The Importance of Critical Thinking and How to Measure It

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Critical Thinking Today

Critical Thinking (CT) is a term that is appearing increasingly in both academic and occupational contexts. Putting "critical thinking" into a popular online search engine will yield 65 million results. Numerous research studies show that while CT is an important ability, it is lacking in many students and employees.
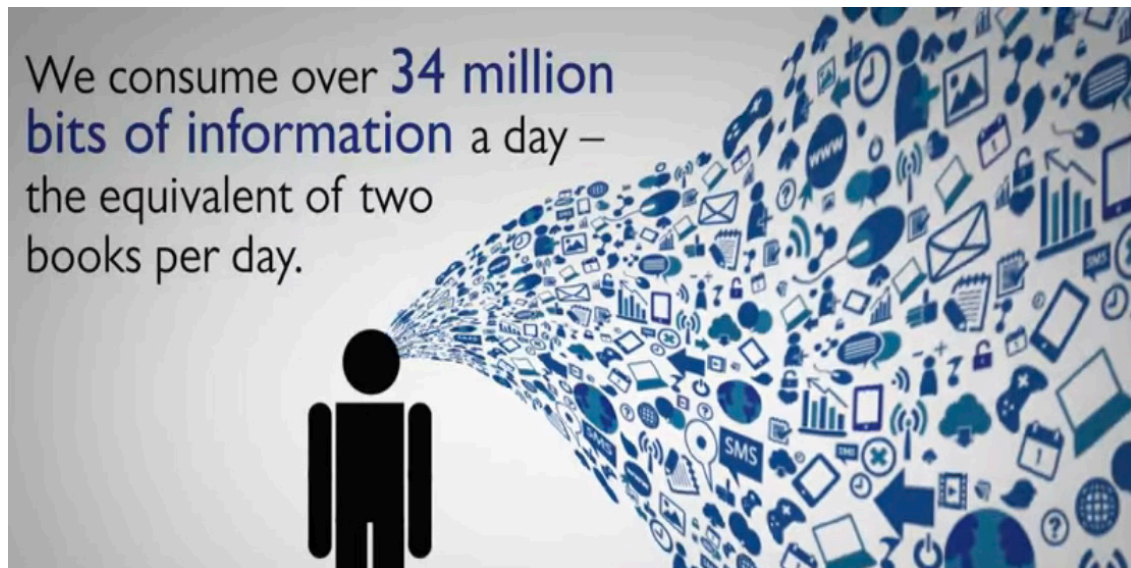
Good decisions require focusing on the most relevant information, asking the right questions, and separating reliable facts from false assumptions in order to come up with a logical decision: the intrinsic elements of CT.

Without each of these elements, a decision is likely to fall short, leaving both the individual and organisation open to criticism.

Whilst sound decision-making has always been important, an explosion in the volume and speed at which we receive news has led to us facing a complex flow of information both at home and at work. Objectively evaluating this information is becoming increasingly difficult.

CT ability is now more important than ever and its requirement is most certainly not limited to workplace contexts - it also has distinct societal relevance.

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CT Through the Ages

CT goes back more than 2,500 years to the time of Socrates who used a method of probing questioning to ascertain how rationally people could justify their claims and opinions.

The term 'critical thinking' appeared in the early 20th century to describe an educational goal and is believed to have originated from the American philosopher, John Dewey. He more commonly called it **'reflective thinking'**, which he defined as "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends.".[1]

CT became increasingly important in the 21st century when it was termed one of the 21st century skills that are required both in and outside of work. In 2002, the Partnership for 21st Century Skills (comprised of major educational bodies and global employers) published the **Four Cs of 21st century learning**.[2]

- Critical thinking
- Communication
- Collaboration
- Creativity.

These 'soft skills' are increasingly measured by a wide range of organisations as the core competencies required in most staff.

In the workplace, CT is seen as the raw material that underpins a number of core workplace skills and competencies, as shown in the diagram below.

Nowadays the sheer overload of information bombarding our brains means that we now need to think about CT in a different way. This is partly also because our environment means that it's far easier for us to make (bad) snap judgements, not read things properly and fail to make space for our brains to do what they were designed to do - which is to be creative, innovative and resourceful.
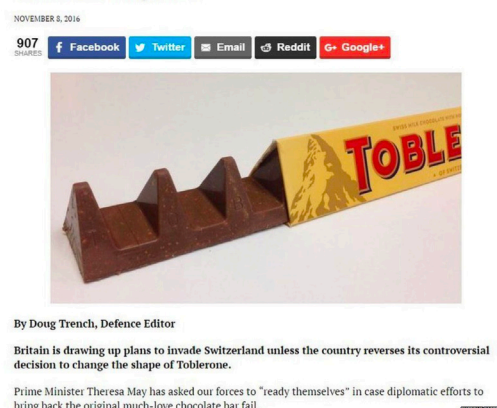
CT and Fake News

The increasing spread of "fake news" and disinformation has also led to a greater interest in CT. Fake news is nothing new, but in the past few years it is a term that is being increasingly used.

With the explosion of the Internet and the increase in news channels via social media, it's easier than ever to spread news stories. There is a tendency to just absorb small, bite-sized snippets of news or sensational headlines that may reinforce our viewpoint (or confirm our biases) but are unable to be substantiated or may even be false.

Clearly some stories are meant as satire but a large number are now being accepted as fact without any evidence to support them.

The spread of false information or disinformation is now becoming a serious concern for society as a whole. Researchers from Oxford University, released a report in September 2019 in which they identified that *'at Least 70 Countries Have Had Disinformation Campaigns'* – campaigns which seek to spread disinformation, discredit others, or affect views.[3]

Good CT skills can help evaluate news objectively. Further information and advice on ways to do this can be found in the whitepaper: **Improving and Developing Critical Thinking.**

Research that Supports the Importance of CT in the Workplace

According to a 2014 article in the Wall Street Journal, mentions of CT as a requirement in job postings in the USA had more than doubled since 2009.[4]

According to the O*NET database, an analysis of a number of job descriptions, shows that a diverse range of job roles require CT skills.[5] A search on jobs requiring the skill of critical thinking results in 867 job roles. A number of recent publications show the results of surveys to determine the skills that employers will require over the next few years.

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The University of Phoenix's **Non-Profit Institute for the Future (IFTF)** published its "Future Work Skills 2020" research, which underpins the key drivers that are shaping our future.[6] Of the top 10 skills required by a future workforce, **CT or sense-making** is the most important.

AMA American Management Association®

According to an **American Management Association** survey, of the four key managerial competency requirements, employers rated **CT** as the most important for their business.[7]

A major report published in 2015 by the **World Economic Forum (WEF)** was compiled following an extensive survey of senior talent and strategy executives from circa 400 leading global employers, representing more than 13 million employees.[8] The report asked Chief HR and Strategy Officers what the current economic and technological shifts mean, specifically for employment, skills and recruitment across industries and geographies. They were asked to rank the top skills required by employees and recruits across a wide range of job families in 2015 and in 2020.

The table (right) shows the **Top 10 Skills** in 2020 that these companies want from their employees and recruits.

It is worth noting that a number of the core skills referred to in the WEF survey, such as Creativity, Judgement and Decision Making, Problem Solving, plus Cognitive Flexibility are underpinned by good CT skills.

According to the **Future of Skills 2030 Pearson and Nesta study**, judgement and decision-making feature highly alongside other skills.[9]

In a **Times Educational Supplement 2014** international survey, teachers were asked to rank the skills needed for success in higher education; **92 percent identified CT as one of the most important.**[10] Yet despite this, when asked which skills students currently lacked when they

entered university after school, **56 percent of the teachers said students were still unable to think critically**.

All these studies highlight the increased need for CT to support creativity, problem solving and decision making, innovation, active learning and fluidity as well as quantity of ideas.

WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD

Top 10 skills

	in 2020		in 2015
1.	Complex Problem Solving	1.	Complex Problem Solving
2.	Critical Thinking	2.	Coordinating with Others
3.	Creativity	3.	People Management
4.	People Management	4.	Critical Thinking
5.	Coordinating with Others	5.	Negotiation
6.	Emotional Intelligence	6.	Quality Control
7.	Judgment and Decision Making	7.	Service Orientation
8.	Service Orientation	8.	Judgment and Decision Making
9.	Negotiation	9.	Active Listening
10.	Cognitive Flexibility	10.	Creativity

Source: Future of Jobs Report, World Economic Forum

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CT Definition

Interestingly, whilst many employers and academics cite its importance, there is some uncertainty about what exactly CT is.

A 2018 article in the Stanford Encyclopedia of Philosophy entitled 'Critical Thinking' states that, *"its definition is contested, but the competing definitions can be understood as differing conceptions of the same basic concept: careful thinking directed to a goal."*[11]

At its core, there is a general consensus, that CT involves *"questioning assumptions, objectively evaluating information and arguments and making logical and rational decisions".*

It is not about criticising or finding fault.

Other researchers contend that in addition to the above, CT also involves the ability to think **creatively** and a well-rounded critical thinker is able to create new ideas and solutions, critically evaluate them and then make logical and rational decisions. Finally, critical thinkers should be able to **reflect** on their decisions and evaluate them critically.

In the Pearson publication, *7 Skills for the Future: Adaptability, Critical Thinking, Empathy, Integrity, Optimism, Being Proactive, Resilience*, CT is defined as questioning assumptions, evaluating a situation from different angles, solving problems creatively and using a reflective, considered approach (to evaluate and learn from the experience).[12]

Other observers, such as Sherry Diestler, have added that in addition to the points above, critical thinkers develop and exhibit personal dispositions or tendencies, such as fair-mindedness and empathy.[13]

What constitutes fair mindedness and empathy however, is open to interpretation. As practitioners using tools based on the psychological theories of Carl Jung like the MBTI® or Golden Personality Profiler™ know, fairness can mean different things to people with Thinking or Feeling preferences.

After evaluation of various literature, TalentLens defines that, at its core,

"CT is the ability to look at a situation logically and clearly understand it from multiple perspectives while separating facts from opinions, prejudices, intuition and assumptions".

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Measuring CT Ability and Skills

Critical thinking involves both cognitive (thinking and reasoning) skills as well as behavioural tendencies and biases which are termed dispositions.

In 1990 a panel of 46 experts in critical thinking came together and worked toward a consensus definition of the cognitive and dispositional skills of critical thinking. They agreed that CT includes both cognitive skills and "dispositional" dimensions. The results are published in the Delphi Report.

A number of assessments have been developed to measure the cognitive elements as well as the dispositions.

One of the most established and reputable global tests is the Watson Glaser™ Critical Thinking Appraisal, (W-G) which is suitable for testing adults (16 years and above) and has been revised and improved many times since its launch several decades ago. Watson Glaser focuses primarily on measuring the cognitive skills

Cognitive Skills	
Analysis	Evaluation
Inference	Self Regulation
Dispositions	
Suspend judgement	Open minded
Inquisitiveness	Fair Minded

Watson-Glaser's History and Ongoing Development

Watson-Glaser is a cognitive ability test that measures higher level verbal reasoning skills.		
It was originally developed in the 1920's by Goodwin Watson and E. M. Glaser, a professor and student at Columbia Teachers' College who were working on the measurement of CT in students.	**1926**	Precursor W-G Tests
In 1964 two 100 item parallel forms (Ym and Zm) were published under the name Watson-Glaser Critical Thinking Appraisal in the U.S.	**1964**	W-G Forms Ym and Zm; 100 items
This was followed in the '80s by **forms A and B** containing a reduced number of items, and updated content.	**1980**	W-G **Forms A & B**; 80 items
In 1991 a **Short Form**, containing 40 items, was published which increased its popularity in corporations.	**1991**	W-G **Form C**; 80 items W-G **Short Form**; 40 items
In 2010, Pearson published the Watson-Glaser II **forms D&E**, introducing its easy-to-use RED model of CT.	**2010**	
At the same time **Watson-Glaser development reports** were also published.	**2012**	W-G ll **Forms D & E**; 40 items W-G lll (UK only); 40 items
Most recently, in order to support unsupervised internet-based testing, a global new item-banked test version, **Watson-Glaser III (W-G lll)**, was added to the Watson-Glaser family of tests.	**2018**	W-G lll; 40 items

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In 2018, in excess of 100,000 Watson-Glaser tests were administered globally by educational establishments, businesses and organisations, across all industry sectors, to measure CT ability in students, job applicants and existing staff.

Watson-Glaser III (WG-III)

This latest version is a timed online test, available in a number of languages that contains modern relevant, business-related items (questions). WG-III is equivalent in terms of difficulty to the previous fixed form version, WG-II Form D. WG-III contains 40 items and completion time is up to 30 minutes. A wide-range of norm reference groups is available. Watson Glaser measures five areas of CT.

The Five Watson-Glaser Scales		Examples
Recognising Assumptions	An assumption is something presupposed or taken for granted.	When you say *"I'll buy a new car in June"*, we take for granted or assume you will have passed your driving test by then, will be alive in June and that you will have sufficient funds to buy the car or take out and repay a loan.
Evaluating Arguments	CT involves being able to distinguish between arguments that are strong and arguments that are weak, as far as the question is concerned. For an argument to be strong, it must be both important and directly related to the question	Question: *Should all young adults in the United States go to college?* Proposed Arguments: Arguing that college provides an opportunity for students to make life-long friends and have fun is not a strong argument, it is a weak argument; it would be a silly reason for spending years in college.
Drawing Inferences	An inference is a conclusion a person can draw from certain observed or supposed facts	Inference: *If the lights are on in a house and voices can be heard coming from inside, a person might infer that someone is at home.* But this inference may or may not be correct. Possibly the people in the house have gone out but they left the lights and TV on?
Deducing	A deduction is a conclusion made from a statement. It is an area that can be open to prejudice. In the W-G you are asked to judge each conclusion as to whether it necessarily follows from the statements (that for the sake of the test are taken as true).	Statements: *Some holidays are rainy. All rainy days are boring. Therefore: Proposed Conclusion: No clear days are boring.* The answer is NO, the conclusion does not follow. You cannot tell from the statements whether, or not, clear days are boring. Some may be.

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Interpreting	In W-G the test taker is presented with a short paragraph that is assumed to be true (a fact). They are then asked to judge whether, or not, each of the proposed conclusions logically follows beyond a reasonable doubt from the information given in the paragraph.	Fact: *A study of vocabulary growth in children from ages eight months to six years old shows that the size of spoken vocabulary increases from zero words at age eight months to 2,562 words at age six years.* Proposed Conclusion: None of the children in this study had learned to talk by the age of six months. YES, the conclusion follows beyond a reasonable doubt because, according to the statement, the size of the spoken vocabulary at eight months was zero words.

Once the WG-III test is completed, the report depicts an overall percentile score (against a norm reference group) as well as scores in three individual areas, shown in the **RED model** below (where **infer**, **deduce** and **interpret** scores are combined into **Draw Conclusions**).
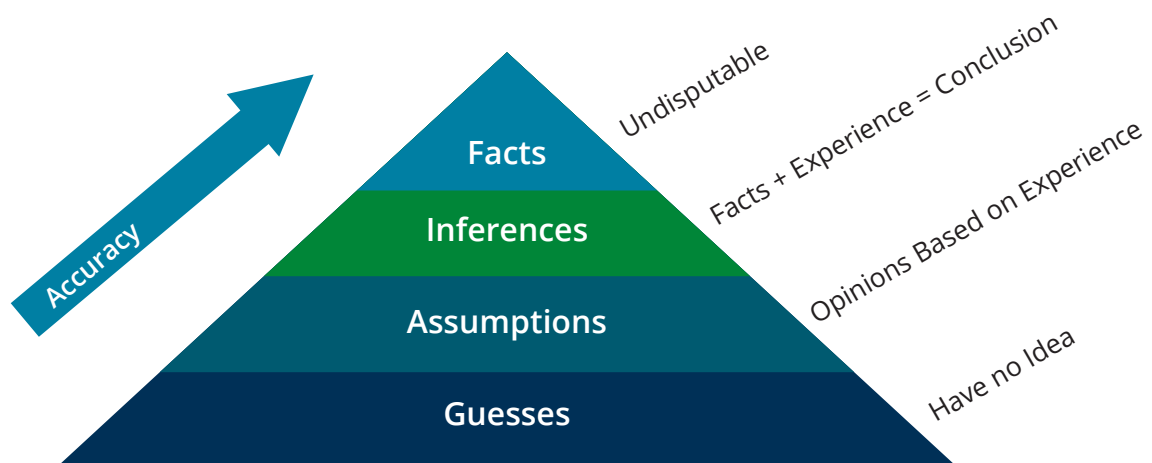

RECOGNISE ASSUMPTIONS   EVALUATE ARGUMENTS   DRAW CONCLUSIONS

Recognise Assumptions

It is deceptively easy to listen to a comment or presentation or to read or see something on social media and assume the information presented is true even though no or little evidence was given to back it up. We often assume things are true if they support our own values and views. However, this is dangerous as many assumptions are not supported by evidence.

Evaluate Arguments

The art of evaluating arguments entails analysing information and alternate views objectively and accurately, questioning the quality of supporting evidence and understanding how emotion influences the situation. Common barriers include confirmation bias (where we seek only information to support our views) or allowing emotions to get in the way of objective evaluation.

When evaluating an argument, the level of accuracy of information ranges from guesses and hunches to hard, undisputable facts.

Pyramid diagram with an "Accuracy" arrow pointing upward along the left side. From top to bottom: Facts, Inferences, Assumptions, Guesses. Labels on the right: Undisputable, Facts + Experience = Conclusion, Opinions Based on Experience, Have no Idea.

Inferences

An inference is a conclusion a person can draw from certain observed or supposed facts. The problem lies when someone makes an incorrect inference.

Without knowing for sure what is correct (a hard fact) or making false assumptions you might make the wrong inference.

Reasons

Before making up their mind and reaching a decision a good critical thinker will reason. Reasons are the statements that provide support for conclusions. Without reasons, you have no argument; Reasons are called evidence or justifications. This is where many arguments fail because the evidence is poor, riddled with bias, assumptive or the other party simply refuses to believe it.

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Draw Conclusions (Deduce)

Once an issue has been defined and reasoning conducted, we need to draw a conclusion. A conclusion, in terms of CT, is often called a viewpoint, position or opinion.

Bringing diverse information together to arrive at conclusions that logically follow from the available evidence is crucial when making a decision. People who can do this are careful to not inappropriately generalise beyond the evidence and can change their position when the evidence warrants doing so. They are often characterised as having "good judgment." This skill is particularly important in lawyers, which is why CT is regarded as a must have ability in legal professionals.

Many organisations use the Watson-Glaser to measure the levels of CT in job applicants. Others use the assessment and resulting development report to pinpoint where an individual's strengths and development areas lie, whilst the report provides suggestions for coaching activities and exercises.

Measuring Dispositions

In response to research carried out into the dispositions that are involved in critical thinking, the TalentLens team of psychologists has designed an online behavioural questionnaire, My Thinking Styles, that focuses on measuring an individual's level of seven dispositions or thinking styles.

My Thinking Styles ideally complements the Watson-Glaser test to give in-depth insight into an individual's critical thinking.

Analytical
- Organised
- Planful
- Logical

Truth Seeking
- Frank
- Independent
- Asks the Tough Questions

Inquisitive
- Curious
- Asks Questions
- Probes Deeply

7 Powerful Thinking Styles

Timely
- Mobilises Resources
- Multitasks
- Takes Initiative

Insightful
- Steadfast
- Thinks Before Thinking
- Perseveres

Systematic
- Strategic
- Connects Ideas
- Sees the Big Picture

Open-Minded
- Good Listener
- Respects Differences
- Adaptable

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We all use a variety of thinking styles in our daily lives, but we tend to favour some at the expense of others, which can impact our ability to make good decisions.

Based on the responses, the report ranks the seven styles from most to least preferred. For the less preferred styles, the report offers exercises and suggestions on ways to develop them further. The seven styles can be particularly helpful when practicing the 5 steps of better thinking (see white paper **Improving and Developing Critical Thinking**).

Critical Thinking	
Skills	**Styles**
1. Stop and Think	Insightful
2. Recognise Assumptions	Inquisitive Truth Seeking Open-Minded
3. Evaluate Information	Systematic Analytical (Insightful)
4. Draw Conclusions	
5. Plan of Action	Timely (Analytical)

Developing CT Skills

CT taps into both cognition and behaviour and whilst it is harder (but not impossible) to develop how you think, it is possible to change or modify behaviour.

The most important step for developing CT skills is to become a critic of your own thoughts and actions. Transferring CT from theory into practice is hard, but developing cognitive flexibility and letting go of old habits, assumptions or ingrained beliefs is especially important for improving CT. It requires motivation, will-power and practice.

The Watson-Glaser development report and My Thinking Styles can both be used in development interventions. The paper **Improving and Developing Critical Thinking** covers way to develop CT in greater detail.

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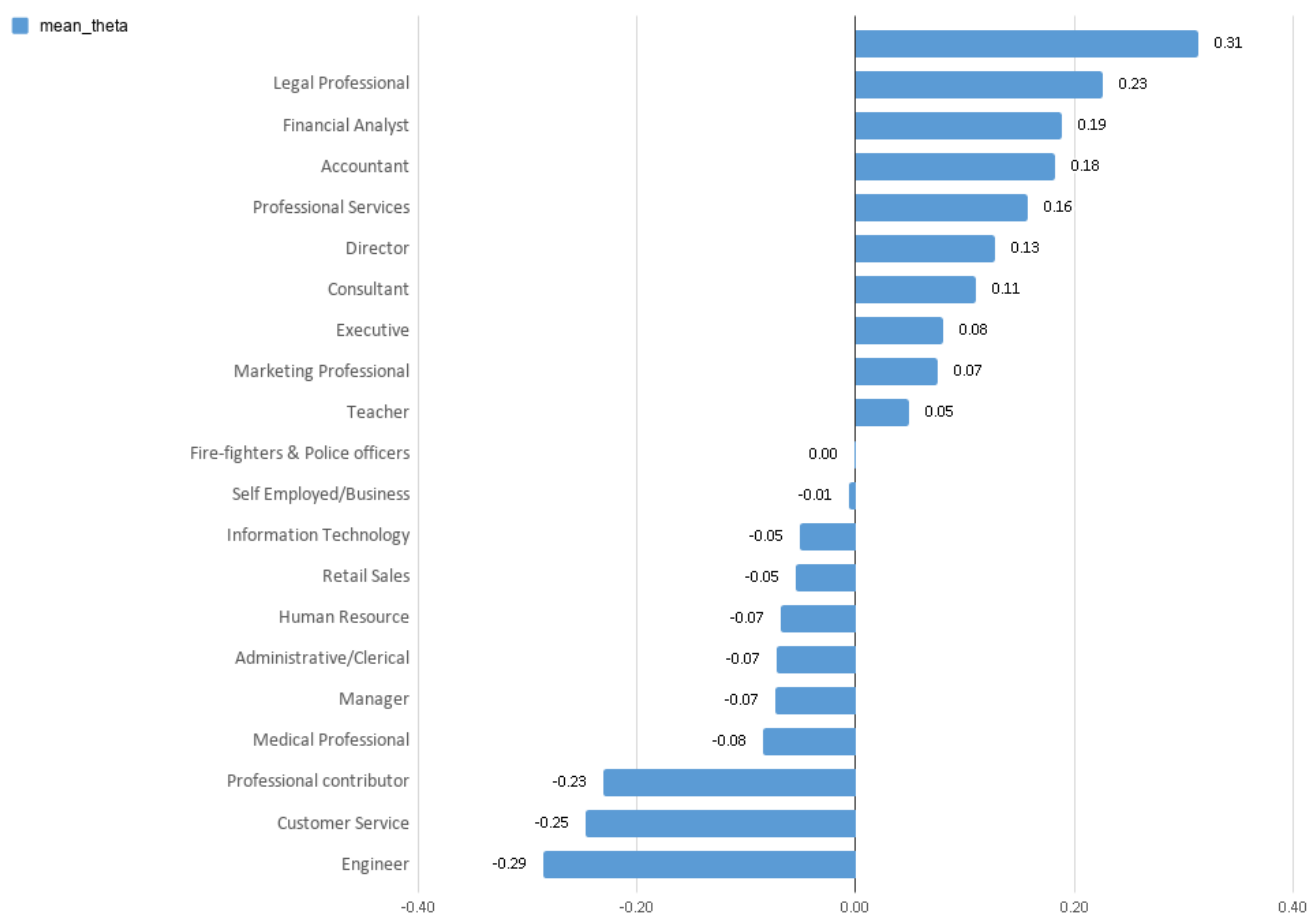
Evidence that Watson-Glaser Measures CT

Any test or assessment needs to 1) measure the area that it pertains to and, 2) discriminate accurately between high and low performers in the specific test area. The test clearly measures the key cognitive areas recognised as being important in CT: the evaluation of arguments, recognising assumptions and drawing logical inferences and conclusions.

One of the best ways to look at whether Watson-Glaser does measure CT is to compare the average scores in groups of people who have higher levels of CT vs. those with lower levels.

Many jobs require CT but a profession where it is a must-have is the legal sector (solicitors, attorneys), barristers and judges.

Analysis of the Watson-Glaser scores across professions shows statistical differences in the mean scores across different cohorts of people.

The table below shows the mean theta Watson-Glaser scores for groups of test takers by occupation. The highest average mean score is found in legal professionals.

Occupation	mean_theta
Legal Professional	0.31
Financial Analyst	0.23
Accountant	0.19
Professional Services	0.18
Director	0.16
Consultant	0.13
Executive	0.11
Marketing Professional	0.08
Teacher	0.07
Fire-fighters & Police officers	0.05
Self Employed/Business	0.00
Information Technology	-0.01
Retail Sales	-0.05
Human Resource	-0.05
Administrative/Clerical	-0.07
Manager	-0.07
Medical Professional	-0.07
Professional contributor	-0.08
Customer Service	-0.23
Engineer	-0.25
	-0.29

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Predicting Performance in a Job or on a Course

Years of wide-ranging research has consistently demonstrated that measures of cognitive (mental) ability are good predictors of likely performance in most job roles and many higher educational, University and Masters courses.[14]

Recent research by Pearson of the correlation of W-G test scores with success on Business Studies and Social Science University courses show very high positive predictive validity correlations 15.

Thousands of organisations use ability tests alongside other assessment measures when hiring staff for a variety of job roles.

Examples of Poor CT in Business

Hindsight is a wonderful thing, and there are numerous examples of business decisions that turned out to be bad. These are not necessarily due to poor CT but may result from arrogance, poor competitor information, new technology or changing consumer habits and needs. Other examples can be attributed to risks that were taken and based purely on hunches or with limited market research.

Some of the biggest failures have been in international expansion. Many organisations assume that consumers in one market are identical to another without carrying out any research. Take for example WalMart, the hugely popular US supermarket. It has expanded into a number of foreign markets but has been unable to replicate their US success in some. Analysis of this problem has been attributed to poor market research or assuming that the shopping experience is similar across all cultures.[16]

Another example of poor CT is Kodak, a prime example of a company that failed to see that their market (the world of cameras) was changing. Ironically, Kodak had been pioneers of many of the underlying technologies inherent to digital cameras, but they failed to grasp that people's ultimate goal is to take great photos, not to buy film for cameras.[17]

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About Us

TalentLens, a Pearson business, publishes psychometric assessments that are used globally to hire and develop the 21st century workforce. Our instruments measure critical thinking, problem solving, and a range of job skills to deliver data-driven insights that inform and clarify an organisation's human capital decisions. Learn more at TalentLens.co.uk or call 0345 099 1485.

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