

Assessment and classification of visual functioning of children with brain damage according to ICF-CY

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ICD and ICF

ICD, International Classification of Diseases registration of diseases: visual acuity, visual field

ICD, ICF 2001 and ICF-CY 2007

ICD, International Classification of Diseases registration of diseases: visual acuity, visual field

ICF-CY, International Classification of Functioning,Disability and Health, Children and Youth Version (2007)- assessment of visual functioning

all functions that can be assessed, holistic approach

ICF-CY 2007

International Classification of Functioning, Disability and Health

> Children & Youth Version

Management of low vision in children

Report of a WHO Consultation Bangkok, 23-24 July 1992



Hosted by the International Council for Education of the Visually Handicapped





9 activites/domains

World Health Organization

4 activites/domains

International Classification of Functioning, Disabilities and Health, Child and Youth Version

Distr.: Limited Original: English

WHO/PBL/93.27 Distr.: Limited Original: English

Main functional areas:

- Communication & interaction
- Orientation & moving
- Activities of daily living
- Sustained, demanding visual tasks, reading

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Strategies:

- like a normally sighted
- typical to impaired but useful vision
- typical to blind children

Management of low vision in children

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Visual Functioning

1. OCULAR MOTOR FUNCTIONS and REFRACTION

2. QUALITY OF VISUAL INFORMATION CLINICAL TESTS

A. Information from the ophthalmologist, optometrist, neurologist

B. Observation and measurements in EI, at KG and school C. General and visual ergonomics

3. ASSESSMENT OF VISUAL PROCESSING at different levels of processing

4. PARTICIPATION & ENVIRONMENT



Visual Functioning HOLISTIC APPROACH

Children 8 Youth Version

(A) Blockd Health



2. QUALITY OF VISUAL INFORMATION CLINICAL TESTS

A. Information from the ophthalmologist, optometrist, neurologist

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3. ASSESSMENT OF VISUAL PROCESSING at different levels of processing

4. PARTICIPATION & ENVIRONMENT

V1-V2, Ventral and dorsal stream Mirror neuron system



Ocular Motor Functions & Refraction

- Fixation, Saccades, Accommodation, Following
- Strabismus, Nystagmus, Head and Body Control
 - Refractive Errors
 - Corrective Spectacles, Frames, Devises



Text on clear film

VA reported to be 0.63; at school 0.02 with 50% spacing



Assessment of Visual Functioning

1. OCULAR MOTOR FUNCTIONS and REFRACTION

2. QUALITY OF VISUAL INFORMATION CLINICAL TESTS

A. Information from the ophthalmologist, optometrist, neurologist

B. Observation and measurements in EI, at KG and school C. General and visual ergonomics

3. ASSESSMENT OF VISUAL PROCESSING

Clinical examination

gives the foundation for the assessment of visual functioning



Fixation to penlight, to picture, following, saccades, accommodation, convergence, visual communication, refraction, spectacles Photo: Miguel G. Alvares, MD Brazil





Detection grating acuity



Hiding Heidi test

Clinical examination

gives the foundation for the assessment of visual functioning



orthoptists, therapists, nurses, optometrists, technicians, parents, rehab team OBSERVATIONS require time!

Photo: Miguel G. Alvares, MD Brazil

Eye-hand coordination



Clinical examinations

- **Oculomotor functions** \bullet
- Grating acuity lacksquare
- Recognition acuity ullet
- Contrast sensitivity igodol
- Visual field \bullet
- Visual adaptation, filters igodol
- Motion perception ullet

Tests should be repeated in day care and at school.























Visual Sensory Functions

Visual acuity, near (single, line, crowded), distance, Grating acuity Contrast sensitivity, optotype and grating tests
Colour vision, Visual adaptation to changes in luminance level, filter lenses
Figure in motion, Biological motion, Perception of motion at high speeds
Visual field, size and scotomas, Goldmann, flicker, automatic, campimeter

Several tests – several VA values WHO 2003: distance and near VA

 Distance
 - single 3m/1.9M
 1.0, 3/3

 - line 3m/4M
 0.63, 3/5

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at 40cm

0.40, Near 40cm – single symbols 3/7.5 $1\mathbf{M}$ 0.25, 3/12 **1.6**M - screening test – 50% spacing 0.20, 3/15 2.0Mle SYMBOLS -25% spacing 2.5M 0.16, 3/16 00000 DΟ ΟÔ

Single optotypes sometimes the only VA test possible



answering with head turn, looking at the choice VA values with single optotypes can be 10x line acuity value

Oculomotor problems tactile keycard, looking can be kept on the test



Cover above and below the line to be read.

LEA Grating Acuity Test Discrimination acuity test



LEA Rectangles & Mailbox



Stereovision, figure-ground, short-term visual memory

Ventral Stream Inferotemporal Networks

Details in pictures, Noticing errors and missing details Perception of textures and surface qualities **Recognition of familiar and unfamiliar faces** Facial expressions, Body language Landmarks, Concrete objects, Pictures of concrete objects Abstract pictures of objects of different categories Abstract forms (letters, numbers) **Reading** words and lines of texts, Optimal reading strategy Comparison with pictures in memory, 'Reading' series of pictures Visual problems in copying pictures from blackboard and/or at near Crowding effect, Scanning lines of text 24(64)

Cognitive vision test

- Hiding Heidi for communication
- LEA-Mailbox
- LEA-Rectangles
- Face pictures
- Heidi Expressions
- LEA Puzzle
- Crowding effekt
- Reading tests
- OBSERVATIONS
- Neuropsychological consultation















Copying basic forms



Task: to copy three parallell lines, cross, angle and rectangle with circle and square at corners. The tester draws the test figures while the student is watching. Student A has left sided hemiplegia and –anopia and visual acuity 0.12 (10/80); student B has normal clinical findings in vision tests and diplegic condition (legs).

Matching pictures of faces normal

prosopagnosi, recognition of faces had not developed

Febr. 2000; 3years 5 months



Nov.2001, 5 years 2 months



In communication situations she did not perceive movements of lipps or facial expressions, listened carefully. She is therefore experienced "autistic".

Dorsal Stream/ Parietal Networks

Awareness of surrounding space, directions and distances in space Body awareness Perception of near and far space Orientation in space, map based, Memorising routes Motion perception, Depth perception, Simultaneous perception Eye-hand coordination, Grasping and throwing objects Drawing, free hand, visual imagination Copying from near/ from blackboard, motor planning and execution Mathematics, Visual attention 12 (76)

Profile of visual functioning

For the IEP/ILP, the learning strategies that probably will be used

N= normal (1), I= impaired but useful (2), P=profound VI or blindness (3)

	Ν	Ι	P
DORSAL STREAM			
A2 Perception of near and far space			
B1 Observation of surrounding			
C3 Orientation in space, map based			
D2 Route based orientation			
E1 Simultaneous perception			
F1 Eye-hand coordination			
G1 LEA-Rectangles			
H1 LEA-Mailbox			
Il LEA-Puzzle			
J1 Grasping and throwing objects			
K2 Drawing, free hand			
L2 Copying from blackboard			

OCU	ILAR MOTOR		N.1	1,2	P,3	
A1	Fixation		1			
B2	Saccades		22			
C2	Scanning					
D2	S+S in reading	1.1				- 31
E3	Accommodation					
F	Following					
G	Strabismus		1			
н	Nystagmus	1.1	- 32			
1	Head control					
J	Body control			· · · ·		
K						
L		_				
M	Refraction		1			
N	Spectacles, add	1.2	100			1
0	Devices					
P						
Q						
2	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
SEN	SORY FUNCTIONS					
A	VA near, line					
8	VA dist, line					
C	VA crowd					
D	Single only	4			\square	
E	Grating A, discrimin.					
F	Grating A, detect.	4				
G	CS, optotypes	1				
н	CS, grating					
1	Colour vision		1			
J	Vad	5				
K	Filters	5				
L	Figure in motion		1			
M	Biological motion	1.1	1			
N	High speed motion					
0	Very low speed	5				
P	Visual field, size		1			
Q	VF. central	1.1		2 2		
R	Vernier acuity	5				
S						
						_
EAR	LY PROCESSING	12 8		1		
A	Length, eye-hand		1			
В	Length visually	12.5	1			
C	Direction eye-hand		1			
D	Direction visually	1		1		
E	Figure - ground					
F	Object - background		1			
G	Stereovision					
н	Matching colours		1			
1	Short time memory		1			
			- 1			
INF.	TEMP NETWORKS					
A	Details in pictures	1.5	1			
B	Noticing errors		-			
C	Missing details	5				
D	Textures surfaces	5				
F	Face recognition	5	1			
-	Facial and a state		-			

INF	F.TEMP NETWORKS	1.1	N,1	1,2	P,3	
G	Body language		1			
Н	Landmarks		1			
1	Concrete objects		1			
J	Pictures, conc.obj		1		1.1	
ĸ	Abstact pictures					
L	Characters		1			
M	Numbers		1	1		
N	Reading words		1			
0	Optimal read strategy	_		1		
P	Comparing pictures					
Q	Copying pict blackbo					
R	Copving pict desk		1			
S	Crowding effect	_				
T	Scanning text					
ù	Visual imagination	_		_	-	
-	rioddi firioginadan			-		
PAR	IETAL NETWORKS					
A	Spatial awareness	1	1	1	1	_
B	Directions in snace		1	-	-	
c	Distances in space		1			
D	Body awareness		1	-	-	_
F	Near space		-	-		_
F	Farshace		-	-		_
0	Orientation man h			-	-	
u	Memorising routes		-	-	-	-
1	Motion norcent			-	-	
	Dooth percept.	0	-	-		_
J	Cepth perception	5		-		
K	Simultaneous	5		-		_
	Eye-hand coordinat.		1	-		
M	Goal directed reach.		1	-		
N	Goal dir. grasping	-	1	-		
0	Drawing free hand	5		_		
P	Copying as motor		1			
Q	Math tasks	5	_			
CON	MON PROBLEMS	10	1	-	25 15	
A	Sensory integration		1	1		
В	Visual overload		1			
С	Auditory overload		1			
D	Sped. memory prob		1			
E	Hearing		1			
F	Mobility					
G	Hand functions		1	1		
н	Executive functions	5				
1	Visual ergonomics					
J	Devices in classroom					
K	Devices at home					
1	Vision in particinat	5		-	1	
M	Attitudes of other	5	-	-	-	_
N	Paddocs of other	5		-	-	_
0				-		
0			-	-		
SUP	MADY					
301	Communication	10 11		-	1	
_	Maurication	-	-	-		
	Moving				_	_
	A stilling of daily tife					
	Activities of daily life	_	_	-	-	

OCL	JLAR MOTOR		N.1	1,2	P,3	IN	F.TEMP NETWORKS	1.1	N,1 1,2	P.3
A1	Fixation		1			G	Body language		1	
82	Saccades	1.1	- 24	8		H	Landmarks		1	
C2	Scanning					T	Concrete objects		1	
D2	S+S in reading	1.1		1		J	Pictures, conc.obi		1	12 12 1
E3	Accommodation					K	Abstact pictures	_		
F	Following	1.1		1000		L	Characters		1	
G	Strabismus		1	_		M	Numbers		1	
H	Nystagmus		- 1	1000		N	Reading words		1	
1	Head control			_		0	Optimal read strategy			
1	Body control					P	Comparing pictures			
K				-		0	Conving pict blackbo		-	
1			_			R	Copying pict desk		1	
M	Refraction		1	-		S	Crowding effect			
N	Spectacles add		-	1000		T	Scanning text		-	
0	Devices			-	- C	U.	Visual imagination			
P	Devices			-			visual imagination	-		
0		-		-		DAR	IETAL NETWORKS	_		· · · · · · · · · · · · · · · · · · ·
×		1 1		-		A	Soatial awarenese	1 1	1	
SEN	SORY FUNCTIONS		_			0	Directions in space		1	
A	VA poor line		_	1000	- I- I	C	Dietances in space		-	
-	VAriear, inte			1000		0	Distances in space		-	
B	VA dist, line			-	<u></u>	0	Body awareness	-	1	
0	Ciesto colu		_	-	_	6	Ivear space	-	-	
0	Single only	-4	_	-		F	Par space	_	1	
E	Grating A, discrimin.			1		G	Orientation map b.	-	1	
F	Grating A, detect.	4		-		H	Memonsing routes	-	1	
G	CS, optotypes		_				Motion percept.	5	_	
н	CS, grating				L	J	Depth perception	5		
1	Colour vision	-	1	-		K	Simultaneous	5		
J	Vad	5		-		L	Eye-hand coordinat.	_	1	
K	Filters	5				M	Goal directed reach.		1	
L	Figure in motion		1	-		N	Goal dir. grasping	-	1	
M	Biological motion		1	_		0	Drawing free hand	5		
N	High speed motion					P	Copying as motor		1	
0	Very low speed	5		-		Q	Math tasks	5	_	
P	Visual field, size		1	_			I			
Q	VF, central	-		3 5		CON	MMON PROBLEMS	- 1 - C	- A -	S. 19 1
R	Vernier acuity	- 5		_		A	Sensory integration	_	1	
S						B	Visual overload		1	
						C	Auditory overload		1	
EAR	LY PROCESSING	-		1		D	Sped. memory prob		1	
A	Length, eye-hand		1			E	Hearing		1	
В	Length visually	2.5	1			F	Mobility	_		
C	Direction eye-hand		1			G	Hand functions		1	
D	Direction visually			12		н	Executive functions	5		
E	Figure - ground					1	Visual ergonomics			
F	Object - background		1			J	Devices in classroom			
G	Stereovision					K	Devices at home			
н	Matching colours		1			L	Vision in participat	5		
1	Short time memory		1			M	Attitudes of other	5		
						N				
INF.	TEMP NETWORKS					0				
A	Details in pictures	10.00	1			P				
В	Noticing errors					SUN	MARY		na nafr	
C	Missing details	5					Communication			
D	Textures, surfaces	5					Moving			
E	Face recognition		1				Activities of daily life			
F	Facial expressions		1				Sustained tasks			

V1-V2, Ventral and dorsal stream Mirror neuron system



OCL	JLAR MOTOR		N,1	1,2	P,3		IN
A	Fixation						A
в	Saccades						В
С	Scanning						C
D	S+S in reading						D
E	Accommodation						E
F	Following						F
G	Strabismus						G
н	Nystagmus						H
1	Head control						I F
J	Body control						J
к							ĸ
L		+ +					Ē
M	Refraction	+					M
N	Spectacles add	+ +		-			N
0	Devices	+ +					6
P	Derives	++	-	-			Ē
0		+ +		-		-	6
w.	-	+ +		-			
SEN	ISORY FUNCTIONS				-		s
4	VA near	1				_	Ť
R	VA distance	+ +		-			l li
c	VA crowded	+ +	-	-			P
Ď.	Single only possible	+ +	-				
E	Grating A discriminat	+ +	_	-			
E	Grating A, detection	+	_	-			$ \vdash$
C	CS optotypes	+ +	_	-			
u 0	CS, optotypes	+ +	-	-		-	
<u> </u>	Colour vision	+ +		-			+
-	Visual adaptation	+		-			
J	Visual adaptation	+	-	-		-	
<u>n</u>	Filters	+ +	_	-			
	Figure in motion	-		-	-	-	P/
M	Biological motion	+ +	_	-			A
N	High speed motion	+-+	_			-	B
0	Very low speed	+	_				C
P	Visual field, size	+ +	_	_		-	
Q	VF, central	+ +		_			트
R	Vernier acuity	+					F
S		-	_				G
							н
EAF	RLY PROCESSING						_ L
A	Length, eye-hand						J
В	Length visually						K
С	Direction eye-hand						
D	Direction visually						M
E	Figure - ground						N
F	Object - background						0
G	Stereovision						P
н	Matching colours						Q
1	Short time memory						

NF.T	EMP NETWORKS		N,1	1,2	P,3		
	Details in pictures						
	Noticing errors						
	Missing details						
)	Textures, surfaces						
	Face recognition						
1	Facial expressions						
;	Body language						
1	Landmarks						
	Concrete objects						
	Pictures, concr. objects						
3	Abstact pictures						
	Characters						
1	Numbers						
	Reading words						
)	Optimal read. strategy						
	Cartoons						
2	Copying pict.blackboard						
	Copying pict. on desk						
	Crowding effect						
	Scanning pages						
1	Sequenc.non-sense w					_	
						_	
						_	
ARI	ETAL NETWORKS						
	Spatial awareness						
	Directions in space						
	Distances in space	1					
6	Body awareness						
	Awareness near space						
2	Awareness of far space						
;	Orientation map based						
1	Memorising routes						
	Motion perc./moving						
	Depth perception						
-	Simultaneous percept.						
	Eye-hand coordination						
1	Goal directed reaching						
1	Goal directed grasping						
)	Drawing free hand						
	Copying as motor						
2	Math tasks						

Four-leafed clover of Visual Functioning





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