International Journal of Developmental and Educational Psychology
Psicología del desarrollo: infancia y adolescencia
INFAD, año XXI
Número 1 (2009 Volumen 1)

ISSN 0214-9877

ASSESSMENT OF COGNITIVE PROFILES IN PORTUGUESE GIFTED STUDENTS WITH WISC-III

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ABSTRACT

The Wechsler Intelligence Scale for Children and Young remains a reference for the psychological assessment and diagnosis of giftedness. Portuguese studies from Pereira (1998), Wechsler (2003), and Candeias, Simões and Silva (in press) point out to psychometric characteristics of reliability and validity from WISC-III, which improves its usage as an instrument of diagnosis, as the original American version. These characteristics have stimulated many studies on this test as a tool for diagnosis (Kaufman 1994; Prifitera & Saklofske, 1998). Researchers' points at the study of discrepancies between IQs as one important issue to understand the complexity of cognitive functioning of gifted students (e.g. Detterman & Daniel, 1989; Legree, Pifer, & Grafton, 1996; Pereira; 1998, Sweetland, Reina & Tatti, 2006).

In order to understand the functionality of this test in the diagnosis of cognitive profiles from gifted students, we present a study with Portuguese gifted children and youth (N = 23) we propose a detailed study about the discrepancies between IQs and between Indexes. We will also discuss these discrepancies in diagnosis of giftedness and in the characterization of its cognitive profiles and how that could improve more specific educational intervention with gifted students.

Keywords: Giftedness; Cognitive profile, WISC-III, Psychological Assessment, Educational implications.

INTRODUCTION

The procedures to identify gifted and talented students are one of the most discussed and written about topic in our field (Brown, Renzulli et. al, 2005). In spite of the development of theories of intelligence (e.g., Gardner, 1983; Sternberg, 1985) and extend conceptions of giftedness (e.g., Gagne, 1999; Renzulli, 1978, 1988; Simonton, 1997), actual practices of assessment continue to be dominated by cognitive ability test scores. In the psychoeducational evaluation Wechsler Intelligence Scale for Children–Third Edition (WISC–III; Wechsler, 1991) is the most widely used psychometric measure of intelligence for children (Donders, 1996), especially with gifted children (Winner, 2000; Sweetland, Reina & Tatti, 2006).

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As Wechsler initially proposes, WISC measures the various aptitudes that contribute to the total behavior of the individual. The WISC-III has six verbal subtests and seven performance subtests (ten subtests are mandatory and three are optional). The Verbal intelligence quotient (VIQ) is obtained by adding the scaled scores of all the verbal subtests except Digit Span, and the Performance IQ (PIQ) is derived from five of the performance subtests. The PIQ is not as good a predictor of school achievement as is the VIQ. Indexes derived from the WISC-III subtests include: Verbal comprehension (VC); Perceptual organization (PO); Processing speed (PS).

In the last decades several studies suggest methods and models for interpretation of WISC–III profiles that vary from a global interpretation of the Full Scale IQ (FSIQ) score to more specific interpretation of the 13 separate subtests (e.g., Kaufman, 1994; Pereira, 1998; Wechsler, 2003, Sweetland, Reina & Tatti, 2006). Full scale score generates expectations about the possibility of gifted children to have high performance in all the domains (Winner, 2000). So, several studies propose multiple looks to score on WISC-III as we discuss below.

Some researchers demonstrated that the magnitude of discrepancies is positively correlated with IQ (Detterman & Daniel, 1989; Legree, Pifer, & Grafton, 1996; Pereira; 1998, Wechsler, 2003), and previous work with gifted individuals confirms the finding that V-P differences are typically larger than with normal children.

Sweetland, Reina & Tatti (2006), in a study developed with 161 gifted students examined that a discrepancy of 13 points or more occurred in 68.9%, 18 points or more occurred in 54.7% and 25 or more points occurred in 26.7% of the gifted students' sample. This results are not consonant with the discrepancies founded with the standardization sample (Wechsler, 1991), when a discrepancy of 18 points or more occurred in 17% of the cases, and a discrepancy of 25 occurred in 4,9% of the sample.

Gifted students show a greater range of subtest variation than average students (e.g., Candeias, Simões & Silva, in press; Fishkin & Kampsnider & Pack, 1996). A larger portion of gifted students score above their mean than average students for Similarities, Comprehension and Vocabulary. Subtests that allow students to display superior logical abstract thought to differentiate essential from non-essential detail. By the contrary a larger portion of gifted students score below their mean than average students for Coding and Symbol Search, both tasks involve speed.

Gifted children are particularly prone to "hitting the ceiling" on WISC-III (Candeias, Simões & Silva, in press; Pereira, 1998, Wechsler, 2003). Ceiling effect occurs when the child's knowledge goes beyond the limits of the test. If the global score on the test is well above the last score available in the scoring manual for children of his or her age, for example, on the WISC-III, three or more subtest scores in the 17, 18, or 19 ranges, often indicate ceiling problems indicated this effect. Some subtests don't have a stopping point and the child continues to answer items correctly even among the most difficult tasks. The tests do not have items of sufficient difficulty to assess the full strength of the abilities of highly gifted students (Silverman, 1995; Silverman & Kearney, 1989; 1992a).

With this study we propose to clarify the functionality of WISC-III in the diagnosis of cognitive profiles from gifted students, especially in Portuguese population. Our propose is based on the assumption that a specific look to: discrepancies between IQs and Indexes could get a better understanding of cognitive profile of gifted students on the WISC III improving its usefulness in psychoeducational evaluation of giftedness.

METHOD

Participants

Participants consisted of 23 gifted students who received comprehensive psychoeducational evaluations ANEIS (Portuguese Association for the Study and Intervenction in Giftedness) in Alentejo Region during 2007 and 2008. Participants were selected based upon the criteria that their cognitive

assessment included the 10 mandatory subtests and one optional subtest (Symbol Search) of the WISC-III.

The sample included 1 female and 22 males, aged between 6 and 13 years (Mean = 9.7, SD= 2.44). All children included in the study attained at least one IQ score (Full Scale, Verbal, or Performance) of 130 or higher, as in the study of Sweetland, Reina & Tatti (2006), with the range of Full Scale IQs between 119 and 154 (Mean = 137, SD= 10,32). The mean Verbal IQ was 138 (SD = 12.34) while the mean Performance IQ was 125.3 (SD = 14.93).

Procedures

WISC-III was administered by an ANEIS certified school psychologist. Students who attained a score of 130 or higher on the Verbal, Performance, or Full Scale IQ comprised the current sample of 23 students. All children were required to have parental consent before any testing was initiated. Subjects were assigned a code to protect confidentiality.

Instrument

The **Wechsler Intelligence Scale for Children (WISC-III), Portuguese version (**Wechsler, 2003) is an individually administered test of intellectual ability for children aged 6.0 to 16.11 years. It consists of 10 mandatory and three optional subtests that combine to yield Verbal (V), Performance (P), and Full Scale (GIQ) IQs (M=100; SD=15). The WISC-III is an individual test that does not require reading or writing. Verbal subtests are oral questions without time limits except for Arithmetic. Performance subtests are nonverbal problems, all of which are timed and some of which allow bonus points for extra fast work. The subtests that compose WISC-III, are:

Information: oral, "trivia"-style, general information questions. Scoring is pass/fail.

Similarities: explaining how two different things (e.g., horse and cow) or concepts (e.g., hope and fear) could be alike. Scoring is 2-1-0, according to the quality of the responses.

Arithmetic[*]: oral, verbally framed math applications problems without paper or, for most problems, any visual aids at all. Scoring is pass/fail.

Vocabulary: giving oral definitions of words. Scoring is 2-1-0, according to the quality of the responses.

C*omprehension*: oral questions of social and practical understanding. Scoring is 2-1-0, based on quality.

Digit Span: repeating dictated series of digits (e.g., 4 1 7 9) forwards and other series backwards. Series begin with two digits and keep increasing in length, with two trials at each length.

Picture Completion[*]: identifying missing parts of pictures.

Coding A[**]: marking rows of shapes with different lines according to a code as quickly as possible for 2 minutes (under age 8)

C*oding B*[**]: transcribing a digit-symbol code as quickly as possible for two minutes (eight and older).

Picture Arrangement[**]: sequencing cartoon pictures to make sensible stories.

Block Design[**]: copying small geometric designs with four or nine larger plastic cubes.

Object Assembly[**]: puzzles of cut-apart silhouette objects with no outline pieces.

Symbol Search[**]: deciding if target symbols appear in a row of symbols and marking *YES* or *NO* accordingly.

Mazes[*] no pencil lifting, points off for entering blind alleys.

The results of subtests could be combined in IQs and Indexes: *Full Scale IQ* (FSIQ) is based on the ten tests included in the Verbal and Performance IQ scales. The *Verbal IQ* (VIQ) is obtained by adding the scaled scores of all the verbal subtests except Digit Span, and the *Performance IQ* (PIQ) is derived

from five of the performance subtests. Indexes derived from the WISC-III subtests include: *Verbal comprehension* (VC) that is based on Information, Similarities, Arithmetic, Vocabulary, and Comprehension; *Perceptual organization* (PO), which is composed by Picture Completion, Picture Arrangement, Block Design, and Object Assembly; and *Processing speed* (PS) that includes Coding and Symbol Search.

RESULTS

First we analyse descriptive statistic to IQs and Indexes as we report in Table 1. As we could observe the mean of VIQ, FSIQ and VC is 130 or higher, by the contrary the values of the mean in PIQ, PO and PS are lower as is suggested in previous studies (Candeias, Simões & Silva, in press; Wechsler, 2003; Sweetland, Reina & Tatti, 2006).

Table 1

Descriptive Statistics for VIQ, PIQ, FSIQ, VC, PO and PS (N=23)

	VIQ	PIQ	FSIQ	VC	PO	PS
Mean	137,61	125,30	137,30	135,17	120,74	108,19
Mode	143	117(a)	134	125(a)	114(a)	95(a)
Std. Deviation	12,335	14,931	10,324	12,812	15,446	13,045
Minimum	111	96	119	106	93	92
Maximum	153	149	154	149	161	145

a Multiple modes exist. The smallest value is shown

In next step, data analysis observed discrepancy scores reflecting differences between verbal and performance scores in IQs and in Indexes. Table 2 reports the actual frequencies and cumulative percentages of this gifted sample obtaining various Verbal-Performance IQ and Indexes discrepancies and Table 3, 4 and 5 reports the actual frequencies and cumulative percentages of this gifted sample obtaining various Verbal Comprehension-Perceptual Organization, Verbal Comprehension-Processing Speed and Perceptual Organization- Processing Speed Indexes discrepancies, respectively.

Table 2
Cumulative Percentages and Frequency of the Verbal-Performance IQ Differences (N=23)

Amount of discrepancy	Frequency	Sample percentage
1	2	8,6 %
8	2	8,6 %
9	1	4,3 %
14	1	4,3 %
17	1	4,3 %
18	2	8,6 %
20	1	4,3 %
21	2	8,6 %
22	2	8,6 %
25	2	8,6 %
27	1	4,3 %
28	1	4,3 %
34	1	4,3 %
41	1	4,3 %
42	1	4,3 %
53	1	4,3 %

Descriptive analysis presented on Table 2, explore the various V-P IQ discrepancies within this population. Results indicated that the amount of V-P IQ discrepancy observed in our population ranged from 1 to 53 points. The mean V-P IQ discrepancy was 20,7, and the median was 21. In gifted sample 65% of students had 18 or more points of discrepancy while 24% of students from Portuguese standardization sample obtain 18 points or more of discrepancy (Wechsler, 2003).

Table 3
Cumulative Percentages and Frequency of the Verbal Comprehension and Perceptual Organization Indexes Differences (N=23)

Amount of discrepancy	Frequency	Sample percentage
0	1	0 %
2	1	4,3 %
5	1	4,3 %
8	2	8,6 %
10	1	4,3 %
11	1	4,3 %
16	1	4,3 %
18	1	4,3 %
19	1	4,3 %
20	1	4,3 %
23	1	4,3 %
24	1	4,3 %
25	3	12,9 %
29	2	8,6 %
32	1	4,3 %
39	1	4,3 %
41	1	4,3 %
48	1	4,3 %
55	1	4,3 %

Data from Table 3 indicated that the amount of VC-PO discrepancy observed in our population ranged from 0 to 55 points. In gifted sample 65% of students had 18 or more points of discrepancy while 26% of students from Portuguese standardization sample obtain 18 points or more of discrepancy (Wechsler, 2003).

Table 4
Cumulative Percentages and Frequency of the Verbal Comprehension and Processing Speed Indexes Differences (N=23)

Amount of discrepancy	Frequency	Sample percentage
6	1	4,3 %
11	4	17,2%
13	1	4,3 %
18	1	4,3 %
19	1	4,3 %
27	3	12,9 %
29	2	8,6 %
31	2	8,6 %
33	1	4,3 %
34	1	4,3 %
36	1	4,3 %

Results in Table 4, indicated that the amount of VC-PS discrepancy observed in our population ranged from 6 to 36 points. The mean VC-PS discrepancy was 26,6, the mode is 46 and the median was 31. In gifted sample 52% of students had 18 or more points of discrepancy while 34% of students from Portuguese standardization sample obtain 18 points or more of discrepancy (Wechsler, 2003).

Table 5
Cumulative Percentages and Frequency of the Perceptual Organization and Processing Speed Indexes Differences (N=23)

Amount of discrepancy	Frequency	Sample percentage
2	3	12,9 %
5	1	4,3 %
7	1	4,3 %
13	3	12,9 %
14	2	8,6 %
23	2	8,6 %
25	2	8,6 %
29	1	4,3 %
30	1	4,3 %
33	1	4,3 %
35	1	4,3 %
40	1	4,3 %
48	1	4,3 %

In Table 5 we could examined that the amount of PO-PS discrepancy observed in our population ranged from 2 to 48 points. The mean PO-PS discrepancy was 20,6, the mode is 2 and the median was 23. In gifted sample 44% of students had 23 or more points of discrepancy while 30% of students from Portuguese standardization sample obtain 18 points or more of discrepancy (Wechsler, 2003).

DISCUSSION AND CONCLUSIONS

As previous studies demonstrated the magnitude of discrepancies seems to be positively correlated with IQ (Detterman & Daniel, 1989; Legree, Pifer, & Grafton, 1996; Pereira; 1998, Wechsler, 2003) and with Indexes as our study proves. Gifted individuals present Verbal IQ and Performance IQ differences typically larger than with normal children. Present confirm this results with Portuguese gifted students and indicated that these differences also exist between Indexes, namely between Verbal Comprehension and Perceptual Organization, Verbal Comprehension and Processing Speed and Perceptual Organization and Processing Speed.

Other important finding is that Portuguese gifted students have a propensity to have higher results on Verbal IQs and Verbal Comprehension Index confirming the previous studies with samples from other countries (e.g., Fishkin & Kampsnider & Pack, 1996; Kaufman, 1994; Prifitera, & Saklofske, 1998). However these results should be observed with some criticism, especially with regard to the ceiling effect especially starting at 12-13 years. Consequently results on Verbal IQ and Verbal Comprehension Index, in special, are so high that could have little impact on the differentiation of specific cognitive profiles of gifted students.

Therefore it is important to complement the assessment of intellectual abilities of gifted students in accordance with the cognitive theories of giftedness (e.g., Gagne, 1999; Renzulli et al., 2005; Shavinina, 2008) via the measurement of their hidden or potential intellectually-creative abilities. Psychoeducational assessment of intellectually-creative abilities should be based on psychological mental context generated by an individual and should not be exclusively retrospective in its measurement of an individual's intellectual resources; it should be prospective, based in the characterization of the cognitive potential and of the cognitive functioning as cognitive styles and metacognitive abilities.

Definitely WISC-III could be a good tool to a preliminary identification and diagnosis, but we need more specific cognitive tasks to do a more complex evaluation of hidden or potential intellectually-creative abilities of gifted individuals.

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NOTAS

* Time limit.

** Time limit and bonuses for speed.

Fecha de recepción: 28 febrero 2009
Fecha de admisión: 19 marzo 2009

International Journal of Developmental and Educational Psychology
Psicología del desarrollo: infancia y adolescencia
INFAD, año XXI
Número 1 (2009 Volumen 1)

ISSN 0214-9877