

IMPERIAL

10-14
FEB
2025
South
Kensington
Campus

Learning Well Programme

DESIGNED FOR ALL IMPERIAL STUDENTS

- Craft your personal journey to success
- Connect study strategies with positive mental wellbeing
- Foster wellbeing through effective learning practices

Explore the Learning Well Project student resources

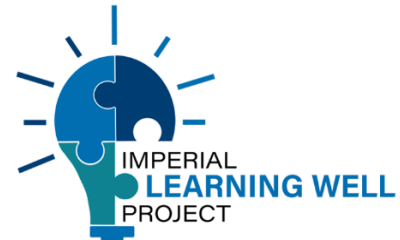


What is Intelligence, and how and why is it important to you?

Martyn Kingsbury

(Centre for Higher Education Research and Scholarship)

12/02/2025



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Pre-session Check-in Exercise

Imperial students -

To support you to get the most from the Learning Well Programme, please take a moment to complete this short exercise about your current understanding and expectations of this session:

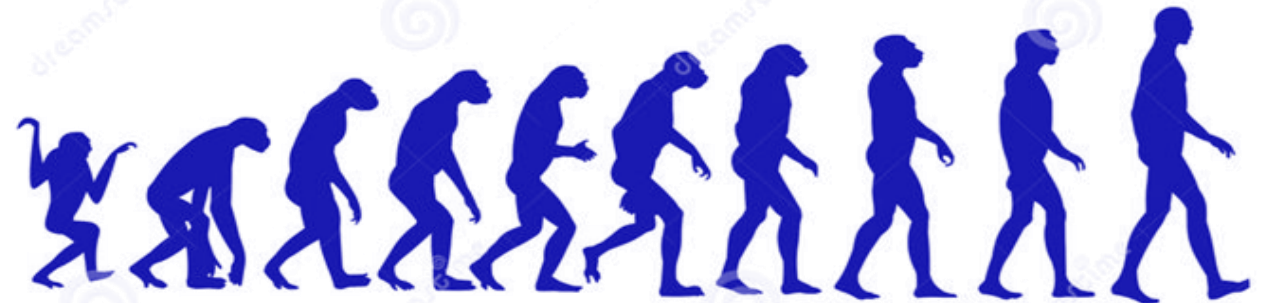
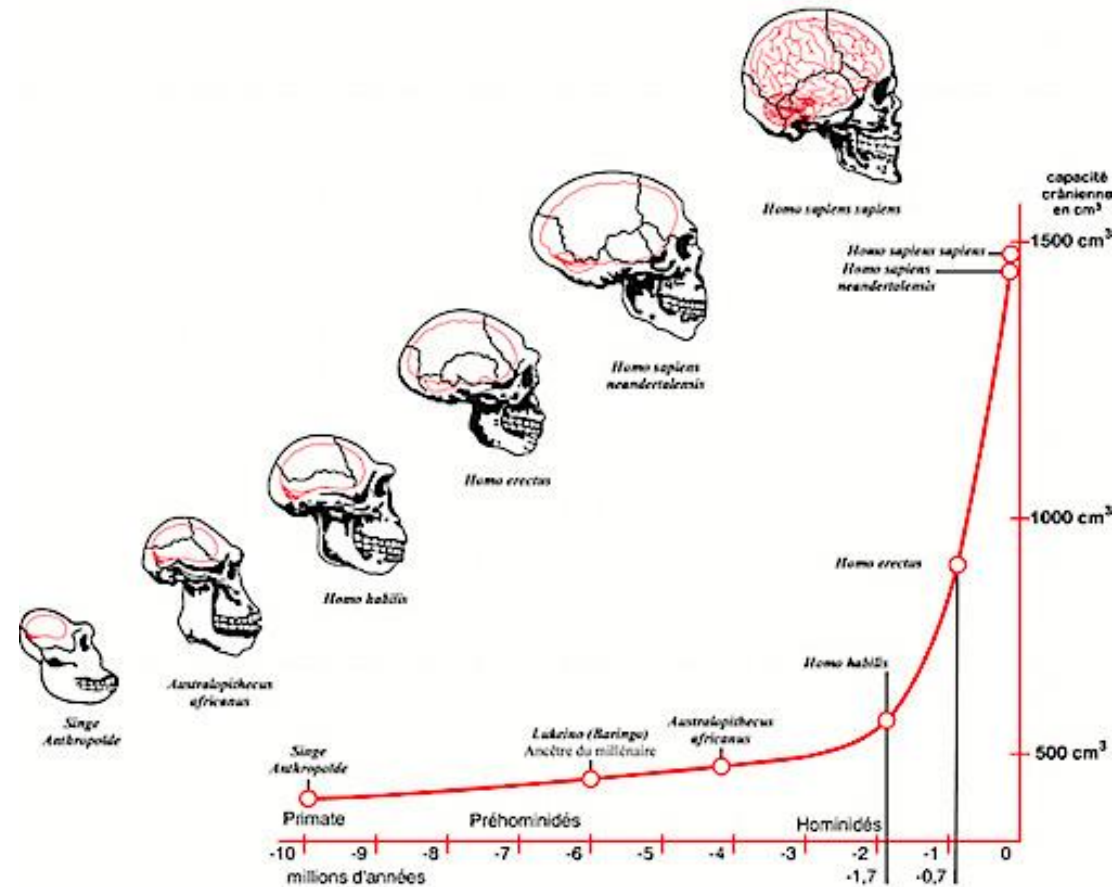
- Your responses will be submitted anonymously.
- There are no right or wrong answers – feel free to share your thoughts.
- This activity should take no more than 2-3mins.

Learning Well Programme: Pre-session Check-in Exercise
(WEDNESDAY)



Don't worry ...

You are all
Intelligent!



What is intelligence ...

Take a moment, how would you define it?

Talk to the person next to you, what do they think?

Be prepared to share some definitions



Some definitions ...

The faculty of understanding; intellect. Also as a mental manifestation of this faculty, a capacity to understand.

Oxford English Dictionary

A(1): the ability to learn or understand or to deal with new or trying situations : reason & the skilled use of reason

(2): the ability to apply knowledge to manipulate one's environment or to think abstractly as measured by objective criteria (such as tests)

B: mental acuteness : shrewdness

Merriam Webster Dictionary

Intelligence is a multifaceted concept that encompasses various abilities and skills. Generally, it refers to the capacity to acquire and apply knowledge, solve problems, and adapt to new situations. Including:

- (i) Cognitive abilities
- (ii) Learning and Adaptation
- (iii) Emotional Intelligence and
- (iv) Creativity

Co-Pilot

Some definitions ...

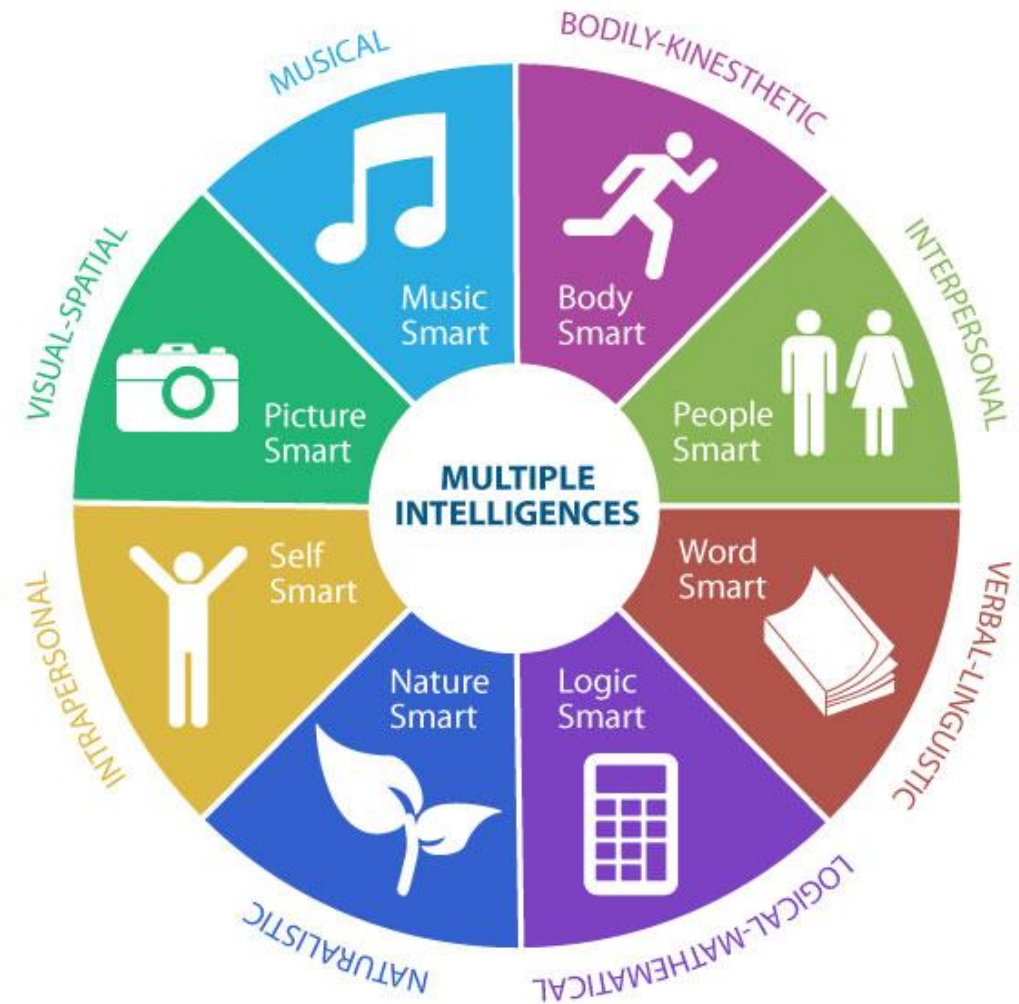
What does Psychology tell us?

Research	Definition
Alfred Binet & Theodore Simone (1905)	Judgment, otherwise called "good sense", "practical sense", "initiative", the faculty of adapting one's self to circumstances.
David Wechsler (1944)	The aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with their environment.
Lloyd Humphreys (1979)	The resultant of the process of acquiring, storing in memory, retrieving, combining, comparing, and using in new contexts information and conceptual skills.
Robert Sternberg & William Salter (1982)	Goal-directed adaptive behaviour.
Shane Legg & Marcus Hutter (2007)	A synthesis of 70+ definitions from psychology, philosophy, and AI researchers: Intelligence measures an agent's ability to achieve goals in a wide range of environments, which has been mathematically formalized.
Alexander Wissner-Gross (2014)	$F = T \nabla S \tau$ Intelligence is a force, F , that acts so as to maximize future freedom of action. It acts to maximize future freedom of action, or keep options open, with some strength T , with the diversity of possible accessible futures, S , up to some future time horizon, τ . In short, intelligence doesn't like to get trapped.

Theory of multiple intelligences

- Howard Gardner (1983) surveyed several disciplines and cultures around the world to determine skills and abilities essential to human development and culture building.
- Differentiated human intelligence into specific distinguishable multiple intelligences, in contrast to the prevailing theory of a single general intelligence.
- Linked to different Learning Styles - VAK (Visual, Auditory and Kinaesthetic)

These ideas have been widely criticised and are disputed ... but despite this and a lack of evidence they are still around



Social intelligence

- The ability to understand one's own and others' motivations and actions.
- Communicate, listen effectively and adapt behaviour to different social settings.
- Successfully build relationships and navigate social environments.



Emotional intelligence

- The ability to perceive, use, understand, manage, and handle emotions.
 - **Self-awareness** – knowing one's emotions, strengths, weaknesses, drives, and recognize their impact on others
 - **Self-regulation** – controlling one's disruptive emotions and impulses and adapting to change
 - **Social skill** – managing relationships to get along with others
 - **Empathy** – considering other's feelings especially when making decisions
 - **Motivation** – being aware of what motivates them

What its NOT

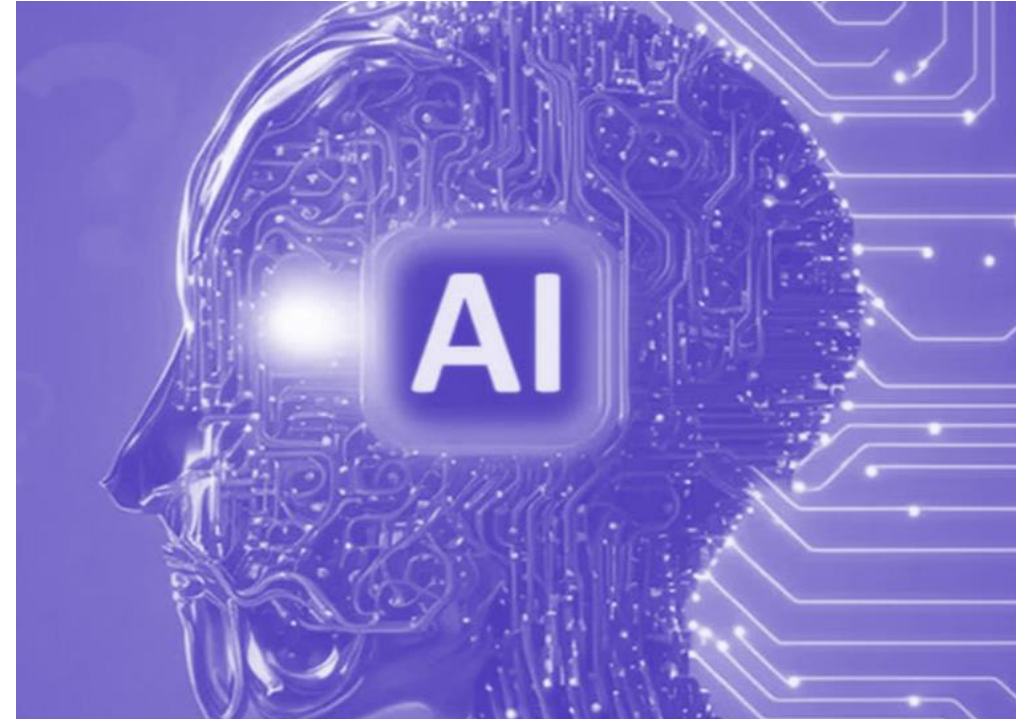


Simply the ability to remember more facts.

While facts are important as a basis for understanding AI is much better at collating and remembering them

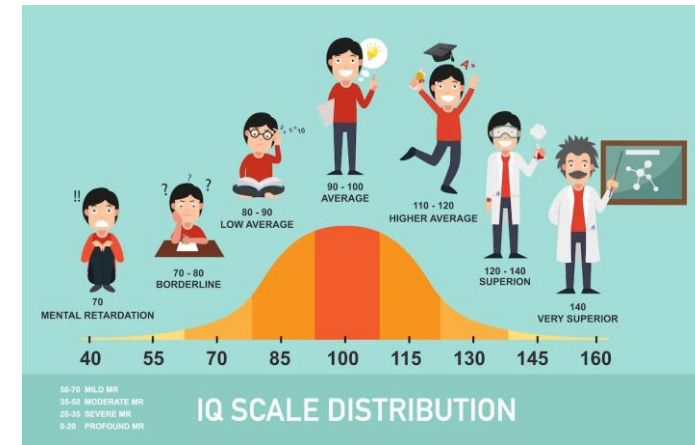


It doesn't (yet) possess the Social, Moral or Emotional intelligence to apply facts in real world contexts.





Measuring intelligence ... intelligence quotient (IQ)



- There are a variety of individually administered IQ tests in use in the English-speaking world, most commonly the Wechsler Adult Intelligence Scale (WAIS) and the Wechsler Intelligence Scale for Children (WISC)
- Raw IQ score is transformed to a normal distribution with mean 100 and standard deviation 15. so approximately two-thirds of the population score 85-115
- IQ Score estimates some forms of intelligence but NOT its broader complexity
- Shown to be associated with e.g. nutrition, environment, socioeconomic and social status
- High statistical reliability BUT validity (whether the test measures what it purports to measure) is questionable, although they do seem to predict some kinds of achievement at population level (school performance. Employment, income, crime and mortality)

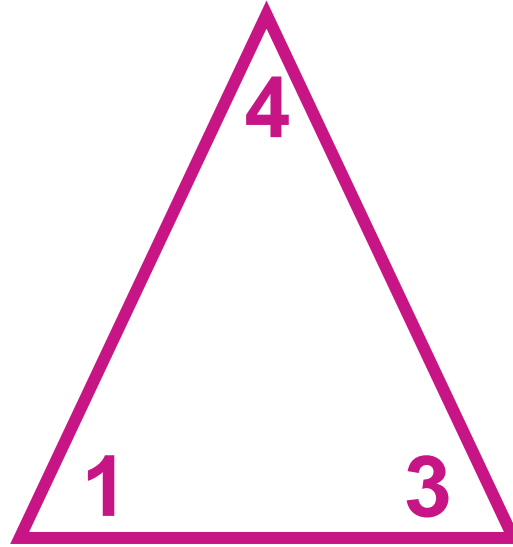
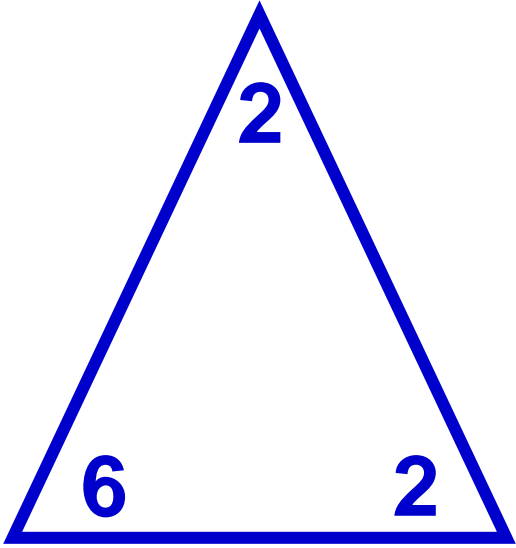
IQ test ...

Q1. What is the missing value?

2	8	7	6
9	5	9	5
9	7	4	?

- a) 5**
- b) 7**
- c) 9**
- d) 11**

IQ test ...



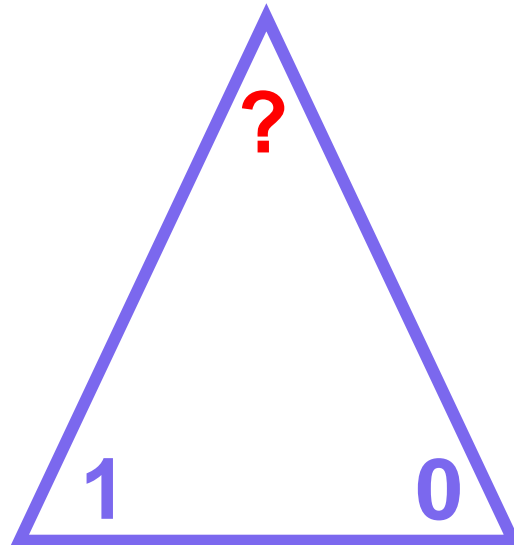
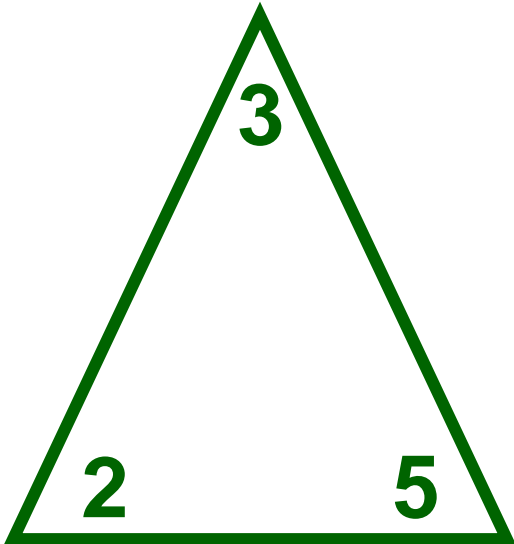
Q2. What is the missing value?

a) 1

b) 2

c) 3

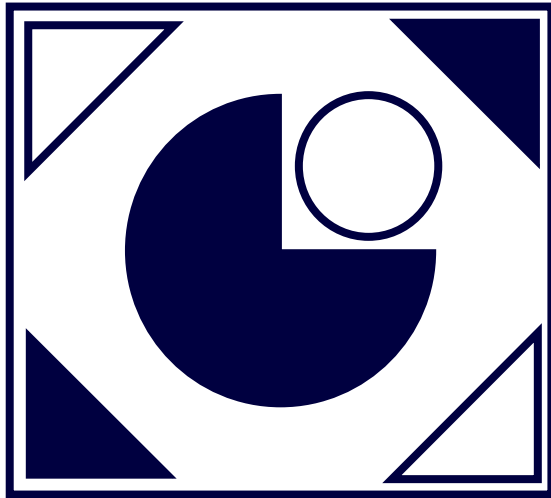
d) 4



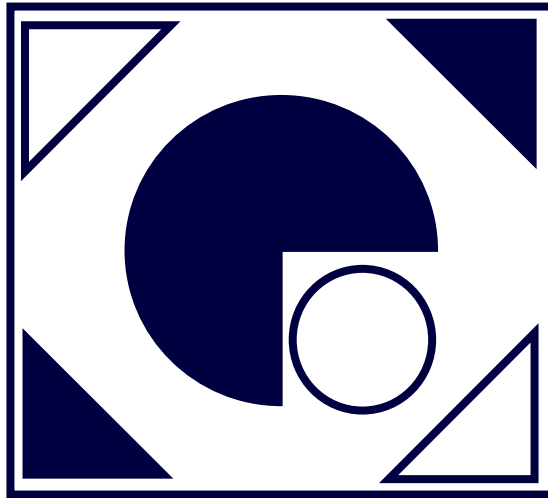
IQ test ...

Q3. Which is the odd one out?

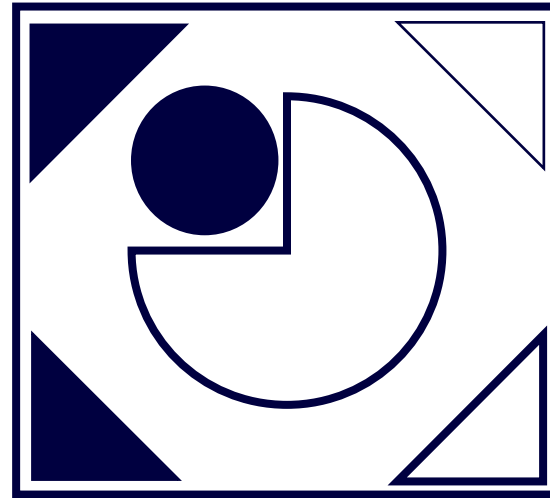
A



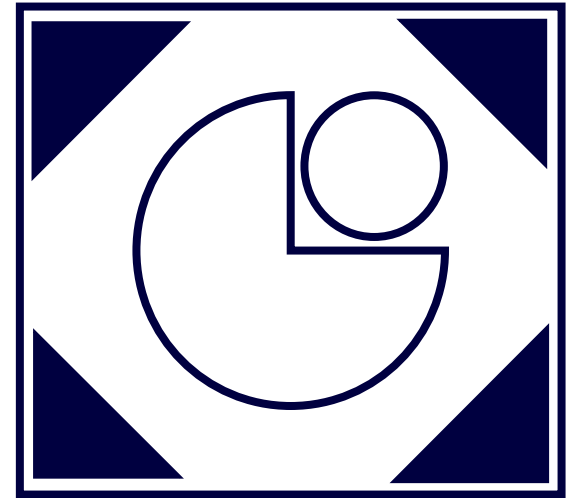
B



C



D



IQ test ...

Q4. What is the next number in the series?



- a) 42
- b) 44
- c) 46
- d) 48

IQ test ...

Q5. A florist has 50 beautiful plants, 10 bonsai and 17 cacti all but 7 were sold.
How many plants are left?

- a) 7
- b) 77
- c) 70
- d) 84

IQ test ...

Q6. If the word, "quane," is understood to mean the same as the word, "den", then the following sentence is grammatically correct:

"Looking out from my quane, I could see a wolf enter quane."

- a) True**
- b) False**

IQ test ... Answers

Q1. What is the missing value? Answer = C, 9 (All columns add up to 20)

Q2. What is the missing value? Answer = A, 1 (All points of the triangles add to 10)

Q3. Which is the odd one out? Answer = D (All others have two each of black and white triangles)

Q4. What is the next in the series? Answer = A, 42 ($= 30 + (2 \times 6)$)

Q5. How many plants are left? Answer = A, 7 (in the question. "all but seven sold")

Q6. Is the following sentence grammatically correct? Answer = B, False ("Looking out from my den,
I could see a wolf enter den.")



Can you think of any criticisms ...

Can we increase our intelligence ...

Take a moment, what do you think?

How would you do it?

Talk to the person next to you, what do they think?

And what would they do?

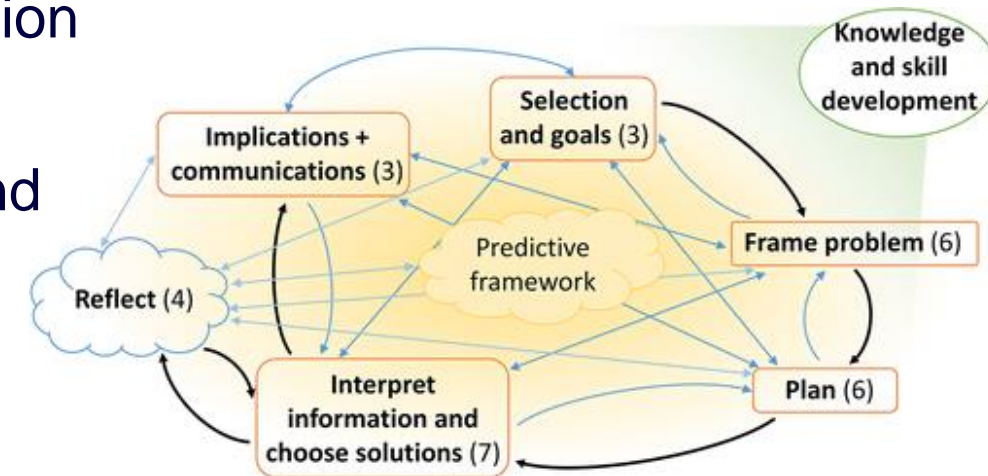
Be prepared to share your ideas



Expertise ...

Applied Intelligence?

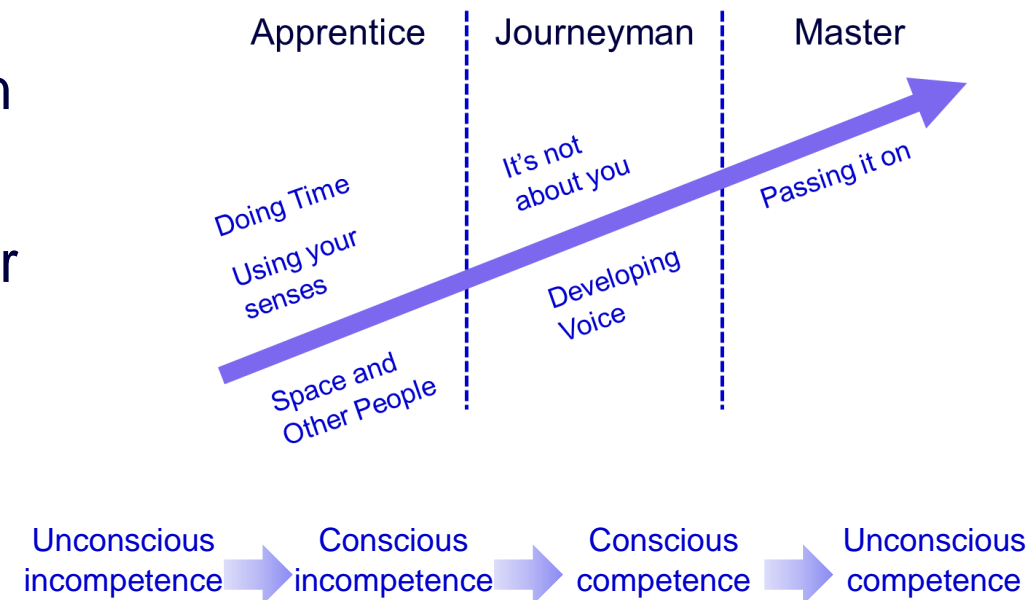
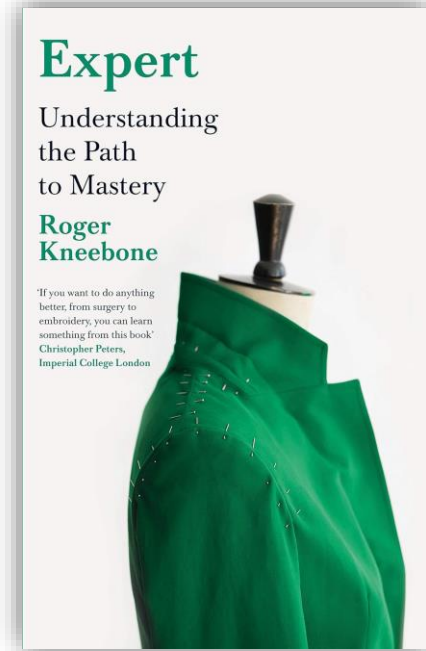
- Carl Wieman, Nobel Prize winning Professor of Physics and Professor in the Stanford Graduate School of Education
- CWSEI - Advocate for active learning in STEM education taking an evidenced based approach
- Researched expertise across STEM disciplines – found unexpected cross-discipline similarities
- Experts have:
 - Mental framework for organising knowledge
 - Enabling efficient reasoning and recognition of patterns and conflicting ideas
 - Frame the problem
 - Plan a strategy to solve/test



Expertise ...

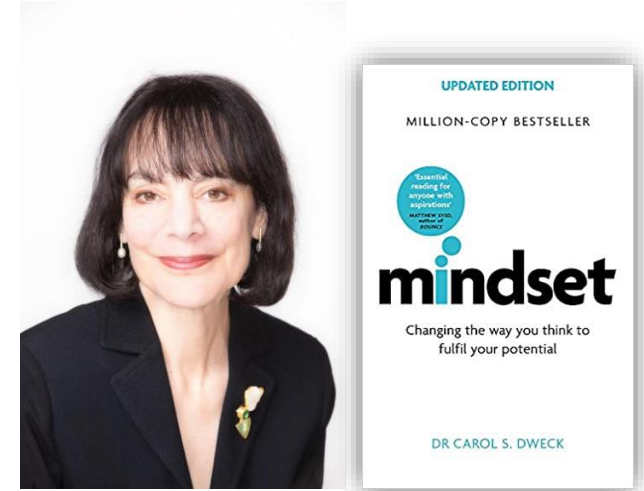
Applied Intelligence?

- Leads Centre for Engagement and Simulation Science + Centre for Performance Science
- Suggests we are all on this path to some extent - it is a basic human characteristic
- Making mistakes is inevitable – making sense of and learning from is part of the path to expertise
- Improvisation – bringing evidenced expertise to bare in responding to changing situations
- Passing on wisdom to help others and further the art or discipline ... part of the ongoing journey
- Research from a wide range of experts – Expertise resides in the person and comes from the path not the discipline



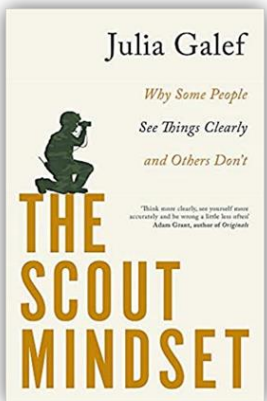
Growth mindset ...

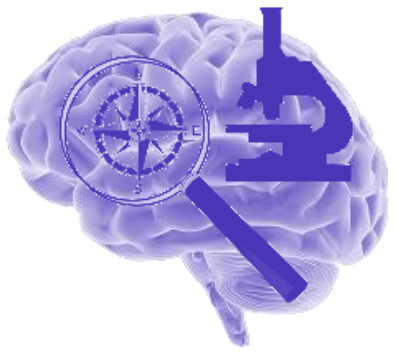
Carol Dweck - individuals can either believe their success is based on innate ability; these are said to have a fixed mindset. Or believe their success is based on hard work, learning and doggedness who are said to have a growth mindset.



Scout mindset ...

Julia Galef - Scout mindset, an attitude that allows you to see things as they are, not as you wish they were. It's what allows you to recognize when you were wrong, to seek out your blind spots, to test your assumptions and change course. NOT **Motivated reasoning** where individuals allow emotion-loaded motivational biases to affect how new information is perceived.





Discovery mindset ...

- Curious
- Sees challenge as opportunity
- Explores difference
- Engages, 'plays' and 'experiments'
- Tests and changes 'Frame of Reference'
- Sees assessment as a signpost/way marker
- Learns from failure
- Willing to 'risk'



"Curiosity is the engine of achievement." ~

"If you're afraid to be wrong you'll never do anything creative." ~

"Being creative is at the heart of being human and of all cultural progress." ~

Ken Robinson

Resilience ...

Toughness, the capacity to recover from difficulty

Capacity to adapt in the face of challenging circumstances

Psychological strength to cope with stress and hardship

Risk that this is about bearing 'pain' and blaming those experiencing it for not having resilience



“The greatest glory in living lies not in never falling, but in rising every time we fall.”

Grit ...

The power of passion,
perseverance and stamina as long-
term goals.

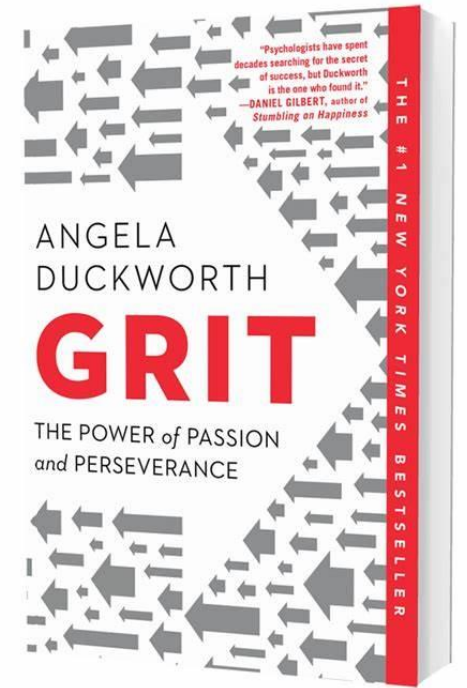
IQ was not the difference between
the best and worst academic
performers

Developed a 'grit scale' those with
most grit drop out less and do better
– NOT related to IQ or talent


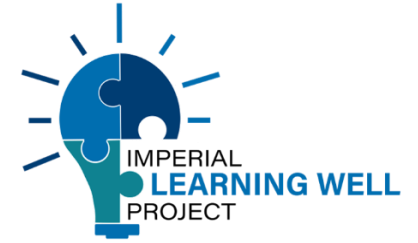
Talent x Effort = Skill → Skill x Effort = Achievement [Effort counts twice]

“By shining a spotlight on
talent, we risk leaving
everything else in the
shadows.”

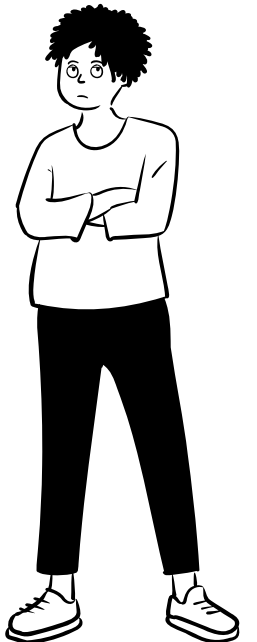
Angela Lee Duckworth



Why might it matter? ...

A black and white line drawing of a woman with glasses, wearing a dark long-sleeved shirt and light-colored trousers. She is pointing her right index finger towards the text.

Su: cause like I never tell the truth about how much study I've done, cause like then if I do well, they [other students] won't think I'm smart, they'll just like - you just worked for it

A black and white line drawing of a man with curly hair, wearing a light-colored t-shirt and dark trousers. He has his arms crossed and a slightly concerned or thoughtful expression.

James: ... even, even when I'm worried about a test sometimes I won't really study – cause if I study and don't do well then, well - I'm not smart ... if I haven't studied then its okay

What is Intelligence, and how and why is it important?

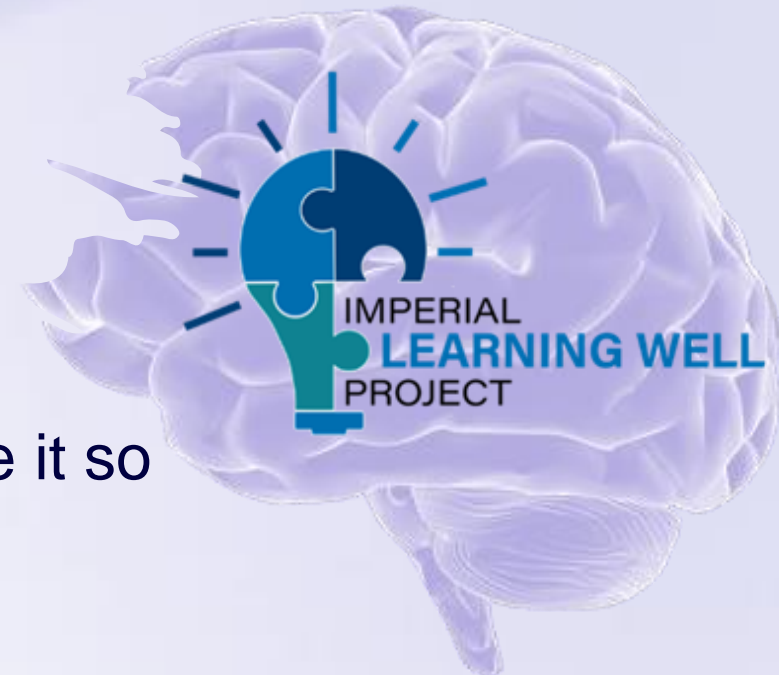
Intelligence is complicated, individual and ever changing – it is not fixed or only about knowledge

We need intelligent:

- Curiosity
- Risk
- Failure/mistakes

Maximising future freedom of action ...
creating multiple possible futures

The journey is ongoing, we must intelligently manage it so we are fit to learn and can learn well!



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Post-session Reflection

Imperial students -

To help you maximise this learning opportunity, this activity is designed to support you to reflect on what you've learnt and to consider what you can personally take away from this session.

- Your responses will be submitted anonymously.
- There are no right or wrong answers.
- This exercise should take no more than 3mins.
- We hope you find this activity helpful.

Learning Well Programme: Post-session Reflection Activity
(WEDNESDAY)

