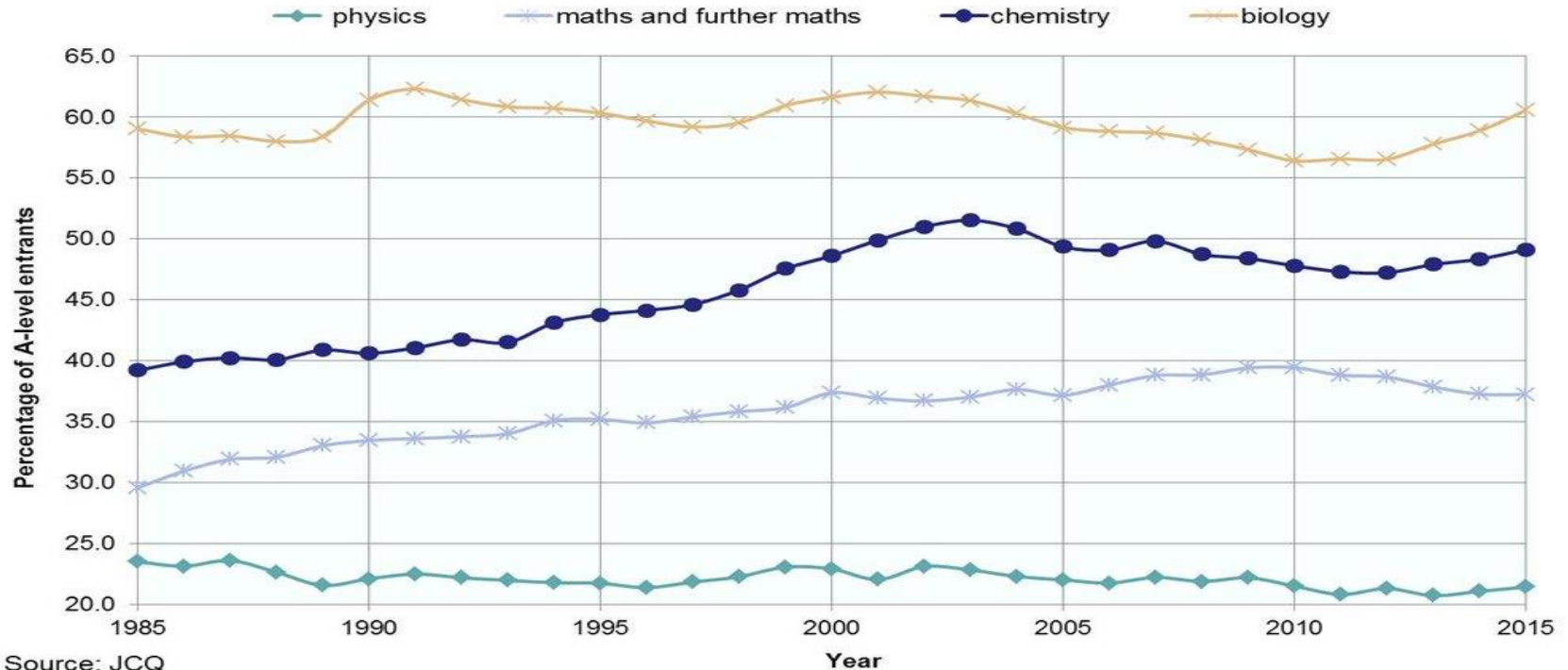
Address common  
errors in thinking

Address the role of  
unconscious bias  
and stereotypes

Reflect on current  
practice and policy  
departments

# The current position

## Percentage of girls in STEM subjects

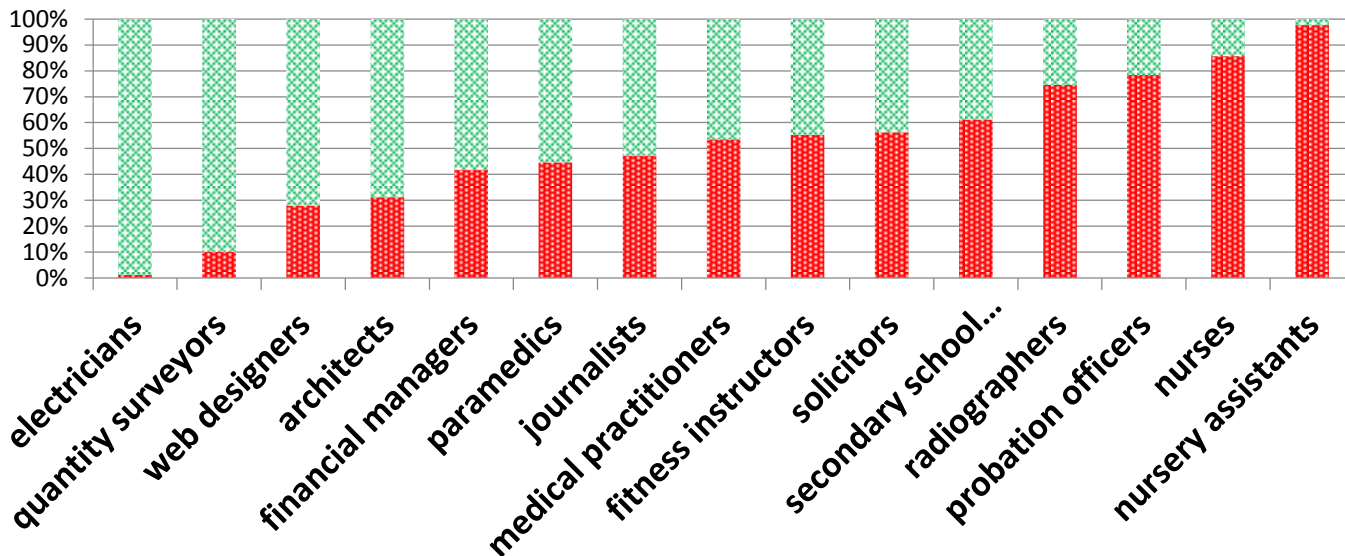


# What is the issue and what is the IOP doing?

- ❑ 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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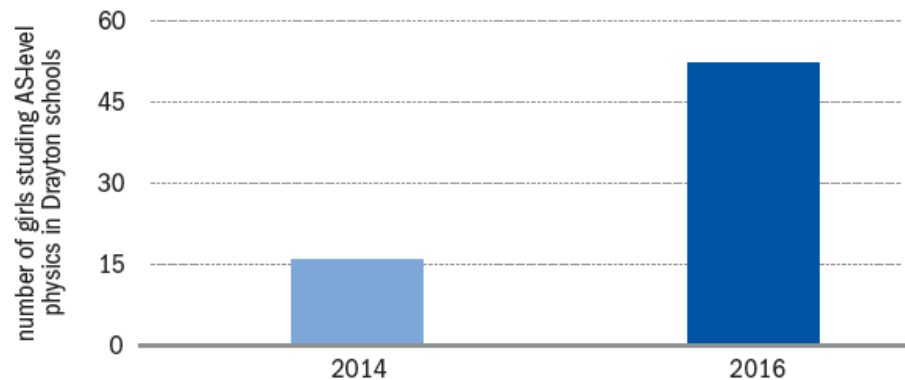
# Our research



## Improving Gender Balance

# Our impact

**Drayson 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

# 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  
receive

It may uncor

For example

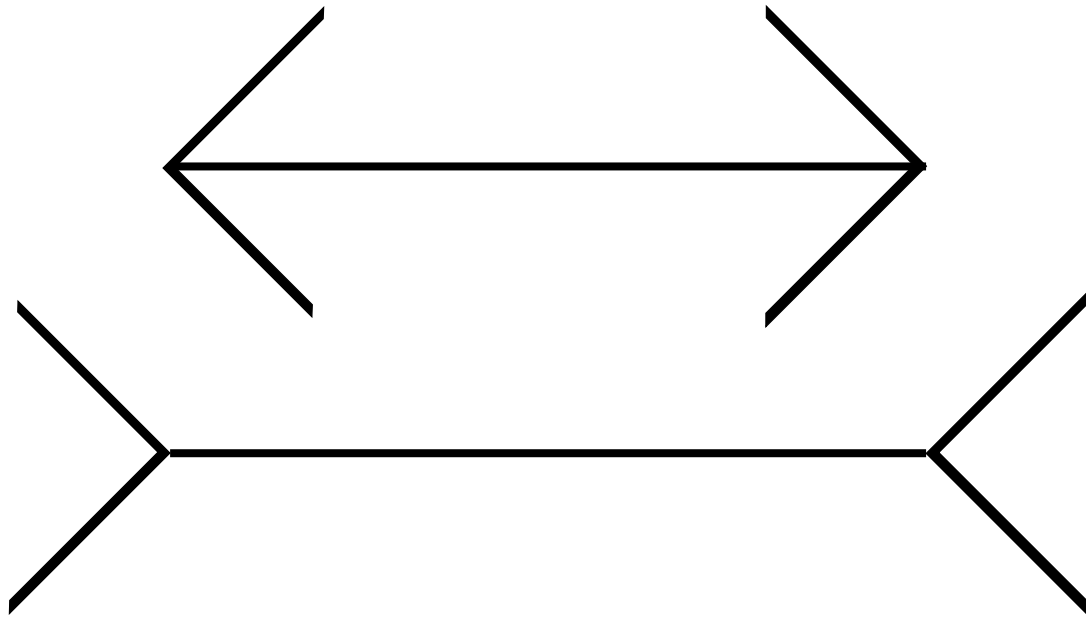
- Our assum
- Our expect
- How we t



information we

our or decisions

# Our brain tricks us



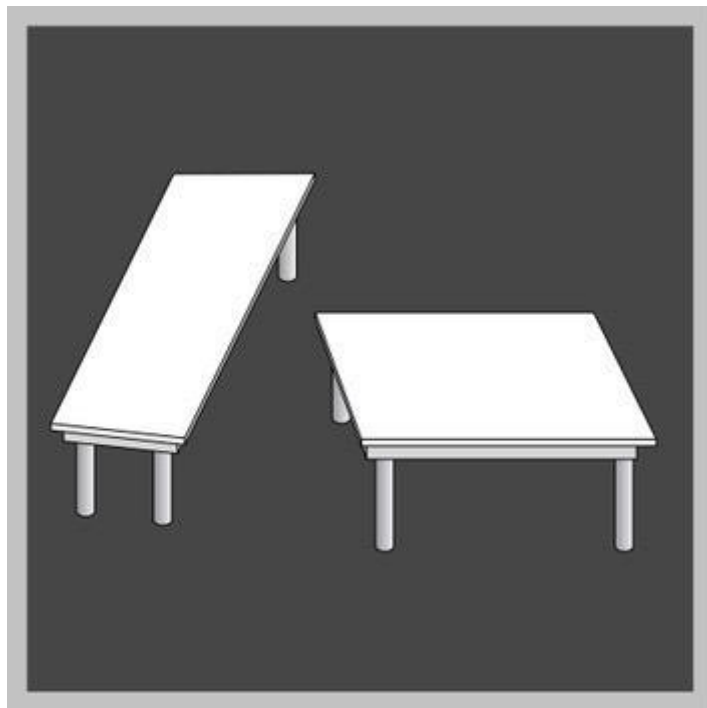
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# Optical illusion



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# Optical illusion

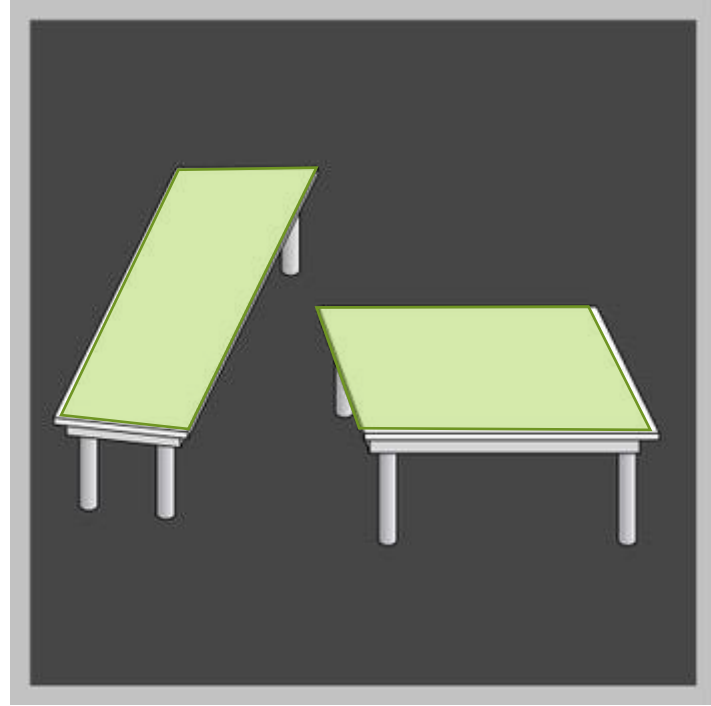


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# Fundamental attribution error



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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

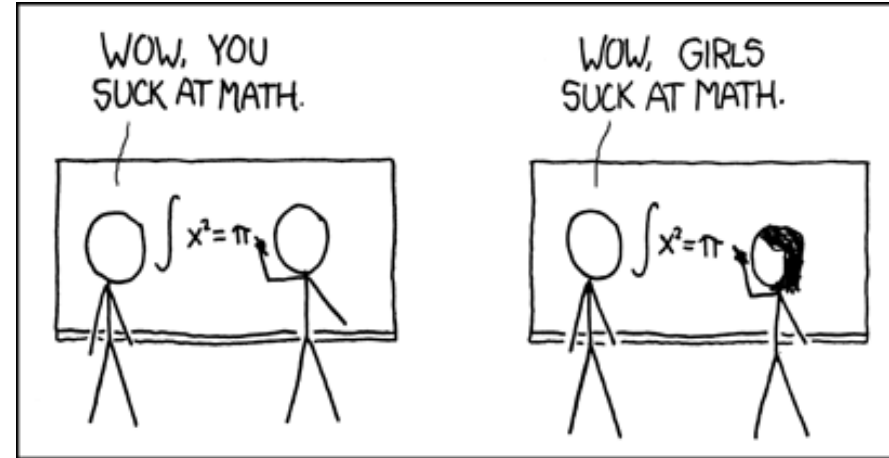
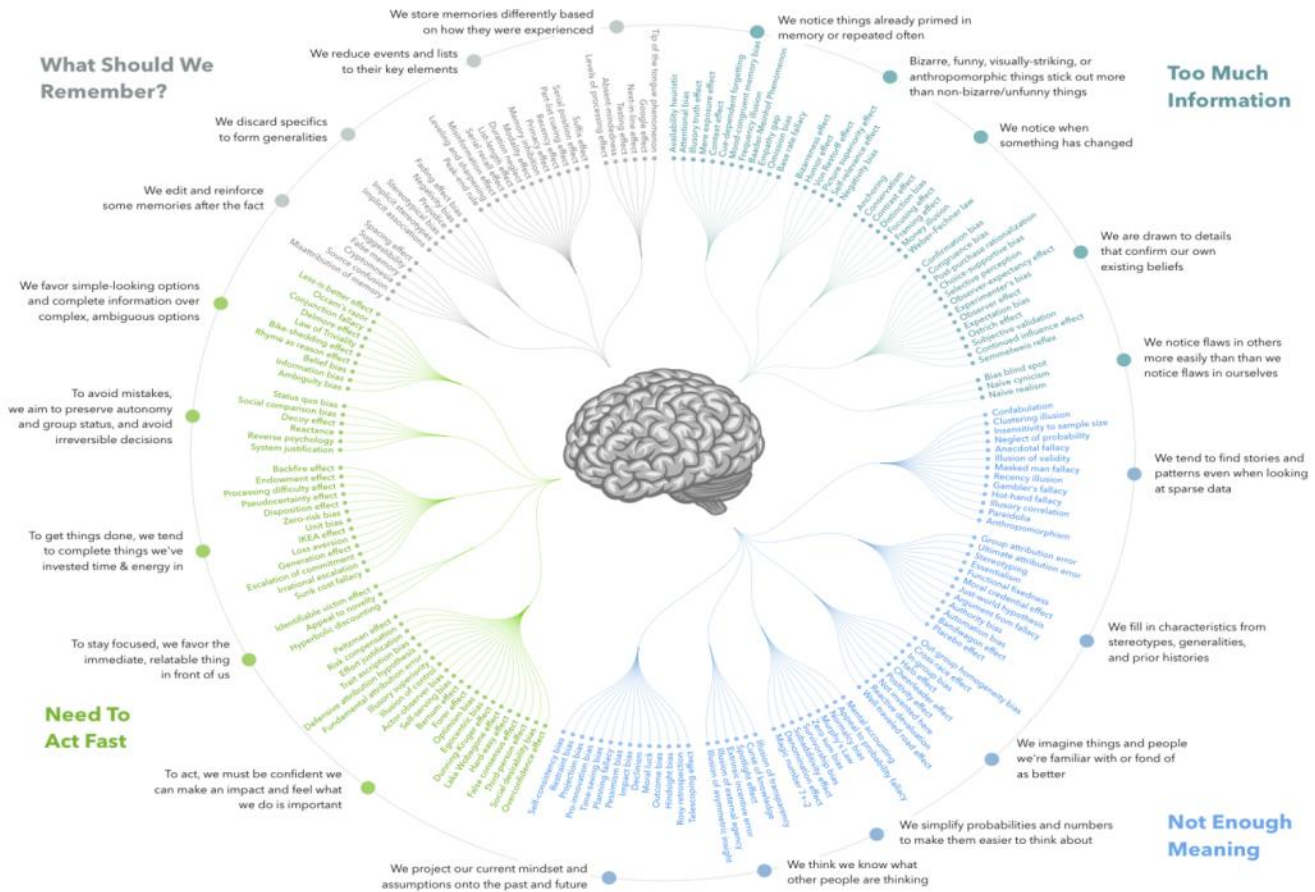


Image shared under CC BY\_NC 2.5  
<https://xkcd.com/385/>

# COGNITIVE BIAS CODEX



Improving

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.



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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

Please read this silently

Question B:

How much would you expect to pay for this room?

Write this down on your post it note



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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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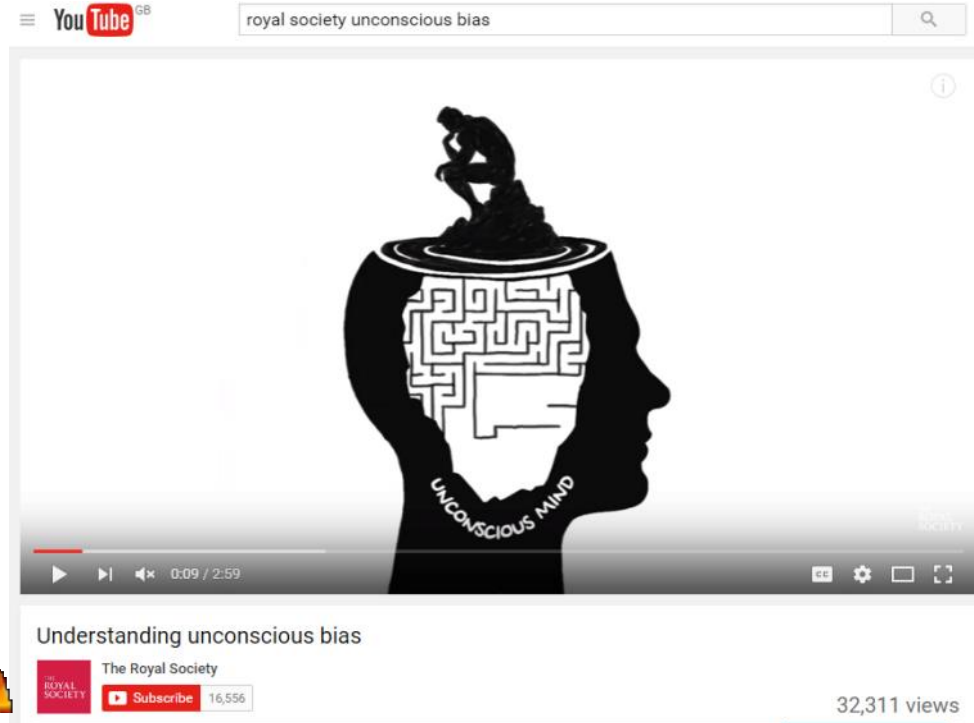
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A bat and a ball cost £1.10 in total

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 shortcuts
- Based on the sum of our experiences and perceptions
- Incredibly quick acting and mostly automatic
- Difficult to change but can be managed



**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



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

# 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?

**Zero  
Judgement**

# 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



# Girls Toys vs. Boys Toys

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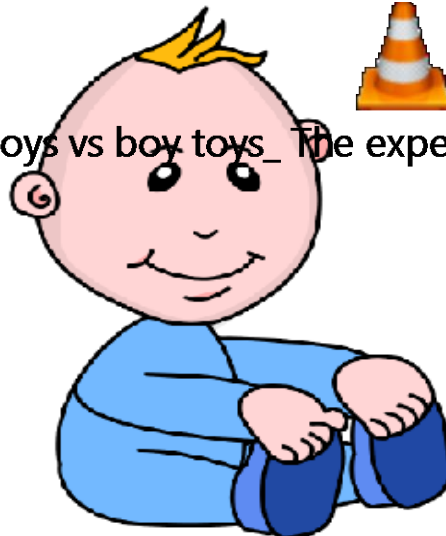
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Experiments where babies are dressed up as the opposite sex show adults treat boys and girls quite differently

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)

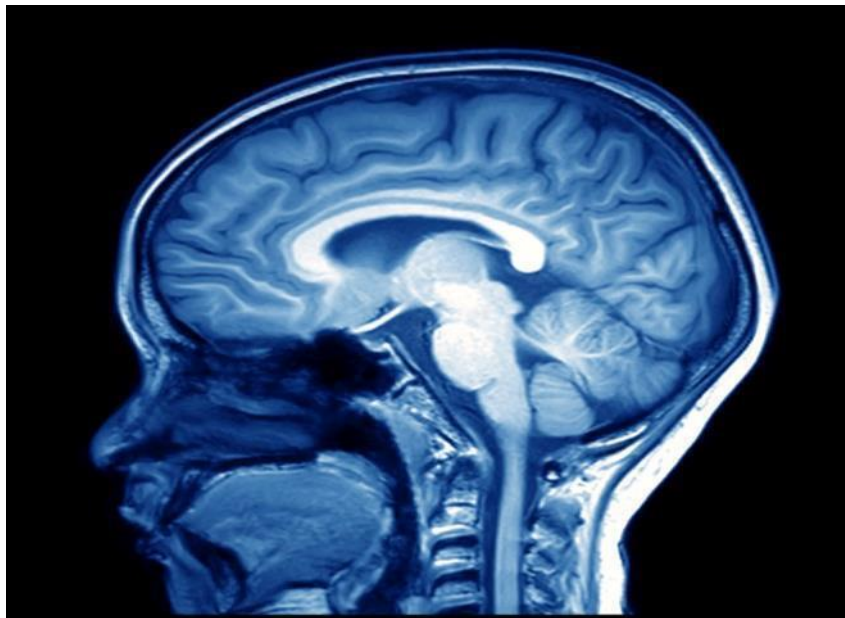
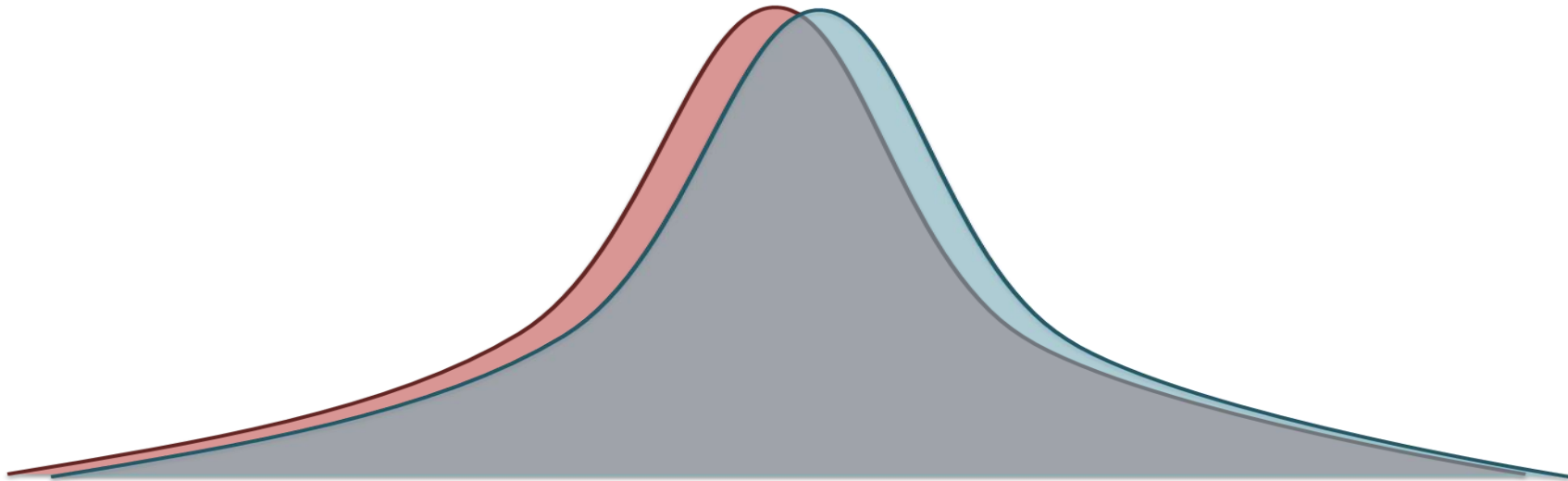


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# Greater differences within the sexes than between them



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# Where does our unconscious brain get its information from?

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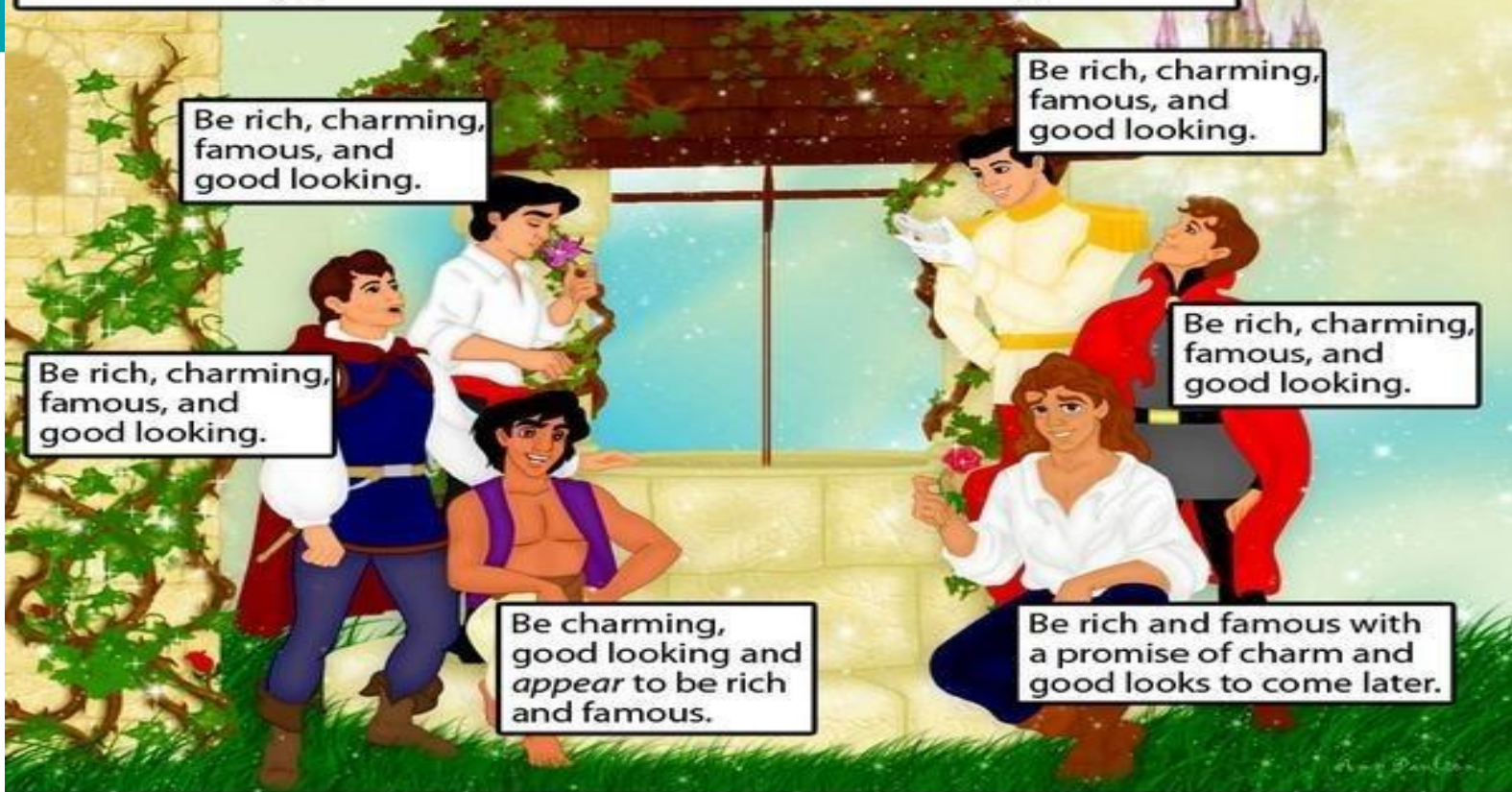




- Moana and Merida are not too happy about how women are portrayed in traditional children's films!



## 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".)

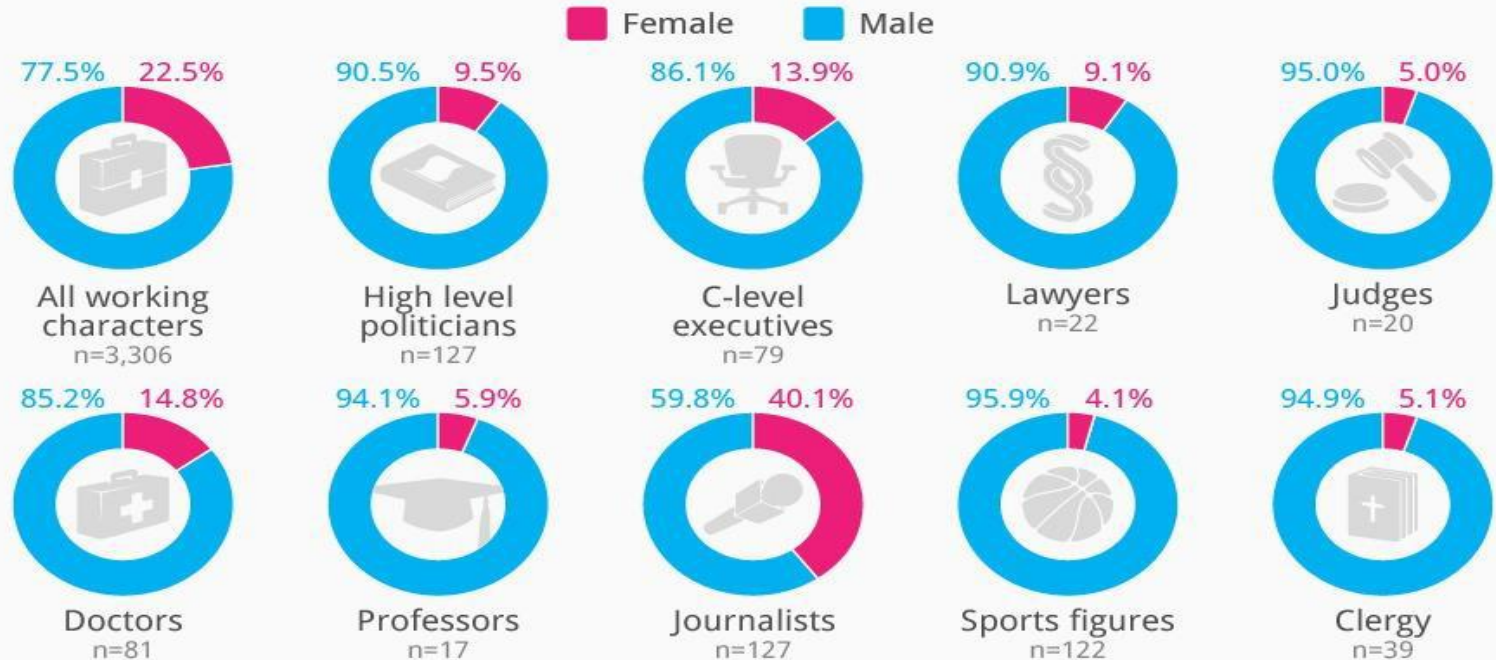


- The Bechdel Test:
  1. Has to have at least two named women in it
  2. Who talk to each other.....
  3. About something, besides a man!



# 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

Mashable statista

# The impact of unconscious bias in society

## Why does it matter?

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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

Jennifer was less likely to be hired

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

The professors were less willing to mentor Jennifer

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

# 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

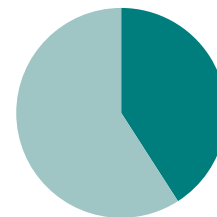
Where all children were given the sort of feedback most often given to girls, they tended to lose confidence in their academic abilities.

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## Number in Class



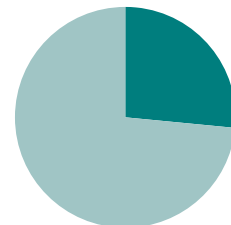
## Answers from



Girls

Boys

## Check ups



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# 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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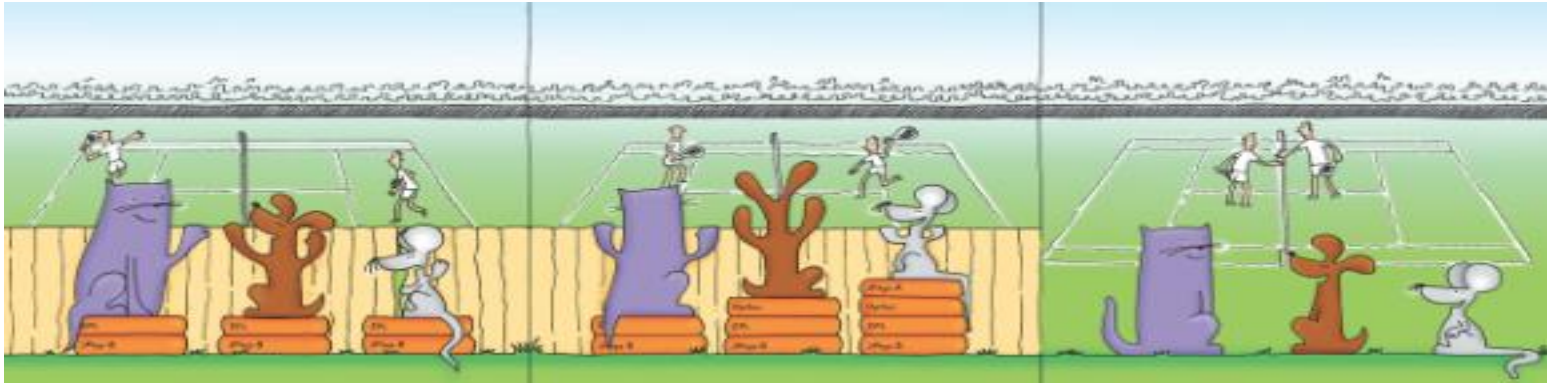
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# First thoughts...what does this image show?




Equality

Equity

Barriers Removed



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



1 min  
thinking  
time



5 mins

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# Read the handout

What could you add to  
your approach?  
Feedback in groups

Note: not an IOP  
Document

## MANAGE UNCONSCIOUS BIAS

### ADD STRUCTURE AROUND HIRING AND EVALUATING PEOPLE

- 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.