ASSESSMENT SCHEME OF FUNCTIONAL VISION FOR CHILDREN WITH MDVI

Name of child		PHOTO	
Data of the child			
Diagnosis of oph-thalmologist		R (OD)	
		L (OS)	
Parents			
Network			
Name of the school Address			

MEDICATION, VISUAL COMPETENCIES AND CONDITIONS OF THE CHILD

ITEMS OF VISUAL ASSESSMENT		Remarks and refer-ences
1. Visual attention and awareness		
2. Reflexes		
3. Fixation /Eye contact		
4. Nystagmus		
5. Opto-kinetic Nystag-mus		
6. Following movements (Tracking)		
7. Form perception		
8. Visual acuity		
9. Contrast sensitivity		
10. Strabismus		
11. Accommodation		

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12. Convergence-Divergence		
13. Motion perception		
14. Recognition of faces		
15. Colour vision		
16. Visual directed movement		
17. Visual field		

FUNCTIONAL IMPLICATIONS	
18. Need of magnification	
19. Need of contrast and light	

PEDAGOGICAL CONSEQUENCES		
	AIMS	
20. Communication	a) Environmental changes Materials	b) Attitudes-actions
21. Orientation and Mobility	a) Environmental changes Materials	b) Attitudes-actions
22. Activities of daily living	a) Environmental changes Materials	b) Attitudes-actions
23. Sustained near vision tasks	a) Environmental changes Materials	b) Attitudes-actions

Responsible for report		Date of report	

Further explications to this document may be found on: http://www.lowvision.lu when using the login form or by contacting one of the following persons: a.henriksen@t-online.de; frank.groben@idv.etat.lu; Tove.arntzen.andrew@statped.no

Education and Culture
Socrates

FOREWORD

Assessment of Low Vision in children with multiple disabilities has received increased attention over the last years. The results are a steady development of formal and informal testing methods to evaluate the visual functioning of this group of children. Still for many children with multiple disabilities clinical testing is not very successful. Some of these children have difficulties in communicating, some are frightened in an unknown environment and some are not able to cooperate for various other reasons. A functional vision assessment that takes place in the well-known environment of a child, like kindergarten, school or at home, so that the child feels save and sheltered, gives the opportunity to get information about visual functions of the child as well as the functional vision.

According to Colenbrander (2002) the term “visual functions” (such as visual acuity or visual field) refers to the functioning of each eye, whereas the term “functional vision” refers to the functioning of the individual. “Functional vision describes how the person functions and involves measures of a person’s visual skills and abilities as applied to the performance of usual tasks of daily life… It is measured binocularly to replicate the individual’s visual performance in the real world, and examines suprathreshold (i.e. above threshold) performance so that a persons comfort level for an activity is identified. An evaluation of functional vision involves categories that are less precise than measures of visual functions, and often is affected by multiple variables at one time” (Hall Lueck 2004).

A good functional vision assessment for children with Low Vision and multiple disabilities should always start with a basic eye examination by an ophthalmologist to make sure that refractive errors (myopia or hyperopia) are corrected through conventional optical devices. It is particularly necessary for this group of children to get good eyeglasses from an optician to make the best use of their vision.

The clinical eye examination by an ophthalmologist is also necessary in order to know as much as possible about the cause of the visual impairment. Simply knowing the cause of a person's visual impairment helps to identify which of his or her visual functions will probably be affected. Of course it is not sufficient to predict an individual's visual functioning, just by knowing the cause of the impairment.

The medical eye examination should be followed by a pedagogical functional vision assessment done by a special educator for visually impaired people. It is the aim of the functional vision assessment to get more information about the way children use their vision. This means to describe children’s visual skills in everyday tasks, but also to design appropriate educational interventions and to select suitable materials. It includes tests that are used in clinical settings as well as observations of parents, classroom-teachers and special teachers in typical surroundings.

All the information that has been collected during the assessment should be summarized in a report that is written in an understandable language, so that parents, therapists, teachers and caregivers know how to design appropriate educational measures and to enhance the child´ s development in as many areas as possible.

Functional Vision is not a set of skills which operate in isolation. It is closely related to other sensory, motor and cognitive systems. It is the aim of the functional vision assessment to create visually interesting situations and environments for every child in everyday situations and encourage children to use their vision in as many areas as possible. For that it is necessary to meet the child on its individual cognitive level; find out what the child can do and link it together with pleasant and meaningful activities in a joyful way. It is the main aim to give the child a possibility to be active in his/her own surrounding and become the “driver” - not just the “passenger” in his/her own life.

When talking about children with visual impairments and multiple disabilities we have to consider the group of children who have brain damage related vision loss or cerebral visual impairments (CVI). Over the last years this group has received increased attention and many articles and books about

cerebral visual impairments have been published (e.g. Blaikie, Dutton, Hyvärinen, Zihl and Priglinger). The numbers of children with CVI seems to be very high. “Twenty percent of visual impairment in infants and children is caused by brain damage” (Hyvärinen 2002). Children with cerebral visual impairments can have some problems that are not typical for children with ocular visual impairments. These are for example difficulties with form perception, face recognition or visual complexity.

It is difficult and sometimes nearly impossible to find out if a special visual behaviour of a child who functions on a very young developmental level relates to a cerebral visual impairment or if the child functions entirety on a very low cognitive level, so that there might be no visual interest or visual attention in the surrounding world. When a child with multiple disabilities seems to have visual problems and the ophthalmologist’s report doesn’t state any obvious ocular problems, it does not necessarily mean that there is no visual impairment. If possible, the child should be sent to a neurologist who is able to diagnose cerebral visual impairments. Careful observations of all people involved with the child seem to be the best way to find out as much as possible about the visual abilities of each child.

It is the aim of this “Assessment Scheme of Functional Vision for Children with MDVI” not only to give an overview over the different visual functions, which should be considered in children with complex needs, but also to explain briefly what is meant, when talking about a special item (definition/description), how to observe these items (observation) and finally what can be done or should be considered, when teaching children who have some or many of the mentioned problems (educational approach). The scheme is supposed to help to structure observations. It is a collection of experiences and ideas of three people from three different European countries and is made for special teachers for visually impaired children as well as teachers for mentally retarded children, their parents and therapists in order to understand the vision of the child.

The linked descriptions of the different items help to make this report readable, accessible and useful for teachers who work with children with MDVI. Every item can be extended to several aspects within the WORD-document as well as on the HTML-version, where further descriptions and notes concerning all the items of the assessment scheme may be found.

Naturally a scheme like this must be incomplete. There are always aspects missing, there is a lot that can be said in addition to what seemed to be the most important to us. Of course there are probably many other ideas that could be contributed to the scheme. We would like to encourage everybody who is working with it, to send us their ideas and we will try to complete the scheme from time to time so that it will stay lively and change over the years.

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REFERENCES

- HALL LUECK, A. (2004).Comprehensive Low Vision Care. In: Functional Vision. A Practitioner´s Guide to Evaluation and Intervention New York 2004
- COLENBRANDER, A. (1999). Guide for the Evaluation of visual impairment. International Society for Low Vision Research and Rehabilitation. Presentation at the International Low Vision Conference Vision-99
- HYVÄRINEN, L. (2002) Cerebral Visual Impairment (CVI) or Brain Damage Related Vision Loss

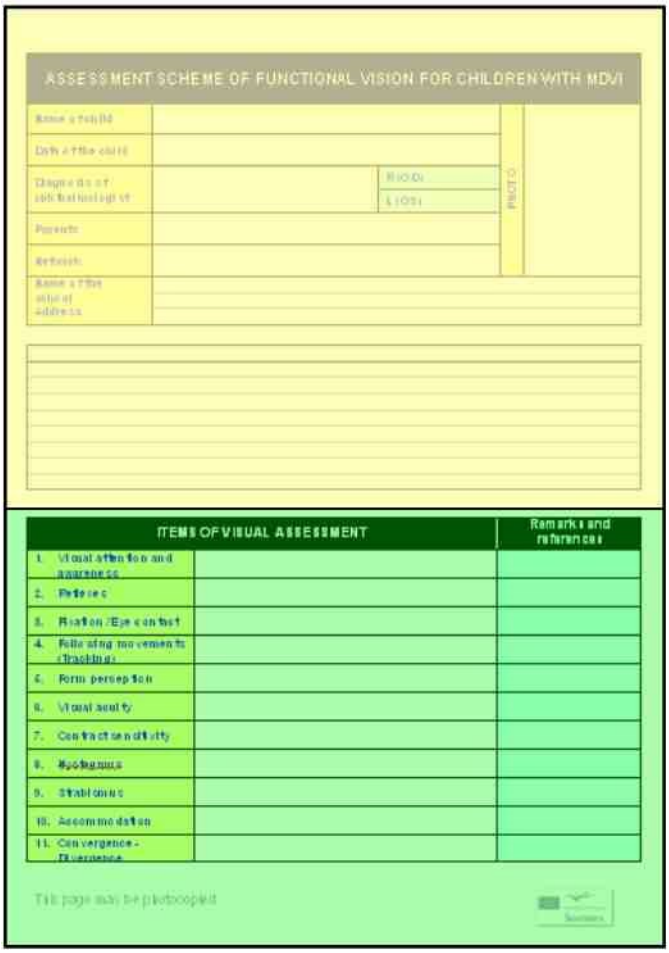
HOW TO MOVE WITHIN THIS DOCUMENT – HOW TO USE THE HYPERLINKS

The scheme may be printed out from this document as well as downloaded from our internet-side: Acrobat Reader (.pdf) – document as well as MS Word (.doc) - document). It may be reproduced!

The Word as well the HTML-version of this document have been provided with hyperlinks for every item, relating them to very specific further information.
In the WORD Document you have to point on the item and then left-click while pressing down CTRL. In the html-version you just have to left click with the mouse pointer on the item. To return to the scheme please choose: arrow back + ALT. This simple navigation within the WORD-document should make it very easy to use and to understand it. We suggest printing out for every teacher, making use of your assessment scheme, the complete documentation and explication of the items. We therefore propose to print out a very small PDF-version (explanations to functional assessment scheme), using a minimum of pages.

STRUCTURE OF THE SCHEME

The scheme is subdivided in 4 major areas:



1	Data at our disposal before starting our functional assessment
2	Data from our assessment/ observation
3	Functional implications which are deduced from preceding data
4	Pedagogical Consequences: Environmental changes/ Materials as well as attitudes-actions

1) **NETWORK:** All involved professionals, associations, doing interventions and giving care to the concerned child: therapists, medical doctors other than ophthalmologists, specialists in pedagogy, teachers, social assistants…

   MEDICATION, VISUAL COMPETENCIES AND CONDITIONS OF THE CHILD: Does the child get medication for epilepsy that influences its situation and attention? What is the actual awakeness level of the child?

2) There are many advantages doing the assessment of children in their familiar environment:[1]
   - Children and parents are less stressed
   - Less time is lost during the day for the child
   - Access to learning materials used by the child
   - Appropriate seating available

   Therefore, we recommend assessing the child whenever possible in its familiar environment.

3) If the Low-Vision specialists has at his disposal:
   - the ophthalmologist's exam results
   - the functional assessment results
   - the observations of the patient's network

   he will be able to do a first statement on eventual environmental adaptations to be done. We consider these adaptations as functional implications as they correspond to the real needs of the visually impaired person. They will not improve the person's sight but his functional vision.
   Once the functional implications have been considered and implemented, the following-up consists in a regular re-evaluation, describing eventual functional improvements.

4) The pedagogic staff will mostly be interested in the pedagogical consequences deduced from former evaluation points.
   We consider 4 main fields of pedagogic interventions for visually impaired children. This is also true for multiple disabled visually impaired children (see examples in § 20 **Error! Reference source not found.**page 35 to § 23 page 39).
   For the aims we consider first the (a) environmental changes which have to been provided/ realized in order to make (b) pedagogic actions/ changing of attitudes possible.
   e.g.:
   - providing computer-guided communication kit making use of speech-synthesizer and enlargement program (=a) to start communication with the visually impaired child being deaf (speech language) (=b)
   - adapting light conditions to the needs of the child to enhance, to make possible visual learning by (=a); use specialized materials and programs for re-education

[1] Scottish Sensory Centre.Cerebral Palsy and Visual Impairment in Children : Experience of collaborative practice in Scotland. Page 115

1. VISUAL ATTENTION AND AWARENESS

1.1 DEFINITION - DESCRIPTION

“Visual attention and awareness means that the child is aware of something in his/her field of vision. The child may demonstrate this by consistent change in behaviour, such as a brief pause, altered breathing pattern, vocalization, body, head or eye-movement, or an attempt to look at or reach for the visual stimulus. A child displaying visual awareness does not necessarily display any visually directed movement or recognize the things he/she is aware of” (Southwell 2003)

2.2 OBSERVATION

The observation of the child’s use of vision is best done in the child’s every day surroundings e.g. school, kindergarten, home. The observation must be based on the near person’s knowledge of the child and done while at least one of them is present. This is to have the opportunity to discuss the content of the observation.

Asking questions (to parents, grandparents, teachers, therapists) about the child’s situation makes it easier to interpret the child’s visual behaviour.
QUESTIONS
The observations can be done in different places during the day, if necessary. It is possible to observe visual awareness.
We observe the child’s behaviour when showing using a light in different distances to the child. We may notice afterwards if there is a change in behaviour and reactions when changing illumination conditions. This is possible by simply reducing the light in the room and than do the same procedure as describes above. All kinds of known toys is also useable. By illuminating the toy it enhances the contrast and could make it more visible to the child. The observation should be repeated if possible since the child function can change in short time, due to medical or physical changes. The importance of focussing the observation of what the child can and succeed in must be stressed. This is extremely necessary due to the contact with parents and near persons. It is easier to build the action on things the child can than the opposite. The parents nearly always know what their child is good at.

3.3 EDUCATIONAL APPROACH

We can go on stimulating the child, when we know by neurological exams that the visual pathways are working, in order to see if there is some development in its visual attention and awareness. If we know that the child is attentive to visual stimuli that move, we can go on with the evaluation.
When we don’t find any visual attention during our observation session, we can attempt to watch the child in his/her daily routine and observe any changes in awareness.
When the child shows no visually awareness and acts like being blind, we have to encourage the use of other senses (tactile, auditory …)

2. REFLEXES

1.1 DEFINITION – DESCRIPTION: Pupil Reflexes

The pupils of both eyes will constrict, when a bright light is shone into one eye. They will remain constricted as long as the light is present. This reaction is an indication for light perception in children with ocular visual impairments. If a child has no light perception there will be no pupil response to the light. There is probably reduced vision, when the pupil response is very slow.

Normal pupil responses are no guarantee for light perception in children with cerebral visual impairments. Some children don't have any light perception but can have normal pupil responses, when the retina and the optic nerves are normal.

2.2 OBSERVATION: Pupil Reflexes

The pupils normally constrict, when a penlight is presented into one eye at a time. The pupil reflex should be observed in a room with moderate illumination. If necessary the contrast can be increased by turning down the room lights. If there is slow or no response or different responses between the two eyes, the child should be sent to an eye care specialist.

3.3 DEFINITION – DESCRIPTION: Blink Reflex

The blink reflex may also be used as an indication of light perception and movement perception. If you move a mirror, or a black and white striped pattern quickly towards the eye, an involuntary blink reflex closes the eye. If there is no light perception, there is no blink reflex, if a child has problems in seeing moving objects the blink reflex could be missing.

4.4 OBSERVATION: Blink Reflex

When moving an object like a mirror or a black and white pattern quickly towards the child's face without touching it, it is possible to observe whether the blink reflex exists. It is necessary to be careful not to cause air movement, which the children might feel and respond to, even if they have no light perception. It is a possibility to use a piece of Plexiglas between the face of the child and the stimulus in order to avoid sensible air-movements.

Children showing no **blink reflex**, either have very low vision, or can not see moving objects. Children showing **no pupil reflex** could get a high medication (e.g. medicine against epilepsy) or there is no light perception.

3. FIXATION / EYE CONTACT

1.1 DEFINITION - DESCRIPTION

Fixation is the ability to direct gaze on an object of interest and hold it steadily in view. A child is able to focus at a distance about 30 cm at the time of birth, although visual acuity is only around 0.1. At this early time it is already interested in faces and objects of high contrast. Between birth and the age of one month the child takes up eye-contact. Around the age of one month a child is able to fixate objects shortly.

There are several reasons for difficulties in keeping eye contact. A visual field defect causes the face to disappear in certain areas or the face and the eyes may have low contrast and are not seen in a greater distance by the visually impaired child. A child may not look directly at a person but look slightly above, below or to the side of the eyes of the partner if there is non-central (eccentric fixation). This may be misinterpreted as autistic behaviour or behavioural problem.

2.2 OBSERVATION

The corneal reflections should be central when the child fixates the light of a torch. When testing fixation under monocular conditions the corneal reflections should also be central.
It is important to describe the size of the target and the distance towards it. Light sources, toys with good contrast and sound-producing toys can attract the child's attention. If the child is not able to respond under daylight conditions to the stimuli its reactions should be observed in the darkroom with neon light and other light sources.
It is important to watch whether there is eye-contact when the child is in interaction with familiar persons.

Some children with CVI are able to fixate moving objects, but can not fixate objects that stand still. Others are able to fixate, when they move themselves. Children with CVI are often not able to keep eye contact, which may mislead to the assumption that the child shows autistic behaviour. It should be carefully observed, under what conditions a child is able to fixate

3.3 EDUCATIONAL APPROACH

If a child is able to fixate large objects in a close distance or under special light conditions, these conditions should always be provided in order to improve fixation. Many children with visual impairments need magnification in order to see. Taking things closer is one possibility to enlarge targets. Many children also need good contrast if they are supposed to fixate. Providing pictures or objects with good contrast, or offering slides of objects of well known persons in a dark room are possible solutions for these problems. Fixation and Eye Contact are often difficult for children with low contrast sensitivity. It can be compensated by enhancing contrast of faces (for example use of make-up and additional light, use of mirrors and photos or slides).

If a child is not able to fixate or not interested in eye contact, a clown's nose (contrast, colour, surprising communicative effect) can be put on the adult's nose and observations should be done if there is a difference in the child's attention towards the face.

Enhancing the contrast: look NEED OF CONTRAST AND LIGHT

make a link to “normal visual development” and “development age”, this is also true for visual acuity

4. NYSTAGMUS

1.1 DEFINITION - DESCRIPTION

Nystagmus is generally described as an involuntary movement of the eyes, which reduces vision. The movement is usually side to side (can also be up and down or circular motion) and can be either jerk or pendular.
There are over 40 different types of nystagmus, but the main division is between Congenital (appears from 0-5 months old) and Acquired nystagmus (occurs later than 6 months of age).
Nystagmus comes very often together with congenital or early acquired visual impairments (first months of life). Indeed it is commonly assumed that nystagmus is "an effect of visual impairment occurring early in life" or indicates neurological conditions of later origin (Hall, 2004, 47). This kind of nystagmus seldom causes visual problems.
Sometimes children with congenital nystagmus may succeed in reducing the frequency and/or amplitude of it if they look in a certain direction. They block their nystagmus.

2.2 OBSERVATION

The assessment of ocular-motor functions should precede any other observation/assessment of visual functions. Nystagmus is a readily apparent phenomenon. Children adopting head tilts or appearing to have parafoveal fixation may just try to compensate their congenital nystagmus.
The description of the type, form and amplitude of the nystagmus can be very useful. Later comparisons and eventual changes (improvements) during follow-up visits may be notified.

3.3 EDUCATIONAL APPROACH

The effects of nystagmus vary between individuals, but the most significant effect is reduced vision. The long distance vision is normally limited. The level of vision varies during the day according to stress, tiredness or nervousness and in function of the angle of vision. Children having a null point (where the eye movement is minimal and vision is improved) should be encouraged to use it. (e.g. sit to the left of the viewing object).

It is good to respect the child's possibilities for tasks and acticities requiring depth perception. Unsteadiness and clumsiness are actually rather common in children with nystagmus since depth perception is reduced.

Congenital nystagmus is normally compatible with the wear of contact lenses or the use of low-vision devices.

4.4 REFERENCES

- HALL, Amanda. (2004). Functional Vision. A practitioner's guide to evaluation and intervention. American Foundation for the blind
- HYVÄRINEN, Lea (2004). Community Eye Health Journal. Vol 17 No.50. pp 27-29
- Nystagmus Network, UK. www.nystagmusnet.org
- The Royal College of Ophthalmologists of London. UK. http://www.rcophth.ac.uk/
- Royal National Institute of the Blind.UK. http://www.rnib.org.uk

5. OPTO-KINETIC NYSTAGMUS

1.1 DEFINITION-DESCRIPTION

An opto-kinetic nystagmus is a nystagmus that is activated by movement of visual targets in the environment and consists of slow following movements, interrupted by involuntary saccades in the other direction. The opto-kinetic nystagmus occurs when following objects that move (e.g. going by train). These eye movements are closely related to the vestibular system, because they compensate when moving and allow stabilisation of the world outside and of the own visual perception. The opto-kinetic nystagmus exists already at the age of birth and can certainly be activated at the age of 6 weeks

2.2 OBSERVATION

When looking at a black and white striped pattern that moves slowly, the eyes of the child should show a nystagmus.

3.3 CONCLUSION:

There are several possibilities if the opto-kinetic nystagmus can not be activated:

- The stimulus is not big enough
- Lack of cooperation or visual attentiveness
- Diseases or lesions of the cerebellum
- Lesions of the pathways that pass on following movements

Picture to be added (Anne)

6. FOLLOWING MOVEMENTS (TRACKING)

1.1 DEFINITION - DESCRIPTION

The ability to fixate a moving object leads to visual following of an object and processing of the information of the object during movement. The eyes stay on the target during horizontal, vertical and diagonal movement of the stimulus. At the age of four weeks, children are able to follow a visual stimulus with their eyes, if the speed of the stimulus is not too fast. At the age of four months exact following movements are possible. A child with spasticity can have difficulties to carry out following movements, because the spastic muscles of the eye can pull the eye away from the midline position.
(Zihl, Priglinger, 2002, 48)

2.2 OBSERVATIONS

A favourite toy or a penlight can be used in close distance and within the child's field of vision to observe following movements. It is important to give enough time for fixation before moving the object slowly horizontally, vertically and diagonally.
Repeat the same at a greater distance. Rolling balls on the floor can also be used as stimulus and give the possibility to test at a distance up to 3-4 meters.

3.3 EDUCATIONAL APPROACH

The educational approach depends on the medical reasons for the problem. If difficulties are due to motor problems (like paralysis or short eye muscles) that can't be changed, it is not useful to try to "train" the child to do following movements.

If the conditions around the child did not allow developing following movements, cable toys, balls or light can be used to offer interesting aims to look at. Children with CVI may have difficulties tracking across the midline. If the stimulus is lost, give time and information to find it again.

Toys that produce sounds can be an opening to attract attention. It might be useful to offer visual stimuli under extreme good contrast conditions (e.g. dark room, big visual stimuli) at the beginning and to change slowly to normal contrast and smaller objects.

4.4 REFERENCES

- HALL, Amanda. (2004). Functional Vision. A practitioner's guide to evaluation and intervention. American Foundation for the blind
- SOUTHWELL, C. (2003).Assessing functional vision. Children with complex needs. RNIB London
- ZIHL,J., PRIGLINGER,S. (2002). Sehstörungen bei Kindern. Diagnostik und Frühförderung. Wien, New York

7. FORM PERCEPTION

1.1 DEFINITION - DESCRIPTION

Form perception means perception and recognition of letters, numbers and geometric forms. Only at the age of 18 Months a child can usually play with simple puzzles. It can then recognize that pictures are representations of real objects and may eventually name pictures and objects, such as the Lea symbols (apple, house, block and ball).

Even in children with normal sight, form perception is less accurate in the peripheral visual field than in the central visual field.
Many children with brain damage related vision loss have problems differentiating forms and shapes from each other even if some visual acuity can be observed. These children will probably have difficulties in math, especially in geometry.

2.2 OBSERVATION

Form perception can be observed by using the Lea puzzle or other objects with similar shapes. After having accomplished the puzzle, it might be interesting to turn the puzzle by 90° in order to observe if the child still can recognize the form and not just put it at the same position as it was before. The child might have a good visual memory when repeating previous tasks. This does not necessarily mean that the child has form perception. It should be carefully observed, if the child is able to differentiate forms by touch but is not able to do it by vision.

3.3 EDUCATIONAL APPROACH

Children on a younger developmental level who are able to discriminate objects tactually but not visually, should get many opportunities to improve their concept of forms by playing games connected to different qualities of materials, surfaces, shapes and forms. Different objects (2 balls, 2 blocks, 2 stars) can be used for matching games in order to find out if the child is able to match similar tactile objects.

Problems in differentiating forms from each other can lead to the inability to read or to recognize numbers. These children are not able to learn to read black print, but if they function on a higher intellectual level, they might be able to learn how to read Braille.

4.4 REFERENCES

- HYVÄRINEN, L. (2002). Assessment and classification of visual impairment in infants and children. http:// www.lea-test.fi

8. VISUAL ACUITY

1.1 DEFINITION - DESCRIPTION

Visual Acuity is a measurement of the ability of the eye to perceive fine details of high contrast. “The WHO definition of Low vision is based on measurement of distance visual acuity and the size of visual field. Visual acuity range is ”less than 6/18 (0,3, 20/63) to light perception” (Hyvärinen 2002,1).

In adults and children, who function on a higher developmental level and who have normal or near normal vision, distance visual acuity is measured with line tests at a distance of 5 meters (in Europe). Younger children and/or persons with multiple disabilities are tested at a distance of 3 meters or closer, since their attention diminishes with greater testing distances. It is necessary to adapt the testing distance to persons with visual impairments, because many of them can not see optotypes in a greater distance, when their visual acuity is too bad.

Visual acuity in children with multiple disabilities should not only be measured with single symbols, or line tests, but – if possible – also with tightly grouped symbols, or crowding-tests in order to find out if they have difficulties to discriminate crowded symbols or a so-called increased crowding phenomenon. This means that single symbols might be seen, but symbols that stay close together can not be distinguished from each other. .Children with crowding problems may also have problems with pictures with many details or have problems differentiating the foreground from background.

Very often it is not possible to test children with intellectual disabilities with line tests, but some of them can be tested with single optotype tests.

Grating acuity tests have been used in children at early developmental levels or children with severe communication problems. These tests measure grating acuity, but not optotype acuity. It is not necessary to say what is seen, the detection of presence of visual information is sufficient. When grating acuity tests are used, one has to be aware, that in some cases they may overestimate visual acuity. “The use of grating acuity values for classification of visual impairment is misleading and should not be allowed (Hyvärinen, 2002,1)

2.2 OBSERVATION

Clinical testing is often difficult for children with multiple disabilities. Therefore it is necessary to observe the behaviour of these children very carefully in order to find out more about their visual capacities and functional vision.

As mentioned above there are different ways of assessing visual acuity, depending on the developmental age of the child:

- Line tests (e.g. symbols, numbers, letters, landolt C), measure recognition acuity. The task is to identify what is seen on the card.
- Single optotype tests (e.g. symbols, numbers, letters, Landolt C) measure also recognition acuity, it is also necessary to identify the visual object.
- Preferential Looking Tests (Lea-Gratings, Teller Acuity Cards) measure Grating acuity. The task is to identify WHERE the visual information is, without identifying WHAT it is.
- The Greated Ball Vision Test, a self-made test consisting of black balls or pearls, shown on a white background is also a preferential looking test. The task is to detect the balls in different sizes. It is a good test for children who respond primarily to moving targets.(picture of test-situation or material)

The size of toys that the child locates and handles can give clues to the visual function. By using small objects like balls (Greated Ball Vision Test) smarties, pearls, or miniature animals, it is possible to make first statements of visual functioning.

The following formula can be used to calculate the equivalent acuity:

$$\frac{distance\_of\_object(mm)}{size\_object(mm)} 0{,}00145$$

3.3 EDUCATIONAL APPROACH

Children with intellectual disabilities can improve their ability to understand the tests being used. Training the test situation should include finding names for the symbols as well as using the same names every time the child sees the symbol. If the child is nonverbal it can be useful to practise the test situation in teaching the child to point onto a special symbol on a board close to him, while the teacher shows the same symbol from a greater distance. Producing memory or lotto games with the optotypes are other possibilities to enhance recognition and naming of the material.

The ability of the eye to perceive fine details is important in many tasks of Acitivities of Daily Living (ADL). Even if many children with intellectual disabilities are not able to learn how to read, many other activities (like sewing, drawing, recognition of facial expressions, etc.) , depend on the ability of perceiving fine details. Many children with low visual acuity have difficulties to see small objects if they are too far away. One possibility to compensate this is magnification through proximity; for example come closer to the child's face in communication situations. Coming closer to the child's face does not necessarily mean that the quality of the picture improves; it might still be blurred. The benefit of taking it closer is the enlargement and reveals details of the face. Adjusted colours, contrast and light and information from other senses are essential for pedagogical work.

4.4 REFERENCES

- HYVÄRINEN, L. (2002). Assessment and classification of visual impairment in infants and children. http:// www.lea-test.fi

9. CONTRAST SENSITIVITY

1.1 DEFINITION - DESCRIPTION

With contrast sensitivity we describe the ability to perceive differences between an object and its background.

Many functional tasks in everyday life do not only depend on good visual acuity, but also on good contrast sensitivity. It is not only important to detect fine details of objects. The recognition of large, but low contrast information, which is not easily seen in front of a background, is of great importance.

Good contrast sensitivity has influence on the recognition of faces and facial expressions, activities of daily living (e.g. pouring milk into a white cup) and orientation and mobility (e.g. walking in the dark or in the rain).

It is difficult to see low contrast objects in a poorly illuminated surrounding. On the other hand, this means, that someone who has bad contrast sensitivity needs good light in order to see.

Contrast sensitivity decreases in several common diseases, like Retinopathia Pigmentosa, Diabetes, Glaucoma, Cataract and diseases of the optic nerve.

2.2 OBSERVATION

From 3 months of age on we can assess contrast sensitivity in children. Hiding Heidi Low Contrast Face Pictures allows assessing children who are not yet able to speak. It is a preferential looking test that is made for children on a young developmental level. It gives information at what distance the child can see objects in low contrast.

There are other tests for measuring contrast sensitivity (e.g. SZB LCS-Test with Landolt C in low contrast, Lea Symbols, Line Test, Bailey-Lovie Chart)

Observing the behaviour of children towards objects of different sizes, in different contrast levels and with different backgrounds and using good illumination or poor illumination can indicate if children have problems with objects in low contrast. Contrast and illumination are related to each other. Contrast diminishes with lower illumination (see Need of Contrast page 32)

3.3 EDUCATIONAL APPROACH

It is easy to enhance contrast in some activities of daily living. Using table sets in a contrasting colour, before setting the dishes on the table or using black cups, when drinking white milk are just some examples.

Recognition of faces and facial expressions are difficult for children with impaired contrast sensitivity. This can be compensated by enhancing contrast of faces. One possibility is the use of make-up, additional light and coming very close in communication situations. Another possibility is the use of a mirror to show the child its own face (with wonderful make-up). Pictures projected with beamers, TV's and computers and all other devices having a good contrast rendering, as well as slides of the parents, teachers or classmates, wearing make-up, are also an effective way to enhance contrast.

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10. STRABISMUS

1.1 DEFINITION - DESCRIPTION

Strabismus is a condition in which the eyes point in different directions. It is commonly termed:“ Misaligned eyes, wandering eye, eye muscle problem, crossed eye or lazy eye”. (American Association for Paediatric Ophthalmology and Strabismus)
Both eyes normally look at the same object. If the child's eyes do not look at the same object the child is said to have strabismus or squint. He/she may then use his/her eyes alternating or only one eye all the time. If the child uses only one eye, the other eye becomes a“ lazy" eye, an amblyopic eye.
A lazy eye cannot use central vision normally. It is important to diagnose a lazy eye early and to teach the infant to look with this lazy eye, too. Otherwise that eye will never see well.

2.2 OBSERVATION

The Cover test is used to find out if a child has a lazy eye. When you cover a lazy eye with a small card or your hand without touching the skin, it may not disturb the child as much as when the same card is brought in front of the other eye. If the child repeatedly tilts his/her head as if trying to look with the eye behind the cover, the child should be seen by an eye doctor. Your hand coming from above is a better way of covering the eye.

3.3 EDUCATIONAL APPROACH

When a child has strabismus and looks in a different direction with both eyes it is necessary to know which eye the child uses for communication. Many children are having an operation for cosmetic reasons. This can help in a eye to eye communication. This does not necessarily mean that visual acuity is improving. In most of the cases visual acuity doesn’t improve. Anne/ Tove

Many children with Strabismus are able to see with one eye at the time (alternating Strabismus). The visual acuity is then less probable to be reduced. If the child has to wear a patch on one eye in some periods of the day, it is important to know how the visual function changes. Great differences of visual acuity between the eyes require techniques for visually impaired in the period the patch is on.

4.4 REFERENCES

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11. ACCOMMODATION

1.1 DEFINITION - DESCRIPTION

Accommodation is the coordinated distortion of the crystalline lens by the cilia muscles in order to have on the retina the best image quality of a fixated object close to the eyes. The ability of accommodation in people without visual impairments starts to decline slowly at the age of 10 and most people need reading glasses to compensate for this loss about age 43.

Due to the flexibility of the lens in childhood, most children without visual impairments can see things clearly even in very close distances. Accommodation is a motor function that may be poor in visually impaired children and children with other motor disorders, especially children with cerebral palsy.

In infants and young children accommodation can be measured only by using the objective technique of dynamic retinoscopy[2].

“Accommodation may be normal, insufficient, jerky or spastic. If the cornea, lens and vitreous are clear, accommodation is easy to measure (i.e., whether the refractive state changes when an interesting small object with high contrast details is brought closer the child’s eyes). If the child can focus at the object, refraction moves toward myopia. If the child cannot accommodate, there is no change.” (Hyvärinen, L.)

The test distance during near vision testing has to correspond to insufficient accommodation by pushing the test to a longer distance. Accommodation errors need to be compensated for during all testing and observations.

2.2 OBSERVATION

When glasses have been prescribed for a child, information should be provided about how they were fitted and what the glasses correct:

- Do the glasses correct the basic refractive error or under- or overcorrect it?
- At what distance is the infant/child supposed to see best?

Some eye conditions cause reduced accommodative abilities. People who develop cataracts for example have often problems in accommodation, because of the hardening of the crystalline lens. In children with Downs Syndrome or with motor problems like Cerebral Palsy difficulties in accommodation are also to be expected. In children with spasticity, it is possible that the spasm influences accommodation and disturbs vision. Lack of activities in close distances or problems in communication may be observed in children who are not able to accommodate.

In the examination of older children it is possible to use visual acuity tests to assess accommodation. If visual acuity at distance is better than visual acuity at near because of poor accommodation, the use of plus-lenses increases visual acuity at near. There does not need to be total lack of accommodation. Often the problem is in sustaining exact accommodation for longer periods of time.

[2] In Static Retinoscopy we have the patient fixate on a target at optical infinity to relax accommodation. In Dynamic Retinoscopy the patient fixates on a target at near, instead of at distance. The term *dynamic* is used because the patient's accommodation is active. In contrast to static retinoscopy, no woking distance power is added or subtracted from the finding. If the patient's accommodation is equal to that required for the fixation distance, the dynamic and static retinoscopy results will be equal. An average patient will fail to accommodate fully for the testing distance, exhibiting a lag of accommodation of 0.50 to 1.00 diopters (Nova Southeastern University)

The tester/observer needs to know whether the child uses the eyes together (binocular vision), uses only one eye or uses alternating the left or the right eye. Sometimes it is possible to make a tentative diagnosis just watching the pupils. If the pupils of an infant do not constrict (become smaller) when an interesting toy moves close to the eyes, accommodation may be affected.

3.3 EDUCATIONAL APPROACH

People with visual impairments need very often their first reading glasses at a very young age. “The main reason for this is not that they have abnormal accommodative abilities, but that they have abnormally high accommodative demands. Such demands are created by the close viewing distances necessary by their visual impairments” (Flom, R. 2004).

Plus-lenses may facilitate the use of vision long before a child learns to read and should therefore be evaluated in each case of poor accommodation and close viewing distances on the basis of a high need of magnification.

It is important to know in which accommodation field the child works. Therefore we have to know the eventual refractive errors, the given correction and the minimum distance where an object can still be seen in best conditions (the sharpest possible). This accommodation field should correspond to the child’s working distance, that means the distance in which motor activities are possible.

If a child does not tolerate additional plus lenses for close working distances it might be helpful to enlarge pictures or books and let them be seen from a greater distance.

4.4 REFERENCES

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12. CONVERGENCE-DIVERGENCE

1.1 DEFINITION - DESCRIPTION

Convergence is the ability of the eye to keep the focus on a target coming closer. Divergence is the opposite: The ability of the eye keeping focus on an object getting away from the eyes. Vergence movements are linked closely to accommodation. The closer the object the more convergence and the more accommodation is required. If the child has good convergence, both eyes look at the same target and the convergence should be symmetric. When looking into the distance the eyes neither converge nor diverge.

We can assume problems in convergence and divergence if:

- the child's eye drifts or aims in a different direction than the other. This is significant even if it only occurs when the child is tired or stressed,
- one eye is noticeably higher than the other,
- the head is frequently tilted to one side,
- the child turns or tilts the head to see,
- the child is squinting or closing one eye,
- the child shows a poor eye-hand coordination,
- the child has problems moving in space, frequently bumps into things or drops things,
- the child twists or tilts its head towards an object so as to favour one eye,
- the child complains about headaches or eyestrain, nausea or dizziness, motion sickness or double vision,

2.2 OBSERVATION

Move an object gradually towards the eyes to induce inward movements of the eyes. These should be possible up to about 10 - 5 cm in front of the eyes. Children who are not interested in near objects should be checked with plus-lenses which may produce a good response.

3.3 REFERENCES

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13. MOTION / MOVEMENT PERCEPTION

1.1 DEFINITION - DESCRIPTION

Many children who have brain damage related vision loss are able to see moving targets even if they can't see static objects. That means that the part of the brain that is responsible for movement perception is still intact. For some of the children static objects are easier to be seen, when the child is moving itself, therefore these children often move their body or their head. By rocking to and fro they manage to have a better awareness of the surrounding world.

According to Dutton (2001) there are mainly two types of condition which impair movement perception: Impaired tracking and impaired movement perception.

Difficulties in tracking moving objects also often occurs in children with brain damage and children with cerebral palsy. Many of these children try to compensate by moving their head. This is only possible when the object moves slowly. When the object moves quickly, it is too difficult to fixate and to follow.

If the area for movement perception is damaged, a child may see static targets and objects that move very slowly, but not objects, that move faster. These children prefer television programmes, with limited movement and have no interest in fast moving programmes, as cartoons. This condition seems to be rather rare (Dutton 2001).

2.2 OBSERVATION

There are several possibilities to observe movement perception.

- It is possible to observe movement perception by confrontation with two identical objects; one moving and one not (e.g. slowly moving toy and similar toy with similar colour and contrast conditions),
- Playing ball games with fast rolling balls and slower rolling balls. The balls have to be visible to the child (acuity) and of good contrast. The visual background has to be uniform without any visual distractions (no patterned carpets). The auditory background should be calm and not take the child's attention.
- Bringing a small mirror or other visually interesting materials (e.g. black and white stripes) fast to the face of the child. If the child is reacting with a blink reflex, it likely has motion perception
- Using transparent plastic sets with black stripes, that are available in supermarkets, is a possibility to watch the eyes of the child, while moving the stripes against each other.ANNE PICTURE AS AN EXAMPLE?

3.3 EDUCATIONAL APPROACH

Many children with cerebral visual impairments have to move in order to see. It is important for teachers to know about this fact. These children should be encouraged to move as much as necessary, even if this is against social rules. They should get as many occasions as possible to move e.g. lying in a hammock, sitting on a rubber ball in the classroom or using a swing in physical education.

Slow movement and gestures are important in educating children who have problems in tracking moving objects (e.g. children with cerebral palsy). When using videos, computer programs or DVD´s, fast moving pictures on the screen should be avoided.

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14. RECOGNITION OF FACES

1.1 DEFINITION - DESCRIPTION

The visual information that reaches the brain, in children with ocular impairments, is only as good as the quality of the input. Recognition of faces and facial expressions is particularly difficult for children with impaired clarity of visual input or impaired contrast sensitivity. Difficulties in recognising faces due to brain damage can also lead to impairments in face recognition and the inability to interpret facial expressions. Some children avoid eye contact. Magnification or enhancing contrast does not help to compensate these problems. The ability to interpret different nuances of facial expressions and to respond with appropriate facial expressions of your own, needs a lot of processing in the brain. The disability to recognise faces is called prosopagnosia, a study of pupils and students in schools and universities showed that up to 2% have these difficulties. Prosopagnosie ?? Anne (ZIHL, PRIGLINGER???
The disability to recognise people and to interpret the nuances of facial expressions, as well as the disability to take up and to keep eye contact can be extremely socially disabling. Recognition of faces is a precondition for communication (see COMMUNICATION

2.2 OBSERVATION

Problems in face recognition can be observed in natural situations: Many children do not recognize their mother, father or classroom teacher as long as they do not speak or give any other - except visual - clues. If they do not expect a person in a special situation they often cannot find out who this person is, as long as they are not given any other clues. A child with loss of face recognition will not respond differently to known and unknown persons, as long as they do not give any other signs that are known to the child. It is easy to observe the child's behaviour in an unexpected situation, if - for example - the parents come unexpectedly to school or kindergarten, or the teacher comes unexpectedly to the home of the child without saying anything. The recognition should not be done by auditory or other clues but only by vision.

It is difficult for children with impaired face recognition to detect friends on the playground or to greet people they know on the street. It is necessary to observe carefully what strategies the child uses to find out, who a person is. Clothing, the sound of the voice or even smell are clues that may be used.

Other possibilities to find out if a child has face recognition is the use of photos of family members, teachers or class mates. It should be carefully observed what additional information is given on the photo that the child may use to find out, who someone is. The face with the glasses might be the classroom teacher; the girl with the special hairstyle might be the best friend. Lea Hyvärinen suggests cutting off all extra information like hair and only presenting the photo of the face of known people to the child.

The Lea-faces test is another possibility to find out if a child is able to differentiate between various facial expressions. Different facial expressions are shown on several cards. When children are able to speak they can name or describe the different facial expressions they see.

3.3 EDUCATIONAL APPROACH

If the cause of difficulties in recognizing faces is due to ocular impairments and related to impaired clarity of visual input or low contrast sensitivity, it helps simply getting closer to the face of the child (magnification through proximity), using optical devices (additional plus lenses) or using more light.

The light should shine onto the face of the adult, or the child should sit with his/her back to the window, so that the face of the teacher or parent is illuminated. Contrast of faces also can be enhanced by the use of make-up (see COMMUNICATION

If the cause of difficulties in recognizing faces is due to cerebral visual impairments, it is important to know that the recognition of people just by vision and also the perception of facial expressions may not be possible. Magnification or enhancing contrast does not help to compensate these problems. Children may compensate the lack of visual recognition by identifying people's voices, their smell, their movements, special clothing or jewellery and by asking questions to find out who their partners are. A well structured plan for the day helps the child to connect certain activities with persons. If the teacher changes, it is necessary to give special information to the child.

4.4 REFERENCES

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15. COLOUR VISION

1.1 DEFINITION - DESCRIPTION

Colour vision is the ability to recognize colours. Colour blindness is the inability to see colours. Achromatopsia is one example for congenital colour vision defect, caused by a loss of cone photoreceptors. It is often associated with reduced visual acuity, nystagmus and aversion to light The most common state is either from heritage or from the disease in the eye and problems with discrimination of colours. Red/green colour vision defects are more frequent than blue-yellow colour vision defects and much more common in males than in females.

2.2 OBSERVATION

There are several standardized- and not standardized test methods. Often the standardized tests are complicated; but with a little individual adjustment it is possible to use parts of them to get information about the child's colour vision. Most frequently tests are:

- Ishihara colour test
- PV-16, Farnsworth – Hue
- Matsubara test (a more appropriate version with pictures for children)

When using Ishihara, the child can use its finger in order to follow the coloured numbers. We can then see if it follows the lines. If you try different pages like this, it is likely to assume that the child doesn't have a green-red defect.
There is no commercially available test to assess colour vision in children with multiple disabilities. Discriminating different blocks (e.g. Lego) into groups is difficult. The luminance differences of the coloured blocks can be used as a cue for sorting.

3.3 EDUCATIONAL APPROACH

Some children with normal colour vision have problems with naming colours. This could be due to damaged visual memory in the pathways. Therefore it is necessary to use different tests such as sorting colours, matching the exact colour and try to name them.

It is important to be aware of the child's colour vision to put this knowledge into the educational approach for the child. Observing the child and seeing what strategies the child uses, gives a lot of information. If the child has colour vision problems, dark colours like moss green and snuff brown may look similar to the child. If the child is able to speak, it is possible to ask the child what colour he/she sees on objects. Not just assume that what the child is seeing is what you see yourself.
By using a light source, one can brighten the colours and at the same time create a more uniform background. The forms, the colours and the objects will then be easier to differ from each other. It can be useful to train discrimination of objects that are different or similar to each other (e.g. coloured Lego, pearls, coloured forms and so on). It will be easier for the "colour-blind" child to interpret his/her environment, by avoiding a colour-based educational approach.
Many children with colour vision defects have fewer difficulties in discriminating colours in higher light levels or if the vision target is enlarged and the area of colour is larger.

4.4 REFERENCES

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16. VISUALLY DIRECTED MOVEMENT

1.1 DEFINITION - DESCRIPTION

Visually directed movements means the ability of children to use their eyes in conjunction with their hands to reach or move towards things they see**.** Nnewborns move their hands very early in front of their faces and look at them. This is an important precondition to start to reach for objects. A normal developed child starts to reach for objects at the age of 4 – 5 months. In visually impaired children we often see the inability to observe movements of their hands and also a delayed eye-hand-coordination. This may lead to difficulties in locating near object and reaching them. Add Lilli Nielsen …??? Link to literature

2.2 OBSERVATION

Observations of eye-hand coordination can be made in all play situations. It is helpful to observe if the child looks at his or her hands or at objects when playing and if it is able to do a purposeful hand movement towards a stimulus. Under what light conditions is the child able to do this, how good is the contrast - and what is the preferred size of the object?

The accuracy of eye-hand coordination is also an important factor. Children can over reach, under reach, they might reach out too far left, too far right or below or above an object. If reaching is inaccurate, it is helpful to find out if the degree and the direction of inaccurate reaching is always the same and how much it is.

When a child is able to locate desired (small) objects it should be observed if the visual contact is maintained when reaching or if the child looks and than turns his head away. It is helpful to find out if the child is able to use searching techniques to find things.

There are other possibilities to observe eye-hand-coordination:

- Use a torch and let the child point with a finger on the light.
- Place a torch behind a wooden frame with holes in it; illuminate one hole from the back of the wooden frame and let the child point onto the illuminated hole.
- Put small objects (for example sugar decoration for cakes) in front of the child; ask the child to find the sugar-beads. Observe and record the size of the pearls, the distance in which the objects are seen, the color of the background and the lighting conditions.
- Children on a higher developmental level may be able to copy pictures, numbers or letters, to draw or color within lines, to cut or even to cut along lines

3.3 EDUCATIONAL APPROACH

Many possibilities to improve visually directed movements in children, who function on a younger developmental level, are given during play situations. Offering toys with interesting visual, auditory and tactile qualities within reaching distance gives the child the possibility to learn about distances and accuracy in reaching. If the child is not able to sit by itself, it should be in a position that it can see his or her own hands when handling different objects: By the use of the support bench (Lilli Nielsen material) or other devices like hammock, wedge (pictures), it is possible to bring the child into a position where the hands come together on the midline and the hands can be seen by the child. Children can be offered favoured sound-making objects that are in reaching distance. After using large objects in high contrast, smaller objects in high contrast should be offered, followed by big objects in low contrast and small objects in low contrast.

Reaching for the parent's face in close proximity is another way to encourage visually directed movements in communication situations.
If the degree and the direction of inaccurate reaching is always the same it is a possibility to teach children to reach out a little more to the right, or left, below or above in order to find the desired object.

Gross- motor activities—fysioteraphy, grov motorsik trening gjennom lek vil stimulere finmotorikken.tove

4.4 REFERENCES

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- Nielsen,L. Literature/Anne

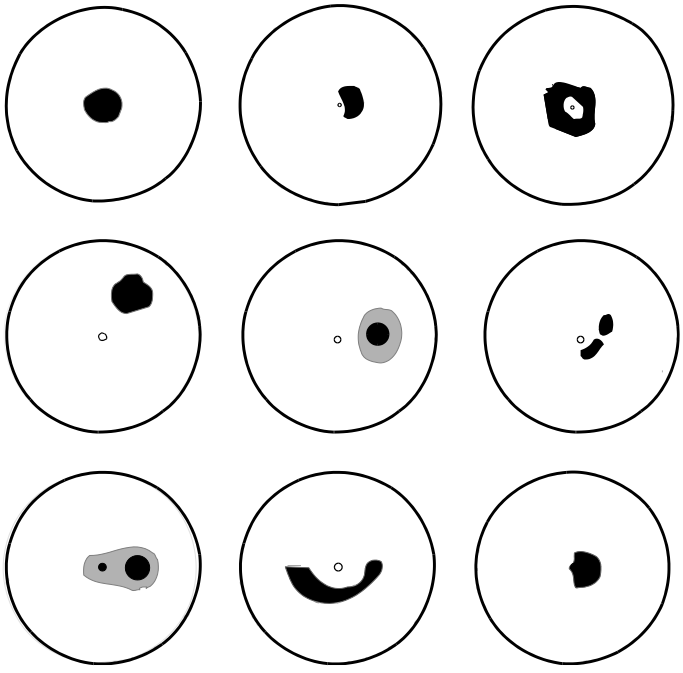
17. VISUAL FIELD

1.1 DEFINITION - DESCRIPTION

When a person with normal vision looks straight ahead without moving the eyes, he sees also on both sides. The entire area visible to all sides, without moving the eyes, is called visual field. “Visual field loss can be caused by abnormalities of the eye itself, damage to the optic nerve or the pathways leading to the brain, or damage to areas of the brain that process visual information” (Haegerstrom-Portnoy, G. 2004, 115). Several types of visual field losses which are classified by their shape, their location, their size and their density are known:

- Central visual field defects
- Peripheral visual field defects
- Hemianopia
- Different forms of scotomas

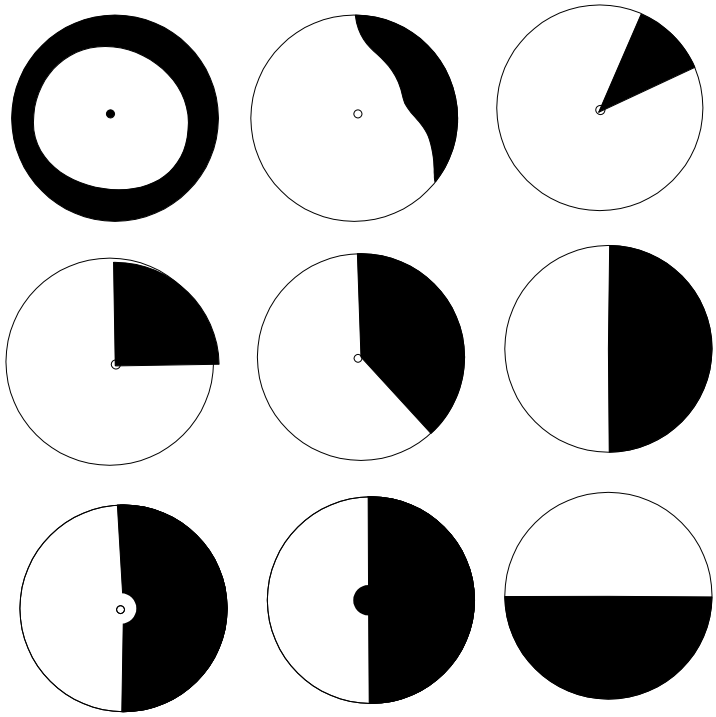
Central field defects (or so called central scotoma´s) make it difficult to say WHAT is seen, while visual field defects in the periphery make it difficult to see WHERE things are. Orientation and mobility is impaired when having visual field loss in the periphery, while near vision tasks (reading, painting, sewing) are impaired when having a central visual field loss or central scotoma.



Central scotoma
Paracentral scotoma
Ringscotoma

Peripheral scotomas

Arcuate scotomas
Central scotoma



Concentric defects

Right quadrantanopia
Partial hemianopia
Total hemianopia without macula gap

Total hemianopia with macula gap
total hemianopia with loss of macula
Inferior hemianopia

Pictures: Buser, F. (1999)

2.2 OBSERVATION

Observing children in their natural environment can give many clues for visual field defects: Falling over toys and obstacles or other things that lay on the floor, having difficulties when walking down-stairs or stumbling over the end of pavements can give hints to visual field defects in the lower visual field. Not being aware of the traffic coming from one side, bumping into doorways, leaving food on one side of the plate or overlooking information in a picture or a book may give hints to visual field defects on the right or the left side (hemianopia).

Visual field defects can be assessed in the central and in the peripheral area. Different methods may be used:

- Donders (fingers movements in the peripheral area)
- Nef-Trichter (a funnel, that is held in front of the child, see photo) Photo Anne
- Computer perimetry (very difficult)
- Campimetry (Tangent screen)
- Amslers grid (central vision field)

The aim of these tests is to determine the extent of visual field loss. Children with multiple disabilities respond best to the Nef-Trichter or the Donders evaluation/observation method. Both methods are easily adaptable to the child's surrounding. No large equipments and no difficult explanations are needed. Very often children with multiple disabilities can't concentrate for a longer time. Since this evaluation method can be used in a spontaneous way it can fit into the child's awakening level. When using the Donders method the child's attention can be drawn to the tester's face by the use of a clown´s nose. The red colour and the simple round form draw the attention of the child towards the stimulus.

3.3 EDUCATIONAL APPROACH

“Children with extensive field losses need to be alert to auditory and others cues that warn of people and/or objects present or approaching from the area where visual cues are absent. They must also learn to move the head and eyes to scan their environment with the part of the vision that is still functioning” (Scholl, G. 1986).

The knowledge about the visual field is important for the teacher, so that he/she can implement it in education: It is for example important to find the right place in the classroom for a child. If a child has hemianopia (field loss on half side of the visual field), it should not sit with the hemianopic side towards the blackboard, but just on the other side of the room. Central scotoma´s make reading slow, even if the print has been enlarged. By magnifying things it is possible to make small objects visible, which can not be seen with the central vision that is left. The peripheral vision capacities can compensate, although the field of vision becomes smaller.

A child with central visual field loss will use eccentric fixation to see an object presented to him. The fact that a child does not look straight into your eyes while communicating, should not lead to the assumption that this is a psychological problem.

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18. NEED OF MAGNIFICATION

Magnification through proximity
Many children do not pay attention to material of greater distances if it is too small. Recognition of faces and facial expressions is also difficult for children with impaired clarity of visual input. One possibility to compensate is getting closer to objects. In communication situations we can let the child look and reach for faces in a close distance, or use a mirror to show the child it's own face. We can use photos or slides of parents and siblings in a slide projector and let the child sit very close in front of it.

Magnification through Plus Lenses
Difficulties due to impaired clarity of vision can also be compensated by using optical devices. Additional plus lenses make near objects clearer, without the need of accommodation. The plus lens should be inversely related to the distance at which the child is holding near material.

19. NEED OF CONTRAST AND LIGHT

1.1 DEFINITION - DESCRIPTION

“The impaired eye is most sensitive to intermediate levels of details (such as a 20/100 acuity target) and least sensitive to high levels of details (such as a 20/20 acuity target)” (FLOM, 2004, 42) .
We therefore have to have more contrast to see fine details. Magnification may be a useful adaptation to encounter a lack of contrast sensitivity (see NEED OF MAGNIFICATION page 31). When a child has a moderate loss of contrast sensitivity, this may not be functionally noticed. A deeper loss of contrast sensitivity will have an effect on a wider range of objects and details.

Contrast is directly linked to light and illumination. It diminishes with lower illumination. Providing good illumination is essential for children with poor contrast perception. 1500-2000 Lux on the object is usually sufficient for good illumination for the visually impaired people who need a lot of light. 10 times more light is needed to feel any improvement.

Too much light makes it difficult to distinguish visually between different contrast levels. With higher level of light, the contrast will increase to a certain limit. Adding too much light could induce reflections on the surface and lead to glare and the disability to see objects clearly.

People showing difficulties in **adaptations to new levels of lighting** (indoor-outdoor) can be seriously troubled by changes of these light levels.

Visually impaired people, sensible to light and glare will have a reduction of contrast with too much light. They need a moderate level of light.

Extreme light sensitivity may be found with achromatopsia. These people need a very low level of light. Their contrast sensitivity will always be reduced but best with dimmed light.

2.2 OBSERVATION

Too much or not enough light, depending on the individual’s needs, can reduce the contrast sensitivity. “Therefore, it is especially important to test the effect of well directed, bright light on visual functioning…” (Hall, 2004, 45). The needs of visually impaired people concerning light are very individual and the evaluation of their best visual performance in combination with a certain level of lighting is essential.

We have to observe the person’s preferred light conditions for near vision tasks as well as their preferred ambient lighting. We should also monitor the behaviour of the child while adapting to new levels of illumination.

The observation of the person’s light sensitivity can eventually give precious clues to the ophthalmologist concerning a correct diagnosis. Extreme light sensitivity is a common characteristic for some eye conditions such as achromatopsia or retinopathia pigmentosa.

3.3 EDUCATIONAL APPROACH

- It is important to have the possibility to change the light conditions in the room where the child is most of the day. By installing a “dimmer” you can change light levels. In addition to the light on the ceiling, many children must have an additional light source close to their working-place, so that the things they are looking at are better illuminated. There should not be a big differ-

ence in illumination-levels within the room. Otherwise the eye will have difficulties to adapt to the different luminance levels.

- The contrast will be reduced when the angle of the light coming from the light source is identical to the angle of the reflected light from the object towards the observer. The child should therefore never be seated in front of a window or other light-sources, but preferably have the light on his left when he/she is right-handed or vice-versa to prevent shadows by parts of its own body.
- Many children with severe multiple disabilities lie on mattresses, resonance boards or beds in their classroom. It is important to avoid light shining directly into children's eyes when lying on their back looking at overhead lights or windows. It is helpful to simulate the child's situation by taking it's positions. The use of simulation glasses can give additional information.
- Children sensible to glare have very often problems in recognizing people's face. It could be useful to take slides of these faces or to use additional light. Lighting the face of the care- person is another possibility to help children with Low Contrast Sensitivity. It is also possible to enhance contrast through changes of the background (dark).
- It is very important to use the right illumination technique/ bulb. The surface of the lights should be as large as possible. Halogen lights have in addition to their intense heat development a very low surface so that the light produced comes from a very small spot. The alternation of different luminance levels on the roof may induce relative glare for People sensible to light. They could even suffer from this illumination while lying on the back being exposed to this light source. Therefore halogen lights are totally inadequate for enlightenment of rooms and especially close workspaces. Indeed, halogen lights without filters can even produce sun-burns, when the child is exposed in less than 30 cm for more than 30 minutes.

  It is preferable to use fluorescent tubes (T5) ("cold light lamps") instead of halogen or classical light bulbs. These lights use a very small part of the consumed energy for heat. The light emanates from a rather large surface, so that no strong glare is probable. Besides, since they stay rather cold and they show no radiation, which might do harm to the skin, they can be used in very short distances to the body.
  Therefore, it is possible to have these lights just above/ against the forehead and therefore to improve the contrast (the insensitivity of light increases in relation to the distance by square: putting the light source at half distance will increase the intensity of the light on the object illuminated by 4 when no reflections take place) (Buser, 2006, 9-10). With fluorescent tubes a very flexible and affordable management of illumination of the direct working space can be achieved.

SUGGESTIONS FOR GOOD LIGHT

- Use indirect light sources whenever possible (in order to enlarge the surface producing illumination).
- Use white colour for roof in order to have good quality (and quantity) of light with indirect illumination of the room.
- Avoid extreme luminance differences within rooms and between rooms.
- Dim the light, if a child is sensitive to light.
- Give special filters (blue blocker), or sunglasses and a cap, when the child has photophobia.
- Give the child time to adapt from light to dark and from dark to light.
- Eliminate as much glare as possible on all surfaces.
- Increase lighting by moving the light source closer to the child, if the child needs more light in order to see well.
- Ask the child's opinion, impression about the light- increase, the awareness of how light changes the visual environment.
- Contact professionals selling lights and ask for advice which will fit to the use of the room.
- Use a lux-meter to measure the light in the room.

4.4 REFERENCES

- BUSER, Fritz. (2006) Licht, Kontrast, Farbe. SZB Kurs. Unpublished manuscript.
- FLOM, Roanne. (2004). Visual Functions as Components of Functional Vision. In HALL, A.(Ed.) Functional Vision. A practitioner's guide to evaluation and intervention. American Foundation for the blind. New York

20. COMMUNICATION

Communication is closely linked to language. The word comes from “Communicare”. This is Latin and means to do something in common / to share. What we share is the words, thoughts, experiences and feelings. We all depend strongly on communication and interaction with others. Communication does not only take place by language, but also in a non-verbal way, like expressions of faces and gestures. Non verbal communication is a highly visual skill and difficult for visually impaired children. Low contrast sensitivity (see NEED OF CONTRAST AND LIGHT

32might be one reason for difficulties in recognizing faces or facial expressions. Touch and tactile signs are possibilities of nonverbal communication for blind or low vision children

When children have limited speech they often have special devices for communication. These devices vary in complexity – from simple switch operated devices to complex devices with various set of pictures or symbols and spoken words or sentences. As a result of a functional vision evaluation the size, complexity, distance, contrast and positioning of the symbols on the devices should be carefully considered.

Often photos, pictures or drawings are used in conjunction with communication devices. It should be known, that some children can see photographs, while others can not. Colour photos are usually easier to decipher than black and white ones, since they have better contrast. To some children tactile symbols may be beneficial. The positioning of the device depends on the visual field of the child and also on oculomotor limitations.

Communication is an important aspect when doing a functional vision assessment, there are several things that should be considered: First of all, the testing person should be sure, that the child has normal hearing. It is also important to know what expressive language the child has and what kind of verbal directions the child understands. If the child is nonverbal, it might be useful to know, if he or she is capable of pointing. If the child cannot point, is he or she able to respond “yes” or “no” using head movements or other signals? It many cases it might be necessary to make judgements of vision functions through the child’s use of eye movements. And over all it has to be considered if the child has any oculomotor limitations which make it necessary to present the visual stimulus from a certain direction.

Andreas Frölich writes in his book Basal Stimulering 1995 about baby talk and he refers to the work of H.and M. Papouseks work with normal functioning newborn children, to develop the communication skill of the severe multihandicapped child. On page 176 he has a list where he describes this structured communication method. He emphasizes the use of the voice, language and facial mimic and the rhythm in pauses and activity.
For the severe multihandicapped child there are different ways to make the communication easier. Some of them can be::

- Structure the place for communication (the same place, time, length, avoid auditory sound chaos)
- Make sure that the child is well and ready for communicating by talking to the people who knows the child best.
- enhance the contrast of lips, eye-browns, (contrast)
- come close to the child (magnification)
- light on the teacher’s/parents face (enhance contrast)
- non-verbal communication: tactile
- Structure the rhythm in the dialog and wait for response from the child.
- Use sign language which the child is used to
- imitation (baby talk) The adult imitate the child immediately after a response from the child

- Be aware of the words you use -how you pronounce them, how many, how loud, and so on.
- wait for the child's initiative
- Use video to watch what is happening during "talking" to each other. Look for the child's initiative by watching the eyes, the hands, the feet, change of breathing, the attitude, the expression in the face and in the communication partners face (see more from early intervention programme on www.MarteMeo.com)
- Get to know the small signs when the child shows that he/she is attentive.
- Make the start and the end of the communication clear by doing the same things in the beginning and end of the sequence.

Blind children can get problems with the development of communication because some of the reactions from the blind child is different from a seeing child and can be misinterpreted by near persons. Parents can experience that they don't get so much response from the blind child when the child actually just gives feedback in a different way. It is therefore necessary that the parents learn to interpret other signals from the child's need, interest and preferences (Liv Vedeler, 1989,17).

The following references can give more information about communication:

- DRUILLARD, Richard & RAYNOR, Sherry. (1986). Get a wiggle on.
- DRUILLARD, Richard & RAYNOR, Sherry. (1986)Move it
- FEILBERG, Julie. (1989). Det blinde barnet, Språkstimulering i det første leveåret by m.fl. Gyldendal
- FEILBERG, Julie (1991). Det blinde barnet 2. Forberedende lese- og skriveopplæring by m.fl. Gyldendal
- FRÖLICH, Andreas. (1995). Basal Stimulering for mennesker med multifunksjonshemning
- VEDELER, Liv (1989). Lek og kommunikasjon i de første utviklingsår by Pedagogisk Psykologisk Forlag
- WWW.MarteMeo.com

21. ORIENTATION AND MOBILITY

It was Berthold Lowenfeld who already in 1948 stated that blindness has three limitations on the individual. First in the range and variety of concepts. Second the limitation of the ability to get about and third a limitation in the control of the environment and the self in relation to it. All these three limitations has to do with orientation and mobility.

A child with reduced vision meets other challenges than a seeing child. The visual sense is so strong and superiour that it easily gives an overview of what goes on in the childs surroundings. Still the little child has to learn what it sees. The different senses we have like touch, smell, taste, hearing helps us to sort out and learn from the experience of using them. The ability to get around reduces when the child does not have vision. It is necessary to help the child to reach out for its surrounding in a playful way and wake his curiousity towards objects and people around. The multiple disabled visually impaired child has many competing factors that challenge the main goal which is to get independent.

« For the seriously multiple-handicapped human being, mobility is the capacity to move, so that he can arrive, in his own way and within the limits of his possibilities, at enjoyable experiences and that he will be able to withdraw from unpleasant experiences ».(Harley et al., 1987)
The child must start to move around to get his own experience from the surrounding. By being active himself the learning will be easier. We can never start early enough to make good premisses for development of skills for orientation and mobility for the child.

In the book Mobility for special needs by Juliet Stone (chapter 6, 1992) the author mention 11 points which can be useful in the assessment of the children's present level of functioning to compile a profile of the child. These questions can be useful to discuss together with parents, physiotherapist, O&M instructor and others around the child to be aware of the child's different developmental levels and what is next to be expected :

1) Is it possible to say what clues the child uses in his or her movement within the environment; auditory, tactile etc?
2) Is the child's ability to move impaired? How? (This may vary from a child who has a poor gait or posture to the very physically disabled child who has very little motor control).
3) Does the child show an interest in moving?
4) What appears to motivate the child to move?
5) Can the child move purposefully, such as respond to a request like `come to me`, or move to a particular place, such as the toilet, hall or playground ?
6) Does the child appear to know where he or she is; in the classroom, in the wider environment?
7) Does the child understand early route taking, for example how to move from place to place such as from door to seat, classroom to toilet? Note that a child using a wheelchair may still be able to understand how to get to different places even if he or she is unable to move unaided. This also applies to non ambulant children.
8) How well is the child able to perform within the real situation, as opposed to an artificially devised one?
9) Is the child able to communicate any need for assistance?
10) What would seem to be the next stage developmentally, that should be encouraged?
11) How far does this next stage need to be subdivided into steps that are small enough for each individual child to achieve success?

References ;

- STONE. (Juliet 1992). Mobility for Speciale Needs, chapter 6
- Lowenfeld, B (1981)

- Hill, E. W (1986). Orientation and Mobility. G.T.Scholl American foundation for the Blind.

22. ACTIVITIES OF DAILY LIVING

1.1 DEFINITION - DESCRIPTION

A good way to show things to the visually impaired child is to put your hand close to the child's hand. Let the child take the initiative and put its hand over yours. When you examine the object the child feel your movements and feel safe. In this way the child can examine the object under "safe" conditions. The aim is that the child can examine the object all by him/herself after a while (ref. Hand over hand –project HUS). Try to avoid to "take" the hands of the child whenever possible, when you want to show something or guide the child. The child should feel safe and be able to be active when he/she is ready.

If a child attends kindergarten every day, it has every day routines which are repeated. This gives the child a special opportunity to get natural repetitions every day. Every child has different needs and the individual plans for every child should reflect in the natural environment where the child is every day. It is important to use situations which the child like and enjoy, so that the activity gives meaning to the child and the adult /the teacher who works with the child. Examples for these situations can be: take of out -door clothes when the child arrive, wash hands, breakfast, body massage, motor training in walker, the little room, move to music and so on. These situations decide the "route" during the day. The child moves from the hall to the breakfast-room every morning followed by certain main activities. And moves again into the play-room and from there to the hall again to dress for out-door activities. These repetitions are a good learning environment if you structure them and see what you can stimulate during these activities. Language, communication, orientation, visual stimulation, motor training, auditory stimulation and so on. The main goal would be to make the environment around these situations so that the child can take initiative and be more self helped.(selvstendig). It is important to do the activities on the same place every day. One have a special place for listening to the music, a place for washing hands, a place for motor training, a regular place to change clothes…
When structuring these activities they will after a lot of repetitions and endurance function as markers for the child. For example the child could build a pattern of activities and know what is going to happen after eating breakfast. In this way the communication about what has been and what is going to happen will be stressed. By observation of the child you can see if the child has any expectations of what is going to happen during the day. This structured thinking will make is easier for the teachers to interpret the reaction of the child and to respond to it and to continue to stimulate the child's learning abilities and visual functions. After the structure is built up and you see that the child function in it then it is time to evaluate the use of it. Has the child a good understanding of the day and the routines the you can try to build more of the education on the child's own initiative and stimulate more of the child's own responses. If you structure the plans for the child it is easy to do an evaluation to see if it is adapted to the child's individual needs. Is there enough time left after motor activities. How many breaks does the child need during the day? Is the activities directed individual to the child or is it the whole group of children which decide what activities they have during the day. When the activities are structured it is important that the whole staff knows about these plans. If the teacher is ill one day it should be easy to take over if you have a detailed plan for the day and the child will also have a better possibility to adjust to the new person.

Use this text eventually with Mobility and integrate some ideas in the foreword (philosophy)-redo partially this text

23. SUSTAINED NEAR VISION TASKS

1.1 DEFINITION - DESCRIPTION

Sustainability in near vision tasks with children presenting Cerebral Palsy is indeed an existent issue. The child may be visually impaired and have additional special needs and still be solicited for sustained near vision tasks.

Where the problem of fatigue arises already in longer ongoing activities requesting near vision for normal sighted people, we consider this problem to be considerably more important in the life of multiple disabled visually impaired children.

These children may for example make use of computers for purposes of education, re-education and communication.

In order to make them these pedagogical and functional devices available we have to consider different aspects:

- choose a well adapted device in connection with oculomotor possibilities, vision field and all elements of evidence deduced from the assessment scheme;
- make the entry-device (keyboard, keypad, adapted joystick, as simple and contrasted as possible (see Communication page 35);
- to bring the reception device (i.e.g. screen) as close as possible to the child (flatscreen on arm);
- to respect the child's vision field and to bring used devices in the right angle regarding it (as well as oculomotor limitations)
- to make use of very explicit materials (touch screen, whenever no oculomotor limitations exist);
- supply enlargement when needed (enlargement program for IT based devices);
- respect the child's need of additional enlargement: to be adjusted (additional dioptres for near vision tasks added to the dioptres of refractional correction)

Some children could still be part of the group of the MDVI children (look definitions) and might nevertheless be able to read for a longer time. They have to be provided with the adapted optoelectronic equipment enabling comfortable reading situations. The use of supportive voice output combined with screen readers providing a continuous single line reading with enlarged letters as well as many other combinations of optoelectronic solutions may help the child for problems of orientation. Motor controlled screen control (pedal) may substitute manual operation of devices.

2.2 REFERENCES

STRUKTUR is computer based communication program, designed for giving support of communication for young people suffering from the Battens (JNCL) disease. This project had partners from Finland, Denmark, Sweden and Norway:

- Finland: Finnish Association on Mental Retardation / Tikoteekki, Helsinki; Central Organization of the visually handicapped, Helsinki
- Denmark: Renaesskolan, Kalundborg; Danish Centre for technical aids for rehabilitation and education, Århus
- Sweden: SPRIDA Communication Centre, Örebro; Resurcenter syn (Ekeskolan), Örebro
- Norway (Tove will give information)

Literature

Frank:
Literature correction