EDITOR

Dear friends and subscribers to Ideacción, the Spanish journal dedicated to giftedness.

This number of Ideacción is the result of an in-depth study by Yolanda Benito, Jesus Moro and Juan Antonio Alonso. The research was presented at the August, 2007 World Conference: World Council for gifted and talented children, University of Warwick, U.K. The work received such a quantity of feedback from the five continents that it was necessary to write it up as an article for publication and nothing better than to devote a special number to it in this Journal.

The tile is sufficiently suggestive and we are sure the reader will find it interesting from start to finish of the eight sections of which it is comprised: “What is intelligence? Validity of the WISC-IV test for measuring intelligence. Correction criteria for intellectually gifted children”.

I am convinced that this special number, due to its quality, will help towards a greater and deeper understanding of the Assessment and Diagnosis of these pupils.

Juan A. Alonso,
Programme Coordinator for the Huerta del Rey Centre, Valladolid (Spain).
Member of Executive Committee of World Council for Gifted and Talented Children (1997-2001).
Organizer 14th World Conference for gifted and talented children,
Barcelona (2001) 54 countries represented.

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What is intelligence? Validity of the WISC-IV test for measuring intelligence. Correction criteria for intellectually gifted children

Summary

To understand what intelligence is, its concept and to determine the validity of tests for measuring intelligence is the key to assisting the progress of school children, given that the psychometric concept of intelligence forms part of the diagnostic and prognostic both in the DSM-IV-TR (The Diagnostic and Statistical Manual of Mental Disorders published by the American Psychiatric Association, 2000) as well as in the ICD-10 (The Classification Manual of Mental Disorders and Behaviour published by the World Health Organisation, 1992).

Intelligence tests provide a profile of the child as a pupil and they offer a precise, global picture of their skills. They highlight the strong and weak points of each student and make it possible to use different sources of assessment in order to observe their progress and give useful information for learning and to tackle the question of processes and products.

This empirical research, which deals with the validity of the WISC-IV as a psychometric clinical means for measuring intelligence, has concentrated on the following questions:

1. Is the new WISC-IV effective for measuring intelligence?
2. Is the WISC-IV effective for the intelligence of children with a high, medium or low average (IQ between 70 and 130)?
3. Is the WISC-IV equally effective for measuring the intelligence of children at the higher end of the scale (IQ equal to or higher than 130)? Is the WISC-IV effective for the identification and assessment of gifted children?
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5. Which subtests determine and differentiate the intelligence of gifted children?
6. What is the cut-off score which should be used as significant in the WISC-IV for determining that a student requires special education because of intellectual giftedness?
7. Which of the definitions of intelligence throughout history come closest to the reality of the concept of intelligence in line with the research results and the new theories?
8. Which is the best intelligence test for identifying gifted children?

The specific, and difficult to repeat, characteristics of the sample of pupils used in the research means that this is relevant and useful. **The sample is comprised of 84 children from 6 to 16 years of age, of whom 33 are non-gifted and 51 are gifted.**

It is equally noteworthy that the WISC-IV represents the most significant revision of any of the Wechsler scales in the history of the series of tests, principally because of its clear alignment with the CHC theory (Cattell-Horn-Carroll). **The WISC-IV is the most widely used measurement of intelligence in the world.**

On the other hand, the WISC-IV has demonstrated its validity in relation to school performance.

The future of education must be built on solid theoretical and research foundations. The assessment procedures lend themselves to scientific validation and the theory is the result of rigorous investigation.

Note: research carried out by Yolanda Benito, Doctor in Psychology; Jesus Moro, Doctor in Medicine and Juan A. Alonso, Doctor in Education Sciences. Research presented at the 2007 WORLD CONFERENCE, World Council for gifted and talented children, August 2007, University of Warwick (U.K.).

Introduction

Every time that a new revision of a test for the psychometric clinical measurement of intelligence is carried out it is necessary to determine its effectiveness for measuring intelligence given that, as we have said, this measurement is considered in the diagnostic and prognostic of the pupils, as well as making it possible to draw up educational proposals in accordance with the academic needs of each student.

What has been most highlighted from the revisions or from the new intelligence tests is, generally, their clear approximation to a theoretical base and, in particular, to that known as CHC (Cattell-Horn-Carroll) (Flanagan and Kaufman, 2006: 6).

The Wechsler scale is one of the scales recommended in the DSM-IV-TR and one of the possible assessment scales according to the ICD-10 for determining the general intellectual capacity of the pupil. It is, therefore, very important to know up to what point the WISC-IV is capable of differentiating those students with a particular capacity for learning in order to offer to both the parents as well as the teachers an accurate explanation of individual differences and to make it possible to give, within their education, individualised designs as well as diversified and stimulating teaching in accordance with the learning capacity of the pupil. It is a matter of seeking academic excellence by adapting the programme in keeping with the students´ way of learning.

It is important in education not only to consider the production and work of the children in the academic and/or family environment which, at times, may be in line with their capacities, but also to know their capacities as such since, for many reasons, these capacities may not be clearly apparent in the academic performance of the child or impossible to observe by the parents.

Despite the criticisms of the bias and limitations of the intelligence tests, they continue to be the most useful and are the best measurements of intellectual ability, as well as being the most accurate method of identifying children for special programmes.

For the reasons previously outlined, and because of the need to know which is the best definition of intelligence and what it is that differentiates the capacity of the most intelligence children, it is important to carry out empirical research into the new tests for the psychometric clinical measurement of intelligence.

We believe that this research may help to clarify and understand the human mind. We know that the ends of the intelligence curves provide valuable heuristics.

1. Is the new WISC-IV effective for measuring intelligence? The effectiveness of the WISC-IV as a psychometric clinical measurement of intelligence. Validation study in relation to the Stanford-Binet (Form L-M)

The WISC-IV is the latest revision, marketed in Spain in August, 2005, of the Wechsler scale for pupils, whose practical and clinical usefulness is supported by more than 60 years of research in very different fields and with very diverse aims. As Beres, Kaufman and Perlman indicate, the Wechsler scales have consistently demonstrated their clinical usefulness in detecting mentally handicapped children and those with learning difficulties, for assignment to specialised programmes, for clinical intervention and neuropsychological assessment.

As Wechsler said: “What we measure with the tests is not what the tests measure: information, spatial perception and reasoning capacity. These are only a means to an end. What intelligence tests measure is something much more important: the capacity of an individual to understand the world about him and his resourcefulness to cope with the challenges” (Corral and others, 2005: 16).

The WISC-IV is structured significantly differently to its processors: WISC, WISC-R and WISC-III. The verbal and performance sections have been replaced by four indices: Verbal Comprehension, Perceptual Reasoning, Working Memory and Processing Speed. The subtests of Object Assembly, Picture Arrangement and Mazes have been removed. Likewise, some new subtests have been added, which are: Word Reasoning, Matrix Reasoning, Picture Concepts, Letter-Number Sequencing and Cancellation. The Arithmetic subtest, which is now a supplementary test, has been changed so that subjects have only 30 seconds at their disposal to answer each item and none of the items for the children is presented visually. It is grouped with the Working Memory tests although it also has a great importance in fluid reasoning (Falk, Silverman and Moran, 2004).

In our research regarding the validation of the WISC-IV, we have chosen the SBL-M (Stanford-Binet, Form L-M) because this test had not been previously used to validate the WISC-IV in relation to other measures and because the SBL-M is one of the tests which has the least ceiling and can measure extreme scores on the curve: i.e., it can measure extremely low intellectual levels, for example an IQ of 20 and also extremely high IQ levels of, for instance, 200. The Stanford-Binet Scale (Form L-M) was published in 1960 and revised in 1972. The strength of this test lies in measuring the unitary concept of intelligence. The SBL-M evaluates high level abstract reasoning as well as mathematical and spatial reasoning.

Research Methodology

The research was carried out by selecting 84 children with ages ranging from 6 to 16 who attended the “Huerta del Rey” Centre in the period between 2005 (the year in which the WISC-IV was published in Spain) and 2007.

The “Huerta del Rey” Centre was founded in 1989. In 1990 the Centre published the book “The Problems of Gifted Children”, the first Spanish book written on the subject, and which in our country developed the concept of the “gifted student”: a concept that has deeply affected society. The majority of the families who attend the “Huerta del Rey” Centre are advised by different experts (teachers, paediatricians, neurologists, psychiatrists, counsellors, etc) and belong overwhelmingly to the middle and upper-middle classes. Children from all the provinces of Spain, and even from other countries, attend the Centre.

Equally, parents also attend the Centre following the advice of different experts to obtain a diagnostic assessment of their children with the aim of knowing their psychological development and to seek educational, family and socio-affective advice which might be necessary to guarantee the correct development of their children, although a priori they may not consider that their child is intellectually gifted and knowing, equally, that the “Huerta del Rey” Centre is specialised in the education and assessment of this type of child. We consider that this is the case because the Centre has a staff which is highly qualified in the knowledge of infant/juvenile clinical psychology and recognised as such at the national and international level.

In the sample chosen, no criteria of exclusion have been applied. The sample is comprised of 84 children with ages ranging from 6 to 16, as we have indicated, from all parts of Spain and from state, private and state-aided schools.

- *Table 1.1. Statistical description of the total sample*

IQ	N
<100	**5**
100-109	**4**
110-119	**6**
120-129	**18**
>129	**51**
Total	**84**

The full WISC-IV was applied to all the children in the sample (including the complementary tests) together with the SBL-M. The evaluation and correction of the tests was performed separately by two persons trained to that end.

The results obtained regarding the relationship between the SBL-M and the WISC-IV showed a high significant correlation (r= 0.823) which implies that both tests are “very similar”, rather as if the contents overlapped.

- Table 1.2. C*orrelation of the SBL-M and WISC-IV tests*

Correlations

		IQ	WISCIV
IQ	Pearson Correlation	1	,823**
	Sig. (bilateral)		,000
	N	84	84
WISCIV	Pearson Correlation	,823**	1
	Sig. (bilateral)	,000	
	N	84	84

**. The correlation is significant at the 0,01 level (bilateral).

On analysing the results, it seems surprising that, from the correlation studies carried out with other intelligence measurements for the validation of the WISC-IV, it is the SBL-M with which it has a greater correlation, with the exception of the Total IQ of other Wechsler scales in which similar correlational levels are observed: WISC-III 0.89; WPPSI-III 0.89; WAIS-III 0.89; WASI 0.86 (Flanagan and Kaufman, 2006: 41).

On the other hand, it should be pointed out that the correlation with the WISC-IV is greater than with the version of the WISC-R whose correlation with the SBL-M, according to the study carried out by Wechsler (with 108 children), was r= 0.73 (Wechsler, 1974: 51). The correlation found in the present study between the WISC-IV and the SBL-M is of the order, r= 0.83 (in 84 children).

That is to say that the “new” test of the Wechsler scale, performed using the very latest techniques and based on the most up to date theories on intelligence created to be used throughout the world in order to measure pupils´ intelligence, is more similar to the “old” SBL-M rather than the previous editions of the tests of the Wechsler scale.

This means that the new theoretical approaches based on the new theories of intelligence which support the theoretical foundation of the WISC-IV and all the present international intelligence tests for the psychometric clinical measurement of intelligence which have a clear theoretical approximation to the theory known as CHC (Cattell-Horn-Carroll), this new theory and the sophistication of the techniques used, have resulted in the fact that the new WISC-IV is more similar to the “old” SBL-M than the previous tests of the Wechsler scale. It should be remembered at this point that the “old” SBL-M is based on the monolithic theories about intelligence from the beginning of the 20th century.

The “old” SB (Stanford-Binet) appeared in 1904 when the Minister of Public Education in France created a commission to find a way of distinguishing mentally “defective” children from those who did not have good academic results for other reasons (Binet and Simon).

The work of Binet and Simon appeared in 1916 from the desire to help and protect the children and not to penalise them. The school teachers who considered certain pupils very troublesome had an option which for them was a great relief: to recommend that they be placed in classes for retarded children. Thus, there was no clear difference between those children with behavioural problems and the mentally handicapped children.

Binet and Simon referred to the nucleus of intelligence in terms of: *"judgement*, *also called common sense, practical sense, initiative and the faculty to adapt to circumstances. To judge well, to understand well, to reason well",* these are the essential activities of intelligence. Binet designed a test which a physically handicapped person could adequately satisfy. He is known above all for his test but he also had a solid theory of intelligence (Sternberg, 1997).

Binet suggested that intelligent thought had three distinct elements which he called *direction, adaptation and criticism. Direction* involves knowing what one has to do and how to do it. *Adaptation* refers to the creation of a strategy for performing the task and then maintaining the path to the strategy and adapting it at the same time that it is applied. *Criticism* is the ability to criticise our own thoughts and actions.

It is striking how other "modern" theories point to similar definitions regarding the concept of intelligence but, in contrast to the theoretical approaches of Binet and Simon and those of Wechsler and of the theoretical foundation of intelligence and its conceptualisation, they do not enjoy the empirical evidence to back them up as is the case with Gardner´s theory of multiple intelligences (MI) which enjoys great popularity. This theory has more to do with talent than intelligence as such and fundamentally offer the possibility to observe performance more than capacities (Pérez and Beltrán, 2006: 147-163).

We should highlight that the inter-correlations between the indices of our study agree with the inter-correlations concerning the validity of the internal structure of the WISC-IV. Therefore, we can consider our research data valid at the same level [verbal comprehension (VC), perceptual reasoning (PR), working memory (WM) and processing speed (PS)].

- *Table 1.3. Correlation of the WISC-IV test and indices according to an internal validity study (Corral and others, 2005: 63).*

Pearson correlation coefficient	***WISC-IV TIQ***
VC	***0'82***
PR	***0'82***
WM	***0'70***
PS	***0'57***

- *Table 1.4. Correlation of the WISC-IV and indices according to our research data.*

Pearson correlation coefficient	***WISC-IV TIQ***
VC	***0'847***
PR	***0'826***
WM	***0'669***
PS	***0'536***

To conclude, we would suggest that the "new" WISC-IV appears more similar than its previous editions to the "old" SBL-M, confirming the latter's validity for measuring students´ intelligence.

On the other hand, they confirm the existing theories about intelligence based on empirical research. A tangible reality is evidenced between what the tests measure, the development of the pupils, the method of learning, the speed of learning, the abstract capacity and understanding of the environment. The WISC-IV has demonstrated the significant relationship with academic performance. The relationship of the TIQ (total IQ) of the WISC-IV with the total score of the WIAT-II, is r= 0.87. This correlation is among the highest published regarding total IQ and academic performance (Flanagan and Kaufman 2006: 41).

2. Is the WISC-IV equally effective for the entire range of intelligence?

The effectiveness of the WISC-IV as a psychometric clinical measure of intelligence. A validation study in relation to the Stanford-Binet (Form L-M) in children with high, average and low normative intelligence (IQ range between 70 and 130).

The question which we pose in this section is: can the same correlation level be observed for the WISC-IV and the SBL-M if we leave the intellectually gifted children out of the sample?

In the tests performed to identify a school child as intellectually gifted, the international psychometric criteria have been maintained for obtaining an IQ equal to or higher than 130 in the WISC-IV and the SBL-M, which is considered to be the most accurate for measuring higher intelligence.

The number of pupils in our sample with an IQ of under 130 was 33.

- *Table 2.1. Statistical description of the sample*

IQ	N
<100	5
100-109	4
110-119	6
120-129	18
Total	33

The results obtained concerning the relationship between the SBL-M and the WISC-IV in the sample of non-gifted children is r= 0.828. Therefore, given that both tests are similar to the same degree, they can be used for the assessment and diagnosis of non-gifted children.

- Table 2.2. *Correlation of the SBL-M and the WISC-IV test on children with a high, average and low normative average. (IQ between 70 and 130)*

Correlations

		IQ	WISCIV
IQ	Pearson correlation	1	,828 **
	Sig. (bilateral)		,000
	N	33	33
WISCIV	Pearson correlation	,828 **	1
	Sig. (bilateral)	,000	
	N	33	33

**. The correlation is significant to level 0,01 (bilateral).

On the other hand, we should point out that the inter-correlations between the indices of which the WISC-IV is comprised [VC (verbal comprehension), PR (perceptual reasoning), WM (working memory) and PS (processing speed)] are similar both in the total of the sample (gifted pupils plus non-gifted pupils) as when the sample is composed of only students with an IQ range of between 70 and 130 (Tables 2.3 and 2.4).

- *Table 2.3. Correlation of the WISC-IV test and indices according to the study of the total sample*

Correlations

		IQ	IVCV	IVRP	IVMT	IVVP
IQ	Pearson correlation	1	,761 **	,737 **	,491 **	,360 **
	Sig. (bilateral)		,000	,000	,000	,001
	N	84	84	84	84	84
IVCV	Pearson correlation	,761 **	1	,712 **	,453 **	,234 *
	Sig. (bilateral)	,000		,000	,000	,032
	N	84	84	84	84	84
IVRP	Pearson correlation	,737 **	,712 **	1	,400 **	,279 *
	Sig. (bilateral)	,000	,000		,000	,010
	N	84	84	84	84	84
IVMT	Pearson correlation	,491 **	,453 **	,400 **	1	,246 *
	Sig. (bilateral)	,000	,000	,000		,024
	N	84	84	84	84	84
IVVP	Pearson correlation	,360 **	,234 *	,279 *	,246 *	1
	Sig. (bilateral)	,001	,032	,010	,024	
	N	84	84	84	84	84

**. The correlation is significant to level 0,01 (bilateral).

*. The correlation is significant to level 0,05 (bilateral).

- *Table 2.4. Correlation of the WISC-IV test and indices: sample of children with high, average and low intellectual capacity (IQ range between 70 and 130)*

Correlations

		IQ	IVCV	IVRP	IVMT	IVVP
IQ	Pearson correlation	1	,728 **	,784 **	,479 **	,184
	Sig. (bilateral)		,000	,000	,005	,306
	N	33	33	33	33	33
IVCV	Pearson correlation	,728 **	1	,796 **	,392 *	,000
	Sig. (bilateral)	,000		,000	,024	1,000
	N	33	33	33	33	33
IVRP	Pearson correlation	,784 **	,796 **	1	,353 *	,222
	Sig. (bilateral)	,000	,000		,044	,214
	N	33	33	33	33	33
IVMT	Pearson correlation	,479 **	,392 *	,353 *	1	-,051
	Sig. (bilateral)	,005	,024	,044		,779
	N	33	33	33	33	33
IVVP	Pearson correlation	,184	,000	,222	-,051	1
	Sig. (bilateral)	,306	1,000	,214	,779	
	N	33	33	33	33	33

**. The correlation is significant to level 0, 01 (bilateral).

*. The correlation is significant to level 0, 05 (bilateral).

As a conclusion, we suggest that the “new” WISC-IV in the validation study carried out with the SBL-M is appropriate for measuring the intellectual capacity of children with high, average and low intelligence and we confirm its validity for measuring the intelligence of school children (IQ range between 70 and 130).

We would point out that both in the research carried out with the total sample as well as with the sample which excludes the gifted children, the greatest correlation was given with the TIQ (total IQ), followed by the VC (verbal comprehension index), the PR (perceptual reasoning index) and to a lesser extent the WM (working memory). Correlation with the PC (processing speed index) was not observed (Tables 2.3 and 2.4).

3. Will the same relationship between the WISC-IV and the SBL-M with the sample of gifted children continue to be observed?

The effectiveness of the WISC-IV as a psychometric clinical measurement of intelligence for evaluating highly gifted children (IQ equal to or higher than 130).

Given that the “new” test should serve to correctly assess all pupils, a concern to know the answer to the following question has arisen: up to what point is the WISC-IV adequate for assessing gifted children (two typical deviations above the average: IQ equal to or higher than 130)?

In the American assessment study, the normative group of gifted school children collected in the Manual is strikingly lower in the WISC-IV than in previous IQ tests (Falk, Silverman and Moran, 2004).

The WISC-IV allows substantially more time for the answers than the WISC-III, which benefits gifted students, but adds time on to the administration of the test. It also adds items of greater difficulty in order to obtain a greater distinction between the highest IQs. There are now 15 subtests: 10 compulsory and 5 optional.

The American validation study for observing the effectiveness of the WISC-IV for measuring the intelligence of gifted children was carried out with 63 school children who had been previously diagnosed as gifted since they presented two standard deviations above the average in a standardised measurement of cognitive aptitude. No information is available about the specific measurement of intelligence used in the American study.

Our study has been performed with a total of 51 gifted children who were previously diagnosed as gifted in line with the psychometric criteria for obtaining a score of two standard deviations above the average in the SBL-M: i.e., children with an IQ equal to or higher than 130.

- *Table 3.1. Statistical description of the sample*

IQ	N
130-139	26
140-149	21
150-159	3
>159	1
Total	51

The American study showed significant differences in favour of the gifted children with respect to a control group in all the main and optional tests, except the non-significant difference in the Animal Test *(Flanagan and Kaufman, 2006: 241).* Although it is noteworthy that, according to the WISC-IV Manual (Corral and others, 2005: 86), the Cancellation Test was only applied to 24 of the 63 pupils in the total sample.

Like the American validation study of the WISC-IV carried out with gifted children, in our investigation with gifted pupils, in the first place, significant differences were observed in favour of the gifted children in all the principal and optional tests (with significant statistics in non-parametric tests) except in the Symbol Search subtest.

Both in the validation study of the WISC-IV as well as in our study, we would highlight, in the second place, that the intellectually gifted pupils also scored significantly higher in the TIQ and in the four indices in relation to the data of the control group. However, the average TIQ of the WISC-IV in the American study is 123.5 (number of children = 59) and the indices of this sample previously reviewed were less than expected. The average TIQ of the validation study of the WISC-III was 128.7 (Wechsler, 1991: 210).

The fact that the average falls from the original critical point of 130 in the gifted group examined with the “new” instrument has been attributed to the Flynn Effect and the average regression effect. However, according to Flanagan and Kaufman, the TIQ average of the WISC-IV in gifted children is too low to be due only to these factors.

There are various alternative explanations according to Flanagan and Kaufman. One of these is that it is possible that the average or original averages for identifying the gifted students were excessively varied or perhaps little related to the WISC-IV. It is not clear whether the individual or collective tests were applied to initially identify these subjects. If these were initially identified with a collective test, this could explain the difference (Flanagan and Kaufman 2006: 241 and 242).

The average score in our sample in the WISC-IV, is TIQ= 133 (number of children = 51), that is to say that the low score obtained by the gifted children in the American study (TIQ of the WISC-IV = 123.5: number of children = 59) is due to the sample choice.

On the other hand, and taking up again the question posed as to whether the same relationship between the WISC-IV and the SBL-M with the sample of gifted children will continue to be observed, we can see (Table 3.2) that the correlation existing between the WISC-IV and the SBL-M is much lower than with children who are not gifted. The relationship between the SBL-M and WISC-IV with gifted pupils is r= 0.408. Therefore, the SBL-M and the WISC-IV cannot be substituted for evaluating a gifted child. The WISC-IV is reaffirmed as being bad for measuring the intelligence of a gifted child.

- *Table 3.2. Correlations of the SBL-M with the WISC-IV*

Correlations

		IQ	WISCIV
IQ	Pearson correlation	1	,408 **
	Sig. (bilateral)		,003
	N	51	51
WISCIV	Pearson Correlation	,408 **	1
	Sig. (bilateral)	,003	
	N	51	51

**. The correlation is significant to level 0,01 (bilateral).

Equally, if we observe Table 3.3, we can see that the correlations between the SBL-M and the different indices of the WISC-IV are much lower than that observed in the non-gifted.

- *Table 3.3. Comparative study of the SBL-M with the indices of the WISC-IV*

Correlations

		IQ	IVCV	IVRP	IVMT	IVVP
IQ	Pearson correlation	1	,440 **	,224	,202	,033
	Sig. (bilateral)		,001	,114	,155	,820
	N	51	51	51	51	51
IVCV	Pearson correlation	,440 **	1	,157	,257	,124
	Sig. (bilateral)	,001		,270	,069	,387
	N	51	51	51	51	51
IVRP	Pearson correlation	,224	,157	1	,166	-,058
	Sig. (bilateral)	,114	,270		,246	,686
	N	51	51	51	51	51
IVMT	Pearson correlation	,202	,257	,166	1	,330 *
	Sig. (bilateral)	,155	,069	,246		,018
	N	51	51	51	51	51
IVVP	Pearson correlation	,033	,124	-,058	,330 *	1
	Sig. (bilateral)	,820	,387	,686	,018	
	N	51	51	51	51	51

**. The correlation is significant to level 0,01 (bilateral).

*. The correlation is significant to level 0,05 (bilateral).

It seems clear that, in the case of the evaluation of gifted children, the WISC-IV and the SBL-M do not measure the same thing.

Sternberg and Davison (1985: 37-74) express the opinion that gifted children use different methods to resolve problems and for learning.

Another aspect that has been considered regarding the validity of the WISC-IV for measuring higher intelligence is that, when the 15 subtests were distributed from the highest to the lowest in the sample, it was observed that five of the six subtests where the lowest scores for the gifted group were obtained were required in order to obtain the TIQ while four of the five optional subtests, which were more difficult to administer due to time restrictions, gave scores which were among the highest in the gifted group (Flanagan and Kaufman, 2004: 14).

In our study, four of the six subtests which produced the lowest scores for the gifted group were required to obtain the TIQ, while three of the five optional subtests, which are more difficult to administer due to time restrictions, gave scores among the highest in the gifted group.

That is to say, the tests in which the students most stand out are not considered for the evaluation, these being optional and rarely administered, given that they are not necessary for obtaining the TIQ.

The 10 obligatory tests of the WISC-IV are: block design, similarities, digit span, picture concepts, coding, vocabulary, letter-number sequencing, matrix reasoning, comprehension and symbol search.

The 5 optional tests of the WISC-IV are: picture completion, cancellation, information, arithmetic and word reasoning.

The optional subtests serve to provide greater information about the student evaluated or to substitute, with a justified cause, some of the obligatory subtests of the WISC-IV. In accordance with the suggestions of the Application and Correction Manual, the optional tests can be used to substitute some of the main tests when certain conditions are fulfilled. For example, the Coding subtest can be replaced by the Cancellation subtest in the case of a student with motor deficiency (Flanagan and Kaufman, 2006: 107).

- *Table 3.4. Comparison of the highest and lowest scores obtained by the gifted students in the American study and in ours.*

The highest and lowest scores from the technical manual of the WISC-IV and from our study into gifted children

Gifted children **TIQ = 123.5; n= 63**	**Gifted children** **TIQ = 133; n= 51**
Highest subtests: scaled scores	
— **Vocabulary: 14.6**	— **Vocabulary: 16.57**
— **Arithmetic: 14.2**	— **Information: 16.47**
— **Similarities: 14.1**	— **Matrix reasoning: 15.78**
— **Comprehension: 14.1**	— **Word reasoning: 15.59**
Lowest subtests: scaled scores	
- Digit span: 12.0 **- Coding: 11.5** **- Cancellation: 11.0**	**- Symbol search: 12.22** **- Coding: 11.35** **- Cancellation: 11.29**
Note: WISC-IV tables 5.22	**Note: Result of the investigation**

To obtain the TIQ of the WISC-IV we would point out that of the 10 obligatory subtests we find: digit span, coding and symbol search. Among the 5 optional subtests of the WISC-IV we find: information, arithmetic and word reasoning.

4. Which of the indices of the WISC-IV are the best measurements for predicting intellectual capacity, taking the SBL-M as a reference?

In our investigation, three of the four indices of the WISC-IV appear to be related to the SBL-M, considering the gifted and non-gifted students, that is to say the total of the sample investigated: these are the VC (verbal comprehension), PR (perceptual reasoning) and PS (processing speed) indices with a high correlation of r= 0.830. The WM index (working memory) is not related to the SBL-M.

The index of the WISC-IV which best predicts the SBL-M score of the non-gifted students is the PR index (perceptual reasoning) where the correlation is equally high: r= 0.784.

The index of the WISC-IV which best predicts the SBL-M score of the gifted pupils is the VC index (verbal comprehension) although the correlation is not high: r= 0.440.

- *Table 4.1. Indices of the WISC-IV which best predict execution in the SBL-M*

Comparative study SBL-M and WISC-IV. ALL

Model	R	R squared	Typical estimation error	Significant variable
	0.823	0.665	9.15	VC-PR-PS

Comparative study SBL-M and WISC-IV. NON-GIFTED

Model	R	R squared	Typical estimation error	Significant variable
	0.784	0.602	8.63	PR

Comparative study SBL-M and WISC-IV. GIFTED

Model	R	R squared	Typical estimation error	Significant variable
	0.440	0.177	5.69	VC

In the study carried out in Colorado (Falk, Silverman and Moran, 2004) with 36 cases (Histogram of the sample of children above 130 in the SBL-M = 27), small correlations were found of the WISC-IV with the SBL-M in the different indices: VC (verbal comprehension) r=0.233; PR (perceptual reasoning) r=0.169; WM (working memory) r=0.249; and PS (processing speed) r=0.058. The authors affirm, on the basis of their results, that the VC index (verbal comprehension) is the best of the four indices for predicting intellectual giftedness.

Therefore, the VR index (verbal reasoning) of the WISC-IV is the best of the indices for predicting giftedness. The Verbal Reasoning index, which measures different aspects of crystallised intelligence, according to the CHC theory (Carroll-Horn-Carroll) is considered a cultural indication [the type of intelligence which indicates the breadth and depth of the knowledge acquired by a person as well as an effective application of that knowledge (Flanagan and Kaufman, 2006: 135)]. The verbal comprehension index, comprising the Vocabulary, Similarities and Comprehension tests, allows us to evaluate specific aptitudes of CI (crystallised intelligence), including word knowledge (WK), language development (LD) and general information (GI). The other two tests which are also included in the Verbal Reasoning index, Information and Word Reasoning, also form part of the specific aptitudes which are included in the crystallised intelligence (Flanagan and Kaufman, 2006: 316).

We should also point out that the VC (verbal comprehension) of the WISC-IV is the index which has the best capacity for predicting academic performance (correlation of the VC in the WIAT-II, r= 0.80) (Corral and others, 2005: 79).

5. Which of the subtests of the WISC-IV predict a better execution in the SBL-M?

In our research, the subtests which are related and which best predict the execution of the SBL-M, considering both gifted and non-gifted children (i.e., the total sample of the investigation) are: V (vocabulary), I (information), M (matrix reasoning) and A (arithmetic) with a high correlation of r= 0.87.

The subtests of the WISC-IV which are related and which best predict the SBL-M score of non-gifted children are the same if the total of the sample is considered: V (vocabulary) I (information), M (matrix reasoning) and A (arithmetic) with an equally high correlation of r= 0.892.

The subtests of the WISC-IV which best predict the SBL-M score of gifted children and therefore those which best predict giftedness are: I (information) and S (similarities), although the correlation is not high: r= 0.466.

- *Table 5.1. Subtests of the WISC-IV which best predict the execution in the SBL-M*

Comparative study SBL-M and WISC-IV. ALL

Model	R	R squared	Typical estimation error	Significant variable
	0.87	0.745	7.98	V-I-M-A

Comparative study SBL-M and WISC-IV. NON-GIFTED

Model	R	R squared	Typical estimation error	Significant variable
	0.892	0.767	6.6	V-I-A-M

Comparative study SBL-M and WISC-IV. GIFTED

Model	R	R squared	Typical estimation error	Significant variable
	0.466	0.185	5.66	I-S

It is curious to note that in an analysis of 10 studies with the WISC-R, Harrison (1990) observed that those individuals with mental deficiency had the greatest difficulty: that is, their lowest scores, in the crystallised intelligence subtests which included Vocabulary, Information, Arithmetic and Word Reasoning (Flanagan and Kaufman, 2006: 222). Arithmetic, Vocabulary and Information are the subtests which best predict academic performance according to the correlation observed of these subtests in the scores which comprise the WIAT-II.

Given that the Information subtest is significant both for gifted and non-gifted children, it would appear that it is the Similarities subtest which best differentiates the most intelligent children from those who are a little less so.

The Information subtest has much to do with what the child has been able to learn up to a given moment and, therefore, reflects well his/her learning capacity. It, thus, appears to be significant in all the children, independently of their intellectual ability.

On the other hand, the Similarities subtest appears to have more to do with the capacity for thought and language which is a basic human ability and which most differentiates us from other species.

On the other hand, the Similarities subtest is one of the tests which, together with Information and Vocabulary, are the ones which most saturate the “g” factor: Similarities (0’91), Information (0’92) and Vocabulary (0’92) (Flanagan and Kaufman, 2006: 329). The saturation of a subtest is an important indicator of the degree to which the subtest measures general intelligence and the ability which is involved in all intellectual activity.

6. Which cut-off score should be used to determine that a child is psychometrically gifted?

In response to this question, the Colorado study (Falk, Silverman and Moran, 2004) suggests that the cut-off point which should be used is the TIQ (total IQ) of 123 in the WISC-IV. The authors consider that this is an adequate alternative.

Their study shows that when individuals with a TIQ in the WISC-IV of 123 or higher are selected, the distribution of the scores of the VC index (verbal comprehension) and the PR index (perceptual reasoning) is above 130. Moreover, a TIQ score of 123 or more includes 75% of the subjects who obtained scores of 130 or above in the SBL-M.

According to our data, the cut-off point of the TIQ (Total IQ) in the WISC-IV which should be considered would be slightly highly: TIQ = 125. That is to say, that we can infer that, if a child has 125 in the WISC-IV he/she could be gifted in the SBL-M, and their score in the SBL-M will be 130 with a margin of error. If we consider the GAI (General Ability Index), the cut-off point which should be taken into account is GAI = 130.

- *Table 6.1. Comparative study: SBL-M and WISC-IV*
  Cut-off point for selecting gifted children with the WISC-IV, TIQ

Cut-off point	*Sensitivity*	*Specificity*
>115	*100%*	*48%*
>125	***83%***	***72%***
>135	*36%*	*93%*

- *Table 6.2. Comparative study: SBL-M and WISC-IV*
  Cut-off point for selecting gifted children with WISC-IV, GAI

Cut-off point	*Sensitivity*	*Specificity*
>120	100%	52%
>125	**93%**	**62%**
>130	**71%**	**83%**
>135	38%	90%

In the study carried out by Flanagan and Kaufman (2004), and in accordance with the recent information of the Psychological Corporation (Harcourt Assessments), they suggest that if the GAI (a combination of the VR (verbal reasoning) and PR (perceptual reasoning) indices) is considered, the test increases its capacity to identify gifted children.

Barbara Gilman and Frank Falk (2005: 4) give the following guidelines for using the WISC-IV for identifying gifted children:

- They recommend the inclusion of educational programmes for the gifted on the basis of obtaining scores above 139 in VC (verbal comprehension) or PR (perceptual reasoning). These scores are an excellent indicator of high reasoning capacity.
- Alternatively, we should consider the General Ability Index (GAI) with a score of 130 or slightly less (for example, 125), which is a more prudent option.
- If the TIQ of the WISC-IV is used as a requisite for admission to special programmes for the gifted, a score of 123 is sufficient.

On the other hand, to determine if the TIQ of the WISC-IV can be considered a reliable estimate of the intellectual capacity of a child, independently of their intellectual capacity, the variability of the indices (VC, PR, PS and WM) that compose it should be studied. If the difference between the lower and higher index is very large (>22 points), the TIQ can not be considered as a single unit and, therefore, is not interpretable.

When the TIQ is not interpretable it is advisable to use the GAI abbreviated index of the WISC-IV which is composed of the VC (verbal comprehension) and PR (perceptual reasoning) indices for describing the intellectual capacity of the child, as long as the difference between the VC and the PR is less than 1.5 standard deviations (<23 points). If the difference between the VC and the PR is greater than 23 points, then neither will this index be interpretable. Therefore, the TIQ should be considered with caution since a strong variability exists between the four indices which comprise it.

Consequently, intelligence should be estimated from the interpretation of the four indices, separately: i.e., verbal comprehension, perceptual reasoning, working memory and processing speed (Flanagan and Kaufman, 2006: 135-143).

7. Which of the definitions of intelligence throughout history is nearest to the reality of the concept of intelligence, in accordance with research results and new theories?

If anything has surprised us in the course of our research it is the high correlation found between the WISC-IV and the SBL-M when it comes to assessing children with average intelligence, which makes us consider both tests equally effective for measuring the intelligence of this group of students.

With regard to the validity of the "new" WISC-IV, considering the relationship with the average of the SBL-M, it appears to be effective for calculating children with a high, average and low intelligence: the present relationship between both scales being greater than in the previous versions of the Wechsler scale. The correlation of the WISC-IV with the SBL-M in these children is evident in both the TIQ (total IQ) as well as the rest of the indices of the test with the exception of the PS index (processing speed).

Such a high relationship between one test and another is more striking when the theoretical foundation is distinct. As we have previously observed, the WISC-IV is based on the CHC theory (Carrol-Horn-Carrol) on which all present-day intelligence tests are based, while the SBL-M is based on the monolithic theories of intelligence from the beginning of the 20th century.

This approach was the first theoretical approximation to intelligence carried out. From this monolithic conception, three principal concepts are derived: mental age, IQ and the "g" factor, also known as general intelligence.

Spearman believed that the "g" factor (general intelligence) was the one which best represented and defined intelligence (Spearman, 1904: 201-293).

The author estimated that all intelligence tests measured, to a large extent, a general factor (“g”) which, strictly speaking, assimilated intelligence and, although intelligence varied from one individual to another, it remained unalterable for the same individual with respect to other correlated aptitudes and another, much smaller, specific factor (“s”), which was characteristic of the test used. The “s” factors are multiples of each individual and they not only vary from one individual to another but they can also vary in a single person and for distinct aptitudes. In some way, the “g” factor would be involved in every intellectual activity and would, therefore, appear in all the items and all the intellectual tests although in a varying proportion.

It appears that when Wechsler offered his own definition of intelligence he accepted the ideas that prevailed then regarding the “g” factor and the concept of intelligence as a global entity, congruent with what Terman, Binet, Spearman and others had proposed. According to Wechsler, intelligence is “the aggregate or global capacity of the individual to act purposefully, to think rationally and deal effectively with his environment”. He concluded that this definition “avoided alluding to a specific capacity even though it is primordial (e.g. abstract reasoning), with something crucial or extremely important” and it implies that any intelligence test is interchangeable with another (Flanagan and Kaufman 2006: 8 and 9).

Later, Wechsler often swings between the concept of intelligence as a singular entity (first theory) or as a meeting of mental aptitudes. This is the moment when he published the WISC.

In the second period, his WAIS scale for adults appeared: the revisions of the WISC, the WISC-R and the WISC-III.

At that time the new technologies (computers and statistical programmes which facilitated the interpretation of the intelligence tests) allowed the appearance of what Kamphaus and his collaborators called the third wave in the interpretation of tests: the psychometric profile analysis (Flanagan and Kaufman, 2006: 11).

Although the third wave of the interpretation of intelligence tests did not achieve much success in terms of a valid a priori proof regarding profile analysis, the psychometric approach provided the bases necessary for launching the fourth, present wave in the interpretation of intelligence tests.

Kaufman commented that the problems of interpreting the intelligence tests could be attributed, to a large extent, to the lack of a specific theory to orientate this practice.

Without taking into account the initial criticisms, the years following the publication of the WISC-III could be described as the calm before the storm. That is to say, the WISC-III remained the dominant intelligence test for examining children from 6 to 16 years old, providing along the way diverse critical analyses and revisions. Nevertheless, with the arrival of the 21st century, the CHC storm burst onto the scene and the instrument has continued unchanged up to the present. In the last 5 years the revisions of three principal intelligence tests have been published and all had the CHC theory as their foundation (these are: WJ-III, the SB5 and the KABC-II). Never before in the history of the intelligence exam has there been a single theory (clearly no one theory) that has had such a prominent role in the development and interpretation of the tests. Among the publications of these instruments based on the CHC theory was the publication of the WISC-IV (Flanagan and Kaufman, 2006: 15).

Carroll (1993), in a reanalysis of more than 461 factorial studies performed in 19 countries, among them one carried out in Spain by Mariano Yela, profiles what he denominates as the “three-stratum theory”. His theory provides a hierarchical model but this hierarchy is not necessarily tree-shaped (Porfirio tree-type) but is clearly hierarchical, depending on a general factor or general intelligence which subsumes the fluid and crystallised factors of intelligence described by Cattell and Horn, as well as other less important factors.

Unlike crystallised intelligence (Gc), which has been of a cultural type, fluid intelligence (Gf) has been considered more of a hereditary type (fluid intelligence alludes to the mental operations or approaches to problem solving that a person uses when he faces relatively new tasks: both deductive as well as inductive reasoning are considered aspects close to this field), and it has been thought up to this moment that it is the one which has a greater relationship with the general intelligence factor (or “g” factor) among all the factors of CHC in the broad strata or level II (Carroll, 1993; McGrew and Flanagan, 1998).

Carroll finds a General Intelligence factor (factor “g”) in the third level, eight group factors in a second strata and in the first strata a multitude of factors are found, although not all of the same importance for intellectual competence (Yuste, 2002: 30 and 31).

This consideration in the theoretical base, both in the monolithic theories and the present CHC theory, of the “g” factor, may be the reason for the high relationship existing between the WISC-IV and the “old” SBL-M, and the fact that both are equally effective for determining the intelligence of children with average levels of intellectual capacity.

8. Which is the best intelligence test for identifying gifted children?

It would appear that we can explain the relationship existing between the “old” SBL-M and the “new” WISC-IV, but how can we explain that this relationship is much less when it comes to assessing the intelligence of gifted children? Which is the best test for identifying the gifted?

A correlation has been observed between the WISC-IV and the SBL-M, the TIQ (Total IQ), the GII (General Intelligence Index) and the VC (Verbal Comprehension Index) in the measurement of the intelligence of gifted children but, unlike that which happens with children of average intelligence, this is not high.

The WISC-IV is a useful test for the population of gifted children due to its capacity for measuring verbal and perceptual reasoning. However, it has serious gaps which negatively affect the identification of gifted children for special programmes.

The WISC-IV is not as effective for accurately measuring those children with intellectual giftedness in consideration of the correlations found with the SBL-M and they both show that they measure different aspects for this group of children.

This lack of effectiveness of the WISC-IV for measuring intelligence in gifted children may be due, among other things, to the following reasons:

- In the first place, the absence of any description in the American Technical Manual and interpretation of the WISC-IV in the sample of gifted children. In this respect, it only states that it was a group comprised of 62 school children of between 6 and 16 years who had been identified as gifted without specifying what original measurement or measurements were used to identify these children as gifted.

- Reference is made in the Manual to the fact that they were previously identified as gifted as they had a score which was higher than the two standard deviations above the average of cognitive aptitude. It is not clear if individual or collective tests were applied to initially identify these pupils.
- Nor is the range of giftedness described that existed between the gifted children previously selected. For example, whether all of them had a specific IQ or whether there was any difference between them.
- The initial sample in the WISC-IV is of 62 children. The number of children in the sample in which the TIQ is given is 59. On the other hand, the heterogeneity of these pupils was not considered, taking merely a single group. In this respect, it should be pointed out that in the study regarding the validity of the WISC for evaluating the intelligence of children with mental deficiency two studies were performed, considering the level of retardation of the child (slight mental deficiency n=63 and moderate mental deficiency n=57).
- In the research, it is concluded that significant differences exist in favour of the gifted with respect to a control group in all the main and optional subtests, except the significant difference in the Cancellation subtest. The Cancellation subtest was only given to 24 children in the sample.

We consider that these observations regarding the validation of the WISC-IV for assessing intellectually gifted children are worrying given the international importance which the Wechsler scales have in the assessment, diagnosis and guidance of the pupils.

In the case of the validity of the scale for assessing gifted students, it does not appear that they have proceeded with enough care. Unfortunately, this group of students, due both to prejudices of a differing nature and an erroneous search for equality, are usually groups of school children who are most abandoned to their luck and, given that these children are from every social class, it is the ones from the underprivileged classes who suffer most.

In the underprivileged classes, it is the instruments such as intelligence tests, which make it possible to detect these children. The intelligence tests are very useful for identifying under-performing gifted children, and young school-age children and gifted children with associated disorders. If we carry out the tests without due care we are taking away from these pupils one of their fundamental rights: the right of children to receive an education which makes it possible to develop their capacities to the maximum.

With regard to the SBL-M, we would highlight the most important contributions performed by Binet in his study into intelligence:

- That intelligence was measurable.
- That intelligence was manifested as learning speed.
- That intelligence was related to performance.

Binet also reached the conclusion that the tests which included more complex tasks and which presented a greater similarity to mental activities of everyday life turned out to be more promising. The tasks in the Binet test were based principally on language and gave importance to judgement, memory, comprehension and reasoning.

Some later studies of the Binet-type tests, above all those performed by Terman in his Stanford-Binet, led to the appearance of an elaborate technology for this type of scale, studies which included the careful selection and collocation of tasks in the scale, with the aim of producing measurements and standard deviations approximately constant for the IQs of the different ages. This was the factor that made it possible for the scale to be applied not only to normal children and those with deficiencies but also to higher levels of ability.

The Stanford-Binet was used by Terman in assessing more than 1.500 individuals with IQ levels of over 130, the majority being +140. Perhaps his rigorous creation and selection of the sample has meant that the SBL-M continues to be a test which accurately assesses the intelligence of children not only of average ability but also those children at the extreme ends of the curve.

On the other hand, the SBL-M better differentiates the higher levels of intelligence since the children who achieve high scores in the SBL-M show greater learning capacity and development of their reasoning and language ability as well as considerable maturity in the processing of information.

It is important to highlight in this respect the research carried out by Susana Guerra at the University of Valladolid (Spain). Susana Guerra carried out an empirical investigation with a group of 25 students of high intelligence whose ages ranged from 5 to 8 years with an IQ of between 123 and 170 in the SBL-M and found a correlation of r= 0.83 between the Mental Age obtained in the SBL-M and the equivalent age in Visual Memory in the Benton Visual Memory Test. It should be pointed out that visual memory is linked to the neurological development of the brain and has much to do with information processing.

There has always been more uncertainty about the assessment of gifted children than other members of the population due to the surprising discrepancies in the scores from the intelligence tests which the gifted obtain in the different tests. Children with average intelligence and those with retardation in their development normally obtain fairly consistent IQ scores in the different tests. However, in gifted children a discrepancy of more than 50 points can be observed in two psychometric intelligence tests. For example, the same child may obtain an IQ of 144 on the Wechsler scale and that same child, and at the same age, may obtain an IQ of 175 on the SBL-M.

When gifted children obtain scores in two different IQ tests which are extremely discrepant some experts tend to believe that the lower score is the more accurate one. This is strange because the opposite assumption occurs with children with retarded development. If such a child obtained a score of 50 in one test and 65 in another, the majority of the people would suppose that the higher score were more accurate. Why? Because innumerable reasons exist to explain why a child might not have performed well: as many reasons as were possible in the test which gave the lower score. It is unlikely that a child with retarded development would obtain an IQ score higher than his capacities. Shouldn´t the same logic be applied to the scores of the gifted? Let us hope this is so!

According to Linda Silverman (2005: 5 and 6), another of the problems which arises in assessing the intelligence of a gifted child is the ceiling effect of the tests. The majority of people are aware to what extent the low ceilings of the tests can reduce the IQ scores in the gifted band. The ceiling effect occurs when the child´s knowledge is greater than the limits of the test. To assess all the abilities of a gifted child, the sections of a test should be sufficiently difficult. Imagine if you try to measure a person who is 2 metres tall with a one-metre tape measure (Stanley, 1990). The size of the problem increases with age: the older the child, the more likely it is that he/she exceeds the capacity of the measuring tool.

The ceiling effects vary according to the different types of tests. The School Aptitude tests and the group Intelligence Tests have low ceilings. They are designed to compare pupils of a specific course level. Thus, they do not contain elements much beyond that level. For the purpose of these tests it is sufficient to know that the child is in the number 95 percentile. The highest percentile that a child can obtain in this type of test is 99.9. The highest score possible on the Wechsler scales is an IQ of 160.

The classrooms also have ceiling effects. Very often the gifted know more than what the teacher is teaching or what the tests measure and the children have no possibility to show their advanced knowledge.

The Talent Searches provide an excellent view of what happens when we eliminate the ceiling effects in the intelligence tests. In the Talent Search programmes, the American pupils in Middle School who achieve a percentile of 95 (or 97) in the reading level or arithmetic tests are allowed to do the exams for early entrance to University (for example, SAT-1 or ACT). These exams were designed to identify the best high school seniors who might be capable of going to university. When such a difficult exam is given to children of 12 or 13 years, those who, a priori, in the tests appear to have similar abilities, in fact have enormously different ability levels. For example, two students who were chosen to do the university entrance exam with a percentile of 95 in mathematics may obtain scores ranging from 200 (the lowest possible score) to 800 (the highest possible score) in the SAT-Math. The Talent Searches give gifted adolescents the opportunity to demonstrate their total capacities, perhaps for the first time, and it is clearly shown that they are ready to do considerably advanced work.

The Individual IQ Tests also present problems, given that the scores which they generate for the gifted are not comparable. The new IQ scales are probably excellent for 95% of the population but they are inadequate for assessing both the gifted and the profoundly retarded. The children in the highly gifted (IQ 145-159), exceptionally gifted (IQ 160-174) and profoundly gifted bands (IQ +175) obtain considerably lower scores with the new instruments. This inclines us to think that the best way to measure the highly gifted levels is with the *Stanford-Binet Intelligence Scale, Form L-M* (SBL-M) (Silverman and Kearney, 1989 and 1992). Given that it goes up to Adult Superior III, the SBL-M acts as a measurement above that level, similar to the SAT for the participants in the Talent Search. According to the words of Stanley, founder of the Talent Searches: “The Binet-style age-scale could be considered the original exam appropriate for extensive above-level testing” (Stanley, 1990: 167).

The strongest objection that has been made to the use of the SBL-M is its antiquated norms but it would appear that this is not true given that this version correlates more with the WISC-IV than the previous tests of the Wechsler scale, as we have seen in this investigation.

According to Silverman, the SBL-M continues to be the only tool which can measure extreme verbal abilities. Unfortunately, due to its age, this valuable instrument may be lost as a means of discovering the most brilliant minds in society. What will happen to these children if we only rely on the lowest calculations which the current tests provide? The majority will be misunderstood due to their inability to relate to their peers and the need to follow the study plans governed strictly in accordance with the norms of age. Some will be wrongly diagnosed and receive medication and others will languish in the courses corresponding to their age when what they desperately need is a radical acceleration. And some will sink into life-long depression. There will be no way to record the extent of their differences and to provide for their need for very advanced work. If we had no way to know the real level of their abilities we would be incapable of finding them truly intellectual equals. If their true abilities were neither recognised nor developed, they would probably develop intellectual habits considerably below their possibilities.

There is a higher number than expected of gifted children among those who abandon their studies (Seeley, 1998). Motivation and erudition depend on recognition. It would be debilitating for these individuals, their families and our understanding of intelligence, to lose the only tool that we have for measuring the highest levels of potential (Silverman, 2005: 10).

Terman (1925) and many other researchers observed that there were more children with scores of above IQ = 160 in the population than the normal curve predicted (Silverman, 1989). If we want to help them correctly it is incumbent upon us to find them. The adaptation problems of a wrongly diagnosed child whose true IQ is 180 are tremendous. The further away from the average a child is, the greater is the potential of suffering alienation and the more need there is for early detection and intervention (Silverman 2005: 10).

We consider that it is always advisable to apply the SBL-M in the diagnosis of a gifted child although in the international field it is recommended that this test be applied when the child obtains the maximum score on the scale (PT = 19) in two or more subtests in the WISC-IV.

The SBL-M is the only scale which makes it possible to measure extreme scores, from children or people with mental retardation to adults or gifted children up to the age of 11. From that age, the SBL-M also has a ceiling.

If we understand that the best test, on the basis of the empirical evidence for measuring the intelligence of gifted children, is the SBL-M, why do we also use the WISC-IV for assessing gifted pupils?

The CHC theory (Cattell-Horn-Cattell), which supports the theoretical foundation of the WISC-IV, makes an ipsative or intra-subject analysis possible by means of the observation of the results of each of the 15 subtests which are included in the four indices of the WISC-IV: VC (verbal comprehension), PR (perceptual reasoning), WM (working memory) and PS (processing speed).

The intra-subject analysis allows us to observe a student's strong and weak points at a given moment and help in the diagnosis of infant and adolescent disorders. The SBL-M also provides exact knowledge of the overall intellectual capacity of the child and the Mental Age.

The most intelligent children have deeper and more sophisticated thoughts, their replies are more elaborate and they show a greater ability for abstraction. They have better cognitive capacities (such as attention and concentration), greater emotional maturity and greater control and handling of their capacities. Rafael, 9 years and four months old with an IQ = 180, when asked what he believed it meant to be intelligent answered “that it was to see the world in a different way”.

Conclusions, implications of the study and future research

The research carried out firmly supports Galton´s Theory and the latest studies about genetics and cognition: of the existence of a general intelligence factor (the “g” factor) which assimilates intelligence strictly speaking and is involved in all mental activity or human thought. Intelligence would thus be a diffuse or global quality of the mind: i.e., not modular. Fluid intelligence (Gf) and crystallised intelligence (Gc) have a common origin in the “g” factor or general intelligence.

This “g” factor is hereditary in accordance with the correlation found between the Mental Age in the SBL-B (Stanford-Binet Form L-M) and the equivalent age of Visual Memory (linked to the neurological development of the brain) in the BVRT (Benton Visual Retention Test, r=0.83).

Contrary to the theories maintained previously, our research seems to demonstrate that fluid intelligence (Gf) is not the basis of human intelligence and neither is it the factor that has most to do with the hereditary nature of intelligence. Equally, we corroborate the findings of Vandenberg (1969) who demonstrated that when moving on from the capacity factors of high heritability to those which have low heritability, the order of classification was the following: word fluency, verbal abilities, grammar and handwriting, spatial visualisation, numerical capacity, reasoning, memory and finally speed and accuracy in secretarial tasks (Buss and Poley, 1976: 212).

On the basis of our research, human intelligence is determined by verbal comprehension, semantic relationships and the formation of concepts and information in general (Gc= crystallised intelligence) and this investigation shows, moreover, that Gc is that which has the greatest hereditary character.

The differences found, in the study of the WISC-IV, between more intelligent children is due to the higher scores in the VC index (verbal comprehension) which is considered to be linked to specific aptitudes of crystallised intelligence.

It should be pointed out that, within the 5 subtests of the VC index (verbal comprehension), 3 of the subtests which are most saturated in the “g” factor of the WISC-IV are to be found: Information (0’92), Similarities (0’91) and Vocabulary (0’92).

Saturation is an important indicator of the degree to which a test measures general intelligence. The saturation of the “g” factor in Information, Similarities and Vocabulary is greater, the older the child (Flanagan and Kaufman, 2006: 329).

Empirical evidence exists to show that gifted children develop distinctly from normal children and this is similar in different countries. It should be pointed out that within the empirical observations regarding the learning characteristics of gifted children is the ability to identify colours at 18 months, to solve a jigsaw with at least 25 pieces at 2 and a half and to read a story with ease at 4 years. A qualitative difference between children with an IQ of 130 and children with an IQ of more than 145 is the significant difference between them in their early learning (2 and a half years) of the alphabet in those children whose IQ is equal to or over 145 (Benito and Moro, 1997: 24).

The differences in the mental performance of gifted children can be observed from a year and a half. The differences in receptive and expressive linguistic abilities are consistently found from infancy.

In our research, the subtest of the WISC-IV which turned out to be most significant in determining intelligence, independently of the intellectual capacity of the child, is the Information subtest (general knowledge questions) which clearly exemplifies what a child has been able to learn up to a certain age. It is curious that, being one of the most significant subtests for determining intelligence, this is optional in the WISC-IV.

The Information subtest is an optional subtest of the VC index (verbal comprehension). The child has to answer questions which refer to diverse general knowledge subjects. It aims to assess the capacity of the individual to acquire, conserve and recover knowledge linked to general events and is, therefore, related to crystallised intelligence (cultural knowledge), long-term memory and the aptitude for remembering and recovering information extracted from school and the environment. In this test, the subject can employ other abilities such as perception and listening comprehension, verbal conceptualisation, abstract thought and verbal expression.

The subtest of the WISC-IV that differentiates the most intelligent children is the Similarities subtest which tells us about the capacity to form concepts. Similarities is one of the principal subtests of the VC index (verbal comprehension) and consists of a child having to discover how two words which are shown to him, related to common objects or concepts, are similar. It attempts to measure above all verbal reasoning and concept formation but it is also related to listening comprehension, memory, capacity to distinguish between essential and secondary characteristics and verbal expression (Corral and others, 2005: 25 and 26).

In fact, some of the earliest things to be learnt, and something which has been empirically confirmed as linked to intellectual giftedness, are the different colours at 18 months of age, independently of the culture and social class.

Information and Similarities are the subtests which differentiate the most intelligent children and more specifically it is the Similarities subtest which is linked to the formation of concepts: i.e., of understanding and comprehending the world around us. The essence of human beings is thought in order to form concepts. The depth of, and capacity for, abstraction when it comes to forming concepts is what differentiates the most intelligent children. Spearman (1927) wrote about the formation of concepts or neo-genesis as the most typical of intelligent behaviour (Yuste, 2002: 14).

Foster (1986: 33-37) suggested an emergent theory of intelligence: in the same way that water changes its properties to different degrees, intelligence may change its properties when it reaches a critical point. Leta Hollingworth thought that this critical point would be at IQ = 145.

Taking all this into consideration, it is interesting to know what would happen if we considered the different ranges of giftedness in the SBL-M (gifted, IQ 130-144, highly gifted IQ 145-159, exceptionally gifted IQ 160-174 and profoundly gifted IQ 175+) in the correlation between the WISC-IV and the SBL-M.

Some questions which we could pose are: will the correlation between the TIQ of the WISC-IV and the SBL-M be found in all the ranges of giftedness? Will this correlation increase or decrease according to the ranges of giftedness?

Another possible question is: will a correlation be observed between the indices of the WISC-IV and the SBL-M? Will this possible correlation of the different indices (VC, PR, WM and PS) of the WISC-IV increase or decrease as the range of giftedness of the children in the SBL-M becomes greater? Which of these indices will be significant?

Finally, will the subtests of the WISC-IV which have the most correlation in all the ranges of giftedness in the SBL-M continue to be those of Information and Similarities or, perhaps, will these vary according to the degree of giftedness of the child in the SBL-M?

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