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Scatter of Scores on WISC III and Identification of Cognitive Strengths and Weaknesses: A Single Case Study

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ABSTRACT : *Presenting here is the case study of an eight years old boy Omer with speech and language disorder. Differential diagnosis was made in order to rule out other factors targeting the problematic areas. The case proceeded with initial evaluation based on reason for referral, background information, parents and teachers feedback to ensure comprehensive evaluation. WISC-III was administered to measure the intellectual ability and cognitive strengths and weaknesses of Omer. Results indicated an abnormal amount of scatter within his subtest profile, hence making his Full Scale IQ on WISC-III meaningless. Among the scores variability covering most of his verbal and performance profiles, meaningful representation of Omer's abilities is found in his individual strengths and weaknesses. With the help of this information an integrated and child centered treatment plan was devised to address examinee's idiographic traits, abilities and risk factors.*
Key Words: *speech language disorder; WISC-III; verbal; performance; strengths; weaknesses; IQ; abnormal scatter.*

I. Introduction

Children with communication disorders usually do not accomplish well at grade level. They have to make strenuous efforts with reading, understanding and expressing language. They fail to understand social cues, resist going to school, exhibit poor judgment, and have difficulty performing tests.

Intelligence, according to Wechsler (1981) is having different aspects and facets. It is a global ability which is explicitly seen in many ways and allows the individual to think logically and cope functionally within the environment. Wechsler tests were practical and clinical based, strongly supported as measures of general *g* (Kaufman, 1994; Sattler, 1988). The original *Wechsler Intelligence Scale for Children* (WISC; Wechsler, 1949), the *Wechsler Intelligence Scale for Children—Revised* (WISC–R; Wechsler, 1974), and the WISC–III included a Full Scale IQ (FSIQ) as well as a Verbal IQ (VIQ) and Performance IQ (PIQ). The WISC–III introduced four index scores to represent more narrow domains of cognitive function: the Verbal Comprehension Index (VCI), the Perceptual Organization Index (POI), the Freedom from Distractibility Index (FDI), and the Processing Speed Index (PSI).With the introduction of these index scores, a total of seven composite scores could be derived with the WISC–III: the FSIQ, VIQ, PIQ, VCI, POI, FDI, and PSI.

The index scores in WISC-III were brought into practice to allow the practitioners to select the composite scores that best described verbal and perceptual ability, based on the outcome of the assessment. When there is a lot of scatter in the subscales and difficult to interpret the global abilities it aids in interpretation, the practitioner could describe verbal abilities using the VCI in place of the VIQ, and describe perceptual abilities using the POI in place of the PIQ. In particular, the index scores were preferable for cases in which the VIQ was considered less descriptive of verbal ability than the VCI because Arithmetic—a subtest from the working memory domain—was discrepant from the verbal comprehension subtests at a level that was unusual in the standardization sample and for cases in which the PIQ was considered less descriptive of perceptual ability than the POI because Coding— a subtest drawn from the processing speed domain—was discrepant from the perceptual organization subtests at a level that was unusual in the standardization sample, (Raiford,.Weiss, Rolfhus, & Coalson, 2008).

The Wechsler scales are the most popular individual measures of intelligence for children, adolescents, and adults (Alfonso, Oakland, LaRocca, & Spanakos, 2000; Belter & Piotrowski, 2001). Among the school-age population, millions of children have been administered the Wechsler Intelligence Scale for Children—Third Edition (WISC–III; Wechsler, 1991) as part of an evaluation to determine eligibility for special education services (Kamphaus, Petoskey, & Rowe, 2000). Beyond its diagnostic applications, the WISC–III is often used to identify cognitive strengths and weaknesses that form the basis for psycho-educational recommendations (Zeidner, 2001). On the basis of these principles, intricate subtest interpretation systems (Kaufman, 1994; Sattler, 2001) have achieved wide popularity in psychology training and practice (Alfonso et al., 2000; Groth-

Marnat, 1997; Kaufman, 1994; Pfeiffer, Reddy, Kletzel, Schmelzer, & Boyer, 2000). These interpretative strategies typically begin at the top of the WISC–III score hierarchy by making inferences about general abilities from the Full-Scale IQ (FSIQ), Verbal IQ (VIQ), and Performance IQ (PIQ) scores only if subtest scores do not vary significantly. If there is substantial scatter among lower level components, then an IQ score "represents a summary of diverse abilities and does not represent a unitary entity" (Kaufman & Lichtenberger, 2000, p. 424). Hence an ipsative strategy is recommended for teaching a student according to his/her needs and aptitudes (Kaufman, 1994; Kaufman & Lichtenberger, 2000).

II. Referral Questions

Omer, 8 years old was presented for evaluation by his parents. Riffat (Omer's mother) was concerned that her son was going through with some school difficulties. On enquiry, following complaints were shared by Omer's mother

- Grades falling down,
- Difficulty in expressing thoughts
- Started speaking late and even now shows difficult in communication
- Bullied by class mates for not showing verbal fluency
- Sometimes cannot follow instructions of teacher in the class

Evaluation Procedures

- Background Information
- Remarks of Class teacher
- Medical History
- CT-Scan of the Brain
- Childhood Autism Rating Scales (C.A.R.S.)
- Revised Rutter Parent Scale for School-Age Children
- Wechsler Intelligence Scale for Children-III (WISC-III)

III. Background Information

Omer lives with his parents and three siblings. He is the eldest son, father holds his own business and mother teaches in school. Both the parents are well educated and well settled financially.

As shared by Omer's mother, Omer did not cry instantly on delivery, though it was a normal delivery. There is a family history of delayed speech and some autistic features. Omer's grandfather and paternal uncle exhibited those features, even father Sohail Ali is also a quiet person by nature.

Except for talking all other developmental milestones were passed normally. He uttered first word at the age of two. He was a super calm baby (mother's verbatim) by temperament. During play he used to arrange things of one category and then played.

According to medical records, two pediatricians evaluated Omer at age 3 and suggested the parents to wait till Omer would be 4 or 4 and a half then it would be right time to predict any anomaly or to start with some medications. The only solution at that time they suggested was to admit him in some nursery school to improve his speech and comprehension. That delay according to their opinion could be genetic.

Omer was also assessed for his behavioral problems by a psychologist in 2009, as referred by school. Results at that time indicated no significant attitudinal or emotional problems.

According to the parents at this age when Omer is 8 years old, he is facing problems in comprehension and hence showing decline in academic performance.

IV. Remarks of class teacher

A review of his school records indicated some issues regarding attention span, following classroom instructions, making good use of time, participating in group work and playing with friends. The major

complaints posed by his class teacher were however, inability to carry out verbal instructions, language and communication problems.

V. Differential Diagnosis

For differential diagnoses Childhood Autism Rating Scale (CARS), Revised Rutter Parent Scale for School-Age Children were conducted and found non autistic and no behavioral issues results. Magnetic Resonance Imaging (MRI) was then suggested to rule out any organic reason for the problem. Clinical Report of MRI suggested no anomaly.

It was then; Wechsler Intelligence Scale for Children (WISC) was administered. Omer took two sessions to complete that test.

VI. Observation

For first session Omar came with his mother and sister. He was neatly dressed and appeared confident of his age. He shook hand and looked around inquisitively. His mother asked if he could stay there with me without the presence of his mamma, he agreed without showing any signs of resistance or fear. Omar was a pleasant looking child, very confident of his age and only spoke English, though understood Urdu as well.

As I started administering WISC, he sat down attentively and listened to all my instructions quietly. Initially he displayed a little difficulty in understanding my instructions but once he started he took all the sub tests with ease. In between certain tests (Verbal subtests, usually), he showed lack of interest, yawned and seemed bored. But as some performance subtests started he gained back his interest.

At the end of 6th subtest, I wound up the first session and asked him to call his mother and allowed him to use my cell phone. He was excited to use the android phone and during that time when his mother was retuning I opened a mobile game for him. He started playing the game with interest and showed no signs of ignorance for the rules of the game, neither asked me to guide him. He was playing that game for the first time and showed his learning capabilities with hit and trial method. He was so much absorbed in the game that he bit his nails a few times from his teeth, while playing. Attention span seemed to be good throughout. He remained seated and was not distracted much by the environment.

During his second session Omar showed happiness to meet me again. He completed rest of the test willingly without any difficulty.

Test (WISC-III) results and interpretation

Omer was administered WISC-III, which is an individually administered test of children for their intellectual abilities, cognitive strengths and weaknesses. The WISC-III characterizes child's specific abilities into two groups, viz., Verbal Intelligence Quotient (VIQ) and Performance Intelligence Quotient (PIQ). VIQ measures verbal skills and PIQ measures how intelligently the child involves in the manipulation of concrete material to solve non-verbal problems.

Table 1

SCALE	SCORE	IQ INDEX	PERCENTILE	95% CONFIDENCE INTERVAL
Verbal	48	98	45%	92 – 104
Performance	63	119	90%	109 - 125
Full Scale	111	107	68%	101 - 112
VC	33	90	25%	84 - 97
PO	50	116	86%	106 - 123
FD	15	86	18%	78 - 97
PS	13	81	10%	74 – 94

VC= Verbal Comprehension, PO= Perceptual Organization, FD= Freedom from Distractibility, PS= Processing Speed.

On WISC-III Omer earned a VIQ of 98 (45th percentile) which is indicative of average intellectual functioning. On the contrary, on PIQ he scored 119 (90th percentile), which is in above average range of intellectual functioning. On the whole he achieved FSIQ of 107 (68th percentile) which is again in average range of intellectual functioning (Table 1).

However, there was a great deal of variability in Omer's score within the sub scales of VIQ and PIQ, hence indicating significant inconsistencies in his performance. The best description of distinction between Omer's overall verbal and non verbal abilities is probably provided by his Verbal Comprehension Index (VCI) of 90 (25th percentile) and his Perceptual Organization Index (POI) of 116 (86th percentile) (Table 1)

Table 2

VCI	POI	DIFFERENCE	SIGNIFICANT (p<.01)	SIGNIFICANT (p<.05)	NOT SIGNIFICANT	IS THERE A SIGNIFICANT DIFFERENCE?
90	116	26	16 or more	12 -15	0 – 11	YES

The 26 points difference between these indexes is both statistically significant and unusual (Table 2), occurring in 10 percent of normal children (Kaufman, Lichtenberger, 2000). It indicates that Omer performs better when solving non verbal via the manipulation of concrete materials than when expressing him orally and solving verbal problems.

Table 3

Verbal Subtest	Scaled score	Rounded Mean	Difference	Size of Difference needed for Significance	Strength or Weakness (S or W)
Information	7	8	-1	±3	_
Similarities	16	8	8	±3	S
Arithmetic	1	8	-7	±3	W
Vocabulary	9	8	1	±3	_
Comprehe-nsion	1	8	-7	±4	W
Digit Span	14	8	6	±4	S

Table 4

Performance Subtest	Scaled score	Rounded Mean	Difference	Size of Difference needed for Significance	Strength or Weakness (S or W)
Picture completion	12	11	1	±4	_
Coding	10	11	-1	±5	_
Picture arrangement	16	11	5	±4	S

Block design	11	11	-	±4	_
Object assembly	11	11	-	±4	_
Symbol search	3	11	-8	±4	W

Examination of individual subtest on WISC-III provides a clearer picture of his abilities (Tables 3 & 4). He exhibited a significant weakness on arithmetic problems and comprehension subtest. Both these subtests required him to respond to auditorily presented problems. His strengths lied on subtests like similarity and digit span. It shows that he can adequately apply information that he learns.

Within the non-verbal (performance based) domain Omer displayed a significant relative strength in his temporal and visual sequencing and in his ability to anticipate consequences. This was noted on a subtest requiring him to arrange a set of pictures into logical story sequence. On the test he scored in a superior range. He was able to sequence the pictures into a meaningful order quickly and accurately and he appeared confident about his performance on that task.

In contrast, on a verbal subtest of the WISC-III measuring his social judgment and knowledge about social rules he scored less. This discrepancy indicates that although Omer does have knowledge and understanding about social events and is able to display common sense, the only difficulty is that he has to struggle to verbalize this knowledge.

On subtest of symbol search he scored less than average which shows that it's difficult for him to work under time pressure. On another test where he has to replicate two dimensional geometric pattern using colored cubes, he scored high average. That reflected his strong ability in the area of non verbal concept formation.

An important thing which should be noted here is that this subtest was presented to him in a graduated fashion in which it was required that examiner demonstrate the model first and then later the child has to construct designs based on pictorial models presented in the stimulus booklet. As the instructions on that subtest required modeling, that method appeared to be efficient in teaching Omer novel tasks.

In order to make a recommendation plan for Omer his mean performance on all subtests with each test administered is compared. An ipsative comparison will help in examining how well a child is performing relative to his or her own average subtest scores (Kaufman & Lichtenberger, 2000). This helps in determining the relative strengths and weaknesses of the child. With all the relevant information available through clinical observation, background information and supplementary testing following strengths and weaknesses of Omer hypothesized and shared with parents and teachers.

Strengths

- Similarity: (Ability to perceive verbal relationships especially abstract relationships and good logical thinking).
- Digit Span: (Alert ability to concentrate, low anxiety and ability to reorganize verbally).
- Picture Arrangement: (Ability to sequence well, ability to note action, understand consequence of action and ability to note details).

Weaknesses

- Arithmetic: (Poor calculation skills, difficulty in mental calculations, poor short term verbal memory, inattention, verbal output problem).

- Comprehension: (Low social intelligence or understanding, poor verbal skills, speech deficits, verbal output problem).
- Symbol Search: (Difficulty in speed of mental processing, visual-perceptual problem, and working under time pressure).

VII. Recommendations

The following recommendations were made to the parents to assist Omer in dealing with his educational needs in particular and school adjustment in general.

- Omer should be provided with individual tutoring or small group instructions to help improve his academic skills. This tutoring should focus on his verbalization (speech) of reading material and also focus on his arithmetic skills, especially mental math.
- He should be provided with concrete meaningful material and introduced multi sensory learning experiences in which visual, auditory, tactile and kinesthetic channels are used to reinforce learning whenever possible.
- As Omer has difficulty with complex, multi-step directions, but has an ability to accomplish tasks involving more simple instructions, so he should be tutored in which instructions be simplified and broken down at concrete level.
- It was highly recommended that continuous positive feedback appreciation and verbal encouragement be given to him for his approved behaviors by parents and teachers.
- He should be encouraged to speak, verbalize and participate in academic or non academic group activities rather than solitary assignments.

VIII. Conclusion

The present results have limited implications for psychological practice. First, because ipsative subtest categorizations are non-generalizable and hence recommendations based on them will also be limited. In case studies the focal concern is to help the individual and decision making. Every individual is unique with unique complexities and in-depth analysis reveals new dimensions or new evidences to support or disprove theories. The only problem is they cannot be replicated.

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Note

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I extend my thanks to parents of my client for their permission to present this case. The real name of the client is changed with a factitious one for ethical reasons.

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