

Problems of Visual Perception in Premature Children. Presentation of a Screening Program

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Due to medical advantages a growing amount of extremely premature children survive. Some of these children are born with severe brain damage which leads to serious disabilities. Others seem to develop in a satisfactory manner their first years, but problems assumingly related to visual perception slowly occur at 3-4 years of age.

Parents report that the child stumbles, bumps into obstacles, avoids activities like puzzling and drawing. Some are described as clumsy and strives with activities like dressing, participate in playing and find their way about. Some children don't recognize familiar persons just by looking at them and some are unable make sense of pictures or photos.

Amongst these children there is an overrepresentation of strabismus, loss of lower vision field and problems with eye motility. The ophthalmologist will often find that the visual acuity is normal, and there are not abnormalities or conditions in the eyes that can explain the poor visual function. However, results from MRI or ultrasound often show changes of the white matter in the ventricles of the brain compatible with Periventricular Leucomalasia (PVL). Damages of this kind often occur in premature children due to lack of blood and oxygen to the brain. The periventricular areas of the brain help carry visual information from the eyes to the special visual areas of the brain. These children are not categorized to have a brain damage, although they obviously have a dysfunction in the brain which leads to difficulties in interpreting and processing visual information. Cerebral visual Impairment (CVI) is an "umbrella diagnosis" which also includes PVL.

Rikshospitalets barnenevrologiske seksjon, specialist neurological centre for children in Oslo, Norway, initiated a follow-up program for premature children (n= 30). They were all born in 2000, from a specific district in Norway with birth weight ≤ 1000 grams. It is a longitudinal program, and the children will regularly be examined by neuropaediatrist, neonatologist, neurophysiologist, physiotherapist from age one to eleven years.

Huseby Recourse Centre assists with the visual screening when the children are accessed at the age of five. They are seen by the multidisciplinary team which includes ophthalmologist, optometrist, and a special teacher. All with high competence and experience within the field of visual impairment in children.

Each professional has worked out a screening check-list. Additionally we use some set questions when interviewing the parents. In this way we collect valuable information concerning the children's behaviour in relation to their vision. We especially focus on their strategies in avoiding difficult situations and how they compensate for their visual impairment in daily life.

The ophthalmologist and optometrist will check the child's visual field, contrast sensitivity, light sensitivity, colour vision, strabismus, binocular vision, visual function in dark and eye motility.

The neuropsychologist uses parts of standardised tests that can reveal problems in processing and remember visual information, simultaneous processing and visuospatial difficulties. (NEPSY, VGA (visual gestalt ability), VMI (Developmental Test of Visual Motor Integration) MFVT – Motor-Free-Visual-Perception Test).

The special teacher focuses on problems in orientation, recognition and interpretation of visual information, crowding and shape/background difficulties.

Through our assessment we try to pinpoint each child's specific difficulties. With this knowledge it is possible to give more accurate and suitable information and counselling to the parents and teachers before the child attends school.

In the following I will present some main areas of visual difficulties we expect to find in these children. The emphasis in this lecture will be on the screening procedures undertaken by the special teacher.

The checklist used by the special teacher.

N = normal, U = uncertain, A = abnormal

Function area		N	U	A	Comments
Crowding	Point out ▲●■ in a row ≠ spacing and sizes				
	Point out different letters in a row				
Shape/background + Distinguish details from the whole- and opposite	pictures with overlapping figures pencil drawings complex pictures with many details				
Recognition	Faces (photo) LH expressions				
	Photography (of familiar objects)				
	Drawings				
	Pictogram (icon)				
Visuo-spatial conditions	LH letter-box				
	LH Puzzle				
	fit-in puzzles of various complexity				
	Copy ▲●■ □ // X Z				
-and orientation	Copy "body-positions"				

Crowding

If the child has crowding problems, it will not distinguish or be able to see letters or forms that are placed right next to each other. If one suspects crowding: try to find out what spacing the child needs to distinguish each form/letter. If the child uses strategies to eliminate the problem, like tracing with the finger or lower the head towards the book, there is reason to suspect crowding problems. The ophthalmologist can reveal crowding when checking the child's visual acuity using both single and line tests (LH symbols).

Parents questions:

Does the child tend to prefer magnification or keep short distance to what it is looking at? Does the child often use finger-tracing?

Shape/background discrimination

Problems with shape/background discrimination should be suspected if the child has difficulties in finding its toys, are unable to detect small objects on a mixed-up background or separate and see one figure from the rest in a picture.

In the screening we use pictures of different complexity, both very mixed-up with lot of details and overlapping objects. If this is too difficult one can try to hide a favourite toy or a piece of chocolate among other things in a box, and ask the child to find it up.

Parent question:

Will your child show signs of insecurity or try to avoid situations when many people are present?

Will your child find its favourite toy when it lies amongst other objects?

Is the child able to see/point at small details in a complex picture?

Recognition of faces

Many of the children are verbally clever, and as to recognition they will often ask people who they are, or in one way or another make them say something. Their auditory skills are usually superb and they may easily recognize persons through the sound they make when they walk or move about.

The material used is pair of photos of different faces. If the hair is hidden it is more difficult to distinguish between them. Play Lotto – see if the child can match the two photos that are just the same.

Try to make the child copy your facial expressions. The LH expression cards are useful, to see if the child by looking at photos of faces can tell in what mood he thinks a person is.

Parent questions:

Does the child recognize you or other people he knows only by looking?

Does the child recognize familiar people in a photo?

Does your child use auditive and tactile information more than its peers?

Recognition of form, pictures and symbols

For some children who are reckoned to have a normal vision, it is important to check their basal preception of form. Photo, drawings and Pictograms are all representations of the “real world” - the concrete thing itself. It should be taken into account that to see and interpret icons and symbols like Pictograms and letters also challenges the child’s cognitive capacity.

Parent questions:

Does your child enjoy picture books and photos?

Does your child watch TV even if the sound is turned off?

Is the child more than other children preoccupied with colours and/or uses naming of colours as an important quality?

Visuo spatial conditions and orientation

Find out if the child is able to copy your different body positions. This will tell you something about the child's capability to see the position and orientate on his/her own body. If this is difficult, try to only give verbal instructions.

How does the child cope with puzzles of different level of complexity? Does the child have a range of strategies or is it more likely to try and fail?

Does the child strive in turning the piece of puzzle into the right hole. Is he showing a high degree of distress dealing with these tasks?

Parent Question:

Does your child like to draw, to puzzle or to play with blocks?

Does the child know the way to its nearest friend?

Does the child ask to go out to play on his own?

Can you ask him to fetch something in another room?

Does the child prefer to play with its friends at home?

Is he able to dress himself?

In addition we observe the child's

- Endurance and ability to concentration.
- Appropriate activities of the eyes
- Eye-hand coordination
 - To draw or copy forms is often very difficult for these children. If this is a result of not seeing the forms and figures, if the processing from eye to hand is disturbed, or if there is a real deficiency in the hand due to for instance CP, must be assessed further.
- Simultaneous processing
 - To deal with information of more than one senses at the same time, like vision and sound, one may observe that the child favors sound. Subsequently there is a reason to suspect difficulties in processing visual information.
- If the child seems to be more tactile than normal
 - exemplified by the child's preferences to touch instead of using its vision, can reveal problems in understanding information given through the visual system.

How to can we help these children to find good strategies and compensatory techniques when going to school:

Some of the children may have many different difficulties; others may just have problems with orientation or to recognize faces. The parents often need a lot of information to understand the complexities of the different problems and are very eager to get ideas and advice in what to do to help the child. In the following I will give some suggestions of how to organize and behave to reduce the difficulties for the child.

Crowding and perception of shape/background:

- Use good spacing and magnify the size of print.
- Crisp and clean pictures and background. Good contrasts
- Use a ruler (or finger-tracing) to help follow the line
- Verbal support
- Audio books as support to text
- With crowding, a computer can be of great help

Recognition of faces

A child, who has never been able to recognize faces by use of vision, will not know what it means to do so. They will also have difficulties to see and understand facial expressions. In addition to recognize people by listening to voices, we have experienced that most of the children are greatly helped to use their well functioning colour vision.

- Present yourself and the peers with name, say “hello”.
- Help them to recognition through focus on colours and sound/voices.
- The teacher might use bright coloured cloths.
- Emphasize emotional expression through your voice
- avoid new seating in the classroom

Recognition of form

Fore some will difficulties in this area have the consequence that they will poor readers or not learn to read at all.

- Use computer with sound-support
- Teach the child touch
- Some should learn Braille
- Use audio books

Visuo-spatial conditions and problems in orientation

- Computer as a help to write
- Consider to teach the child mobility

For these children it is always good help if there is a structure of the activities through the day and different materials and furniture are kept in fixed places . Some children are easily disturbed by noise. Try to keep the classroom calm.

The child itself has often found functional strategies to diminish his difficulties. Help the child to widen and develop them. To give the teacher and the child's peers information, is always a help.

Literature

Borch TG 2002. *Å kunne se – men ikke gjenkjenne.*

University of Oslo. Institute for special education. Post-graduate Thesis.

Dutton G et al 2000. Cortical Visual Dysfunction in children: a clinical study.

Eye, No 10, 302 -309

Ek U 2000. Children with Visual Disorders- Cognitive development, developmental Disorders and consequences for Treatment and Counselling.

Stockholm University: Thesis. Department of Psychology.

Hyvärinen, L 1995.1996. *Vision Testing manual.*

Villa Park: Precision Vision

Jacobsen L et al 1996. Visual Impairment in Preterm Children with Periventricular Leucomalacia – Visual, Cognitive and Neuropaediatric Characteristics related to Cerebral Imaging.

Developmental Medicine and Child neurology No 38, 724-735

Jacobsen et al 2001. The Relationship between Periventricular Brain Injury and Deficits in Visual Processing Among Extremely-Low-Birth weight ($\leq 1000g$) Children.

Journal of Paediatric Psychology Vol. 26, No 8, 503-512

Rekkedal MB 2000. PVL-barna. Ny kunnskap gir nye muligheter.

Oslo: *Spesialpedagogikk No 7, 3-6.*