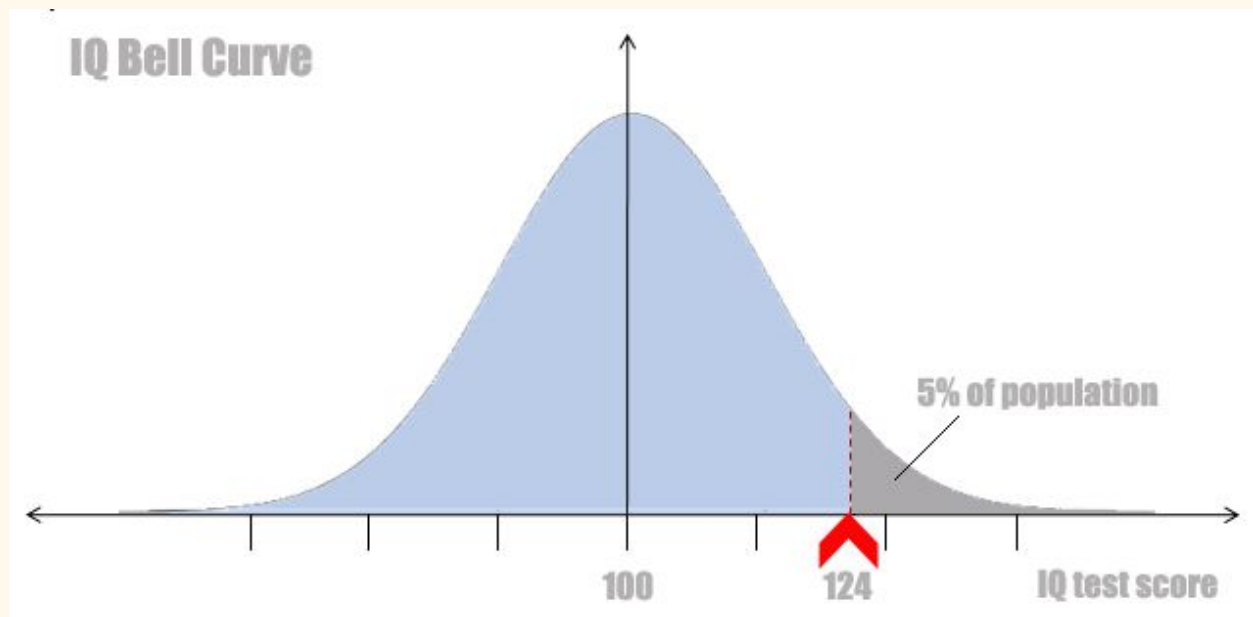


PSYCHOMETRIC IQ AUGMENTATION 2



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IQ TESTS

'IQ' stands for 'intelligence quotient'. Scientifically valid IQ Tests are standardized psychometric tests of general intelligence (**g**).

Scientifically valid means that they actually measure general intelligence rather than some other cognitive ability or abilities.

Standardized means that scores can be compared in the general population and you know what score is needed to be in a certain percentile – for instance above average or in the top 2% (Mensa standard).

There are many bogus IQ tests on the web that either don't accurately or reliably measure your general intelligence, or which give you an inflated score. Valid, standardized tests are difficult to locate and are usually professionally administered.

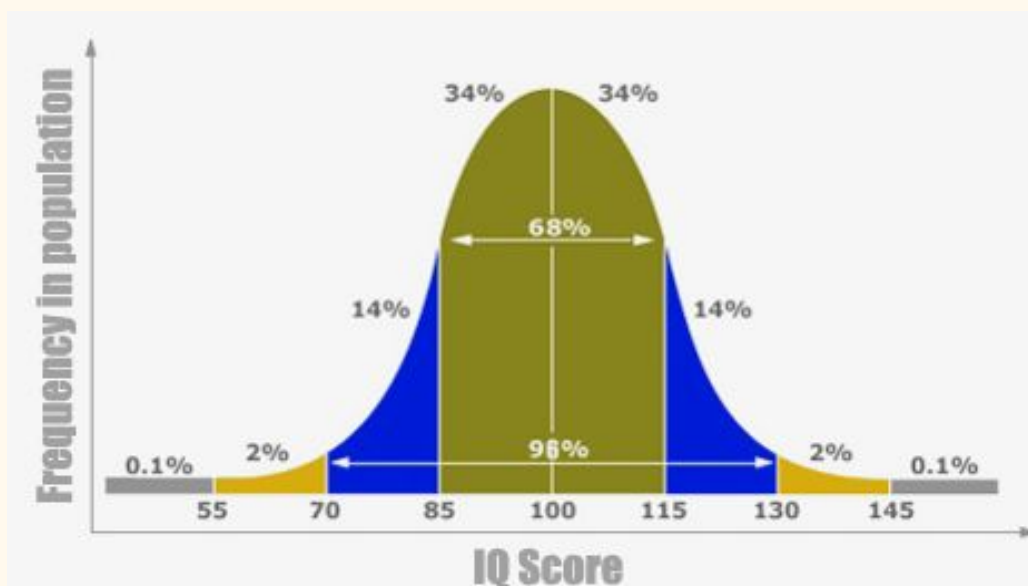
IQ test scores can be used to predict achievements in a wide range of abilities, including creativity, educational attainment, health, leadership, lifespan, professional achievement and income.

IQ tests are widely used in our institutions and organisations because of their consistency and validity. Schools and universities use IQ tests (or 'aptitude tests') to select and stream students, companies use IQ tests to screen applicants, with estimates of 80% of Fortune 500 companies' HR departments using these kinds of psychometric tests for recruitment.

The IQ Score Bell Curve: A Normal Distribution

With standardized IQ tests, the tests are designed so that their scores have a 'bell curve' distribution in the general population with an **average of 100**.

The distribution curve has a peak in the middle where most people score and tapering ends where only a few people score. In statistics this is called a **normal distribution**. Many variables in nature (such as height and weight) have a distribution of the same shape.



IQ Bell Curve

The area under the curve between scores corresponds to the percentage of the population between those scores. The scores on this IQ bell curve above are color-coded in *standard deviation units*. A standard deviation is a measure of the *spread* of the distribution. 15 points is one standard deviation for most IQ tests. Nearly 70% of the population score between 85 and 115 – i.e. plus and minus one standard deviation. A very small percentage of the population (about 0.1% or 1 in 1000) have scores less than 55 or greater than 145 – that is, more than three standard deviations from the average score.

A critical insight from research over the past decade is that IQ is not a fixed, genetically determined attribute. An individual's score on the bell curve is not static. Over time – weeks, months or years – an IQ level can change substantially.

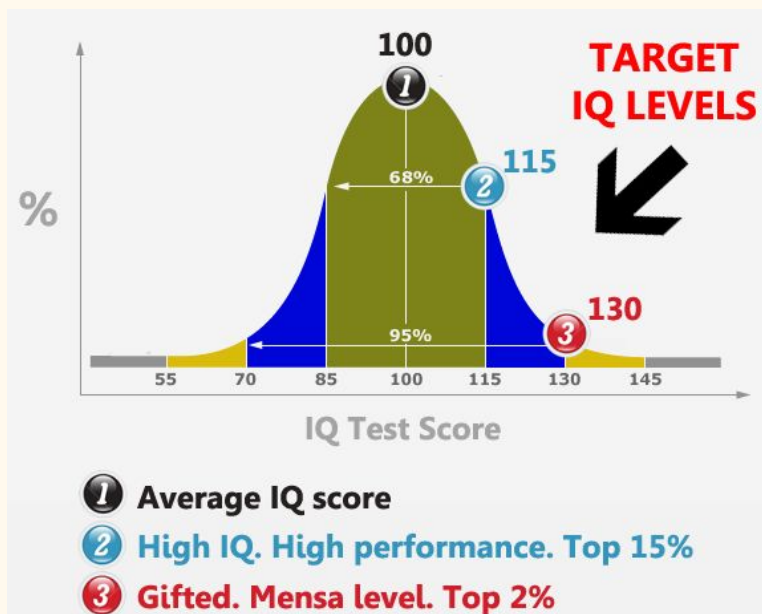
What is an Average IQ Score?

Standardized IQ tests are designed so that the exact average (mean) IQ score in the general population is 100. An 'average IQ score' or 'normal IQ score' can be defined as a score between 85 and 115 – between plus and minus one standard deviation from the average (see the table below).

What is a High IQ Score? What is Mensa Standard?

An IQ of 115 or more can be considered to be a high IQ score or level. Only 15% of the population have an IQ level of 115 or above. There is no magic bullet but in general it is thought that:

- An IQ of **110** or above typically enables you to attain a college level education.
- If you have an IQ of **115** or above you are capable of the cognitive demands of almost any profession, and can attain the highest levels of education and training.
- The entry score for An IQ of **124** is needed to become a member of the [International High IQ Society](#). This is the first entry-point score into high IQ societies. This is another criterion for a high IQ score.
- The average Harvard University undergraduate IQ in one study was **128.1**.
- Around 2% of the population (98th percentile and above) has an IQ greater than **130** which is 'gifted' intelligence. This is an IQ of 2 standard deviations from the average IQ. This is **Mensa standard** – the IQ score on a valid, standardized IQ test required to become a member of Mensa.



IQ Level Scale

This table indicates how IQ levels can be classified. The IQ ranges are conventional ones.

Classification	IQ Range	%
highly gifted	140+	0.4%
Mensa membership	130+	2%
gifted	130+	2%
International High IQ Society membership	124	5%
high	115-129	15%
high average	110-114	25%
average	90-109	50%
low average	85-89	23%
borderline	70-79	8%

Types of Intelligence Test

There are two broad types of intelligence test:

1. Full Scale IQ Tests

IQ tests giving a measure of overall intelligence (**g**), made up of a **test battery** of different **subtests** for 5-7 of the broad ability domains identified in the CHC theory of intelligence. Examples are the WJ IV, WAIS-IV, WISC-V and Cattell III B.

For an example, the WJ IV broad abilities and their subtests are:

Fluid reasoning (Gf): Concept Formation, Number Series, Analysis-Synthesis

Comprehension-knowledge (Gc): Oral Vocabulary

Working memory (Gwm): Verbal Attention, Numbers Reversed

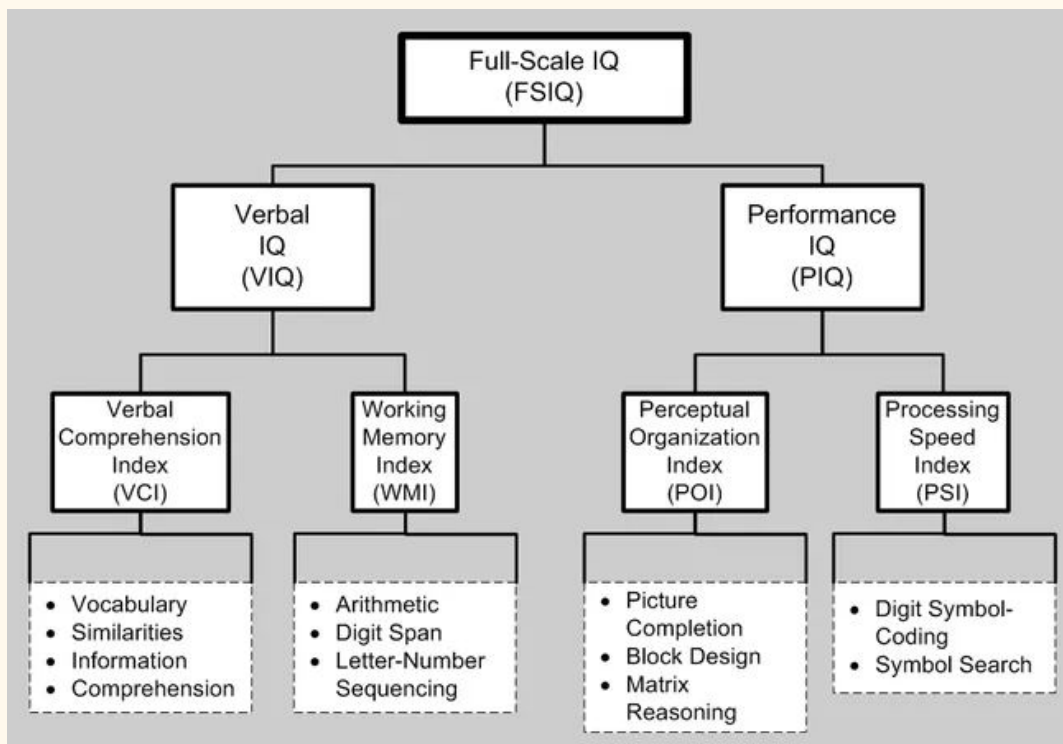
Processing speed (Gs): Number-Pattern Matching, Pair Cancellation

Auditory processing (Ga): Phonological Processing

Long-term storage & retrieval (Glr): Story Recall

Visuospatial processing (Gv): Visualization

The well-known [WAIS-IV full scale IQ test](#) has its own broad ability classification system. Fluid reasoning (**Gf**) and Visuospatial processing (**Gv**) are grouped together under a 'Perceptual Organization Index'. Other broad abilities with subtests in the WAIS-IV are Working memory (**Gwm**), Comprehension-knowledge (**Gc**), and Processing speed (**Gs**). The subtests for each Index are listed at the bottom of the figure.



WAIS-IV taxonomy

2. Culture-Fair IQ Tests

IQ tests of cognitive ability that are designed to be independent of language and cultural background. One of the broad abilities tested in well-known full-scale IQ tests such as the WAIS-IV or WJ-IV is Comprehension-knowledge (**Gc**) - with subtests such as vocabulary and general knowledge. Scoring well on a **Gc** subtest clearly depends on language and cultural background. This puts individuals who have not grown up in an American culture with English as a first language at a disadvantage. Culture fair tests are designed to get around this problem, focusing on broad abilities such as Fluid reasoning (**Gf**) and Visuospatial processing (**Gv**).

Examples of culture fair IQ tests are the Raven's Advanced Progressive Matrices, and Cattell Culture Fair III A.

Raven's Advanced Progressive Matrices (APM) IQ Test

The APM ([ref](#)) is a popular career / job aptitude test. It primarily measures the Fluid reasoning (**Gf**) broad ability - our on-the-spot reasoning and problem solving ability, not dependent on background knowledge, education or any specific expertise.

As described by the publishers of the Raven's Advanced Progressive Matrices test:

“The APM score can be used as an indication of a candidate’s potential for success in high-level technical, professional, and executive positions that require high levels of clear and accurate thinking, problem identification, holistic situation assessment, and monitoring of tentative solutions for consistency with all available information. The APM score also can be used for developmental purposes in occupational and advanced educational settings. The nonverbal aspect of the test minimizes the impact of cultural or language bias.”

Different countries have different average scores on this test ([ref](#)).

Country	N	Mean
Australia/New Zealand	128	11.95
France	106	14.33
India	100	9.51
Netherlands	103	13.01
UK	101	12.38
US	175	12.23

Here is an example of a progressive matrix problem of the sort found in the APM test. You need to choose from 1-4 to fill in the missing matrix. Notice that in each row, the 3rd matrix is the addition of the first two.

		—	

1	2	3	4
5	6	7	8

Matrix reasoning IQ problem

IQ Test Ceilings

What is the highest you can score on a professionally proctored IQ test?

The answer is typically anywhere from 160 to 170. Here is a table showing the max scores on some of well-known full scale IQ tests.

Intelligence Test	Test Ceiling
Wechsler tests WPPSI-R (ages 3-7) WISC-III (ages 6-17) WAIS (ages 16 +)	160 full scale standard deviation (s.d.) 15
Wechsler tests WPPSI-III (ages 3-7) WISC-IV (ages 6-17)	160 full scale standard deviation 15 210 extended scale, with subtest ceilings of up to 28 (Harcourt Assessment WISC-IV Technical Report #7 WISC-IV Extended Norms)
Stanford Binet, Fourth Edition	164 standard deviation 16
Stanford Binet 5	160 standard deviation 15
Differential Abilities Scales (DAS)	175 (lower at ages approaching 17) standard deviation 15

For highly gifted individuals who reach the ceiling in their scores, there are **extended IQ scales** which give scores up to 210 (WISC-IV Extended Scale) & 225 (SB5 Extended Scores) ([ref](#)).

Highest IQs in the World

There are a number of individuals with IQs estimated to be >200. Here are two well-known examples:

[Terence Tao](#), an Australian mathematician of Chinese origin. He was capable of performing basic arithmetic by age 2. Tao earned his PhD from Princeton by age 20 and is now a full time professor at UCLA.

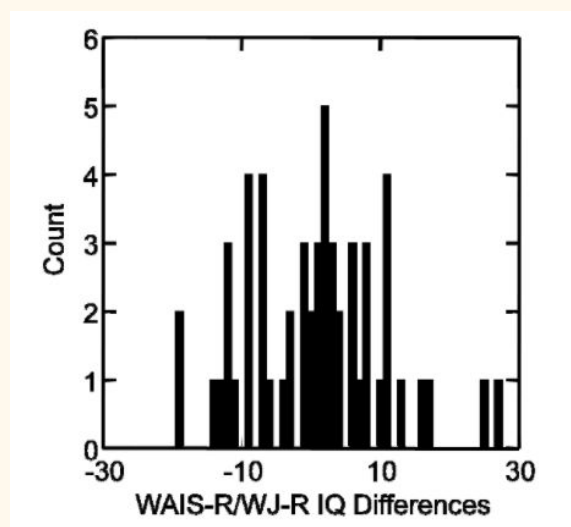
[Christopher Hirata](#) - an American child prodigy who had won a gold medal at the Physics Olympiad by age 13, earning his PhD from Princeton by 22. He has worked on a project exploring the possibility of colonizing Mars for NASA ([ref](#)), and currently works at the Center for Cosmology and Astroparticle Physics at the Ohio State University. His app innovations can be found [here](#).

IQ Test Score Variation

Would you expect to get the exact same score if you took one scientifically valid, standardized IQ test, and then another one? The short answer is no. Correlations reported between major IQ tests usually range from the .60s to .80s, with the highest correlations typically found in the .70 to .80 range ([ref](#)).

Correlation: An index measuring the degree of relationship (usually linear) between two attributes scaled so that the value of +1 indicates a perfect positive relationship, -1 a perfect negative relationship, and 0 no relationship.

In one study looking at test scores of the 55 individuals for two different full-scale IQ tests - the WAIS-R and the WJ-R it is clear that there is surprising range scores ([ref](#)). In this sample 2 individuals actually scored 20 points more on the WAIS-R than the WJ-R.



Another study ([ref](#)) looking at a variety of contemporary full scale IQ tests (also called ‘test batteries’) has concluded that:

“Psychologists can anticipate that 1 in 4 individuals taking an intelligence test battery will receive an IQ more than 10 points higher or lower when taking another battery.”

The differences are in part due to measurement error (which may be the result of different conditions while taking the test), but also significantly due to *non-shared cognitive abilities* actually measured by different IQ tests. Some full scale IQ tests may measure broad ability domains such as Auditory processing (Ga) not measured in other IQ tests. And a single broad ability such as Working memory **Gwm** is a highly complex cognitive ability, and two IQ tests may measure non-overlapping components of the brain’s Working memory ability.

The take-home from these multiple IQ test studies is that a given full-scale IQ test score you may obtain should reasonably be interpreted as a score within 10 points of another full-scale IQ test you may take. Identical scores on two independent tests is unlikely.

How To Test Your IQ?

Most IQ tests on the internet are not standardized tests. If you want to test your own IQ level, how do you go about it?

One approach is to take a professional IQ test administered by a qualified test-administrator, such as a private psychologist or a Mensa test official.

Professionally administered IQ tests

Professionally administered IQ tests (e.g. WAIS-IV or Cattell III B) give you an accurate measure of your IQ level. They are typically administered by a certified psychologist, educationalist or clinician. They cost to you will be in the region of \$300-\$500 for an assessment. The test kits can be purchased independently – at a high cost: up to \$1,110.00 for the WAIS-IV test battery ([link](#)).



Mensa Admission Test

A cost-effective method of measuring your true IQ level is to take the supervised Mensa Admission Test. Mensa offers supervised IQ tests - and tests can be taken in most countries. The test-taking fee varies from country to country - for instance in the US the fee is now \$60.00 ([ref](#)); in the UK the fee is now £24.95 ([ref](#)). You will need to check for details in your home country's Mensa website. This fee will buy you:

- A reserved place at the centre of your choice.
- The opportunity to take two IQ test papers. The Cattell III B (full scale) and the Cattell Culture Fair III A. Check with your local centre options.
- The marking of your IQ test papers and your results returned to you in confidence.

Mensa test sessions are held at centres throughout your home country. Details can be found at one of these links:

- [International Mensa](#)
- [US Mensa](#)
- [British Mensa](#)

A follow-up eBook looks at preparing for the Mensa Admission Test to optimize your IQ score.

Free Online IQ Tests With Instant Results

There are many so-called 'IQ tests' online. The vast majority these are not scientifically valid or standardized. They may be fun, they may even be good for training purposes, but they are worthless as a measure of your general intelligence (**g**) level. The following tests should give you valid measures of your IQ measured by the broad Fluid reasoning (**Gf**) ability which has a high correlation with general intelligence (**g**).

Free Online Culture-Fair IQ Tests

Anders Jensen's IQ Test

This non-verbal IQ test is based on the well known Raven's Progressive Matrices. The IQ test is culture fair – eliminating the effect of cultural factors such as vocabulary and general knowledge. The calculation of IQ is based on answers from more than 250,000 people. The test is based on seeing relationships in abstract geometrical shapes. It is a measure of Fluid reasoning, which correlates highly with general intelligence (*g*).

Time required: 40 minutes time limit

Broad ability domain: Fluid reasoning (*Gf*)

Repeat testing? No

Fee: No charge

Instruction languages: English, Spanish, Danish, German

Creator: Anders Jensen, Mensa Denmark



The JCTI (Test of Induction)

This non-verbal IQ test of fluid intelligence (*Gf*) assesses your IQ through culture fair nonverbal matrices questions.

The JCTI correlates very highly with the IQ on traditional intelligence tests such as the Wechsler Adult Intelligence Scale III (WAIS-III) Full Scale IQ or the Slosson Intelligence Test – Revised (SIT-R3) Total Standard Score.

The JCTI has very high correlations with both the Scholastic Aptitude Test I (SAT I) combined score, and the SAT I Mathematical reasoning test scaled score. In the US you can use this test to predict your SAT performance.

Time required: No time limit – 52 item test

Broad ability domain: Fluid reasoning (*Gf*)

Repeat testing? No

Age: 15+

Age normed? Yes

Fee: No charge

Creator: Xavier Jouve, The Cerebrals Society

Special information: For information on how to interpret this test, [click here](#).



IQ Brain IQ Matrices Tests

[IQ-Brain.com](#) offers 4 culture-fair IQ tests based on Cattell, Raven's Advanced Progressive Matrices and the Mensa-administered Figure Reasoning Test (FRT).

The IQ score estimates are comparable what users have been able to achieve on proctor-administered tests. The tests have a similar number of questions and time pressure as both FRT and the Cattell culture fair IIIa tests which are often administered by Mensa.

The test-developer recruited a cohort of test takers from all walks of life, but more importantly test takers who had taken a Mensa-administered IQ test. The test is calibrated to ensure that the raw score required to achieve a passing score of 132 was in line with the score needed to become a Mensa member. If you can achieve an IQ score of 132 on his tests, that you stand a good chance of achieving a similar result with a Mensa-administered test.

There is a free IQ test which provides you with a realistic assessment of your IQ standing, as per the following IQ categorisations:

Superior: 120-129+

High average: 110-119

Average: 90-109

Low average: 80-89

Very low average: >80

Once you have taken our free IQ test, you may decide to take one or more of the full IQ tests online which will provide you a precise estimate of your fluid reasoning (*Gf*) IQ. The cost of 1 test result at last check is \$9.00, 2 test results for \$12.00 and 3 test results for \$15.00. The tests measure IQs up to 148.

A yellow button with a blue border and a blue shadow, containing the text "Take The Test" in bold black font.

Online Full Scale IQ Tests

GIQ IQ Test

This full-scale IQ test will give you a valid estimate of your general intelligence (*g*). It is biased towards English language speakers. It has subtests for the following:

- Picture Questions
- Vocabulary Questions
- Recall Questions
- Relationship Questions
- Arithmetic Questions

The GIQ test does not have segregated subtests for the broad ability domains identified by the CHC theory (eBook 1), but it will give you a valid and standardized estimate of your full scale IQ.

The fee is \$10.

A yellow button with a blue border and a blue shadow, containing the text "Take The Test" in bold black font.

IQ Level Is Not Fixed: Intelligence Augmentation

Individual Differences in IQ: How To Use Your Scores

“Each mind has its own method.” Emerson

“Minds differ more than faces.” Voltaire

As already noted in the previous eBook, a major purpose of psychological testing is **selection** and **streaming** - for example testing for college admissions, job selection or admission to Mensa.

But as argued by the Director of the Institute for Applied Psychometrics, [Kevin McGrew](#), a major purpose of psychometric testing: to appreciate *the individual difference terrain or landscape of each individual's personal abilities*. In other words, to understand each person's **unique personal profile** - their cognitive peaks (potentialis, capacities, strengths) and valleys (weaknesses, deficiencies), to design programs to allow them to reach their fullest potential.

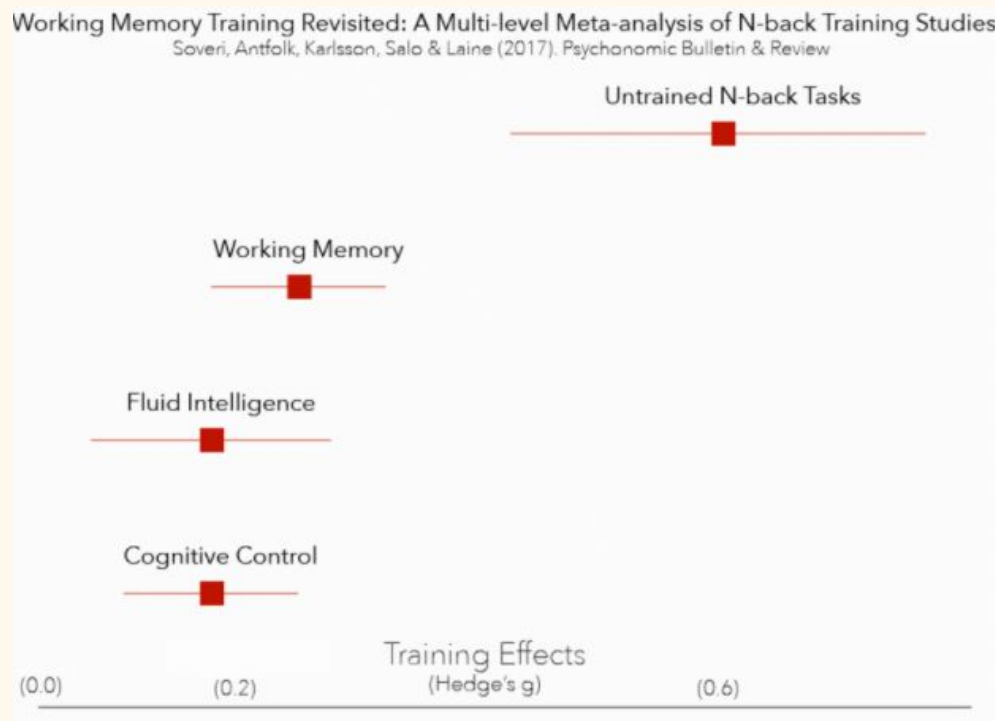
This is the primary aim underlying the development of IQ increasing apps such as [i3 Mindware](#) which provides its own scientifically valid IQ tests.

You can take a 'baseline' IQ test to estimate your current IQ level, and then re-test yourself after an IQ augmentation program. You should expect to see substantial increases in your IQ score, not just from practice on aspects of IQ such as Comprehension-knowledge (**Gc**) that benefit from learning, but also in terms of cognitive efficiency and 'processing power' - measured by e.g. Working memory (**Gwm**) or Processing speed (**Gs**).

IQ Augmentation Through Training

But it has become clear from peer-reviewed research in cognitive psychology as well as neuroimaging that some types of brain training are effective for inducing long-term neuroplasticity change and increasing general intelligence (*g*) as well as, IQ scores ([reviews](#)).

For instance working memory brain training such as [i3 Mindware](#) increases IQ in both working memory (*Gwm*) and fluid reasoning (*Gf*) – as well as improving attention control. The latest 2017 ‘meta-analysis’ of all 33 published, randomized, controlled DNB trials from independent labs all around the world ([ref](#)) concludes there are real training effects of working memory brain training on IQ, beyond placebo effects and just getting good at the n-back game itself through practice. By comparison, the training effect on *Gwm* is as powerful as an effective antidepressant drug - an industry worth billions of dollars.



Training effect estimates of working memory brain training

Summary

In summary, we have explained what valid, standardized IQ tests and scores mean in terms of the IQ Bell Curve. We now know what an average and a superior IQ score is - including a Mensa qualifying score. We know there are two basic types of IQ test: full scale and culture-fair, and we have looked at some specific tests in both categories. We have also determined that there can be differences in test score results from one (valid) test to another. In general culture-fair matrices-type IQ tests that measure fluid reasoning (Gf) can be taken as a good estimate of full-scale IQ due to the high correlation between Gf and general intelligence (g), but an individual may have a strength in broad abilities not measured by matrices tests, and this should be taken into account when interpreting your own culture-fair IQ test scores. In this eBook we have also provided links to free online IQ tests that can be considered valid and standardized. We concluded by providing some data demonstrating that some types of brain training apps (such as [i3 Mindware](#)) can augment IQ scores. Intelligence level and IQ scores are not fixed, but can benefit from training programs.