



Results of the Intelligence Test for Visually Impaired Children -ITVIC- on a Hungarian Sample

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IQ assessment of VI – Blind People

- Problematic field
- Intelligence tests are – based on visual abilities
- A few in practice designed for the special needs of this population
- Dial, J.G. & Dial, C.L., 2009, Atkins, 2012:
 - Adaptation and design are not very successful in this field
 - Particularly not for IQ testing
 - Once developed but not available (Williams, Perkins, etc.)
- Future is also not promising: „Test design for this population is not financed because of low user group and little financial interest by producers and distributors ... developers are also not active because of the difficulties to create a normative sample (Bylsma & Doninger, 2004; Miller & Skillman, 2003; Miller et al, 2007)“.
- Low vision individuals with good corrections can be tested and results interpreted with caution with tests designed for sighted people*

**Best Practices in School Neuropsychology: Guidelines for Effective Practice, Assessment, and Evidence-Based Intervention 466.o.*

Selection of haptic adaptations for IQ test

Hayes, 1942	Interim Hayes-Binet Test	Binet
Bauman, 1947.	Non-Language Learning Test	Non-Language Learning Test
Williams, 1956	Williams Intelligence Test	Binet, Wechsler
Wattron, 1956	Wattron-Kohs Block Test	Kohs Block Design
Ohwaki, 1960	Ohwaki-Kohs Tactile Block Design Intell. Test for the Blind	Kohs Block Design
Shurrager, Shurrager 1964.	Haptic Intelligence Test	WAIS
Newland, 1964, 1979	Blind Learning Aptitude Test	Developed for VI by the author
Rich, Anderson, 1965	Tactual Progressive Matrices Test	Raven Progressive Matrices Test
Caton, 1977	Tactile Test of Basic Concepts	Boehm Test of Basic Concepts
Davis, 1980	Perkins-Binet Test	Stanford-, Hayes-Binet, Williams
Dekker, 1992	Intelligence Test for Visually Impaired Children	Holland WISC-R, Tactual Progressive Matrices, Kohs, etc

Tests on the list

- The tests listed were not standardised or not on a homogeneous sample
- Heterogeneity in vision is only one aspect, but individuals with additional handicaps – disturbances were also included to the samples (Gutterman, Ward & Genshaft 1985, Hills-Friggs et al 2007)
- Professional demands towards tests has changed e.g.:
 - Definition of VI and Blindness has changed several times from the dates of development of these tests
- Tests in the list are not available: except two (ITVIC!)
- Dial & Dial (2009 page 468): Mentions Dekker's test with appreciations as being well composed, modern and reliable but for European culture, suspicious about interpretation of results in the USA page 468

Most commonly used tests today

- Declared fact: WISC Verbal subtests are the most popular for VI population worldwide (Atkins, 2012)
- USA – Dial & Dial test
- The cultural problem with ITVIC in the US is an advantage for Europe 😊

ITVIC (Intelligence Test for Visually Impaired Children) (Dekker et al, 1991).



ITVIC

- Az ITVIC (Intelligence Test for Visually Impaired Children) (Dekker et al, 1991 – Dutch, 1996 -English).
- Braille reading VI and Blind children
- Age: 5y 10 m – 16y 1 m interval
- Carefully selected (vision test) Dutch speaking sample
- Developed over 10 years
- Based on Thurston's (1938) 7 factors intelligence model (factors: verbal reasoning, number and verbal fluency, memory, comprehension, perceptual speed, spatial ability)
- Composed by original and evidence based former test components from test for sighted people and some of those for VI subjects. E.g.:
 - Stanford-Ohwaki-Kohs Tactile Block Design Intelligence Test for the Blind (1966)
 - Rich and Anderson: Tactual Progressive Matrices Test, (1965) etc.)
 - R-AKIT, WISC-R
- Internationally used – but not published in English (1-2 publication available ☹)

ITVIC - Advantages

- Includes verbal and HAPTIC subtests
- Selection – pre-test of vision (Dot and Colour Test, Smits and Mommers, 1976)

Standardised:

- 155 Dutch and Dutch speaking Belgian school children, most of them from special schools (35 integrated)
- Braille – learning – tactile-audio teaching method
- More standards
 - Braille group
 - Own group – selected by vision pre-test
 - Functional vision
 - No – functional vision
 - Short version
 - HQ – VQ

ITVIC structure

Haptic subtests (7)

- Exclusion
- Figural analogy
- Perception of line figures /
(objects till the age of 8)
- Block design
- Rectangle puzzle
- Map questions
- House plan questions

Verbal subtests (5)

- Vocabulary (WISC-R)
- Digit span (WISC-R)
- Learning names
- Fluency
- Verbal analogies

Verbal subtests

NAME OF SUBTESTS	MEASURED ABILITY
Learning names	Associative memory
Verbal analogies	Inductive reasoning
Fluency	Ideational fluency
Vocabulary (WISC-R)	Word knowledge and verbal expression
Digit span (WISC-R)	Working memory

Haptic subtests

NAME OF SUBTESTS	MEASURED ABILITY
Exclusion	Reasoning. Finding correct classification rule
Figural analogies	Inductive reasoning
Perception of figures/objects	Accurate perception
Block design	Spatial perception, motor skills, memory
Rectangle puzzle	Spatial perception, motor skills
Map questions	Spatial perception, manipulating with mental presentations, memory
House plan questions	Ability to verbalise spatial representation, memory

Advantages and Disadvantages

- ITVIC offers an alternative to the declared fact: WISC Verbal subtests are the most popular for VI population worldwide (Atkins, 2012)
 - Haptic perception used
 - Several standards
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- Difficult administration and calculation
- Extreme long testing time

Hungarian sample – research design

- Longitudinal study in the 90'
- Two times assessment with WISC-R Hungarian standard
- 190 – 78 individuals
- One assessment with ITVIC
- 40 individual
- 1st sample full school age population
- No new subject included to ITVIC assessment

Aim of the research

- Collection of experiences with Hungarian children
- Analyse the factor structure of the ITVIC in the Hungarian sample (see also poster)
- Determine relationship between ITVIC IQ and other Q-s: ITVIC VQHQ, S(hort) IQ and SVQ, SHQ
- Reliability
- Differences of the Dutch and Hungarian results

Sample n=40

Age	Mean	14,62	Interval	10,5-16,08	
Gender	Male	18	Female	22	40
Gestation	Pre-term	30	Term-born	10	40
Vision	NO	35	YES	5	40

Presented results

Factor analysis

Examination of metrics

IQ – VQ – HQ results analysed by:

- Full Braille group (vision test ø),
- Own group (ref. pre-test)
- Short form (Vocabulary, Verbal analogies, Block design, Map questions and Exclusion)
- See graph→

Dutch factors

- ITVI has been composed with the idea of 7 Thurston factors
- Factor analysis proved 4 factors in the Dutch results
 - Orientation: Map questions, House plan questions
 - Reasoning: Verbal and Figural analogies, Exclusion, Perception of line figures & Digit Span
 - Spatial abilities: Block design, Rectangle puzzle
 - Verbal abilities: Vocabulary, Fluency, Learning names

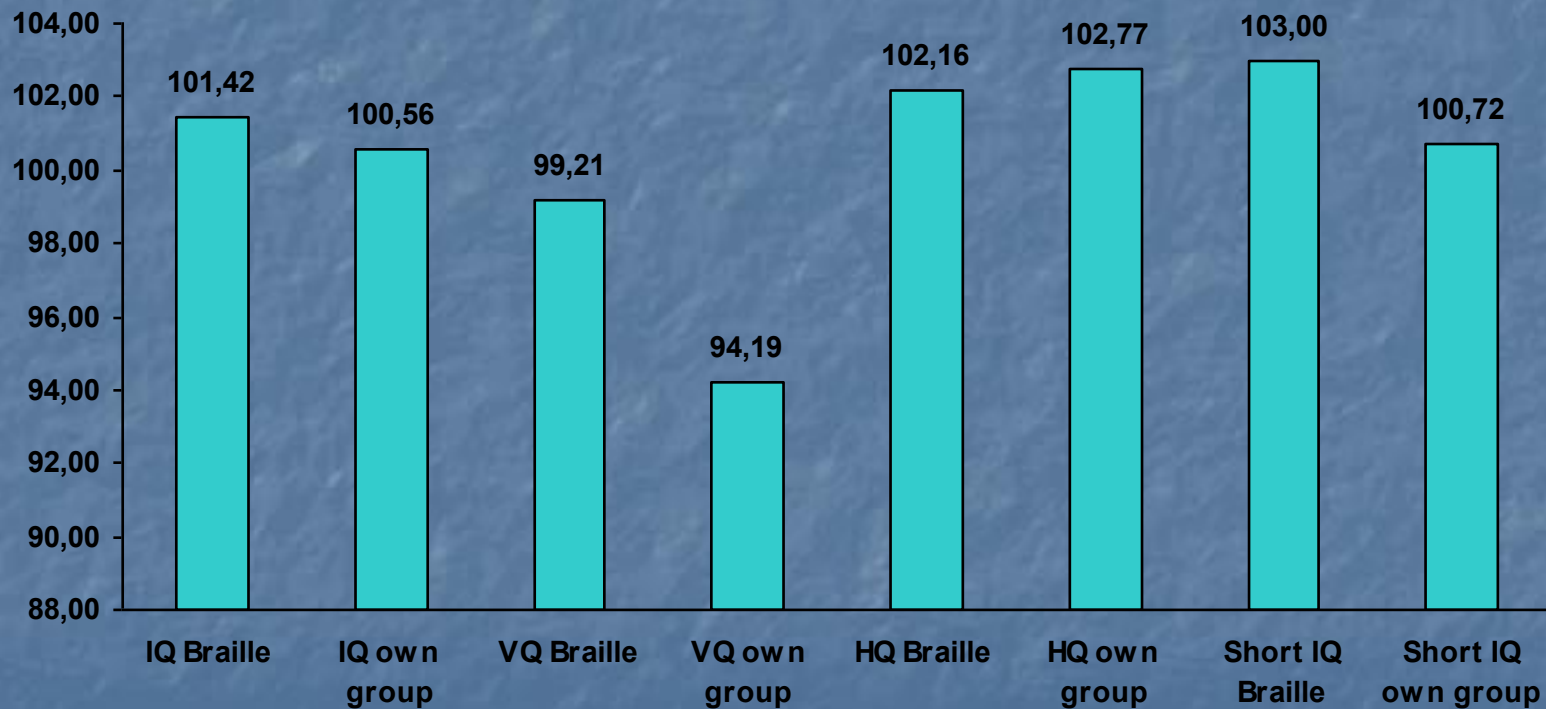
Hungarian Factors

Subtests	Main components	
	1	2
<i>Map questions</i>	0,826	
<i>Perception of line figures</i>	0,746	
<i>House plan questions</i>	0,726	
<i>Rectangle puzzle</i>	0,711	0,275
<i>Block design</i>	0,63	0,348
<i>Figural analogies</i>	0,561	0,540
<i>Exclusion</i>	0,271	0,773
Learning names		0,742
Verbal fluency	0,443	0,606
Verbal analogies		0,567
Varimax rotation	Iteration after 3 rotations	

Comparative analysis of metrics

- In the following charts we show results of all calculated metrics and their relationships

ITVIC IQ, VQ, HQ, Short IQ– Braille and Own group results



Summary of chart 1.

- VQ Braille and VQ own group (vision group) under average
- Haptic subtest results are all higher than average

Difference between Dutch-Hungarian sample one sample t-test

Quotients	N	Mean	Sd	t	df	p
ITVIC BrG IQ	40	101,50	9,861	0,962	39	0,342
ITVIC Og IQ	40	100,53	10,74	0,309	39	0,759
ITVIC VQ	40	98,48	13,49	-0,71	39	0,479
ITVIC Og VQ	40	93,63	12,38	-3,25	39	0,002
ITVIC BrG HQ	40	102,43	7,84	1,956	39	0,058
ITVIC Og HQ	40	103,03	9,67	1,978	39	0,055
ITVIC BrG IQ-S	40	102,80	8,57	2,064	39	0,046
ITVIC Og IQ-S	40	100,35	9,13	0,242	39	0,810

Further analysis of the Quotients

Spearman cor. & Wilcoxon-test

- ITVIC **OWN** IQ (SIQ) correlated ($Rho=0,5-1,00$) **with all other** quotients ($p<0,000$).
- **Short and Full IQ correlates strongly** ($Rho=0.93$)
→ Short IQ is a good measure(!) of the IQ → **practical consequence – reducing time!**
- **Own IQ and own VQ** ($z=4,36$), **HQ** ($z=-3,84$) are significantly **different** ($p<0,000$) – are not interchangeable but **additional measures** of the abilities.

Subtest means (N=40) showing D-H diff.

Subtests	Mean	Sd	<i>t</i>	df	<i>p</i>
Perc. Line fig.	11,28	1,935	4,168	39	0,000
Fig. analogies	11,03	1,993	3,252	39	0,002
Learning names	10,76	2,477	1,859	39	0,071
Block design	11,13	1,924	3,698	39	0,000
Fluency	8,78	3,017	-2,568	39	0,014
Exclusion	11,49	2,114	4,394	39	0,000
Map questions	9,53	2,219	-1,354	39	0,184
House plan q.	9,63	2,559	-0,927	39	0,360
Verbal analogies	8,48	1,679	-5,744	39	0,000
Rectangle puzzle	9,03	2,190	-2,816	39	0,008

Conclusions

- The research results are important on the Hungarian sample.
- Using WISC verbal subtests is not only one-sided measure but also **misleading**
- **Verbal** ability is not over, but **under estimating** IQ of blind children
- **Haptic** subtests are very **important** – insight of haptic process, exploration and reasoning too
- ITVIC offers us to use this advantage
- The tiresome test process can be replaced by **short version**

- We need further data to declare factor structure
- We need further analysis and comparison between ITVIC and WISC results.
- We might come to a result of composing short form sets/suggestions which might better describe weaknesses and advantages on individual levels.

There is a need for international co-operation!

Thank you for your attention!