



Professionals for Visually Impaired Persons Training XL  
and Knowledge Sharing

**KnowProViP**

**HANDBOOK**

Subject:

***Visual impairment and specificities  
at older age***



Official handbook for the KnowProViP course

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## **I General information for the trainer**

This training is made for professionals dealing with visually impaired persons and who want to better understand the specificities of people in older age.

People coming into contact with elderly persons, feel the need to improve their knowledge of the ageing process and of the needs, limitations and potential of this population.

The following document will guide you in the content of these two days course.

It is built with ideas and advices from professionals issued from the low vision and geriatric field, and literature sources.

It is made so that the trainers will have to set up their own content according to their knowledge and vocational practices.

### ***1.1 Aim of this handbook***

- To get an overview about normal and pathological ageing process, specificities of older people and visually impaired old people.
- To be aware of problems which may occur while working with this population.
- To learn basic strategies to cope with these problems.
- To be able to adapt the rehabilitation means.

### ***1.2 Presentation group and trainers***

To get familiar with the group.

- Presentation round.
- The trainer presents the content of the day, and its aims.
- The training may follow the module as it is presented below

## 2 Specificities of older people and discussion

Trainer: Geriatrist

### 2.1 Aim of this chapter

Share through all participants their experiences and knowledge, to get an overview of the elderly and very old people specificities, and of the particularities while dealing with them. A further aim is that participants are capable to identify the following issues while getting older:

- physical and mental fitness
- participation in social life
- social environment and family

The participants should also learn about the existing tools to evaluate dependency and/or ageing process (this could be very specific to each country and could allow financial benefits). Measurement methods, indicators of ageing and assessment methods are also subjects of this chapter.

### 2.2 Required media and material

1. Video
2. Interviews
3. Photos
4. Examples, clinical situations
5. Demonstration of different evaluation scales

### 2.3 Methodology

- Exchange of experiences amongst the participants in working groups or by brainstorming, debate and discussion.
- Demonstration and introduction into tools for evaluation of ageing process if existing (AGGIR in France), demonstration of different scales.
- A video on interviews with elderly with vision impairment could be interesting to look at and to discuss about.

## 3 Ageing process

Trainer : Geriatriest

### 3.1 Aim of this chapter

- The participants should be enabled to discriminate physiological and normal ageing process from pathological caused ageing processes
- Knowing about the different aspects of ageing process.

### 2.2 Required media and material

Slides

### 3.2 Methodology

- Normal ageing process, the bio-medical basis underlying the ageing process: cells and organs modifications, genetic length of life, environmental factors....
- Pathological ageing process : dementia, Parkinson's disease, depression, cerebrovascular trauma, hyper arterial pressure, diabetes, arthritis, osteoporosis, poly-pathology in aged patients which accelerate ageing process
- Psychological aspects of the elderly person: When do we feel old? To be able to get over a trauma, loss, mourning ...Psychological consequences of low vision by elderly and very old people.
- Ageing and sensory systems: Older persons are disproportionately affected by sensory impairments which increase vulnerability and limit the quality of life. Visual and hearing impairments decrease independence in performing the activities of daily living, getting from place to place, or communicating with others. Isolation.
- Social ageing process : understands that getting old is not only related to the age of the subject, but has also a psychosocial dimension in which the environment, adaptation, and coping play important roles

The poly-pathology of the elderly requires specific care: multidisciplinary approach, maintaining the elderly in their framework, care organisation according to the specific demand and needs of the elderly...

Care strategies, multi faceted, multidisciplinary approaches are very important for very old people to maintain their well being and quality of life

To work through a network of actors from geriatric and handicap field for mutual exchanges is very important.

There is also a need of collaboration to facilitate communication with very old people because of the usual vision and hearing double impairment.

## 4 Elderly and environment

Trainer: Geriatriest ...

### 4.1 Aim of this chapter

- Emphasis is placed on the importance of taking into account the familial and social environment of old people.
- Being able to understand why our actions are part of the prevention of dependence.

### 4.2 Required media and material

- examples of Clinical cases or case studies
- Video, films

If necessary, and according to the group desiderata, simulation of double sensory loss (so specific at older age with simulation glasses and earplugs)

### 4.3 Methodology

Consequences of low vision when getting old in the following fields:

- Mobility
- Leisure time
- Reading
- Daily living activities
- Risk of falling
- Communication, especially because of the added hearing problems...

### Prevention aspects

Attempting to postpone as much as possible the dependence:

The rehabilitation approach is part of the process of preventing dependence especially when we deal at people's home.

The different way of life for elderly: maintaining at home, care home, nursing home, residential home.

The necessity to coordinate the care and the actions of different professionals and services which deal with very old people and their relatives and environment.

### End of the first day

Review of the day, Discussion and evaluation.

## Start of day 2

Day 2 starts with an overview of today's course and questions about the previous day.

## 5 Experiences and Adaptations when working with elderly people

Trainer: Group of experts:  
Optometrist, ADL-trainer, Mobility-trainer, Psychologist, Rehab worker

### 5.1 Aim of this chapter

- Exchange of experiences of the group of participants with the group of trainers
- Understand the reasons (based on bad vision) for the elderly persons behaviour/problems
- Find access to the elderly clients vision problems
- Conclusions: adaptations while working with elderly visually impaired clients

### 5.2 Required media and material

- Power Point Presentations
- Glasses and blindfolds to simulate vision impairment
- Utensils one needs in daily life (napkins, plates, glasses, books, newspapers, fruits etc.)

### 5.3 Methodology

- Discussion within the group of participants concerning their experiences when working with elderly people and how/if they recognized their clients having bad vision
- Make aware the physiological processes of the ageing eye
- Talk about indicators of bad vision, i.e.

Indicator
Prescriptions for eyes and vision
Has got devices like : magnifier, filter, cane ...
Has got visual problems
Complains about light (too much or not enough), needs lamps, switches off light, lowers blinds ...
Can't recognize people
Gets hurt by obstacles, stumbles, falls down ...
Gets lost or disoriented, gets into danger with vehicles
Is afraid while walking with somebody

<b>Indicator</b>
Doesn't want to go out
Doesn't go any more for shopping or buying something
Is awkward while eating
Refuses some meals like fish, meat with bones
Is not aware of his/her physical appearance (matched clothes, colors, hairstyle)
Doesn't do anymore daily activities like phone calls, reading, writing, playing cards...
Has difficulties to find his or her personal goods
Doesn't know what time it is or can't identify it
Doesn't control his or her property at home
Gets isolated

- Discuss reasonable questions to address the elderly, for example:

Near vision:

- + When did you read a newspaper last time?
- + Do you have difficulty to recognize whether bills you receive are accurate?

Grab range:

- +Do you have difficulty to figure out what's on your dinner plate?

Distant vision:

- + Do you have difficulty to recognize people's faces?
- + Can you recognize people from across the room?
- + Do you have difficulty to recognize stairs?

- Professionals report on how and why they adapt their way of working with elderly visually impaired persons
- Practice: strategies to cope with vision impairment in daily life – try practical arrangements for preparing and serving meals, for mobility and independent moving, for hobbies (books, crosswords ...)

## 6 Light, Environment and Accessibility

Trainer: Low Vision expert

### 6.1 Aim of this chapter

- Understand vision impairment in relation to different light requirements
- Get an impression on how the right lighting improves safe and independent living
- Learn about different light quality and ways of lighting a place
- Get an impression on adaptations and of how to make the environment (home, workplace) accessible for elderly visually impaired persons

### 6.2 Required media and material

- Power Point Presentations
- Videos
- Light Laboratory

### 6.3 Methodology

- Low Vision expert reports on light:
  - ▶ What is light, illuminants, colours and sources of light, mode of illumination
  - ▶ Illumination related to reduced vision, criteria for sufficient illumination, barrier-free living space
- Practical experience in the light laboratory: different light conditions and activities (paperwork, crosswords, newspaper...)
- Examples of adaptations of the environment: illumination at public places, at workplaces, at home (photos, video)
- Discussion: experiences of participants and their intentions for adaptations while working with their elderly clients

## 7 Computer and Internet

Trainer: IT-trainer experienced in computer and internet accessibility standards

### 7.1 Aim of this chapter

- Understand how ICT may support independent living of elderly people
- Understand which adaptations and devices may help elderly visually impaired persons to operate the computer independently
- Learn about common available communication technology (home phones, mobile phones, TV etc.) designed for older users

### 7.2 Required media and material

- Computer with assistive software/devices e.g.:
  - + magnification software
  - + Screenreader
  - + Braille displays)
- Internetaccess
- Electronic devices (phones, remote controls etc.)

### 7.3 Methodology

- Short introduction by the trainer and presentation of different electronic devices
- Practical experience by using a computer:
  - tips and tricks with Windows (font size, contrast, colour, screen loupe...)
  - magnifying software and screenreader (Zoom Text, Lunar, JAWS, Webformator, NVDA...)
- Information and practical presentation on electronic devices especially designed for older users

### End of the second day

Review of the day, Discussion and evaluation, Survey and Feedback

Talk with the group on the subjects they've learned, exchange on ideas the students most like to keep for their own work.

## 8 References

**BLOOM, T.J.M., DIEPEVEEN, C.**, Visually Impaired Elderly, in: Slechtziendheid / T.J.M. Blom; 3<sup>e</sup> dr. – Ridderkerk:. – VI, 180, [14] p.:fig., lit. opg.; ISBN 90-76252-27-0, H.9: Slechtziendheid bij ouderen / T.J.M. Blom en C. Diepeveen, p. 146 – 158; Luiten, 2001  
(Full article see Appendix 2 – Literature)

**CHRISTAEN, M.P.**, Vivre mieux dans un environnement visuel adapté. Association pour le Bien des Aveugle et malvoyants, Genève, 2004  
<http://www.abage.ch/themes/content/EnvironnementVisuel.pdf> (French)  
<http://www.abage.ch/themes/content/Sehbehinderte.pdf> (German)

**HOLZSCHUCH, C., MOUREY, F., MANIERE, D.**, Gériatrie et basse-vision. Pratiques interdisciplinaires. MASSON, 2002

**NOLAN, D.E.**, Normal Age-Related Vision Loss and Related Services for the Elderly, [http://hubel.sfasu.edu/research/donia/impact\\_of\\_low\\_vision.htm](http://hubel.sfasu.edu/research/donia/impact_of_low_vision.htm), 04.07.2008

**ORR, A. L.**, The psychosocial aspects of aging and vision loss. J. of Gerontological social work, 1991, 17 (3/4), 1-14

## Appendix 1 Programme

<b>DAY 1</b>			
Themes	Content	Trainer	Time
Start up	To get familiar with the group		0,5 h
1 Specificities of older people and discussion	<ul style="list-style-type: none"> <li>- From the participants experiences and knowledge, discuss about older people</li> <li>- Identify the issues while getting older : physical and mental fitness, participation in social life, social environment and family</li> <li>- Means or tools to evaluate dependency and ageing process</li> </ul>	Geriatrist	1,5 h
2 Ageing process	<ul style="list-style-type: none"> <li>- Biological and normal ageing process</li> <li>- Pathological ageing process</li> <li>- Psychological aspects of the elderly</li> <li>- Double sensory loss while getting old</li> <li>- Social ageing process</li> </ul>	Geriatrist	2 h
3 Elderly and environment	<ul style="list-style-type: none"> <li>- Consequences of low vision when you are getting old: mobility, leisure, reading, daily life... linked with hearing problems, generally associated, and risk of falling...</li> <li>- Prevention of dependence in the elderly</li> <li>- Coordination of care</li> </ul>	Geriatrist	1,5 h
Review	Discuss what you have learned on the first day	Geriatrist	0,5 h

<b>DAY 2</b>			
Themes	Content	Trainer	Time
4 Experiences and adaptations when working with elderly people	<ul style="list-style-type: none"> <li>- How to get an impression on your older client's visual problems. Interaction of low vision and age. Discuss your experiences with the group,</li> <li>- Different professionals report on how and why they adapt the way of working with the elderly vip, tools, methodology, surrounding to take into account</li> </ul>	Group of experts, Optometrist, ADL-trainer, Mobility-trainer, Psychologist Rehab worker	2,5 h
5 Light, environment and accessibility	<ul style="list-style-type: none"> <li>- Learn about the light conditions' influence on vision, especially for the elderly</li> <li>- How to adapt light and environment to elderly?</li> </ul>	Low Vision expert	2 h
6 Computer and Internet	<ul style="list-style-type: none"> <li>- Electronic devices and tips for handling a computer and the Internet with low eyesight, focused on topics for people above 60</li> </ul>	IT-trainer experienced in computer and internet accessibility standards	1 h
Survey & feedback	Group's talk about the subjects learned	Trainer	0,5 h

## Appendix 2 Literature

(with permission of the authors)

### VISUALLY IMPAIRED ELDERLY

T.J.M. Blom, PhD & C. Diepeveen, MSc

#### Introduction

A chapter examining visually impaired elderly suggests a difference between low vision at younger age and low vision in the elderly. However, with regard to the technique of visual aids no differences exist. The way to find out which visual aids are most suitable is the same for both groups. From a technical point of view this chapter could be disregarded. Focussed on the age distribution of the population requiring visual aids, the old to very old aged population is represented abundantly. In a country like The Netherlands visual impairment is often an age related problem. Over two thirds who request visual-aid advice are older than 65 years. Moreover, the elderly will be a relative larger group of the population in the future, especially people over 80 years-old. From 1990 till 2005 an increase of 39% was expected. In these age categories especially, severe eye diseases occur considerably more often than in the younger population. Concerning the prevalence of eye diseases in the elderly a dynamic cumulative impact occurs. Several estimations have been made about population prognoses, table 1 shows the middle variant (CBS, 1993). People aged above 45 and above 65 will represent a relative large group of our community. The ages 45 and 65 are not chosen randomly, an increased risk of several eye diseases exists. Particular eye diseases as ocular hypertension, glaucoma and diabetic retinopathy occur more often above the age of 45. Estimated increases from 1990 to 2005 are respectively 30%, 28% and 45%. Cataracts and macula-degeneration occur more often above the age of 65, estimated increases from 1990 till 2005 are both 26% (CBS, 1995).

Furthermore to define the elderly as a single group is not appropriate. The elderly do not have concrete corresponding group characteristics as other age groups have, like children, youngsters or adolescents. Concerning child-research it can be advantageous to compare same age groups on their behaviour and possibilities, like in educational research. This is not applicable in research in elderly because more differences than similarities exist between elderly. Some elderly of 90 years old are very independent and actively involved in their environment and some elderly of 60 years old are complete dependant on intensive care. Despite the differences among the elderly, issues concerning the elderly should be considered. There actually are very active people of 90 years-old, but the chance of being needy at ninety years old is greater than at sixty years old. For this reason, statements about the elderly can only be made in statistical terms and no hard conclusions can be made on an individual base. The only strict criterion is that the elderly are older than younger people. It appears futile but it is often the criteria one is judged upon. Subsequently, the elderly are generally no longer involved in economic society. Furthermore, in the elderly the process called ageing is more progressive than in younger people. The ageing process does not always occur in the same way or at the same pace.

## **Identity and balance**

Everyone has a certain identity and everyone tries to maintain that identity, despite any kind or amount of ageing. Any help damaging the identity will not be appreciated. Besides the identity people also try to maintain certain balance in their life. That balance will not persist automatically.

Identity or self image is the idea or image one has about oneself. It is the combination of personality characteristics and behaviour styles which are experienced by one.

### ***Identity characteristics***

- A) Our personality is experienced as a constant: we know we change permanently during our life. A child's perception is totally different from an adult's one, like a student's perception differs from a parent's one, and an elderly perception differs from a middle-aged one. Nonetheless, we feel that we constantly remain the same person. We keep acting the same although situations differ all the time. Despite changes, permanency is a feature of identity.
- B) We experience ourselves as unique. It's difficult to exemplify the uniqueness of the personality to someone else. Everyone feels his or her own identical identity, which is totally different from others and which is fundamental to his or her behaviour and relationship to others.

It can be concluded that the notion of identity is diffuse. Therefore, it is meaningful to discuss a few parameters or components which shape the notion of identity. It is possible to describe many self images with limited different fundamental components. One person uses many typical X-components to form his or her identity (for example financial profit), while others wish many typical Y-components (many education for example). Important is that everyone has an identical and unique pattern of components which in mutual ways create an absolute individual identity. Tempelman (1986) lists eleven components:

1. Physicality
2. Personality
3. Gender
4. Personal history
5. Values and standards
6. Ideals
7. Activities
8. Participation, membership of a group
9. Knowledge, skills and level of education
10. Interests
11. Material property

### **Unstable balance**

In every phase of their life many influences affect people. Those influences can make it difficult to maintain a balanced state. Depending on the individual, the amount and intensity of influences can be valued differently. Based on the balance of an individual Tempelman (1986) formulated the model of unstable balance. The model of unstable balance tries to view systematic at forces which can disturb or stabilise the balance. Following three parameters determine the stability of the balance:

1. Physical state
2. Mental state
3. Social state

These three parameters are in balance with each other. The term unstable balance refers to the fact that balance is not stable and changes when one of the parameters changes. So the parameters are not independent. Changes in one parameter can effect changes in the other. For example, social problems, like conflicts with family members or stress, can cause physical problems such as stomach ulcers. In addition, social problems such as loneliness can be a cause of mental problems like fears or phobias. One of the features of getting older is that the interdependence of the parameters increases. In contrast with younger people, influenza can have disastrous consequences in the elderly. In some situations a relatively small change in one parameter can cause a large change in the other. Complete loss of balance is the consequence (decompensate).

### **Ageing**

In conclusion, people have an identity and their balance is maintained by their physical health, mental health and social capabilities. Both processes are influenced by ageing. Last statement can actually not be made as long as it is not clear what the definition is of ageing. Ageing and getting older are not identical. Ageing means that a complex of irreversible processes take place in the organism during life after maturity.

Still it is a complicated gerontologic issue whether physical changes can be attributed to ageing or not. Therefore age-related changes have to meet the following four criteria before it can be considered part of the basic ageing process. Age-related changes are:

- A) Universal. This rules out hereditary changes and environmentally induced changes.
- B) Intrinsic. It must be attributable to changes inside the organism.
- C) Progressive. Age-related changes generally occur gradually over time. During development processes occasionally slow down over time and stop at the time of maturity.
- D) Deleterious. Most age-related changes contribute to the increased probability of death. This criterion eliminates many developmental processes, because those age-related changes are not deleterious and do actually improve survival capacity.

### **Physical ageing**

Ageing is as well a physical process as a mental process. Physical ageing is a loss of function of all organs. The more complex the (system of the) organ, the sooner loss of function will happen. Physical ageing can be caused by extrinsic factors, like quality and composition of nutrition. People who eat poor and limited food age more quickly than people who eat high-quality and diverse food. Climate is also an influential factor as ageing processes go slower in temperate areas than in extreme cold or hot areas. In addition, it is assumed that air pollution and other kind of environment pollution also contribute to ageing. The longer ageing occurs, the more susceptible people are to extrinsic factors, for example an increase of infections. Also intrinsic factors, like cell loss, exhaustion of essential elements (elasticity) and molecular changes can cause ageing. Intrinsic factors can also affect health by a speeding up ageing process, just like metabolic disorders (as diabetes or thyroid diseases) can lead more quickly to mental confusion, dementia and psychiatric disorders in the elderly.

Most prominent physical features of ageing are:

- 1) Integument: less elastic, drier and pigmentation spots.
- 2) Skeletal system: osteoporosis, decrease in length.
- 3) Muscular system: decrease in muscle mass, partly replaced by fat.
- 4) Circulatory system: arteriosclerosis (thickening and hardening of the arterial walls, thrombosis and cerebral infarcts).
- 5) Respiratory system: decrease in vital capacity (total amount of air that can be moved in and out of the lungs). Obesity, decreased elasticity, and changes within the blood vessels and skeletal system may contribute to this.
- 6) Nervous system: one year after birth the amount of nervous cells does not increase anymore. Research indicates a loss of weight of the brain of 6-7% between the age of 25 and 75. An important measurable neurological change is a reduction of nerve conduction velocity (10%).
- 7) Sensory system: changes in the visual, auditory, tactile and olfactory system.

### **Ageing of the eyes**

Visual impairment is one of the fundamental ageing processes. As one ages, several degenerative changes can be observed in the structure and, therefore, the function of the eye.

#### *Cornea*

The cornea tends to flatten and often the corneal epithelium degenerates. Both changes can impair vision, the former through astigmatism and the latter through severe discomfort. (...)

#### *Sclera*

The sclera becomes less elastic with age and turns more yellow because of the accumulation of fat. A decreasing elasticity during the ageing process is also found in several other tissues.



### *Iris*

Similar to other tissues, the iris thickens and becomes more rigid with age. This resolves in reduced dilatation and a smaller opening of the pupil. (Atropine induces pupil dilatation artificially.)

### *Anterior chamber*

Due to the thickening and sclerosis of the trabecular meshwork in the angle of the eye's anterior chamber, there can be some obstruction in the canal of Schlemm, which drains aqueous fluid from the eye. Fortunately, a concomitant decrease in the production of aqueous fluid seems to take place, so that intraocular pressure is not normally elevated.

### *The lens*

The lens of the eye continues to grow with age and enlarges, becomes stiffer, and tends to turn yellow. The result is a decreased accommodation and an increased opacity of the lens. The yellowing also results in a decreased colour perception of blue colours (Pokorny et al., 1979) and opacities lead to cataract and loss of contrast sensitivity.

### *Choroidea*

Hyaline or colloid bodies develop in the layer of blood vessels known as the choroids and show up as rounded, yellow spots in the retina (Feeney-Burns et al., 1990).

### *Retina*

As a combined result of the ageing processes in the lens and iris, less light reaches the photoreceptor cells of the retina, especially in the peripheral field and in the macula (reduces visual acuteness).

### *Vitreous humour*

In later years, the body loses hydration and sometimes detaches from its connections to the retina, a situation which can eventually lead to a more serious retinal detachment from the choroids. An additional complication can be haemorrhaging of retinal blood vessels into the vitreous. Another common occurrence with vitreal degeneration is the appearance of opacities in the vitreous that take the form of dots, lines, or cobwebs and are referred to as "*mouches volante*" or "floaters". Although annoying to the individual, the presence of "*mouches volante*" ("floaters") are normal and not a serious health concern.

### *Combined result*

The combined result of age-related changes in the iris, retina and media is that less light gets to the photoreceptor cells of the retina. Therefore, older people tend to need more intense light to see as well as they once did.

### *Adnexa*

Dry eye is another age-related complication associated with the lacrimal apparatus. Dry eye is a condition resulting from a decrease in the secretion of tears from the lacrimal glands and is seen more often in elderly women than in elderly men. The result can be discomfort and possible inflammation. The usual treatment, hourly



administration of artificial tears, is not always a satisfactory solution to the condition.

### ***Mental ageing***

In addition to physical ageing mental ageing also occurs. Several relevant parameters of mental ageing are:

1. Evaluating the balance of life for the second time. First evaluation happens around middle age and chosen lifestyle will persist until it becomes dysfunctional, around the age of 65.
2. Change of life perspective. Functioning is effected by experiences in the past. Long-term thinking decreases and the notion of future perspective gets another meaning.
3. Maintain the identity. More energy is necessary to maintain the identity, because of all physical, mental and social threats.
4. Personality. A lot of research has been done on gerontology and it can be concluded that differences between individuals increase with age. There are more differences within age groups than between age groups. Human beings are unique, but older people appear to be even more unique. Overall life situation, including biographical and social elements, seems to be more crucial on personality characteristics than physical age is. Research suggests an integrated personality develops until the age of 50 or 60. The elderly tend to avoid risks and, although indications also point out a certain declining flexibility, this tendency is not equal to rigidity. In problematic situations they prefer known solutions, even if they are inactive.
5. Intelligence doesn't increase or decline with age, but changes. In particular, the speed related parts of intelligence are affected by nervous system changes. Verbal intelligence remains unchanged or even increases with age. Intelligence at an older age depends on the following factors: original intelligence, education, stimulating (work) environment, health (less healthy people score lower on all parts of intelligence) and a positive attitude toward the future.
6. Ageing includes a decrease of memory and the ability to learn. Problematic ageing, which can be caused by loneliness, partner loss or depression, is associated with an increase in mental confusion. There are a significant number of single elderly with feelings of loneliness and insecurity, and elderly with mourning, loss and depressive problems. Related confusion is marked by:



- Tempo loss: slower formulations, apathy and loss of initiative.
- Difficult imprinting: talk a lot about the past and rely on old solution strategies, which can be wise as well as rigid.
- Emotional instability: a diminishing *perception*, depressive features increase suicide chances.

### ***Ageing of the visual function***

Age-related sensory and perceptual changes can greatly influence daily functioning. Keep up a common lifestyle and maintaining balance can be very difficult, and ageing processes may influence these. Following ocular functions change with increased age and lead to visual impairment:

#### *Visual acuity*

It is presumed visual acuity declines gradually in a linear way between the age of 30 and 80. A famous longitudinal research at Fozzard (University of Baltimore, USA) tested a randomized population and demonstrated an average visual acuity of 1.4 at 25-year old people. Most people older than 80 have a visual acuity just above 0.5 and 12 % have a visual acuity of 0.4 or less. As a result of decreased visual acuity, road signs and instructions, for example, have to be closer in order to be read. Same counts for rephrase accommodation, but most reduction occur between the age of 45 and 70.

#### *Contrast sensitivity*

Visual acuity is investigated with the help of *low vision charts*. These charts measure someone's ability to distinguish between subtle details in a situation with optimal lightning and maximum contrast. Such a situation hardly ever occurs in daily life because the contrast of lightning is much lower then. The contrast sensitivity value is the required brightness difference between the object and its background to recognize an object. That difference grows with age. Studies have shown that, with low contrast photos, the elderly have more difficulties with recognizing faces. Significantly more time was needed before recognizing. Marron and Bailey (1982) demonstrated that deteriorated mobility, caused by visual impairment, more often is a result of low contrast sensitivity or a small vision field, than low visual acuity. When someone can not judge the depth of steps anymore, for example, it is more often a result of contrast sensitivity than of low visual acuity.

#### *Luminance*

As mentioned before, a result of changes in the media and iris is that less light reaches the retina.

This can partially be compensated by increasing the illumination in the environment or using light separately. Even with a common visual acuity, a typical sixty-year-old person requires approximately twice as much illumination as does a twenty-year-old. A typical eighty-year-old even needs approximately three or four times as much. During counselling, sometimes an optometrist prescribes visual aids in a different lighting situation as the home environment. Subsequently the visual aids may not have the right effect. Hence, it is important to take into account the lighting of the home environment.

Practical consequences of age-related changes in visual acuity, contrast sensitivity and luminance become clear when drivers were asked to read road



signs at night. The 60-and-over-age group required 75% less distance to read a road sign than people around the age of 25.

### *Colour vision*

Research has consistently reported, as a result of a yellowing lens or retina affections (as glaucoma), a differential loss of discrimination for the colours of short wavelengths, such as green, blue, and violet. Colours with longer wavelengths, such as red, orange and yellow, may seem less faded (Pokorny et al., 1979).

### *Depth vision*

Another important aspect of human vision is depth perception. The localization of objects in the visual field can be made using different cues of relative object size, overlay of near or far objects, light, shadows, and differences in colour and texture. Interpreting and integrating different visual stimulants is usually an unconscious process and provides a lot of information about the person related to his environment. To move from one point to the other this is essential. A loss of depth vision can have negative consequences to mobility, especially at elderly, when falling can lead to severe complications. Instead of age, it is reliable that impaired depth vision is a function of the parameter reduction mentioned above.

Physiological changes have functional consequences. A few will be exemplified below.

### *Perception*

One of the most obvious aspects of reduced visual perception is the reduced reading speed, usually noticeable when reading subtitles. Elderly frequently complain that, as a result of reading difficulties, there is no time left to see the images. Also changes in the other sense organs contribute to vision difficulties, like hearing, smell, taste and touch (reduced smell, taste and hearing of high and low). The individual can become isolated because of sense reduction, and that may lead to complex psychological reactions as depression, apathy and loneliness.

Another aspect is more difficulties with accomplishing complex visual functions. Complex visual functions include organizing, processing and interpreting of visual information. Visual searching problems derive from ageing. More time is needed to scan the environment and filter relevant information (as searching a grandchild on a group photo). Elderly are presumed to have more problems with ignoring irrelevant stimuli.

Different studies demonstrate significant changes in visual perception of more complex patterns at ageing (Ordy & Brizzee, 1979). Visual perception does not only refer to recognizing complex patterns, but also to visual memory and visual learning. However, how ageing is related to brain changes, personality changes or psychosocial changes is unclear.

## **Prevalence of visual impairment and blindness**

In the Netherlands extensive research has been carried out examining physical disabilities using a sample of 55,000 of all ages. (CBS and Nimawo, 1990). Respondents were asked to fill in a questionnaire about bodily functions and arrange them according to importance. 86% of the participants rated visual faculty as most important. The research also indicated that over 30% of the participants lacked something physically. These participants were then questioned orally to evaluate whether they met the criteria of disability. Different questions determined also how serious the disability was. Regarding visual impairment, people could choose the following statements:



- a. I only can distinguish light from dark.
- b. I cannot read large headlines or distinguish illustrations.
- c. I cannot read usual headlines (10 pts. letters).
- d. I cannot recognize someone's face on the other side of the room.
- e. I have (some) difficulties with seeing.
- f. I do not have difficulties with seeing.

When a or b was chosen, the researchers called the visual impairments 'extremely severe', c or d was called 'severe', e 'light' and f 'no impairment'.

Table 2 shows that, extrapolated to the total population, 625,000 people lack something visually. Even 0.4% of the population (59,000 persons) assessed their visual impairment as extremely severe. Furthermore, table 3 shows an age dependency: older people report more problems.

Besides visual defects, the research also focussed on walking impairments, hearing impairments and overall fitness. Table 3 also shows that impairments increase with age. Combinations of physical and visual impairments are shown in table 3b. Within the categories 'severe' and 'extremely severe' visual impairment (estimated at 158,000 persons), 56.9% reported at least one additional impairment. The research suggests that a substantial percentage of people who visit the optometrist for visual impairment also have other physical impairments, which is important with counselling. It appears that in approximately 18% of cases, the advice given is inadequate, like using the ears more than before through taped books.

Remarkable in the CBS- and Nimawo-research is the almost consequent gender difference. At every age women show more often impairments than men. However, the higher the age, the smaller that difference. In the age category 'older than 85' men even score higher than women.

### ***Elderly in need of help***

The research mentioned above was based on a random population. A different research (Hoogmoed et al., 1990) was typically focussed on elderly in need of help. On a geriatric department in a general hospital (GAAZ) 99 elderly were tested on the prevalence of visual disorders. Hospitalized participants entered the hospital because of other diagnosis than visual impairment, which makes the research representative for elderly on a GAAZ with co morbidity. Also patients with light to moderate memory disturbances were included. 64 Participants did not report visual complains, 30 participants did and 5 participants reported an unclear answer. 73% of the group who reported 'no visual disturbances' (47 persons) had a normal vision. Remaining 27% is noticeable visually impaired. The participants who did report visual disturbances (30 persons), 67% of them was diagnosed with an evident handicap and 33% was not.

Hoogmoed correctly concludes that the questionnaire is not a reliable method to discover visual impairments. It is remarkable that little to no relation exists between visual impairment and problems with daily activities and mobility.

An odd phenomenon with of age diseases and disorders is the difference between the professional's diagnosis and the individual bodily experience. The amount of professional diagnosis shows little correlation with the subjective well being. Recent research shows that approximately 50% of people above 65 evaluate their health as 'well'. Among those who report health problems, just retired men and women feel less well than the elderly above 80 years old. Just retired men



feel less well and the eldest men most well. So, elderly above 80 years old evaluate their health more positively than younger elderly. A clear positive correlation exists between objective diagnosed diseases and age. People above 80 years old have significantly more diseases than people around 65 years old. A clear (second) correlation was found between bad physical health, bad mental health and reduced social networks. In other words, lonely elderly report worse mental health and have significantly more diseases than elderly who have social contacts on a daily basis.

### **Prevalence of visual impairment and blindness in the Dutch elderly**

As shown by the study of Hoogmoed et al., a difference between objective impairments and subjective limitations accounts especially in the elderly. Hence, questionnaires focused on the opinion of the (elder) participant indicate subjective experience instead of an objective diagnoses.

An extensive study has been done in Rotterdam among the population above 55 years. They attempted to abolish the methodological complications of self report as mentioned above. In all 7.983 participants were questioned about possible vision problems and 6.775 of them were extensively ophthalmological examined. The ophthalmological examination includes refraction, *visusbepaling*, *oogdrukmeting*, *spleetlamponderzoek*, *fundusscopie*, *fundusfotografie* and eye-range research. With this, the research is the only elaborated study in the Netherlands which collects both subjective self report data and objective ophthalmologic data. The study no longer defined visual impairment and blindness by subjective data, but the principle is the objective ophthalmologic data. The latter are tested on the WHO-criteria of visual impairment and blindness. Mentionable is the Working group on the prevention of blindness, who invented the WHO-criteria, mainly includes ophthalmologists. It is thought that the criteria are too strict because some people who are not able to engage in certain activities because of visual impairment do not meet the criteria. Because of this criticism and in comparison with other studies the authors use the US-criteria of visual impairment and blindness. A visual acuity between 0.5 and 0.1 on best eye means visual impairment and a visual acuity below 0.1 on best eye means blindness.

As shown in table 5, according the WHO-criteria, 1.9% of the participants in the Rotterdam study is visually impaired or blind, and according to the US-criteria 4.3% is. It is interesting to combine these results with Klaver et al.'s research (1998) and the population prognoses of 1993 (CBS), and to calculate the extrapolated amount of visual impaired and blind Dutch elderly. An additional complication is that the middle variant of the prognoses only includes people older than 65 years old. In 2000 this is 13.8% of the population (over 2.2 million). When leaving the youngest category of Klaver et al.'s study out of consideration, an estimation of people above the age of 65 can be made. Dependent on the (WHO-

or US-) criteria, between 2.2% and 5.9% is visually impaired and between 0.7% and 1.1% is blind. In all, this means that between 64,000 and 154,000 people above 65 are visually impaired or blind, which does not differ a lot from the estimation of the CBS- and Nimawo research (158,000 of the population). Klaver et al. mention their estimation has a somewhat low prevalence because of their population, and because people who did not respond appear to be relatively more often visually impaired than people who did respond.

In the Rotterdam study, a gender difference in prevalence is also examined. Different to the CBS- and Nimawo research, no significant gender difference of



visual impairment has been found in this study. Above the age of 55, women and men are equally visually impaired.

### **Causes of visual impairment and blindness in the elderly**

Table 6 shows that cataract is the main cause of visual impairment in elderly, like former research also indicated. Generally, it is believed that cataract is not a main cause of visual impairment anymore because of the current availability of good therapy. Klaver et al. concluded that more people with cataracts than presumed do not visit an eye-doctor. A more active ophthalmological policy may prevent visual impairment by cataracts. Focussed on the causes of visual impairment of people who visit a low-vision practice, many people with cataracts will not consult because of visual aids.

Second distinct issue is that diabetic retinopathy is less often a cause of visual impairment than it was thought. The authors emphasize diabetes mellitus does appear often, but it is not an important cause of visual impairment.

### **Conclusion**

Adaptation of visual impairment is very diverse in the elderly and the intensity of visual deterioration varies per individual. That is why it is not only important to know the intensity of visual deterioration, but also to focus on the effects of visual deterioration on daily functioning (Rumney et al., 1994). The process of managing the deterioration and seeking to master the conflicts of daily functioning is referred to as coping.

Disorders as reduced *scherp zien (contrast sensitivity?)*, reduced colour vision and reduced depth vision do not necessarily lead to enormous limitations, but from a psychological point of view they do can have radical social consequences. Often certain adaptation occurs spontaneous when deterioration is noticed. When adjustment appears to be insufficient, low-vision visual aids, coping skills and environmental adaptation can maintain an acceptable balance for a long time, promoting independent functioning. Verstraten (1993, 1994) notices correctly that it is important that eye care specialists and service providers inform the elderly about possible visual assistance and aids, and motivate them to use the low vision devices. After all, only when knowing the possibilities, good decisions can be made.

Great variance exists among the elderly concerning plasticity, social expectations and desires about daily tasks. Therefore, professional attention does not only need to focus on measuring visual abilities and suggesting visual aids, but especially focus on lifestyle, interests and personal goals of the elderly person. For example, focus on the activities of the individual that he or she would like to, and is able to, manage.

The assumption that reduction in visual abilities always leads to the same limitation in activities is not true, especially for the elderly.

## References

- Bellshaw, B., (1993). *Depression in elderly visually impaired people*. New Beacon: 77 pp. 1 – 4.
- CBS, (1993). *Bevolkingsprognose; middenvariant*. Centraal Bureau voor de Statistiek (publ.), Voorburg.
- CBS, (1995). *Statistisch jaarboek*. Centraal Bureau voor de Statistiek (publ.), Voorburg.
- CBS and Nimawo, (1990). *Lichamelijke beperkingen bij de Nederlandse bevolking, 1986-1988*. (publ.) Centraal Bureau voor de Statistiek, Den Haag.
- Diepeveen, C., Teurlings, L. and Verstraten, P. (2000). Ooit gezien, maar nog niet uitgekeken. Bohn Stafleu van Loghum (publ.), Houten.
- Feeney-Burns, L., Burns, R.N. and Gao, C.L., (1990). *Age related macular changes in humans over 90 years old*. Am. J. Ophthalmol.: 109 pp. 265 – 278.
- Haegerstrom-Portnoy, G., Schneck, M.E. and Brabyn, J.A., (1999). *Seeing into old age: vision function beyond acuity*. Optom. Vis. Sci.: 76 pp. 141 – 158.
- Hoogmoed, J., (1990). *Visusstoornissen op een geriatische afdeling van een algemeen ziekenhuis*. Bull. Ned. Ver. Geriatrie: 3 pp. 34 – 36.
- Klaver, C.C.W., Wolfs, R.C.W., Vingerling, J.R., Hofman, A. and Jong de, P.T.V.M., (1998). *Age specific prevalence and causes of blindness and visual impairments in an older population. The Rotterdam study*. Arch. Ophthalmol.: 116 pp. 653 – 658.
- Marron, J.A. and Bailey, I.L., (1982). *Visual factors and orientation-mobility performance*. Am. J. Optom. Physiol. Opt: 59 pp. 413 – 426.
- Pokorny, J., Smith, V.C., Verriest, G. and Pinckers, A.J.L.G., (1979). *Congenital and acquired colour vision defects*. Grune and Stratton (publ.). New York.
- Rumney, N.J., Fryer, A. and Leat, S.J., (1994). *Outcome of low vision aid provision: effectiveness of a low vision clinic*. Optom. Vis. Sci.: 71 (3) pp. 199 – 205.
- Tempelman, C., (1986). *Zelfbeleving bij ouderen*. Van Loghum Slaterus (publ.), Deventer.
- Verstraten, P.F.J., (1993). *Hulpverlening aan blinde en slechtziende ouderen*. In: Blom, M.M., Kuin, Y. and Hendriks, H.F.J. (eds.), *Ouder worden*. NIZW (publ.), Utrecht, pp. 389 – 393.
- Verstraten, P.F.J., (1994). *Meet the elderly*. In: Kooyman, A.C., Looijestijn, P.L., Welling, J.A. and Wildt van der, G.J. (eds.), *Low vision. Research and new developments in rehabilitation*. Studies in health technology and informatics. IOS-Press (publ.), Amsterdam, pp. 408 – 410.
- Verstraten, P.F.J., (1994). *Motivation as a key factor in rehabilitation of visually impaired elderly*. In: *Proceedings of the EBU conference on the situation of the elderly blind and partially sighted in Europe*. European Blind Union (publ.), Paris, pp. 73 – 80.
- W.H.O., (1979). *Study-group on the prevention of blindness*. In: *Technical report series*. World Health Organisation (publ.), Genève.
- W.H.O., (1992). ... World Health Organisation (publ.), Genève.

**Tables**

Year	1990	1995	2000	2005
Older than 65 (%)	12,5	13,4	13,8	14,2
Expension index	100	107	110	114
Older than 45 (%)	33,5	36,2	38,2	40,6
Expension index	100	108	114	121

Table 1. Middle variant of obsolescence of the Dutch population (CBS, 1993). Expected percentages of the population above 65 years old and above 45 years old.

**A) Visual Impairments.** To determine the seriousness, participants could choose one of the following answers.

Extremely severe

- a. I only can distinguish light from dark.
- b. I can not read large headlines or distinguish illustrations.

Severe

- c. I can not read usual headlines.
- d. I can not recognize someone's face on the other side of the room.

Light

- e. I have (some) difficulties with seeing.

**B) Percentage of the respondents (sample 55,000) with visual disturbances, and amount of people extrapolated to the total population.**

Value judgement of the visual impairment Amount

	Answer	%
Extremely severe 16,000	a	0.1
Extremely severe 43,000	b	0.3
Severe 70,000	c	0.6
Severe 29,000	d	0.2



Light	e	3.4
467,000		
Total		
625,000		

Table 2. (CBS and Nimawo, 1990).

A) Percentage of respondents with physical impairments per age-group. The total amount of people was 100% in every sample group.

Age	Vision	Audition	Walking
Overall			
fitness			
25-34	0.7	0.4	0.7
0.8			
35-44	0.4	0.9	1.1
1.0			
45-54	0.9	1.9	2.0
2.6			
55-64	1.4	2.5	3.9
5.6			
65-74	3.1	5.1	8.4
8.9			
75-84	7.1	15.6	18.5
15.2			
85+	24.2	35.0	45.3
17.1			

B) Percentage of extremely severe visual impaired people, with additional impairments.

Difficulties with:	%
Walking	
25.7	
Rising or sitting	
14.3	
Keep standing up or sitting	
22.6	
Arm- and hand use	
13.0	
Audition	
18.0	



Speaking  
4.2  
Overall fitness  
19.0

Table 3.

Age (years)	Visual impaired women (%)	Visual impaired men (%)
25-34	0.4	0.4
35-44	0.6	0.2
45-54	1.2	0.6
55-64	2.1	0.7
65-74	4.0	1.9
75-84	7.8	5.8
85+	22.9	27.2

Table 4. Gender differences in visual impairments per age category.

W.H.O. (1979, 1992) criteria:

0.3 > visual acuity > 0.05      low vision  
20° > visual field > 10°  
0.05 > visual acuity              blindness  
10° > visual field

U.S. Criteria

0.5 > visual acuity > 0.1      low vision  
0.1 > visual acuity              blindness

Age	impairment Amount	Blindness		Visual
		W.H.O.	U.S.	W.H.O.
55-64	2,561	0.1	0.2	0.1
65-74	2,408	0.2	0.2	0.4
75-84	1,398	0.6	1.4	2.6
85+	408	3.9	5.9	11.8
Total 55+	6,775	0.5	0.8	1.4



3.8				
Total 65+	4,214	0.7	1.1	2.2
5.9				

Table 5. Prevalence of visual impairment and blindness among the elderly from (the neighbourhood of) Rotterdam. Numbers are percentages of the age groups (age group is 100%) (Klaver et al., 1998).

	Blindness (visual acuity < 0.05)	Visual impairment (0.3 > visual acuity > 0.05)
Age-related macular degeneration	58	25
Cataract	6	36
Primary <i>open-hoek</i> glaucoma	8	2
<i>Myope</i> degeneration	6	6
Optical neuropathy	6	1
Retinitis <i>pigmentosa</i>	3	-
Diabetic retinopathy	-	1

Table 6. Main causes of visual impairment and blindness among people above the age of 55 and from (the neighbourhood of) Rotterdam Numbers in the left column are percentages of the total amount of blind people and numbers in the right column are percentages of the total amount of visually impaired people.