



Assessment of tactile discrimination skills in blind students of primary school age admitted in special schools for visually impaired

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Dear colleagues and friends,

- I am very sorry for not being able to be with you during the International conference on Sensory issues and Disability, entitled “Touch to learn, touch to communicate”.
- I wished I could join you for the conference days and present my paper to you in person.
- However, thanks to the new technologies I still will be able to be with you virtually.
- I wish you a very interesting and fruitful conference and I am sure it will be a big success.



Let me tell you a little bit about myself:

- I graduated in special education many years ago. I have worked shortly as a teacher of students with intellectual disabilities in a special school. I was a doctoral student in special education, later an assistant professor at Sofia university and since then I started climbing the ladder for an academic career. At the current moment I am a full professor at Sofia University. I have two PhD-s in Special education.
- I have specialized few times abroad – for 3 months in Finland, working with young adults with multiple disabilities, later in Perkins school for the blind in Boston, taking their 9 month long Educational Leadership Program, and in 2003 I specialized for one semester in Boston college through a Fulbright grant as a senior researcher on Deafblindness.
- Throughout the years I developed a lasting interest in issues connected both to pure Blindness, but also to multiple disabilities, incl. Deafblindness.



- I remember quite well how I got attracted to the issues regarding the development and the work of the tactile sense in visually impaired individuals.
- I was still a university student, when one of my professors, whom some of you may know – prof. Vladimir Radoulov, who is severely visually impaired, started reading his Braille notes during one of our classes. I said to myself: “Wow, what a fantastic job is he doing by reading with his hands! I need to learn more about how the tactile sense really works!”
- And this is how my interest in the tactile skills in blind and visually impaired children, pupils and adults started.



- Later, by reading many books and articles, I discovered that the tactile sense has been of interest for researchers and scholars for centuries.
- Aristotle for instance considered the human hand as “organum organonorum” and believed that the tactile sense was a basic and primary sense and all other senses, even vision, were its derivatives.
- Many studies later on (Platner, 1793; Blumenfeld, 1937; von Senden, 1960; Revesz, 1934, 1938, 1950; Сеченов, 1947, 1952; Запорожец, 1960) investigated and analyzed the role of the tactile sense in the human development.



For blind people, touch is the most appropriate sense to achieve spatial knowledge about environment and objects (Hatwell, 2003). Some contemporary research confirm that the tactile development plays a key role in the whole developmental process of the children, and especially in children with visual impairments, because this way they acquire not only knowledge about the environment and the world, but are able to become as independent as possible in their future lives as adults (Hatwell, 2003; Withagen et al., 2010; Heller & Gentaz, 2014).

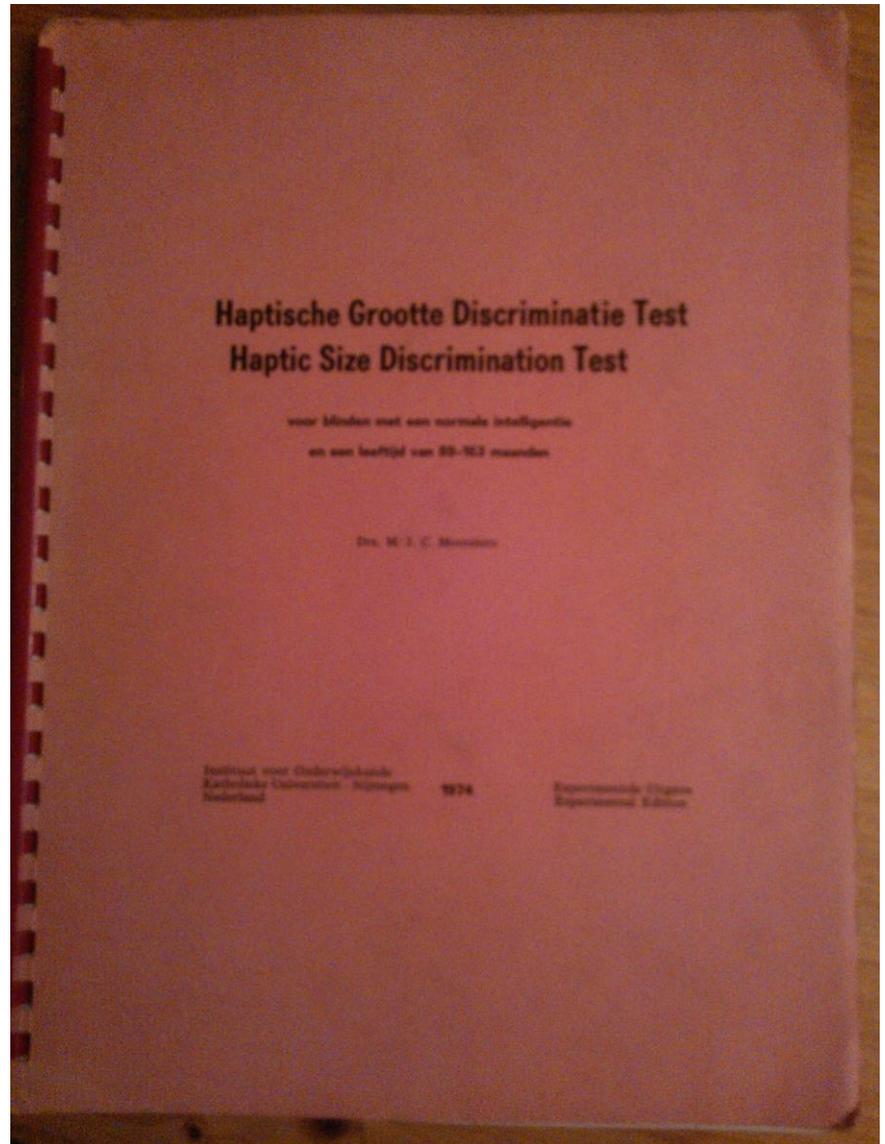
- Many tactile tests were also developed throughout the years in order to measure the tactile skills of blind and visually impaired children, pupils and adults. A recent article of Mazella, Albaret, & Picard (2014) for instance offers a broad literature review on the available haptic (tactile) tests for blind.



- Let me present to you now the research I have conducted in assessing the tactile discrimination skills of blind students of primary school age admitted in special schools for visually impaired in Bulgaria.

Procedure:

- The experimental part included testing blind students (with perception of light (PL) at highest) admitted for a first year in either preparatory class or first grade class in the two special schools for visually impaired in Bulgaria. These schools are the only two special schools of such a type in the country.
- 60 blind students in total were involved in the research, 24 were in preparatory and 36 in first school grade classes. They did not have any school experience yet and were never taught any tactile skills in a structured way.
- The pupils were tested with 3 tactile tests:
 - 1) The Nolan-Morris roughness test (short version of Mommers of 1974);
 - 2) The Crandell, Hammill et al. test for tactile discrimination of shapes (1968);
 - 3) The Mommers test for tactile discrimination of size (1974).



Results:

- At first a classical item analysis by the means of Cronbach's Alpha for Reliability and for finding the discriminative characteristics and the internal consistency of the tests was used for the 3 tests.
- It showed that all three tests were highly internally consistent.

Table 1

- Table 1 presents the situation with the Nolan-Morris roughness test (short version of Mommers of 1974).
- As the table shows Cronbach's Alpha is .89 and it is high enough, which means that the scale is homogeneous and the items in the test are internally consistent.
- However, there were two items, which internal consistency was lower and they could be excluded from the scale – items No 10 and 21.

Scale	Mean	Standard deviation	No of items
Nolan-Morris roughness test (short version of Mommers)	13.30	7.37	34
$\alpha = .89$			

Table 2

- Table 2 presents the situation with the Crandell, Hammill et al. test for tactile discrimination of shapes of 1968.
- As the table shows Cronbach's Alpha is again high enough (.85), which means that the scale is homogeneous and the items in the test are internally consistent.
- The only exclusion was with item No 17, which did not correlate well and was with lower consistence.

Scale	Mean	Standard deviation	No of items
Crandell, Hammill et al. test for tactile discrimination of shapes	11.42	5.74	25
$\alpha = .85$			

Table 3

- Table 3 presents the situation with the test for tactile discrimination of size (Mommers, 1974).
- As the table shows Cronbach's Alpha is .88 – again high enough, which means that the scale is homogeneous and the items in the test are internally consistent.

Scale	Mean	Standard deviation	No of items
Test of Mommers for tactile discrimination of size	12.15	6.89	30
$\alpha = .88$			

- The recognized items in all 3 tactile discrimination tests is shown in a comparative way in Table 4 .

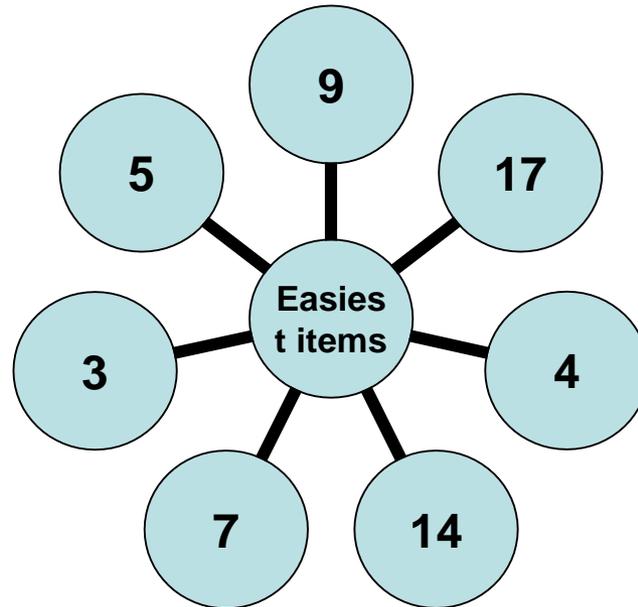
Table 4

Test of Mammars for roughness (short version of Mammars)		Test of Crowdel, Hammill, et al. for tactile discrimination of shapes		Test of Mammars for tactile discrimination of size	
Item	Mean	Item	Mean	Item	Mean
1	47	1	43	1	43
2	37	2	40	2	42
3	33	3	47	3	42
4	38	4	37	4	38
5	33	5	38	5	47
6	43	6	33	6	40
7	38	7	43	7	52
8	38	8	50	8	52
9	32	9	43	9	50
10	25	10	37	10	40
11	47	11	50	11	52
12	35	12	37	12	33
13	47	13	33	13	38
14	33	14	45	14	40
15	47	15	53	15	37
16	50	16	50	16	33
17	52	17	45	17	43
18	45	18	43	18	50
19	45	19	48	19	35
20	50	20	53	20	38
21	37	21	50	21	45
22	30	22	40	22	42
23	25	23	47	23	43
24	27	24	40	24	35
25	32	25	37	25	38
26	28			26	40
27	32			27	28
28	38			28	38
29	27			29	27
30	13			30	22
31	13				
32	28				
33	27				
34	27				

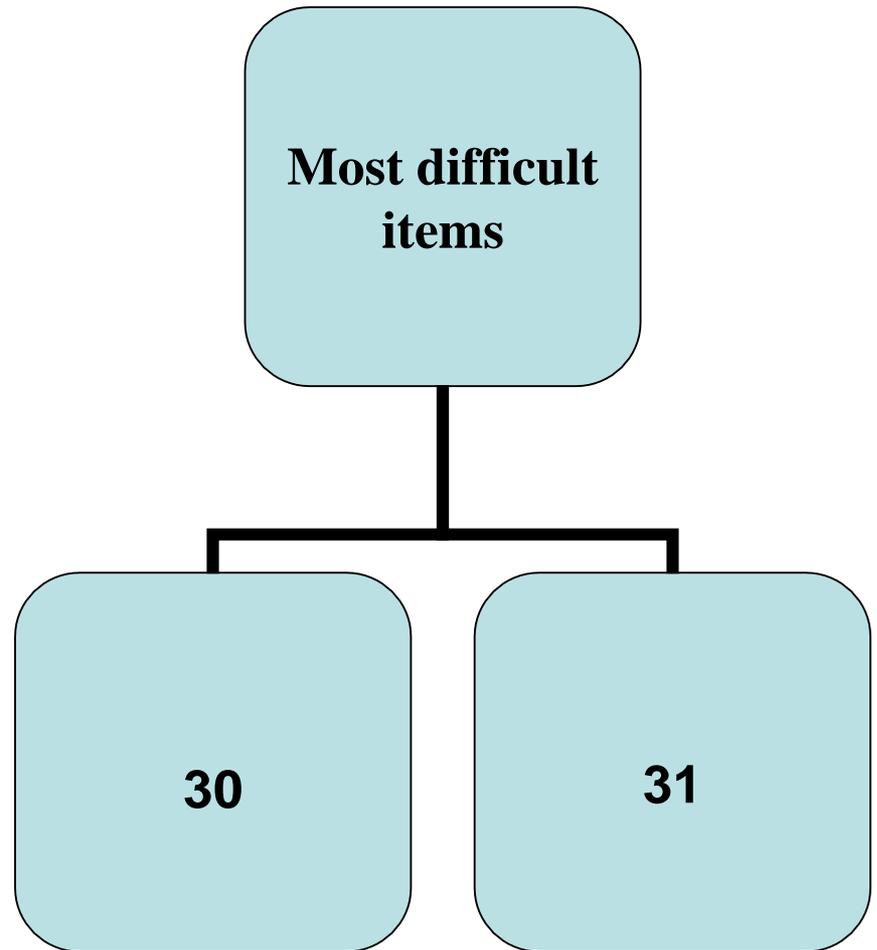
Test 1)

- In the roughness discrimination test of Nolan-Morris (short version of Mommers) **7 items** turned out to be the easiest ones. They were recognized by 52% of the pupils and up.
- Item No 4 was recognized by 65% of the pupils,
- Item No 14 was recognized by 63% of the pupils,
- Item No 7 was recognized by 55% of the pupils,
- Item No 3 was recognized by 53% of the pupils,
- Items No 5, 9 and 17 were recognized by 52% of the pupils.

In the roughness discrimination test of Nolan-Morris (short version of Mommers) **7 items** were the easiest ones.



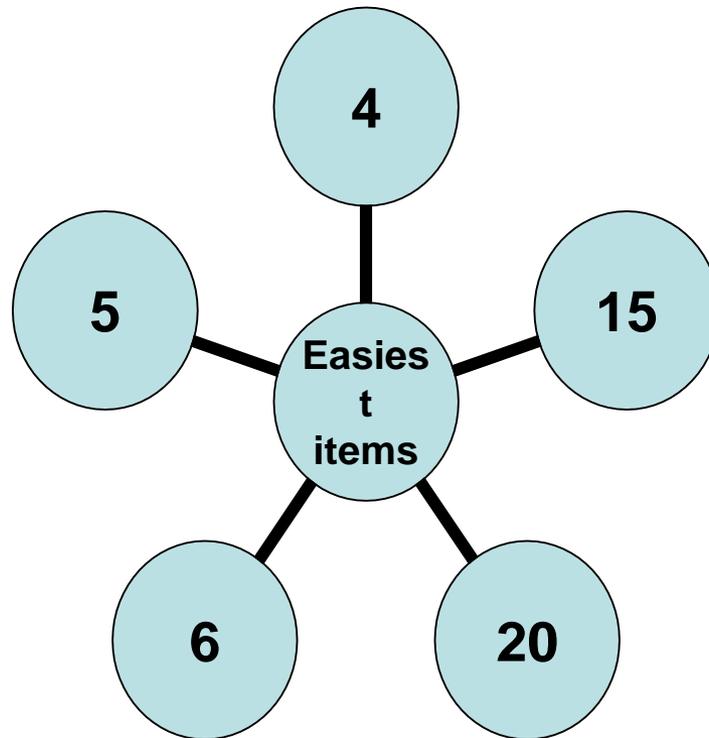
- The most difficult items were **two** and these were items No 30 and 31.
- They were recognized by only 13% of the participating students.



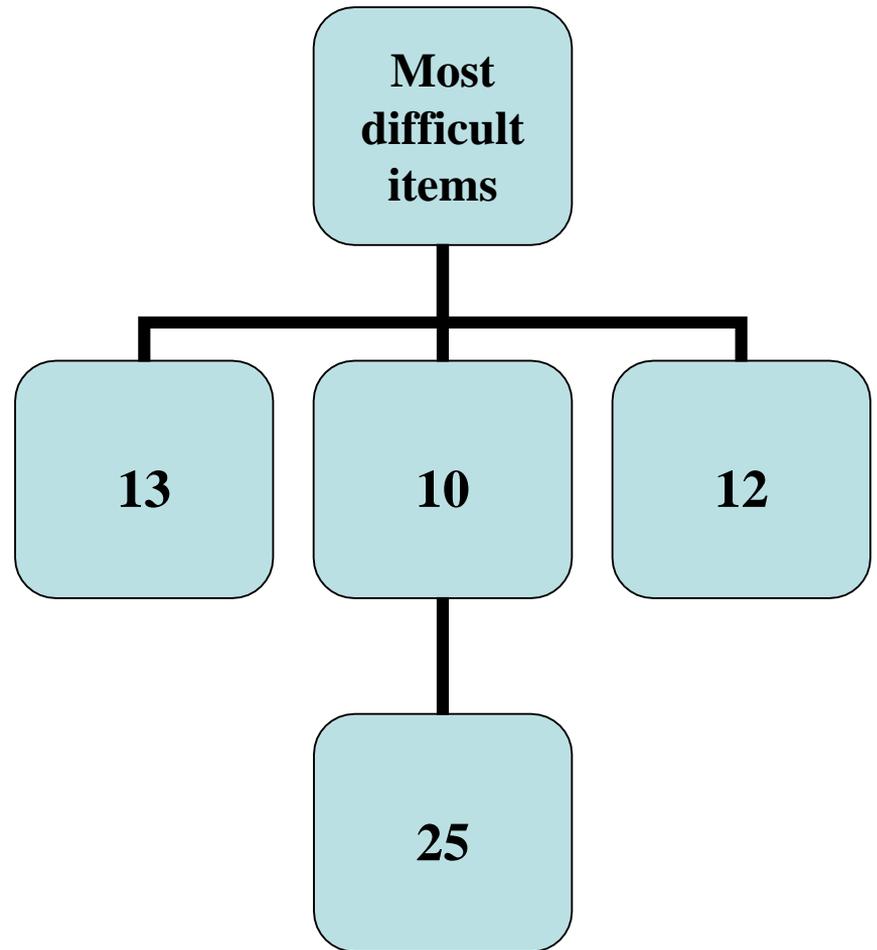
Test 2)

- In the Crandell, Hammill et al. test for tactile discrimination of shapes the easiest items were again **5** (recognized by 52% of the pupils and up). These were items No 5, 4, 15, 20 and 6.
- Items No 4 and 5 were recognized by 58% of the pupils,
- Item No 4 was recognized by 57% of the students,
- Item No 15 and 20 were recognized by 53% of the participating pupils,
- Item No 6 was recognized by 52% of the students.

In the Crandell & Hammill test for tactile discrimination of shapes the easiest items were again **5**



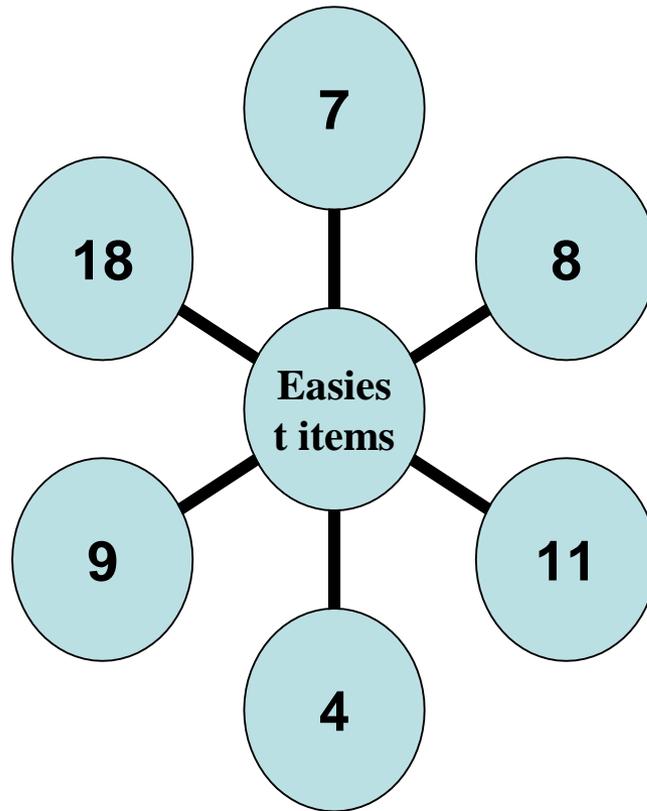
- The most difficult items were **four** – these were items No 13, 10, 12 and 25.
- Item No 13 was recognized by 33% of the pupils,
- Items No 10, 12 and 25 were recognized by 37% of the students.



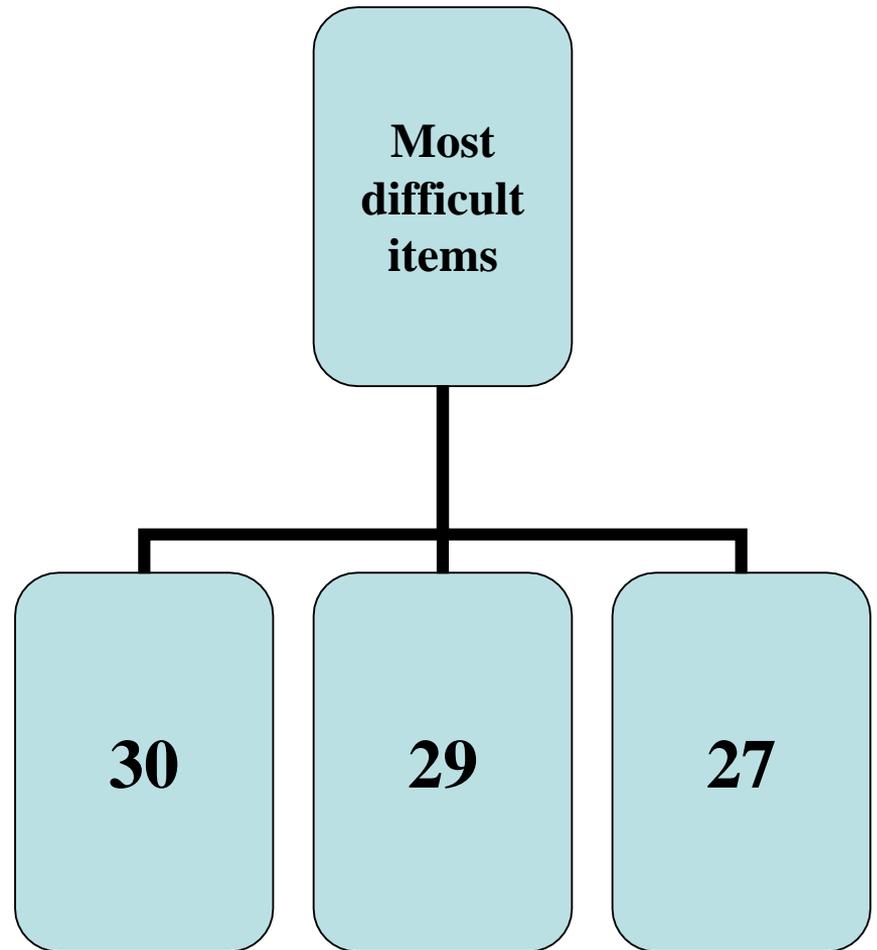
Test 3)

- In the test for tactile discrimination of size of Mommers **six** items were the easiest ones (recognized by 50% of the pupils and up) – items No 7, 8, 11, 4, 9 and 18.
- Items No 7, 8 and 11 were recognized by 52% of the pupils,
- Items No 4, 9 and 18 were recognized by 50% of the students.

In the test for tactile discrimination of size of Mommers **six** items were the easiest ones



- The most difficult items were **three** – items No 30, 29 and 27.
- Item No 30 was recognized by 22% of the pupils,
- Item No 29 was recognized by 27% of the pupils and
- Item No 27 was recognized by 28% of the participating students.



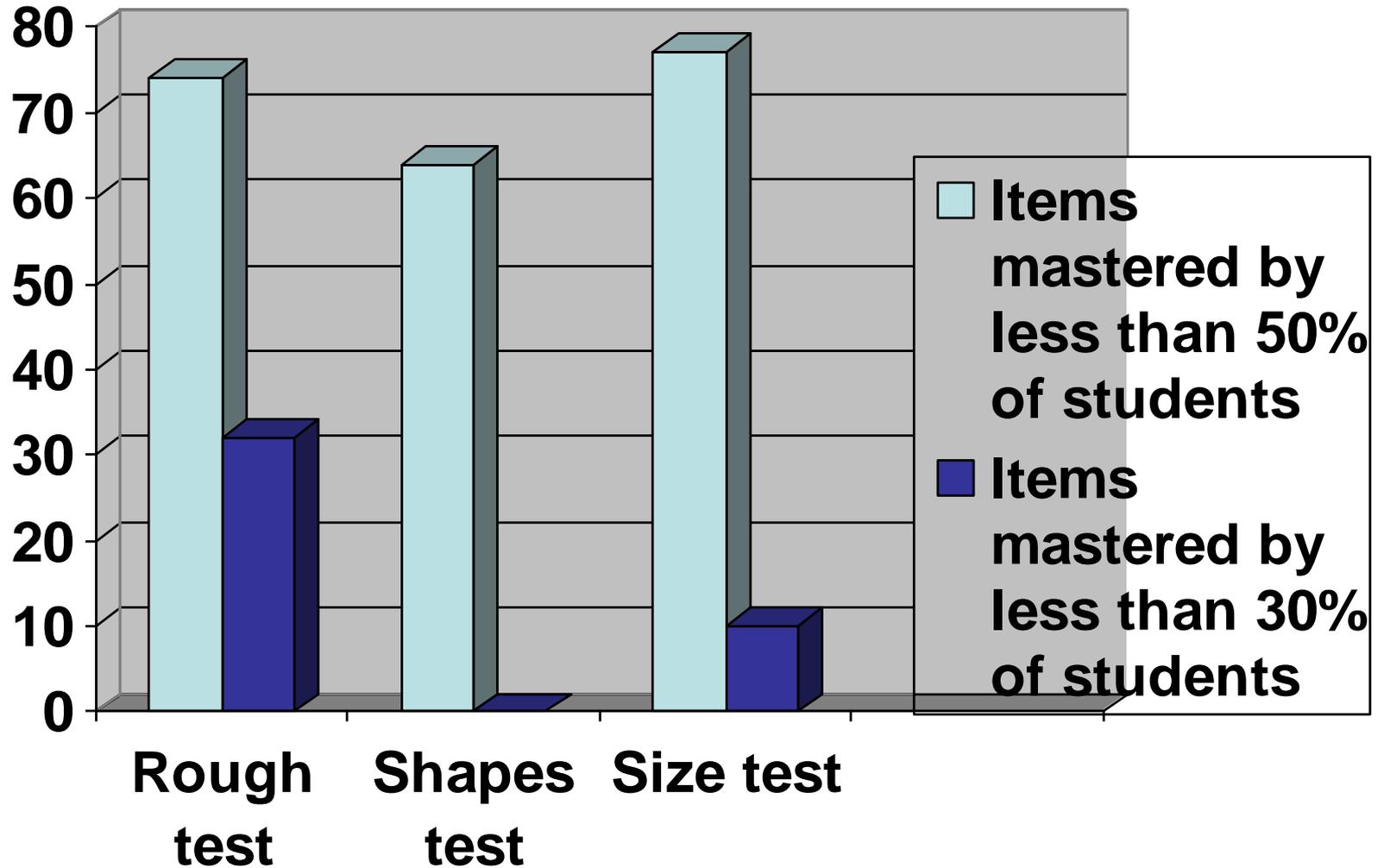
If we have to compare the difficulty of the three tests for the students, we can summarize that:

- In the roughness discrimination test of Nolan-Morris (short version of Mommers) **25** items in total were mastered by less than half of the participating students (50%) – this makes 73.5% of the items.
- In addition, **11** items were mastered by less than 30% of the students – this makes 32.4% of the items in the test.

- In the second test – the Crandell, Hammill et al. test for tactile discrimination of shapes, **16** items in total were mastered by less than half of the participating students (50%) – this makes 64% of the items in the test .
- **None** of the items were mastered by less than 30% of the pupils.

- In the test for tactile discrimination of size of Mommers, **23** items were mastered by less than half of the participating students (50%) – this makes 76.6% of the items in total.
- **3** items were mastered by less than 30% of the pupils or this is 10% of the items in the test.

Figure 1



Conclusions:

- The main conclusion that can be made is that the level of performance of the majority of the blind students admitted into special schools for visually impaired in Bulgaria (above 50%) with all items in the 3 tests for tactile discrimination **was low**. Most of the blind students did not have good or developed tactile discrimination skills.

- As a consequence, we can expect a serious gap in the future education of these students, which would require structured instructions in order to acquire such tactile skills as soon as possible. These skills are highly important for learning Braille and for using and reading the variety of relief materials and tactile maps that are used during the school education in the different school subjects.

- As a result from this research few structured classes for development of tactile skills (both for tactile discrimination with elements also of tactile recognition) were designed. Three classes were included in the special program for useful skills (Daily living skills) for the blind pupils of preschool and primary school age.

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Thank you for your attention!

