A new low vision centre in a government hospital in Makassar, Indonesia

Adelina Titirina Poli1, Masita Rahmatullah2, Karin van Dijk3

1Hasanuddin University Hospital, MAKASSAR, Indonesia
2Yayasan LAYAK, JAKARTA, Indonesia
3CBM, AMSTERDAM, Netherlands

'UNHAS', a university hospital in Makassar, started a low vision clinic in late 2015 (the first government hospital in Indonesia to do so). Financial support was obtained from ‘Seeing is Believing’ and ‘CBM’. The team (ophthalmologist, rehabilitation worker) cooperated closely with in-house refractionists and a pediatric ophthalmologist. Patients paid regular hospital fees, but subsidies were available for spectacles and magnifying devices. During 2016 a total of 143 clients received low vision care: 57% were male, 66% were children 0-18 years (majority 0-6 years). Of the children, 19% had additional disabilities. Across all clients, 43% lived more than 2 hours travel time from the hospital and 76% were referred from within ‘UNHAS’ or by other medical services. The main causes of low vision were retinal disorders (34%), refractive errors (23%) and cerebral visual impairment (13%). Distance VA (where measurable) improved by 0.15 logMAR (SD 0.19); 78% of clients were prescribed distance spectacles (21% presented with spectacles). Near VA improved by 0.17 logMAR (SD 0.22); 42% of clients were prescribed a magnifying device for near vision tasks (1% presented with a magnifier); over 90% obtained magnifying devices, 69% of which were provided unsubsidised.

Initial numbers accessing the service were low but active advocacy by the team within ‘UNHAS’, in nearby hospitals, in (special) schools and within organisations of and for people with disabilities made the new services known to a wider public. Further specialised training of the team to improve skills to assess children with additional disabilities, and by the team of local rehabilitation and education programs (expected to train clients after clinical low vision care) in low vision have been planned.

Four years activities review by means of an Electronic Health Record

Valeria Silvestri, Marco Sulfaro, Margherita Guidobaldi, Paola Piscopo, Filippo Maria Amore

National Centre of Services and Research for the Rehab of Low Vision Patients, ROME, Italy

Aim: The aim of this study was to describe four years activities in a low vision rehabilitation center based on a multidisciplinary approach by means of a new Electronic Health Record (HER) in order to highlight the benefits.

Methods: Clinical and functional data of patients assessed at our low vision center were collected and analyzed retrospectively through the use of nLIFE, a new EHR. nLIFE is easily customizable to follow different needs, scenarios from stand-alone configuration to big networks and to set interactive home training. nLIFE is updated with different modules including advanced search ability and scheduling of resources to implement a full field approach to medical data management. Eye disease, National Eye Institute 25 Item Visual Function Questionnaire (VFQ-25), Best Corrected Visual acuity (BCVA), Contrast Sensitivity (CS), Fixation stability, Microperimetric retinal sensitivity, Reading Speed (RS) and aids prescribed were evaluated. All data came from different modules and tools and were processed in an ad-hoc database.

Results: A total of 909 HERs of patients who attended the low vision center between January 2013 and December 2016 were included in the analysis. Mean age was 68 years (S.D. 19.2). Age related Macular Degeneration (AMD) was the most frequent disease with a prevalence of the atrophic one. BCVA was collected for 1288 eyes with a mean of 0.84 (± 0.46) LogMAR. CS of 1062 eyes was 0.74 (±0.7) LogC. 503 patients underwent a specialized psychological assessment. Moreover, VFQ25 was completed by 401 subjects. Glare and reading were the most frequent demands.

Conclusion: EHR appears a valid tool for supporting clinicians. nLIFE is based on the state of the art of web technology with the possibility to receive data from different sources and multidisciplinary modules. It can review clinical and research data locally or through Internet and by using all device type.

Three guides for innovative clinical practice

Bernadette Gayouyère
Institut Nazareth et Louis-Braille, LONGUEUIL, Canada
Bernadette Gavouyère M. Sc. en science de la vision, réadaptation en déficience visuelle, École optométrie, Université de Montréal. Membre clinicien/intervenant au CRIR. Spécialiste en activités cliniques, installation INLB, CISSS Montérégie-Centre, Longueuil, Québec, Canada.

The Deaf-Blind Program at the Institut Nazareth and Louis Braille and the Raymond Dewar Institute offer super-specialized and diverse services for people of all ages who have visual and hearing impairments. This poster presents three guides to our best professional practices:

Hearing localization training program for clients with deafblindness: Julie Dufour, audiologist and Agathe Ratelle, specialist in guidance and mobility, developed the “Training program for auditory localization for clients with deafblindness”, based on their clinical experience, on the evidence and results of their research projects. With their expertise, many people can now move independently using their visual or auditory abilities.

Intervention curriculum for the acquisition of a guide dog for people with deafblindness: Michel Bradette and Valérie Martel, specialists in guidance and mobility, have been working several years to develop a guide for multidisciplinary teams involved with a deaf-blind people who wishes to have a guide dog. It contains fact sheets for professionals and users to prepare for the use of a guide dog.

Live daily with a deaf-blind child: a practical guide for parents and caregivers: Gilles Lefebvre, Deaf-Blindness Counselor, Marie-Claude Lavoie, Guidance and Mobility Specialist, and Joanne Thibodeau, Occupational Therapist, have written this guide to inform parents of the impact of deafblindness on the overall development of their child. The guide also provides concrete ways to help them maximize the development of their child on a daily basis.

None

P004

Management of patients with Low Vision within an Ophthalmology Department of a General Hospital
Betty Giselle Arteaga
HOSPITAL ITALIANO DE BUENOS AIRES, BUENOS AIRES, Argentina

Background:
The Low Vision Rehabilitation Service of the Italian Hospital of Buenos Aires (Argentina) is one of the few existing in the Argentine Republic and until now the only one functioning as part of an Ophthalmology Department inserted in a General Hospital of High Complexity. The sector receives referrals, and works in permanent contact with different medical, social and management areas of the Hospital. It participates actively in the training of medical residents in low vision as well as educational activities towards the community.

Aim:
Promote the care and proper management of low vision patients within an Ophthalmology Service. Inform about the organization of a Low Vision and Visual Rehabilitation Service within a highly complex Hospital.

Methods:
A retrospective statistical analysis was performed on the number of patients treated and the therapeutic interventions carried out by the low vision multidisciplinary service.

Results:
Between November of 2015 and November of 2016 a total of 836 consultations were realized to 463 patients. Our team of Low Vision is conformed by a low vision specialized Ophthalmologist; Visual rehabilitators; Optical technician; Psychologist; Socio-sanitary team; Technology teacher; and Orientation and Mobility specialist. On average 1.5 medical consults and 2 visual rehabilitation consults per patient were conducted. 73.48% of the patients had ARMD, other important causes of visual impairment were Glaucoma and Neuropathies. The 72.3% were female and 27.7% were male. The average age was 75.74 years. These following interventions were performed in order of frequency: rehabilitation in reading; optical filters; legal certificate of disability; psychological support; and orientation and mobility. The duration of complete care was on average 2 months. Conclusion:
The possibility of having a Low Vision Service within an Ophthalmology Department in a General Hospital facilitates the direct access to visual rehabilitation both for physicians and patients within a comprehensive care medical environment.

P005

Does the experience of former clients contribute to an effective rehabilitation?
Els de Keijzer
Royal Dutch Visio, BREDA, Netherlands

Visio intends to make more and better use of the power of the former client in its services, in addition to the professional staff, by using their experience in living with a visual impairment.
Research has shown the importance of the use of subject matter experts. Clients find recognition which can give them the motivation, support and encouragement that contributes to an effective rehabilitation. The small-scale pilots take place within the team adult care of Visio Rehabilitation & Consulting in Breda and Den Haag and focus on two roles: 1. Buddy; a representative of Visio that will share her/ his expertise to support clients (before and) during the rehabilitation process. 2. Ambassador; a representative of Visio, that will share her/ his expertise for promotional purposes.

A competency profile has been prepared for both functions. After recruitment through internal and external channels, 15 people were chosen: one ambassador, four buddies and ten people who combine both functions. They followed a course, consisting of a base module, a buddy module and an ambassador module. This course and the course book are evaluated and adjusted, with specific attention for empowering the buddy’s and ambassadors. During the pilot, the experts are guided by a coach through individual consultations and they will join peer review meetings. The coaches (employees of Visio) followed a training by an external party to be well prepared for these tasks. A student will measure the effects for both clients, the organization and the experts themselves through an evaluative research from January to June 2017.

In addition, there will be developed a policy document after the pilot which will outline a clear longer term framework for structural use of subject matter experts in all facets of the Visio Services.

P006

Barriers to Uptake of Low Vision Services In Cameroon: Case Study of Banso Baptist Hospital
Ngong Joseph Kenchi
Cameroon Baptist Convention Health Services, BAMENDA, Cameroon

Introduction
The hypothesis was that the uptake of Low Vision services is low. The objective was to see if the hypothesis holds true in Cameroon and then identify some possible barriers to the uptake of Low Vision services in Cameroon.

Method
Used the demographic estimates of the North West Region of Cameroon to project the number of persons likely to be living with Low Vision in the region and compared with the actual number of persons accessing the Low Vision services in 2016. Assuming that 2% of the population is likely to have Low Vision. Hence, from available data, determined the percentage of Persons Living with Low Vision that access the Low Vision Services in Banso Baptist Hospital.

Results
From the study, it is likely that 41,000 persons are living with Low Vision in the Region. In 2016, only 25 persons accessed the Low Vision service in Banso Baptist Hospital (BBH). In absolute terms, the percentage of persons that accessed the service stood at 0.06%. this represented very uptake of services.

Conclusion
From the study, it was seen that the uptake of Low Vision services remained very low in BBH and thus implies that very few persons are using the services. Some of the reasons that accounted for the low uptake of services included the following:
Cost
Beliefs
Fashion
Government Taxation on imported devices
Inadequate awareness
Lack of financial support to clients, even from family.
Poor financial strength

P009

Excellent visual rehabilitation - The six coherent dimensions
Astrid Stijfs, Ton Roelofs
Royal Dutch Visio, Institute for visually impaired and blind people, SITTARD-GELEEN, Netherlands

Background/aim:
Royal Dutch Visio has the ambition to provide excellent care in complex rehabilitation programs. However, for visual rehabilitation programs there is no set of criteria available that defines this level of excellent care. The dimensions used in a medical program of excellence in the Netherlands were tailored to the setting of visual rehabilitation.

Content:
Excellent care is more than just defining the level of needed expertise and resources. A set of six coherent dimensions describe a broad spectrum of aspects relevant when aiming to reach an excellent level of care.
These dimensions are:
Complexity of patients
Quality of care and life
Scientific research
Dissemination of knowledge
Culture and infrastructure
Effectivity
For each dimension we described generic criteria for visual rehabilitation organizations, which are a precondition for excellent rehabilitation. Additionally, theme specific criteria were described, making it possible to develop excellent care on a theme basis.

Implications:
Our framework sets a standard for excellent visual rehabilitation. Using this framework, insight is obtained in the specific areas that are of interest to reach that level.
Funding: This work was funded by the NOVUM Foundation, Huizen, The Netherlands.
Disclosure: None

P010

Bridging the Rehabilitation Gap - An ICF-based model
Ton Roelofs¹, Astrid Stijfs²
¹Royal Dutch Visio, APELDOORN, Netherlands
²Royal Dutch Visio, Institute for visually impaired and blind people, SITTARD-GELEEN, Netherlands

Background/aim: In order to provide efficient and effective visual rehabilitation from an individual client perspective, it is necessary to have insight in all aspects which characterize rehabilitation. At Royal Dutch Visio, institute for visually impaired and blind people, a new ICF-based model for individual visual rehabilitation was developed in which all relevant aspects can be included.

Content: Until now, there was no concept for visual rehabilitation available which includes all relevant aspects that provide insight in individual rehabilitation. From a clients perspective, rehabilitation is working on reaching personal goals. These goals are set at the level of participation in the relevant social context. In other words, visual rehabilitation can be seen as bridging the participation gap.

The patient’s level of participation depends on external factors (e), personal factors (p), and functions (f). From the treatment perspective, bridging the participation gap can be characterized by two dimensions: complexity and the amount of necessary care. This complexity and amount of care also depend on e, p and f. However, these external factors are more extensive than the above-mentioned external factors. Thereby the model also takes the services, facilities and the policies of the society into account, as well as the local availability and level of visual rehabilitation opportunities. Our newly developed generic model can therefore be used in a wide range of rehabilitation settings worldwide.

Implications:
1). This model is useful to consider and describe individual visual rehabilitation (progress). It structures the dialogue between client and professional, and can be helpful for setting or adjusting personal goals.
2). This model provides a tool to systematically determine the necessary steps in individual visual rehabilitation programs. In complex visual rehabilitation, the different viewpoints in the model help to understand and prioritize the next step in the process.
Funding: NOVUM Foundation, The Netherlands. Disclosure: None

P011

Royal Dutch Visio: enabling self-direction
Ton Schilderman
Royal Dutch Visio, APELDOORN, Netherlands

Introduction: Trends in society demand new goals for Visio’s expertise center for the visually impaired. Clients want information, service and care that is less uniform and dependent of location and opening hours. Insurance companies and governments embrace trends towards self direction, hoping for cost reductions as a side effect.

Methods: 5 Visio R&D programs all include innovations; ME-Health and Education explores ICT. The general goal is
that at least 50% of our services is accessible online by 2020.

Results: Visio surveys show that clients and workers want: a) Blended care: mix of f2f and online contact; b) An integrated, easily navigable platform; c) Reliable information on various subjects; d) “Click for Advice” feature; via chat, email and/or video calls; e) Multimedial e-learnings and e-trainings; f) Help: introductory trainings in the use of eHealth and tech-support; g) Client and worker participation in designing all of these factors. Initiatives launched in the 3 major domains: (1) Rehabilitation & Advice with OTC-New Techniques and implementation after successful pilot, Exploration of general eHealth requirements and (im)possibilities now followed by development project: ME-R&A, E-PsEYE; pilot study involving eHealth self-help interventions in elderly clients suffering from anxiety and depression; Visio lab; testing possibly interesting gadgets and ICT. (2) Education: Digital College: exploring Office 365 as an online interactive educational environment, Exploring 3D drawings and auditory cues on iPads to unlock mathematical graphs to the visually impaired. Making computer programming courses accessible, ICT4Music: platform/knowledgebase to open up music making. (3) Housing and Daycare (visually and cognitively impaired): Media-literacy training for safe use of the internet, I am online communication platform, Webshop to self-reliantly showcase and sell products.

Conclusion: there are still some challenges: a) Making eHealth easily navigable for the visually impaired; b) Financing eHealth development and implementation; c) Organising and maintaining client & worker participation.

P012

Numerical estimate of people with low vision based on subjective criteria
Yoshimi Suzukamo1, Mineko Ono2, Shinshi Chin3
1Tohoku University, SENDAI, Japan
2Tohoku Bunka Gakuen University, SENDAI, Japan
3Asahigaoka eye clinic, SENDAI, Japan

Introduction/aim: To estimate the number of people with low vision (LV) based on subjective criteria and to clarify the potential needs of LV care.

Methods: A two-step stratified random sampling method identified 1200 potential study participants from the residential map database of Japanese residents aged 15 to 79 years. Of those, we selected 716 people who were 40 years of age or older. We conducted a placement method-based survey and asked study participants to identify their corrected visual acuity, inconvenience in daily life due to poor eyesight, how they coped with the inconvenience, and results of their coping strategies. Subjective LV was defined as “always” or “almost always” feeling inconvenienced in daily life due to poor eyesight.

Results: Of the 716 study participants, we identified 168 (23.5%) people with subjective LV. Of those, 21 (12.5%) had visited an LV specialist, 79 (47.0%) had visited an ophthalmologist, 102 (60.7%) had visited a prescription eyewear shop, and 28 (16.7%) had done nothing. However, 54 study participants (32.1%) responded that their inconvenience due to LV had not been resolved. When we included participants who had done nothing and those whose inconvenience had not resolved, the percentage of people among those aged 40 years or older who remained inconvenienced due to poor eyesight was 11.5%.

Conclusions: The previous study reported that the number of people with LV according to WHO criteria is 0.39% of people 40 years of age or older. Using subjective criteria, our study revealed that the number of people with LV was higher than the number defined with visual acuity. In addition, it suggests that 11.5% of people 40 years of age or older may need appropriate services, including care or rehabilitation, to compensate for LV.

P013

Chinese new five years plan on low vision rehabilitation
Jianmin Hu
The Second Affiliated Hospital of Fujian Medical University, QUANZHOU, China

Over the past five years, Chinese society devoted to enthusiasm on low vision rehabilitation, and invested about 1 billion yuan to help patients with low vision to adapt low vision aids and get rehabilitation, which made a very fruitful work. New national five years plan on low vision rehabilitation in China is from 2016 to 2020, when is a new round of that China Disabled Persons’ Federation (CDPF) propose the plan of well-off process for disabled, National Ministry of Education present a promotion plan on special education, National Ministry of Health put forward national eye health plan. So these different aspects gave policy and financial support on low vision rehabilitation, such as the screening of eye disease and vision for young children, eye treatment and visual rehabilitation for free for children aged 0-6 with visual impairment. Some provinces and cities expanded the free service to 14 or 18 years old, so that almost all children with visual impairment could be improved their functional vision, promoted the mainstreaming of
inclusive education, and then be healthy growth. For the support of adult and orderly's low vision rehabilitation, it would be increased in the subsidy system on low vision services and formulated the disabled employment security, improved their learning ability and quality of life in China. Low vision rehabilitation will have achieved remarkable works in China by 2020.

P014

The different chromatic temperature means different reading ability for low vision teenagers after congenital cataract surgery
Jianmin Hu
The Second Affiliated Hospital of Fujian Medical University, QUANZHOU, China

Objective: To evaluate the reading ability of low vision teenagers after congenital cataract surgery exposure to different chromatic temperature light.
Methods: 32 cases of 7-14 years old teenagers with low vision after congenital cataract surgery and intraocular lens implantation in low vision clinic were taken into this study. They were exposed to the 300Lux and 5000K/575nm chromatic temperature light and were in progress of Chinese words reading away 40 cm. The sentence reading speed in four font words and minimum font size were tested. Then the most comfortable chromatic temperature for the same reading test was measured by the LuxIQ chromatic temperature measuring instrument for every subject. Then the same tests were repeated when the subjects were exposed to the most comfortable chromatic temperature. The results were analyzed using paired t-test.
Results: Compared to exposure to the 5000K/575nm chromatic temperature light, the minimum reading font sizes was significantly smaller (t=5.383, P<0.05) and the sentence reading speed in four font words were significantly accelerated (t=7.936, P<0.05) respectively in low vision teenagers after congenital cataract surgery who were exposed to the most comfortable chromatic temperature light.
Conclusion: Adjusting the chromatic temperature to comfortable can improve the reading ability of low vision teenagers after congenital cataract surgery.

P015

Multifocal IOLs implantation for cataract patients with extreme myopia
Na Liu
Beijing Bo'ai Hospital, X, China

Objective. To evaluate the postoperative visual quality of cataract patients with extreme myopia after implantation of Multifocal IOLs.
Methods. twenty-eight eyes were enrolled in this prospective study. Fourteen eyes with an axial length longer than 28 mm were included in the extreme myopia group, and the other eyes were included in the nonextreme myopia group. Phacoemulsification and Multifocal IOLs were performed. Six months after cataract surgery, best-corrected visual acuity (BCVA), contrast sensitivity, and wavefront aberrations were measured, and subjective visual quality was assessed.
Results. The BCVA improved significantly after surgery for both groups, and patients in the nonextreme myopia group achieved better BCVA. The evaluation of contrast sensitivity without glare was the same in both groups, whereas patients in the nonextreme myopia group performed better at intermediate spatial frequencies under glare conditions. The two groups did not show a significant difference in high-order aberrations. With regard to subjective visual quality, the composite scores of both groups did not differ significantly. Conclusions. Multifocal IOLs provided good visual outcomes in cataract patients with extreme myopia. These patients should undergo careful evaluation to determine the maculopathy severity level before surgery.

P016

'Sight at elderly age'- an initiative of the blind and partially sighted self-help movement
Renate Reymann
German Federation of the Blind and partially sighted (DBSV), BERLIN, Germany
This presentation reports about the establishment, aims and impacts of the alliance “Sight at elderly age”. In 2015 the German Federation of the Blind and Partially Sighted (DBSV) and the German National Association of Senior Citizen’s Organizations (BAGSO) have jointly organized a first symposium targeting the issue of sight loss of elderly. Experts specialized in authomology, ophthalmic optics, architecture, geriatrics, health care, politics, rehabilitation, self-help, administration and research of medical supply, discussed about deficits in ophthalmological care and a lack of appropriate support/counselling services for the elderly. It was ascertained that due to the increased expectation of life sight loss has become a fairly common disease among the elderly. One main achievement of the symposium was the establishment of a joint alliance consisting of various experts specialized in authomology and other care and health related subjects, aiming at preventing avoidable sight loss and securing an optimal and efficient support for partially sighted persons.

Achievements of the alliance:

Release of the downloadable patient brochure “sight at elderly age”, also available in Russian

Advanced training- and educational concepts for employees in caring professions, for the sensitization of the special needs of clients experiencing an increasing sight loss

Development of a counselling map for Germany

The joint efforts of all involved partners in areas of media coverage and networking are resulting in an improved social awareness about causes, symptoms and consequences of sight loss among the elderly. These efforts are establishing a fundamental base for national and international political actions which strive towards a sustainable improvement of the living conditions of partially sighted persons. A second symposium taking place on the 7 TH and 8 TH July 2017 which intends to gather national and European experts, aims at evaluating the current work of the alliance and designing new approaches to prevent avoidable sight loss.

P017

The Effects of Lens filters on Visual Functions and Visual Quality of the Elderly in Taiwan

Shyan-Tarng Chen, Ching-Ying Cheng, Tse-Hao Lin, Pei-Ying Lin

Chung Shan Medical University, TAICHUNG CITY, Taiwan

Purpose: The purpose of the study was to investigate the visual functions and the visual quality on the elderly in Taiwan and the improvement by using filters.

Methods: Ophthalmic history, distance and near, habitual and best corrective visual acuity, (VA, log MAR), visual acuity with glare, contrast sensitivity (Pelli-Robson), color vision (D-15) and the visual quality questionnaires (VQQ) were recorded for 48 subjects (average age 67.9 ± 5.7 years) under their agreement, with no serious visual defects and under stable health conditions. Filters were prescribed by participants’ preference and as an important variance between pre- and post examinations, including VQQ phone interview after two week.

Results: Most of the elderly have mild eye-related diseases: cataract (40%), dry eye (44%), diabetes (16%), hypertension (14%), and glaucoma (6%); fortunately, binocular VA (-0.0059 ± 0.09672 log MAR), binocular contrast sensitivity (1.8184 ± 0.16095) were normal on the average. Furthermore, Visual quality score, distant and medium works showed high satisfaction, but near works and light adaption were mild defected, especially on reading and glare disability at night. Moreover, monocular VA had significant improved but not significant on binocular VA, monocular and binocular contrast sensitivity after filters prescription. Although negative responses on color vision were shown, there were still under standard criterion on average. Questionnaires results also indicated that filters promoted all parts of visual quality, except out-door frequency.

Conclusions: The elderly in Taiwan showed good visual functions, but were not satisfied at their visual quality. It needs to mention that, the elderly did not aware of their disease and reading problems. Filters had minimal impact on binocular VA, binocular contrast sensitivity and color vision. However, filters provide excellent protection against the discomfort from glare in the visual life, even visual acuity improvement.

P018

Screening for Vision and Hearing Loss in Patients with Dementia: Recommendations from Interviews with Sensory Experts

Jonathan Jarry1, Fiona Höbler2, Katherine McGilton2, Walter Wittich1

1Université de Montréal, MONTREAL, Canada
2University Health Network, TORONTO, Canada

Introduction: Dementia affects a person’s ability to understand and express information. The higher prevalence of vision and/or hearing losses among persons with dementia in long-term care (LTC) interferes with the ability of
nurses to provide optimal care because communication is compromised. Therefore, the screening for sensory impairment is of the utmost importance; however, there is currently no agreement among nursing professionals on how to best identify such losses. The need for a validated screening measure suitable for nurses working in LTC is clear. The present project investigated the screening recommendations of vision and hearing care professionals working with patients with dementia.

Methods: Eleven experts in audiology, optometry, deafblindness, and technology participated in individual semi-structured interviews on the topic of tools and strategies that can be used to screen patients with dementia for sensory loss. Interview transcripts were coded by two evaluators using verbal agreement and consensus building.

Results: Three main themes emerged from the interviews with experts: barriers, facilitators, and strategies. The main barriers to sensory screening were communication with patients and difficulties in convincing nursing staff to participate in screening. The main facilitator was linked to the collaboration of individuals, such as family members, intervenors, and nurses. Strategies for sensory screening in this population consisted of improving communication with patients through repetition of information and encouragements during the administration of testing procedures; considerations based on familiarity; and inferring an impairment on the basis of patient behaviour. Few of our interviewees were knowledgeable on the topic of screening apps.

Conclusion: Our findings, to be integrated with a similar environmental scan conducted among LTC nurses, can inform the administration of sensory impairment screening tests among a population with dementia in order to optimize care.

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P019

Implementation of the Crowding Training in Dutch vision rehabilitation centres
Blanca Huurneman
Donders Institute for Brain, Cognition and Behaviour, NUMEGEN, Netherlands

Background: Crowding refers to the impaired ability to see objects in clutter. Children with visual impairment often show stronger crowding effects than normally-sighted peers. In 2013, we developed the Crowding Training, which improves near visual acuity and reduces crowding in 4-9 year old children with visual impairment (Huurneman et al. IOVS 2013;54(9):6208-16). Based on the positive results of the Crowding Training, we received support for implementation. The main goal of the implementation project was to stimulate the use of the training.

Content: The following parties were involved during the implementation process: managers of vision rehabilitation centres, clinicians who could prescribe the training (psychologists, ophthalmologists, and optometrists), rehabilitation workers, and parents of children with visual impairment. The five objectives of the implementation project were to: 1) produce user-friendly manuals, 2) write a treatment protocol, 3) organize informative meetings for the target groups, 4) present information about the treatment on relevant websites, and 5) produce extra training sets. All these objectives were met at the end of the implementation project. Thirteen children were trained during the implementation project (Jan 2014-Nov 2015), which was less than expected. Reasons for the limited use of the training and slow implementation could be: 1) crowding is not yet a part of the routine vision screening, so it is unclear which children could benefit from treatment, 2) reorganisations at Bartiméus and Royal Dutch Visio, and 3) questions about the cost-effectiveness of the treatment.

Implications: Although considerable work has been done, there are still steps that need to be taken by the Dutch vision rehabilitation centres to facilitate successful implementation. Crowding measurements should be part of the routine screening of children with visual impairment and clinicians should prescribe the training if a child meets the inclusion criteria. This project was funded by ZonMw, programme InSight (grant number 943070071).

P020

Longevity of Visual Improvements following Electro-stimulation Therapies and Efficacy of Retreatment in Retinitis Pigmentosa subjects
Ava Bittner, Kenneth Seger
Nova Southeastern University, FORT LAUDERDALE, U.S.A.

Introduction: A small-scale randomized controlled trial conducted by our group found that 57% and 29% of retinitis pigmentosa (RP) subjects who received six weekly Transcorneal Electrical Stimulation (TES) sessions or ten electro-acupuncture sessions, respectively, developed significant improvements in visual acuity (VA) and/or quick contrast sensitivity function (qCSF). We longitudinally monitored these participants for declining visual function due to natural RP progression to determine the duration of these responses and administer retreatments.

Methods: Retreatments with TES or electro-acupuncture were given to four RP subjects who developed decreased
ETDRS VA and/or qCSF over 18-27 months.

Results: A 44 y/o female improved from 1.52 to 0.52 logMAR following the initial TES course, then diminished to 1.22 logMAR ten months later, at which time retreatment improved VA to 0.62 logMAR. VA was 0.78-0.80 logMAR at 6-9 months post-retreatment, which re-improved to 0.50 logMAR after the third TES course. A 47 y/o male improved from 1.62 to 1.20 logMAR and 0.20 to 0.46 logCS at 1.5 cpd after the initial TES course; then 11 months later his VA was stable at 1.24 logMAR, but qCSF returned to baseline. Fourteen months after initial TES, he declined to 1.40 logMAR, then improved with retreatment to 1.32 logMAR and 0.66 logCS. A 34 y/o female improved binocularly from 1.12 to 1.00 logMAR VA and 0.33 to 0.65 logCS at 1.5 cpd after initial TES, then after slight declines every 3-4 months, she received three retreatment courses, which maintained her vision over 18 months. Over 27 months, a 46 y/o male developed improved qCSF AULCSF by 0.16-0.19 after each of three electro-acupuncture courses, and had no progressive macular atrophy or visual function loss.

Conclusion: Following encouraging visual improvements after TES or electro-acupuncture that lasted for several months, it appears possible to restore slowly diminishing vision over time with retreatments.

P021

Simulating the Effect of Acuity and Contrast Sensitivity Reduction on Reading Performance

Ying-Zi Xiong, Jeffrey Boucher, Aurelie Calabrese, Quan Lei, Gordon Legge

1University of Minnesota, MINNEAPOLIS, U.S.A.
2École normale supérieure, PARIIS, France
3Aix-Marseille University, MARSEILLE, France

We investigated the impact of reduced visual acuity (VA) and contrast sensitivity (CS) on reading text by simulating different levels of low vision. A successful simulation would approximate the reading performance of subjects with low vision and could be useful in evaluating the accessibility of text for these readers. Low-pass spatial-frequency (SF) filters, created by shifting normal contrast-sensitivity functions leftward along the SF axis, or downward along the CS axis, or along both axes, were used to simulate VA reduction, CS reduction or a combination of both. Simulated VA and CS were quantified by letter acuity and Pelli-Robson contrast sensitivity. The filters were applied to MNREAD charts to simulate reading with reduced VA and CS. 25 normally sighted subjects were tested. For each simulated condition, maximum reading speed (MRS), critical print size (CPS) and reading acuity (RA) were estimated. Reading with the simulation was compared with MNREAD data from 43 actual low-vision subjects (Mean VA = 0.77 logMAR, Mean CS = 0.98). The results showed that a pure reduction of VA explained most of the variance in CPS (R² = 0.82) and RA (R² = 0.97) but not MRS, while a pure reduction of CS explained part of the variance in MRS (R² = 0.12), CPS (R² = 0.37) and RA (R² = 0.45). Combined reduction yielded significant correlations MRS: R² = 0.12; CPS: R² = 0.86; RA: R² = 0.96. Comparison of MNREAD results between simulated and actual low-vision subjects with matched VA and CS showed approximately matched CPS (p = .39), while the simulation group had significantly faster MRS (p = .002) and larger RA (p = .001). In conclusion, simulation of reading with reduced VA and CS accounts for low-vision CPS and places an upper bound on MRS and RA.

P022

Natural History of Retinitis Pigmentosa in Low Vision

Julie-Andree Marinier, Rosalie Gauthier, Marie-Pier Philie, Laurence Boily, Jeanne Morency, Marie-Josée Senécal

1Université de Montreal, MONTREAL, Canada
2Institut Nazareth et Louis-Braille, MONTREAL, Canada

Introduction: This retrospective study is presenting the natural history of retinitis pigmentosa (RP) patients in Low Vision at Institut Nazareth et Louis-Braille (INLB) and is comparing its evolution between patients presenting RP and RP combined with Usher syndrome (RP-Usher).

Methods: A chart review of all RP and RP-Usher patients followed at INLB was performed. All patients needed to be followed at INLB since the beginning of their visual rehabilitation. In total, 131 RP patients and 77 RP-Usher patients were reviewed. 92 patients were excluded from the retrospective study because they had another ocular pathology or syndrome.

Results: At the initial visit, RP patients presented a mean age of 22.1 years ± 14.8, a visual acuity in the right eye (VA OD) of 0.57 logMAR, a visual acuity in the left eye (VA OS) of 0.50 logMAR and visual field measurements of 16.4 and 19.5 degrees for horizontal and vertical meridian OD and OS. RP-Usher patients were younger at the initial visit (14.7 years ± 14.4) and presented similar VA (OD 0.52 logMAR and VA OS 0.56 logMAR), but had visual field measurements inferior to those of RP patients only (between 10.5 and 12.8 degrees for the horizontal and
Conclusion: It is logical that the mean age to RP-Usher patients is lower than the one of RP patients only. In fact, the dual sensory loss caused an earlier referral to a Low vision center. The visual acuity at the initial visit is similar in both groups, according to the initial stages of RP. Otherwise, the study showed that visual field measurements are lower for RP-Usher patients than those of RP patients only. This retrospective study will eventually focus on later visits in Low vision for the same cohort.

The Study on Near Distance Reading for Low Vision Students in Taiwan
Po-Han Huang¹, Hisham Bilal Salih², Toshibumi Kakizawa³
¹Master's Program in Disability Sciences, University of Tsukuba, TSUKUBA, IBARAKI, Japan
²Doctoral Program in Disability Sciences, University of Tsukuba, TSUKUBA, Japan
³Comprehensive Human Sciences, TSUKUBA, Japan

Introduction: According to various research's, many students often use the normal letter while others are using the magnified materials. The variables that deserve consideration when reading the magnified materials are the letter size and the visual distance. If one of them changes, the retinal image will change as well. The distance that often set to keep the size of the retinal image at fixed level called the required equivalent viewing distance (REVD). The purpose of this study is to examine the critical print size (CPS) for Taiwanese students who use traditional Chinese letters based on the RVED theory.

Methods: Reading chart was designed for the preliminary experiment and the CPS and the REVD theory both was used for testing the real experiment. 34 partially sighted with corrected eyesight of the 2 eyes from 0.02 to 0.5. Data was collected with no restrictions on distance, and the letter size 4M and 1.6M. (VA4M and VA1.6M) compared to CPS was examined based on REVD theory.

Results: The coefficient of correlation between CPS and VA4M was r=0.611 (r²=0.374, F (1, 32) =19.102, p<0.01). In free visual viewing setting, all participants’ visual angle that make visual distance bigger than CPS. The coefficient of correlation between CPS and VA1.6M was r=0.671 (r²=0.450, F (1, 27) =22.080. p<0.01). Number of participants located on the straight line is 0; 24 above and 4 on the bottom.

Conclusions: The result of the 2 letter size with no restrictions on distance revealed that there is tendency among the participants to read in shorter distance than what was hypothesized in the REVD theory. Generally human being during reading process cannot maintain stable distance and thus further researches are needed to determine the proper distance.

Preferred writing size for students with low vision
Etsuko Tanaka¹, Hirono Sugama², Atsushi Watanabe¹, Koichi Oda²
¹Hamamatsu Special Needs Education School for the Visually Impaired, HAMAMATSU, Japan
²Tokyo Woman's Christian University, TOKYO, Japan

Aim: To address the following questions:What is the preferred size when people with low vision handwrite? Does the angular size of the handwriting relate to the critical print size (CPS) for reading? How do they adjust viewing distance and/or large writing in order to achieve the preferred angular size? Methods: We collected the writing data both from 23 college students with simulated low vision (0.3, 0.7, 1.0 and 1.3 logMAR) and from 16 students with actual low vision (0.7±0.5 logMAR) enrolled in a special school. The task was to make them handwrite their names on a sheet of paper in the usual and comfortable way suited to their vision. The height of written characters and the visual distance were recorded and converted into the angular size. CPS with MNREAD-J was measured individually and compared. Result: The preferred angular size for handwriting was well correlated to the CPS when CPS was larger than 0.8 logMAR in both groups of participants and writing size was 0.2 log larger than the CPS. Those with a CPS less than and or equal to 0.8 logMAR wrote with a constant angular size of 1.0 ±0.2 logMAR, irrespective of the CPS. Students shortened visual distance down to 10 cm while keeping writing size constant at about 1.0 cm. Beyond 10 cm, they started writing larger. Conclusion: We were able to predict the preferred writing size to be 1.6 times larger of client’s CPS. This allows us to suggest a suitable visual distance and the necessary magnification for a writing task.
Do individuals with Stargardt macular dystrophy fixate eccentrically when asked to look straight ahead?
Mary Lou Jackson1, William Seiple2
1University of British Columbia, VANCOUVER, BC, Canada
2Lighthouse Guild, NEW YORK, U.S.A.

Aim: To examine whether individuals with Stargardt macular dystrophy (SMD) change the location of fixation with instruction.

Methods: We conducted a case control study in an outpatient vision rehabilitation clinic. We examined fixation in 13 normally sighted and 37 SMD participants using an Optos SLO/OCT microperimeter. Fixation was measured for five seconds under two different instructions: “Look at the cross,” and “Look straight ahead, even if you do not see the cross.” Visual acuity, contrast sensitivity, disease duration, and age at disease onset were obtained from medical records.

Results: Mean age of the SMD participants was 39.2 years, and 24 were female. Mean acuity was 1.01 ± 0.29 logMAR, and mean contrast sensitivity was 1.16 ± 0.41 log. The largest number of fixations under the “Look at the cross” condition were in the superior retina. SMD subjects were divided into three groups, depending upon the change in fixation locus when asked to look straight: those having fixation closer the fovea; those with no change in the location of fixation; and those looking farther away from the fovea. Fifty-one eyes of 32 subjects had fixations closer to the fovea when asked to look straight (average change = -6.3°), whereas 13 eyes of 11 subjects did not change fixation. There were no significant differences between groups in age, acuity, contrast sensitivity, bivariate contour ellipse area, and age at disease onset.

Conclusions: A majority of SMD participants retained some concept of the field location of their foveas; that is, fixation instructions led to different fixation behavior. This finding emphasizes that reliable assessment of visual function during evaluations of disease progression or in therapeutic intervention trials requires consistent instructions and monitoring of fixation. Otherwise, a subject’s interpretation of fixation instruction may change fixation and potentially change measured visual function.

P026

Clinical characteristics, visual deficits, refractive errors and the use of low-vision devices in patients with albinism
Serpil Akar1, Sefay Aysun Idil2, Emin Ozmert2, Sule Gurbuz3
1Medicine Faculty of Baskent University, ISTANBUL, Turkey
2Ophthalmology Department, Medicine Faculty, Ankara University, ANKARA, Turkey
3Tepe Medical Center, ISTANBUL, Turkey

Purpose: To describe clinical characteristics, visual deficits and refractive errors in patients with albinism and to analyze whether patients with albinism benefit from correction of refraction and the use of low-vision devices (LVD).

Method:The demographic characteristics of the patients and the parental consanguinity were recorded. Uncorrected and best-corrected visual acuity of albino individuals both for near and distance with and without LVD, and the methods of low vision rehabilitation (for distance and for near) were determined. Refractive data, colour vision, contrast sensitivity, iris transillumination, macular transparency, and foveal hypoplasia grades were collected for a group of 19 albino individuals with oculocutaneous albinism. Best-corrected visual acuity was also assessed binocularly and monocularly. Refractive errors were evaluated objectively and subjectively by retinoscopy, and followed by cycloplegic refraction to reconfirm the results.

Results: Nineteen albino subjects were examined, ranging in age from 9 to 50 years (median 17.42 years), 13 (68%) boys and 6 (32%) girls. All exhibited horizontal pendular nystagmus. Correction of refraction and LVD usage increased the mean distance visual acuity from 0.92 logMAR to 0.04 logMAR and provided an improvement in mean near visual acuity from 1.17 logMAR to 0.96 logMAR. The differences were statistically significant for both near and distance vision (paired samples t test, p=0.001).

Refractive errors were mainly astigmatism and hypermetropia. Twelve patients had with the rule astigmatism. No patients had against-the-rule astigmatism. Patients with astigmatism equal to or more than 1.5 D in any axis improved in all of cases by 3 lines or more.

Conclusion: A significant improvement in visual acuity can be achieved both for distance and near vision with correction of refraction and low vision rehabilitation in patients with albinism. This condition serves as an impetus to the reduction of visual disabilities in individuals with albinism.

P028
Predictive Analysis: Unlocking LogMAR’s Hidden Power
Bennett Mcallister
Western University of Health Sciences, POMONA, CALIFORNIA, U.S.A.

Modern visual acuity charts such as Bailey-Lovie and ETDRS are based on logarithmic progression for a good reason: they closely mimic the human perceptual phenomenon of just noticeable differences as stated in Weber’s Law. While this is commonly known, what is, perhaps, less well appreciated in clinical application is the power of predictive analysis logarithmic progression portends. A simple four step process allows one to make high confidence chairside predictions of reading performance improvement based on a single near visual acuity measurement. The four steps, which will be demonstrated during the session, are:
(1) Measure and record near visual acuity in M-Units
(2) Set a goal of desired improvement in M-Units
(3) Count chart steps/lines of desired improvement on chart from acuity measured to goal
(4) Implement with both diopters and working distance

In addition, reciprocals are built into LogMAR charts so the practitioner can quickly find the working distance for diopters and vice versa without resorting to memorization or calculation.
Telescope power decisions can benefit from LogMAR predictive analysis through a modification of the four step process by substituting distance visual acuity for near visual acuity and telescopic power for diopters and working distance. It is also possible to interpolate between multiple systems of nomenclature such as Point size to M-Units, inches to centimeters and miles to kilometers right on the chart without calculation.
The properties of logarithmic progression in LogMAR charts, when utilized optimally, yield high confidence predictions of patient performance with fewer confounding assumptions inherent in common low vision rehabilitation formulae. Each of these attributes are possible due to the built in “slide rule” nature of the LogMAR chart progression and leads to better, faster and higher confidence patient care decisions through predictive analysis for those who apply these “Hidden Powers” of LogMAR.

P029

Good interior lighting facilitating communication.
Froukje Antje de Boer, Jan Koopman
Royal Dutch Visio, THE HAQUE, Netherlands

Introduction. People with dual sensory loss have a individual demand for lighting in their own environment for activities such as speech reading. In order to fulfill these demands, the illumination in the room should not be placed dependent in the horizontal plane as well as in the vertical plane, by shedding light on the face and the posture of the narrator. In addition to this, illumination levels should be higher than generally can be provided by lighting available in general shops.
In our institute occupational therapists offer advice on lighting levels based on ones requirements, to fulfill a specific task and on how these levels can be achieved. Such task can often be subdivided into two requirements. Orientation lighting levels should also be applicable for communication, since communications is generally not pinned down to a specific location in the room.
Description/Results. People with dual sensory loss generally indicate that their own environment is poorly lit in terms of illumination levels. In our institute we can emphasize the impact of equally distributed lighting levels, the effect of shadows and glare control in a dedicated room. Apart from that, the effect of physical adjustments such as luminance and colour contrast are illustrated as well.
Using this input for the deafblind individual, recommendations for their own environment are followed. By using indirect lighting, the vertical plane as well as the horizontal plane will be roughly independent across the room, making it feasible to communicate on different locations in the room. Controllers are used to adjust the lighting levels to the individuals’ demand.
Discussion/Conclusion. By improving lighting conditions, persons with dual sensory loss indicate that social communication and interaction is stimulated, leaving more energy and effort to fulfill their role within society and to conduct activities of daily living.

P030

Saccadic eye movements of people with low vision differ from saccadic movements of people with normal vision.
Theo Blom¹, Fatiha Egouiti¹, Celeste Elizen¹, Herman Talsma Ph.d², Jan Koopman Ph.d³
Aim: The saccadic eye movements of people with low vision were compared to the eye movements of a control group with normal vision.

Methods: With a Tobii eye tracker, we examined pro-saccades and anti-saccades, both in saccadic length and saccadic duration, during reading of text. We examined a target group and a control group both of 30 individuals. We used size 1M, 2M, and 4M texts. The effect of interspacing on saccadic eye movements was studied.

Results: The target group have shorter saccadic eye movements during reading, compared to the control group. In 4M texts, the target group shows an average saccadic length of 3.6 characters (=ch). In the control group it was 4.4ch. This difference is significant (p<0.05). In 2M texts the difference is larger, 4.4ch in the target group versus 7.7ch in the controls (p<0.01). In 4M text, the target group used an average of 183 pro-saccades, the controls used 103 pro-saccades (p<0.01). The difference in anti-saccades was significant, 40 in the target group and 10 in the control group (p<0.001). Two representatives of the target group were examined on the influence of the width of interspacing on reading. We used 0.75; 0.8; 0.9; 1.0; 1.5; 1.6; and 2.0 interspacing (1.0 = width of the lower cast letter x). Reading duration and the number of fixations decreases up to a crowding ratio (CR) of 1.0, after which it increases with increasing CR. The fixation duration was independent of CR.

Conclusion: People with low vision differ in pro-saccadic and anti-saccadic eye movements during reading, they consume more time during reading than persons with normal vision. A part of this extra time is explained by the larger number of saccades. Whether or not there are variations in saccadic eye movements in different causes of low vision is subject to further investigation.
Background / aim
To learn practical skills is not obvious when you are born blind or severely visually impaired. As the child misses more visual information, it is less possible to imitate parents or peers; wanting to explore the nearby environment and learning new skills aren’t therefore easy tasks. This may have a significant influence on the development of the visually impaired child.

Content
This overview is composed of best practices on the functioning of children and youth in the field of practical self-reliance in different age phases, from dependence in the preschool-age up to independence in adolescence. It is about discovering how something works, about cause and effect proceedings: about modelling, doing together and in the end doing by himself.

The book offers support to children, their parents and carers with the systematic teaching on all kinds of skills such as dressing, self-care, cooking skills, shopping or managing finance and administration.

Implications
Through a systematic approach of modelling, doing together and doing it himself the result will be independence, appropriate to the age and abilities of the child or young person.

P033

The influence of the use of white cane on gait of young people with blindness
Diana Santos¹, António Filipe Macedo², Ivo Roupa³, João Abrantes³
¹Faculdade de Desporto, Universidade do Porto, PORTO, Portugal
²Linnéuniversitetet, KALMAR, Sweden
³Universidade Lusófona de Humanidades e Tecnologias, LISBOA, Portugal

Purpose
The aim of this study was to analyse the influence of cane use on walking patterns of blind individuals.

Methods
Five individuals with ages between 16 and 19 years participated in this study. The task consisted of walks of 10 metres measured in two conditions: 1) 20 walks with cane and 2) 20 walks without cane. During walks participants were monitored with a Vicon® 3D-motion capture system with Nexus-1.7® software synchronized with a AMTI-OR&force platform and a Basler high-speed-camera. Spatial-temporal, kinematic, kinetic and dynamic parameters were recorded and compared between the two conditions.

Results
The negative ankle-joint-power measures were different for the two conditions (MeanDif=0.19°, p=0.044). We also observed an interaction between the type of trial and the instants of the gait cycle of ankle angular measures (p=0.003). With the cane there was a tendency to higher values of step-length (MeanDif=0.013m), stride-length (MeanDif=0.009m), stance-time (MeanDif=0.011s), swing-time (MeanDif=0.012s) and double-support-time (MeanDif=0.009s); lower values of step-width (MeanDif=0.010m) and cadence (MeanDif=1.3stride/min) when compared with without cane. These differences were not statistically significant.

Conclusion
Results indicated that the use of a cane may change the strategy in which the absorption of energy is concretized. Our cases suggest that there is more absorption in the ankle joint when a blind person uses the cane. This result can be explained by the fact that they move faster with the cane, which can indicate more confidence in “treading” the ground in this phase.

P034

Functional visual fields 3: Relationship of Visual Field Areas to Self-Reported Function
Hikmat Subhi¹, Keziah Latham¹, Joy Myint², Michael Crossland³
¹Anglia Ruskin University, CAMBRIDGE, United Kingdom
²University of Hertfordshire, HATFIELD, United Kingdom
³Moorfields Eye Hospital, LONDON, United Kingdom

The aim of this study is to relate areas of the visual field to functional difficulties, to inform the development of a binocular visual field assessment reflecting the functional consequences of visual field loss.

50 participants with peripheral field impairment undertook three custom binocular visual field tests on the Octopus 900 assessing 60 degrees from fixation: threshold, 10dB supra-threshold, and 10dB kinetic assessment; and two
tests on the Humphrey Field Analyzer: integrated monocular threshold 24-2 fields, and an Esterman field. Visual field data was divided into central (0-30 deg) and peripheral (30+ deg), and superior and inferior visual field areas. Mean thresholds, percentage of points seen, and field extent of these areas were calculated and compared to self-reported mobility function. Statistically significant differences between areas under Receiver Operating Characteristic (ROC) curves were determined to establish which areas were better at predicting perceived mobility function.

The central and peripheral visual field areas were similarly related to mobility self-reported function for threshold, suprathreshold and Esterman scores ($R^2=0.33-0.45$, $p<0.001$ for all). Peripheral threshold field score was significantly better than central at predicting difficulty with two mobility tasks. Superior and inferior field areas were both significantly related to self-reported mobility function for all field paradigms, with a tendency for inferior field to be more strongly correlated. Inferior visual field score was significantly better than superior at predicting difficulty with five mobility tasks.

Both peripheral and central visual field areas have a role in reflecting the functional difficulties of people with field loss and should be considered in a functional visual field assessment. The significance of the inferior field to mobility function is demonstrated in individuals with moderate to severe visual field loss.

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P035

Contrast sensitivity and walking downstairs
Hidetsugu Kawashima, Miyako Ohmori
Aichi Shukutoku Univ., NAGAKUTE, Japan

Aim: Walking downstairs is an important component of mobility. It has been suggested that contrast sensitivity (CS) is a good predictor of walking downstairs for people with low vision. To determine whether the CS for walking downstairs might be similar to that for detecting stairs, we compare here the CS for the speed of stair descent with that for detecting stairs. Methods: Five normally sighted subjects were tested at nine levels of artificial contrast reduction. The contrast reduction levels were attained using Banger occlusion foils worn in front of the eye. We measured the contrast sensitivity function and estimated the peak CS of the function at each level of contrast reduction. In the walking experiment, the speed of stair descent was measured as a function of the peak CS for each subject. In the detection experiment, the task for the subject was to respond with a decision whether the steps of the stairs were visible or not. We defined the CS for detecting stairs as the minimum peak CS at which the steps of the stairs were visible. Results: The walking speeds increased with peak CS up to a critical peak CS and then remained constant at the same speed. Using a two-limbed straight-line fit, we estimated the critical peak CS and found that the critical peak CS for stair descent was significantly higher than the CS for detecting stairs ($p < 0.05$). Conclusions: Our data reveals that walking downstairs requires a higher CS than detecting stairs. These results suggest that people with low vision may have difficulty in walking downstairs, even when they have enough CS to detect the stairs.

P036

How annoying is it for children to get eye drops?
Heleen Veen-Hellendoorn, Florine Pilon-Kamsteeg
Bartiméus, ZEIST, Netherlands

Background: In the Netherlands each year 10,000 children visit an ophthalmologist or orthoptist. All children under the age of 12 get eye drops during their first visit. Children under the age of 12 wearing glasses receive eye drops every year. From our clinical experience, we have got the impression that eye drops are the most annoying part of the ophthalmological examination.

Aim of the study was to analyze how and why eye drops are annoying. Furthermore the experience of getting eye drops was linked to the frequency and to different ages and gender of children.

Methods: During conversations with children we analysed which aspects of the examination are experienced as most annoying.

The degree of anxiety was measured with the Wong-Baker Pain Scale. Children were questioned about the level of control they experienced during getting eye drops. Parents were asked to give their opinion of an intervention (eye drop booklet) and the usefulness of it in relation to the distress of their child getting eye drops.

Results and conclusions:
Getting eye drops is the most annoying experience during ophthalmological examination. The degree of anxiety experience was analysed in relation to age, gender and experiences (of children and parents) with getting eye drops and the intervention of the eye drop booklet. The outcomes of the impression of parents were compared to the degree of anxiety of the children on the Wong-Baker Pain Scale. Insight in the experiences of children during the ophthalmological examination, and in particular during the eye drops, gives the professional the opportunity to anticipate as best as possible the behaviour of children. This leads to better child-oriented care. This research is made possible by: Vereniging Bartiméus Sonneheerdt Disclosure: none.

P037

Going to school with a motility disorder of the extraocular muscles
Niki Slingerland1, Julia van Hooft1, N.E. Schalij-Delfos1, Nynke Stellingwerf1
1Koninklijke Visio, DEN HAAG, Netherlands

Introduction: Congenital fibrosis of the extraocular muscles (CFEOM) is a congenital non-progressive restrictive ophthalmoplegia with ptosis, that has been shown to have a neurogenic origin. Although visual acuity may be normal in these cases, restricted ocular movements can lead to various problems in daily life. Visio low vision rehabilitation can provide help in this situation. Methods: Case report. Results: This 9 years old girl was referred to Visio for advice, because of her unusual posture in the classroom at school for advice. She had regular examinations by her ophthalmologist were she had normal visual acuity, hyperopic astigmatism and punctate keratitis due to incomplete lid closure and distichiasis. Visio, specifically our developmental supervisor helped this girl by giving her an adapted desk, advice in head posture and in communication to her teacher and classmates, because of the lack of making eye contact. Conclusions: The delay in referral to Visio is possibly due to the fact that this girl had normal visual acuity. Although visual acuity is normal in this case, it proved to be worth the effort to refer her to Visio.

P038

Family of EDA PLAY applications: another possibility to support development of visual functions in children with severe visual handicaps.
Marketa Skalicka, Martina Herynkova
EDA cz, z.u., PRAHA 2, Czech Republic

Early Intervention Center EDA is a non-profit institution that has developed four applications (EDA PLAY, EDA PLAY TOBY, EDA PLAY PAULI, and EDA PLAY ELIS) for iPad devices since 2013 (http://www.edaplay.com/). The new recommendation of the American Academy of Pediatrics regarding usage of screens, especially for very young children, shifts the focus from “what is on the screen” to “who else is in the room”. A new policy statement says that kids as young as 15 months can learn from media when a caregiver is present and involved. We think that the iPad with our applications is a special needs tool because we can support not only child’s vision development, but also the child can spend and enjoy the time with the parents or other caregivers at the same time. Moreover, children in our target group usually need support of their parents or teachers. The applications are designed for the vision training of children with visual disorders and impairments. All application pictures are rendered against a black background in striking colours and understandable shapes. Children can focus their attention on the picture and observe the changes after touching the display. The applications offer specific tasks of various levels of difficulty, with several user options. Children control the application by a simple touch of a screen, following the trail with a finger etc., so the children with multiple impairments are motivated to train their fine motor skills. The applications contain a Skills section, which records the child’s work on the application. All applications simulate the most common visual impairments, such as blurred vision, nystagmus, hemianopia, and visual field defects. The EDA PLAY applications are designed for iPad devices. Additionally, we plan to adjust the EDA PLAY TOBI application for Android systems.

P039
A new, NGO-run, low vision rehabilitation centre in Jakarta

The Indonesian NGO ‘Layak’ started a low vision rehabilitation centre in Jakarta in late 2015, satisfying an urgent need for services. Financial support was obtained from ‘Seeing is Believing’ and ‘CBM’. The team (optician, rehabilitation worker, receptionist) cooperated closely with ophthalmologists in Jakarta hospitals, providing free in-house and outreach services, especially to special schools. Clients paid for spectacles and magnifying devices via an income-dependent subsidy system. By the end of 2016 a total of 451 visits had been made by 373 clients: 45% female, 71% children 0-18 years (30% 0-6 years). Of the children, 31% had additional disabilities. Across all clients, the main causes of low vision were lens (24%) and retinal (15%) disorders. Referral sources differed between children (68% from education and school screening) and adults (46% from health services, 23% from Disabled Peoples Organisations). Some 37% had no health insurance. Most adult clients (64%) were unemployed or performed unskilled work. Distance VA (where measurable) improved by 0.14 logMAR (SD 0.19), Near VA by 0.15 logMAR (SD 0.22) and 80% obtained prescribed magnifying devices.

P040

Tactual Profile MDVI to assess the tactual functioning of persons with a severe visual and mental impairment

Ineke Jacobs, Anneke Blok
Koninklijke Visio, BREDA, Netherlands

Tactual Profile is a procedure to assess the tactual developmental of blind children in the age of 0-16 years. The instrument has proven to be reliable for many years in countries throughout the world. However the users of Tactual Profile requested for a version specially for multiple disabled visual impaired persons of all ages, since the items of Tactual Profile were too difficult for them. Tactual Profile MDVI was developed by a project group of employees of Royal Dutch Visio, with experience with multiple disabled visual impaired persons. The version of Tactual Profile for multiple visual impaired persons can be used for persons with a cognitive development, comparable with the age of 0-6 years. The steps in development are more refined than in the original Tactual Profile and the instruction is far less verbal. The domains of tactual functioning are; tactual sensory functioning, tactual motor functioning, tactual perceptual functioning. With less focus on the items,(less on perceptual functioning, more on sensory functioning. The instrument has been assessed by psychologists, occupational and physiotherapists, teachers and rehabilitation therapists. All items were discussed with a group of persons of different backgrounds who have experience with multiple disabled visual impaired persons. For instance a neuro psychologist, psychologist, occupational and physiotherapist. The instruments has been tested with persons of different ages and best practice has been proven. The focus has also been on Influential Factors on tactual perception and functioning, they were specially written for this Tactual Profile version.

P041

Optimizing eyetracker based communication systems for people with multiple disabilities.

Wieneke Huls
Royal Dutch Visio, Centre of Expertise for blind and partially Sighted people, AMSTERDAM, Netherlands

Communication is essential for people. Within this communication, eye movements are very important, especially for people with (severe) multiple disabilities. Once someone is not able to express themself and, hence, may be
misunderstood, they might feel frustrated or experience feelings of reduced self-esteem. Currently communication systems, which use eye tracking are available, and are used by people with multiple disabilities to select images on a screen that can be translated into spoken text. Given the high prevalence of visual impairment amongst the group of people with severe multiple disabilities, special attention is required to tailor these systems to the users’ needs and abilities to process visual information. A special test based on preferential looking stimuli determines the accurateness of information processing regarding color, contrast and motion by assessing fixation accuracy and duration.

Five subjects, with a (severe) multiple disability, participated in this study consisting of a visual and an eye tracker assessment (2 x 20 minutes). During the visual assessment, we assessed visual acuity, contrast sensitivity, eye motility and color perception. During the eye tracker study, stimuli were presented using a preferential looking paradigm with the Tobii X2 eyetracker. Each stimulus was presented four times. Based on our observations and by reviewing the eye movements, pro-saccades and anti-saccades were characterized by the monocular and binocular fixation accuracy and the fixation durations. These findings were translated into practical recommendations for the use of the communication system.

The study enabled us to quantify the clients’ visual abilities to use an eyetracker technique. Our results provide information on the type of icon to be used on the communicator, the fixation duration required to select a stimulus, the colour and luminance contrast of icons and the number of stimuli that can be presented simultaneously on the screen.

**P042**

**Active Learning An approach for clients with visual impairment and severe multiple disabilities**

Martien Rienstra  
Royal Visio, AMSTERDAM, Netherlands

As an occupational therapist working with clients with visual impairment and (severe) multiple disabilities, I searched for ways to treat these clients and to stimulate them to take initiative in acting. Some of these clients turn inwards upon themselves or develop stereotypical behaviour. They make very little contact with their surroundings (people, objects, materials) and they have a small range of possibilities to see, feel, act, and move. In the theory of Active Learning, developed by Lilli Nielsen, I discovered a fruitful approach, including treatment, structure and special materials for this target population.

Active Learning means:

Giving back the initiative for active participation to the child or adult: they decide if they are going to make contact with the world around them.

Enriching the environment so that children and adults with multiple special needs become active learners.

Active participation and initiative are necessary for interaction with the world (persons, materials, objects).

By using Active Learning clients are stimulated to make contact with their surroundings, and will thereby become more conscious of their own contact- and acting possibilities.

Having used the principles of Active Learning for eight years, I observed clients starting to explore objects and materials step by step. I also noticed that Active Learning provides caregivers and professionals with new tools for making contact with their clients and for stimulating clients to act.

Currently I am working on a project to implement Active Learning within Visio. Its aim is to train specialists who can transfer knowledge and experience about Active Learning within Visio and beyond, so that children and adults with visual impairment and severe multiple disabilities will be able to improve their contact with their surroundings.

**P043**

**Being sensitive towards the special support needs of people with a visual and intellectual disability: a condition for participation.**

Truus van Duijvenboden  
Bartimeus, KATWIJK, Netherlands

Throughout the last decades a lot of expertise is gathered in special institutions for people with a visual and intellectual disability. Nowadays our care system more and more focuses on community living, empowerment and participation. People with a visual and intellectual disability frequently are not capable of making clear what they need in order to feel secure and to be able to participate on their own level. They need assistance from a personal and a professional network. The possibilities of rehabilitation are limited because both disabilities influence and exacerbate each other. This affects not only the development of practical skills but also has an impact on the development of emotional- and communication skills. Caregivers have to compensate for the negative effects of the
A combination of disabilities and focus on the person’s abilities. Therefore it is necessary that they have relevant knowledge about the implications and risks of such a multiple disability in daily life and about the appropriate support.

The International Classification of Functioning, Disability and Health (ICF) is used as a tool for identifying key factors associated with participation and rehabilitation, and to collect and describe both practice-based and scientific knowledge which is essential for understanding the special needs of people with a visual and intellectual disability. This knowledge is presented in a useful and broad overview of possible support needs, methods and treatments regarding this specific population. Research can be done to evaluate revalidation goals in different ages and settings.

P044

Increasing awareness on the role of sound for people with severe visual and intellectual disabilities through MoSART.

Danielle Kistemaker,1 Karin van der Topper - Horst1, Kirsten van den Bosch2
1Royal Dutch Visio, HUIZEN, Netherlands
2SoundAppraisal / University of Groningen, GRONINGEN, Netherlands

People with visual impairments rely more on the sound in their environment to understand their surroundings. When a visual impairment is accompanied by an intellectual disability, the importance of a well-adapted auditory environment becomes even greater. Therefore, to increase the awareness on the role of sound amongst direct support professionals (DSP), Royal Dutch Visio will implement MoSART in the course of 2017 and 2018.

MoSART (Mobile Soundscape Appraisal and Recording Technology) is a smartphone application created for DSP within special needs care. Research on MoSART by Dr. K. van den Bosch and colleagues has shown that the use of the application leads to increased awareness of the DSP and an improved quality of the auditory environment, which was accompanied by a decrease of negative moods and challenging behavior displayed by clients.

These results are the reason for Royal Dutch Visio to broadly implement this method. The goal is to implement MoSART at all units (N=87) for people with severe visual and intellectual disabilities, within three domains (Residential care, Daycare, and Education), spread over eight locations throughout The Netherlands. An estimated 600 direct support professionals will use MoSART during six weeks, spread over the course of nine months. An E-Learning module will be developed to accompany the implementation and further increase the knowledge an awareness of DSP on the role of sound in the living environment of their clients.

P045

Reliability properties of the UN-moving-task, an ecological assessment of Unilateral Neglect in patients with acquired brain injuries. Preliminary results

Frédérique Poncet1, Noémie Duclos2, Walter Cybis1, Philippe Azouvi1, Cyril Duclos2, Marie-Chantal Wanet1
1Centre for Interdisciplinary Rehabilitation Research of Greater Montreal (CRIR), LONGUEUIL, Canada
2CRIR, IRGJM; U. Montréal, MONTREAL, Canada
3EA 4047 HANDIReSP, Université de Versailles Saint Quentin; APHP, VERSAILLES SAINT QUENTIN; GARCHES, France

Introduction/aim: Unilateral neglect (UN) is a frequent problem in individuals with brain injury. UN has been described as a peripersonal or extrapersonal disorder. Although many tasks assess UN in peripersonal space, neglect in extrapersonal or far space is rarely assessed. The UN-moving-task, an ecological test of UN in a real corridor and involving multi-tasking, was developed and exhibits excellent discriminant validity (Poncet et al. 2012).

To further evaluate the psychometric properties of this test, this study explored reliability of the UN-moving-task.

Method: Patients with a unilateral hemispheric brain vascular lesion (left or right) with UN were recruited in two rehabilitation units (in Paris, France & Montréal, Canada). A convenience sample of healthy matched controls was recruited. In the UN-moving-task, participants were asked to go through a corridor (2.30 meters wide, 20 meters long), while pointing at each of the 18 magazine covers displayed, distributed at 3 levels of height, on the two walls. Two examiners recorded the number of omissions on each side. Test-retest reliability was determined based on scores obtained by the same judge in 2 evaluations 30 to 60 minutes apart, using Intra-Class Coefficients (ICC, one factor random). Inter-rater reliability was determined by comparing scores obtained by the 2 examiners in the same test, using ICC. Preliminary results were calculated from a cohort of 21 participants, i.e. 9 participants with stroke (5 men, mean age 48 yrs., SD=22.8) and 13 control subjects (5 men, mean age 37 yrs., SD=14.7). For all participants (n=21) inter rater reliability was excellent (ICC=0.99) and the test-retest reliability was good (ICC=0.64). Conclusion: If the results obtained from the reliability of the UN-moving-task findings are confirmed with a larger cohort (n = 50),
it will be a useful clinical tool to evaluate UN on the move.

P046

Cost effective Vision Stimulation material for children with CVI
Harini Mohan Kanagasabai, Deiva Krishnasamy
Frontline Eye Hospital, CHENNAI, India

Aim:
To share felt–effective low cost DIY vision stimulation material used for children with cortical visual impairment in a vision rehabilitation centre, India.

Content:
Vision Rehabilitation centre in Frontline Eye Hospital, Chennai, India caters to the needs of children with a wide range of visual impairment and multiple disabilities. It serves infants and toddlers with cortical visual impairment referred from paediatric ophthalmologists, neurologists and developmental therapists. The Vision Rehabilitation Professionals assess oculo motor skills, visual preference & field restrictions, visual sphere, visual latency and response to lights. DIY vision stimulators such as patterned paper cups, high contrast flashcards, translucent shapes and forms, translucent paper puppets & sealed thermo ball packs against light box, translucent bead strings, patterned and reflective cards, etc are being used to improve visual awareness, visual attention, oculo motor skills, visual motor / tactile integration and visual perceptual skills. These stimulators are cost effective and they can also be used in community based rehabilitation programs.

Implications:
These stimulators are recommended to parents, Vision Rehabilitation professionals and developmental therapists after being implemented with 100 children with cortical visual impairment and delayed visual maturation. These tools are felt very effective in eliciting visual response faster. Progress is measured through assessment of grating and detection visual acuity periodically. It paves way to experimental research on children with cortical visual impairment.

P047

Understanding hallucinations: a transdiagnostic approach
Meenakshi Dauwan1, Maya J.L. Schutte, Msc1, Drs. Mascha M.J. Linszen1, Sanne Koops, Msc1, Prof. Dr. Arjen J.C. Slooter1, Prof. Dr. Odile A. van den Heuvel2, Dr. Afina W. Lemstra2, Dr. Elisabeth M.J. Foncke2, Dr. Karin W. Slotema3, Prof. Dr. Philip Scheltens2, Prof. Dr. Iris E.C. Sommer1
1UMC Utrecht, UTRECHT, Netherlands
2VU Medical Center, AMSTERDAM, Netherlands
3Parnassia Groep, DEN HAAG, Netherlands

Introduction: Hallucinations are typically associated with schizophrenia, but occur in visual and hearing impairment, and a broad range of psychiatric and neurological disorders. Current treatment of hallucinations is diagnosis based instead of symptom based, while diagnosis is not a good predictor of treatment response. Subtypes of hallucinations may exist ‘within’ diagnostic categories, or ‘across’ diagnosis. These subtypes of hallucinations may arise from diverse pathophysiological mechanisms. This study aims to identify subtypes of hallucinations in a large sample of hallucinating individuals with different disorders, and to reveal associated brain mechanisms of each subtype with state of the art functional imaging techniques.

Methods: The phenomenology of hallucinations is assessed in 350 participants using a structured questionnaire (the Questionnaire for Psychotic Experiences; QPE). We will use latent class analysis on the QPE item responses to find specific subtypes of hallucinations. We will assess cognitive deficits that may be associated with subtypes of hallucinations, including visual and auditory top-down processing, source recognition and attention. Resting-state EEG and fMRI are obtained and will be analysed with modern network and connectivity analyses.

Results: We expect to find specific abnormalities on perception, cognition and functional imaging underlying the subtypes of hallucinations in visual impairment, and will compare this to psychiatric and neurological disorders. We expect that the characterization of the phenomenology of hallucinations will provide a good prediction for the response to pharmacotherapy, as these subtypes are thought to be related to pathophysiology.

Conclusion: Defining subtypes of hallucinations with different underlying pathophysiology will enable rational selection of the most adequate type of treatment based on the phenomenology of an individual patient, thereby paving the way to “personalized medicine” for hallucinating patients.
Neural correlates of visual processing in patients with macular dystrophy: development over a period of one year
Maja Traurig1, Tina Plank1, Jozef Frolo1, Sabine Brandl-Rühle2, Mark W. Greenlee1
1Institut für Psychologie, Universität Regensburg, REGensburg, Germany
2Klinik für Augenheilkunde, Universitätsklinikum Regensburg, REGensburg, Germany

Introduction:
Macular dystrophy leads to central vision loss and often to the use of eccentric fixation at the so-called preferred retinal locus (PRL). We investigated the neural correlates of visual processing at the PRL compared to an equally peripheral area in the opposite hemifield (OppPRL) with fMRI over one year without any training measures. The results can serve as control for brain activation changes occurring without intervention.

Methods:
Seventeen patients with macular dystrophies and established PRLs, and fifteen age-matched normally-sighted controls were measured with fMRI three times at intervals of six months. During a passive task flickering checkerboards and object pictures were presented to PRL and OppPRL. Thirteen patients and controls additionally completed an active visual search task. Mean percent signal changes were calculated in early visual cortex (V1, V2, V3) and higher visual areas responsible for object recognition.

Results:
During passive stimulation object pictures evoked significantly more activation than flickering checkerboards (all p < .05), in the patients even in V1 and V2. Signal intensity decreased over time in both groups, significantly in V1 (p = 0.021), fusiform gyrus (p = 0.005), inferiortemporal gyrus (p = 0.043) and lateraloccipital cortex (p = 0.037). In patients, stimulating the PRL led to significantly more activation than stimulating the OppPRL in fusiform gyrus (p = 0.007) and lateraloccipital cortex (p = 0.023) across all sessions. In active visual search they showed a task specific increase in brain activation in V1, when the target fell into their PRL area (p = 0.033), that decreased over time (p = 0.056), while performance remained stable.

Conclusion:
The results suggest that patients benefit from using their PRL, but brain activation tends to decrease over time probably due to getting used to the scanning environment, which should be considered in future studies including interventions.

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Effect of display style for digital reading on maximum print size
Kazuhito Ujima
Hiroshima University, HIROSHIMA-PREF., Japan

Introduction: Reading sentences on display is expressed as digital reading. There is a fixed format, reflow format, line format and sectional format in digital reading. The term for when letters in these four formats are enlarged and reading speed becomes slow is called maximum print size (MPS). In this research, the MPSs for sighted persons and low-vision persons were compared.

Method: MPSs of 21 sighted persons and five low-vision persons were measured in these four formats. A stimuli article with 160 letters was shown on an iPad Air 2 and the times were measured. There were seven letter sizes from 0.4° to 6.6° determined by every 0.2 log UNIT.

Results: As a result of the analysis using single factors among participants, using MPS as depending variables, the main effect of display formats was significant (0.1% significance level). As a result of multiple comparison, FF < LF < RF and SF. MPSs of low-vision persons became larger than those of sighted persons and no magnitude correlation of MPSs by display format was observed, which was shown in sighted persons.

Conclusion: Because low-vision persons’ reading speed is slower than that of sighted persons, it is considered that the effect of display format on MPS is smaller, and therefore MPSs of low-vision persons became larger than those of sighted persons.

‘Then I read faster and make less mistakes’ Children with reading difficulties reporting on environmental factors influencing their reading performance
Sonja Breitenbach
The ability to read is a key competence and enables to learn throughout a lifetime and to participate in society. Reading is a complex task on many different levels. From a visual perspective it requires the effortless and rapid processing of fine visual details (Hyvärinen & Jacobs, 2013). The efficiency of visual processing is based on visual physiology, but also depends on the environmental setting which is rarely considered in assessment and intervention. The International Classification of Functioning, Disability and Health (ICF) includes environmental factors (physical, social and attitudinal) as essential aspects to describe and gather information about functioning and disability (WHO, 2001). This exploratory study investigated reports of children with reading difficulties on the influence of physical environmental factors (e.g. contrast condition, font size) on their reading performance. This was done by developing a semi-structured interview following the ICF categorization of environmental factors to specifically capture visual aspects. The evaluation of data was done by using a qualitative content analysis. 32 German children from 3rd to 5th grade with reported reading difficulties were interviewed. The qualitative analysis of statements demonstrates that the interviewed children were able to draw very precise lines between specific environmental factors and their reading performance. Frequently indicated factors were font size (n=24) and light condition (n=16). These results illustrate children’s experiences of environmental factors to influence their reading. Moreover they highlight the ability of children to give specific information about environmental barriers and facilitators which is an important source to guide reading assessment and intervention.

P051

Visual therapy for patients with homonym hemianopia and oculomotor dysfunction
Peter Smaakjaer
CSU-Slagelse, SLAGELSE, Denmark

Background: There are annually about 12,000 cases of stroke in Denmark. About 2/3 in persons, with no prior history of stroke. The prevalence of stroke is expected to increase with the number of elderly in the population. Rehabilitation for stroke patients mainly consists of physiotherapy or intervention focused on improving learning, speech and memory. There is very little if any training of visual field defect, double vision or binocular dysfunctions.

Methods: Participants (N18) included in the study were diagnosed with oculomotor dysfunction and/or visual field defect through an optometric examination. To ensure group homogeneity patients with apperceptiv agnosia, associative agnosia or simultan agnosia were excluded.

Vision therapy was designed to enhance stereopsis, vergence ranges, version and saccadic ability maximally and for patients with hemianopia also to improve peripheral awareness. Visual training consisted of one lesson per week for 12 weeks performed by an optometrist and a vision therapist. Between lessons a minimum of 15-20 minutes of home training per day was performed. Follow up tests are planned one and two years after visual training is completed.

Results: Before and after vision therapy the patients were given a test battery including Groffmann, a reading speed test, a peripheral awareness test and the Canadian Occupational Performance Measure (COPM). The participants’ satisfaction in self-care has an average increase by 100% in COPM, Groffmann 44 %, reading speed 17 % and peripheral awareness 17%.

Conclusion: Nearly all participants in this small group showed either complete or marked reduction in their oculomotor-based symptoms and found they performed better in daily life activities.

The results in this study are promising but further research and investigation needs to be carried out in this field.

P052

VISUAL ILLUSIONS OR COGNITIVE TEST?
Mario Broggi
1. Giuseppe Caglioti
1Low Vision Centre Varese, LUVINATE, Italy
2Energy Department Politecnico di Milano, MILANO, Italy

Mario Broggi
Low Vision Centre, Varese, Italy
Giuseppe Caglioti
Energy Department
Politecnico di Milano, Milano, Italy

VISUAL ILLUSIONS OR COGNITIVE TEST?
P053

Natural course of submacular hemorrhage in recurrence of Immune thrombocytopenia

Junko Kamo, Keita Kirito, Atushi Ito
1Kofu Kyoritsu Hospital, KOFU, Japan
2Dept.of Hematology and Onclogy, University of Yamanashi, CHUO, Japan

Introduction: In Immune thrombocytopenia (ITP) cases, we often come across hemorrhages such as subcutaneous or mucous hemorrhages. Retinal hemorrhages are rare and only a few reports are published. We experienced a case with retinal hemorrhage in recurrence of ITP. We could record the natural course of visual acuity, Amsler chart and Optical Coherence tomography. Case: A 47 year-old lady who had ITP in X-5 year. With prednisolone, the symptom disappeared and we discharged the patient in X-4 year. Since January, X year, she experienced excessive menstruation and fatigue. Because of financial reason, she did not come to clinic until she noticed right visual deterioration in May X year. On this day, blood test revealed WBC 5440/µL, Hb 7.8g/dL, MCV 77.0f, and Plt 0.7x10^{11}/mL. We diagnosed recurrence of ITP and iron deficiency anemia. She was referred to our opthalmology department. Visual acuity was (vd=0.01(0.03x-6.5D), vs=0.3(1.5x-6.25D)) with paracentral scotoma upper right area. Fundus camera showed both parapapillary hemorrhage and right submacular hemorrhage. The thickness of macula (µm) was 585 horizontally (H) and 704 vertically (V) by NIDEK RS 3000, Tokyo, Japan. With prednisolone and iron preparation, the data improved to H: 9.2g/dL, Plt: 9.8x10^{11}/mL in 4 weeks. In 4 months later, the right visual acuity improved to vd=0.03(0.2x-6.0D). The macular thickness (µm) was decreased to H:143, V:266. Scotoma became smaller with Amsler chart, however distortion was still exists in the same area. Conclusion: Submacular hemorrhage in ITP was naturally absorbed with only the treatment for ITP. It was lucky for her that it occurred in one macula, however the eye became low vision. It was suggested to follow the patient even if ITP is once in remission. When a patient has anemia with ITP, we need to consider there might be hemorrhages in retina, brain, digestive tract, and urinal tracts.

P054

Contrast Sensitivity measurement as a function of visual acuity assessment in normal and cerebral palsy subjects - An Observational Study

Deiva Krishnasamy, Rashima Ashokan, Uma Kanagala
1Frontline Eye Hospital, CHENNAI, India
2Sankara Nethralaya, CHENNAI, India
3Holy Cross, TIRUCHIRAPALLI, India

Aim: To compare the visual acuity at high and low contrast levels in normal and cerebral palsy (CP) subjects.
Method: Thirty subjects with cerebral palsy (aged 7 to 22 years) from I-Count Registry and age matched thirty subjects from a higher secondary school were recruited for the study in India. The registry had the information regarding the type and severity of all subjects with Cerebral Palsy from a Rehabilitation Centre. The subjects with cerebral palsy who can understand symbols and match them in the key card were selected. Dr. Lea's three meter
P055

Predictors of visual ability in a group of visually impaired patients
Laura Moreno1, Ana Patrícia Marques2, Sara Perestrello1, João Tavares-Ferreira3, Rui Santana2, Robert Massof4, António Filipe Macedo1
1University of Minho, BRAGA, Portugal
2Centro de Investigação em Saúde Pública, LISBOA, Portugal
3Centro Hospitalar de São João, SÃO JOÃO, Portugal
4Johns Hopkins Wilmer Eye Institute, BALTIMORE, U.S.A.

Purpose
To determine which factors can affect the ability to perform activities that depend on vision (vis-ab) in people with visual impairment (VI).

Methods
A sample of 211 persons (51% females) with VI from the PCVIP-study was used. Visual acuity at far and near was measured using ETDRS scales, a letter-by-letter score was used. Age, gender, cause of VI, and number of comorbidities (nCoMorb) was collected. The activity inventory (AI) provides a score of vis-ab that is quantified by person-measure. This instrument examines self-reported difficulties to perform vision related tasks that are split between three objectives: social functioning, recreation and daily living. Responses were Rasch analysed (Winsteps v3.9) to produce a continuous measure of vis-ab(person-measure).

Results
The median age was 63years (SD=17) and the most common causes of VI were retinal diseases. Mean distance acuity in the better eye (VA-BE) was 0.76logMAR (SD=.48), near-acuity 0.74logMAR (SD=0.48). The mean item difficulty in the AI was -0.33logits (SE=0.16), item reliability 0.96. The most difficult items were “sew or do needlework”, “read the newspaper” and “drive”. The easiest items were “provide care for a pet” and “eat meals”. The mean vis-ab was 0.28logits (SE=0.38), person reliability 0.94, 3 extreme cases. Multiple linear regression analysis showed that VA-BE, near-acuity and nCoMorb were independent predictors of vis-ab, R2=0.37, p<0.001.

Conclusion
Our results indicate that the Portuguese version of the AI provides a good measure of the vis-ab. The person reliability, for the person measure, indicates correct distinction amongst people with VI. The reliability coefficient for the items indicates that the 46 goals used in the Portuguese version have high separation reliability. The influence of non-visual factors for the final scores requires investigation.

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P056

Microperimetry and Fundus Photography in Patients with Drusen and/or Age-related Macular Degeneration
Rand Allabade1, Caitlin Murphy2, David Nguyen-Tri3, Michael Kapusta3, Pierre Forcier2, Olga Overbury1
1Jewish General Hospital: Lady Davis Institute for Medical Research, MONTREAL, QUEBEC, Canada
2École d’Optométrie: Université de Montréal, MONTREAL, QUEBEC, Canada
3Department of Ophthalmology: Sir Mortimer B Jewish General Hospital, MONTREAL, QUEBEC, Canada

Purpose: The relationship between structural changes in the retina, identified in fundus photos, and the overlying retinal sensitivity has not been well studied. The purpose of this research was to examine the association between...
The prevalence, as well as the nature and severity of the visual complaints and dysfunctions of patients with a background on visual dysfunctions and complaints is needed to be able to offer these patients appropriate chain care. To achieve this, the NAH-Progress study (October 2016 to October 2020) is mapping the prevalence, as well as the nature and severity of the visual complaints and dysfunctions of patients with a

**P058**


Iris van der Lijn, Fleur van der Feen, Gera de Haan, Janneke Koerts, Oliver Tucha, Joost Heutink

University of Groningen, GRONINGEN, Netherlands

Care for patients with multiple sclerosis (MS) and Parkinson’s disease (PD) is improving. However, visual disorders and complaints of patients with MS and PD are often neglected, and visual rehabilitation is not always applied. This is striking because visual dysfunctions may have a vast impact on the patients’ quality of life and they are estimated to occur in a third of patients with MS and in three out of four patients with PD. A well substantiated scientific background on visual dysfunctions and complaints is needed to be able to offer these patients appropriate chain-based care and rehabilitation. To achieve this, the NAH-Progress study (October 2016 to October 2020) is mapping the prevalence, as well as the nature and severity of the visual complaints and dysfunctions of patients with a

**P057**

Stroke patients - do they need to see clearly?

Helle Falkenberg, Grethe Eilertsen, Heidi Ormstad, Irene Langegegen

University College of Southeast Norway, KONGSBERG, Norway

Background: In Norway, 15 000 stroke events occur annually. Visual problems affects >60%, including reduced visual acuity, visual field defects, eye movement disorders and abnormal perception. Vision loss is a risk factor for reduced quality of life, falls, fatigue and depression, thus early assessment and identification of visual impairment will improve outcome after stroke. However, visual acuity loss receives little attention, even if essential for reading, driving, physical and cognitive rehabilitation. This study investigates avoidable visual acuity loss in stroke patients from two stroke units using a multidisciplinary visual screening tool (CROSS, Falkenberg et al, 2016).

Method: Patients attended an extended eye exam at the University Eye Clinic 6-12 weeks post-stroke. The eye exam included structured history taking, habitual and BCVA distance/near (LogMar), binocular assessments, neglect, automated perimetry and other standard vision tests. Forty patients (66,3+/-14 yrs; 11 female) participated with informed consent.

Result: History and symptoms revealed problems with reading, fine detail eye-hand coordination and mobility. BCVA improved significantly (Wilcoxon p’<0.05) after refraction (OD: -0.02+/-.3; OS: 0.05+/-.2, NVA LogMar 0,1+/-.2). 16 patients improved VA >2 lines. Visual field loss was present in 12 subject, ocular motor problems in 6, and 1 had neglect. Results and appropriate advice related to vision, rehabilitation and everyday activities were communicated to all patients.

Conclusion: This study shows that reduced visual acuity is common and correctable in many stroke patients. This supports the importance of that stroke patients undergo a visual examination after stroke, to enhance their outcomes. Contrary to most other visual problems, visual acuity can be improved easily without further training. Visual acuity is important in everyday tasks and quality of life, and should not be neglected in rehabilitation after stroke.

**P056**

Microperimetry of the macula conducted via optical coherence tomographer/scanning laser ophthalmoscope (OCT/SLO) and macular drusen, geographic atrophy (GA), choroidal neovascularization (CNV) and pigment mottling, identified on fundus photos.

Methods: Patients over the age of 50 who had drusen and/or were diagnosed with AMD were recruited into the study. Visual acuity (VA) was measured with ETDRS charts. Colour fundus photos were taken and subsequently were graded using the Age-related Eye Disease Study (AREDS) criteria for AMD. Macular sensitivity was evaluated using microperimetry via the Optos OCT/SLO. Microperimetry images were scaled and superimposed over fundus photos.

Results: VA and overall sensitivity (dB) were significantly different across AMD grades (VA: ‘p’=0.027, dB: ‘p’=0.003) with earlier stages having better VA and dB. Mixed model analysis showed a main effect of macular sensitivity ‘F(4,835)= 83.51, ‘p’<0.001. Bonferroni corrected post hoc tests showed significantly decreased sensitivity over GA and CNV (both ‘p’<0.001), but not over drusen (‘p’=0.10) or pigment mottling (‘p’=0.25).

Conclusion: As expected, macular sensitivity decreases with disease severity, particularly over GA and CNV. However, it is not diminished over areas of drusen or pigment mottling. Sensitivity over these areas may depend on the size of drusen or integrity of the inner segment-outner segment junction. Fundus photography can identify structural changes in the retina, but the added value of a microperimetry overlay is that the functional impact of these changes can be interpreted.
neurodegenerative disease, including MS and PD.

Firstly, the prevalence study is done by means of a screening questionnaire, developed by the authors. It consists of 20 items inquiring visual complaints. All patients with MS and PD that are seen by a neurologist at the UMCGroningen or Martini Hospital are asked to fill out the questionnaire. A cut-off score distinguishes patients with visual complaints from patients without visual complaints. The patients with visual complaints are then referred to Royal Dutch Visio, a rehabilitation centre for all individuals with visual complaints. To create an appropriate control group, a group of patients without visual complaints are also referred to Visio. Secondly, at Visio, objective assessment of visual functions is carried out in an attempt to explain the patient’s visual complaints. In addition, a neuropsychological assessment is done, consisting of a visuo-perceptual assessment and a cognitive screening. Evidently, all patients referred to Visio are offered a tailored occupational rehabilitation program. In the last phase of the study, this rehabilitation program will be evaluated.

P059

Visual function improvement using photocromic and selective blue-violet light filtering lens in patients affected by retinal diseases
Leonardo Colombo, Paolo Ferri, Ettore Melardi, Giovanni Montesano, Gaetano Savaresi, Fabio Patelli, Luca Rossetti
Sari Paolo Hospital, University of Milan, MILANO, Italy

Purpose: To evaluate functional visual parameters using photocromic and selective blue-violet light filtering spectacle lenses in patients affected by central or peripheral scotoma due to retinal diseases.

Methods: Sixty patients were enrolled in this study: 30 patients affected by central scotoma, group 1, and 30 affected by peripheral scotoma, group 2. Black on White and White on Black Best Corrected Visual Acuity (BW-BCVA and WB-BCVA respectively), Mars Contrast Sensitivity (CS) and Glare Test (GT) were performed to all patients. Tests with and without the lenses were compared for both groups.

Results: All parameters increased significantly with the tested lenses. The mean BW-BCVA increased from 0.30 ± 0.20 to 0.36 ± 0.21 decimals in group 1 and from 0.44 ± 0.22 to 0.51 ± 0.23 decimals in group 2. The mean WB-BCVA increased from 0.31 ± 0.19 to 0.38 ± 0.23 decimals in group 1 and from 0.46 ± 0.20 to 0.56 ± 0.22 decimals in group 2. GT was also significantly reduced: the letter count increased from 20.93 ± 5.42 to 22.82 ± 4.93 in group 1 and from 24.15 ± 5.5 to 25.97 ± 4.7 in group 2 (Mean ± SD, p<0.0001 in all cases). The letter count for the CS test increased from 26.7 ± 7.9 to 30.06 ± 7.8 in group 1 (Mean ± SD, p = 0.0005) and from 31.5 ± 7.6 to 33.72 ± 7.3 in group 2 (Mean ± SD, p = 0.031).

Conclusions: The use of a combination of photocromic lens with a selective blue-violet light filter showed functional benefit in all the patients evaluated. The use of a blue-violet light selective filter as a protective measure should also be taken into consideration especially in patients with retinal diseases. An increasing visual in-door pollution due to the spread of LED lights represent a concern as clearly demonstrated by in-vitro studies.

P060

Comparison of Esterman disability scores using Goldmann perimetry test and Humphrey field analyser in Japanese Low vision patients
Meiko Yanagisawa, Satoshi Katou, Makiko Ochiai
The University of Tokyo Hospital, TOKYO, Japan

Purpose: To compare Esterman disability scores (EDSs) among Japanese patients by disease, using the Goldmann perimetry test (GP) and Humphrey field analyser (HFA).

Methods: We carried out this study at the Department of Ophthalmology, Graduate School of Medicine, University of Tokyo. We used the GP in 128 patients (76 [59.0%] men and 52 [41.0%] women) officially classified as visually impaired. All 128 patients were recruited into the study having fulfilled the following criteria: (1) score of III/4-e isopters on GP; (2) EDS scoring by HFA carried out within 3 months of GP; (3) patient considered to have visual field impairment according to the official Japanese visual impairment grading. The causes of vision loss were glaucoma (Gla) in 57 patients, age-related macular degeneration (MD) in 17, pigmentary retinal dystrophy (RP) in 17, and other in the remaining 37. We examined the relationships among EDSs using GP (GP-EDS) and HFA (HFA-EDS) according to disease, and analysed the correlations using Spearman’s rank correlation coefficients. We performed an analysis of the regression and residuals of both GP-EDS and HFA-EDS.

Results: EDSs for GP correlated significantly with those for HFA (r=0.67, P<0.001). In Gla, the GP-EDS was 35.7±26.0 and HFA-EDS was 44.0±27.6; in RP, the former was 14.2±21.4 and the latter was 23.6±29.3. EDSs measured using HFA were estimated from those of GP; EDSs of GP were significantly lower than those for Gla and
RP. No significant differences were found among other diseases.

Conclusion: EDSs of GP correlated with those of HFA and we suggest that differences between them is based on the disease.

P061

What we are learning from Adaptive Optics imaging.
Scott Robison
Medical College of Wisconsin, MILWAUKEE, U.S.A.

Adaptive Optics Imaging is changing the way we view ocular structures and approach ocular disease. This paper will include a brief history of imaging, discussion of optics used in Adaptive Optics, and comparisons to standard OCT (Optical Coherence Tomography) and SLO (Scanning Laser Ophthalmoscopy) imaging. Current research papers and case studies will explore and highlight the dramatic imaging in selected ocular cases. Adaptive Optics imaging is revealing many insights on how we understand ocular structures at the cellular level and the resulting approaches to treating ocular disease.

P062

Training project for the interpreter-guides for the deafblind in Japan
Satoko Mishina
Keio University, KANAGAWA, Japan

Background The loss of both vision and hearing means the deafblind have many difficulties in their daily lives. According to one survey, merely 20% of deafblind people can only enjoy conversation with others, go out and get various information about one or two days per month. In order to alleviate such difficulties and to promote the social participation of the deafblind, human support in the form of interpreter-guides is required.

Content On their own, a guide for the visually impaired or an interpreter for the hearing impaired is not able to fully support the deafblind. Special training courses are thus essential. The National Rehabilitation Center for Persons with Disabilities and the Japan DeafBlind Association established special training courses for interpreter-guides. Besides, under the Comprehensive Supports for Persons with Disabilities Act which was enforced, to have projects to develop highly skilled professionals in deafblindness with tactile sign language skill and/or finger braille skill became indispensable for municipalities. To follow up on these training projects, surveys were conducted on each participant to assess the situation of interpreter-guides, their training, and the needs of deafblind people for support in their daily lives. Based on the results of these surveys, we proposed the “training curriculum for interpreter-guides for the deafblind,” which was adopted by the government. The training project was expanded to cover the whole country.

Implications While the project in place, some challenges remain. One is the creation of a standard textbook in accordance with the training curriculum. Another is the establishment of a system for training deafblind and non-deafblind people to become project leaders. This is especially significant because if deafblind people who are receiving support become trainers in turn, the program’s impact on the students will be easily recognized. Furthermore, it could enhance the sense of self-efficacy of the deafblind participants.

P063

The OrCam MyEye Device; Wearable Assistive Technology
Bryan Wolynski
OrCam Technologies, NEW YORK, U.S.A.

Wearable technology is a growing industry. Different from wearable technology, Wearable Assistive Technology (WAT) is assistive technology built from the ground up with the visually impaired user in mind. One such WAT is the OrCam MyEye device, by OrCam Technologies.

The OrCam device is an intuitive, portable, smart camera, mounted onto a person’s own eyeglass frames, which is able to harness the power of computer artificial vision, to assist people who are blind or visually impaired.

Developed by leading minds in the Computer Vision and Machine Learning field and powered by proprietary
algorithms and a powerful processing engine, the OrCam device interprets visual information - recognizing text (OCR) and products and faces previously entered into its internal memory. Its proprietary technology translates visual information into audio instantly conveying information through a speaker near the wearers’ ear. OrCam has also developed a unique interface and is the only assistive device for the visually impaired that is triggered by a gesture. The user simply points at the item they wish to identify and the device recognizes the gesture and responds appropriately. Those unable to point, due to arthritis or other conditions can simply press a trigger button or tap on the base unit. The device does not require an Internet connection, which allows it to respond quickly and also alleviates many privacy concerns. The OrCam device is not dependent on anything external. Because everything happens inside, it’s very quick and easy to use, but does require training. Users of OrCam have been of all ages, has been used by those who are visually impaired to no light perception and used for work, home and leisure activities.

This presentation will demonstrate real world applications of OrCam, previous studies, its advanced and newer features and current user experiences.

P064

Universal Designs at Home or in Community for Patients with Visual Impairment
Hsi-Pao Hsieh1, Ching-Ying Cheng2, Pei-Ying Lin2
1Department of Optometry, Da-Yeh University, CHANGHUA, Taiwan
2Chung Shan Medical University, TAICHUNG CITY, Taiwan

Purpose: To investigate the universal designs at home or in community that would be applicable to all.

Methods: Three times of focus group interviews were conducted to gather useful data about the main perceptions, opinions, beliefs, and attitudes in this survey research. There were about 15 participants participating in the study under agreement, all of them were identified as visual impairment and adults (above 18 years of age).

The discussion was designed to gather information in regard to the following outcomes:
What you think is inconvenient or is a handicap at home or in community.
The experiments about any conditions or accidents at home or in community.
What kinds of universal designs participants desire and thought that would be assessable and be applicable to all.

Results: according to the data that gathered and analyzed from focus groups for three times, participants indicated the inconvenience or handicap at home or in community wew below: (1) Light more or less was different based on the elderly and patients with visual impairment; (2) Complexity and liquid crystal panel designs on household electric appliance would be dangerous to the elderly and patients with visual impairment; (3) The height of hand rail and grab bar designs were not adjustable for different stature; (4) Hard to set up an elevator, even the stair lift because of limited space; (5) Inconveninet to shop, physical activities, and communication. Accessible recommends, for example, smart panel for E-shopping, auto calls in danger, siri designs on light controller and household electric devices, and social housing projects.

Conclusion: Family and community matters are very common in everyday life; with the aging society have arrived, the elderly and the vision deficits populations will be a persistently problems, live together and live well, universal designs at home or in community would be imperative.

P065

Accessibility of railway stations
Els de Keijzer, Wim van Damme, Bart Melis- Dankers
Royal Dutch Visio, BREDA, Netherlands

ProRail, the railway infrastructure authority in the Netherlands, is going to improve the accessibility of the rail system for people with (physical, visual or hearing) impairments. This ambition arises from the ratification of the UN Convention and European legislation but also from a national ambition of the railway sector and the government. The Ministry of Infrastructure and Environment is the initiator and financier. The aim is high: all 410 stations in the Netherlands are 'independent accessible' in 2030. An intermediate step is that 90% of the travelers can travel to / from an accessible station in 2020 (= 70% of the stations).

ProRail works together with various partners in the implementation, such as the National Railways, regional carriers and patient organizations. ProRail and the patient organization for visually impaired people (Oogvereniging) have asked Royal Dutch Visio to participate and to share our expertise in order to make the stations accessible. The Accessibility Program focuses on three sub-programs: 1. Accessible entrance (requiring height of platforms of 76 cm) 2. Accessible platforms: lifts, ramps, stairs, blind guiding 3. Small measures: lighting, platform edge marking,
braille plates on handrails, obstacle-free route, security marking, the visualization of glass, etc. There will also be investigated which innovative accessibility measures can be value-added, for example, way finding with your smartphone and Google Street View in the 23 tallest stations.

An accessible station should be normative, not the exception. The added value of the Project Accessibility of railway stations lies mainly in the fact that all people, regardless of their disability, can use the train and the stations in the Netherlands. Visio is involved before the tender of each individual station, which allows an early stage of intervention and identifying the bottlenecks concerning full accessibility.

P066

Accessibility Designs of Adaptive Mobility Devices for Patients with Visual Impairment
Ching-Ying Cheng¹, Chao-An Chi², Su-Chen Chuang³
¹Chung Shan Medical University, TAICHUNG CITY, Taiwan
²Department of Special Education, National Taiwan Normal University, TAIPEI CITY, Taiwan
³Department of Special Education, National Taichung University of Education., TAICHUNG CITY, Taiwan

Purpose: Aging and vision deficits populations will be a persistently problems in Taiwan. According to the latest research by ourselves, the Quality of Life (QoL) score of patients with visual impairment showed significantly low in mobility dependency; since that, the next step should investigate to know what kinds of adaptive designs they desire, and how accessible that would be? The purpose of this study was to investigate the accessibility designs of adaptive mobility devices for patients with visual impairment.

Methods: In order to achieve the purpose, three times of focus group interviews were conducted to gather useful data about the main perceptions, opinions, beliefs, and attitudes of cane users in this survey research. There were about 15 participants participating in the study under agreement, all of them were identified (visual impairment), adults (above 18 years of age), and all of them should be experienced cane users over 5 years.

The discussion was designed to gather information in regard to the following outcomes:
To understand what participants’ mobility demands? And what demands they could or could not achieve independently now.
To understand what the advantages and the disadvantages about the traditional canes.
To understand what kinds of additional functions participants desire and thought that would be accessible for canes designer.

Results: Besides question one and two, participants’ opinions about adaptive mobility devices included:
warning voice only for crowded condition
light control to illuminate the ground in the dim or at night
glowing cane at night
length adjustable under different environment
hidden umbrella or seat
self-defense, mayday, or auto calls in danger
smart card or fast pass for transportation and pay easy
easy fold and hanging designs when not use
blue tooth connect with google glasses or smart phone
QR code search and scan

Conclusion:
Canes, with the speedy technology development, adaptive and additional designs would be likely to accomplish someday.

P067

Usability and availability of PDF readers on iPad for people with low vision: tunnel vision simulation experiment
Hidemi Komatsu¹, Emi Kudo², Mai Suzuki², Natsuko Katsushima², Madoka Ohnishi², Etsuko Tanaka³, Koichi Oda²
¹Keio University, YOKOHAMA, Japan
²Tokyo Woman’s Christian University, SUGINAMI, Japan
³Hamamatsu Special Needs Education School for the Visually Impaired, HAMAMATSU, Japan

Introduction We investigated usability and accessibility for people with low vision of several PDF readers on iPad. Before the experiment, we interviewed 9 people with low vision about usability of PDF viewer (Adobe Acrobat and UD browser) on iPad after the actual use. Acrobat is a general PDF Viewer. UD browser was designed for visually...
impaired people by Yasushi Nakano Laboratory of Keio University. As a result, UD browser was easier to use. Especially when they use Acrobat, it was inconvenient that they could not enlarge contents other than the main body text. It was important not only visibility of text but also usability of the environment to read. Therefore, we performed simulation experiment to investigate usability more detail.

**Method**

30 individuals (24 females and 6 males; 20-27 years) participated in this experiment. All participants had normal or corrected-to-normal visual acuity. They divided into 3 groups, low visual acuity simulation (below 0.7 log MAR), tunnel vision simulation (3 degrees) and a control group.

Original tour guides in PDF edition were presented on iPad. Viewer applications were Acrobat and UD browser. The participants performed several tasks and were interviewed about usability. Tasks were making a content bigger or smaller, searching a page, etc. The depending variable was the time to perform each task.

**Results**

Especially, in the page searching tasks, there was the significant difference of time among the simulation conditions ($F(2,19) = 5.59, p<.01$). In most of page searching function, tunnel vision condition is longer than other conditions. From the results of the interview, it was difficult to find undo button, etc., because they were arranged in the location away from the keyboard.

**Conclusion**

The layout is very important. The relevant functions need to be arranged adjacent area.

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**P068**

**Quick Response Code Designs of Orientation and Mobility in an Unfamiliar Building for Patients with Visual Impairment**

Ching-Ying Cheng, Kuo-Chen Su, Shyan-Tarrng Chen
Chung Shan Medical University, TAICHUNG CITY, Taiwan

**Purpose:** To investigate the quick response code (QR code) designs for patients with visual impairment when orientating and mobilizing in an unfamiliar building.

**Methods:** Three times of focus group interviews were conducted to gather useful data about the main perceptions, opinions, beliefs, and attitudes in this survey research. There were about 15 participants participating in the study under agreement, all of them were identified as visual impairment, adults (above 18 years of age), and skilled smart phone users.

The discussion was designed to gather information in regard to the following outcomes:
- The experiments about any conditions or accidents when orientating and mobilizing in an unfamiliar building.
- The experiments about QR code scanning or information reading
- What kinds of suggestions about QR code design, including setup location, contents, and easy-scan or fast-scan designs?
- What will the efficiency for mobility independent of QR code designs?

**Results:** according to the data that gathered and analyzed from focus groups for three times, participants indicated that (1) low frequency cue tone design on QR code location; (2) high visual contrast design on QR bar code; (3) blue tooth, infrared ray, or easy-scan design; (4) auto-scan APP designs when approaching; (5) stationary QR code location at every building; (6) hierarchical reading or selectable function; (7) obstacles or momentous place buzzer design, restroom and drinking fountain, for example; (8) siri communication or interaction after QR bar code scanning; (9) might combine with white cane; and (10) might apply to the deaf and the elderly.

**Conclusion:** According to the latest research by ourselves, the Quality of Life (QoL) score of patients with visual impairment showed significantly low in mobility independent, especially in unfamiliar buildings, hospital, shopping center, or an office building. So, enriching the character of physical environment is needed to be established in urgent.

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**P069**

**Inclusive (architectural) design; a building tailored made for everyone, including visual impaired people**

Marij van den Wildenberg
Bartiméus, DOORN, Netherlands

**Aim:** To include people with visual impairment in society, Bartiméus made an effort to make surroundings more accessible. Bartiméus gained knowledge on aspects the target group themselves considers important for their autonomy and wayfinding. This provides important information for principals and designers. The majority of designers focus on creating outstanding, eye catching buildings, whereas more awareness of impairments and
informed choices, can often lead to impressive improvements in wayfinding of all users, including visual impaired people. Methods: Bartiméus collect dates from diagnostic research on people with a visual impairment. Beside this empirical research, we also use the results of other research-fields. That includes research on architecture topics as well as ergonomics and environmental psychology. Results: Results give information what sensory aspects (acoustics, texture, smell, light & colours) can improve the environment. In November 2012 this expertise was published in the book 'Architectuur door andere ogen' (Architecture through different eyes www.uitgeverijdekunst.nl). In this publication eight blind people visited public buildings and shared their experiences. The second part of the book focuses on the above mentioned sensory aspects that architects and designers should take into account to create a more accessible environment for everyone, including people with a disability. Conclusions: We are convinced that knowledge on this subject, information of users and awareness of designers, is essential to create better living environments for everyone, including people with a visual impairment. Architecture is a human product and should therefore preferably reflect as many human qualities as possible.

P070

Comparing writing/reading on paper with writing/reading on tablet PC: implications from a simulated low vision study

Nobuyuki Nagai¹, Kazuki Kubota¹, Junya Sasaki¹, Daisuke Koizumi²
¹Miyagi University of Education, SENDAI, Japan
²Trust Medical Ltd., SENDAI, Japan

Introduction: Studies on the tablet PC as a low vision reading device have recently increased considerably. However, very few studies regarding the validity of the tablet PC as a low vision writing/reading device have been conducted. This study aimed to investigate this by comparing the results of paper examination and tablet PC examination for persons with simulated low vision.

Methods: Twenty university students with normal sight participated in the study. They wore the low vision simulator with a diffusion filter and answered the mathematics examination paper using their own pens after selecting the preferred print size. They also answered the mathematics examination paper on a tablet (Apple Inc., iPad Pro 12.9 inch) using a stylus pen (Apple Inc., Apple Pencil). They magnified (pinched out) the screen for their preferred print size. Half the participants answered the paper examination first and the other half answered the tablet PC examination first.

Results: The time required for answering was significantly shorter for the paper examination (paired t-test; *p<.05). Participants reported that they were accustomed to using a paper and pen and faced difficulty while using the stylus pen. They also reported high accessibility for reading with the tablet PC because magnification was easier. Therefore, the difference between the answering times for the two types of examinations seemed to be caused by the difference in the writing method.

Conclusion: These results suggest that the tablet PC is accessible for reading but inaccessible for writing for persons with low vision. However, accessibility appears to be influenced by whether or not participants were familiarise themselves with writing/reading on tablet PC, it might become an accessible device for writing/reading.

P071

Quality of Life (QoL) Investigation for Patients with Visual Dysfunctions in Taiwan

Kuo-Chen Su¹, Ching-Ying Cheng¹, Jheng-Sin Lian², Jia-Yi Lin³
¹Chung Shan Medical University, TAICHUNG CITY, Taiwan
²Shu-Zen Junior College of Medicine and Management, KAOHSIUNG CITY, Taiwan
³Center for General Education, National Taiwan University of Sport, TAICHUNG CITY, Taiwan

Purpose: To investigate the QoL for patients with visual dysfunctions.

Methods: Participants were asked to fill out a questionnaire adopted for the study. 151 patients aged from 18 to 91, referred from ophthalmology clinics or low vision centers, participated in the study. Data were then analyzed by using SPSS 22 package.

Results:

General QoL for patients with visual dysfunctions
(1) In the section of "Family and Community", participants gave low ratings on vehicles use, unfamiliar environment mobility, child bearing, family income and other factors. (2) In the "School" section, the majority of participants chose "no problems" or "can be resolved with assistive devices". This showed that special education played an important role for students with visual dysfunctions. (3) In the "Job" section, about 60~70% chose "unable to answer" or "give
up”. This might reflect the government’s incomplete labor policy
Background and QoL for patients with visual dysfunctions
According to statistical analysis, ages and certification variances were significant different in all aspects; significant
differences were found in the “job” section among participants of different genders, ages, age of eye disease onset,
and degrees. In addition, males were more likely to score higher than females; and younger patients and those with
earlier onset of disease scored significantly higher than the others. The results indicated that gender and age
stereotypes could also be found among the disadvantaged.
Physiological and QoL for patients with visual dysfunction
With regard to family and job, significant differences were found among patients with various habitual visual acuity.
Although visual field did not show significant differences, low tally between every subgroup was worthy of more
attentiveness; Last but not least, it was found that eye diseases and light adaption could also impact on patients’
perceptions of job.
Finally, strategies for both government and patients, and recommendations for future studies were also suggested.

P072
Evaluation of a tele-rehabilitation program for visually impaired people
Valeria Silvestri, Marco Sulfaro, Margherita Guidobaldi, Paola Piscopo, Filippo Maria Amore
National Centre of Services and Research for the Rehab of Low Vision Patients, ROME, Italy

Aim: Visually impaired people have difficulties to attend and complete visual rehabilitation programs. The aim of this
prospective study was to evaluate the efficacy of a customizable computer-based telerhabilitation program (CBTP),
called EyeFitness (NIDEK Technologies), dedicated to low vision patients. Moreover patients’ usability was
evaluated.
Methods: A CBTP including 17 customizable exercises was developed. For each exercise setting and stimulus can
be modified in order to create a visual training plan tailored to every eye defects. CBTP resides in a USB Pen drive
containing stimulation results consultable by rehabilitation therapist. 7 patients with visual impairment due to
different eye disease and best corrected visual acuity (BCVA) between 1 and 0,5 LogMAR in the better eye were
recruited. Patients underwent to 14 visual home-training of 45 minutes each, performed daily binocularly. BCVA,
Contrast sensitivity (CS), Reading acuity (RA), Reading speed (RS), Bivariate contour ellipse area (BCEA), Retinal
sensitivity (ReS) were compared before and after training. Moreover, accuracy, reaction time and System usability
scale (SUS) were evaluated.
Results: CS was found to be significantly improved both in the better eye (from 0,5 ± 0,2 LogC to 0,9 ± 0,3 LogC;
p=0,05) and in the worse one (from 0,4 ± 0,5 LogC to 0,9 ± 0,6 LogC; p=0,05). Statistically significant improvements
were also registered for BCEA values for 1-, 2-, 3- standard deviations in both eyes (p<0,05). Exercises duration
reduced significantly (p<0,05). The comparison between pre and post home training for both accuracy (from 52 ±
30,3% to 84,8 ± 20,1; p<0,01) and reaction time (from 35,7 ± 27,7 sec to 9,3 ± 1,7 sec; p<0,05) showed significant
differences. 50% of the sample considered the CBTP “good”.
Conclusion: The data provide evidence by showing improvements in visual functions. The results suggest that this
methodology could be adopted as a visual rehabilitation strategy.

P073
Sensors in the care for persons with a visual-and-intellectual disability: use, needs, practical issues and
ethical concerns
Gerdien Woensdregt, Hans Scholten, Claudia van Alfen, Paula Sterkenburg
Bartimeüs, DOORN, Netherlands

Aim of this study is to identify needs for the use of sensor technology in the care for persons with a visual-and-
intelectual disability. The main focus was to gather information concerning; the needs for sensor technology, the
use of sensor output, issues on user-friendliness and ethical concerns. Method: Using a Delphi study data was
collected among 20 representatives in the field of visual and/or intellectual disabilities, domotica, eHealth and sensor
technology (6 experts in sensor technology, domotica and eHealth, 4 managers, 3 client representatives, 3
caregivers, 2 developmental psychologists, 1 physician and 1 paramedic; age ranges 25 – 61). Atlas.ti software was
used for the coding of the data. Using qualitative analyses the themes were then categorized. Results: Ten
categories of desired sensors were identified: behavior, orientation / localization, health, activation / entertainment,
surveillance, falling, lighting, posture and sleep. The type of sensor and the context in which that sensor is used
determines whether the sensor output is used by clients, caregivers, physicians or the developmental psychologist.
Storage of sensor data should be digital. Furthermore, the sensor should be easy to use and understand and
preferably displaying sensor output on an app, smartphone, tablet or apple watch. The sensor should not be invasive for the client. An important ethical concern was to always put the interest of the client first. Privacy issues should be considered and the use of sensor technology should be supportive and additional to the given daily care.

Conclusion: For further research the following applications for sensor technology were given high priority to be tested in pilot studies for clients: lighting, posture and entertainment; caregivers: stress and muscle strain; developmental psychologists: understanding behavior; paramedics: falling and physical measurements; and physicians: physical measurements.

P074

Using the HoloLens’ Spatial Sound System to aid the Visually Impaired
Arjen Teijo Zijlstra
TNO, ZUIDBROEK, Netherlands

The Microsoft HoloLens is an augmented reality system renowned for its impressive holograms. For a large part, the holograms are so convincing due to the well-performing spatial sound system. In combination with the HoloLens’ ability to create a spatial mapping from the sensory data it collects, the spatial sound system could be used in order to guide a visually impaired person through an unfamiliar building by creating sounds that the person could use to find its way. In order to know how well the system is applicable in real life the accuracy of the HoloLens spatial sound and spatial mapping system is tested. The spatial sound system is tested by generating a sound in different angles and distances from the participant. Different types of sounds are tried and both visually impaired and sighted people are used in the experiments. The accuracy of the spatial mapping system is tested by measuring the size and the distance of objects it can detect. Furthermore, the speed an object could have and still be detected is measured. The combination of both systems is implemented in an application that guides a person through a building by creating a sound that the person follows. This is still a work in progress, only few results have been collected so far. A first pilot has shown that test-subject can accurately locate the direction of a sound generated by the HoloLens. Regarding the distance of a sound and the accuracy of the spatial mapping the experiences are not very specific at the moment of writing. The best practices to use the HoloLens for indoor navigation are presented.

Many other opportunities where the HoloLens could help the visually impaired exist, which are yet to be researched.

P075

Efficacy of automatic speech recognition software for congenitally blind speakers
Pauline Veenstra, Martijn Wieling
Rijksuniversiteit Groningen, GRONINGEN, Netherlands

Is there a difference in Automatic Speech Recognition (ASR) software efficacy for congenitally blind vs. sighted speech?
Visual and acoustic input is important in language acquisition. A recent study of Ménard (2013) has shown that the articulation of Canadian French speakers who are congenitally blind (CB) differs from articulation of non-blind (NB) speakers. Lip movements of CB speakers are less strong than those of NB speakers, but they compensate by using stronger tongue movements. However, this compensation strategy is not sufficient, as the acoustic difference between certain vowel pairs is more pronounced in NB speech. This suggests a clear link between visual input during language acquisition and the resulting pronunciation.

The performance of ASR systems relies on the acoustic model. The acoustic model is based on the relation between the acoustic speech signal and the individual sounds, which in turn is based on speech of NB speakers. Hypothesis: if Dutch CB speakers indeed have a tighter formant space in their running speech, ASR systems will have more trouble with recognition of their speech. We investigated acoustic (ASR, formant-measurements) and articulatory (video, articulography) properties of CB and NB read and spontaneous speech. We present the data on the efficacy of ASR.

Audio samples of read speech and spontaneous speech of 20 CB and 30 NB Dutch participants were fed through various ASR systems. Levenshtein-distances were computed and the data was analysed using Generalized Linear Mixed-effects regression. For read speech the normalized Levenshtein-distance showed that ASR systems performed significantly better for CB speakers (p<0.001) and for spontaneous speech no significant difference between CB and NB was found (p=0.84)

Analysis of the audio data indicates that ASR software performs better for read speech of CB speakers than for NB speakers, and shows no ASR performance difference between CB and NB spontaneous speech.

ZonMw/VIVIS-grant
**P076**

**Integrating the Use of Guide Dogs in Argus II Patients for Orientation and Mobility**

Andy Fisher, Marine Florence, Valentina Carbone  
Second Sight, LAUSANNE, Switzerland

The Argus II Retinal Prosthesis System (Second Sight Medical Products, Inc, Sylmar, CA) was developed to restore a degree of functional vision to blind patients resulting from retinitis pigmentosa (RP) or outer retinal degeneration. The Argus II Retinal Prosthesis is the only prosthetic device to have received the CE Mark for commercialization in Europe (2011) and approval from the Food and Drug Administration (2013). As of January 2017, more than 210 patients have benefited from the Argus II Retinal Prosthesis, with clinical tests showing long-term favorable safety results and benefits to patients in terms of Orientation and Mobility. Whilst long cane users have integrated successfully the Argus II system into their daily use for O&M purposes, the integration with a guide dog was not formally explored.

Argus II patients using guide dogs in the UK, Germany, France, the Netherlands, Italy and Spain were involved in the development of a “good guide practice”. New skills and strategies for O&M were developed to ensure that the guide dog would not notice changes on the patient’s behavior due to the new visual abilities, and the patient would not interfere with the work of the guide dog.

Without interfering or confusing the guide dog’s work, the Argus II patients trusted and understood the dogs’ decisions thanks to the additional functional vision and awareness of the surroundings. The artificial vision provided additional confidence and patients were able to be part of the decision-making process rather than be totally reliant on the guide dogs.

**P077**

**Visual Educational Program using computer and electronic devices in patients with retinal prosthesis ARGUS II**

Gaetano Savaresi, Paolo Ferri, Leonardo Colombo, Fabio Patelli, Tommaso Nuzzo, Luca Rossetti  
University of Milano - San Paolo Hospital, MILAN, Italy

**PURPOSE:**  
The aim of our study has been to improve the quality of the light stimulus from retinal prosthesis ARGUS II, in patients implanted at San Paolo Hospital, in order to optimize the quality of their life, based on needs coming directly from our patients. We refer to an electronic device to support patient on a permanent training.

**METHODS:**  
The core device (Mini Low Vision Working Station - MLVWS) of our visual educational program is a standard HD desktop magnifier with OCR and speech support, but including specific applications customized on patient needs. Our protocol includes reading/visual skills and O&M skills.

Reading skill procedure consists in dividing alphabet letters into groups according to their shape (straight, oblique, round lines or mixed shape) to help the patient to recognize shape and meaning, then create words and finally read short sentences.

O&M skills procedure teaches the patient how to scan outdoor environment. He needs to reach the awareness of the different signals received from ARGUS II and from white cane.

Letters, sentences, indoor and outdoor images are loaded into MLVWS, allowing the patient to organize his training, getting support from the speech.

**RESULTS:**  
After six sessions of two hours each, we have noticed significant improvements in reading accuracy and time. Time for scan and read is significantly reduced to 1/20, allowing the patient to be more independent in reading short texts on MLVWS screen.

Regarding O&M skills, the patient is able to recognize the differences in signals, coming from the “upper belt” obstacles “detected” by ARGUS II and the “below belt” obstacles by the white cane.

**DISCUSSION**  
The patient can’t never be “discharged” and needs to be constantly assisted. The MLVWS allows us to get in touch remotely, give immediate assistance and share information and feedback to improve benefits of ARGUS II.

**P078**
Development of a standard low vision curriculum for optometrists
Hasan Minto¹, S May Ho¹, Joseph Cho², Jill Keeffe³
¹Brien Holden Vision Institute, SYDNEY, Australia
²Hong Kong Society for Blind, HONG KONG, China
³LV Prasad Eye Institute, HYDERABAD, India

Background/aim: Currently an estimated 80,000 people and 6,000 children are in need of low vision services globally. These services are usually provided by ophthalmologists, optometrists, orthoptists, occupational therapists and special education teachers. Optometrists with their extensive education in optics, refraction, optical correction and ocular diseases are well placed to manage people with low vision. Low vision assessment and rehabilitation are taught in most optometry programs at various levels with varying content. We propose a minimum ‘standard low vision curriculum’ for optometrists to be included as part of optometry education to ensure that graduates have a basic minimum competency in providing low vision assessments and services.

Content: The proposed low vision curriculum covers areas of epidemiology, causes of low vision, low vision assessment, assessment of functional vision, assessment of children and the psychosocial impact of low vision. Rehabilitation strategies including prescription of optical and non-optical low vision devices, lighting advice, orientation and mobility and counselling are also included. Further to this, various service delivery models and planning for low vision services are also incorporated to equip future practitioners with knowledge on how to develop and establish low vision services. Recommended hours for each area in the curriculum is outlined, with an emphasis on clinical low vision practice. This curriculum is endorsed by the International Agency for Prevention of Blindness (IAPB). The Brien Holden Vision Institute Academy has developed the associated teaching content as part of its Global Optometry Resources.

Implication: Development of an IAPB endorsed standardised low vision curriculum for optometrists as part of a series of curricula for special needs teachers and eye care personnel, which can be adopted globally, will form a basis for the education of this cadre. This will in turn enable them to provide low vision rehabilitation and services to the community at large.

P079

Does multisensory presentation of mathematical graphs improve visually impaired students’ performance on identifying mathematical graphs? A comparison study
Louis Pool¹, Mijke Hartendorp¹, Christiaan Pinkster²
¹Saxion University of Applied Sciences, DEVENTER, Netherlands
²Royal Dutch Visio, APELDOORN, Netherlands

It is difficult or even impossible for visually impaired students to perceive complex information, e.g. graphs, tables and maps. A common solution is to present this information tactiley, but processing this information tactiley costs much time and energy. As an innovative solution, Royal Dutch Visio has designed in collaboration with Big Orange and University of Delft an application prototype for tablets that presents mathematical graphs both tactiley and aurally. The prototype consists of a regular tactile map of a graph and of a 3D sound clip of that same graph in which the x-axis is represented as a metronome and the line of the graph as a musical instrument. We have investigated whether visually impaired students processed a graph faster and more accurately when they perceived the graph tactiley and aurally than just tactiley. Eight visually impaired students participated (aging from 13 to 20 years). Four of them were blind and four had low vision. The tasks participants were asked to perform concerned identifying type of graph, pointing at the point of intersection of the graph with one of the axes, and indicating the location of specific coordinates with respect to the graph. It was found that there was no significant difference in reaction time in seconds or accurateness between the tasks performed with tactile and auditory graphs and with only tactile graphs. This suggests that adding sound to graphs does not improve performance. Nevertheless, all participants indicated that adding sound to the graphs took away doubts about the type of graph. In conclusion, adding sound to graphs does not directly lead to better performance, but does provide confidence for students.

Future research should focus on the effect of using auditory graphs after a longer training period and on what the effects are when only using auditory graphs.

P080

History of special classes for partially sighted students in the post-war Japan
Hisae Miyauchi
University of Tsukuba, TSUKUBA, Japan
In the pre-war time, despite the first “sight saving” class in Tokyo established in 1933, most partially sighted children were taught in schools for the blind using Braille or in regular schools without any support. It was only in the early 1950s where special classes for partially sighted children who focused on using residual vision began to appear in schools for the blind, and in the 1960s, in local primary schools. This presentation aimed to highlight the condition and the complications that the special classes in local schools faced and how it changed over time. The study involved a documentary analysis using reports produced by the Ministry of Education and the local schools in Tokyo and Osaka area. On June 1st, 1963 the first special class for partially sighted children was established in Honden Primary School, Oosaka and a year later in Sumiyoshi Primary School, Tokyo. The class in Honden started with 5 children with visual acuity greater than 0.1, less than 0.3. This was different from the classes set up in schools for the blind as those targeted children with more severe vision impairment. Within the next 10 years, the total number of special classes for partially sighted in Japanese local schools increased to 60, serving about 300 children. While the numbers increased, the following two changes were seen. One was the visual acuity of the partially sighted children receiving support in local schools. In Tokyo for example, by the mid 1980s, around 30% of children had the vision less than 0.1, some as low as 0.02. Other was the increasing number of children with multiple disabilities. By the mid 1990s, around 40% of children in partially sighted classes in the Tokyo area were children with multiple disabilities. The quality of teachers supporting these children starts to be questioned.

P081

The Evaluation of Digital Textbook Viewer for Children with Visual Impairments
Yoshihiro Tanaka
National Institute of Special Needs Education, YOKOSUKA, KANAGAWA PREF., Japan

Aim: Accessibility function of the digital textbook viewer developed by ACCESS Inc. and Tokyo Shoseki Publishing Company was evaluated among 4 teachers of schools for the blind, who have sufficient skill to teach children with visual impairments and have practical experience of ICT instruction. Method: Accessibility function was evaluated by 4 teachers with evaluation forms. Evaluation terms were followings: i. Visibility, ii. Usability, iii. Operability of monitor arms. And we prepared 3 different-sized tablet PC (12/15.6/21 inch). Each tablet PC had been demonstrated by 4 teachers for 3 weeks to each tablet PCs. Results: As it turned out, accessibility function of the viewer was basically available also for children with visual impairments, especially reflow of sentences and change of font types marked high score. The other way, change of font color and background was given low evaluation. Conclusion: The followings were suggested that tablet PC installed digital textbook viewer should be set by monitor arms in order to maintain stability and posture of children with visual impairment in using the viewer. In case of using mainstreaming settings, children with visual impairments needs at least 15.6 inch size tablet PC.

P082

Effects of moving window and notation system for fractions on computational speed
Mao Suzuki\textsuperscript{1}, Kazuhiro Ujima\textsuperscript{2}
\textsuperscript{1}Tsukuba International Junior College, TSUCHIURA CITY, IBARAKI PREF., Japan
\textsuperscript{2}Hiroshima University, HIGASHI-HIROSHIMA CITY, HIROSHIMA, Japan

Purpose: The purpose of this research is to clarify the effect of limit of information amount coming into sight at once and a notation system of fractions on computational speed. Methods: The participants on the experiment were 23 persons with normal vision 18 years or older. They were shown a display, on which they solved fraction addition problems, while manually scanning the window that was limiting the field of view and the times until solving the problems were measured. The experiment was conducted by a factorial design method using two factors among participants with window sizes (three levels: small, large and none) and notation system for fractions (two levels: slash and horizontal line). Four difficulty levels were established for the problems. Results: As a result of the variance analysis, the interaction was in significant trend at the time when the difficulty level 1 and level 3 were $F(2,44)=2.83$, $p<.10$ and $F(2,44)=6.92$, $p<.01$, respectively. Therefore, the simple main effects were analyzed. As a result, the notation of the fraction at the time when the size of the window was small became a significant trend in both difficulty level 1 and level 3 (level 1: $F(1,22)=3.52$, $p<.10$, level 3: $F(1,22)=6.92$, $p<.10$). The effect of the size of window had a significant trend under both conditions of notation system of fractions by slash (level 1:$F(2,44)=36.83$, $p<.01$, level 3: $F(2,44)=6.25$, $p<.01$) and horizontal line (level 1:$F(2,44)=160.79$, $p<.01$, level 3: $F(2,44)=5.55$, $p<.01$). Conclusion: The computing time became longer when notation system was by slash rather than horizontal line. This
Development of the ability to observe and conceive objects through activity using a game of cards
Satoshi Kikuchi, Kanako Fukuda, Ayana Okamiya, Sashima Tsuyoshi
University of Tsukuba, TSUKUBA-SHI, IBARAKI-KEN, Japan

Aim: For children with low vision, constant and systematic educational intervention is essential to develop the ability to observe carefully. Intervention for low vision toddlers should be conducted through play, rather than training, to make him/her engage in the task of observing. This research reports two cases of children with low vision who developed observing ability through the activity of a game of cards.

Content: In case A, a toddler with low vision (five years old) looked at a card illustrated with one Japanese letter and picked up a card illustrated with the same character from ten cards on the table. This activity took twenty minutes and was completed taken once a month for six months (six sessions). After that period, the toddler was able to count cards she picked up and learned all Japanese letter (Hiragana). In case B, for a toddler with low vision (five years old), used cards illustrated with numbers in the same procedure. This activity took twenty minutes and was completed approximately once a month for a year (nine sessions). After that period, the toddler was able to play cards of a mixture of numbers, alphabets and pictures. He would be able to discriminate one concept from two different concepts. Both of the toddlers are now studying in regular schools.

Implications: Although intervention is conducted only once a month, development of the ability to observe and conceive of objects is expected from the educational activity the low vision toddlers enjoy.

Objective evaluation of tablet-PC using in education for a child with intellectual disabilities with visual difficulty
Iwao Kobayashi, Chiaki Takahoshi, Suguru Oikubo
Tokyo Gakugei University, TOKYO, Japan

Introduction/aim: Information and communication technology (ICT) has been used widely in the education and evaluation of children with disabilities. Among ICT applications, salivary amylase monitoring with video analysis has been used for objective evaluation of people with profound intellectual and multiple disabilities. We hypothesized that such an evaluation method is useful for people with other multiple disabilities, especially for people who cannot express their own thoughts voluntarily. For a child with intellectual disability and visual difficulty, we applied such education evaluation methods for using tablet PCs.

Methods: An eight-year-old girl who had severe intellectual disabilities and visual difficulties had educational needs of advancing sustained visual activities. During the study's first year, we used some tablet PC (iPad; Apple Computer Inc.) applications with her to confirm her preferences and stress for respective applications using video-analysis and by monitoring salivary amylase. Based on that evaluation, during the second year, we planned and used a tracing writing application for advancing her ability.

Results: The first-year study revealed that the participant felt great stress at the beginning of each session no matter what kind of application was used. Based on that result, during the second year, we planned a session program for the learning of tracing writing. Advancement of the girl's activity was found in terms of the time and the number of completed tasks with educational support.

Conclusion: Using a tablet PC with objective evaluation can be effective for advancing the visual behavior of a user.

Characteristics of low vision patients and use of low vision aids
Aysun Idil1, Nedime Sahinoglu-Keskek2, Firat Selen3
1Ankara University, Faculty of Medicine, ANKARA, Turkey
2Baskent University, Faculty of Medicine, Adana, Turkey, ADANA, Turkey
3Ankara Numune Training and Research Center, Department of Ophthalmology, ANKARA, Turkey
Aim: To evaluate the diagnosis distribution of the low vision patients, the use of low vision aids for reading and writing activities in individuals with low vision. Methods: This descriptive study included sixty five partially sighted patients who presented to the low vision clinic for the first time between October 2016 and December 2016. The patients were between the ages of 5 and 84 years. The distribution of diagnosis, accompanying ocular findings, best corrected visual acuity for distance and near without low vision devices and the preferred low vision rehabilitation aids for distance and near were noted. Results: The mean age of the patients was 35.7 ± 12.72 years and the median age was 17 years; 41 (63.1%) of them were male and 24 (36.9%) of them were female. The mean BCVA of the better eye was 0.83 ± 0.34 logMAR for distance and 1.03 ± 0.35 logMAR for near vision. Analysis of the distribution of the diagnoses revealed that the most common were hereditary macular dystrophy with 26% and age-related macular degeneration with 21.5%. The most frequently used low vision rehabilitation methods were telescopic glasses (73.8%) for distance and hyperocular glasses (33.8%) for near vision. Conclusion: In current study, retinal diseases were found to be common in visually impaired patients. The young partially sighted patients preferred to use telescopic glasses for distance vision. However among the adults generally hyperocular glasses for near vision was preferred. The preference of the low vision aids changed according to needs in daily activities.

P086

Analysis of low vision clinic patients with basic clinical characteristics
Qing Huiling
Henan Eye Hospital Henan Eye Institute, ZHENGZHOU, China

Objective: To investigate the clinical features of the patients with low vision clinic, guiding the effective development of low vision rehabilitation.
Methods: This is a retrospective review of 40 cases presenting to the low vision clinic at Henan Eye Hospital, Henan Eye Institute. All patients have a detailed understanding of routine eye examination, instruction of rehabilitation training, summarize the etiology, age, visual acuity, contrast analysis.
Results: 40 cases of the patients, there were 26 males, 14 women. Mean patient age was 50.71 years (range 6~76 years), According to the 40 patients suffering from eye diseases were: 8 cases of glaucoma, 6 cases of primary optic nerve atrophy, 5 cases with congenital nystagmus, 3 cases of diabetic retinopathy, 2 cases of ocular trauma, 2 cases of congenital myopia, 2 cases of lens dislocation, 2 cases of retinal detachment, 2 cases of uveitis, and 2 cases of adherent leucoma. 1 case of Leber’s disease, 1 case of congenital microphthalmos small cornea, 1 case of retinitis pigmentosa, 1 case of central retinal vein occlusion, 1 case of corneal dystrophy, 1 case of ocular pemphigoid disease. 40 cases of patients with binocular best corrected visual acuity for manual ~0.3, including a low vision (0.1 vision < 0.3) and 25 cases, two low vision in 8 cases, the ratio was 3:1.
Conclusion: Among the patients with low vision, the majority of patients are one-level low vision, There are greater gains in visual rehabilitation with available Optical vision aids. Appropriate visual aids and necessary rehabilitation training could improve their visual function and quality of life.

P087

The benefit of simple magnifying glasses - and the importance of its training
Arnd Graf-Beilfuss
Swiss National Association for the Blind, LENZBURG, Switzerland

Simple magnifying glasses do have obvious advantages: They are inexpensive, light in weight, extremely mobile and provide the largest usable field of vision. Only the shorter reading distance could theoretically be a critical factor. However, our practical experience shows that reading at a short distance is generally accepted because the advantages are numerous. And even the advanced age of the visually impaired people has no significant influence on the acceptance.
Approximately 90% of the clients of the SNAB Low Vision department do work very successfully with simple magnifying glasses from sph + 6.00 Dpt. up to + 72.00 Dpt. Therefore the trained handling of the optical device is essential and the key to its success: To find a suitable optical aid, some further evaluations have to be made beforehand: the practical determination of the necessary magnification, the consideration of the dominance of an eye and the evaluation of the PRL’s. Magnifying glasses should not be distributed without an appropriate training and its success depends on a good communication between patient and Low Vision professional.
Instead of proposing cost-intensive electronic aids, which are not affordable for all visually impaired people, a simple
pair of magnifying glasses could be the appropriate device. Another general advantage is the much easier self-controllable reading behaviour. The many years of experience in the care of visually impaired people with simple magnifying glasses shows that a large number of visually impaired persons - even in case of the increasing demand of magnification - would rather remain with their trusted kind of magnifying device. I would like to emphasize the many benefits of this simple and functional low vision aid.

P088

Portable CCTV versus iPad in Spot Reading tasks
Walter Wittich¹, Jonathan Jarry¹, Julie-André Marinier¹, Aaron Johnson²
¹University of Montreal, MONTREAL, Canada
²Concordia University, MONTREAL, Canada

Introduction: Spot reading, the ability to obtain short pieces of visual information, can easily be rehabilitated with magnification devices, such as loupes or portable closed-circuit TVs (CCTVs). However, they have limitations such as screen size and price and have previously been shown to be stigmatizing when used in public. The arrival of tablet computers provides an alternative with greater magnification at a reduced price. We present preliminary results on the objective and subjective comparison of the iPad and a portable CCTV for spot-reading tasks.

Methods: Twenty-three men and 30 women age 19-93, with impaired visual acuity (<20/60) due to central visual impairment, were asked to complete spot-reading tasks involving three common objects (TV cable bill, nutrition info on food package, box of eye drops) using the iPad and a portable CCTV in randomized order. We measured their ability to complete each task and the time it took, in addition to their subjective device assessment and preference.

Results: A Bayes Factor and effect size analysis showed no statistically significant differences between the device conditions in the time to complete each task (BF01 > 4.05, Median d = -0.043, 95% credible interval [-.21, .234]). Choosing one device over the other may simply depend on preference which, in our cohort, was divided (39.6% iPad, 56.6% CCTV, 3.8% neither) and which could be influenced by factors such as device size, usability or stigmatization.

Conclusion: The data indicate that, for certain spot reading tasks and levels of difficulty, the use of a tablet computer may be as efficient and effective as a traditional device such as a portable CCTV. Future investigations will further examine device preference as we predict that it may influence device success and continuation of use.

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P089

Visual Rehabilitation Using a Single Peripheral Prism in a Patient with Right Hemianopia: A Case Report
Michele Arthurs
Centre de réadaptation Estrie, WESTMOUNT, Canada

A 62 year old male with a right homonymous hemianopia secondary to a left occipital lobe stroke was referred to the Centre de Réadaptation Estrie vision rehabilitation clinic. The right visual field loss interfered with many instrumental activities of daily living and caused difficulty with mobility. Unilateral peripheral prisms developed by Eli Peli have been shown to expand lateral visual field between 20 to 30 degrees in upper and lower hemianopic fields resulting in improved obstacle detection and mobility in patients presenting hemianopia. The patient's visual acuity was 20/20 in each eye with glasses and his monocular and binocular Easterman visual fields demonstrated a right homonymous hemianopia. The field was 50 by 90 degrees in the right eye, 80 by 90 degrees in the left eye and 80 by 90 degrees in both eyes. Visual field sparing was noted in the inferior hemianopic field in each of the monocular and binocular visual fields. Peripheral prism glasses were recommended and two peripheral demo prisms were added to the patient's glasses' right lens using the Peli Lens™ guidelines. Binocular Easterman perimetry was tested with the demo prisms resulting in visual field expansion of 20 degrees in the upper hemianopic field and stable inferior hemianopic field sparing. The use of both demo prisms versus the use of a single upper prism was compared and no objective or subjective difference was noted. Peripheral prism glasses were ordered with a single 40 diopter permanent upper prism and resulted in a 30 degree lateral expansion in the upper field in addition to the inferior field sparing. The patient underwent orientation and mobility training which successfully improved his ability to detect and react to obstacles in his environment. The use of a single peripheral prism is an alternative and more simple option to hemianopia visual rehabilitation.
Visual performance and oculo-motor plasticity in low vision patients: The impact of practice with eSight Eyewear
Marie-Céline Lorenzini, Jonathan Jarry, Walter Wittich
Université de Montréal, MONTREAL, Canada

Low vision rehabilitation has yet to reliably demonstrate the impact of interventions on the location and stability of a preferred retinal locus, and to show the close link between changes in oculo-motor control and functional improvements. Recently, eSight Corp. (Toronto, Canada) has developed a wearable, electronic low vision aid, “eSight Eyewear”, intended to improve the functional visual performance. The goal of this study was to evaluate if the use of eSight Eyewear improves visual function and whether it is associated with better oculo-motor control. Thirteen participants (age 36-63, M = 49, SD =10) with low vision (VA 20/63-20/400) affected by hereditary visual diseases were recruited. They completed measures of distance and near VA, contrast sensitivity, and reading speed, at baseline, and after 3 months of using the eSight Eyewear, with and without the device. At each time point, fixation location and stability were assessed using the Optos OCT SLO microperimeter (Optos pic, Scotland). Participants returned home with the device for 3 months. Within-subject analysis of variance of distance VA revealed a significant interaction effect of time and device use, indicating that acuity improved with time, however only with the device, p = .01. Complete fixation assessments across the two time points were available in 5 participants. Fixation location remained the same for all participants as categorized by the OCT SLO, whereby improvements of fixation stability were recorded for 3 participants. Fixation stability using the bivariate contour elliptic area did not show significant difference after 3 months, p = .20. In all participants, we found improvements of distance and near VA, contrast sensitivity, and reading speed using the eSight Eyewear, indicating that the device improves functional vision. Results also indicate that a 3-months utilisation improves DVA, indicating the benefit of training and/or practice. Moreover, the eSight device may improves fixation stability.

Low Vision Rehabilitation in a young woman affected by oxalate maculopathy and retinopathy in primary hyperoxaluria type 1.
Giovanni Sato1, Roberta Rizzo1, Alessandro Galan2
1Low Vision Rehabilitation Center, PADOVA, Italy
2St.Paul Ophthalmic Center, PADOVA, Italy

Introduction
Primary hyperoxaluria is a rare autosomal recessive error of glycoxylate metabolism occurring at birth which causes widespread calcium oxalate crystal deposition in various tissues such as kidney, liver, bone and bilateral widespread distribution of retinal oxalate crystal with maculopathy and subretinal fibrosis. This case of 25 year old woman represents a model of low vision rehabilitation in maculopathy.

Methods
The patient underwent to ETDRS, MnRead, contrast sensitivity, microperimetry. The ETDRS results were RE 1/20 and LE 1/50. Microperimetry revealed central scotoma with upper PRL. Inviting the patient to look above towards upper PRL there was an increase of visual acuity: RE from 1/20 to 1/10 and LE from 1/50 to 1/10. The patient underwent to eight session of audiobiofeedback moving the fixation in the upper PRL associate with reading rehabilitation according to the Backman formula (tang d°=X/RD) and six diopeters hypercorrective prismatic aid.

Results
The patient underwent to rehabilitation of fixation with: reading exercises using the Backman formula and six diopters hypercorrective aid, eight session of audiobiofeedback, prism lenses. After audiobiofeedback the retinal sensitivity increased and the patient became aware of the best area of fixation (PRL). The distance rehabilitation involved two types of telescopes: 2.1 x with an increase of visual acuity from 1/10 to 3/10 and 4.2x with increase of visual acuity from 1/10 to 6/10. With 527 nm filters we reduced glare and increase contrast sensitivity.

Conclusion
The case of primary hyperoxaluria type 1 with oxalate retinopathy and subretinal fibrosis can be taken as a model of low vision rehabilitation where we used all the techniques of rehabilitation: reading PRL-exercise, audiobiofeedback, visual far aids, near hypercorrective aid, prism lenses and filter lenses.
EEG Signals Change after Filters Intervention for Patients with Blepharospasm
Shu-Hui Su1, Ching-Ying Cheng1, Hsi-Pao Hsieh2
1Chung Shan Medical University, TAICHUNG CITY, Taiwan
2Department of Optometry, Da-Yeh University, CHANGHUA, Taiwan

Blepharospasm, is the condition of having dry eyes or keratoconjunctivitis sicca (KCS), the main complaint photophobia have been proved to be strongly correlated with thalamus responses (Emoto, et al., 2009).

Purpose:
In order to ease the chief complaints and to predict the efficiency of filters, the purpose of this study was to detect the EEG P100 signals change pre- and post-filters intervention; EEG amplitude of frontal, temporal, occipital lobe were then examined to indirectly represent the responses of thalamus.

Methods:
Four tinted lens, including gray, RL1, RL2, RL3 (rose, high to low penetration) were used as independent variances to slow down the amplitude response which were indicated correlated with photophobia symptom for patients with Keratoconjunctivitis sicca by using Electroencephalogram. Thirty-one subjects, aged from 20-79 years (mean=50.31 years of age) were recommended from ophthalmologic clinic, ophthalmic slit lamp examinations, Schirmer tests were also performed to recruit the participants. Each participant need to proceed five times of Electroencephalogram examination, including without filter, with gray, RL1, RL2, RL3. EEG P100 signals were analyzed with descriptive statistics, spearman correlation, dependent and independent t test, one-way and repeated ANOVA analysis, Post Hoc, and linear regression by using SPSS 22 package.

Results:
Results showed that all filters could ease the amplitude of frontal, temporal, and occipital lobe, especially the gray filter; moreover, different filter might produce significant efficiency on different lobe, gray worked well on frontal, RL1 on temporal, and RL2, RL3 on occipital. Data also showed that all filters might have good predictive power to different lobe up to 50~60% (β coefficient ) under regression analysis.

Conclusion:
The experimental result showed the correlations among all the filters, and also showed significant correlated with benignant-essential-blepharospasm. EEG P100 was suggested as a good marker for the investigation, and filter was also suggested as good assistive devices for photophobia.

P093

An assessment of innovative optical low vision aids (LVAs) in simulated visual impairment
Moyra Mcclure1, Aoife Hunter2, Sara Mccullough2
1Belfast Trust, BELFAST, Northern Ireland
2Ulster University, COLERAINE, Northern Ireland

Changes in optical LVA design have seen improvements in appearance, illumination and handling. This study aimed to compare four innovative optical LVAs with a conventional magnifier. All LVAs were from Eschenbach with similar magnification (2x to 4x). Twenty normally sighted students, of mean age 21 years, at Ulster University consented to this ethics approved study. Three spectacles simulated visual impairment (mild, moderate and severe). Distance and near visual acuities, contrast sensitivity and reading speed were measured with the simulation spectacles and each LVA. Reading speed in words per minute (wpm) was undertaken reading a newspaper, letter and recipe book. Participants’ views were assessed using a questionnaire. Outcome measures were evaluated using ANOVA with repeated measures. Three innovative LVAs (Powerlux, Menaslux and Makrolux) improved mean near visual acuities more than the conventional magnifier (System Vario) for all simulation spectacles. Mean reading speed was significantly faster with these three innovative LVAs than the conventional magnifier (p <0.05) for mild and moderate visual impairment. Reading a newspaper with mild visual impairment, using the Powerlux, granted a 46 wpm improvement from 73wpm with the conventional magnifier while for moderate visual impairment, the Menaslux gave a 49 wpm increase from 41 wpm with the conventional magnifier. Compared to the conventional magnifier, the Makrolux increased reading speed by 62wpm for reading recipes in mild visual impairment and by 46wpm in reading a letter in moderate visual impairment. All subjects preferred the innovative magnifiers rating them as having better appearance and reading speed whereas most subjects (60%) favoured their handling. For those with mild to moderate visual impairment, Low Vision Services should demonstrate both innovative and conventional magnifiers, especially to young adults who are concerned about appearance, handling and functionality. Clinicians and patients alike will be pleased to see the potential reading speed improvements with innovative LVAs.

P094

Prism lenses in low vision rehabilitation
Introduction

Low vision rehabilitation can be carried out through different methods: we use prism lenses with the final objective of recovering the visual ability due to ocular or neuroophthal-mological disease.

Methods

The goal of Prism Lens is to move the image seen by the eye where we want. We use this method of rehabilitation in different diseases: Hemiamopia, maculopathy, glaucoma, retinitis pigmentosa, nystagmo.

Results

In Homonymus Hemianopia after ETDRS, Pelli-Robson, visual field 30°, Greene test, binocular Esterman, we applied the prism lens with the topic of enlargement of the visual field. Low power prism lenses up to a maximum of 10 prismatic diopters in some cases and with Pelli prism lenses of 40 diopters in other cases, are placed with their bases towards the blind site in order to enlarge the visual field which bringing the image of the environment of the blind site towards the seeing site. Before the treatment the median of visual field was 80° and after prism was 100° with the median in increased visual field of 10°. In maculopathy we placed the prism with the base in the PRL which resulted in improvement of far visual acuity. In glaucoma the goal is to bring the residual peripheral visual field towards the central blind area in order for the patient to see without moving their head. In Retinitis pigmentosa we used prisms to move the central visual field to the periphery. In nystagmo the prism stabilizes the gaze in the null position with elimination of stiff neck.

Conclusion

The patients are satisfy because with the prim lenses they can improve visual acuity, visual field and orientation and mobility, being able to see without movement of head in the visual field.

P095

Keeping the home flag flying - Enabling Work with a visual impairment in a demanding environment

Kevin McNally1, Keziah Latham2

1Eye Consulting Ltd, KETTERING, United Kingdom
2Vision & Eye Research Unit, Anglia Ruskin University, CAMBRIDGE, United Kingdom

Background: This case study illustrates the complex challenges arising from visual tasks required to maintain employment for a person with a visual impairment, and how they can be countered by the low vision practitioner’s improvisation in combining optics from different sources into single devices, sometimes applied differently to their original design intention.

Content: The patient has a history of bilateral retinoplexy, with complications over 15 years, with current distance acuity (OD 0.48, OS 0.90 logMAR), near vision (OD N12, OS N32 @25cm), impaired visual fields and increased glare sensitivity. Employment is as a master rigger and ships’ engineer requiring him to check trueness of rigging 30m up a mast at sea, examine fine detailed electronics at close distance in confined conditions, and pilot small ships.

Two devices will be illustrated offering a combination of distance, intermediate, near and glare reduction: Spectacle mounted 3x focussing kepler biopic with custom made polarizing eyepiece caps (OD) and 3x near aplanatic (OS). Used for piloting, navigating and checking mast alignment from top of masts, yielding acuities of (OD) 0.14 distance and (OS) 0.10 near.

A 2.5x 50 cm focus surgeon’s loop on a custom made hinged mount for correct clearance, fitted with a Franklin split bifocal with distance correction and + 5D add (OD) and +12D aspheric (OS). Used for close and intermediate tasks in rigging, workshop and dry dock.

Implications: The subjective appreciation of these devices is greater than the acuity measures relate. They have survived four years of daily use in aggressive salt water environments, allowing continued highly specialized employment by meeting a broad range of visual demands, where electronic aids could not offer the required task flexibility or durability. This approach of adapting readily available optics has equally valid applications in other fields of employment and daily living.

P096

Effectiveness of refractive error correction and need of optical low vision devices for people with oculocutaneous albinism in Nepal

Hari Bahadur Thapa1, Ken Bassett2

1Low Vision Rehabilitation Center, PADOVA, Italy
2St.Paul Ophthalmic Center, PADOVA, Italy
Introduction
Albinism is commonly associated with high refractive errors, but some clinicians are reluctant to prescribe glasses because reduced vision persists due to additional non-refractive visual problems. The purposes of this study were to evaluate the effectiveness of glasses and to assess need of optical low vision devices in people with oculocutaneous albinism in Nepal.

Methods
People with Oculocutaneous albinism (OCA) were prospectively examined through an outreach program of Lumbini Eye Institute, Nepal. Glasses were prescribed to determine the objective improvement in visual acuity (VA) and strabismus. Compliance with spectacles wear was assessed by telephone contact after 3 weeks and categorized as excellent: >75% of awake hours; good: 50–75% of awake hours; fair: 26–50% of awake hours or poor: <25%. Interviews data were conducted with individuals and/or parents. Need of optical low vision devices was also assessed.

Results
Thirty seven people (67% male) median age 16 years (range: 3 to 50) with OCA were examined. Mean refractive correction was −1.05 ± 4.1 Diopters spherical equivalents (range: −13.0 to +5.0 D). Mean visual acuity at distance was 0.87 ± 0.23 (6/45) corrected and 1.11 ± 0.32 (5/60) uncorrected (P <0.001) in the patients. Mean near VA was 1.74 ± 0.80 corrected and 2.38 ± 1.24 uncorrected (P <0.001). Compliance was excellent in 49% (18), fair in 24% (9), good in 13% (5), and poor in 13% (5). Magnifiers for near were needed in 43% (16) people and telescopes for distance were needed in 59% (22) people.

Conclusion
Providing eyeglasses resulted in a clinically and functionally significant improvement in VA in people with OCA.

Key words: Albinism, Low vision, Refractive error

The prototype of measuring instrument of equivalent viewing power for magnification
Tadaaki Tanabe
Nippon Lighthouse, OSAKA, Japan

Purpose
Equivalent Viewing Power (EVP) for people with low vision is normally estimated using methods such as MNREAD, but do not utilize any mechanical instrumentation. EVP is measured by the telescope for near vision due to variability of telescopic length and differing outcomes. Some ongoing issues are for example; manually fixing the telescope in a usable position. Because of this, during the experiment focusing the telescope and keep it in a fixed and usable position was difficult. As a result, a more convenient method for using an auto-focus telescope to reduce manipulation by the investigator was required.

Method
The prototype instrument consists of target letters on the modified optical bench and auto-focus telescope for near vision. The target was controlled with a speed controller switch to alternate forward and backward motion. The calibration of EVP from 10D to 34D was printed on the optical bench for the investigator to read EVP for magnification. Students were asked to tell the investigator to indicate when the target was in their sight, while the target was moving from far to near for them. A total of 10 students whose corrected decimal visual acuities were from 0.03 to 0.4 were recruited to compare values of diopters, for magnification between the new instrument method and recent common method using Japanese reading chart.

Results
Student who had a score of 0.03 of visual acuity were excluded due to the necessities over 34D of EVP. Another 9 students who had corrected visual acuity between 0.04 and 0.4 were compared when using the instrument and reading chart. As a result, there were no significant differences with the t-test.

Conclusion
Measuring of the EVP instrument for magnification, successfully estimated the EVP without calculation. The prototype instrument was effective in its intended purpose.

Examining the link between visual impairments and psychosis: a systematic literature review
Tineke de Jonge, Paula Sterkenburg
Bartiméus, KRIMPEN AAN DE LEK, Netherlands
This abstract is part of a planned symposium.

**Symposium Title:**
VISION2017. Low vision rehabilitation: a global right.

**Moderator of the symposium:** International Society for Low Vision Research and Rehabilitation (ISLRR)

**Title of presentation**
Examining the link between visual impairments and psychosis: a systematic literature review

Tineke de Jonge & Paula Sterkenburg

**Aim:** To examine whether there is a relation between psychosis and visual impairment.

**Methods:** In a systematic literature review of literature (2000 – 2017) the link between psychosis and visual impairment (including the Charles Bonnet syndrome) is examined.

**Results:** Many studies describe the difference, but also comorbidity, between visual hallucinations in Charles Bonnet syndrome and psychosis. For example major depression with psychotic features is considered as a likely comorbid diagnose in patients with Charles Bonnet syndrome (Chen, 2014). Also a few case reports of people with Usher syndrome (the most common cause of deaf-blindness) and psychosis were found. Some studies report on visual functioning in people with schizophrenia, for example Viertiö et al. (2007) reported that for schizophrenia there were significantly increased odds for having a visual impairment, while for other psychotic disorders this was not found.

**Conclusion:** Studies report that persons with schizophrenia (psychosis) more often have visual impairments. It is therefore very important to evaluate visual functioning in children and adults with schizophrenia. It is also important to differentiate between hallucinations due to the Charles Bonnet syndrome and hallucinations related to psychiatric conditions.

**Disclosure:** none

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**P099**

**Long term effects of inpatient low vision rehabilitation on quality of life, psychological functioning and participation**

Ruth van Nispen, Hilde van der Aa, Tishelle Daniel, Ger van Rens

VU University Medical Center, AMSTERDAM, Netherlands

**Introduction/aim:** In the Netherlands, every year approximately 120 visually impaired adults with complex needs follow an inpatient multidisciplinary weekday rehabilitation program. The aim was to investigate its long-term effectiveness on participation, vision-related quality of life (VRQOL) and mental health. Also, prognostic factors were studied as were the direct healthcare costs.

**Methods:** In a prospective study, 74 adults (62% male, mean age 47 SD=15 years) were interviewed by telephone at baseline (Feb 2013-Jul 2014) and 10 and 18 months follow-up. Linear mixed models were used to analyze rehabilitation effects on the Participation and Activity Inventory, Low Vision Quality of Life subscales, Adaptation to Vision Loss, Center for Epidemiological Studies – Depression, Hospital Anxiety Depression Scale and prognostic factors. Costs of stay and interventions provided were calculated for each patient.

**Results:** Improvement was found on participation, LVQOL-mobility and LVQOL-acceptance subscales and on adaptation (p<0.001). Visual functioning, depression and anxiety symptoms did not change significantly over time. Comorbidity and severity of vision loss were negative predictors of participation and VRQOL; duration of the visual impairment was a positive predictor. Mean duration of stay was 137 (SD=50) days. The most often followed interventions were computer training (mean 130 hrs SD=60), leisure courses (63 SD=49), Braille training (60 SD=55), orientation and mobility training (54 SD=56), psychosocial counselling (53 SD=31). Mean costs per patient of stay were €10,624 (range 3,089-21,873) and interventions €25,546 (range 6,270-73,631).

**Conclusions:** Although some outcomes did not improve, there was a strong long-term positive effect of inpatient rehabilitation on participation, mobility, acceptance and adaptation. Knowledge about vulnerable groups within the inpatient setting may increase awareness of professionals and may help to fine-tune rehabilitation trajectories. The variability in the tailor-made trajectories warrants future studies into dose-response relations of (combinations of) interventions to reduce costs of the program and to further increase effectiveness.

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**P100**

**The incidence and predictors of depressive and anxiety symptoms in older adults with vision impairment: a longitudinal prospective cohort study**

Ger van Rens, T Heesterbeek, RMA van Nispen, HPA van der Aa

VUmc, HELMOND, Netherlands

**Purpose**
Depression and anxiety are highly prevalent in older adults with vision impairment. Aim of this study was to determine the incidence of subthreshold depression and anxiety, and to investigate predictors of developing depression and anxiety in older adults with vision impairment who had no subthreshold depression or anxiety at baseline.

Methods
Longitudinal prospective cohort study with a follow-up of 24 months in 540 older adults with vision impairment (mean age 75 years, 56% female, 48% macular degeneration, 15% glaucoma) from outpatient low-vision rehabilitation organisations. Cumulative incidences of subthreshold depression and anxiety were calculated and linear mixed models with maximum likelihood estimation were used. Main outcome measures were: fluctuations in depressive symptoms (Center for Epidemiologic Studies Depression Scale) and anxiety symptoms (Hospital Anxiety and Depression Scale-Anxiety subscale).

Results
The annual cumulative incidences of subthreshold depression and anxiety were 21.3% (95% confidence interval (CI) 18.7-23.9) and 9.5% (CI 7.4 – 11.6), respectively. Risk factors for developing depressive symptoms were: living alone, having just enough money to cover expenses, having macular degeneration, having problems with adaptation to vision loss, reduced health related quality of life, and experiencing symptoms of anxiety. For developing anxiety symptoms, a relatively younger age, experiencing symptoms of depression, not living alone and experiencing hindrance at work proved to be risk factors.

Conclusions
The incidence of subthreshold depression and anxiety in older adults with vision impairment is twice as high compared with older adults in general and depression and anxiety symptoms fluctuate over time. It is of great importance that low vision rehabilitation staff monitor older adults with vision impairment who are most vulnerable for developing these symptoms, based on the risk factors that were found in this study, to be able to offer early interventions to prevent and treat mental health problems in this population.

P101
Vision-related quality of life among low vision people in communities in Beijing

Yanhong Zou1, Qian Li2, Shanshan Cui3, Xipu Liu4
1First Hospital of Tsinghua University, BEIJING, China
2First Hospital of Tsinghua University, BEIJING, China
3First Hospital of Tsinghua University, Sekwa Eye Hospital, BEIJING, China

Aim
To assess the quality of life among low vision people in Beijing communities. Methods
Cross sectional epidemiological survey. Visual disabled people registered in Desheng and Jiuxianqiao communities in Beijing were invited to take part in a home interview from 2013 to 2015. Through home visits, general information, visual function and vision-related quality of life evaluated using low vision quality of life questionnaire (LVQOL) were collected. People whose vision function matched with Bangkok-Madrid standard of low vision were included in the analysis. Continuous t test or rank sum test was used to analyze the continuous variables while the chi-square test was used for categorical variables. The possible relative factors were analyzed using logistic regression. Results
Totally 148 visual disabled people took part in the survey and 74.3% (110 people) with low vision. The visual acuity of the low vision people was quite poor, 60% of them with a visual acuity of less than 0.05, or a visual field of less than 10° from the point of fixation. Their score of vision-related quality of life was 47.3±26.7 of 125. No related factor was found with LVQOL. The main needs of rehabilitation in low vision patients were walking outside and reading by themselves. Only a few of them had used magnifiers before and no further rehabilitation was received. Conclusions
Low vision patients were accounted large proportion in the visual disabled people in Beijing communities. Their visual function was severe injured and the level of their vision-related quality of life was low. Further rehabilitation effort was needed.

P102
Periodontal disease and oral hygiene among low vision patients with diabetic retinopathy

Rokiah Omar, Nursyariza Razak, Tuti Ningseh Mohd Dom, Nur Zakiah Mohd Saat
Universiti Kebangsaan Malaysia, UNIVERSITI KEBANGSAAN MALAYSIA, Malaysia

This study aimed to determine the relationship of visual function and glycemic control level status of diabetes mellitus (DM) patients with and without diabetic retinopathy (DR) with the presence of periodontal disease (PD). This was a comparative case-control study group (n=89) comprised of DM with DR and control group (n=89) comprised of DM without DR patients. Visual function tests; distance visual and near visual acuity (VA), contrast sensitivity and central visual field were measured. Glycosylated Hemoglobin test (HbAlc) results were extracted from patient’s files.
The PD screening test was performed through face to face interview. Status and relationship of the visual function, level of glycemic control and periodontal disease for both groups were analyzed. Analyses for all visual function tests showed significant difference between the two groups. Results for the PD screening test results showed that 46.1% PD presence in DM with DR while 34.8% PD presence in DM without DR patients. However Chi Square test found no significant difference ($\chi^2(1)=2.33, p=0.13$) for PD presence in both DM with and without DR patients. The Two-Way ANOVA analyses for HbA1c mean was higher in PD for DM with DR 9.52±2.17% (81mmol/mol) when compared to DM without DR 7.94±1.81% (63mmol/mol). Un-Paired Student’s T-test showed that there was a significant difference ($t=3.30, p=0.001$) for both groups. The Rho-Pearson Correlation test also found a positive correlation ($r=0.263, n=89, p=0.013$) for HbA1c test with PD. In conclusion DM with and without DR patients with poor glycemic control should undergo periodontal screening test during low vision assessment and should be referred to the dentist to seek further investigation and treatment. Awareness about oral hygiene should also be noted by all patients with diabetes because of the presence of PD can interfere with blood sugar control.

**P103**

**Priority Rehabilitation Needs on Referral to Visual Impairment Services in Leicestershire, England.**

Jane Macnaughton
Anglia Ruskin University, Cambridge, MELTON MOWBRAY, United Kingdom

**Purpose**
To determine the principal rehabilitation needs of people who are entering visual impairment rehabilitation services in Leicestershire, England in order to guide service provision priorities.

**Methods**
Participants were recruited from people referred to visual rehabilitation services in Leicestershire from Leicester Royal Infirmary eye clinics. Participants completed the Dutch ICF Activity Inventory and rated the importance (3 point rating scale: ‘not’ to ‘very’ important) and difficulty (4 point rating scale: ‘not difficult’ to ‘impossible’) of 47 activity and participation goals. The priority of rehabilitation needs was determined by calculating ‘priority scores’ as the product of importance and difficulty scores for each goal (minimum 0, maximum 12). Demographic factors and clinical visual function were also assessed.

**Results**
Results are presented for 45 participants. Of these, 69% were female, and 96% white British, with 49% having a primary diagnosis of age-related macular degeneration. Mean age was 74.7±2.3 years, with duration of vision loss affecting daily life of 30±9 months. Binocular distance visual acuity with habitual correction was 0.71±0.06 logMAR, and contrast sensitivity was 1.17±0.05 logCS. The goals with the highest mean priority scores were reading (6.8±2.8), mobility outdoors (6.3±3.9), mobility indoors in unfamiliar environments (5.7±3.9), writing (5.6±2.6), and dealing with personal administration (4.7±4.0). Goals of the emotional health domain were not as highly ranked (fatigue (3.6±4.0); maintaining emotional health (3.0±3.8)).

**Conclusions**
In this sample, principal needs on entry to rehabilitation are for assistance with close work and mobility tasks outside the home. Based on the patients’ perspective, low vision and mobility training are key needs on entry to rehabilitation. The need for emotional support was not so pronounced, or may not be so well recognised by this group.

This study is funded by the College of Optometrists and supported by Vista.

**P104**

**Exploring the patient perspective of fatigue in adults with visual impairment: a qualitative study**

Wouter Schakel¹, Christina Bode², Hilde van der Aa³, Carel Hulshof³, Judith Bosmans⁴, Ger van Rens⁴, Ruth van Nispen¹

¹VU University Medical Center, AMSTERDAM, Netherlands
²University of Twente, ENSCHEDE, Netherlands
³Academic Medical Center, University of Amsterdam, AMSTERDAM, Netherlands
⁴Vrije Universiteit Amsterdam, AMSTERDAM, Netherlands

**Introduction:**
Fatigue is an often mentioned symptom by patients with irreversible visual impairment, but its subjective nature has not yet been studied in this population. The aim of this qualitative study was, therefore, to explore the patient perspective of fatigue in visually impaired adults with a focus on symptoms of fatigue, causes, consequences and coping strategies.
P105

Comparing health-states of people with visual impairment using two versions of the Euroqol-EQ-5D.
Laura Moreno1, Ana Patricia Marques2, Rui Santana2, Antonio Filipe Macedo1
1University of Minho, BRAGA, Portugal
2Centro de Investigação em Saúde Pública, LISBOA, Portugal

Aim
The EQ-5D is a generic preference-based measure of health that has five domains each with three levels of impairment (EQ-5D-3L). The EQ-5D-5L retains the original domains, but the number of levels in each dimension is increased from three to five. The purpose of this study was to compare the responses given to the EQ-5D, 5L-version, with the responses given to the 3L-version, in persons with visual impairment (VI).

Methods
Sixteen subjects with VI from the PCVIP-study were interviewed by telephone with the 5L-version administered first. Information about visual acuity (VA), age and visual ability (vis-ab, measured with a vision specific activity inventory) was available. Inconsistency was defined when responses between version were 2-points. The ceiling effect refers to subjects reporting, no problems (perfect health) in all domains.

Results
The median age was 63 years (range=24-94) and mean VA was 0.79logMAR (SD=0.11). Mean index for the 5L-version was 0.674(SD=.075) and 0.744(SD=.075) for the 3L-version (WilcoxonZ=−1.97, p=0.05). There was a correlation between vis-ab and the 5L-version index (r=0.59, p=0.02). Overall inconsistency was 9%, range was 0% (self-care) to 19% (pain/discomfort). The degree of inconsistency ranged from 0 to 3. Perfect health state was reported by 25% of subjects for the 5L-version and 38% for the 3L-version.

Conclusion
The 5L-version led to indexes that were lower than those produced by the 3L-version. That might be related with the reduction of the ceiling effect. These results, taken together with the association between the 5L-index and vis-ab, indicate that the 5L-version might have better discriminatory power for cases of VI.

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P106

ARMD and Life quality
Eider Gutierrez Zubizarreta1, Maria Clavero Zoreda2
1EIDER BAJA VISION, SAN SEBASTIAN, Spain
2The Low Vision Institute, MADRID, Spain
INTRODUCTION In ophthalmologists’ office the presence of patients suffering Age Related Macular Degeneration (ARMD) is becoming more common, such being the most common reason of legal blindness in people aged over 50.

Macular affectation leads to alterations as for as reading capacity, watching TV, recognizing faces, glare…

The aim of this clinic case is to prove that aid adaptations to Low Vision can enable patients suffering ARMD to be able to do again tasks which have been given up, thus leading to a psychological improvement and dependency problems presented.

CLINICAL CASE An 75-year old woman comes to our Low Vision center referred to by her ophthalmologist after 3 antiangiogenic therapy sessions.

Submitted to a cataract surgery 5 years ago, she presents a ARMD dry on right eye and humid ARMD on left eye stable for the last 3 months.

Within her goals stand out improving reading, watching TV better and improving glare problems.

A first surgery is carried out where her Low Vision is assessed and thereafter some visual rehabilitation sessions are performed so that the patient may choose the Aids which offer more comfort and visual quality.

RESULTS Given the condition of the degenerative illness, there is no treatment improving the VA lost. However, patients may benefit from the adaptation of Low Vision Aids.

CONCLUSIONS Patients suffering ARMD may profit as much as possible from the visual rest remaining, once finished medical and surgical related treatments with the prescription and further adaptation of Low Vision Aids. Adaptation of such aids enables the patient to be able to do again daily tasks given up thus leading to an improvement in her life quality.
this study is to investigate the need for “standby” time before starting an experiment with simulated low vision.

Method: Six males aged between 19 and 23 years participated in this study. Participants wore low-vision simulator goggles (cloudy condition). The task was to recognize and mark designated numbers in a 10 x 10 table randomly filled with numbers from 0 to 9. While wearing the goggles, the task was conducted every 5 minutes for a total of 15 minutes.

Results: Except for one participant (participant A), the standard deviation of answering time gradually reduced from 7.3 (0 minute later) to 2.9 (15 minutes later). Participant A’s answering time was quite long compared with the average time for other participants (2.3 times at 0 minute later and 1.9 times at 15 minutes later).

Conclusion: From this experiment, it is recommended that participants take at least 15 minutes as standby time before conducting simulated low-vision research. In addition, by repeating the practice, we can identify participants who are unable to adapt to low-vision simulation.

PAR01.01

Developing an authentic voice to make eye health a public health priority in the UK

Helen Lee
RNIB, LONDON, United Kingdom

More than six million people in the UK are living with uncorrected refractive error and sight threatening conditions. While most of these people are not yet experiencing symptoms two million are living with sight loss that has a significant impact on their daily lives. With detection, support and treatment more than half of this sight loss is preventable. Yet ensuring that eye health is a public health priority is an ongoing issue in the UK. The State of the Nation Eye Health 2016 was published in September 2016 to make the case for transforming eye health to prevent avoidable sight loss. A representative sample of the UK population (n=10,000) was surveyed to gain insight into their understanding and behaviour in relation to eye health. New economic modelling about the societal cost of sight loss estimates healthcare costs in the UK are £3 billion each year and indirect costs of £25.1 billion. The report presents prevalence estimates, evidence about eye health inequalities, along with initiatives that can prevent avoidable sight loss. A sightloss data tool is routinely published for public health specialists and health service commissioners to use to undertake local eye health needs assessments to inform service planning. Partnership work includes the co-production of a range of health promotion initiatives to improve self management of conditions like diabetes and self advocacy for users of eye care services. Making the case for eye health and sight loss to be recognised as a public health priority requires ongoing effort with a united voice across the sector. A collaborative approach with non-governmental agencies, health services, commercial organisations and most importantly people living with sight loss or at risk of sight loss, working together to development and provide robust evidence is key to ensuring credibility amongst policy makers and service commissioners.

PAR01.02

Four year experience of the Centre for the Diagnosis and Rehabilitation of Visual Impairment in Infants with Multiple Disability

Sabrina Crisafulli, Rosy Galbo, Lorenzo Orazi, Maria Petrianni, Alessia Pacifici, Filippo Maria Amore, Daniela Ricci
National Centre of Services and Research for the Prevention of Blindness and Reh, ROMA, Italy

Introduction: Visual function are crucial for the early neurodevelopment of infants. In Italy only few Centres work on the diagnosis of pediatric visual impairment. Besides, most of the rehabilitation focus on motor and cognitive problems, while concurrent visual impairment is often unknown, especially at an early age.

Four years ago the Centre for the Diagnosis and Rehabilitation of Visual Impairment in Infants with Multiple Disability, from neonatal age to 3 years, was created. The aim of this study is to analyze the four years activity of our Centre, underlying number of infants, causes of visual deficit and taking care.

Methods: Infants come to our Centre from all the Italian central and southern regions. Depending on their needs they stay from 1-3 days. The assessment included an orthoptic, ophthalmological, physiotherapic and pediatric neurologist evaluation in order to organize the best integrated rehabilitation program starting as early as possible. All families received a letter including a proposal of rehabilitation activities. Parents saw the activities proposed and a video was made made as take home message for them and local therapists.

Results: Over the years the activity of the Centre has increased greatly, from 300 infants with 500 assessments in 2013 to 777 with 1300 assessments in 2016. We had infants with CVI, due to brain lesions, isolated (47%) or associated to ocular pathologies (17%), isolated ocular pathologies (24%) or syndromic (12%). The percentage
within these groups have remained constant over the years.

Conclusion: Our Centre represent the first experience in Italy of early detection and intervention in infants with visual impairment. The constant increase of numbers demonstrates that this model of multidisciplinary approach needs to spread all over the Country. The stability of percentage of different causes could be considered a real picture of pediatric visual impairment in Italy.

PAR01.03

Analysis on Patients Prescribed Low Vision Aids at Low Vision Clinic over the Past 30 Years
Xiaohui Yang, Ailian Hu, Baochen Sun, Yuanyuan Zheng, Tongong Cui
Beijing Tongren Hospital, BEIJING, China

Aim: To Analysis on Patients Prescribed Low Vision Aids at Low Vision Clinic over the Past 30 Years
Methods: Retrospective analysis was conducted on patients prescribed low vision aids at low vision clinic of Beijing Tongren Hospital.
Results: The study included a total of 3487 patients, with male accounting for 64.87% and female accounting for 35.13%. The average age of patients was 27.690 ± 20.630. Before wearing low vision aids, distant vision was 0.089 ± 0.0770 and near vision was 0.281 ± 0.219. The etiology analysis showed that congenital diseases were the most common cause of low vision in outpatients (13.12%, including 5.85% of congenital cataract), followed by high myopia (12.87%), macular degeneration (11.68%), optic neuropathy (9.4%) and cataract (8.27%), while 10.04% of the patients had nystagmus. The most common cause of low vision differed in different age groups: congenital disease in 1-17 age group, optic neuropathy in 18-40 age group, high myopia in 41-55 age group, also high myopia in >56 age group. There were no significant differences in the cause of low vision between male and female. The success rate of wearing telescopic visual aid was 88.18%, while the most commonly used is 2.1-2.5 times biopic telescope and the +12 D optical reading aids. Failing to achieve expected efficacy made up for 64.35% of reasons for unsuccessful fitting of low vision aids.
Conclusion: This study will provide the solid date for government to develop adequate policies for low vision rehabilitation.

PAR01.04

Cost-Versus-Benefit Analysis of a Mobile Low Vision Rehabilitation Clinic
Alexis Malkin, Micaela Gobeille, Richard Jamara, Gary Chu, David Mills, Nicole Ross
New England College of Optometry, BOSTON, U.S.A.

Introduction:
Low vision patients’ transportation limitations require local service provision. In Massachusetts, there is a scarcity of providers outside the major metro areas. Consequently, a mobile clinic is utilized to provide care to patients statewide. Here we explore cost-versus-benefit of mobile low vision rehabilitation (LVR) in comparison to in-office LVR. This has not previously been reported.
Methods:
Costs were calculated per patient and per day in each clinical setting assuming maximum capacity (10-12 patients per day). Costs included: salaries, associated benefits, building overhead, and mobile clinic overhead (i.e. insurance, gas).
The Massof Activity Inventory was administered to mobile clinic patients (n=66) prior to and 3 months post-LVR. Effect size was determined using Rasch analysis and Cohen’s d coefficient. Patient travel costs were calculated using subjects’ home addresses, clinic addresses and U.S. Government mileage rates.
Results:
Per day cost for two-lane mobile clinic operations was $1,832 (~$183 per patient). Patients spent an average of $12.26 on transportation and an average of 39 minutes for round-trip travel. Visual ability clinical effect measured 0.86.
Per day cost for two-lane in-office LVR was $1,514 ($757 per lane, ~$126 per patient). Round-trip travel would have cost $86.84 and taken 157.6 minutes if mobile clinic patients traveled to the in-office location. Based on the multi-center LVR Outcome Study (n=468), the general outpatient LVR population showed a 0.87 Cohen’s d effect size.
Conclusions:
Mobile and in-office LVR produced comparable clinical effect measures in the timeframe of this study. Total costs (to provider and patient) were less for mobile LVR, with a total cost per patient of $195.26 versus $212.84 for in-office. A mobile clinic model can produce clinically and cost effective outcomes to supplement in-office LVR provision in underserved areas.
PAR01.05

The Economic burden of fatigue in visual impairment: a cost-of-illness study

Wouter Schakel¹, Hilde van der Aa¹, Christina Bode², Ruth van Nispen¹, Ger van Rens¹
¹VU University Medical Center, AMSTERDAM, Netherlands
²University of Twente, ENSCHEDE, Netherlands

Introduction:
Having both a visual impairment and fatigue may have a significant impact on quality of life and society. The aim of the study was to investigate the burden of visual impairment and comorbid fatigue in terms of impact on daily life, by estimating societal costs (direct medical costs and indirect non-healthcare costs) accrued by these conditions.

Methods:
This cost-of-illness study was performed as part of a cross-sectional study. Data of visually impaired adults (n=247) and normally sighted adults (n=233) were collected through structured telephone interviews and by online surveys, respectively. Outcomes were the Trimbos and IMTA questionnaire for Costs associated with Psychiatric illness for direct costs, the Short Form- Health and Labour Questionnaire for indirect costs, and the Modified Fatigue Impact Scale for impact of fatigue on daily life. Differences between participants with and without vision loss and between participants with and without fatigue were examined by (corrected) multivariate regression analyses, including bootstrapped confidence intervals.

Results:
The impact of fatigue was severe in 40% of participants with vision loss, compared to 11% in those with normal sight. Indirect costs were significantly higher for the visually impaired group (β=408; 95%CI [67, 1043]) and the severely fatigued group (β=278; 95%CI [19, 734]). Direct medical costs were higher for participants with vision loss (β=156; 95%CI [-426, 346]) and severe fatigue (β=133; 95%CI [-94, 361]), but not statistically significant. Mean monthly total societal costs of comorbid visual impairment and severe fatigue were €2801 per person (normal sight and no fatigue: €1826).

Conclusion:
Societal costs for comorbid visual impairment and fatigue seem quite high and mostly explained by the higher indirect non-healthcare costs (e.g. productivity losses). The additional impact of fatigue to the economic burden of low vision emphasizes the need for patient-centered interventions aimed at decreasing symptoms of fatigue.

PAR01.06

The MeyeSight Visual Fitness App

August Colenbrander
Smith-Kettlewell Eye Research Institute, San Francisco, NOVATO, U.S.A.

Background
Millions of people have low vision. Not all receive medical care. Even fewer receive rehabilitative advice. Self-administered tests can reach those who are currently missed. Beyond visual acuity, screening should include contrast and field loss, whose effects are often overlooked. Smartphone apps offer an opportunity for self-testing.

Solution
The "MeyeSight Visual Fitness app" is a free Android app for self-testing of all three aspects: acuity, contrast and central field. The response mode for all three tests is: swiping up, down, left or right in the direction indicated by an arrow. The test results can be saved for later comparison and be shared with a professional. The visual acuity test follows a staircase procedure with standard logarithmic steps. The contrast test compares high- and low-contrast acuity, measuring the slope of the Contrast Sensitivity curve. This measure is more relevant to Activities of Daily Living than traditional threshold tests. The central field test is a novel test, which does not require forced fixation. Shifts in stimulus position determine the retinal areas tested. 15 peri-foveal points can usually be screened in 15 seconds. The test includes explanatory and instructional texts. Subjects with consistently abnormal results should be referred for professional examination. Initial testing shows that the test is well received. 87% of patients (some with severely reduced vision) and 100% of normals found it easy to use. 100% of patients and normals said they would use it at home and recommend it to friends.

Implications
The test provides an attractive home screening test. The addition of contrast and field screening has the potential for earlier detection of common disorders like AMD (important once early treatment modes are developed) and
glaucoma (important since many cases are currently undiagnosed). The test also has potential as a portable vision test for first responders.

PAR02.01

Making facial expressions accessible to blind and visually impaired persons using a wearable vibrotactile device

Hendrik Buimer¹, Marian Bittner², Tjerk Kostelijk³, Abdellatif Nemri², Thea van der Geest⁴, Richard van Wezel², Yan Zhao²

¹Radboud University, Nijmegen, Netherlands
²University of Twente, Enschede, Netherlands
³VicarVision, Amsterdam, Netherlands
⁴HAN University of Applied Sciences, Arnhem, Netherlands

Blind people have a strong disadvantage in social situations as they miss out on nonverbal cues (e.g., eye contact, facial expression, gestures, posture) often used to infer socially relevant information such as feelings, attitudes, and intentions. This contributes to delayed social development in blind children and social isolation across the board, leading to a 70% unemployment rate. To date, there are no assistive technologies on the market that facilitate the socio-economic inclusion of blind people.

Here, we present a wearable system that conveys facial expressions to blind and visually impaired persons (VIPs) through vibrotactile feedback. Machine learning was used to classify facial expressions into one of six basic emotions, which were then conveyed to the device wearer in real time. Twenty persons, including 10 VIPs and 10 sighted persons, participated in the study. Validated sets of pictures and videos of actors displaying facial expressions, both with and without audio, were shown to the respondent. The ability to determine which facial expression was displayed was measured and compared between an unsupported baseline condition and whilst being supported by the system, after training.

We found that VIPs were better in determining facial expressions while wearing the system: their accuracy increased from 14.2% to 82.5% for pictures, 18.3% to 69.2% for videos without audio, and 72.5% to 86.7% for videos with audio.

Our findings show that vibrotactile feedback is a feasible method to make facial expressions accessible to VIPs. Users quickly understood the system and saw potential use in both private and work-related contexts. The system requires further real-life testing and development to improve performance and to validate the system in more realistic social situations.

PAR02.02

Distance magnification using a smartphone: trials of functional use and ergonomic convenience in an augmented reality headset

Alan Johnston
Alan Johnston Optometry & Low Vision, Ivanhoe East, Australia

Alan W Johnston, Optometrist, Australia

Aim: I developed an augmented reality headset for distance magnification using the camera of any patient’s own smartphone. Smartphone high resolution cameras have autofocus and image zoom for viewing distance objects, as well as touch control of screen luminance and colour saturation that may be prohibitively expensive in custom-made low vision devices. This paper reports design parameters and test results for this headset.

Methods: I designed a head mounting for smartphones of usual dimensions viewed monocularly at close range through a collimating lens. My goal was to flip the phone and viewing lens rack up and down simultaneously, using only one movement of either right or left hand. This facilitated alternative unaided or magnified distance viewing without removal of the headset.

Results: For smartphones viewed at 8 to 5 cm from the collimator, nominal relative screen magnifications of 5x to 8x were achieved with monocular fields of view wider than those obtained with bioptic telescopes. Enlargement ratio also depended on screen dimensions and digital zoom setting. Pixel density PPI varies between phones and contributed to image quality. Short term wearability was acceptable if image enlargement was valued over cosmetic appearance.

Conclusions: My headset provides a useable distance magnifier for occasional and specified use but not as an alternative to a bioptic telescope. Additional trials for patients and the normally sighted is needed to assess functional and commercial value. The headset will be inexpensive and feature the image capabilities of whatever phone the viewer possesses. Vendor software such as smartphone speech control and edge contrast enhancement...
will become available for application in future.

Keywords: Smartphone, distance magnification, augmented reality head set, clinical trials.

PAR02.03

Evaluation of a Virtual Biopic Telescope and Virtual Projection Screen for Low Vision Patients
Ashley Deemer¹, Bob Massof¹, James Deremeik¹, Kyoko Fujiwara¹, Chris Bradley¹, Frank Werblin²
¹Johns Hopkins Wilmer Eye Institute, BALTIMORE, U.S.A.
²Visionize LLC, BERKELEY, CA, U.S.A.

Magnification is used to compensate for reduced visual acuity. Using digital image processing, we are testing two innovative approaches to magnification, a virtual biopic telescope and virtual projection screen, that employ virtual reality methods in a head-mounted display equipped with a high-resolution video camera and head trackers (Iris Vision, Visionize LLC). The aim of our study is to determine if these approaches to magnification are beneficial to low vision patients performing ADLs.

Results for the first 15 participants are reported. Participants had BCVA <20/100 in the better-seeing eye and bilateral central scotomas. The participants were trained, then took the system home for a 7-10 day trial. The Activity Inventory (AI) was administered before and after the home-trial to measure effect on self-reported visual function. A simulator sickness questionnaire and system-use survey were administered twice by telephone during the trial period. Baseline and follow-up AI results were analyzed using a Rasch model.

Baseline AI measures ranged from 76th-94th percentile of new low vision patients in the USA. Improvements were seen in reading (d=0.55, p=0.00045) and visual information (d=0.49, p=0.005) tasks (criterion corrected for multiple comparisons). Worsening of functional vision was observed for goals and mobility and visual motor tasks, but results did not achieve statistical significance. Three patients (20%) reported headache and two patients (13%) reported moderate-severe nausea while using the system. The average ordinal patient rating of the overall utility was 6.67/10.

Based on our preliminary AI results, we conclude that use of the system results in incremental functional vision improvements in reading and visual information activities. The lack of improvement in mobility and visual motor tasks is most likely due to poor depth perception and lack of binocular disparity using a single camera presenting the same image to both eyes. Overall, participants found the system to be very useful.

PAR02.04

User experience of Low Vision Aids: Qualitative results from The p-EVES Study
Chris Dickinson¹, John Taylor¹, Heather Waterman²
¹University of Manchester, MANCHESTER, United Kingdom
²Cardiff University, CARDIFF, United Kingdom

Introduction

With the introduction of p-EVES (portable handheld electronic LVAs), the question arises whether these offer real benefits to users, compared to simple optical LVAs. The p-EVES Study was a prospective two-arm cross-over randomised controlled trial aimed to determine the performance advantages of having a p-EVES available in addition to optical LVAs. Interviewing some of the participants gave the opportunity to explore their feelings regarding LVAs, and ask how, where, and under what circumstances, devices were used in daily life.

Methods

A maximum variation sampling technique was used to target a mix of people within the participant cohort. Recruitment continued until data saturation, and a total of 33 participants out of 82 who completed the study were selected. In-depth face-to-face semi-structured interviews of up to 60 minutes were recorded and transcribed, and framework analysis was undertaken.

Results

Some patients described a strong preference for p-EVES, and others described a strong preference for optical LVAs. More commonly, the p-EVES were used for specific tasks alongside continuing use of existing optical LVAs for other tasks, according to their lifestyle and the tasks they needed to perform. Optical LVAs were particularly useful for survival tasks, and p-EVES devices were particularly useful for extended reading tasks.

Conclusions

Modern p-EVES devices can serve a useful purpose if prescribed in conjunction with optical LVAs for many individuals. A qualitative component within a comprehensive RCT design can enhance the validity of the study, and can help to explain and underpin the quantitative findings.

Acknowledgement
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PAR02.05
Low Vision Aid Use in Australian Schools. How are optical low vision aids used in schools?
Carly Turnbull
Department of Education NSW, Australia, REPTON, Australia

Introduction: With the development of access technology, there has been voiced concern in the field of low vision that traditional optical low vision aids have become obsolete. With universally designed consumer devices commonly available for use in classrooms for students with low vision, the question arises should they replace previously used low vision devices produced by specialist technology providers? Or alternatively, should Support Teachers for students with Vision Impairment still advocate their use? Method: The presentation will address this debate by discussing findings from a recent field study conducted across Australian and New Zealand. Presenting qualitative data collected from interview responses from professionals, classroom observations, work shadowing and resource centre visits regarding the role of the optical low vision aid and its use in supporting students with low vision. Results: The presentation will provide an overview of how low vision aids are currently used in schools and will outline observed educational trends and practice. Results from the study relate to the recommendation and provision of optical low vision aids, views regarding specialised technology versus consumer technology for access, the benefits and barriers to successful optical low vision aid use, common events for optical low vision aid use, checklists and instructional materials used to teach optical LV aid use, the importance of early intervention, and optical low vision aids and their connection to large print provision. Conclusion: The presentation will discuss the importance of teaching students with low vision to move between different devices, to be flexible, adaptable and open to using a plethora of different devices and tools to access print. The study clearly identifies the imperative role of the classroom teacher. The presentation will also show an assessible animation resource “Adjusting Print for Students with Low Vision: A Resource for Classroom Teachers” generated from the field study results.

PAR02.06
Correlation of preferred retinal locus found with SPOT chart and microperimetry for PRL oriented magnifying prism prescription.
Marco U. Morales1, Michele Jurilli2, Davide Cacciatore3, Maurizio Licata4, Giovanni Prosdocimo4, Stefano Volanti3, Winfried Amoaku1
1University of Nottingham, NOTTINGHAM, United Kingdom
2Fonda Srl, GENOVA, Italy
3Low Vision Centre of Rimini-AUSL della Romagna, RIMINI, Italy
4Low Vision Regional Clinic Conegliano, CONEGLIANO, Italy

Introduction/aim
Prism therapy in low vision rehabilitation have been used in hemianopsias and overall field constriction. However, their prescription is less common in patients with macular disorders. Moreover, the analysis of the preferred retinal locus (PRL) to select prism orientation has not been reported. We studied the correlation of patient’s PRL found with the SPOT chart (FONDA, Italy) and the MAIA microperimetry (Centervue, Italy), before the prescription of customised PRL Oriented Optical Magnifying Prism (PRLOOP) in patients with late-stage dry AMD.

Methods
20 patients from 2 low vision clinics, 13 females and 7 males (mean age = 58.7 years), with central vision loss secondary to dry AMD, best corrected visual acuity less than 0.5 LogMAR and no other concomitant eye pathologies, were recruited for PRLOOP prescription. Prism base orientation (TABO) and dioptre power was determined after subjective PRL was calculated with the Subjective Prism Orientation Test (SPOT) chart. Microperimetry (MP) was used to identify the objective fundus-related PRL. Correlation between SPOT and MP PRLs was studied. Main outcomes were PRL location (central, superior, inferior, nasal, temporal), PRL distance from the fovea and subjective evaluation during visual tasks wearing PRLOOP. Secondary outcomes were fixation stability and mean retina sensitivity. Correlation was observed between variables.

Results
16 patients had a correlated PRL in both the SPOT and the MAIA test. 14 patients had either superior (S) or inferior (I) PRL and 6 patients showed it either nasal (N) or temporal (T). All 4 patients who had no PRL correlation showed a PRL either N or T and did not reported an immediate visual comfort while wearing the PRLOOP prisms.
Conclusions

Patients with a correlated subjective PRL (SPOT Test Chart) and objective PRL (MAIA Microperimeter), have reported an immediate benefit during clinical visual tasks wearing the PRL Oriented Optical Magnifying Prism (PRLOOP).

PAR03.01

The Effects of Orientation and Mobility Training on Functional Abilities and Self-esteem of Individuals with Visual Impairment

Nomjit Nualnetr¹, Pawinee Layothee²

¹Faculty of Associated Medical Sciences, Khon Kaen University, KHON KAEN, Thailand
²Department of Physical Therapy, Kuchinarai Crown Prince Hospital, KALASIN, Thailand

Introduction: In Thailand, the orientation and mobility (O&M) training for individuals with visual impairment has been systematically promoted nationwide since 2010. However, there were no research studies about the impact of O&M training on the clients. This study aimed to evaluate changes in the ability to perform functional activities and the self-esteem of individuals with visual impairment after participating in an O&M training course.

Methods: A quasi-experimental study was conducted at Kalasin Province, Thailand on 40 persons with visual impairment (26 females and 14 males, mean age ± SD 61.1±15.4 years) who received an 80-hour O&M training during 4 weeks. The participants were assessed for their ability to perform functional activities at baseline, immediately after finishing the training (week 4) and at weeks 8 and 12 of the follow-up period by using an assessment form with a rating scale ranging from 0 (no difficulty to perform the activity) to 4 (complete difficulty to perform the activity). Additionally, at baseline and week 12, the participants were requested to answer 10 items of the Rosenberg Self-esteem Scale-Thai version. The score ranged from 10 to 40 with higher scores reflecting high self-esteem. Data were analyzed by using descriptive statistics, repeated measure analysis of variance and paired t-test.

Results: When compared with baseline, the participants showed significant improvements in their ability to perform functional activities throughout the study (p≤0.01). Furthermore, the O&M training significantly improved the self-esteem (p<0.001) of the participants.

Conclusion: The 80-hour O&M training could provide beneficial effects on the ability to perform functional activities and the self-esteem of individuals with visual impairment. Future studies with a longitudinal study design are suggested in order to determine the long term effects and sustainability of the training. A comparison study between the blind and persons with low visual acuity is also suggested.

PAR03.02

Virtual reality technology used to aiding the blind constructing spatial representation of the unfamiliar environment

Xiao Meng Chen, Jingxun Zhong

South China Normal University, GUANG ZHOU, China

• Introduction/aim: This study explores the effectiveness of virtual reality technology in assisting the blind to construct the spatial representation of the real life environments. • Methods: The study is a field trial that it randomly assigns the 28 subjects to three groups, including the human guide group, the virtual reality group, and the tactile maps group. Subjects in each group accept different interventions and tests. • Results: (1) In terms of spatial representation, virtual reality technology and tactile maps can assist blind in constructing spatial representation of unfamiliar environment, to help them to be familiar with the environment in advance and to make mobility orientation effective in the real environment ultimately. The subjects in virtual reality group are adept at using virtual environments to optimize their path exploring strategy, which makes them much easier to construct an accurate spatial representation of the reality environments. (2) In terms of real walking, the virtual reality group and the tactile maps group can apply the spatial representation obtained into real walking task, which contribute to their mobility & orientation. However, the performance of human guide group is the worst. • Conclusion: The study demonstrated that the subjects in virtual technology group could not only form a clear representation of the whole environment, but also apply the precise spatial representation of environment to effective mobility orientation in the reality environment.Key words virtual reality technology the blind spatial representation cognitive map orientation and mobility
**PAR03.03**

Outdoor difficulties experienced by a group of Iranian visually impaired people

Abbas Riazi

University, TEHRAN, Iran

Propose: A qualitative approach using semi-structured individual interviews was used to elicit common outdoors difficulties in individuals with visual impairment. Method: Interviews were recorded and then transcribed verbatim into text for thematic analysis. Twenty legally-blind individuals aged 34.25±2.41 years with different etiologies were included in this study. Results: All participants had experienced some sort of difficulty in outdoors environments. The most important problems as perceived by the participants, are installation of tactile ground surface indicators, unsafe sidewalks, existence of obstacles on sidewalks, difficulty reading bus numbers, disorientation, fear of falling, recognition of faces, inability to read street names, the presence of spaces between platforms and buses; walking into glass doors, crossing streets and the risk of Arial barriers. Conclusion: As a visually impaired person might say, sidewalks can be the most dangerous of places. Appropriate urban modification can be very beneficial.

Key words: Visually Impaired, Outdoors Difficulty, Pedestrian, Accident, Urban Modification.

**PAR03.04**

Better Wayfinding for Visually Impaired People: Integrating Haptic Feedback via a Smartwatch

Joey Van der Bie¹, Christina Jaschinski², Timon van Hasselt³, Jan Koopman³, Somaya Ben Allouch², Ben Kröse¹

¹Amsterdam University of Applied Sciences, AMSTERDAM, Netherlands
²Saxion University of Applied Sciences, ENSCHEDE, Netherlands
³Koninklijke Visio, AMSTERDAM, Netherlands

Visually impaired people (VIP) can experience difficulties in navigating urban environments. They mostly depend on the environment's infrastructure or technical solutions like smartphone apps for navigation. However apps typically use visual and audio feedback, which can be ineffective, distracting and dangerous. Haptic feedback in the form of vibrations can complement where visual and audio fail short, reducing the cognitive load.

Existing research into wayfinding using haptic feedback to better support navigation for the visually impaired often relies on custom tactile actuators and the use of multiple vibration motors. Although these solutions can be effective, they are often impractical in every day life or are stigmatizing due to their unusual appearance.

To address this issue we propose a more modular system that can be easily integrated in commercially available smartwatches. Based on existing research we present a tactile communication method utilizing the vibrotactile actuator of a smartwatch to provide VIP with wayfinding information that complements visual and audio feedback.

Current smartwatches contain a single tactile actuator, but can still be used by focusing on navigation patterns. These patterns are based on research in personal orientation and mobility training with VIP. For example, a vibration pattern is used to represent a concept like ‘attention’, ‘left’ or ‘stairs’ directing the navigator’s attention towards audio or visual information or to the environment.

In next phase of this research we will conduct several focus groups and co-creation sessions with VIP and orientation and mobility experts to further specify the requirements and test our proposed tactile method. In the future, this method could be integrated in existing navigation apps using commercially available devices to complement visual and audio information and provide VIP with additional wayfinding information via haptic feedback.

This research is part of the EyeBeacons project, co-financed by the ZonMW Inzicht program.

**PAR03.05**

Impact of a long cane echo on veering while walking with a long cane

Hiroki Kadowaki, Tatsumi Mutaguchi

Graduate School of Education, Hiroshima University, HIGASHI-HIROSHIMA-SHI, Japan

Introduction/aim: The primary aim of this study was to quantitatively clarify the impact of long cane echoes on veering while walking with a long cane.

Methods: We conducted measurements of a long cane noise level and straight walking experiment (16 m) in 8 blindfolded Japanese adults without visual impairments (aged 21 to 23). In the former condition the sound level meter is fixed at the ear position of subjects, swinging a long cane (long cane condition) and swinging it with a
were advised for 626 (59.7%) patients. The overall acceptance rate of low vision devices was 19.5%, the maximum causes for low vision were Retinitis pigmentosa (38.1%), Amblyopia (20.7%), ARMD (16.6%). Low vision devices (49.1%) were from southern India, 371 (35.4%) had best corrected visual acuity between 6/60 and 6/18.

INTRODUCTION: To study the clinical profile of patients presenting to a low vision clinic in a tertiary eye care hospital.

METHODS: Cross-sectional Observational study performed during July 2015-June 2016 in the Low vision Clinic. Data obtained included demographic profile, ocular conditions causing low vision and types of low vision devices prescribed.

RESULTS: Of the total 1049 patients, 670 (63.9%) were males, 251 (23.9%) were in the 0-10 years age group, 515 (49.1%) were from southern India. 371 (35.4%) had best corrected visual acuity between 6/18-6/60. The main causes for low vision were Retinitis pigmentosa (38.1%), Amblyopia (20.7%), ARMD (16.6%). Low vision devices were advised for 626 (59.7%) patients. The overall acceptance rate of low vision devices was 19.5%, the maximum

An exploratory analysis of the perceived barriers to physical activity by people who are visually impaired

Diana Santos¹, Marta Leitão², Laura Hernandez-Moreno², Rui Corredera¹, António Filipe Macedo³
¹Faculdade de Desporto, Universidade do Porto, PORTO, Portugal
²University of Minho, BRAGA, Portugal
³Linnéuniversitetet, KALMAR, Sweden

Purpose
Studies indicate high rates of physical inactivity in people who are visually impaired (VI). Therefore, this group has increased risk of developing diseases associated with a sedentary lifestyle. The aim of this study was to determine which barriers can influence physical activity (PA) amongst persons with VI.

Methods
Sixteen individuals with VI (vi) and 16 age and gender matched controls (ctrl) were interviewed using the Physical Activity Barrier Scale (PABS) for persons with VI. The PABS inventory consists of 48 questions, divided into 8 categories. In each question the participant needs to rate how often (never, often, very often) considers the item as a barrier to PA.

Results
Acuity in the vi group was 0.79logMAR (SD=0.45), the mean age was 65 years (SD=20) and the main cause of VI was diabetic retinopathy. Scores for items in the “psychological aspects” category were correlated with age (rVi=0.75, p=0.001, rctrl=0.65, p=0.006) and acuity (rVi=0.51, p=0.043, rctrl=0.50, p=0.049) in both groups and with comorbidities in the vi group (rVi=0.71, p=0.002). Scores for “safety” category were correlated with the number of comorbidities in the vi group (rVi=0.55, p=0.027) and with age in controls (rctrl=0.69, p=0.003). Scores for the category “visual impairment” (MW-U=76.0, p=0.045), for “personal matters” (MW-U=69.0, p=0.022) and for “safety” (MW-U=72.5, p=0.033) were different between groups.

Conclusion
People with VI frequently find barriers to PA. Items related with vision, safety and psychological aspects are affect more people with VI than controls. Personal aspects are also imposes as higher barriers to PA in people with VI but the relationship with VI needs clarification. VI individuals are more prone to sedentary life and that might affect their health. Barriers to PA should be considered when planning visual rehabilitation.

Clinical profile of patients presenting to a low vision clinic in a tertiary medical centre
Ilango Krishnamurthy
Velammal medical college research institute, MADURAI, India

INTRODUCTION: To study the clinical profile of patients presenting to Low vision clinic in a tertiary eye care hospital.

METHODS: Cross-sectional Observational study performed during July 2015-June 2016 in the Low vision Clinic. Data obtained included demographic profile, ocular conditions causing low vision and types of low vision devices prescribed.

RESULTS: Of the total 1049 patients, 670 (63.9%) were males, 251 (23.9%) were in the 0-10 years age group, 515 (49.1%) were from southern India. 371 (35.4%) had best corrected visual acuity between 6/18-6/60. The main causes for low vision were Retinitis pigmentosa (38.1%), Amblyopia (20.7%), ARMD (16.6%). Low vision devices were advised for 626 (59.7%) patients. The overall acceptance rate of low vision devices was 19.5%, the maximum
being Magnifiers (27.5%). There was significant improvement in quality of life of patients who accepted the assistance with low vision devices.

‘CONCLUSION’: Data obtained elucidates the characteristics of low vision patients. This study shows more access to low vision service by men than woman, and only 19.5% acceptance rate of low vision aids which needs to be questioned why the acceptance is poor and find out the reasons if it is due to do the quality of low vision aids or the patients are not convinced of vision rehabilitation, if so what measures has to be taken in future as a collaborative approach among vision rehabilitationists.

PAR04.02

Referral to Low Vision Services for Glaucoma Patients: Referral Criteria and Barriers
Mona Kaleem, Sheila West, Lily Im, Bonnielin Swenor
1University of Maryland, BALTIMORE, MARYLAND, U.S.A.
2Wilmer Eye Institute, BALTIMORE, MARYLAND, U.S.A.

Purpose: Glaucoma patients with vision impairment may benefit from low vision services (LVS). Unfortunately, rehabilitation services are underutilized by this population. The purpose of this investigation is to identify potential barriers to LVS referral from the perspective of glaucoma specialists, and to determine what criteria are being used to make referrals. Methods: A survey was emailed to members of the American Glaucoma Society (AGS), which consisted of 30 questions on respondent demographics, characteristics of patient population, criteria for LVS referral, familiarity with LVS and barriers to referral. For questions on criteria and barriers for referral, respondents could select up to 3 responses. The number and percentage of responses to each survey question were examined. Results: The survey was completed by 207 out of 1029 AGS members (response rate 20.1%). Twenty-one percent of respondents reported referring more than 5 patients to LVS per month, 66% were referring 1-5, and 12% were referring less than 1. Top barriers to LVS referral included patients not expressing difficulty with activities related to vision (34%), not having enough time to counsel patients during clinic visits (32%), and perceiving that patients would not be able to afford LVS even if they were referred (31%). Top criteria for referral included difficulty performing activities related to vision (78%), degree of visual field loss (63%), and difficulty with orientation and mobility (27%). Visual acuity and contrast sensitivity loss were selected by 24% and 4% of respondents respectively. Conclusion: In this population of glaucoma specialists, patient complaints were the most common criteria driving LVS referral. Barriers to referral due to economic restraints and insufficient time to help patients need to be addressed through appropriate interventions.

PAR04.03

Multidisciplinary approach to early diagnosis and rehabilitation of visual impairment
Daniela Ricci, Alessia Pacifici, Sabrina Crisafulli, Maria Petrianni, Rosy Galbo, Lorenzo Orazi, Emanuela Rellini, Stefania Fortini, Paola Piscopo, Filippo Maria Amore
National Centre of Services and Research for the Prevention of Blindness and Reh, ROME, Italy

Background: diagnosis and rehabilitation of visual impairment, due to ocular pathologies or cerebral lesions is usually demanded to specific professionals: ophthalmologist and orthoptist. Visual information are crucial not only for the visual function development but also for motor, cognitive and social abilities. The professionals that work on vision and on the neurodevelopment of children often work separately and the integration of their competences seldom occurs. The aim of this study is to present the work of a multidisciplinary team that includes ophthalmologist, pediatric neurologist, orthoptist, physiotherapist and psychologist. Content: the first approach to the family will be discussed. It always includes orthoptist and pediatric neurologist. Ophthalmologist and physiotherapist are involved if diagnosis is not clear or in the follow up. The psychologist has a double role, support parents who have difficulties to face the new diagnosis and accept rehabilitation, and support the team. Each specialist age and pathology specific protocols and tools for the diagnosis and the follow up of different pathologies will be presented. As our Centre is located within a hospital we have the possibility to involve other specialists, such as the pediatrician and the geneticist, or ask for other exams such as electroencephalogram or auditory checks, etc. We also get referral from the main Neonatal Intensive Care Unit in Rome and we often are involved, since the neonatal age, in the diagnosis and the follow up of infants with visual impairment secondary to ocular or brain problems or both. This imply an early intervention helping parents to learn how to feed and take care of a baby that cannot use vision. Implications: this work means to underline the efficacy of this integrated model of early diagnosis and intervention not only on the infants outcomes but also on parent-infant relationship in order to reduce possible behavioural problems.
PAR04.04

Involving visually impaired service users in a review of the visual impairment curriculum for Optometry students in the United Kingdom
Ahalya Subramanian
City, University of London, LONDON, United Kingdom

Background
Service users (patients) are increasingly being used in medical schools for the design, delivery and evaluation of medical education and are an important part of research steering groups. Inclusion of service users in education and research is considered to be good practice. Service user involvement is beneficial to students as it can help develop communication skills, empathy and clinical reasoning. Although there is no published information about service user involvement in Optometry, service users are sometimes used in teaching and assessment. The current study aimed to review the visual impairment curriculum on the undergraduate optometry programme in conjunction with a group of visually impaired service users and their carers.

Content
Five visually impaired service users (4 of whom were regular volunteers at the City, University of London’s visual impairment clinic), one carer and 2 members of staff reviewed the undergraduate visual impairment curriculum. The review lasted approximately two hours and consisted of an open ended discussion where participants discussed their experience of interacting with students during City, University of London’s visual impairment clinic and areas of strength and weaknesses, the undergraduate optometry visual impairment course content including positive points and things that would benefit from improvement and methods of assessing students.

Implications
As a result of the review it was highlighted that students should be taught empathy training through role play. More emphasis should be placed on communication, delivering bad news to patients and the cultural context of vision loss. Sighted guide training should also be incorporated into the teaching. All of these recommendations have been incorporated into the training resulting in positive feedback from students and could be implemented in the curriculum of other optometry training programmes where these are not currently taught.

PAR04.05

Cerebral visual impairment and teaching packs
Eric van Heuvelen
Bartimeus, institute for the visually impaired, DEVENTER, Netherlands

Using the computer for learning, reading and learning to read for vision-impaired students with cerebral visual impairment (CVI) is a means, in which as much as possible the usual reading methods and teaching methods are used. Computer accessibility software for the visually impaired, and the change of settings within Windows and Windows applications give opportunities to support the reading process. By linking the knowledge from research and literature about reading and learning to read by students with CVI and the possibilities offered by advanced computing, the aforementioned student is adequately supported. The courses given by Bartiméus to teachers dealing with students with CVI turn out to be a good introduction, but insufficient to adequately supported use of the computer in the reading process with CVI students. Evaluation shows that there is a need for further training. As a result teaching packs have been developed supporting teachers dealing with CVI students in daily practice. At the end, the visual impaired student with CVI is able to use the computer for the benefit of his/her reading and learning process.

PAR04.06

Www.exfix.se - a new website - Developing Eccentric Viewing Training Methods in Persons with CFL
Krister Inde
Indenova, KARLSTAD, Sweden

Background
In Sweden and many other countries, children and adults with BCVA less than 0,1 were advised to learn Braille as
their main reading media in the old days. The old days lasted until the 1970s when new insights were presented. The book LOW VISION TRAINING (Bäckman Inde, Liber, Malmö in Swedish 1975, in English 1979) contained methods to use eccentric viewing. An article in JVIB in October 1978 described also methods to train how to use areas outside the central scotoma covering the macula area up to 10 degrees. In 1999 Ulla L. Nilsson presented surprising results in her thesis RESULTS FROM LOW VISION REHABILITATION, where most patients trained to use eccentric viewing could read with magnification correction. In 2005 the LOW VISION TRAINING book was edited and presented in a more digital way.

Method

The LEBERX PROJECT focuses persons with LHON (Lebers Hereditary Opticus Neuropathy) in the book SE FRAMÅT (LOOK FORWARD) and the website http://www.lhon.se/ the authors (Inde/von Sydow) have described emotional and practical problems with central scotomas (CFL) of different sizes and forms. In order to develop the old books described above dr Krister Inde has made the process digital in seven steps, from mapping the scotoma to placing the image on the best retinal area (BRA) in order to give patients with PRL, preferred retinal locus, a possibility to understand better and train independently functional eccentric viewings (fEV). This includes orientation and mobility, looking at objects and faces and in reading situations with CCTV and optical magnification corrections.

Results

In February 2017 the website http://www.exfix.se/ was designed both in Swedish and English including the film LOOK FORWARD at http://exfix.webflow.io/en/start describing a young man using EV with his Smartphone, with his telescope and his 10X magnification correction. Today, Low Vision Clinics, LVC, can use this comprehensive website where different methods to train EV are included: from choosing your BRA (PRL) and then use RSVP Rapid Speed Word Processing and MoviText with scrolled text and then Steady Eye Technique.

PAR05.01

Low vision in school-age children: medical and social features
Maria A. Onuki Haddad, Marcos Wilson Sampaio, José Ronaldo Carvalho Jr, Mauricio Haddad
University of São Paulo Medical School, SÃO PAULO, Brazil

Introduction: Low vision (LV) in childhood can limit experiences, speed in performing daily activities, sensory and motor development, educational, social and emotional improvement. Knowledge of medical and social features can cooperate to the development of effective actions to educational inclusion.

Objectives: 1.to identify clinical features of a population of school age children with LV, evaluated at the Low Vision Service of the University of São Paulo Ophthalmology Department and at the Brazilian Association for the Visually Impaired People, concerning causes of LV, anatomical site of the abnormality, classes of visual impairment (VI), visual functions, optical correction, LV devices and rehabilitation needs; 2.to evaluate perceptions of mothers or person responsible concerning detection of the VI, procedures of the professionals involved, access to LV services and to the prescribed low vision aids; 3.to contribute to improve actions for visual habilitation or rehabilitation.

Methods: 115 LV school-age children were submitted to ophthalmologic evaluation and a semi-structured questionnaire was applied to the mother or person responsible.

Results: main causes of VI were toxoplasmic retinochoroiditis(27,8%) and congenital cataracts (11,3%). Retina (54,8%) was the main affected site. Causes involved heredity (36,5%) or pre-natal infections(32,1%). Moderated (67,8%) VI was more frequent. Glasses for refractive errors were prescribed to 79,1% and LV aids to 82,1%. Mothers were the first to notice VI (53,0%). Pediatricians were not efficient to detect VI. LV was detected in the first year of life (83%) and referral to visual rehabilitation unit occurred chiefly at school age (53,9%). 73% never had a prior low vision examination and mothers or responsibles had little knowledge of other available rehabilitation services(67,0%).

Conclusions: early detection programs, capacitation of pediatricians and regular school teachers, screening for refractive errors, improved access to LV services/devices, awareness on the subject among ophthalmologists, information on community services and VI should be available.

PAR05.02

The Low Vision Service Wales: A review of the demographics and outcomes for children
Rebecca John
Cardiff University, CARDIFF, United Kingdom

Introduction/aim

The Low Vision Service Wales (LVSW) is a national community based low vision service accessible to children and
adults. This service review aimed to provide preliminary data regarding the demographics of children accessing the LVSW and the contribution that the LVSW makes to childrens habilitation.

Methods
The LVSW database was utilised to examine the record cards of all children (n=99) seen within the LVSW between April 2015-March 2016. Data reviewed included; causes of vision impairment, difficulties reported and the prescribing of low vision aids (LVA). Comparisons were made between new and existing patients to the service.

Results
Nystagmus was the most commonly reported cause of vision impairment, being considered the primary cause in 24% of children seen.

New patients to the LVSW were more likely to report problems with reading, writing, glare and lighting than existing patients.

Low vision aids were prescribed to 98% of new patients and updated for 60% of existing patients. Whether the child was a new or existing patient to the service had an impact on the type of LVA most likely to be prescribed. Overall, the most commonly prescribed type of LVAs were stand magnifiers (26%). Hand magnifiers accounted for 23%, both electronic aids and lights accounted 16%, accessory aids accounted for 11% and distance aids for 8%.

Conclusion
The results from this service review suggest children previously seen within the LVSW are less likely to report problems with daily living activities than children who are new to the service. The LVSW operates holistically and provides a large range of LVAs with updates as required. Therefore it is possible that the support provided by the LVSW contributes to habilitation in children with a vision impairment. However more research including the patient reported experience and outcome measures is required.

PAR05.03

THE HABILITATION OF VISUALLY IMPAIRED CHILDREN UNDER THREE YEARS OF AGE
Sefay Aysun İdil¹, Serpil Akar², Huban Atilla³, Sule Gurbuz⁴
¹Ankara University, Faculty of Medicine, ANKARA, Turkey
²Ophthalmology Department, School of Medicine, Baskent University, ISTANBUL, Turkey
³Ophthalmology Department, Ankara University, Faculty of Medicine, ANKARA, Turkey
⁴Tepe Medikal Center, ISTANBUL, Turkey

PURPOSE: Our aim in this study is to evaluate the etiology of visual loss, to evaluate the visual functions expected from age and to evaluate the effectiveness of applied visual habilitation in children with vision problems under three years of age.

METHOD:This is a before-after intervention study conducted by working on the data of 208 children with vision problems under three years of age referred to the Centre of Low Vision Rehabilitation, Ankara University, between February 2011 and November 2016.

After informed consent, detailed ocular examination of all the children was done using standard examination techniques. In accordance with the expected visual behavior of the child’s age, a program has been developed for visually stimulating activities to be done in the clinic and at home, with International programs and practices being considered.

RESULTS:The mean age of the 208 children (101 female, 107 male) was 15+/-2.7(2-36) months. Ninety six children had ocular disorders. The most frequent ocular disorder was associated aphakia or pseudophaki after cataract surgery (19%) and retinopathy of prematurity(19%) followed by oculocutaneus albinism(16%). One hundred and forty five children had cortical visual impairment. The following conditions are frequently associated with cortical visual impairment: epilepsy(43%), hydrocephalus(17%), and cerebral palsy (10%). One hundred and forty four children had multiple disabilities. These included children with norologic impairment(78%), physical impairment(34%), hearing impairment(10%), chrosomal abnormality(7%), speech impairment(4%) and autism(2%). Visual habilitation treatment was effective in children with vision problems under three years of age (p<0.05).

CONCLUSION: Habilitation and rehabilitation for infants and children with vision impairment involves the planning of medical, educational and social services to help them to reach their potential for lifetime quality in the community. Visual habilitation for babies who are younger than 3 years old are planned and practiced individually, through the cooperation of the professionals and the family.

PAR05.04

The Pathogenesis, Refraction Status and Distant Vision Rehabilitation of Blindness and Low Vision in a sample of Chinese children
Min Deng
Kunming Children’s Hospital, KUNMING, China
Introduction: To investigate the pathogenesis, refractive status, refractive correction and rehabilitation condition after using prescribed vision devices in children suffering low vision and blindness. To statistically analyze low vision conditions including onset, surgical history, refraction correction and effectiveness of distant vision devices.

Methods: We screened 140 4-14 year-old children with low vision and blindness examined from May 2013 to June 2015 by the Kunming Children’s Hospital Ophthalmology Department. Procedures included medical history questionnaires, ophthalmologic examinations, cycloplegic retinoscopy and prescription of low vision telescopes. We recorded diagnoses and analyses of vision rehabilitation procedures.

Results: Our visually disabled children had a mean age of 11±3.9 years; 88 males, 55 females. Main diseases were congenital cataracts, retinopathy including optic nerve hypoplasia, RP, Stargardts and congenital microphthalmos with microcornea.

Refraction Status Analysis: Of 155 eyes we found mild and moderate myopia in 46, hyperopia in 54 and high ametropia in 33 eyes. The remaining 24 blind and 80 low vision children with VA of ≤6/60 were prescribed refraction correction and distance vision devices. Blindness (VA ≤6/60) was reduced by 87% with refraction and low vision devices, 13% of low vision (VA 6/18-6/60) was eliminated with refraction alone and 74% eliminated with refraction and devices.

Conclusions: We recommend children with low vision receive routine refraction examinations and be prescribed glasses and vision devices to improve their remaining vision and decrease their disability. Refractive correction alone for postoperative congenital cataracts showed far from ideal results. Effective visual rehabilitation must include refraction correction along with prescribed vision devices.

Key Words: Low vision children; Pathogenesis; Refractive correction; Rehabilitation, Vision devices.

PAR05.05

Helping children with Low Vision maximize use of vision to improve their studies; case School for the Blind, Cameroon
Ngong Joseph Kenchi, Chirac Jacques Awa
Cameroon Baptist Convention Health Services, BAMENDA, Cameroon

Background: Despite the availability of evidence based guidelines on pediatric screening, eye screening, more especially for children is still below expectation. There are few to no schools vision screening programs in pre and primary schools including special schools for children with visual impairment. The effect of this has been the gross bypass of children at risk of blindness in regular schools and the admission of children with low vision into special schools for the blind who could with the use of Low devices access education in mainstream schools. Children with residual children finds difficulties using braille because they get confused between seeing and touch. This paper presents a case study on how a carefully planned low vision intervention helped improved the performance of children with low vision in mainstream schools. Method: To address this concern, all the children with visual impairment were assessed. seven (7) out of (fifty four) 54 had residual vision used the blind technique for a long with little success. After assessment of their vision, they use low vision devices to study using print. They were introduced to print, vision stimulation exercises, to develop print reading skills. A low vision resource center was introduced in the school. Teachers were trained to teach children with low vision and routine follow ups to further support the teachers was conducted. Results: Five years later they recorded significant improvement in their academic performance and are now in the in the secondary schools. Longitudinal follow up plans have helped to ensure efficiency and quality. Conclusion: designing and instituting school vision screening programs facilitates early identifications and can promptly start low vision support for children identified with low vision in view of improving their participation in education.

PAR05.06

Congenital cataracts - comparative study between public and private low vision centers in Belo Horizonte, Brazil, from 1992 to 2007
Luciene Fernandes, Ana Maria Tavares Costa Pinto, Galton Vasconcelos
Universidade Federal de Minas Gerais, BELO HORIZONTE, Brazil

Introduction/aim: Congenital cataract is an important cause of childhood blindness in the world. The aim of this study is to compare diagnosis, surgery and refractive correction characteristics in patients with congenital cataracts in a public and a private low vision center.

Methods: This is a cross-sectional study conducted by review of medical records of patients with congenital cataract
in a public low vision center (Hospital São Geraldo) and in a private one (Eye Clinic Luciene Fernandes) from 1992 to 2007.

Results: A total of 149 medical records were analyzed: 94 of a public and 55 of a private center. The first ophthalmological evaluation was held until 6 months of age in 1 (1%) patient of the public center and in 8 (15%) of the private (p = 0.001 (< 0.05). The family was the first to suspect the ophthalmic problem in 38 (76%) and in 8 (89%) cases, respectively. It took place at birth in 10 (16%) cases and even 6 months in 43 (69%) cases in the public and 2 (9%) cases at birth and 17 (77%) up to 6 months in the private. In the public service, the surgery was performed within the 6 months at 18 (19%) patients, before year 1 in 33 (35%) and up to 3 years in 55 (58%). In private, 20 (36%) patients underwent surgery until 6 months, 30 (55%) before 1 year and 40 (73%) up to 3 years. The prescription of glasses ranged from 1 month to 14 years in the public service and 10 days to 3 years in the private.

Conclusion: The public and the private low vision centers presented similar characteristics in patients with congenital cataracts. This study call attention to the importance of a better management of these patients with congenital cataracts to avoid childhood blindness.

PAR06.01

Visual rehabilitation centres, an added value in the low vision work
Ann Buyck
De Markgrave vzw, ANTWERP, Belgium

Background: Visual rehabilitation centres have been one of the potential services to assist people with a visual handicap. They have operated autonomously and in coordination with other services for visual handicapped people, for example low vision opticians, low vision associations, home counselling and school counselling. Most of the aid given by the aforementioned professionals in the low vision field has consisted of adaptation of low vision equipment or adjustment of the environment. The added value of the rehabilitation centres has been that they offer more than only adaptive strategies because of their multidisciplinary methodology.

Content: The model of visual rehabilitation centre De Markgrave has consisted of several multidisciplinary steps. The rehabilitation process has been a consecutive and constructive pathway. First, the intake of patients was based on medical, (dis)functional and social examination giving a total and multidimensional idea of the patient deficits and possibilities. Thereafter, the treatment was composed of consecutive steps to acquire skills. For example, mobility training: first the patient learned viewing strategies, the interpretation of sound. Next, constructing a mental representation of the environment and finally, mobility training in a concrete situation.

Implications: Every goal of rehabilitation: reading, writing, working with the computer, performing displacement and activities of daily life was directed to either simple or complex low vision compensatory techniques, both of which was offered in the visual rehabilitation centre. The complex trajectory was made up of consecutive steps in which skills were trained by different and specialised therapists whereby the patient acquired more knowledge. This method proved that low vision support was broader and more encompassing than merely adaptive techniques.

PAR06.02

Providing integrated low vision services in Shanxi Province, China - challenges and lessons learnt
April Zhou 1, S May Ho 1, Li Hua Zhang 2, Mitasha Yu 1, Hasan Minto 2
1Brien Holden Vision Institute, GUANGZHOU, China
2Shanxi Provincial Eye Hospital, TAIYUAN, China

Background/aim: Shanxi province with a population of 36.5 million is located in northern China. It is a disadvantaged province with limited eye care resources. There is no coordinated plan or network for children’s vision care, school screening, low vision (LV) services or inclusive/special education for children with vision impairment or other disabilities. One of the aims of the Seeing is Believing “Children’s Healthy Eyes bring Educational Rewards” project is to improve the quality of life and learning opportunities of children through health promotion, education and reducing the burden of vision and other disabilities. To this end, LV services targeting children were established at the Shanxi Provincial Eye Hospital (SPEH) and nine counties in Shanxi.

Content: The low vision clinic (LVC) was established at SPEH as a tertiary centre with secondary LVCs established at county hospitals. Examination equipment and a supply of low vision aids (LVA) were provided to the LVCs. Referral pathways and linkages were established with schools for the blind in the province and China Disabled Persons’ Federation. Human resource development and health promotion activities were undertaken. SPEH LVC acts as a referral centre for complicated cases and as a LVA distribution centre.

Implications: Provision of LV services have improved educational participation of children with vision impairments.
Challenges faced by the LVCs include inadequate record keeping, difficulties in classifying LV and case finding, low accessibility and community awareness. Working with schools for the blind highlighted the need for LV assessment before prescription of LVAs, as prior indiscriminate distribution of LVAs had resulted in wastage. Strategies to overcome these challenges include education of partners, health promotion, advocacy to government and improving linkages with referral sources. These measures resulted in a threefold increase in the number of patients presenting to the clinics.

PAR06.03

Ensuring the provision and improving the quality of Vision Rehabilitation in England
Joshua Feehan
RNIB, BIRMINGHAM, United Kingdom

Vision rehabilitation is a key source of support enabling people with sight loss to live independently. Across England, local authorities have a legal duty to provide vision rehabilitation. However, services are under significant pressure due to reductions in local government budgets. In order to strengthen provision, RNIB have instigated a broad programme of activity. This presentation shares what we have learnt around effective ways to ensure that a quality vision rehabilitation service is available to all.

RNIB activities to enhance vision rehabilitation have taken a multi-layered approach to bring about improvements. RNIB have delivered a number of activities to bring about improvements across the country. We have developed and disseminated our ‘10 principles of good practice’. The principles were built upon existing research evidence, legislation and extensive consultation with blind and partially sighted people and sight loss professionals. They detail all aspects that should be part of the service including initial contact, assessment and training.

To reach local decision makers who can influence what vision rehabilitation is provided, we have run a UK wide campaign entitled ‘See, Plan, Provide’. We have worked with key stakeholders including people with sight loss, to call for improved access to vision rehabilitation assessments and support. To strengthen this case, we commissioned an economic study which concluded that there are significant savings as a result of providing vision rehabilitation.

Additional activities include strengthening a UK wide network of rehab workers to share good practice, provide peer support; implementing a programme of continuing professional development; and taking all opportunities to raise awareness of vision rehab services such as speaking at conferences and writing articles. The presentation will draw together learning across some of these activities as to how provision of vision rehabilitation services can be improved to better meet the needs of people with sight loss.

PAR06.04

Evaluating a Novel Eye Care Model for the Visually Impaired People in Singapore: A Pilot study.
Cheng Sim Anna Tan¹, Chee Wai Wong¹, Ryan Man¹, Shu Yen Lee¹, Marcus Ang¹
¹Singapore National Eye Center, SINGAPORE, Singapore
²Singapore Eye Research Institute, SINGAPORE, Singapore

Aim: To evaluate the impact of an incentive scheme to improve the rates of tertiary eye-care visits following community eye screening.

Methods: In Singapore, visually impaired elderly individuals, identified by community eyecare programs, have a poor compliance to follow-up tertiary eye-care. An incentive scheme (‘Buddycare’), which provided logistic support, a phone reminder and a monetary incentive used to cover transport costs was evaluated as a novel eye care model. Elderly individuals screened from the community were randomised to either receiving: (A) ‘routine care’ with advice from an ophthalmologist with a written referral or (B) ‘Buddycare’ an incentive support scheme to encourage tertiary eye-care visits.

Results: Out of 99 patients, 72 were randomized to receive ‘routine care’ and 68 patients received ‘Buddycare’. The additional cost of ‘Buddycare’ (SGD$60 per subject), led to a significant increase in the rate of tertiary eye care attendance (A: 29.4% vs. B: 51.4%; P<0.05). Cataracts were the most common reason for referral. Mean follow up time was 5.06 and 5.38 months (range 2-10) for the intervention arm ‘A’ and ‘B’ respectively. Mean improvement in logMAR visual acuity was 0.19 versus 0.25 (p=0.3) in the intervention arm “A” versus “B”. Improvement in patient reported quality of life scales from baseline to follow up was also observed and will be presented in detail.

Conclusion: ‘BuddyCare’ is a novel incentive scheme with logistical support that improves the rate of tertiary eye care attendance after community eye screening and this maybe associated with an improvement in visual acuity. Incentive schemes may be useful for improving compliance and thus have the potential to reduce the economic burden of visual impairment.
Modernising a large urban adult low vision clinic
Moyra Mcclure, Jenny Lindsay, Jonathan Jackson
Belfast Trust, BELFAST, Northern Ireland

Relocation of the Belfast Trust Low Vision Clinic provided an opportunity to modernise and instigate evidence-based low vision practice. The clinic was provided by optometrists, with outdated equipment, without depression screening and with user reported audit findings of poor accessibility. Clinical leads chose a ground floor location close to the building front door, with good access for those with any disability. Patients targeted are adults with any sight loss. Each patient has visual function measured using illuminated logMAR charts, Pelli-Robson charts and fluency ratings. Multi-disciplinary staff comprises nurses, optometrists and sensory support who are rehabilitation and social workers. Record sheets were revised to include detailed patient discussions. Traditional and innovative low vision aids were sought so that patients had an extended choice of magnifier. Real life materials such as newspaper, food packets and large print were updated. Links were established with voluntary service providers for those with sight loss. By integrating with sensory support, the clinic provides a range of non-optical aids that previously required home visits. Electronic systems are readily available for demonstration. Clinicians feel patients arrive content due to the convenient location and bright waiting area. Initial patient impressions led to improved signage whilst staff are satisfied with a well-stocked low vision aid store, feasible only by good fund commissioning. All patients receive leaflets, especially on their condition, screening for depression and visual hallucinations. Attendance is excellent, with users highly rating the low vision care. Regular staff training was implemented in collaboration with local charities. The clinic now aligns to the United Kingdom Royal National Institute for the Blind assessment framework with a replicable model of care. By modernising this Low Vision Clinic, it is available for re-audit, clinical research like depression facts, and promotion to prospective patients and service providers for those with sight loss.

Secondary Eye Hospitals in developing Vision Rehabilitation services: A Model
Krishnan Narayanan
Frontline Eye Hospital, CHENNAI, India

Aim: To present a model of a secondary eye hospital in India which covers a wide range of people with visual impairment and other special needs in spite of its limited resources.
Content: This paper describes the activities of Frontline Eye Hospital, Tamil Nadu, India. It gives an overview of Vision Rehabilitation Services provided to children with blindness, low vision and multiple disabilities. It would present the achievement of School Vision Screening programs, Outdoor Eye Camps and Awareness programs in special schools which made a marked difference in the lives of many children with visual impairment and other special needs. It also explains the organizational structure & human resource development.
Implications: Statistics on services to the children with visual impairment and a few success stories would reveal the importance of the involvement of eye hospitals in controlling blindness as well as developing vision rehabilitation services in their locations. Analysis of vision assessment and special skill training for these children will certainly pave way for research.

A preliminary study of significant visual behaviours in children with neurological impairment
Josée Lanners, Tiziana Battistin, Stefania Lodigiani, Liliana Panizzolo, Sonia Segnacasi, Davide Zaccheo, Vittorina Schoch
Fondazione Robert Hollman, CANNERO RIVIERA (VB), Italy

Early intervention is fundamental in each rehabilitative practice, as described in literature. The Robert Hollman Foundation takes care of very young children with visual impairment and is specialized in visual rehabilitation, in support to comprehensive child’s development and to the family. Not all the children arrived at the Foundation with a clinical diagnosis. We decided therefore to investigate visual behaviours in children with neurological impairment but without a clinical
neuro-ophthalmological diagnosis. Our sample was composed by 62 children: 17 with a diagnosis of Cerebral Visual Impairment (CVI), 15 with a neurological pathology, 15 with a pre-chiasmatic pathology and 15 sighted children (control group), all aged 1-4 years. All the children had neuroimaging, electrophysiological and ophthalmological examinations. The children were observed, in the double-blind test, during the staying at the Foundation, for three times by two different professionals.

Fifteen different visual behaviours, already described in literature, were observed and compared. Results showed that:

- 87% of such behaviours were present in the first group (children with CVI).
- 67% of these behaviours were exhibited both in the first and in the second group (neurological pathology).
- 13% were exhibited in three groups (CVI, neurological and also pre-chiasmatic pathology).
- 0% of the behaviours were present also in the control group of sighted children.

In conclusion, we could state:

- The majority of visual behaviours here considered, confirmed the data already known from scientific literature.
- Some of the observed visual behaviour could be characteristic of low vision.
- The overlapping of some visual behaviours, in either the first and the second group, could suggest the existence of a relationship between the localization of the injury and some characteristics of visual behaviour; in addition these results could be helpful in guiding the visual rehabilitation, even in absence of a clinical neuro-ophthalmological diagnosis.

**PAR07.02**

**Restoration the stereopsis in amblyopia with Binocular 3D computer treatment**

Jun Zhao, Hongwei Deng
Shenzhen Eye Hospital, SHENZHEN, China

Background: To use the binocular 3D visual experience with shutter glasses technology in the treatment of amblyopia, and to evaluate the effect of this technology in treating the amblyopia in children.

Methods: Thirty-one children in 4-16 years of age, 21 with ametropia amblyopia, 8 with anisometropic amblyopia and 2 with strabismic amblyopia. The 3D computer procedure is outlined first to measuring and reducing the extent of fixing eye suppresses the fellow amblyopic eye, and give both eye equal external input stimulus, and using the computer program to lead the use of binocular combination experience in order to strengthen or restore the binocular fusion. Each subject completed 33 3D computer trials. Four times per week and 1 hour in each trail. Each subject measures the best correction vision acuity of each eye, check the range of fusion by synoptophore and the stereopsis acuity with the Yan Shaoming random-dot test chart before and after the whole 33 trails.

Results: Significant difference was found before and after the trail in best correction vision acuity (Paired Sample T test, t= 18.391, P<0.05). Similarly, significant difference was also found in the range of fusion and stereopsis acuity (Paired Sample T test , P<0.05. Non rank sum parameter test , P<0.05).

Conclusions: To use the 3D computer device to enhance or restore the amblyopia eye not only benefit the vision acuity, but also the fusion range and stereoacuity at mean time. It would be helpful to choose this computer-assisted 3D device to treat the amblyopia in children.

**PAR07.03**

**Young children with blindness in a universe of digitally tools**
Silje Benonisén¹, Helle Kristine Falkenberg², Bente Kristiansen¹, Vibeke Sundling²
¹Statped Norway, HOLMESTRAND, Norway
²Universitet i sørøst Norge, KONGSBERG, Norway

The society requires digital skills from an early age. Many children make their first experience with digital tools in their first year of life, and the use of digital media is becoming common in schools. However, there is little knowledge of how young children with blindness use digital tools. Through interviews, this study explored how pre-school blind children’s use digital tools and the attitudes of parents’ and teachers towards using digital media with young children with blindness.

The interviews applied a phenomenological approach. Invitations to participate were sent to six families who have a blind child aged 0-6 years and six teachers for the visual impaired. Six parents of three children aged 0-3 years and three teachers participated in the study with informed consent. Interviews were recorded and transcribed for analysis.
Parents and professionals said it was important for children with blindness to experience digital tools and gain digital skills before starting school. Parents expected that professionals had knowledge on how their young child could benefit from digital technology. Nevertheless, they also expressed an understanding of the challenge of keeping up with the rapid development. The teachers expressed a lack of competency on how to use digital tools working with young children with blindness. However, all had high expectations of the potential benefit of using new technology, as the child grows older. Specifically, the opportunity to use digital tools to communicate with others on social media. This study indicates that parents and professionals believe that new technology for small children, who are blind, will be important to participate in society, especially regard to inclusion with peers. It is therefore necessary to improve the digital competency in teachers to ensure that young children with blindness have the digital skills required.

PAR07.04
Evaluation and effectiveness of the Paediatric Low Vision Aid Clinic in Moorfields Eye Hospital, London
Ngozi Margaret Oluonye, Hannah Dunbar
Moorfields Eye Hospital, LONDON, United Kingdom

Background The prevalence of childhood visual impairment in developed countries is 65 per 100,000 when low vision is defined as 6/24 or less. Visual impairment ranges from moderate (visual acuity 6/48 to 6/18) to severe (less than 6/48) and profound levels of visual impairment of light perception at best. With the exception of children with profound visual impairment, children with severe visual impairment may benefit from the use of low vision aids (LVAs). Even children who are registered blind (3/60 or less vision) may benefit from the use of LVAs as long as they have some form of vision or vision for dense objects. Content: Dr Patricia Sonksen (director of the Developmental Vision Clinic of the Neurodisability Service at Great Ormond Street Hospital) demonstrated that young children learn through the use of vision and that is essential to maximise the potential of their vision. The vision research team then carried out a study on the use of LVAs in preschool children and established that children as young as a developmental age of 2 years, could successfully benefit from the provision of simple optical aids and by 4 could use more complex devices. As a result of this the first LVA clinic was set up in the UK dedicated to preschool children with a target age of 3-7 years. The preschool clinic is multidisciplinary with staff from optometry and neurodevelopmental Paediatrics and the children are then transitioned into a school aged clinic. We carried out a cross sectional parent and child questionnaire study to evaluate the effectiveness of the clinics and the aids used. We will present the results of this survey which will inform future development and effective functioning of a multidisciplinary Paediatric Low Vision Service.

PAR07.05
Visuo-perceptual function at preschool age in children with and without retinopathy of Prematurity
Daniela Ricci1, Simona Lucibello2, Maria Petrianni1, Claudia Brogna2, Sabrina Crisafulli1, Alessia Pacifici1, Lorenzo Orazi1, Domenico Lepore2, Rosy Galbo2, Domenico Marco Maurizio Romeo2, Eugenio Mercuri2, Filippo Maria Amore1

1National Centre of Services and Research for the Prevention of Blindness and Reh, ROME, Italy
2Pediatric Neurology Unit - Catholic University Rome, ROME, Italy
3Ophthalmology Unit - Catholic University -Rome, ROME, Italy

Introduction: Retinopathy of prematurity (ROP) is often associated with multiple developmental disabilities and functional limitations. The correlation between severity of ROP and visuo-perceptual function development is not yet clear as most studies include children with brain lesions, that can determine visual impairment per se. Aim of this study was to better understand the role of ROP and prematurity on the development of visuo-perceptual abilities. Methods: Preterm infants born at <31 weeks gestation, without major brain lesions and normal neurological and cognitive development underwent, between 4-5 years, a visuo-perceptual assessment, including crowding effect, stereopsis, Beery-VMI test, block copying, Form and Motion Coherence test, ABC Movement test. Children enrolled were divided in groups, according to the Criorop classification: no ROP, mild ROP (stage 1 and 2), moderate ROP (stage 3: pre-threshold and threshold). Results: One hundred and twenty-two children were included in the study; 65 infants did not develop ROP, 10 developed ROP1, 27 ROP2, 20 ROP3. Of the 20 ROP3 6 underwent laser treatment and 6 presented nystagmus (4 treated, 2 untreated). Our data evidenced a similar percentage of abnormal results almost in all tests, with no significant trend of increase between no ROP and ROP 3. A strong correlation was found between presence of nystagmus and visuo-perceptual impairment irrespective of treatment. Conclusions: our study showed that prematurity has a specific role on the development of visuo-perceptual abilities. The increase of severity of ROP showed a higher percentage of impairment but this was not statistically significant and did not relate to laser treatment. Nystagmus appeared to increase the risk for visuo-
perceptual impairment. As nystagmus was present since the neonatal age, this could be considered a sign to undertake specific early rehabilitation programs, in order to reduce difficulties at school age.

PAR07.06

The development of education for the visually Impaired in China
Xiao Meng Chen
South China Normal Universitly, GUANG ZHOU, China

Background: The education of the visually impaired is an important part of special education in China. The first blind school established in Beijing in 1874 by British missionary (William Hill Moon), has been developed for more than 100 years. Due to the uneven development of economy, culture and education, the development of education of visually impaired is also very uneven. The blind schools in the first-tier international metropolis are striving for the internationalization of the education of the visually impaired. There are also many schools with a serious shortage of funding for running schools, shortage of teachers and equipments, and inadequate understanding of the local government and education. Content: This paper introduces the educational objects, training targets, educational placements, organization of the school system, curriculum and teaching, teachers, vocational education and participation in international projects. At the same time, the paper introduces the development trend of education of the visually impaired in China, which includes more and more complex objects, more and more integration of placement forms, more and more advanced assistant technology, more and more roles of blind school. Implications: Hope that through the introduction of this article, so that more people can know China’s education of visually impaired, and then we can strive to seek more international cooperation research with other countries.

Key words Education of the visually impaired, Blind, Development trend

PAR08.01

Functional visual ability and quality of life in children/young people with low vision from developmental eye defects
Annegret Dahlmann-Noor1, Helena Hurairah2, Vijay Tailor1, Gillian Adams2, Yassir Abou-Rayyah2, John Brookes2, Peng Khaw1, Catey Bunce3, Papadopoulos Maria2
1NIHR BRC at Moorfields Eye Hospital and UCL Institute of Ophthalmology, LONDON, United Kingdom
2Moorfields Eye Hospital, LONDON, United Kingdom
3King's College London, LONDON, United Kingdom

Introduction/Aim: Developmental eye defects such as cataract, glaucoma, microphthalmia, anophthalmia or coloboma require intensive management with frequent hospital visits, surgical interventions, and administration of medicines. This study aims to describe functional visual ability (FVA) and vision- and health-related quality of life (VR-, HR-QoL) in children with low vision (less than 0.48 logMAR) from developmental eye defects and their parents. Methods: Cross-sectional observational study at a tertiary paediatric eye care centre at Moorfields Eye Hospital, London, UK. Between 25/06/2014 and 03/06/2015 we enrolled 52 children age 2-16 years (median 7.28, interquartile range IQR 4.35-12.67) and their parents/carers, and asked them to complete three validated tools: Cardiff Visual Ability Questionnaire for Children (CVAQC) for FVA, Impact of Vision Impairment for Children (IVI-C) instrument for VR-QoL, and PedsQL™ V 4.0 for HR-QoL. Results: FVA is moderately reduced (-0.1 (IQR -0.62 to 0.46; test values can range from -3.00 = higher FVA to +2.80 = lower FVA)). VR-QoL and HR-QoL are profoundly reduced: IVI-C mean 58.5 (SD10.53; normal VR-QoL = 96), PedsQL™ median scores: self-report 70.65 (IQR 59.24 to 80.98, normal HR-QoL = 100), parent report 65.22 (IQR 44.57 to 75.6), family impact 65.97 (IQR 48.44 to 82.47). Older children report less impact on FVA and HR-QoL than younger children. Parents tend to state greater reduction in HR-QoL than children/young people. Conclusion: Low vision from developmental eye defects has a profound impact on children’s VR-QoL, and HR-QoL is affected to degrees reported in children with terminal end-stage heart failure or acute lymphoblastic leukaemia.

PAR08.02

Experiences of Parents and Professionals of Children Suffering from Neuronal Ceroid Lipofuscinosis 3. A Qualitative Interview Study
Background: Throughout their lives children with Neuronal Ceroid Lipofuscinosis 3 (NCL 3) face neurodegenerative decline that leads to death during young adulthood. Their parents and professionals have to deal with the disease of these children as well. However, the experiences of parents and professionals have not been explored.

Objective: To describe the experiences of parents and professionals caring for children with NCL 3.

Method: Semi-structured interviews were conducted with approximately fourteen parents and eight professionals, among whom physicians, teachers/social workers, and nurses. Purposive sampling aimed to obtain variation in experiences with stage of the disease, which meant parents and professionals of children in different stages of the disease. Interviews were analyzed within a research team, using thematic analysis and metaphor analysis.

Results: The study has not been completed yet. Preliminary results indicate that while caring for children with NCL 3 parents and professionals experience a tendency between continuity and discontinuity. On the one hand they strive for order and constancy, for example by repeating stories, rituals, and actions, which is required because of childrens’ neurodegenerative decline. On the other hand they try to transcend this order and challenge children to do new things and add new experiences to their existing ones, which reflects the idea that children are still developing.

Conclusion: The results of this study offer insight into experiences of parents and professionals caring for children suffering from NCL 3. These findings will be useful for parents and professionals who hardly meet others who care for these children in order to find recognition and find new ways of approaching them. Future research is necessary to validate or revise the findings of this study.

Funding: This work was funded by NCL Expertise Center, Bartiméus, Doorn, The Netherlands.

PAR08.03

Visual impairment in children with familial exudative vitreoretinopathy (FEVR)

Erik van Nouhuys
Visio, NIJMEGEN, Netherlands

Introduction: Familial exudative vitreoretinopathy (FEVR) is a hereditary developmental disorder of the blood vessels of the retina. So far, six genes have been identified that contribute to the disease. FEVR shows a highly variable course: uncomplicated disease is compatible with preservation of fair to good vision. However, serious complications- mostly at young age- may occur, leading to visual impairment or blindness. Aim: To show the causes and characteristics of visual impairment in children with FEVR and to give guidelines for prevention of visual loss.

Methods: Review of international FEVR literature (Pubmed database: 1970-2016) including our studies in the Netherlands with a selection of data on visual function, clinical signs and complications. Single case- or family reports were excluded. Results: 23 out of 327 FEVR studies were identified that met the inclusion criteria; all were retrospective case series. Causes of visual impairment were: macular deformation and edema, vitreous haemorrhage, retinal and sub-retinal exudates, retinal detachment, secondary glaucoma and amblyopia. Complications in children were noted from the neonatal period throughout adolescence. Retinal surgical procedures (151 eyes, one or more interventions) succeeded in reattachment in 111 eyes (73%). Visual function after surgery was generally low (mean visual acuity less than 6/30). Information about visual function in non-interventional series of children with FEVR was limited. Conclusion: The number of publications demonstrated the recognition of FEVR as a significant and global hereditary retinal disease. Screening of new-borns in FEVR families is essential in order to detect eyes at risk for complications and has been facilitated by DNA analysis. The benefits of strategies to prevent visual loss have to be evaluated by future studies.

PAR08.04

Temporal perception in children with severe visual impairment

Tiziana Battistin, Serena Vaglio, Stefania Lodigiani, Vittorina Schoch
Fondazione Robert Hollman, PADOVA, Italy

The aim of this project was to study how severely visually impaired children perceive time. In literature, some authors supposed the existence of a system, with more “internal clocks”, depending on the sensory modality used to present temporal stimuli. Eighteen severely visually impaired and twenty sighted children, all aged 6-11 years, were selected to perform a
time bisection task at computer, which consisted in judging different temporal intervals using an acoustic stimuli. In the learning phase, children listened 10 times a brief sound (300ms) and 10 times a long sound (900ms). In the experimental phase, test stimuli (300, 400, 500, 600, 700, 800 and 900ms) were presented randomly in four blocks of sounds, with 42 stimuli/block. Children had to evaluate if the perceived stimuli were more similar to the brief or to the long sound, by pressing a specific tactile button on the keyboard. Moreover, children performed two neuropsychological subtests (Digit Span and Vocabulary) from Weschler Intelligence Scale for Children IV, which confirmed no significant difference in cognitive profile between the two groups.

Results on temporal perception task showed that: in terms of Constant Error, there was a significant difference between the two groups: \[ t(35) = 3.68, \ p = .001; \] visually impaired children = 37 (57); controls = 100 (46], demonstrating that controls made much more errors in estimating long responses’ time.

in terms of Weber Ratio, analysed data didn’t reveal any significant statistical difference between the two groups: \[ t(35) = 1.64, \ p = .0108; \] visually impaired children = .33 (27); controls = .22 (.12], meaning that the two groups were stable in their performance.

These preliminary data could be explained assuming that, in controls, the possibility of using either sensory modalities could create an interference, which burdens on a major allocation of attentional resources.

**PAR08.05**

**Impact of eccentric viewing training on the visual functions and on the life quality for children with progressive retinal dystrophies**

Asmaa Qaddumi
An-Najah National University, NABLUS, Palestina

One of the main causes for low vision in children in the Middle East is retinal dystrophies. Individuals with central retinal dystrophies progressively lose the ability to distinguish fine details causing difficulties in everyday tasks. They tend to use other parts of the retina for seeing and they need professional help to find the best retinal area to compensate for their central field loss. The study aimed at improving the visual efficacy among children with central scotoma by 1) helping them finding the best retinal area, 2) training them to use it and 3) providing them with magnifications. Five students with progressive retinal dystrophy aged between 14 and 16 years participated in this study. Their best retinal area was found for near and far distance vision and they were trained to use it while carrying out different near and far tasks for 3 weeks, each receiving 15 to 19 sessions. Visual functions and quality of life were assessed pre- and post-training. The results show that all the students found an area in their retina which is better than the one they used previously. The average pre-training visual acuity for near was 0.05 + 0.04 and post-training was 0.10 ± 0.07, and for far 0.04 ± 0.04 pre-training and 0.09 ± 0.05 post-training (p < 0.05). When assessing the impact of the training on the quality of life through a functional vision questionnaire for children and young people with visual impairment, the scores show a significant (p < 0.05) decrease in the perception of difficulties from 50.6 ± 7.6 pre-training to 29.2 ± 7.2 post-training. In conclusion, finding and training on the use of the best retinal area can give the children with progressive vision loss a chance to improve both their vision and their quality of life.

**PAR08.06**

**Play and social interaction augmented by a smart toy in children with visual impairments**

Suzanne Verver, Mathijs Vervloed, Bert Steenbergen
Radboud University, NIJMEGEN, Netherlands

Introduction: Play and social interaction are at risk in children with visual impairments (VI), which might interfere with the development of skills that are crucial for participation in a sighted world. Compared to sighted peers, both the social and cognitive play development of children with VI are delayed. Also, few stimulating toys are available for children with VI. In order to foster play, the use of augmented toys (a ‘Smart toy’) that produce sounds during play was investigated. It is expected that the Smart toy stimulates both social and cognitive play, because the sounds might attract attention to the child’s own toys and to their playmate.

Method: A counterbalanced cross-over repeated measures design was used. 26 dyads of children with VI in special elementary education played in both a condition with the Smart toy (AKC) and a condition with normal toys (KC). The Smart toy consists of standard toys and a base equipped with Radio Frequency Identification (RFID) readers and tags, which enable auditory output. Social and cognitive play were observed through interval recording and the Smart toy registered toy use. Differences between AKC and KC were analyzed using Wilcoxon signed rank tests.
Results: Children demonstrated more parallel play (‘p’ < .001) and less cooperative play (‘p’ < .001) during AKC than KC. Also, they showed more explorative play (‘p’ < .001) and less pretend play (‘p’ < .001) during AKC. Toy use was higher in AKC than KC (‘p’ < .001).

Conclusion: One play session with the Smart toy stimulated exploration of play materials, but did not foster social and cognitive play. The effect of repeated playing with the Smart toy on these play behaviors was further investigated.

PAR09.01

Environmental and personal contextual factors influencing participation of children with vision impairment
Deepak Bagga¹, Vijaya Gothwal¹, Serge Resnikoff², Jill Keeffe¹
¹L V Prasad Eye Institute, Hyderabad, India, HYDERABAD, India
²School of Optometry and Vision Science, University of New South Wales, SYDNEY, Australia

Introduction
It is critical to understand the various environmental factors (physical, social and attitudinal) and personal factors such as motivation to plan low vision rehabilitation (LVR) interventions that may affect participation of children with vision impairment (VI). Review of literature reveals a lack of a valid questionnaire to identify contextual factors (includes environmental and personal) affecting participation of children with VI. The objective of this study was to develop content for a questionnaire to measure contextual factors influencing participation of children with VI in various life situations.

Methods
In this cross-sectional study 194 children with VI (mean age 13.9±3.1 years; 59% males), 212 peers with normal vision, 68 parents, 51 teachers, and 12 LVR experts were recruited for brainstorming sessions or in-depth interviews. Perceived barriers and facilitators that influenced participation of children with VI were discussed. Sessions were audio recorded and transcribed verbatim. Transcriptions were reviewed by LVR experts to identify relevant content. Statements collected in local languages (Telugu or Hindi) were translated into English and classified based on the International Classification of Functioning, Disability and Health–Child and Youth version (ICF-CY).

Results
Brainstorming sessions (74) generated 858 statements; 308 unique statements emerged after deletion of duplicate statements (170 environmental factors and 138 personal factors). Environmental factors were categorized as: Products and technology (n=27, 16%), natural environment and human made changes to the environment (n=8, 5%), support and relationship (n=48, 28%), attitudes (n=60, 35%) and services, systems and policies (n=27, 16%). Sixty three per cent of environmental factors were perceived as barriers. The most common barrier was attitudes of immediate family members and teachers.

Conclusion
In addition to vision impairment, a broad range of contextual factors influencing participation of children with VI in various life situations were identified. These findings will guide development of a questionnaire to measure contextual factors.

PAR09.02

How digital literacy develops in students with additional needs, including vision impairment: Findings from a current study
Emily White
University of Melbourne, CARLTON, Australia

‘Introduction/aim’: A 21st century skill for all students (Griffin, McGaw, & Care, 2012), digital literacy can be especially powerful for students with additional needs as it can facilitate access to opportunities for learning. For students with vision impairment, the ability to use a computer and the internet is associated with higher literacy test scores (Li et al., 2012), and technology use supports improvements in learning maths (Bouck, Meyer, Joshi, & Schleppenbach, 2013). It is well-documented, however, that many teachers struggle to teach digital literacy, due to issues with understanding digital literacy, not having the skills or self-efficacy to use technologies for learning, and having few options for assessing and understanding the digital literacy of students, particularly those with additional needs, including vision impairment.

‘Methods’: Built on previous work by Woods and Griffin (2013), the study applied partial credit item response modelling (Masters, 1982) to develop a progression of digital literacy learning, using an online assessment developed in consultation with expert teachers, and data from 1,413 Australian students with additional needs. This
study focused on the development and validation of measures to support the teaching and learning of digital literacy capability for these students.

Results: Using analysis output (e.g., Wright maps, Thurstonian thresholds, deltas [logits], item and score characteristic curves) to determine the order of emergence and the overall quality and coherence of each item and item step, six levels along a progression of digital literacy learning were identified and described. A high alpha reliability score (0.998) and person separation reliability score (0.965) indicated internal consistency and effective discrimination against learners of varying abilities respectively, both arguments for validity.

Conclusion: The results of this study may assist teachers to understand the digital literacy of students with additional needs, including vision impairment, and what they are likely to be ready to learn next.

PAR09.03

Evaluation of a new intake questionnaire for visually impaired young adults: the Participation and Activity Inventory for Young Adults (PAI-YA)
Ellen Elsman, Ger van Rens, Ruth van Nispen
VU University Medical Centre, AMSTERDAM, Netherlands

Introduction: The Participation and Activity for Young Adults (PAI-YA) was developed involving young adults (18-25 years) and professionals as stakeholders. This questionnaire will be used by Dutch low vision rehabilitation centers to identify personal needs and goals of visually impaired young adults, in order to offer them rehabilitation, but can be used as a patient reported outcome measure as well. This study reports on some psychometric properties of the PAI-YA. Methods: Young adults registered at two low vision rehabilitation centers completed the 141-item PAI-YA (n=186) in a test-retest design. Response frequencies were assessed and factor analysis was employed. Item response theory (IRT) models, i.e. the graded response model (GRM) was fitted. Deletion of items was informed by response frequencies, lack of fit to the GRM and participants' comments. After obtaining a satisfactory set of items, participants' thetas, reflecting ability to participate, were calculated and differences between 'known-groups' were assessed. Concurrent validity with other questionnaires and test-retest reliability was investigated. Results: In total, 81 items were eliminated, resulting in a 60-item PAI-YA. The 60 items reflected adequate model fit to the GRM (RMSEA=0.057, SRMR=0.072, CFI=0.967 and TLI=0.966). Persons with mild visual impairment had significantly lower thetas than persons with low vision or blindness, reflecting less disability. Furthermore, significant differences in thetas were found for financial situation, gender, educational and employment situation. Correlations with other questionnaires were as expected (r=0.34-0.72) and test-retest reliability was satisfactory for all items (weighted kappa=0.47-0.87; agreement=63.1-92.0%). Conclusion: This study resulted in a 60-item PAI-YA, with satisfactory fit, concurrent validity and test-retest reliability. Differences in thetas between groups were found as expected, except for gender. This study is an important step in the validation of the PAI-YA, and in the process to develop a feasible instrument to investigate the rehabilitation needs and participation of visually impaired young adults.

PAR09.04

Calibrated assessment tools for ultra-low vision
Gislin Dagnelie, Olukemi Adeyemo, Pamela Jeter, Michael Barry, Duane Geruschat
Johns Hopkins University, BALTIMORE, U.S.A.

Purpose: Ultra-low vision (ULV) is defined as profound visual impairment that only allows perception of crude shapes, movement, and light sources. We have developed questionnaires and assessments of functional vision to quantify ULV use in daily life.

Methods: Based on an inventory of visual activities among 46 members of 9 focus groups we created a 150-item visual functioning questionnaire (ULV-VFQ) and calibrated it through two rounds of administration and Rasch analysis in 80-90 ULV individuals; 50-, 23- and 17-item and adaptive versions were also created. An ADL assessment – based on the 17 items, each at 3 difficulty levels – was also created and calibrated through administration and Rasch analysis in 25 ULV individuals. 4 Argus II recipients and 6 Brainport users.

Results: Focus group members reported 760 activities for which they used their rudimentary sight; these were categorized according to visual domain (detail, visual information, visual-motor, and mobility), but more easily understood in terms of visual aspects, esp. contrast, lighting, size/distance, speed, familiarity, and eccentricity. Questionnaire items and ADLs were selected to broadly represent visual aspects and domains and spanned a range of 6.2 logits, well-centered on the 9.7 logit participant visual ability range. Principal Components Analysis showed that a single ability dimension adequately described the data. Monte-Carlo simulations showed that 16 adaptive items will, with 95% confidence, yield a person estimate within 1 logit from the 150-item estimate. ULV-ADL test results show that a battery of 30 activities will be sufficient to estimate visual ability, and that Argus II and
Brainport users are captured within the same ability dimension.

Conclusions: ULV is clearly distinct from ‘ordinary’ low vision, but can be reliably assessed using appropriate measures, both self-reported and through standardized assessment. We are currently planning the creation of a ULV rehabilitation curriculum built on the same principles.

PAR09.06

Reliability of the MIDVAQ, a French Quebec ecological adaptation of the Melbourne Low Vision ADL index, weighted version

Josee Duquette1, Jocelyn Loiselle2, Claire Frechette2, Lise Dery2, Marie-Chantal Wanet-Defalque3
1Institut Nazareth et Louis-Braille, LONGUEUIL, Canada
2Private practice consultant, BELOEIL, Canada
3CRIR-Institut Nazareth et Louis-Braille, LONGUEUIL, Canada

Purpose: The MIDVAQ is a standardized assessment tool of disability in instrumental activities of daily living (IADLs). It comprises observation of 16 IADLs requiring near vision (part A), mostly with printed material and available in alternate forms (V1 and V2), and questions on 9 dynamic IADLs (part B). Ability and importance of the activity for the tested person are rated on a five-level Likert scale. A disability impact score is obtained by weighting the ability rating by the importance. Item ratings or scores are summed to produce partial and global scores for the ability, importance and disability impact dimensions. The aim of this study was to evaluate the reliability of the MIDVAQ, administered at home to subjects with moderate to profound low vision, with their own aids and strategies.

Methods: Subjects were evaluated twice by the same evaluator for test-retest reliability, at 2 week interval (n=100; 3 different evaluators randomly assigned). For a half sample, V1 of part A printed material was used at time 1, and V2 at time 2; the order was reversed for the other half (alternate-form reliability). At T1, items were simultaneously rated by another rater for inter-rater reliability (n=35; 6 pairs of raters).

Results: Internal consistency was 0.82 (Cronbach’s alpha coefficient). Intraclass correlation coefficient (ICC) was used to analyse scores reliability. Inter-rater reliability of the global disability impact score was excellent (ICC=1.00; p<0.001). Test-retest reliability was 0.84 (p<0.001). Standard error of measurement was 7.2 points out of a possible score of 400. Alternate-form reliability of part A ability score was 0.91 (p<0.001).
Conclusions: The MIDVAQ is a highly reliable, standardized tool to test IADL performance and disability impact of low-vision persons, in their living environment, with their own aids and strategies. It has the potential to be used to measure low-vision rehabilitation outcomes.

PAR10.01
My Voice: exploring what is important to blind and partially sighted people in the UK
John Slade, Catherine Dennison
RNIB, BIRMINGHAM, United Kingdom

My Voice 2015 was the largest comprehensive survey of blind and partially sighted people in the UK. It has enabled us to hear the varied voices of people living with sight loss, and the challenges they face, across broad areas of their lives. This information has informed strategic planning, campaigns, fundraising. Over 1,200 people aged 18 to 97 and having levels of sight loss severe enough to be registered as blind or partially sighted, participated in a 45 minute telephone interview. There was considerable variation in the severity, duration and age of onset of their sight loss, and whether they had other health conditions in combination. The survey asked participants about many aspects of their lives. My Voice revealed lower levels of wellbeing than among the general population and low levels of support to live independently around the time of sight loss. Only one in four blind and partially sighted person of working age was in employment. Key themes that emerged when asked to identify what would make everyday life better were: desire to be able to travel and get out more easily; desire to be more socially included; alleviating financial difficulties; improved awareness of sight loss and more positive attitudes towards people with sight loss among the general public; and, professional support to help them to adapt to or cope with their sight loss. My Voice has given valuable insights that are informing national campaigning, strategy development and service developments. A priority is sharing learning with those providing services at local level across the UK and directly with blind and partially sighted people is a priority, empowering them to bring about improvements across these key areas of concern.

PAR10.02
Access to transport: shared spaces, quiet and self-driving vehicles, issues and opportunities:
Martine Abel-Williamson, Penny Hartin
World Blind Union, AUCKLAND, New Zealand

PAR10.03
The Path to Change: The CNIB’s Efforts to Integrate Comprehensive Vision Rehabilitation within the Continuum of Care in Canada
Leonard Baker
CNIB, TORONTO, Canada

This session will introduce participants to the efforts of the CNIB to ensure Canadians who are blind or partially sighted have a right to rehab. We will take the participants on a step by step journey from concept to execution of the strategy. This strategy includes the key findings of our stakeholder engagement initiative to inform the plan, to the development of the Canadian Patient Charter for Vision Care; publishing an article on a model for Comprehensive Vision rehabilitation in the Canadian Journal of Ophthalmology; to CNIB’s ongoing efforts to integrate vision rehab within every province and territory in Canada. Launched in 2014, The Path to Change is the name of CNIB’s bold strategy to ensure Canadians who are blind or partially sighted have a right to rehabilitation services and no longer rely on a charitable organization’s ability to fund raise in order to access comprehensive vision rehabilitation. Path to Change set out two key objectives pertaining to the provision of vision rehab services in Canada: Ensure an appropriate level of government funding to enable Canadians to access CNIB’s current vision rehabilitation programmes (O&M, LVS and VRT); and to integrate these programmes within the continuum of health care in Canada in order to ensure more people have access to these programmes, experience a more patient
centered model of care, and receive this care from certified professionals. In order to demonstrate the separation of this suite of rehab services from its work as a charity and to help reduce the stigma associated with being referred to the Canadian National Institute for the Blind, in March 2017 CNIB launched a new brand for its rehabilitation programmes entitled Vision Loss Rehab Canada: A CNIB Organization.

PAR10.04

Empowering New Zealanders with vision loss to be self-advocates and campaigners

Dianne Rogers
Blind Foundation, AUCKLAND, New Zealand

Background/Aim

The Blind Foundation, New Zealand’s main provider of vision rehabilitation supports people to lead independent lives, beyond vision loss. However in the community, blind people still experience many barriers, in accessing everyday facilities, services and products. Developing the knowledge and skills to self-advocate, and for individual advocacy and systemic advocacy aimed to create choices for blind people. A two-year pilot to train clients, their families and supporters to self-advocate and to be campaigners tested a new approach to building advocacy skills and knowledge.

Content

Blind people designed the free advocacy training which was provided to selected individuals. Effective communication with MPs, crafting individual stories of accessibility barriers, knowing how to work the system, researching the issue, building networks and understanding the broader campaign narrative was covered. Two advocacy workshops have been run, one in the upper North Island and one in the Lower North Island. After the training, trainees were invited sign on as advocates, and to form community advocacy networks. To date, two networks have been formed.

Participants also contributed to “Access for all”, a non-partisan campaign asking parliamentarians to introduce accessibility legislation in New Zealand.

Implications

Participant feedback from the first two trainings was overwhelmingly positive. Increased self-confidence and knowledge of how the system works was reported. Updates and written resources were provided to the networks. A community of campaigners was fostered through the networks. The training led to a network member becoming an accessibility campaign intern and to another being supported to undertake a New Zealand campaigning fellowship. The advocacy strategies strengthened participants engagement over time, emphasized a sequence of action people can take, and distributed responsibility out to a large network of volunteers for ongoing support.

PAR10.05

Ensuring No one is Left Behind: the implications of the Sustainable Development Goals for Persons with Low Vision

Penny Hartin
World Blind Union, TORONTO, Canada

In 2015, the international community entered a new era of development cooperation aimed at improving the conditions of the world’s most vulnerable populations, with the adoption of the 2030 Agenda for Sustainable Development – the Sustainable Development Goals (SDG’s). The seventeen Goals agreed by countries worldwide set out to address issues from poverty, hunger, inequality, education, economic independence and health to climate change and sustainable cities. And while the precursor to the SDG’s, the Millennium Development Goals (MDG’s) did not address disability in any specific way, leaders in the disability sector worldwide worked collaboratively to ensure that the new development agenda, the SDG’s, would not leave behind persons with disabilities and indeed, achieved their specific inclusion in several goals and indicators. 

This presentation will focus on those goals of most relevance and importance to persons with low vision: Goal 1 – No Poverty; Goal 3 – Good Health and well-being; Goal 4 – Quality Education; Goal 5 – Gender Equality; Goal 8 – Decent Work and Economic Growth; Goal 10 – Reducing Inequalities; Goal 11 – Sustainable Cities and Communities. We will discuss why these goals are important, how their implementation and monitoring can lead to improved services, support and inclusion for persons with low vision and the importance for organizations serving and representing persons with low vision to be engaged in the process. These Goals will form the basis for international development aid programs as well as for programming at the national and local levels within all countries, not just less developed nations. Indeed, all countries report on their achievements and progress towards achieving the goals through annual high level meetings held at the UN; and we will discuss how, as civil society, we
can advocate for inclusion of issues facing persons with low vision in these processes.

PAR10.06

Effectiveness of a serious game 'Stop bullying now!'
Paula Sterkenburg¹, Pieteren Lievensse¹, Juliette Liber², Marielle Bonnet³
¹Bartimeus & Vrije Universiteit Amsterdam, DOORN, Netherlands
²Department of Developmental Psychology, University of Utrecht, UTRECHT, Netherlands
³Vrije Universiteit Amsterdam, AMSTERDAM, Netherlands

Introduction: Children and adults with (intellectual) disabilities are more at risk of being bullied than persons without disabilities. The aim of this study is to examine if the serious game 'Stop bullying now!' increases the autonomy-supporting strategies of caregivers and teachers as well as their self-efficacy in coping with situations in which a client or pupil is bullied.

Methods: Randomized controlled trial with an intervention group and a passive- and active control group. Participants were caregivers and teachers (N = 155) of persons with disabilities. The instruments used were: The General Self-Efficacy Scale, the Handling Bullying Questionnaire, and a Social Validity Scale.

Results: After the intervention there were higher scores in self-efficacy and autonomy-supporting strategies. For the intervention and the active control condition there was a significant increase in autonomy-supporting strategies.

Conclusions: A brief intervention such as a serious game and/or informative texts about bullying can enhance the self-efficacy and the autonomy-supporting strategies of caregivers and teachers concerning bullying. Given the high prevalence of victimization, professionals working with persons with (intellectual) disabilities more attention should be given to the prevention of bullying.

PAR11.01

Age effects on reading parameters in children and adults with vision impairment assessed with the MNREAD iPad app
Michael Crossland¹, Aurélie Calabrese², Long To³, Gordon Legge⁴
¹Moorfields Eye Hospital NHS Foundation Trust, LONDON, United Kingdom
²Aix-Marseille University, MARSEILLE, France
³Boston, MA, BOSTON, U.S.A.
⁴University of Minnesota, MINNEAPOLIS, U.S.A.

Introduction: The MNREAD chart has been used for more than 25 years to assess reading performance in people with vision impairment. Recently, an iPad version of the MNREAD chart has been developed. Here we report the effect of age on reading performance measured using the MNREAD iPad app in children and adults with low vision.

Methods: MNREAD data were assessed retrospectively for 78 people with low vision seen in paediatric and adult low vision clinics. Reading acuity, critical print size, and peak reading speed were identified using the automated algorithm included in the app. Linear regression was used to identify the effect of age on these reading parameters.

Results: The mean age of participants was 37.3 years (range: 8 - 98 years). There was no significant relationship between age and near visual acuity (mean value: 0.30 logMAR, r²=0.003), age and critical print size (mean value: 0.72 logMAR, r²=0.004), or age and peak reading speed (mean: 121 words/minute, r²=0.02). Looking at those under 18 only (n=40), there was an increase in reading speed between age 8 and 18 (from a mean of 75 words/minute at age 8 to a mean of 107 words/minute at age 17, r²=0.10).

Conclusion: The MNREAD app can be used to measure reading parameters in people with low vision from the age of 8. Unlike in control subjects (Calabrese 2016), in a low vision population we do not find significant effects of age on visual acuity, critical print size, or peak reading speed.

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PAR11.02

iPad version of the MNREAD reading acuity test in Japanese
Koichi Oda¹, Yu Noichi¹, Hina Suzuki¹, Long To², Gordon Legge³
¹Tokyo Woman's Christian University, TOKYO, Japan
²Boston, MA, BOSTON, U.S.A.
A randomized controlled trial
The effect of visuomotor compensatory training for individuals with visual field defects: a randomised controlled trial

Azuwan Musa¹, Amanda Ellison², Neil Archibald³, Alison Lane²

¹Cognitive Neuroscience Research Unit, STOCKTON-ON-TEES, United Kingdom
²University of Minnesota, MINNEAPOLIS, U.S.A.
The influence of visual and cognitive factors on sentence reading speed in readers with central field loss

Jean-Baptiste Bernard1, Benoit Favre2, Nuria Gala3, Georges Linares4, Eric Castet5

1Laboratoire de Psychologie Cognitive, Aix-Marseille Université, MARSEILLE, France
2Aix-Marseille Université, Laboratoire d'informatique Fondamentale, MARSEILLE, France

PAR11.06

The influence of visual and cognitive factors on sentence reading speed in readers with central field loss

Jean-Baptiste Bernard1, Benoit Favre2, Nuria Gala3, Georges Linares4, Eric Castet5

1Laboratoire de Psychologie Cognitive, Aix-Marseille Université, MARSEILLE, France
2Aix-Marseille Université, Laboratoire d'informatique Fondamentale, MARSEILLE, France

PAR11.05

Regressions while reading - by sight and touch
Manfred Mackeben, Daisy Lei, Valerie Morash
The Smith-Kettlewell Eye Research Institute, SAN FRANCISCO, U.S.A.

Introduction: The obvious difference between reading print and braille is the input medium. Less obvious are elements that the two processes have in common and that contribute to reading speed and fluency: Fidelity of the input signal, knowledge of the language, grammar, semantics, context, difficulty of the text.

A prominent feature of reading behavior are regressions, i.e. re-reading of words. Regressions have been found to occur frequently in reading print and braille, and research has explored their dependence mostly on linguistic aspects of reading. We hypothesized that regressions while reading braille can also be dependent on the physical clarity of the input, as has been shown for print.

Methods: Twelve blind practiced readers of American braille (8 female, ages 'M' = 38.31 years, 'SD' = 13.21 years) read pages of standardized text (IReST, no repetitions) with 3 different heights of dots (0.38 mm, 0.18 mm, and 0.04 mm). Subjects used either one or both hands, while they had electromagnetic sensors taped to the tops of their index and middle fingernails to track finger positions at 240 Hz (3DG trakSTAR, Northern Digital Inc., 2.0 mm sensors).

Results: We show that braille with very shallow dots is read significantly more slowly (p = 0.027) and with more regressions than better quality braille (p<0.001). This confirms equivalent findings on reading print with diminishing contrast. One-handed readers performed more regressions (p<0.001), possibly because regressions in two-handed reading can be executed by the trailing hand.

Conclusion: Our results support the idea that regressions in reading braille arise from a momentary sense of “insecurity” that can also be caused by the physical characteristics of the input, independent of the level of processing. We hypothesize that regressions during reading in either medium serve similar purposes, despite the obvious differences regarding the two senses.
Introduction: Sentence reading speed is dramatically reduced in patients with central field loss (CFL), along with an increased number of reading fixations compared to normally-sighted readers. Calabrese et al (2016) showed that the spatial distribution of these fixations may not be uniform within a sentence, patients wasting a large amount of time/fixations at specific locations in the text. Here, we investigate which factors possibly underlie this non-uniform distribution of fixations by looking for the visual and cognitive characteristics of words that may slow down the reading process.

Methods: Each of five observers read 600 French sentences extracted from Alexander Dumas’s books (Average sentence characteristics: 9.2±1.5 words and 47.0±5.8 characters) with a simulated loss of central vision (10° diameter round simulated central scotoma). Three different letter sizes (small: 0.6x, medium: 0.8x and large: 1.2x the Critical Print Size value) were used (200 sentences per size). Across subjects, average reading speed was 1.72±0.08, 1.89±0.04 and 2.05±0.03 log words/min for the three different print-sizes. For each sentence, we counted the number of long words (length > 7 letters), low-frequency words (frequency < 15 occurrences/million) and low-predictable words (log probability of estimated presence based on previous words < 10-9). On average, a sentence had 0.63 long, 0.63 low-frequency and 0.63 low-predictable words. A linear mixed-effect model was run to measure the effects of the three variables (number of long/low-frequency/low-predictability words) on reading speed.

Results: Results show that the number of low-frequency words and low-predictable words significantly decreased sentence reading speed (p<10⁻⁵, slopes: -0.04 (resp. -0.03) log words/min per low-frequency (resp. low-predictable) presented word). Word length did not influence reading speed (p=0.85).

Conclusion: Cognitive factors (word frequency and predictability) influence reading performance in readers with CFL and need to be taken into account in reading performance measurements to avoid cognitive interferences.

PAR12.01

Basic ophthalmologic screening in elderly home care patients to reduce avoidable visual impairment

Ruth van Nispen¹, Nikki Meijer², Hilde van der Aa³, Frank Timmermans², Jos de Blok⁴, Jan Keunen⁵, Ger van Rens¹

¹VU University Medical Center, AMSTERDAM, Netherlands
²Huisarts n.p., BEMMEL, Netherlands
³Buurtzorg Nederland, ALMELO, Netherlands
⁴Radboud UMC, NIJMEGEN, Netherlands

Introduction/aim: Independently living older adults with vision loss are at risk of early inpatient admissions and detrimental health outcomes. This study aimed at investigating the prevalence of potential ophthalmologic conditions in vulnerable elderly who live independently and who are assisted by home care nurses. Furthermore, the number of referrals to the general practitioner (GP) and the association between vision loss and health outcomes were studied.

Methods: In a cross-sectional study between May-Dec 2016, trained home care nurses used the Vision 2020 Netherlands eye screeners, i.e. distance (tumbling E) and near visual acuity, Amsler grid and Donders confrontation test for central and peripheral field loss, in 180 patients from across the country (mean age 80 years, range 50-96 years). Validated questionnaires were used to assess health outcomes.

Results: In the best eye, distance decimal visual acuity was <u><</u>0.3 in 21.7% of patients and near visual acuity <u><</u>0.4 in 36.8%. Field problems were present in 31.9% (central) and 23.1% (peripheral). Nurses referred 20% to the GP; in 42% a referral was not necessary, because the GP or ophthalmologist was already aware of the eye condition. Although health problems were prominent in patients with vision loss (e.g. 52% falls, 23% depression, 19% anxiety), no significant associations were found between vision loss and health outcomes in this specific population.

Conclusion: Although the number of independently living elderly home care patients having eye conditions is considerable, many of these vulnerable elderly seem adequately taken care of with respect to eye healthcare. The fact that one in five patients was referred to follow-up care by home care nurses because of suspected eye conditions, makes screening a relevant tool to further reduce the burden of vision loss, thereby contributing to the WHO’s Vision 2020 initiative to eliminate avoidable blindness.

PAR12.02

Determinants of Concern about Falling in Older Adults with Central Visual Impairment due to Age-Related Macular Degeneration

Ursula White⁵, Alex Black⁵, Joanne Wood⁵, Kim Delbaere⁶

¹²Aix-Marseille Université, Laboratoire Parole et Langage, UMR 7309, AIX-EN-PROVENCE, France
³Laboratoire d'Informatique d'Avignon, AVIGNON, France
⁵Aix-Marseille Université, Laboratoire de Psychologie Cognitive, UMR 7290, MARSEILLE, France
Introduction: Concern about falling is a significant problem among older adults with age-related macular degeneration (AMD), potentially contributing to activity restriction, physical and psychological issues, and reduced quality of life. The purpose of this study was to identify determinants of concern about falling in older adults with AMD.

Methods: A sample of 62 older adults with central vision loss due to AMD (binocular visual acuity worse than 6/9; mean age 81.2 ± 6.2; 65% female), and 55 controls with normal vision (mean age 75.8 ± 5.6; 56% female) were recruited from Ophthalmology, Optometry and Low Vision clinics. Assessments included vision (visual acuity, contrast sensitivity, binocular visual fields), psychological (Geriatric Anxiety Inventory, Patient Health Questionnaire-9) and physical measures (balance, timed walk, sit-to-stand, grip and quadriceps strength). The validated Falls Efficacy Scale – I, was used to determine levels of concern about falling. Multivariate regression analysis was used to identify significant visual, physical and psychological determinants of concern about falling in the AMD group, including age and gender.

Results: High concern about falling (FES-I ≥ 23) was more common in AMD (N=28, 45%) compared to controls (N=16, 29%), but did not reach significance (p=0.087). In the AMD group, greater concern about falling was associated with reduced contrast sensitivity (β=-0.22, p=0.033), slower Sit-to-Stand times (β=0.40, p<0.001), and higher depression scores (β=0.41, p<0.001). The overall model explained 44% of the variance (F3,58=15.21, p<0.001).

Conclusion: Concern about falling in older adults with AMD is determined by visual, physical and psychological factors. These findings improve understanding of concern about falling in this group and will inform the design of interventions to reduce concern about falling. As such, intervention programs should incorporate components that target reduced balance and mobility, address psychological issues, as well as vision rehabilitation to address reduced visual function.

Acknowledgment: QUT APA Scholarship

Visual perception of the unevenness in the footway environment
Tianyu Wang¹, Gary Rubin², Nick Tyler³
¹UCL, LONDON, United Kingdom
²UCL Institute of Ophthalmology, LONDON, United Kingdom
³Department of Civil, Environmental & Geomatic Engineering, UCL, LONDON, United Kingdom

Visual information plays an important role for walking in the footway environment as an essential daily activity. A fall is likely to occur if the change in height is not as perceived and expected in this primary essential process. Being able to detect and understand changes in the footway surface correctly is essential for safe pedestrians. The purpose of this study was to investigate the relationships between visual function and perception of unevenness in the footway environment, and how this might differ for older people and at low (mesopic) and high (photopic) illumination.

Sixty participants, thirty in each the young group and the older group, were recruited to complete the novel visual perception experiment on uneven surface with different patterns and heights at both the mesopic and the photopic luminance levels in the UCL Pedestrian Accessibility and Movement Environment Laboratory (PAMELA) where lighting and surface conditions were controlled. The answers of which uneven surface participants believed they had seen were recorded for analysis. Visual acuity, contrast sensitivity and stereoacuity were tested by using standard measures. Multiple regression analysis was used.

When these three visual functions were in the model, only the stereoacuity (95%CI 0.06-0.22) was associated with the misperception of the unevenness at the mesopic luminance level in the older group. However, worse contrast sensitivity (95%CI 0.24-1.06) and visual acuity (95%CI 0.03-0.45) in the older group were associated with the misperception of the unevenness at the photopic luminance level in the multiple regression analysis.

Different primary vision components were the risk factors of misperception of the unevenness at different lighting levels to older people. The findings highlighted that misperception of unevenness was the result of combined intrinsic and extrinsic factors. The detailed results could potentially help ophthalmological clinicians develop targeted fall preventions to reduce the risk of fall or tripping.

Comparison of stair walking in patients with macular degeneration before and after PRL training
Objective: We provided vision training to establish a priority retinal fixation point (preferred retinal locus or PRL) in patients with age-related macular degeneration (AMD). Our aim was to test whether PRL training improved walking speed up and down stairs for these patients.

Methods: We chose 27 patients with macular degeneration and low vision from the low vision clinic of our hospital as subjects, between January 2014 and December 2015. We divided these randomly into a PRL training group of 13 subjects and a non-trained group of 14 subjects. We used 38 healthy volunteer patient elders as our control group. All subjects were current hospital patients and had received regular eye examinations. For the experimental group we provided 10 minutes per day of PRL self-training over a period of four weeks, while the non-trained AMD patients had no intervention. Both before and after the four-week training period, the time taken for each group to walk up and down 18 stairs in an unfamiliar stairway was recorded.

Results: All three groups walked down stairs faster than up the stairs prior to training ($p<0.05$). We found no significant difference for stair walking speeds between the PRL-trained and the non-trained AMD subjects ($p>0.05$), while the healthy subject control group walked faster than either AMD subject group ($p<0.05$). Following four weeks of PRL training the healthy subject control group still walked faster up and down stairs than either of the AMD subject groups. There was no difference between the AMD group when walking up the stairs ($p>0.05$) but the PRL-trained AMD subjects walked faster than non-trained AMD subjects down the stairs ($p<0.05$).

Conclusion: PRL training in patients with macular degeneration appears to improve their speed of walking down stairs.

Keywords: Preferred Retinal Locus, Macular Degeneration

PAR12.05

Mild Cognitive Impairment in Age-related Macular Degeneration
Olga Overbury, Caitlin Murphy
University of Montreal, MONTREAL, Canada

Introduction: The incidence of Age-related Macular Degeneration (AMD) and Alzheimer’s Disease (AD) increases with age and will likely become more frequent as our population ages. There has been a growing body of research investigating the co-occurrence of these diseases, but results have been inconclusive. Cognitive impairment is under diagnosed, especially in the early stages. A patient with AMD and mild cognitive impairment (MCI) would go unnoticed before obvious symptoms of AD appeared. This study aims to explore the co-occurrence of AMD and MCI.

Method: Participants aged 70 years or older with no known neurological or cognitive impairments were recruited for this study. They were divided into two groups; those diagnosed with AMD and healthy controls. Vision was evaluated using ETDRS visual acuity. Cognitive status was measured using the Mini-Mental State Exam (MMSE) and the Montreal Cognitive Assessment (MoCA).

Results: According to the MMSE, two participants from the AMD group (N=21) and none from the control group (N=18) scored positive for cognitive impairment. The MoCA indicated 33.3% of the AMD group and 27.7% of the control group had MCI. Individuals with AMD that did not pass the MoCA had difficulty with delayed recall ($U=14.5, p=0.005$), orientation ($U=37.5, p=0.034$) and abstraction ($U=24.5, p=0.007$) while the controls with scores below normal had problems with delayed recall ($U=2.5, p=0.002$).

Conclusion: There was no significant difference between groups on cognitive score. Although more people with AMD scored positive for MCI, it was not significant. The AMD and control groups did differ on which cognitive domains they had difficulty with. Many older adults develop impairments in memory, but it does not go beyond that. Impairment in other cognitive domains in addition to memory is more common in MCI cases that convert to AD.

PAR12.06

A prospective study of change in depressive symptoms over 12-months in adults with low vision who were accessing vision rehabilitation
Bonnie Sturrock$^1$, Jing Xie$^1$, Edith Holloway$^1$, Ecosse Lamoureux$^2$, Jill Keeffe$^1$, Mark Hegel$^3$, Robin Casten$^4$, David Mellor$^5$, Gwyneth Rees$^1$

$^1$Centre for Eye Research Australia, EAST MELBOURNE, Australia
$^2$Singapore Eye Research Institute (SERI), SINGAPORE, Singapore
$^3$Dartmouth-Hitchcock Medical Center, LEBANON, U.S.A.
$^4$Thomas Jefferson University, PHILADELPHIA, U.S.A.

$^5$MONTREAL University of Montreal, QUANZHOU, China
Introduction: We explored risk and protective factors to change in depressive symptoms over 12-months among adults with low vision (<6/12 best-corrected visual acuity in the better eye) who were participating in a randomised-controlled trial (RCT) and receiving usual care only. Methods: Participants were recruited from vision rehabilitation services across Australia and had at least mild depressive symptoms on the Patient Health Questionnaire-9 items (PHQ-9; score ≥5). Eligibility was adequate hearing, no cognitive impairment, and not receiving treatment for a mental health condition. Telephone interviews were conducted at baseline, 3, 6, and 12-months. Measures were the PHQ-9 (main outcome), Coping Strategy Indicator, Behavioral Activation for Depression Scale, and Illness Cognition Questionnaire (predictors). Participants had access to vision rehabilitation services and were referred to their GP for depressive symptoms. Results: Rasched data from 82 participants (mean age 61 years; 55% women) demonstrated significantly reduced depressive symptoms from baseline to 12-months (Mean raw change -2.04, SD = 4.18). In the linear mixed model, decreasing depression scores were significantly predicted by older age at baseline (β = -0.01), greater use of social support (β = -0.16), and increased acceptance of low vision (β = -0.07). Increasing depression was associated with the perception that health is deteriorating to “fair” or “poor” (β = 0.55; β = 0.70), a history of depression reported at baseline (β = 0.28), and increasing behavioural avoidance (β = 0.08). Use of vision rehabilitation services and uptake of a GP referral did not contribute to change. Conclusion: This study shows prospective risk and protective factors to depressive symptoms among people with low vision. The supportive nature of telephone interviews or the mere-measurement effect may have contributed to this effect and requires methodological consideration in future research. These findings highlight the potential for watchful waiting or stepped-care psychosocial interventions.

PAR13.01
Detecting cheating when testing visual acuity for individuals with low vision
Rianne Ravensbergen, David Mann
Vrije Universiteit, AMSTERDAM, Netherlands

Introduction/aim: People who cheat on vision tests generally do so to make their vision appear ‘better’ than it actually is (e.g., for occupational or driving purposes). However, there are particular instances in which it is advantageous for a person to do the opposite and ‘under-represent’ their level of vision (e.g., when qualifying for disability benefits and inclusion in activities for people with impairment). Therefore, it is desirable to have a method to detect this type of cheating. The aim of this study was to investigate whether the intentional under-representation of vision could be detected when testing visual acuity (VA) in the presence of simulated impairment. Methods: We tested the visual acuity of 13 participants with simulated vision impairment using the Berkeley Rudimentary Vision Test (BRVT) while following the ‘standard’ procedure and a ‘modified’ procedure designed to make the test less predictable. For each procedure, there was an ‘honest’ condition in which participants provided their best effort, and a ‘cheating’ condition in which they attempted to make their VA appear worse than it actually was. Results: Participants were successfully able to under-represent their level of visual acuity, demonstrated by a significantly decrease in VA (honest vs. cheating = 0.8±0.02 vs. 1.7±0.03 logMAR, p<0.001). However, their responses were significantly more variable as shown by a larger standard deviation of the four estimations of VA (honest vs. cheating = 0.05±0.01 vs. 0.12±0.01 logMAR, p<0.001). The variability in VA estimations did not change when using the modified procedure, revealed by a lack of interaction between the intention-to-cheat and the test procedures (p=0.15). Conclusion: The standard procedure used for the BRVT is robust to cheating. Moreover, the variability in the estimations of VA measured on the BRVT may prove to be a means of detecting the intentional under-representation of vision when testing for low vision.

PAR13.02
Eye tracking perimetry as a diagnostic tool for patients suspected of a conversion disorder
Gerard de Wit, Juliette van Seventer, Maria van Genderen
Bartimeus, ZEIST, Netherlands

Introduction/aim: Being able to diagnose patients with functional (non-organic) visual field defects is important, since they are likely to benefit from psychological rehabilitation. This is especially the case if the functional problems are caused by a conversion disorder and not simulation. The aim of our research was to develop and validate a test that more objectively determines if apparent visual field defects (measured with conventional perimetry) are caused by a conversion disorder. Methods: On a computer screen with a standard perimetric background luminance a relatively
low contrast object (clock) moves around and the patient is instructed to follow this clock. At set times the clock disappears and at the same time at a different location (20, 25, or 40 deg peripheral) a standard Goldman V-4e stimulus appears again. If the patient makes a fast enough saccade of large enough amplitude and accurate direction to the new position, it means that the patient (unconsciously) saw the V-4e stimulus. The saccades of 19 patients with functional visual field loss (group F), 9 normal control subjects (group N), and 13 control subjects with either an organic or simulated visual field defect (group D) were compared. Results: The 40 deg peripheral stimuli had the most power to discriminate between stimulus-induced saccades (group N and F) and stimulus-deprived saccades (group D). The cut-off criteria that separated group F from group D were: (saccade delay ≤ 1.2 ms) and (saccade size ≥ 27.2°) and (saccade direction deviation ≤ 8.5°). Additionally, we found that only patients of group F displayed sometimes a very characteristic viewing behaviour in which the patient looks at the stimulus, looks away, and looks at the stimulus again. Conclusion: Eye-tracking perimetry can be a useful tool in diagnosing a patient suspected of a conversion disorder.

PAR13.03

A transdiagnostic comparison of phenomenology of hallucinations and delusions: preliminary results
Maya Schutte1, Meenakshi Dauwan1, Dominic Ffytche2, Mascha Linszen1, Sanne Koops3, Edwin van Dellen1, Sophie Heringa1, Arjen Sloooter1, Rob Teunisse1, Anton Verezen1, Odile van den Heuvel1, Evelien Lemstra4, Elisabeth Foncke5, Karin Slotema5, Joop de Jong5, Clara Strauss6, Neil Thomas7, Susan Rossell1, Iris Sommer1
1University Medical Center Utrecht, Utrecht, UTRECHT, Netherlands
2Kings College London, LONDON, United Kingdom
3Elvea, ARNHEM, Netherlands
4VU university medical center, AMSTERDAM, Netherlands
5Parnassia Psychiatric Institute, THE HAGUE, Netherlands
6University of Sussex, SUSSEX, United Kingdom
7Swinburne University & Monash Alfred Psychiatry Research Centre, MELBOURNE, Australia

Introduction: Although psychotic experiences are prevalent across many psychiatric, neurological and medical disorders, investigation of these symptoms is largely restricted within the boundaries of diagnostic categories. This study aims to examine the phenomenological similarities and differences across a wide range of diagnoses using the Questionnaire for Psychotic Experiences (QPE).
Methods: We assessed presence, severity and phenomenology of psychotic experiences in 352 participants including; participants with visual impairment, schizophrenia spectrum disorders, hearing impairment, Parkinson’s disease, Lewy body disease, Alzheimer’s disease, posttraumatic stress disorder, borderline personality disorder, and recent major surgery. Psychotic phenomena were explored between these groups using the Questionnaire for Psychotic Experiences (QPE).
Results: Patients with visual impairment were generally characterized by visual hallucinations. The prevalence of visual hallucinations, visual illusions, delusions and sensed presence in patients with visual impairment was similar to patients with a neurodegenerative disorder. Patients with a psychiatric disorder typically reported a combination of several psychotic experiences (e.g. hallucinations in multiple modalities, or in combination with delusion), and reported more severe experiences compared to patients with visual impairment and other disorders. Patients with hearing impairment and recent major surgery typically reported hallucinations in one modality.
Conclusion: Our findings indicate that psychotic experiences are not diagnosis specific, as phenomenology of hallucinations and delusions was highly similar across certain diagnoses. This may point to the existence of subtypes across diagnostic categories. These subtypes could have a different underlying etiology requiring specific treatment.

PAR13.04

Hearing rehabilitation for people with visual and intellectual disabilities: a multidisciplinary approach.
Ingrid Korenstra
Bartiméus, DOORN, Netherlands

Background: For many years the Bartiméus ‘hearing rehabilitation team’ works with a step by step program to adjust hearing aids for people with deafblindness and intellectual disabilities. This program is still successful. Aim: Hearing loss is often not recognized in persons with visual and intellectual disabilities. However, studies indicate that the incidence of visual and hearing disabilities (also known as deafblindness) is relatively high in persons with intellectual disabilities. The combined visual and hearing disabilities have great impact on quality of life. The hearing rehabilitation team shows that hearing aids can be successfully implemented within this target group, creating
opportunities for interaction and communication.
Content: In this presentation we describe a practical step-by-step model of adjusting hearing aids for people with deafblindness and intellectual disabilities. The use of hearing aids demands a special approach by a multidisciplinary hearing rehabilitation team. In our team the audiologist, the speech therapist, the audiology assistant, the audio technician, the physician and the psychologist work closely together. This step-by-step program consists of hearing tests, check on inclusion criteria, formulate treatment goals, agree on the habituation process and guarantee de check-ups and evaluations. These steps lead to a decision if, how and when hearing aids could be beneficial. The hearing rehabilitation team supports the implementation process by coaching, check-ups and evaluations. Breaking the isolation by using hearing aids proves to be a feasible intervention; also for people with multiple disabilities.
To underline this statement and to make the theory even more clear, video clips will be shown. The video clips describes the step-by-step process, illustrated by clients from Bartiméus with highly varying intellectual disabilities.

PAR13.05
Tell it. Fostering influence in communication and language in people with dual sensory loss
Saskia Damen, Marleen Janssen
University of Groningen, GRONINGEN, Netherlands

Introduction: The Influencing Communication and Language program aims to aid support partners of individuals born with dual sensory loss in enhancing bodily-tactile communication and language in such a way, that these individuals can demonstrate self-determination. In this study the effectiveness of the intervention is tested as well as the amount of self-efficacy the support partners experience in the communication with the individual with dual sensory loss before, during and after the intervention.

Method: 16 support partners of individuals with dual sensory loss are involved in a pilot-study that precedes a larger effect study. During the pilot study an intervention is developed that is carried out by a communication coach and that focuses on offering bodily-tactile activities and experiences, fostering appropriate tactile communication and language use, and supporting clients' influence in communication. Currently, instruments are developed and adapted to measure the way support partners judge the usefulness of the intervention, their self-efficacy as communication partner and the communication ability of the participant with dual sensory loss.

Results: In close collaboration with the support partners three instruments were developed to measure support partners' attitudes towards the program, as well as the challenges they experience in interpersonal communication and their evaluations of the abilities of the individual with dual sensory loss.

Conclusion: This project is the first on the effectiveness of a longitudinal intervention that considers the importance of self-determination in bodily-tactile communication and language in people with dual sensory loss. First results of the study revealed that it important to closely collaborate with parents, teachers and support workers when adapting and developing observation instruments and questionnaires.
Funding: This study is funded by ZonMW Inzicht, Royal Dutch Kentalis, Bartiméus, Royal Visio and University of Groningen.

PAR14.01
Green background hues appear to optimize perceived acuity
Gregory Goodrich1, Peter Borden2, Michele Klein2
1Private Practice, SEA BRIGHT, U.S.A.
2Jasper Ridge Inc., MENLO PARK, U.S.A.

Hypothesis
We hypothesize that background colors other than white improve perceived visual performance.

Purpose
The most common background for near tasks is white with color temperature range of 3,000 to 6,500°K. Previous studies have suggested that other colors may be preferred or may improve near acuity. Here we investigate preferred background color with subjective near acuity as the evaluation criterion.

Methods
Subjects were 40 normally sighted individuals aged 15-89 years. Subjects were presented with a LuxiO™ system, placed over a mixed contrast Colenbrander 40 cm acuity chart. The LuxiO, modified to provide red (625 nm), green (527 nm) and blue (460 nm), spans a large fraction of the CIE color space, including hues outside the sRGB gamut that conventional displays present. Illuminance was independent of color and set at a constant 5000 lux, where acuity is only weakly dependent on illuminance. Background illuminance was <200 lux. Subjects systematically
adjusted color to their best perceived acuity for high and low contrast stimuli. No attempt was made to measure actual acuity gain.

Results
All subjects preferred a non-white background hue, although individual preferences varied widely across the CIE color space. Most preferred a hue that was predominantly green. With two exceptions all preferences fell outside the space reproducible by standard RGB monitors.

Conclusions
These results suggest non-white background hues, especially with added green, improve perceived near visual performance. This implies properly chosen tinted lenses may improve near visual performance over clear lenses. The spread of chosen hues suggests the need to measure an individual’s best hue before making a recommendation. Optimized hues cannot be determined using a conventional display, as most lie outside the sRGB gamut. A more formal study needs to quantify gains and account for additional effects such as eye strain and contrast acuity.

PAR14.02
Measuring motion perception in the presence of vision impairment
David Mann¹, Rianne Ravensbergen¹, Kristine Dalton², James Roberts², Arijit Chakraborty², Susan Leat², Benjamin Thompson²
¹Vrije Universiteit Amsterdam, AMSTERDAM, Netherlands
²University of Waterloo, WATERLOO, Canada

Introduction: Vision impairment (VI) is most often assessed using the measurement of visual acuity (VA), however a measure of VA may fall short of providing an assessment of a person’s ‘functional’ visual capacity. Mobility in a dynamic world requires the discrimination of objects that move (e.g., approaching cars, bicycles, or pedestrians), and therefore a test of motion perception is desirable to assess functional vision. The aim of this study was to evaluate the performance of people with vision impairment on a test of motion perception.

Methods: A total of 40 participants took part: 21 participants with VI (23.0 ± 6.2 years; VA 1.5 ± 0.4 logMAR) and 19 control participants (30.0 ± 4.6 years). Global motion perception was assessed using random dot kinematograms, whereby the percentage of 100 briefly presented dots moving in a coherent direction was manipulated to establish the threshold percentage (the ‘motion coherence threshold’) at which a forced-choice of motion direction was possible. Motion coherence thresholds were established using logMAR 2.0 size dots for both vertical and radial motion.

Results: Motion perception was measurable in 81% (17/21) of participants with VI, and all controls. The sensitivity of the VI group to radial motion was greater than it was for vertical motion (38.6 ± 25.8 vs 60.1 ± 26.2%, ‘p’<.01), however motion coherence was worse in the VI group irrespective of the test (radial 38.6 ± 25.8 vs 16.5 ± 2.6%; vertical: 60.1 ± 26.2 vs 16.6 ± 6.5%; ‘p’<.01). In the VI group, motion coherence was not significantly correlated with VA or contrast sensitivity (‘r’<.5; ‘p’>.05).

Conclusion: The neural mechanisms that support motion perception remain functional in most individuals with VI who have measurable VA and contrast sensitivity. Motion perception is not correlated with VA or contrast sensitivity, suggesting it provides a unique measure of visual function.

PAR14.03
Retraining Depth Perception for improved ADLs in Age-Related Macular Degeneration
Laura Walker, Tony Succar, Donald Fletcher
Envision Research Institute, WICHITA, KANSAS, U.S.A.

INTRODUCTION. Disruption to the central field causes problems with activities of daily living (ADLs), including reading, mobility and tasks that require eye-hand coordination. Individuals with age-related macular degeneration (AMD) are at risk for loss of stereopsis. The prevalence of stereo blindness in AMD not documented, however we find the many of our research participants have degraded or complete loss of stereopsis. The goal of this work is to examine whether dichoptic training intervention can recover stereopsis with a measureable impact on improved visual functioning.

METHODS. Sixteen patients with AMD were assigned evenly into a control and intervention group. Both groups played an adapted game of Space Invaders in which elements of the game were displayed dichoptically through anaglyph filter glasses (intervention group) or plano lenses (control group). Use of both eyes is required to play the game successfully under dichoptic viewing conditions. Massof’s activity inventory (AI) was administered before and
6-weeks after training to quantify visual functioning ADLs. Stereopsis was measured with the Titmus before, during and 6-weeks after training. Training consisted of five, two hour sessions of game play.

RESULTS. Participants in the control group had statistically significant improvements to stereo acuity throughout training, with a slight fall-off in stereo acuity at 6-weeks. Overall visual functioning as measured with the AI improved significantly. Sub-task analysis indicated that improvements were in visual motor and reading functions. The control group did not exhibit improvements. Two controls were crossed over into the intervention group and subsequent improvements were also found for these individuals.

CONCLUSION. Dichoptic training is an effective approach to restoring the vital function of stereopsis to AMD patients. Because gains were so rapid, the mechanism of improvement is likely to be the formation of a “stereo-PRL” that utilizes healthy corresponding retina in the two eyes.

PAR14.04

Influence of divided attention on performance fields across the retina
Iliya v. Ivanov, Maria Barraza-Bernal, Katharina Rifai, Siegfried Wahl
University of Tuebingen, Institute for Ophthalmic Research, TUEBINGEN, Germany

Locations in the visual field with high performance capabilities can be candidates for the selection of a new preferred retinal locus of fixation (PRL). Sustained attention, which has been suggested to influence orientation discrimination, can be allocated simultaneously to multiple discrete locations in space, regardless of local visual constraints. Although perceptual field performance varies across the visual field, the influence of divided attention on performance across the field has not been described. Since execution of many everyday tasks require attending at multiple locations in space, we investigate the influence of divided attention on performance fields across the retina. Our findings have important implications for new PRL selection in maculopathies, which are progressive and lead to changes of PRL position. Four normally sighted subjects participated in the study to report the perceived orientation of a Snellen-E presented on a previously cued location(s) spanning from 0&deg; to 315&deg; at three eccentricities from 3.5&deg; to 6.8&deg;: Discrimination performance was measured in two conditions: i) single cue was presented to indicate the location in which the stimulus will appear; ii) three cues were presented simultaneously, from which only one indicated the future stimulus location. Progressive maculopathy was simulated with scotoma diameters from 6&deg; to 11&deg; and the selection of new PRL assessed. The results showed that discrimination performance was invariant with the tested retinal eccentricities. When sustained attention was divided, the results showed equal relative performance on the different meridians. All subjects selected their new PRL locations consistently along the initially chosen meridian. The invariance of discrimination capabilities at the different eccentricities suggests characteristics of the performance fields independent of retinal processing factors. The absence of variations in performance with divided attention determine that beneficial re-location of PRLs during disease progression might be along the same meridian. This is corroborated by the progressive maculopathy simulation results.

PAR14.05

Visual functions among older adults presenting with fall injury
Mahesh Kumar Dev
Queensland University of Technology, BRISBANE, Australia

Introduction:
Falls are the leading causes of injury among older adults and are becoming a public health issue. The aim of this study was to identify the visual functions of older adults presenting with a history of a fall or falls, and to explore a relationship between visual functions and falls.

Methods: This cross-sectional, hospital based, and descriptive study involved 104 Nepalese patients of 50 years or older, presenting in orthopedic outpatient department or emergency unit because of fall or falls. A complete eye examination including visual acuity (VA), contrast sensitivity (CS), stereopsis, and color vision (CV) assessment and refractions were carried out.

A preset questionnaire was used to gather information regarding demographic characteristics, fall injuries (number, places, and causes of falls), general health, medications, and vision. Recorded data were analyzed by Statistical Package for Social Sciences.

Results:
The mean age of older adults was 62.77 ± 10.56 years (range, 51-89 years). The majority (61.5%) had multiple falls and the remaining had a single fall. Most common (56.7%) place for falls was inside home while walking up or down stairs. Feeling of dizziness was the main reason (37.5%) behind a fall, and inability to see obstacles was reported by 21.2% patients.
Presenting and best corrected VA, CS, and stereopsis were found to be better among single fallers than multiple fallers. Majority of patients having falls had decreased stereopsis (140 ≥400 seconds of arc). CV defect was crusader of falls in only 11.5 %. Cataract, retinopathy/maculopathy, and glaucoma was highly related to the fall number. 

Conclusion: The prevalence of falls and fall-related injuries are higher among older adults. There is a need of ocular examination and assessment of visual functions among patients presenting with a history of fall or fall-related injuries, along with the examination of general health.

PAR15.01

Implementation of innovative eye tracking diagnostics for young children at risk of CVI

Sanny van der Steen, Marissa Smis
Koninklijke Visio, HUIZEN, Netherlands

The number of children with visual impairments related to cerebral damage seen in rehabilitation centres is steadily increasing. To provide tailored support for those children, measurements of visual and oculomotor functions are essential. In young or intellectually disabled children these measurements can be difficult or even impossible to perform. At Erasmus Medical centre an eye tracking-based method has been developed that provides quantitative information. Because this method is very useful for rehabilitation practice, the eye tracking-based method is being implemented within the rehabilitation centres Koninklijke Visio and Bartiméus. The main objective is to add the eye tracking-based method as an addition to the current diagnostic measurements/tests for the target group young children at risk of CVI.

The following subgoals were formulated: a) making the eye tracking test applicable for usage in the rehabilitation centres, b) develop user-friendly software for professionals, c) write a manual on how to carry out the tests and how to interpret the results, d) implement the manual e) inform the management of Koninklijke Visio and Bartiméus, f) inform and train the professionals (i.e. ophthalmologist, orthoptist/optometrist, clinical physicist and neuro-psychologist) and g) make an instruction video for new professionals, h) check if eyetracking is used. The implementation started in September 2016, for the duration of 8 months. ZonMW InZicht provided a grant for the implementation of the eye tracking-based method within the rehabilitation centres Koninklijke Visio and Bartiméus. Disclosure: none.

PAR15.02

Autism Spectrum Disorder in People with Multiple Disabilities

Mathijs Vervloed
Radboud University, NIJMEGEN, Netherlands

Introduction/aim: In people with sensory and intellectual disabilities (ID) behaviours that resemble Autism Spectrum Disorders (ASD) are often encountered. In a four year project we have tried to disentangle symptoms of ASD from behaviours resulting from sensory and intellectual impairments. This presentation is an overview of this project including the development of an assessment instrument, Observation of Autism in people with Sensory and Intellectual Disabilities (OASID).

Methods: Literature reviews, development of an assessment instrument on 20 (pilot) and 60 (psychometric study) participants with intellectual and sensory impairments. Descriptive comparisons of psychopathology in participants with and without ASD.

Results: Symptom overlap and differentiating characteristics of ASD and sensory impairments were found. The critical review of current screening and diagnostic instruments for ASD in people with sensory impairments in addition to intellectual disabilities showed current instruments are not valid. Because of this a new assessment instrument, OASID, to assess ASD in people with combined intellectual and sensory impairments, was designed. Preliminary cut-off scores are known and reliability was good. Many participants showed symptoms of attachments disorders. Participants with and without ASD differed in social communication and interaction. No difference was found in stereotyped behaviour and stress reactions. Stress reactions were correlated with stereotyped and repetitive behaviours.

Conclusion: The assessment instrument OASID for assessing ASD in people with intellectual and visual disabilities with or without auditory disabilities is suited for people with moderate to severe intellectual disabilities in combination with sensory disabilities. Preliminary cut-off scores are known. Manual, description of test material and forms are available. In contrast to people with ID and ASD the presence and intensity of stereotyped behavior was not a valid discriminator between people with ID and sensory impairments with and without ASD, neither were stress reactions.
The implications of a shunt surgery on a blind child's occupations and performance skills - A case report
Waleed Jarjoura
The Arab American University, ISRAEL, Israel

Abstract

Introduction: Children with visual-impairments confront various challenging experiences in life since early childhood throughout lifespan. In some cases, blind infants, especially due to prematurity, may suffer from intra-cranial pressure and, consequently, go through a shunt surgery in order to prevent or decrease the opportunities for neurological impairments. Method: In this article, a detailed description of numerous crucial implications of the shunt surgery, through the right posterior parieto-temporal cortex, on the observed preliminary abilities that commonly build the basis for the acquisition of literacy skills and orientation schemas in children with blindness. Results: The case of a blind child (A.R) reveals the profound difficulties in acquiring basic literacy skills in Arabic Braille and basic Math competencies, a failure in acquiring the baseline skills of Braille printing and, incapability to acquire orientation and mobility skills using the Cane. In addition, significant difficulties in general organizational skills and social orientation were observed. Conclusion: The primary conclusion of this report focuses on raising awareness among neuro-surgeons towards their pragmatic and scientific clinical reasoning regarding alternative intracranial routes for shunt implantation in blind infants. A second conclusion targets educators and therapists that address the acquired functional limitations of blind individuals due to shunt surgeries.

A one-year follow-up study of high myopia progress before and after modified Snyder-Thompson posterior scleral reinforcement in Chinese children
Hongwei Deng, Jun Zhao
Shenzhen Eye Hospital, SHENZHEN, China

To research on the progress of extensive high myopia before and after the modified Snyder–Thompson posterior scleral reinforcement surgery (PSR), which we all observed the progress of myopia at least one year before the operation and also at least one year follow up the operation. The mean follow-up was 1.5±0.4years after operation and 2.0±0.6years before the operation. Axial length(AL), spherical equivalent (SE), uncorrected visual acuity (UCVA), best-corrected visual acuity (BCVA), curvatures radius of cornea (CR) and the progression speed of AL per degree, the AL / CR were self - comparative analyzed before and after the surgery. The fundus examinations were recorded before and after the surgery with Optical Coherence Tomography(OCT) and Scanning laser ophthalmoscopy (SLO), and complications were noted.Results The mean change in the speed of Al per degree progression before and after the PSR was 0.12±0.46 (mm/D) 0.02±0.97(mm/D) respectively. There were not significant changes in decreasing in AL/CR of 0.56±0.24 and 0.57±0.32 respectively. The patients after PSR showed less myopic progression compare with the progress speed before the surgery (p<0.001). A notable increase in BCVA was significantly progression after the PSR compare the BCVA of themselves before the PSR (p=0.0001). There were no serious complications of PSR surgery. Conclusion The modified Snyder–Thompson PSR surgery was effective and safe in controlling the progression of extensive high myopia in Chinese children.

A Model for Low Vision Rehabilitation and Parenting Children With Bardet-Biedl Syndrome (BBS)- How Far Can Optometrist Go?
Wei Hau Lew
Home & Work Optometry Care Malaysia, Malaysia

Background: BBS is an autosomal recessive syndrome with prevalence higher in consanguinity society. The
characteristics of BBS include: obesity, polydactyly, delayed development, genital abnormality, renal malformation, speech deficit, poor coordination and rod-cone dystrophy. Ocular manifestations include: nystagmus, myopia, cataract, glaucoma and macular dystrophy. Ocular symptoms include: night blindness, restricted visual field and poor fixation. Content: This model for low vision rehabilitation is based on current knowledge by encompassing: physical appearance, social skills, emotional support, education, mobility, medical coverage, career, parents’ acceptance, infertility, independent level, sexual abuse and lifestyle modifications. Obesity and polydactyly increase the chance of getting bullied in school. Delayed developmental and poor learning curve may limit the usage of low vision aids. Prescribing low vision aids may attract more unnecessary attention in class. Distance from study board has to be calculated to estimate minimum distance for best visual acuity as shorter distance may restrict field of view. Parents need to be informed regarding on bully issue and poor social skills may hinder learning process. Low vision specialists need to be sensitive with the acceptance level of parents and discuss on future aspects: potential career, medical coverage for genetic disorder, independence, care-giver and life-long skills needed by using empowering words through multiple visits. Strategies to improve social skills with pets, speech, mobility at night, exercising for obesity, dietary control and self-confidence for the child are included. Social stigma regarding infertility in boys and risk of sexual abuse among girls must be addressed. Implication: This model is to serve as an umbrella approach covering the service of ophthalmology, low vision rehabilitation and pediatric care for special population. It can be modified for other genetic disorders to fill the gap between multi-disciplinary fields at minimal cost to improve the quality of life.

PAR15.06

EVIN: Visual Stimulation on the Internet.
Carlos Manuel Santos Plaza1, Yolanda Matas Martin2
1Organización Nacional de Ciegos Españoles (ONCE), LOS MOLINOS (MADRID), Spain
2Universidad Nacional de Educación a Distancia (UNED), MADRID, Spain

Vision is a function that can be learned and its quality can be improved with training/visual stimulation programs. These programs are suitable for all students who have difficulties either receiving or processing visual stimuli from their environment.

The main objective of the EVIN (Visual Stimulation on the Internet) project is the development of a web platform that exploits the potential of web-based systems along with the experience gained by low vision professionals and emerging advances in the Visual Stimulation field. This stimulation is performed through games by exercising the user in different visual tasks. Each game can be adapted to the different characteristics of students by setting a number of stimulus features that introduce different levels of difficulty. Currently, the platform includes five games: Exploration, Facial expressions, Spatial perception, Puzzle and Prominent features.

EVIN offers: (i) resources for conducting visual training tailored to individual characteristics of each student, (ii) individual and general assessment mechanisms and (iii) support to management and analysis of information about games included in the system and about children’s performance. Additionally, and since EVIN allows students to work from various locations (school, home, etc.), visual training with EVIN stimulates the involvement of specialists, parents and teachers in the whole process.

In order to progress in this project, a validation process has been initiated with the collaboration of researches that evaluate the effectiveness of the EVIN system. They are using EVIN in their intervention with students who present difficulties in performing basic visual tasks.

To summarize, the main goal of this project is to provide a tool of great potential in the field of visual stimulation. Apart from validation, our lines of future work are: (i) increasing the number of games and (ii) providing elaborated reports of the child’s performance in order to support the visual training.

PAR16.01

A Preliminary Investigation on the Use of Technology when Teaching Braille to Children, Adults and Seniors
Natalie Martinello, Anne Jarry, Walter Wittich
University of Montreal, MONTREAL, Canada

Introduction: Though there have been significant advances in refreshable braille technologies, little is known about how these innovations have impacted the teaching and learning of braille. This study explored how Teachers of Students with Visual Impairments (TVIs), who teach within educational systems, and Rehabilitation Specialists, who typically teach adult and senior clients, utilize technology while teaching braille.

Methods: A convenience sample ('n' = 40) of TVIs and Rehabilitation Specialists from the U.S. and Canada were surveyed about their instructional techniques and perspectives on the relationship between braille and technology.
Respondents had on average 12.16 years (SD = 10) of braille teaching experience.

Results: Significant differences were found in the use of technology to teach braille across age groups: while only a quarter of respondents used technology when teaching braille to seniors, almost two-thirds of those working with adults, adolescents, and children reported doing so (p = .02). Rehabilitation Specialists felt significantly less knowledgeable about technologies than TVIs ($\chi^2 (3, N = 35) = 11.53$, p = .006), and consequently used technology less frequently. On the other hand, TVIs felt more strongly that technology increased learner motivation and that the use of technology improved learning outcomes ($z = 2.17$, p = .03).

Conclusions: These results suggest that the degree of technological knowledge, familiarity and comfort held by professionals may inform whether technology is incorporated into braille instruction. This highlights the need to ensure that Rehabilitation Specialists and TVIs are provided ongoing training and support to implement technology within their teaching, where appropriate. Further study is required to explore in greater depth the motivational and learning benefits that such technologies may provide to better meet the needs of learners.

PAR16.02

Integrated school health: using schools as a platform to reach children with low vision
Imran Khan
Sightsavers, WASHINGTON DC, U.S.A.

Education is crucial for children to reach their full potential. 10% of children in developing countries are visually impaired. This impacts the ability to learn and creates risk of drop out. The causes of visual impairment range from refractive error to ocular disease. In these low resources settings, these children are often not identified and their needs are not addressed. Even where school vision screening programs exist, they are often ad hoc and not sustained. The School Health Integrated Program (SHIP) was designed to address these issues by supporting development of an approach to deliver targeted, evidence based interventions, including vision care, to students in a coordinated, integrated and inclusive manner.

The SHIP project was piloted in 4 countries: Ghana, Senegal, Ethiopia, and Cambodia. The program focused on increasing the capacity and engagement of the governments to the importance of school eye health. Teachers were trained to carry out simple vision screening, and refer students who failed the screening to optometrists who traveled to the school to carry out further evaluations, including prescribing glasses and/or referring students for further services. The pilot phase resulted in over 56000 students being reached.

The program demonstrated that schools can be used as an effective platform to deliver health interventions. Simple interventions, like vision screening, can be integrated into the education sector. Furthermore, collaboration between the government ministries of education and health is crucial. The system needs to be integrated to ensure that students with low vision are identified and their needs are met. The program and school-level activities need to be simple in order for teachers to carry these out. Referral systems need to be strengthened to ensure students receive further evaluation and services as needed. Finally, the programs can and must be accessible and inclusive to children with disability.

PAR16.03

How to define, measure and support the engagement of students with visual impairments
Ineke Haakma
University of Groningen, GRONINGEN, Netherlands

There is a trend in education to emphasize students’ engagement to learn. Emphasizing students’ engagement is important because it promotes students’ learning achievements and enhances their well-being. Teachers play an important role in supporting students’ engagement to learn. Their actions can positively or negatively influence a student’s engagement. A large amount of literature is dedicated to the study of teacher-related factors that promote or undermine engagement. Nevertheless, little is known about how to engage students with visual impairments. In this study, we explored the extent to which students with visual loss are engaged. In addition, we investigated what strategies teachers can use to engage their students’ engagement.

Questionnaires and interviews were used to gain insight into student engagement and their teachers’ behaviors. Our sample consisted of 7 teachers and 48 students in both mainstream and special education secondary schools in the Netherlands. The results indicate that students scored relatively high on engagement (a mean score of 3.84 on a 5-point scale), and much lower on the negative counterpart of engagement, namely students’ disaffection (a mean score of 2.41 on a 5-point scale). In line with Self-Determination Theory, we identified three teacher strategies that positively influenced students’ engagement, namely providing structure, autonomy support and involvement. Taken together, in this study we explored the concept of student engagement in the education of students who are...
visually impaired. Moreover, we investigated the ways in which teachers can support students’ engagement and thereby provide practical recommendations that can be used to improve the education of students with visual impairments.

PAR16.04

A development of a computer based examination presentation system for low vision—Characteristics of the Japanese environment and problems identified
Kazunori Minatani
National Center for University Entrance Examinations, TOKYO, Japan

Background: We developed an examination question presentation system that makes use of the adjustable display magnification and text-to-speech audio narration functions on tablet devices. As a computer based accommodation of disabilities in a nationwide examination, the Scottish Qualifications Authority’s Digital Question Paper has already been realized. On the other hand, we must tackle two problems which are specific to the Japanese language. 1. The Japanese writing system is traditionally written vertically. It is not an easy task to display such a non-standard writing system on tablets. 2. Chinese characters, called Kanji, are pronounced differently according to their context. When synthesizing a voice for Japanese text on-the-fly, Chinese character readings and accents are inferred based on the dictionary readings. The task of reading examination questions aloud offers no room for error.

Content: We decided to go with EPUB 3 Mediaoverlays, which is a content format that works with the above zoom display requirements and text-to-speech methods: specifically the reflow display and pre-recorded audio narration. We developed the system using an iPad tablet device. We call the system AXES II: Accessibility eXtended Examination System version 2. The term AXES is also a nod to the fact that the system simultaneously addresses the two “pivot points” of our research, namely, magnification and text-to-speech functions.

Implications: AXES II was able to handle reflow displays for the standard font sizes (10-points, 14-points, 22-points and 30-points) used in educating students with partial sight. Because of pre-recorded audio narration system, it could guarantee correct readings perfectly. On the other hand, time which was needed to read test questions got longer than the time limit of that examination. Three solutions could be considered: 1. traditional time extension, 2. to omit some questions and 3. to disseminate effective methods to understand contents with voice output rapidly.

Disclosure: none

PAR16.05

Learning Media Assessment for iGeneration students with low vision
Frances i Gentle
RIDBC Renwick Centre, Royal Institute for Deaf and Blind Children, NORTH ROCKS, NSW, Australia

Prior to the current rapid advances in assistive and mainstream technologies, information access and expression for learners with low vision was centred on hard copy large print or Braille. However, advances in digital technology have broadened the options available for learners to access, produce and communicate information. For alternative format producers and educators, decisions around the provision of alternative formats and the teaching of literacy must take into account the diversity of individual student preferences and the literacy tools available to them. In any one day for example, a student may shift between paper-based and electronic formats in response to such factors as the nature of the task (e.g. examination or formal assessment, or reading for pleasure), the literacy setting (e.g. social, educational, vocational), the time of day (e.g. if visual fatigue is a factor), and the visual and cognitive demands of the information being read or produced (e.g. email or social media communication with friends, physics textbook, book of jokes).

This presentation will reflect on current learning assessment approaches, with the aim of presenting an approach that captures the multimodal nature of contemporary information access, and expression by students with low vision. It is anticipated that the presentation will be of relevance to producers of alternative formats, technology consultants and educators.

PAR17.01

Accessibility of digital textbooks for students with low vision in Japan
Sungmin Han¹, Yasushi Nakano²
¹Fukuoka University Of Education, MUNAKATA, Japan
Introduction: In Japan, almost all students with low vision can get large print textbooks. But from our research, they were not always satisfied with them. This is because the large print textbooks are not very portable due to the book size, thickness and weight. So many students with low vision are longing for using digital textbooks. However, there are many types of digital textbooks that have different features. We conducted a survey to clarify the accessibility of these digital textbooks in Japan. Methods: Interview researches and technology studies were conducted. We interviewed Textbook Publishers Association (TPA) and Ministry of Education, Culture, Sports, Science and Technology (MEXT) to clarify the variety and the issue status of digital textbooks for students with disabilities. After the interview, we gathered all types of digital textbooks and compared accessibility features from the aspect of low vision. Results: Results of the interview researches showed that were classified into six groups to provide digital textbooks for students with disabilities. Data formats of the textbooks were MP3, EPUB, DAISY, WORD, PDF and HTML. Types of application to browse the data were MP3 player, DAISY player, MS-WORD, iBooks, Web app and three original browsing apps (UD Browser, Lentrance and CoNETS Viewer). Results of the technology studies showed that all system could read aloud the text and, except for MP3 system, change typeface, size and polarity. Some applications contained bookmarks, word wrap feature and dictionary search. However, in almost all systems except for UD browser, font size of the menu or toolbar were too small to see. In addition, UD browser was the only application with a convenient page jump function. Conclusion: There were many types of digital textbooks, but few systems to consider menu or toolbar visibility and user-friendly feature for low vision.

PAR17.02
An exploratory study of the accessibility of existing programming education materials for visually impaired children
Felienne Hermans, Mijke Hartendorp, Robert Steendijk, Petra Hakvoort, Wendy Voorn
Delft University of Technology, DELFT, Netherlands
Saxion Hogeschool, DEVENTER, Netherlands
Visio, ROTTERDAM, Netherlands

Introduction. The world around us is changing fast, and children should not only be consumers, but also creators of technology. Children with a visual disability should not be an exception. There are many initiatives to teach children programming, but almost all current solutions are very visually oriented, meaning that the lesson materials are not accessible to visually impaired children. Methods. In this study we have explored the accessibility of existing programming materials, both with and without using a computer, i.e. plugged and unplugged respectively. The participants in our exploratory study were eight visually impaired children, aged 12 to 14, with a great variability in eye conditions. In four lessons of an hour each, we have presented children with five different programming tools. Through participatory observations, we aimed to extract possibilities and limitations of these materials originally designed for sighted children. Results. We have found that plugged tangible programming devices---Osmo and Ozobots---were engaging for all children, even though the software for both tools is inaccessible due to low contrast and small items. Similar results were found for the unplugged board game RoboTurtles, the children were interested and showed progress, but not all cards were visible enough. For the remaining two products---Swift Playgrounds and Blockly---we found that children not relying on zoom were performing age appropriate, when zooming was required however, children lost the overview of the code, leading to a much slower pace and more confusion about the relation between input and output. Swift Playgrounds can use the built-in iPad voice over, but is only available in English. The fact that the English sentences explaining the movement are complex did not support Dutch children’s understanding. Conclusion. We conclude that tangible devices in isolation are promising, but the supporting software needs adaption to be accessible for visually impaired children.

PAR17.03
Digital changes everything: enabling people to live independently in a digital world.
Tracy Dearing
Royal National Institute of Blind People, LEEDS, United Kingdom

The internet and new digital technology is transforming the way we communicate, work, shop, access services, and find information. But how do we ensure that people with sight loss are not shut out of the opportunities new technologies offer? How can the digital world be harnessed to support independent living?
A UK survey of over 1000 blind and partially sighted people found that just one in three felt able to make the most of new technology. RNIB, the UK’s leading sight loss organisation, has developed a digital strategy to ensure people with sight loss are able to use technology to live independently. This presentation will share learning from a number of strands.

In 2014 RNIB launched ‘Online Today’ a three year programme to support 125,000 people with sight loss with digital skills training. Whilst a significant minority have never been online, the majority of people are “lapsed” users or are struggling to maintain their online engagement as their sight deteriorates. The programme, and its evaluation, has expanded our understanding of the complex digital journey people with sight loss can have and how tailored support is enabling people with sight loss to get, or stay, online.

RNIB is now delivering services digitally where possible to ensure the widest reach. For example, we have comprehensive eye health pages to give information for people experiencing sight loss and have built a platform for the largest online peer support community for people with sight loss in the UK. Our ‘Talking Books’ service is also shifting towards greater use of digital formats.

Alongside this, RNIB has developed strategic partnerships with a number of technology companies to ensure their new products are accessible. We’ve targeted businesses to ensure that their digital services are user friendly to people with sight loss and can share our successes.

PAR17.04

Preschool children with visual impairments - included in the digital world?
Inger Lene Hustuft¹, Helle Kristine Falkenberg², Bente Elisabeth Kristiansen¹, Vibeke Sundling²
¹Statped - Department of Visual Impairment, SVARSTAD, Norway
²University College of Southeast Normay - Dep. of Optometry and Visual Science, KONGSBERG, Norway

Digital media have become a natural part of children’s everyday life, and digital competency is essential to be included in today’s society. Digital media is most easily accessed visually, presenting a challenge for children with impaired vision to achieve digital competence. Preschool children frequently and independently use digital media at home and in kindergarten, but there is sparse knowledge about how visually impaired children use digital devices and how their use compares to children with normal vision.

This study explored the use of digital devices among preschool children aged 0 - 5 years with moderate and severe visual impairment. In addition, parents’ described their attitude towards the children’s use of digital devices. A questionnaire survey was sent to parents of 42 children with visual impairments and to parents of 94 children with normal vision. In all, 30 questionnaires from parents with visually impaired children and 42 from parents with children with normal vision were returned.

Almost half of the children in the study were one year or younger the first time they used tablets and smart phones. Children with visual impairment and normally sighted children had equal access to and used the digital devices for similarly activities. Most visually impaired children use adaptations when they use tablets, but they keep the tablet close, rather using the built-in accessibility features. Parents of children with visual impairment were to a greater extent positive towards the early use of digital devices than parents of normally sighted children.

The study showed that visually impaired children enter the digital world at an early age, and have equal access to and use of digital devices in the same way as normally sighted children.

PAR17.05

Tablet computer use by children with low vision: Feasibility and usage data from a randomised controlled trial
Michael Crossland¹, Annegret Dahlmann-Noor¹, Rachel Thomas², Vijaya Gothwal³, Seelam Bharani³, Hilary Unwin⁴
¹Moorfields Eye Hospital NHS Foundation Trust, LONDON, United Kingdom
²Moorfields at Bedford Hospital, BEDFORD, United Kingdom
³LV Prasad Eye Institute, HYDERABAD, India
⁴Bedford Borough Council, BEDFORD, United Kingdom

Background Children and young people with visual impairment in the developed world increasingly use tablet computers such as iPads to access the curriculum. The CREATE study (Children Reading with Electronic Assistance To Educate) is an international pilot study which aims to assess the effect of these devices on reading ability and the education of children with visual impairment in the UK and India. Here we present data from the UK participants.

Methods 20 young people aged 10-18 meeting the World Health Organisation definition of low vision were recruited into the UK arm of the study. Ten were randomised to conventional low vision care (refraction,
magnification, advice, signposting, educational support) and ten received conventional care plus an iPad and
instruction in its use. iPad usability was tested using a touch-based game. iPad use data were collected by self-
reported diary.

Results Three participants (15%) withdrew from the study: one from the iPad arm and two from the
congventional care arm. All participants scored highly on our usability scale. After three months, 5 of 8 participants
(63%) used their iPad at school every day, one used it less frequently, and one never used it at school. Seven (88%)
participants used it at home every day and one used it less frequently. Six participants used the iPad for reading (for
a mean time of 77 minutes per day), six used it for watching videos (for an average of 49 minutes/day), and five
used it for playing games (mean 53 minutes/day).

Conclusion Tablet computers appear to be well accepted by young people with visual impairment, with only
one participant never using it at school, and all participants using it at home. Reading was the most frequently
reported use of the iPad.

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PAR17.06

Accessible PowerPoint Presentations: Basic criteria to follow
Maria Angeles Matey García, Concepcion Blocona Santos, Maria Jesus Vicente Mosquete
ONCE, MADRID, Spain

PowerPoint presentations are an effective tool for training activities, lectures, conferences ... But are they designed
so that everyone can see and understand them?
When preparing a presentation, authors typically focus on clear expression and achieving their objectives,
developing a thematic thread with the slides, drawing attention to certain details, presenting relevant information and
posing questions to the audience to keep their interest. They also use pictures, charts and graphs to illustrate
concepts, etc. However, they do not always take the 'visual' part into account and forget that presentations should
not be designed to be read only on the computer screen.
The ONCE (Spanish National Organisation of the Blind) conducted a study with more than 100 people, half of them
with low vision and the rest with normal vision, who took some tests and were asked to respond to a series of
questions regarding PowerPoint presentations:
Text: most appropriate number of lines per slide and words per line to enhance readability and keep the audience’s
attention.
Letter/background contrast: the best colour combinations and most pleasant background colours producing the
least amount of eyestrain.
Font: easiest fonts to read and whether or not to mix different fonts in the same presentation.
Font size: the most visible for headings, captions and content.
Movement: whether or not to include sounds, moving text and transition effects.
Images: most appropriate size, number of images, consistency with the subject matter ...
Unity: benefits of using different formats in the same presentation.
We believe that the results, which will be presented in the communication, will provide the basis for a clear set of
criteria to follow when putting together presentations and can serve as a template for presentations that are more
accessible for everyone, including people with low vision.

PAR18.01

Effectiveness of training in reading rehabilitation for patients with diabetic macular oedema - Preliminary
findings of a randomized clinical trial
Cheong Allen My1, Ronnie Huang1, Tsang Celia1, Wong Ian2, Chong Victor3, Brelen Marten4, Wong Raymond4,
Cheung Sing-Hang1
1The Hong Kong Polytechnic University, KOWLOON, Hong Kong
2University of Hong Kong, HONG KONG, Hong Kong
3Oxford Eye Hospital, OXFORD, United Kingdom
4Chinese University of Hong Kong, NEW TERRITORIES, Hong Kong

Aim Some patients with diabetic macular oedema (DMO) complain difficulties in reading after medical treatment. The
aim of this study was to investigate the effectiveness of reading rehabilitation using perceptual learning paradigms in
enhancing reading performance in patients with reading difficulties due to DMO.

Methods
Twenty-eight patients with DMO aged 55 to 70 years were recruited and randomly assigned into one of the 3 groups: 1) temporal training (6 weekly sessions of processing training); 2) spatio-temporal training (6 weekly sessions of temporal and spatial processing training); and 3) placebo control (6 weekly sessions of leisure reading activities). Temporal processing speed and spatial visual span were measured using the trigram character-recognition method, similar to the method described in previous studies. Reading speed was measured using rapid serial visual presentation (RSVP). All outcome measures were conducted at 2 time points: 1) baseline, and 2) immediately after the intervention.

<u>Results</u>
Results from mixed-model analysis showed significant improvement in temporal processing speed in both training groups (p < 0.01), but not in the placebo control group. After 6 training sessions, temporal processing speed in the temporal and spatio-temporal training groups increased by an average of 0.52 and 0.45 log character per second respectively. However, no significant training effect was found in the spatial visual span and RSVP reading speed among the 3 groups (p > 0.05).

<u>Conclusion</u>
Perceptual learning significantly improved participants’ temporal processing speed – one of the factors affecting reading performance. However, it could neither improve the spatial factor on reading performance nor the reading speed in patients with reading difficulties due to DMO.

PAR18.02

Surveying the Ecology of Digital Reading by People with Low Vision
Christina Granquist¹, Yueh-Hsun Wu¹, Rachel Gage¹, Michael Crossland², Gordon Legge¹
¹University of Minnesota, MINNEAPOLIS, U.S.A.
²Moorfields Eye Hospital NHS Foundation Trust, LONDON, United Kingdom

Aim:
To survey the use of reading technology by people with low vision. Subjects responded to an online survey asking about their vision history, assistive technology, display preferences and reading habits. Here, we report on findings concerning acuity and magnification.

Method:
Subjects were recruited broadly from relevant organizations and by word of mouth. As part of the survey, they were shown a text passage and asked to report their viewing distance, screen size and the number of visible lines and characters per line. A control group of 11 normally sighted subjects reported the same information while viewing the passage on cellphones, tablets and computers.

Results:
The controls had a mean viewing distance of 41.7 cm and a mean x-height of 1.38 mm. For all three types of devices, the mean angular x-height was 0.21º (close to laboratory estimates of the critical print size for normal vision) and a corresponding acuity reserve of about 2.5.
To date, there are 110 low-vision subjects—83 female, mean age 47.9 years, 61% with early-onset low vision, mean acuity 0.89 logMAR, 54% with peripheral field loss and 16% with central field loss. For a subset of 47 subjects for whom complete data are available, comparison with controls revealed a smaller viewing distance by a mean factor of 1.8, a larger physical x-height by a mean factor of 6.8, an overall enlargement of angular print size by a mean factor of 19.5 (median 10.7). The mean acuity reserve (ratio of angular print size to acuity size) was 5.16 (median 2.83).

Conclusion:
Our sample of low-vision subjects read digital text with an acuity reserve larger than normal controls. They achieved appropriate magnification primarily by enlarging character size on screen and to a lesser extent by reducing viewing distance.
Supported by NIH grant EY002934.
Disclosure: None.

PAR18.03

Could condensed typeface improve reading performances of people with tunnel vision? : Effect of compression using restricted visual field simulation
Yasuhiro Nakano
Keio University, YOKOHAMA, Japan

Introduction : Reading performances of people with tunnel vision is often low. The narrower the visual field gets, the
slower the reading speed gets. This is because the amount of simultaneously processed information (AOSPI) is reduced. If this AOSPI hypothesis is true, reading performance should increase by using condensed typeface that enables us to increase information in the same space. I sought to confirm this hypothesis. Methods: In this research, 3 degrees of tunnel vision was simulated with goggles, and an examination was conducted using the same principle as MNREAD-J. The participants were 10 adults with normal visual function. Two experiments were conducted. In the first experiment, the effect of AOSPI by changing compression rates (50, 70, 100%) on reading performance was clarified. In the second experiment, the effect of line length (10, 30 letters/line) on reading speed was confirmed. Results: Results of the first experiment showed that there was no difference in maximum reading speed regardless of compression rates. On the contrary, reading acuity and critical print size actually exhibited significantly lower performances according to the compression rates. Based on the AOSPI theory, compression of letters which in turn could elevate reading speed. But this experiment showed compression didn’t elevate reading speed while decreasing legibility. After the experiment, some participants said condensed typeface was not easy to see but it was easy to scan. On the whole, they think it was easy to read. Then the second experiment was conducted to clarify the interaction between line length and compression rates. After increasing the line length from 10 to 30 letters in the second experiment, reading speed elevated according to the compression rates. Conclusion: Condenced typeface elevated reading speed of tunnel vision, but the effect depended on line length.

PAR18.04
Impact of Line Length on Reading performance for Normal Vision and Simulated Acuity Reduction
Atilgan Nilsu1, J. Steve Mansfield2, Gordon E. Legge1
1University of Minnesota, MINNEAPOLIS, U.S.A.
2State University of New York College at Plattsburgh, NEW YORK, U.S.A.

Aim: The MNREAD test has been used to measure reading acuity (RA), critical print size (CPS) and maximum reading speed (MRS) by using print size manipulation. The aim of this study is to use the same testing procedure to evaluate the effect of line length and its interaction with font and acuity. Line length is pertinent to low vision because high magnification often trades off against fewer characters per line.
Methods: Normally sighted subjects were tested on a computerized version of the MNREAD test using 60-character sentences created by an automated sentence generator. Four testing formats were used—one line of 60 characters, 2 lines of 30 characters, 3 lines of 20 characters and 4 lines of 15 characters. For each format, reading speed was measured as a function of print size for two fonts (Times-Roman and Courier) and for “clear” and “blurred” viewing. Blur was produced by digital low-pass filtering with an effective acuity of 20/80. A within-subject design was used.
Results: Preliminary data are available for 6 subjects. A mixed-effect analysis (with font, blur, and line length as fixed effects, and subject as a random effect) shows a fixed effect of line length on MRS (p<0.05) — 4-line sentences were read 6% slower than 2-line sentences. As expected, CPS and RA were significantly larger in the blurred conditions (p<0.001). There was a significant interaction between line length and font, with further data collection required to clarify the nature of this interaction.
Conclusions: The MNREAD test can be generalized to measure the effect of text parameters in addition to print size, such as line length and font. Line length (measured in characters per line) appears to have an impact on reading performance for normal viewing and simulated mild acuity reduction in different degrees.
Supported by NIH grant EY002934

PAR18.05
Systematic Effect of Stroke Width on Legibility of Japanese Fonts
Madoka Ohnishi1, Koichi Oda1, Seiji Yamagami2
1Tokyo Woman’s Christian University, SUGINAMI-KU, Japan
2Senshu University, KAWASAKI, Japan

Purpose:
Stroke width is one of the characteristics of letters that affect legibility substantially. Oda & Miyashita (2014) suggested that legibility of various font styles in simulated low acuity would be significantly affected by their stroke width. The aim of this paper was to study the relationship between stroke width and legibility systematically by using a single font family with a range of weights.
Methods:
Legibility was measured as the inverse of reading acuity (RA) by means of the Japanese version of the Minnesota Low-Vision Reading Test (MNREAD). Stimulus fonts were taken from the Kozuka Gothic Pr6N family with 6 different stroke widths. Character size varied from 0.48 to 30.68 min of arc. Twenty-two native Japanese students with
normal vision participated. The results were compared with previous data (Oda & Miyashita, 2014).

Results:
Difference in stroke width directly affects the contrast component of critical spatial frequency band (CB: 3 cycles per letter [cpl], Solomon & Pelli, 1994) for letter recognition. In order to evaluate the contribution of stroke width and the CB component, a multiple regression analysis was carried out to explain a RA by the amplitude of 3 cpl which was determined from FFT images of fonts used in this and a previous study, stroke widths of these fonts, and visual acuity of each participant. RA was better explained by the amplitude of CB and visual acuity. The larger the amplitude of CB, the smaller the RA. The beta coefficient of CB was larger for the simulated low visual condition than for normal vision. The difference in visual acuity might be related to the preference of a particular stroke width among readers with low vision.

Conclusion:
Legibility increases systematically with thicker stroke width. The effect of stroke width could be mediated by the amount of CB component.

PAR18.06

Scoring reading parameters: an inter-rater reliability study using the MNREAD test
Karthikeyan Baskaran1, Aurélie Calabrèse2, Éric Castet3, Laura Moreno4, Marta Silva5, António Filipe Teixeira Macedo
1Linnaeus University, KALMAR, Sweden
2University of Minnesota Twin Cities, MINNESOTA, U.S.A.
3Aix-Marseille Université, MARSEILLE, France
4University of Minho, BRAGA, Portugal
5Centro Hospitalar de São João, São João, Portugal

Aim: Estimating MNREAD parameters such as Critical Print Size (CPS) and Maximum Reading Speed (MRS) - using the time taken to read blocks of text - often requires subjective analysis of the reading profile. Depending on the rater, parameters may be over- or under-estimated, resulting in difficult or even impossible between-study comparisons. The aim of this project was to evaluate the inter-rater reliability of MNREAD parameters in subjects with visual impairment.

Methods: Reading times for the Portuguese version of the MNREAD chart from 32 subjects, reading binocularly were analyzed. Reading speed was computed by a single experimenter (AFM) using reading time and number of errors. Based on reading speeds, three experimented raters (AFM, AC and KB) computed MRS and CPS using the following method. CPS was defined as the print size at which subsequent smaller print sizes were read at 1.96 x standard deviation slower than the mean of the preceding print sizes; MRS was estimated as the mean reading speed for sentences in print larger than the CPS. Inter-rater reliability was assessed using intra-class correlation (ICC) coefficient for both MRS and CPS for all three raters.

Results: Near acuity range was 0.14-1.9 logMAR. The average measure ICC for CPS was 0.896 with a 95% CI from 0.814 to 0.946 (p< 0.001). The average measure ICC for MRS was 0.984 with a 95% CI from 0.970 to 0.992 (p< 0.001).

Conclusion: A high degree of reliability was found between the three raters for both CPS and MRS. Even though some small variability exists this may be due to raters’ high-level experience with MNREAD data. Future directions will involve: 1) including more raters with various level of experience in MNREAD rating; 2) investigating the degree of inter-rater reliability for raters using different estimation methods.

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PAR19.01

Outcomes of Low Vision Rehabilitation Delivered by a Mobile Clinic
Micaela Gobeille, Richard Jamara, Gary Chu, Alexis Malkin, Nicole Ross
New England College of Optometry, BOSTON, MA, U.S.A.

Introduction:
While studies have examined low vision rehabilitation (LVR) outcomes in a variety of clinical settings, mobile clinic delivery remains unexplored. This study evaluates clinical LVR outcomes from a novel mobile clinic model.

Methods:
Subjects (n=66) were legally blind per U.S. Social Security standard and scheduled for mobile clinic LVR when recruited. Usual LVR was delivered, with visual assistive equipment and training (e.g. orientation and mobility, occupational therapy) provided as clinically indicated.
Subjects completed the Massof Activity Inventory by telephone before LVR as well as 3 months and 1 year after. Rasch analysis was performed to generate person measures. Change scores and measures of clinical effect (i.e. Cohen’s d coefficient and Minimum Clinically Important Difference (MCID)) were calculated.

Results:
Mean subject age was 65.6 (range 17-92) years with a moderately impaired binocular logMAR visual acuity of 0.93 (SD=0.45, range 0.20-2.30) and a severely impaired binocular Mars contrast sensitivity of 0.87 (SD=0.40, range <0.04-1.68) logCS. Many subjects (47%) had no prior LVR exam. At three months, mean visual ability change score was 0.50 (SD=0.58) logit. An effect size of 0.86 was achieved and 76% (n=50) experienced MCID. Improvement was noted in all functional domains. Reading showed the largest effect (d=0.86) while inside the home activities of daily living most frequently showed MCID (82%). Clinical effectiveness was smallest and least frequent in the visual information domain (d=0.42, MCID=55%). Preliminary analysis of one year post-LVR data (n=29) indicates that change scores remain positive, with a 0.53 (SD=0.58) logit mean visual ability change score. The largest effect in any domain was seen at one year (d=0.92, MCID=62%).

Conclusion:
Mobile clinic LVR effect size was moderate to large at 3 months, and was retained 1 year post-LVR. LVR delivered via mobile clinic may be effective at producing outcomes similar to other models of care.

PAR19.02

Impact of corneal disease and corneal transplantation from patients’ and ophthalmologists’ perspectives
Eline Vreijisen, Ellen Elsman, Ruth van Nispen, Ger van Rens
VU medisch centrum, HEILOO, Netherlands

Aim: The association between corneal transplantation and (patients’ and ophthalmologists’ perspectives of) subjective outcomes has not been well studied. The aim of this cross-sectional study was to investigate relevant domains which impact the lives of patients with corneal disease and after corneal transplantation.

Methods: Meaningful concepts derived from questionnaires of patients (N=48) and ophthalmologists (N=7) were linked to the International Classification of Functioning, Disability and Health (ICF), which differentiates between four categories: Body Functions, Body Structures, Activities and Participation (A&P), which is further divided into nine separate chapters, and Environmental Factors.

Results: From the patients’ perspective 233 meaningful concepts were found: 62% referred to A&P, e.g. 17.6% to Mobility, 10.3% to Community, social, and civic life, and 9.4% to Learning and applying knowledge; 13.7% referred to Body Functions, 1% to Body Structures, and 14.6% to Environmental Factors. From the ophthalmologists’ perspective 62 meaningful concepts were found: 66.1% referred to A&P, e.g. 17.7% to Community, social, and civic life, 12.9% to Major life areas, and 11.3% to General tasks and demands; 21% referred to Body Functions, 0% to Body Structures, and 8.1% to Environmental Factors.

Conclusion: Patients and ophthalmologists reported partly the same domains which impact the lives of patients with corneal disease and after corneal transplantation, especially Mobility, Community, social and civic life, and Major life areas of A&P, and seeing (related) functions and energy level of Body Functions. This indicates that ophthalmologists seem to be aware of the impact the corneal disease and corneal transplantation has on, next to the medical condition, several life domains of the patient. The results confirm that, next to clinical outcomes, patient-oriented outcomes need to be considered too. Those domains could be used to indicate whether the expectations of the cornea patient about the results of the corneal transplantation are reached.

PAR19.03

Impact of visual impairment on quality of life and participation of young adults: comparisons with the general Dutch population
Ellen Elsman, Ger van Rens, Ruth van Nispen
VU University Medical Centre, AMSTERDAM, Netherlands

Introduction: Previous studies have shown that visual impairments affect quality of life and participation. This study aims to compare health related quality of life and participation scores of visually impaired young adults (18-25 years) with age- and/or sex-specific norm scores of the Dutch population.

Methods: Young adults (N=177) registered at low vision rehabilitation centers completed the EuroQol-5 Dimensions (EQ-5D), Short Form Health Survey (SF-36) and Impact on Participation and Autonomy (IPA). EQ-5D scores were compared to age- (20-24 years) and age-sex-specific norms. SF-36 scores for each scale were compared to age-specific norms (16-40 years). IPA scores for each scale were compared to norms of the Dutch population with one, two or three chronic diseases.
Results: Compared to age-specific norms, significantly worse EQ-5D scores were found for young adults aged 20-24 years (mean 0.83 vs 0.90; p=0.001) and for females aged 20-24 years (0.78 vs 0.86; p=0.008). Young adults had significantly worse scores on all subscales of the SF-36 compared to age-specific norms, (p<0.001-0.005), except for bodily pain. The physical and mental component scores were also significantly worse (mean 46.9 vs 50.0; p=0.0001 and 44.8 vs 50.0; p=0.0001). Young adults' IPA scores were significantly worse for all scales compared to norms for the Dutch population with one, two and three chronic diseases (p<0.001-0.022), except for autonomy indoors compared to the norm score of a population with three chronic diseases.

Conclusion: Visual impairment has a substantial impact on quality of life and participation. EQ-5D scores of young adults were significantly worse when compared to the age-specific norms, as were almost all SF-36 scores. IPA scores of young adults were mostly worse than scores of the general Dutch population suffering from up to three chronic conditions. These comparisons confirm that young adults with a visual impairment are vulnerable on several health outcomes.

PAR19.04

The role of perceived parental and peer support during adolescence on loneliness later in life of people with visual impairments

Eline Heppe, Sabina Kef, Carlo Schuengel

Vrije Universiteit Amsterdam, AMSTERDAM, Netherlands

High levels of social support during adolescence can reduce problem behavior and emotional problems, such as low self-esteem and loneliness, later in life. Research has shown that during adolescence, support from peers increased, whereas it decreased during young adulthood. The support from parents either decreased or remained constant during adolescence. Having a visual impairment could influence these transformations, as adolescents with a visual impairment experienced more difficulties with forming relationships, spent more time alone, and reported overprotection by parents. This study examined the development of parental and peer support over time among people with visual impairments and the suspected role of this development on loneliness at adulthood. In this longitudinal study participants were interviewed with computer assisted telephone interviews at four different time points: 1996 (T1), 2004 (T2), 2010 (T3), and 2016 (T4, will be analyzed in 2017). Preliminary repeated measures analyses in SPSS on T1, T2, and T3 (N=156), with mean age of respectively 18, 26, and 32 years (53% male at T1), show that perceived parental support decreased between T1 and T2 (F(1, 1450) = 10.005 p’ = .002) and stabilized between T2 and T3. Perceived peer support remained stable throughout. Regression analyses revealed no significant association between perceived parental support at T1 and T2 with loneliness on T3. High levels of perceived peer support on T1 and T2 predicted less loneliness on T3 (β’ = -0.40 (-.06, -0.02), ‘p’ <.001). A significant indirect effect of parental support at T1 and T2 through peer support at T1 and T2 on loneliness at T3 was found (T1: ‘b’ = -0.006, BCa CI[-.015, -.0006] & T2: -.004, BCa CI[-.013, -.0003]). These findings reaffirm the important role of peer support across the transition to adulthood for loneliness in adulthood, while parental support may set important initial values.

PAR19.05

Listening to caregivers: Exploring the experiences of those supporting people with visual impairment.

Claire Fitzgerald1, John Fitzgerald2, Tatiana Tairi3

1Blind Foundation NZ, WELLINGTON, New Zealand
2Massey University, WELLINGTON, New Zealand

Negative outcomes for informal caregivers associated with the long-term caregiving role are well documented when associated with individuals with a range of medical conditions. For many caregivers the adverse impact on health, social, and psychological indicators can be significant. There is little data to indicate whether the same effects are experienced by those providing informal care for people with vision impairment. For such individuals the ongoing medical regimen may be limited. However, the task of supporting independence and ongoing vision rehabilitation in the face of a degenerative disease means that engagement can be long-term and escalating in the level of care required. This study used Interpretative Phenomenological Analysis (IPA) as a framework for exploring the experiences of six women providing informal care for a person with significant vision impairment. Participants were supported in identifying objects of concern, which were those aspects of caregiving particularly relevant to their situation. The standard double hermeneutic approach of IPA was employed to generate five primary areas of interest: the dynamic nature of the caring journey, sharing the support role, the complex relationship between communication and action, supporting independent living, and the role of emotional adjustment and empathy. Each of the themes is explored and supported with relevant illustrative quotations. As expected the participants only had a
limited focus on medical aspects of vision loss, but emphasised the social and emotional aspects. In most cases the impact of caregiving on their own lives had been substantial, and while the role had developed slowly they had been unprepared for its pervasiveness. While acknowledging the emotional challenges faced by the service user, they generally felt their own emotional reactions were not adequately considered. These data provide insights into the ‘real life’ experiences of caregivers which can inform the development of holistic ‘carer-aware’ vision rehabilitation programmes.

PAR19.06

Research on the results of applying the technique of full makeup for women with low vision
Kaho Oishi1, Kanako Suzuki2
1Japan University of Social Welfare graduate school, OSAKA-CITY, Japan
2Japanese Caremake Association, NAGOYA-CITY, Japan

Introduction/aim: The purpose of this research is to analyze positive effects on the quality of life of women with low vision who were able to apply full makeup all by themselves without using a mirror. Women with low vision find it difficult to see their own face in the mirror. This fact causes quite a number of women with low vision to give up wearing makeup. There are also a large number of low vision women who stopped wearing makeup after they had their poor makeup pointed out when they could not have their lipstick in place.

Methods: Kaho Oishi, a makeup instructor, provided 100 low vision women with blind makeup lessons intended to train them to apply full makeup all by themselves. Results: All the 100 women with low vision were able to apply full blind makeup all by themselves. It took approximately 10 minutes to complete a full makeup and 10 to 20 hours (depending on the learning skills of each participant) to master the blind makeup. The support of makeup instructors was vital to achieve this purpose.

Conclusion: Mastering the blind makeup made the women look more attractive and as a result, contributed to:

1. gaining confidence and becoming more active
2. increasing the frequency of leaving the house
3. increasing opportunities to participate in social activities

Disclosure: none

PAR20.01

Motion perception and form discrimination in Extremely Preterm school-aged children
Kerstin Hellgren1, Roberto Bolzani2, Lea Forsman1, Ulrika Adén1, Lena Jacobson1, Sara Giovagnoli2, Mariagrazia Benassi2
1Karolinska Institutet, STOCKHOLM, Sweden
2Bologna University, BOLOGNA, Italy

Background: A multiplicity of visual deficits has been recognized in extremely pre-term (EPT) children. However, it is still under discussion whether these deficits are related to severe brain damages and/or to general cognitive disabilities that could characterize prematurity. This study aims to analyze the differences between a group of school-aged children born EPT and a group of full-term age-matched controls on motion and form perception and it investigates the correlations with neurological impairments, gestational ages, visual acuity, and general cognitive abilities.

Methods: Ninety-two Swedish EPT children aged 6.5 years and born before 27 gestational weeks and 81 age matched healthy full-term peers took part in the study. Motion coherence and form coherence tests were used to evaluate motion and form perception respectively. In each test, five levels of coherence were presented by introducing Brownian noise. The full scale intelligence quotient measured by the Wechsler Intelligence Score for Children was taken as general cognitive function. Visual acuity was evaluated. The presence of retinopathy of prematurity, intraventricular hemorrhage and cerebral palsy was considered. Results: Analyzable perception and cognition data were provided from 71/92 (77.2%) EPT and 78/81 (96.3%) control children. The EPT group showed a deficit on motion and form tasks, but a higher rate of low performance was found in motion perception (41%) than in form perception (30%). The group differences remained significant on motion perception but not on form perception when controlling for general cognition and visual acuity. No association was found to gestational age, previous retinopathy of prematurity or previous intraventricular haemorrhage in the EPT group. Conclusion: The results highlight the severity and specificity of long-term motion perception deficits in extremely preterm born populations.
Marjolein Wallroth¹, Marieke Steendam²
¹Royal Dutch Visio, AMSTERDAM, Netherlands
²Royal Dutch Visio, Den Haag, the Netherlands, DEN HAAG, Netherlands

Introduction/aim:
It is difficult to discern whether children with Profound Intellectual and Multiple Disabilities (PIMD) have visual limitations due to ocular or cerebral visual impairment or both. Unlike children with higher levels of intellectual functioning there are no tests to specify their level of cerebral visual processing. This study was set up to research whether behavioural observations, in combination with a visual assessment by an orthoptist, can assist in diagnosing Cerebral Visual Impairment (CVI) in children with PIMD. In order to specify the observation a set of 9 characteristics and an observational scale with 6 levels of visual functioning were developed.

Methods:
In 3 specialized daycare centres in the Netherlands the data from a group of 70 children with PIMD were gathered. The data consisted of medical (including ophthalmological) information as well as information on the motor development of the children. Furthermore the test results and observational records from the visual assessments. The collected data were analyzed to find out if the observational aspects were reliable tools in diagnosing CVI in children with PIMD.

Results:
In accordance to the medical and measurable findings the observational aspects have shown to be reliable tools in discerning CVI in children with PIMD. A high percentage of the children tested were found to have CVI.

Conclusion:
Observational aspects consisting of characteristics of CVI and the observational scale with levels of visual functioning have shown to be useful tools in the diagnosis of CVI in children with PIMD.

PAR20.03

Collaborative school consultation in the field of ocular and cortical visual impairment
Lydia Marques, Enêcia Mendes
UFSCar-Universidade Federal de São Carlos, ARARAQUARA, SÃO PAULO, BRASIL, Brazil

Despite the high incidence of visual impairments associated with other disabilities, the educational implications of these is not considered in the training of special education teachers. This study aimed to develop and evaluate a collaborative consultation program in the field of visual impairment with a team of professionals of a special school for students with disabilities. The participants were the researcher/consultant orthoptist, five teachers, a speech therapist, a physical therapist, a psychologist, an occupational therapist, and 46 students between 7 and 37 years age. The procedures were: preliminary step of ethical procedures; Study-1, the diagnosis of institutional conditions and parents and teachers complains; and Study-2, the intervention: a) 35 hours of theoretical lessons; b) practice based on the visual evaluation process of students, c) final evaluation of the consultation/training program. The results of student’s characterization showed that 30.4% had cerebral palsy; 30.4% with intellectual disabilities; 19.6% with Down syndrome, and 19.6% with other diagnoses. The team had no previous information about student’s visual disorders or impairments. The results of the evaluation process were: 16 students (34.8%) without abnormalities; 20 (43.5%) with strabismus and/or refractive errors; 3 (6.5%) with ocular visual impairment; 3 (6.5%) with cortical visual impairment; 1 (2.1%) with ocular and cortical visual impairment; and 3 (6.5%) with suspicion of visual impairment. The case studies resulted in referral to ophthalmologist, guidance to the parents, propositions of pedagogical strategies and environment and materials adjustments. The evaluation of the collaborative consultation program was satisfactory to the professionals’ development and to solving the addressed problem. The study highlights the need of ophthalmic and visual functions assessment among students with intellectual and multiple disabilities and emphasized the importance of collaborative practice between specialists, family and school professionals. In addition, it suggested the need of a support network for teachers of special education.

PAR20.04

TEACH CVI: building a bridge between educators and health care professionals to improve literacy in children with Cerebral Visual Impairment
Judith Cederhag, Annika Soedergren
National Agency for Special Needs Education and Schools, ÖREBRO, Sweden
Background/aim: Children with Cerebral Visual impairment (CVI) suffer from a dysfunctional visual perception, caused by a variety of brain lesions. Obviously, this hampers their access to literacy, going from looking at objects and simple picture books, over the first steps in producing text or other media to full academic reading and writing. Therefore, early diagnosis of CVI is of utmost importance. Following diagnosis, further guidance is needed throughout life. TEACH CVI was developed to offer a holistic approach to CVI from knowledge about characteristics, screening and diagnosis over impact of CVI on literacy to a client based teaching resource portfolio. Content: Within the TEACH CVI Erasmus+ project, a consortium of professionals from teachers to medical doctors, first reviewed current resources for screening and assessing CVI. Secondly, the consortium analyzed the literature for classification systems of literacy skills and, based on this, developed a literacy profile. In a final phase, the team generated a web- and paper-based teaching resource portfolio for children with CVI, based on the literacy profile of a specific child. Implications: This teacher and educator oriented resource portfolio will enhance the awareness for and knowledge of CVI. By using this throughout Europe, we will be able to align the methods for screening for and diagnosis of CVI. Foremost, we will increase the children’s potential for access to literacy in the broad sense of the word. Lastly, this project enables and enforces multicenter research projects into diagnosis and (re)habilitation of CVI.

PAR20.05
Assessment protocol and support for professionals working with Children who have CVI
Bláthín Gallagher1, Philippe Belseur2, Maria B Coco3
1BAM Gallagher Consulting/University of York/European University Miguel Cervantes, DRUMKEERAN, LEITRIM, Ireland
2Mutualité française Anjou-Mayenne, ANGERS, France
3European University Miguel Cervantes, VALLADOLID, Spain
There is an increase in the number of children presenting with Cerebral Visual Impairment (CVI). Currently, there is no standard protocol for the assessment and support of CVI children and consequently, organisations end up developing individual methodologies and procedures to address their needs.

The CVI project, funded under the EU Erasmus plus programme, aims to construct a standard multi-disciplinary protocol for use by organisations serving the needs of these children. The partnership for the project comprises nine partners from six countries: Belgium, Canada, Croatia, France, Netherlands and Spain. The project coordinator is MFAM from Angers in France.

During this project, we will identify the existing assessment tools used that meet the identified needs of the target group and select a number for inclusion in the protocol. The protocol will be developed in consultation with the many professionals involved in the assessment process including: ophthalmologists, optometrists, orthoptists, neuropsychologists, rehabilitation professionals, etc., collating their experience to develop a common process in the support of children with CVI. An observation tool and individual “passport” for use in association by relatives, parents, teachers will also be constructed. A training plan and handbook will be written to guide professionals in the use of the protocol. A robust evaluation methodology is being applied to the development of all the project outputs.

Final products will incorporate the recommendations from the evaluation.
We will present the aims of the project, the methodology used in developing the protocol, present the protocol and the preliminary results from the first evaluation.
This results of this project will contribute to the development of a common standard practice for working with children with CVI.

PAR20.06
The value of CVI Experience, a simulation tool of visual processing difficulties
Florine Pilon-Kamsteeg, Marjoke Dekker-Pap
Bartiméus Ziest, AMERSFOORT, Netherlands

Introduction At Bartiméus Centre for rare visual disorders, we see approximately 130 children p/y who are referred with a suspicion of Cerebral Visual Impairment (CVI). After they are diagnosed with CVI, children get appropriate rehabilitation. Understanding the daily experiences of those they care for, will lead to increased empathy and understanding of caretakers. At Bartiméus, the standard way of clarifying the diagnosis of CVI to parents and professionals consists of factual oral information. During the rehabilitation process, we noticed that parents and professionals often had difficulties in understanding the implications of CVI in daily life. We therefore looked for additional ways to give parents and caretakers more insight in the condition. The purpose of this study was to design a simulation programme for CVI and to determine the added value of this programme to the standard educational
program on CVI. Methods We designed a simulation program (CVI Experience) containing 60 exercises with the aim of letting parents and professionals experience the complexity of visual information processing. These exercises enlarge the difficulties that children with CVI experience because of damage to these areas, in such a way that people with normal visual function have problems performing these exercises. The simulation training was offered as an addition to the standard educational program. In the period 2012-2015 we measured the benefits of the CVI Experience by using questionnaires during 9 CVI courses with 138 participants. To analyze the scores of the participants Wilcoxon matched-pairs signed rank test were performed. Results and conclusion The results clearly indicate that both the presentation and the experience toolset added to the understanding of CVI. This is also confirmed by performing a Wilcoxon test on each of the 5 questions, which all give highly statistically significant differences (p<0.0001) between the data at the different measurement point.

PAR21.01
The Study of Improving and Expanding Low Vision Care and Training of Professionals In Turkey. (LCIF:SF-1645)
Aysen Topalkara
CUMHURİYET UNIVERSITY, SİVAS, Turkey

Aim: The Project , supported by Lions Club International Foundation, aimed to early diagnose of low vision people, increase the awareness of low vision and low vision rehabilitation of public, educate ophthalmologists and teachers, prepare vision rehabilitation programme for early childhood, to build real-life application areas for training and rehabilitation patients and to increase social solidarity about volunteer support and among low vision patient’s families. (2013-2014) Content: This study was done with the collaboration of The Low Vision Rehabilitation and Research Center by Medicine School of Ankara University, Ankara Directory of National Education and Lions Clubs. For creating public awareness , pamphlets were prepared for Early Diagnosis of Low Vision in infants and distributed to obstetric clinics, health clinics, major hospitals, to be handed to the families of new born to help to understand what low vision is. For teachers’ awareness and education about low vision, lecture was given by ophthalmologists, specialist insructor and psychiatrist. Moreover , 320 teachers’ and 63 ophthalmologists attended the lecture in 4 cities and educated by 3 ophthalmologists for a day. The lecture was about low vision, low vision rehabilitation and the importance of early diagnosis. In this period 520 visually impaired babies were examined and accepted to the habilitation programme, 1500 patients were trained in the real life application area, 9 solidarity meetings were organized among low vision patients and their families with 1800 participants. Implication: Low Vision Center, the only one in Turkey, was relocated with new facilities in Ophthalmology Department with better equipment. For that reason, we commit to enhance services to Low vision with new and well-equipped centers, so that we envision new Low vision centers with partnership of major universities in Turkey. Ankara University is willing to take leadership in technical consultancy, low vision training and low vision know how.

PAR21.02
Rehabilitation - upcoming Initiatives in Germany
Christiane Moeller
German Federation of the Blind and Partially Sighted, BERLIN, Germany

The strict discrimination and financing of medical, vocational and social rehabilitation Services under German law has led to a current lack of support with specific rehabilitation services especially for elderly people. This presentation reports about the upcoming initiatives to implement rehabilitation services for this group. Compared with other serious diseases, in Germany there is not yet an automatic transfer from diagnostic to medical rehabilitation services after a severe loss of sight. Getting support is a matter of hazard. This needs to be changed. Therefore, in 2016 the German Federation of the Blind and Partially Sighted together with the German Association for Rehabilitation organized a conference on this topic to point out the actual situation, the requirements, the legal legislation and perspectives. The following results are some of the guidelines for further action: While rehabilitation services are not institutionally financed, it is necessary to create concepts which lead to an individual legal claim against the statutory social security. Implementing a medical rehabilitation program has to be given priority because it fills the gap between the medical diagnostic and treatment to necessary rehabilitation services. The second argument is prevention from threatening health problems as a consequence of the vision loss. All professions, who already offer rehabilitation services such as mobility training, low vision counselling services or independent living skills courses need to develop a common understanding of “medical rehabilitation” as a complex and interdisciplinary approach. Therefore, it is important to implement a reasonable knowledge about the
The requirements, the addressed persons and contained elements of a medical rehabilitation program for visually impaired persons have to be identified. Apart from developing a specialized program for visually impaired persons, the importance of vision needs to get more attention in other fields of rehabilitation.

PAR21.03

Ophthalmologic assessment of elderly people with low vision and blindness on tertiary care level
Jose Ronaldo Carvalho-Jr, Fernanda Silva Leal Souza, Janalice Vasconcelos Ribeiro, Marcos Wilson Sampaio, Maria Aparecida Onuki Haddad
São Paulo University, SÃO PAULO, Brazil

Objectives: To assess the elderly population seen at the Low Vision Unit of the University of São Paulo Medical School General Hospital Ophthalmologic Clinic, for causes of decreased visual response, classes of visual impairment and main adaptive low vision aids.

Material and methods: The ophthalmologic assessment was performed in 730 patients, aged above 60 years, with visual impairment. Data related to diagnosis, best corrected visual acuity in the better eye, prescribed optical aids for far and near vision and improvement of visual response with optical aids were recorded.

Results: Mean age was 73.7 years, 46% of the patients were males and 54% females. The main causes of visual impairment included: age-related macular degeneration (33.5%), diabetic retinopathy (14.5%), and glaucoma (13.4%). The observed classes of visual impairment were: 37% presented moderated low vision, 29.2% severe low vision, 12.2% profound low vision, 16% had mildly impaired visual response, 5.5% near blindness, and 0.1% were blind. Near vision optical aids were adapted in 75.3 % of the patients and far distance optical aids in 26.3%. Spheroprismatic lenses were the most frequently adapted near vision aids (22.4%). The most frequently prescribed optical aid for distance was the 2x 40 mm binocular telescopic system (26%).

Conclusion: The causes of low vision in our study were similar to those developed in developed countries. Care provided to elderly people with low vision at specialized centers allows, through appropriate orientation and the use of optical and non-optical aids, to achieve better efficiency with the remaining vision in the performance of daily activities. In addition, increases self-esteem, independence and social acceptance of elderly patients with decreased visual response.

PAR21.04

Low Vision Services - A Public Private Community Partnership Approach in Pakistan
Sumrana Yasmin1, Hasan Minto1, Umar Ghafoor2, Asad Khan3
1Brien Holden Vision Institute, RAWALPINDI, Pakistan
2Layton Rahmatullah Benevolent Trust, KARACHI, Pakistan
3College of Ophthalmology & Allied Vision Sciences, LAHORE, Pakistan

Background: In Pakistan, low vision services exist mostly at tertiary level - generally accessible to urban population. Provision of low vision services at the secondary and primary levels remain limited; and out of reach for urban poor and people living in rural communities. This paper will discuss some of the factors which have played a catalytic role in the development of low vision services at various levels.

Content: Brien Holden Vision Institute in partnership with National Committee for Eye Health has been proactively engaged in expansion of low vision care at secondary level as part of National Eye Health Plan. The overall aim is to develop low vision services as part of comprehensive eye care and to create the necessary linkages within key stakeholders. The program focuses on service and human resource development, advocacy and research. So far, the program has led to the development of low vision services in 24 districts in a short period of 3 years.

Implication: Availability of low vision services at district and sub-district levels has improved access to low vision services and has helped in creating linkages with education, rehabilitation and community development sectors. The clinics developed so far have provided services to nearly 15,000 patients including 6,000 children in education. Through coordinated planning, the program has successfully expanded its geographical coverage and significantly contributed in achieving the targets of V2020. The challenges, however, still remain around awareness at both professional and community levels; and service delivery at primary level. These two components have been considered in the future service development. Organisations: Brien Holden Vision Institute; Layton Rahmatullah Benevolent Trust, Pakistan; College of Ophthalmology & Allied Vision Sciences, Pakistan
PAR21.05

Useful Clinical Pearls for Assessing and Managing Visual Impairment in Brain Injury Patients of Any Age
Carolyn Carman
University of Houston, HOUSTON, U.S.A.

Background/aim:
Vision impairments are often associated with brain injuries but evaluating brain injury patients in order to identify the presence of vision-related problems can be challenging. Sometimes the deficits are difficult to identify because they are subtle; sometime they are difficult to assess because the patient may be non-verbal or unable to respond to conventional testing methods.

Content:
This presentation will address clinical pearls and useful approaches for evaluating and managing children or adults who have suffered vision loss or impairment due to brain injury.

Implications:
The goal of this presentation is to share the development of useful approaches and techniques gained from over 30 years of experience in the clinical and rehabilitative care of brain injury patients of all ages in both hospital-based and private-practice settings.

PAR21.06

Training of eccentric viewing - no mystery Simple instruments for the training of the PRL
Susanne Trefzer
SNAB Swiss National Association of the Blind, LENZBURG, Switzerland

Especially elderly persons with a central scotoma (for example with AMD) have big problems with reading. Finding a suitable eccentric retinal locus helps them to read texts more fluidly and provides some other advantages. Mostly affected are older people with advanced AMD. With training materials tailored to their needs, the PRL can be found and exercised. As training material, word cards, vertical text, single letters or symbols etc. are used. An appropriate training always precedes the delivery of a vision aid, since this is the only way to ensure that the visual impaired person is able to read the desired texts using the new visual strategies and the corresponding optical or electronic aid. The clients are very satisfied with the optical devices given to them, as showed by a survey conducted in 2015.

The use of the trained eccentric retina locus is also of great use in everyday life, be it when recognizing the bus number or when reading the clock. The result: most visually impaired people are (again) more independent in their everyday lives. If cognitive impairments are present after a stroke or through dementia the training of a PRL may be difficult or even impossible. It may also be difficult if the need of enlargement is very high.

PAR22.01

Binocularity and Reading: Subjects with Equal and Unequal Visual Acuity
J. Vernon Odom, Benjamin Stephens, Monique Leys, John Nguyen, Christopher Antonini
West Virginia University, MORGANTOWN, U.S.A.

Aim: To compare monocular and binocular reading performance (speed and acuity) of patients with equal and unequal visual function.

Methods: Subjects were patients or employees at the West Virginia University Eye Institute. We assessed each subject’s performance on 5 vision chart tests, ETDRS, Pelli-Robson (Precision Vision), Smith-Kettlewell Low Luminance Acuity (SKLL), and MN Read. Subjects were tested on each test monocularly and binocularly at a distance of 16 inches (40 cm). Testing was performed in a well lit room (252 lux). Binocular summation was evaluated by comparing binocular function to the mean monocular value or binocular function to the best monocular function. One group had near acuity of 20/25 or better in each eye (logMAR <u><</u> 0.1; average difference 0.05 logMAR). The other group had impaired vision in one or both eyes and an average interocular difference of 0.282 logMAR.

Results: T-tests were used to compare differences between the two groups. Monocular and visual and reading performance was better for the equal group (p<u><</u>0.05). A difference between the binocular summation of reading speed was significant (p<0.02), but not for binocular summation of reading acuity. When binocular reading speed was compared to the best monocular speed there was a gain of 5.89 wpm in the unequal acuity group but a reduction of 11.64 wpm in the equal acuity group.
Conclusion: The present results are consistent with prior reports that reading speed in subjects with normal vision shows little if any binocular advantage. The greater binocular summation in reading speed in those with unequal vision does suggest the importance of devices which assist those with low vision in reading binocularly.

PAR22.02

Microperimetry in not legally blind retinitis pigmentosa patients
Kazim Hilmi Or¹, Sefay Aysun Idil², Emin Ozmert³
¹Private Office, ISTANBUL, Turkey
²Ankara University Ophthalmology Department Low Vision and Rehabilitation Section, ANKARA, Turkey
³Ankara University Ophthalmology Department, ANKARA, Turkey

Aim: In retinitis pigmentosa (RP) patients the evaluation of visual function may be difficult and complicated. In this study our aim was to evaluate the average threshold and the fixation stability which are important for reading.

Methods: In Group I there were 20 RP patients with a visual acuity (VA) less than 0.4 logMAR (between Snellen 0.4-1.0) in the better eyes (representing the RP patients who should normally read without any LVA device). In Group II there were 11 RP patients with a VA between 0.4 and 1.0 logMAR (between Snellen 0.1-0.4) in the better eyes (representing RP patients with low vision without being legally blind due to VA). All patients have undergone MAIA microperimetry evaluation for the central visual field and fixation stability. The difference of the %95 BCEA is compared between two groups with Student t test. Power analysis is applied to the results of t test. The difference of Average Threshold (AV) is compared between two groups with Student t test.

Results: The % 95 BCEA value was 11.73 ± 17.13 deg² in Group I and 63.83 ± 61.50 deg² in Group II. The p value for the difference between two groups in the Student t test was 0.0012, thereby the difference was statistically highly significant. Average threshold (AT) value was 12.48 ± 9.05 in the Group I and 9.45 ± 9.70. In the t-test the difference of the AT between the groups was statistically not significant (p=0.422) Conclusion: In patients with not legally blind RP, the fixation stability is lower with a Snellen visual acuity between 0.1-0.4 than those between 0.4-1.0 of VA , the Average Threshold value being not different. For evaluation of this finding clinically its comparison with reading acuity and reading speed may be indicated.

PAR22.03

The Effects of Lighting on Reading Speed as a Function of Letter Size
William Seiple¹, Olga Overbury², Vernon Odom³, Alan Morse¹
¹Lighthouse Guild, NEW YORK, U.S.A.
²University of Montreal - Optometry, MONTREAL, Canada
³West Virginia University Eye Institute, MORGANTOWN, WV, U.S.A.

OBJECTIVE. To determine under what conditions brighter lighting improves reading performance.

METHOD. Thirteen normally sighted and nine AMD participants were enrolled in this study. Sentences ranging from 0.0 to 1.3 logMAR were read under luminance levels from 3.5 to 696 cd/m².

RESULTS. For normally sighted participants, at the dimmest luminance level (3.5 cd/m²), reading speeds were slowest at the smaller letter sizes and reached an asymptote for larger sizes. When luminance was increased to 30 cd/m², there were increases in reading speeds for the smaller letter sizes, but not for the larger sizes. Lighting brighter than 30 cd/m² did not increase reading speeds for any letter size. Similar size-related effects of luminance were observed in participants with AMD, although their reading functions were shifted to larger letter sizes and slower reading speeds.

CONCLUSION. In some instances, performance on acuity-limited tasks might be improved by brighter lights. However, brighter lighting did not always improve reading; the magnitude of the effect depended on the relative changes in light level and letter size.

PAR22.04

Classification visual impaired athletes
Peter, Hendrik Derksen¹, David. L Mann²
¹Holsboer Optometry, ARNHEM, Netherlands
²Vrije Universiteit, AMSTERDAM, Netherlands
Introduction: Athletes with vision impairment need to be classified to take part in competition, with classification most frequently performed using an assessment of visual acuity (VA). Historically, the International Paralympic Committee (IPC) allowed VA to be measured using a range of tests, and this introduced inconsistencies and increased the likelihood of athletes misrepresenting their level of impairment. The IPC adopted the Berkeley Rudimentary Vision Test (BRVT) as its sole test of visual acuity. The BRVT has been used more than 2800 times during classification to test for eligibility to compete (logMAR > 0.9), and to allocate eligible athletes to one of three sport classes (B3: logMAR 1.0–1.4; B2: logMAR 1.5–2.4; B1: logMAR > 2.4). The aim of this paper is to evaluate the efficacy of the BRVT for classification.

Methods: 720 athletes with vision impairment were classified by practitioners using the BRVT. The room illumination was 200 lux and the luminance on all the charts 400 Lux. All subjects with VA < 1.0 logMAR were deemed as ‘non-eligible to compete’. All classifiers followed the recommended test procedure for the BRVT.

Results: A total of 24% of the investigated athletes had a change in their classification as a result of the change to the BRVT. Most were found to have less impairment than what was found using previous tests. The improvement in consistency was a major advantage when compared to previous charts (e.g., the SOSH chart), which sometimes required a more subjective interpretation of the acuity.

Conclusion: The BRVT has proven to be a better test of visual acuity for the purposes of classification of vision impairment for athletes with severe–profound vision impairment (1.0–2.5 logMAR). Future advances in classification require the development and understanding of vision for observing static and dynamic targets, along with the need to detect multiple rather than single targets.

Gaze Behavior During Navigation with Reduced Acuity
Andrew Freedman, Jacob Achtemeier, Yihwa Baek, Gordon Legge
University of Minnesota, ROSEVILLE, U.S.A.

Purpose: To design visually accessible spaces for people with low vision, it is important to understand their gaze behavior when encountering novel environments. The current study aimed to characterize how acuity restriction affects gaze behavior during navigation, with both artificial acuity reduction and naturally occurring low vision. We hypothesized that reduced acuity would result in a greater proportion of time inspecting the path ahead, at the expense of inspection of objects adjacent to the path.

Methods: Subjects walked along an indoor path, guided by a rope line, passing objects adjacent to the path and naming letter labels posted on the objects. A Tobii head-mounted eye tracking system was used to measure participant gaze direction by means of forward-facing video. Environmental cues in the video, such as the floor wall boundary, were used to record the duration of horizontal and vertical gaze directions during trials. Normally sighted subjects completed half their trials wearing blur foils over the eye tracker, which reduced effective acuity to about 20/900.

Results: Mixed factorial ANOVA testing and Tukey HSD post-hoc tests were performed. Preliminary results indicated participants completing the navigation task under blur conditions spent a significantly greater proportion of time looking down at the floor when completing the navigation task, compared to the no blur conditions (’p’ ≤ .001). Proportion of gaze time looking straight ahead was not significantly different for blur conditions. Overall mean walking time was 14.8 seconds longer (’SD’ = 8.7) with reduced acuity.

Conclusions: Preliminary data indicates that subjects completing the navigation and search task with artificial acuity restriction spend more time directing their gaze downward, toward the floor, than those without restriction. However, time spent inspecting objects was proportionally the same. The current work explores the impact acuity reduction on visual attention, and the consideration of designing visually accessible indoor spaces.

A SUBJECTIVE REFRACTION BRACKETING TECHNIQUE FOR VISUALLY IMPAIRED PATIENTS
Ian Bailey
Of California, BERKELEY, U.S.A.

BACKGROUND,
The clinical measurement of the visual capabilities of the visually impaired visual generally requires that refractive error is corrected. In low vision populations, there is often uncorrected refractive error, often of substantial magnitude and objective methods are often impractical. Visually impaired individuals often have difficulty with discrimination of blur. Non-standard subjective refraction techniques are needed. Many clinicians use coarse steps, with step sizes
determined by the visual acuity. A common practice is to use “Just Noticeable Differences” where the refractive step size is equal to one tenth of the reciprocal of the VA. (For 6/60, the “JND” = 1.00D) Here, we advocate a different approach that uses large step bracketing.

METHOD
The refraction should begin with the best estimate of the refractive correction in place. The “bracketing” method requires rejection of two lenses of equal powers with opposite sign. For bracketing with spherical lenses, one lens should be rejected because of “too much plus”, the other because of “too much minus”. The clinician takes note of the relative strength or emphasis with which the patient rejects both lenses, and judges whether the responses suggest a preference for “more-plus” or “more-minus” and makes an estimation of the magnitude. The refractive correction is adjusted and then another “bracketing” is conducted, but now the power of the bracketing lenses is reduced. Commonly, we use 3 brackets, +/-0.00D, then +/-1.25D, to estimate the spherical component. With a Jackson X-cyl, two flips estimate the cylinder axis, and then 3 flips are usually required to estimate cylinder power. Then there are brief refinement procedures to adjust the sphere, axis and cyl-power. Some modifications may be required for pre-presbyopic patients.

IMPLICATIONS
Most of the judgments are easy for the patient and no assumptions are made about the patient’s discrimination abilities.

PAR23.01
Assessment of the Visual Status of Older Adults in a Sub-acute Rehabilitation Ward
Debbie Boey
Tan Tock Seng Hospital, SINGAPORE, Singapore

There is a high prevalence of low vision among older adults in the inpatient wards, and having low vision predicts higher functional dependence at discharge. Occupational Therapy (OT) low vision rehabilitation promotes participation in daily activities and prevents depression. However older adults in the inpatient wards are not routinely assessed on their visual status and few are referred for low vision rehabilitation. This study aims to examine the visual status of a cohort of older adults in a sub-acute ward and initiate early OT low vision rehabilitation. A convenience sample of 62 older adults was recruited from the sub-acute ward. Inpatient OTs asked them about their visual problems, assessed their visual field with the confrontation test and visual acuity using a standardized chart. Participants who complained of visual problems, had visual acuity worse than 6/18 and visual field deficits were taught strategies to manage their daily activities. Those who benefitted from further rehabilitation after discharge could be referred to outpatient OTs with specialized low vision training. Descriptive statistics was collected and feedback obtained from the inpatient OTs. 50% of the participants had subjective visual problems, 50% had visual acuity worse than 6/18 and 13% had visual field deficits. 31% who wore glasses did not bring them. 20% were taught low vision strategies by inpatient OTs and none were referred for outpatient low vision rehabilitation. Inpatient OTs feedback that they did not have adequate knowledge to provide low vision rehabilitation and identify patients for outpatient rehabilitation. Visual impairment is prevalent in older adults and should be routinely assessed by inpatient OTs, including asking patients to bring their glasses which may improve functional vision. Continuing education should be done to enable inpatient OTs to provide basic low vision intervention and identify suitable patients for outpatient low vision rehabilitation to optimise functional performance.

PAR23.02
Occupational Therapists contribution to low vision rehabilitation within Australia: Impact of past influences on future direction
Emma Bartley
Guide Dogs NSW/ACT, CHATSWOOD, Australia

By 2020, it is expected there will be over 800,000 individuals living in Australia with vision loss, with the greatest rise in incidence occurring among the ageing population. It is anticipated that there will be an increased demand for Occupational Therapists to provide services addressing vision loss, including those working within generalist settings as well as low vision rehabilitation services. Traditionally, Occupational Therapists have not been recognised as key providers of low vision rehabilitation services. This paper explores the development and contribution of Occupational Therapists to the profession of low vision rehabilitation, and its influence on Australian practice. Research findings indicate that there is a lack of clarity regarding Occupational Therapists role when working with individuals with vision loss. An overlap in roles with other key low vision service providers has emerged
and a defined scope of practice is not available for Occupational Therapists working with individuals with vision loss within Australian practice settings. The role of the Occupational Therapist is influenced by the practice setting in which they are employed, which subsequently defines the level of knowledge and skill set required by the Occupational Therapist to adequately address the needs of an individual with vision loss. Currently, there are limited professional development opportunities for Occupational Therapists within Australia to expand this knowledge and skill set. This paper suggests the following actions to support the growing number of Occupational Therapists providing services to individuals with vision loss within Australia: 1) a defined scope of practice outlining best practice in this area; 2) consideration of an advanced practice framework for Occupational Therapists who have chosen vision impairment as their key area of practice and 3) increased professional development and furthering education opportunities for Occupational Therapists within the area of vision impairment.

PAR23.03

When two halves do not make a whole: the challenges of bitemporal hemianopia
Catharina Stellingwerf1, Anne Vrijling1, Alessandro Grillini2
1Koninklijke Visio, HAREN, Netherlands
2Neuroimaging Center, Department of Ophthalmology, University of Groningen, GRONINGEN, Netherlands

Aim: To give insight of the problems in daily life caused by bitemporal hemianopia. Bitemporal heteronymous hemianopia is usually caused by a lesion of the optic chiasm. The nasal hemifields of both eyes are spared giving a pretty complete binocular overview, at first sight. However, appearances are deceptive: the absent binocular fusion, impaired stereopsis and the blind area posterior to fixation are often not recognised and can cause problems and safety risks in daily life.

Methods: By means of patient cases, literature study and visual material including a short video, we give insight in the particular type of visual problems bitemporal hemianopia causes in daily life. We focused on the challenges in visual rehabilitation for these patients.

Results: The problems experienced by the patients concerned mainly reading and mobility. In traffic unforeseen situations could arise, which were not expected on the basis of the binocular visual field.

Conclusion: The problems and hazards in daily life situations caused by this specific visual field loss can easily be missed. This can cause frustration for the concerning patients in daily life activities and hazards in traffic situations. Visual rehabilitation helps by giving insight, training in compensation strategies and adjustments in the living environment.

PAR23.04

Vision of the future: Occupational therapy and neurological vision impairment
Evelien Hollestelle, Mary Butler
Otago Polytechnic, DEN HAAG, Netherlands

In New Zealand there are no specialist services for people with visual impairment as a result of acquired brain injury (VI ABI). Occupational therapists work in neurology services but it is not known to what extent they take responsibility for visual impairment as part of their role and whether they require additional education in this field.

The research was undertaken to identify the role of occupational therapists who work with adults with VI ABI in New Zealand. A survey was developed based on Warren’s (1993) theoretical analysis of the visual hierarchy and it included both open and closed questions. Occupational therapists were invited to participate through neurology and management special interest groups run by the OTNZ Association. Twenty two practising clinicians completed an online survey over a three week period. The method was qualitative description and data was analysed thematically. The findings indicate that experienced occupational therapists play a significant role in the assessment and treatment of visual impairment following acquired brain injury, and get to spend between 0.5-5 hours with each patient. Most of this work is carried out in the context of an occupational/ functional approach to therapy. Therapists were aware of visual deficits, and had an understanding of how these might manifest in everyday activities. There is little specialist assessment and treatment of specific aspects of VI ABI and occupational therapists felt ill-prepared by undergraduate education and the lack of postgraduate opportunities in New Zealand.

Occupational therapists endorse the need for further education in the area of visual impairment. Following this survey, a postgraduate paper was set up, including a module on visual impairment and acquired brain injury. In addition, there is a move to integrate vision rehabilitation more comprehensively in the undergraduate curriculum and a specialist undergraduate fieldwork placement was established.
Design of a training method for occupational therapists in the rehabilitation of visually impaired people

Inez Ummels
Koninklijke Visio, APELDOORN, Netherlands

Abstract:
Background/aim: During Occupational Therapy at Visio Het Loo Erf (Centre for Intensive Visual Rehabilitation) clients learn alternative strategies, such as using other sensory information than visual input, which enables them to perform daily activities. Unfortunately, there is no transparent and evidence-based training method which can be used by occupational therapists with visually impaired clients. Choices that therapists make during rehabilitation sessions, for instance about the way of training, are mostly based on practical experience. As an example, a way of training is performing an activity ‘non visually’ wearing blackout glasses. The aim of this study was to provide occupational therapists with guidelines that support their therapy choices. This abstract focuses on the diagnostic phase.

Content: In the exploratory phase of this design study, four occupational therapists and three clients were interviewed. Participants were asked which factors play a role in the learning of alternative strategies. These data were analyzed by ‘open coding’ with the program ‘Atlas ti’. The identified factors were categorized according to the ‘International Classification of Functioning, disability and health’ (ICF) model. Participants were also asked which factors are successful and restricting in learning. These factors were highlighted in the ICF model and elaborated in a checklist.

Implication: This study has identified factors that play a role in the learning process of clients. As part of a training method, the ICF model and checklist are designed tools to make an inventory of these factors in the diagnostic phase. In the next phase of this study, these tools will be implemented and further examined.

Effectiveness of rehabilitation of visual agnosia and Balint’s syndrome

Joost Heutink1, Dana Indorf2
1Royal Dutch Visio / University of Groningen, HUIZEN, Netherlands
2University of Groningen, GRONINGEN, Netherlands

Aim: The literature about the rehabilitation of some of the more complex visual disorders is virtually silent, which is the case for visual agnosia and Balint’s syndrome. We performed a systematic literature review to bring together the treatment approaches and documented effectiveness that can be found for these syndromes.

Methods: Pschinfo, Amed and Medline were searched for peer-reviewed publications published in either English or German. The used keywords were “treatment” or “rehabilitation” in combination with each of the terms “visual agnosia”, “simultanagnosia”, “object agnosia”, “prosopagnosia”, “associative agnosia”, “apperceptive agnosia”, “color agnosia”, “form agnosia”, “semantic agnosia”, “topographical agnosia” and “Balint’s syndrome”. The time period of the listed results ranged from 1948 until 2016. Abstracts of the 302 listed results were reviewed, resulting in 19 articles meeting predefined criteria for inclusion.

Results: There is at least some literature available on the major subtypes of visual agnosia as well as on Balint’s syndrome, which can be consulted for guidance by practicing clinicians. Generally, compensatory strategies have proven to be beneficial in most of the cases where they were applied. Restorative training on the other hand has produced mixed results.

Conclusion: The few cases available in the literature for visual agnosia and Balint’s syndrome make it difficult to establish an evidence-based training programme. Nevertheless, a scientific foundation about the rehabilitation of these deficits is evolving and there are approaches giving valuable information that can be built upon in the future. We encourage clinicians to share any cases of these syndromes with the scientific community, and to make detailed rehabilitation procedures available so others can consider these when setting up their own programmes.

A pilot study of alternating field device for homonymous hemianopia

Jae-Myoung Seo1, Geunho Park2
1Baekseok Culture University, CHEONAN, South-Korea
2Kong Eye Center, SEOUL, South-Korea
Aim: Fresnel prisms for hemianopia provided field expansion despite inducing the inevitable diplopia. If two different fields would not let present at the same time, the diplopia would not be realized but it should be called the alternating monocular vision based on the visual memory. This study was to investigate whether the alternating field device could reduce diplopia. Methods: Thirty four young college students without any known ocular pathology or operation participated in right homonymous hemianopic simulation. Playing a computer-based typing game that words were falling down on the bottom, subjects were asked to count the fallen words. Due to the right hemianopic simulation, the left half of the screen could only be viewed and the prism resulted in 14 degrees expansion. The alternating field device (MJ Japan Design, 2MJ03SE-1622) was worn and set so that the left lens was transparent while the right lens was flickering (occluded for 660 ms and open for 340 ms). Results: Subjects viewed the clear left field through the left lens while viewing flickering images that were shifted in 14 degrees and occluded through the right lens. Under the right hemianopic simulation circumstance, 9/18 words were counted without the Fresnel prism and after adding the prism 27±7.5/18 words were viewed. Subjects reported to view more words because they were confused by diplopia. While wearing the alternating field device subjects reported 16.7±6.2/18 words to be viewed, which was closest to the reference. Conclusions: Fresnel prism for hemianopia was often prescribed but diplopia was accompanied as well. The alternating field device showed to be able to minimize diplopia and confusion so that it will provide a stable visual recognition for hemianopia.

PAR24.03

Method to treat symptoms of complicated grief of people with severe visual and mental disabilities.
Rianne Vermeulen, Wija Kaaden
Bartiméus, DOORN, Netherlands

People with severe visual and mental disabilities are dealing with experiences of loss in their lives, for example loss of important family members or loss of functioning. When they are struggling with these feelings of loss, complicated grief (symptoms) can exist. There was no existing therapy or intervention to treat these problems in this population. In this practice-based study we developed a method to treat symptoms of complicated grief of people with severe visual and mental disabilities.

After studying in the literature the intervention was designed. This intervention was used by the caregivers of four people with severe visual and mentally disabilities and (symptoms of) complicated grief. Their caregivers were supported by the developers in carrying out the intervention/method. The symptoms of complicated grief were measured in advance, during and after the intervention by quantitative and qualitative questionnaires. Also the feelings of being competent in helping the persons with his complaints by the caregivers were measured.

The results were varying. The quantitative results indicated the symptoms of complicated grief didn't change or worsened after the intervention. The qualitative results indicates the symptoms of complicated grief were reduced. The level of competency of the caregivers was increased after using the intervention. The results led to some adjustments in the intervention. Recommendations were done for a follow-up study.

PAR24.04

Tactual Profile MDVI to assess the tactual functioning of persons with a severe visual and cognitive impairment
Anneke Blok
Royal Dutch Visio, AMSTERDAM, Netherlands

Tactual Profile is a procedure to assess the tactual developmental of blind children in the age of 0-16 years. The instrument has proven to be reliable for many years in countries throughout the world. However the users of Tactual Profile requested for a version specially for multiple disabled visual impaired persons of all ages, since the items of Tactual Profile were too difficult for them. Tactual Profile MDVI was developed by a project group of employees of Royal Dutch Visio, with experience with multiple disabled visual impaired persons. The version of Tactual Profile for multiple visual impaired persons can be used for persons with a cognitive development, comparable with the age of 0-6 years. The steps in development are more refined than in the original Tactual Profile and the instruction is far less verbal. The domains of tactual functioning are: tactual sensory functioning, tactual motor functioning, tactual perceptual functioning. With less focus on the items, less on perceptual functioning, more on sensory functioning. The category Touch Sensitivity is an important one, therefore a special set of materials was developed for
observation. The materials have been manufactured in 3D print and have been tested. The instrument has been assessed by psychologists, occupational and physiotherapists, teachers, early intervention workers and others with experience in working with severely mentally and visually impaired persons. All items were discussed with a group of experienced persons of different backgrounds. For instance a neuropsychologist, psychologist, occupational and physiotherapist. The instruments has been tested with persons of different ages and best practice has been proven. The focus has also been on Influential Factors on tactual perception and functioning, they were specially written for this Tactual Profile version

PAR24.05

Treasures hidden and revealed
Marit van Buijsen¹, April Boessen², Uta Roentgen², Peter Verstraten¹
¹Robert Coppes Stichting, VUGHT, Netherlands
²Zuyd University of Applied Sciences, HEERLEN, Netherlands

Introduction/aim: This study focussed on the target group of persons (aged 18+) with a visual impairment (VI) and multiple additional disabilities. The aim of this study was to gain knowledge about the size of this complex target group and their requests for support and rehabilitation.

Methods: The study (Hidden Treasures) consisted of three components: (1) retrieving data regarding the target group (e.g. number of persons and type of additional disabilities) from national institutions and through a survey among 600 care organisations; (2) a scoping review of available literature about the specific target group; and (3) interviews with clients (N=10) of the target group and professionals (N=29) supporting them.

Results: (1) National organisations could not provide aggregated data on the target group. The survey (corrected response 15%) showed that 80,7% of these organisations supported clients with VI; 86,7% of those clients had additional disabilities. (2) The scoping review shows that articles on interventions or implications mainly cover subjects such as: deaf-blindness and communication; VI and depression/anxiety; severe intellectual disabilities in visually impaired persons (interaction); complex multiple additional disabilities (case studies). Least represented were articles on VI combined with psychiatric disorders. (3) the most important themes of interest for the target group were: trust, self-management, sincerity, creativity, sociability, continuity, collaboration, being valued and equality.

Conclusion: Specific approaches and methods for this target group have not been systematically documented and scientifically proven. A follow-up project (Hidden Treasures Revealed) focusses on systematically documenting approaches and guidance of persons with VI and psychiatric comorbidity, exploring professionals' needs and making an inventory of knowledge from other sectors that can be applied to this target group. This leads to a methodological and systematic approach and a related multi-methodological toolbox. Projects are carried out by Robert Coppes Foundation and Zuyd Hogeschool. Hidden Treasures was financially supported by Bartiméus.

PLE02.02

The Effect of Eccentric Viewing Training on Fixation Stability.
Graham Brown, Gary Rubin
UCL Institute of Ophthalmology, LONDON, United Kingdom

Aim: EFFECT is a randomised controlled trial investigating whether eccentric viewing training (EVT) improves self-reported visual ability and reading performance patients with central scotomas from age-related macular degeneration (AMD). Improved fixation stability is a secondary outcome for the study.

Methods: 200 patients with AMD were recruited from retina clinics at Moorfields Eye Hospital. To be eligible for the study, the patient needed to have visual acuity worse than 0.3 logMAR (6/12 Snellen) and a dense central scotoma in the better seeing eye. Patients were randomised to placebo or to three sessions of EVT at the patient's preferred retinal locus (PRL) or at an "optimal" PRL chosen by the trainer. EVT followed a set protocol that included scotomas awareness, steady eye strategy, and practice with reading and non-reading eye movements. Fixation stability was measured before and after training with a Nidek MP-1 micro perimeter while the participant fixated a small red cross for 30 seconds. Fixation stability was quantified with the 95% bivariate contour ellipse area (BCEA).

Results: Before training average BCEA was 4.7 sq-deg and after training average BCEA was 6.02 sq-deg. The difference was statistically significant (p = .01). Overall there were no significant differences between training groups. However, when the data were adjusted for baseline BCEA, there were significant differences among training groups with the EVT group showing about a 1 sq-deg greater improvement in fixation stability than the groups who received no training. The change in fixation stability was not associated with an improvement in reading speed or reading
comprehension.
Conclusions: As far as we are aware, this is the largest randomized controlled trial of eccentric viewing training for AMD. In general, we find modest changes, at best, in fixation stability following EVT; however, these changes are not reflected in improved activities of daily living.

PLE02.03

The serious game HearHere for elderly with age-related vision loss: Effectively training the skill to use auditory information for navigation

Mijke Hartendorp1, Janke van Slooten2, Elco Braad3, Christiaan Pinkster4, Frank Steyvers2
1Saxion University of Applied Sciences, DEVENTER, Netherlands
2University of Groningen, GRONINGEN, Netherlands
3Hanzé University of Applied Sciences, GRONINGEN, Netherlands
4Royal Dutch Visio, APELDOORN, Netherlands

More and more people suffer from age-related eye conditions, e.g. Macular Degeneration. One of the problems experienced by these people is navigation. A strategy shown by many juvenile visually impaired persons (VIPs) is using auditory information for navigation. Therefore, it is important to train age-related VIPs to use auditory information for navigation. Hence the serious game ‘HearHere’ was developed to train the focused auditory attention of age-related VIPs enhancing the use of auditory information for navigation, available as an application for tablets. Players of the game are instructed to navigate virtually as quickly as possible to a specific sound, requiring focused auditory attention. In an experimental study, the effectiveness of the game on improving focused auditory attention was examined. Forty participants were included, all students of the University of Groningen with normal or corrected-to-normal vision. By including sighted participants, we could investigate whether someone who was used to rely on its vision could improve its focused auditory attention after playing ‘HearHere’. As a control, participants played a digital version of Sudoku. The order of playing the games was counterbalanced. Participants were asked to perform a dichotic listening task before playing any game, after playing the first game and after playing the second game. It was found that participants improved significantly more in their performance on the dichotic listening task after having played ‘HearHere’ (p<.001) than after playing Sudoku (p=.040). This means the game indeed improves focused auditory attention, a skill necessary to navigate on sounds. In conclusion, we recommend the game to become part of the orientation and mobility program, offering age-related VIPs the opportunity to practice the use of auditory information for navigation. Currently, we are working on a version that is suitable for actual use.

PLE02.04

Impact of visual field damage on at-home and away-from-home rates of falls per step in glaucoma

Pradeep Ramulu, Aleksandra Mihailovic, Laura Gitlin, David Friedman, Sheila West
Johns Hopkins, BALTIMORE, U.S.A.

Aim: To define impact of visual field (VF) damage on step-normalized at-home and away-from-home fall rates in glaucoma.

Methods: 245 glaucoma patients submitted >12 months of falls calendars and completed phone-administered follow-up questionnaires to define fall location. At-home and away-from-home steps were estimated by integrating accelerometer and GPS data collected over a one-week trial on a minute-by-minute level. Right and left eye 24-2 VF data were used to calculated integrated visual field (IVF) sensitivity. Negative binomial regression models evaluated at-home and away-from-home rates of falls/step after adjusting for relevant covariates.

Results: Mean patient age was 70.3 (SD=7.7) and average better-eye mean deviation was -4.5 (6.6) dB, respectively. Patients averaged of 1,923 at-home and 1,573 away-from-home steps/day (p=0.009); the difference between at-home and away-from home steps did not vary with IVF sensitivity (β=5.03, p=0.98). A total of 357 falls occurred in the full cohort over the study period, including 110 and 247 at-home and away-from-home falls, respectively. Over the first year of follow-up, the cumulative probabilities of falls at and away from home were 20% and 35%, respectively. Worse IVF sensitivity was associated with a higher rate of away-from-home falls/away-from-home steps (51% higher per 5 dB decrement in IVF sensitivity, p=0.001), but was not associated with a higher rate of at-home falls/away-from-home steps (28% higher per 5 dB in IVF sensitivity, p=0.16). Away-from-home steps were more likely to be associated with a fall as compared to at-home steps (rate ratio=3.84, p<0.001).

Conclusions: While most walking occurs within the home, walking outside the home results in a substantially greater risk of falling, and glaucoma-related VF damage poses particular dangers when walking outside the home. Research is needed to develop strategies to prevent falls outside the home, particularly in persons with VF damage from glaucoma.
**PLE02.05**

**Consequences of central vision loss on cortical micro-structure estimated by diffusion tensor imaging**

Tina Plank, Anton L. Beer, Mark W. Greenlee
Universität Regensburg, REGENSBURG, Germany

Introduction: Central vision loss due to macular degeneration results in a reduction of cortical gray matter at the posterior calcarine sulcus (lesion projection zone, LPZ, in early visual cortex). However, the relationship between macro-structural changes of the brain and the underlying micro-structure are still unclear. Here we examined the plasticity of the gray matter and the superficial white matter due to central vision loss by the use of diffusion tensor imaging (DTI), an in-vivo technique sensitive to the diffusion of water and the brain micro-structure.

Methods: The study sample comprised 38 patients with macular degeneration and 38 age-matched controls (age: 19 to 85 years). Several DTI-based indices of brain micro-structure were analyzed and compared with surface-based measures of brain macro-structure based on T1-weighted imaging. These indices included mean (MD), axial (AD) and radial diffusivity (RD), fractional anisotropy (FA), mode of diffusion, inter-voxel coherence, and cortical thickness. Effects of aging were excluded by a linear model. In addition, cortical representations of the preferred retinal locus (PRL), which serves as an eccentric gaze reference point, were examined.

Results: Compared to the results from controls, patients showed enhanced mean diffusivity in the gray matter of the posterior calcarine sulcus (LPZ). By contrast, reduced diffusivity (MD, AD, RD) was observed in sections of the calcarine sulcus that represent the patients’ PRL compared to a control region in the opposite visual field. Moreover, FA in the gray matter was enhanced in the PRL region (all p < .05).

Conclusion: The findings show that central vision loss results in substantial changes in DTI measures sensitive to the brain micro-structure likely reflecting reduced dendritic branching or gliia rather than axonal degeneration. Brain plasticity related to a PRL in patients with macular degeneration likely reflects enhanced dendritic branching or glial processes at that locus.

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**PLE06.02**

**Effectiveness of Problem-Solving Treatment for depression integrated into low vision rehabilitation services: A pragmatic randomised controlled trial**

Edith Holloway¹, Jing Xie¹, Bonnie Sturrock¹, Jill Keeffe¹, Mark Hegel², Robin Casten², Eric Finkelstein⁴, David Mellor⁵, Ecosse Lamoureux⁶, Gwyneth Rees¹
¹Centre for Eye Research Australia, EAST MELBOURNE, Australia
²Dartmouth-Hitchcock Medical Center, LEBANON, U.S.A.
³Thomas Jefferson University, PHILADELPHIA, U.S.A.
⁴Duke-National University of Singapore Medical School, SINGAPORE, Singapore
⁵Deakin University, BUNDOORA, Australia
⁶Singapore Eye Research Institute (SERI), SINGAPORE, Singapore

Depression is highly prevalent in people with vision impairment (VI) yet few receive evidence-based psychological intervention. This study aimed to investigate the effectiveness of integrated telephone-delivered Problem-Solving Treatment (PST) for adults with VI and depressive symptoms. A pragmatic, two-arm randomised controlled trial conducted across 28 low vision rehabilitation (LVR) centres in Australia. 163 LVR clients with depressive symptoms (Patient Health Questionnaire-Nine (PHQ-9) score ≤5) were randomised to PST plus usual care (n=82) or usual care alone (n=82) and completed telephone assessments pre-post intervention and at 6 and 12-month follow-up. The primary outcome was a reduction in depressive symptoms at 6 months, where a ≤5-point reduction on the PHQ-9 was considered a clinically significant change (CSC). Secondary outcomes were maintenance effects at 12-month follow-up, changes in health-related quality of life (HRQoL) and vision-specific distress at 6 and 12 months. Intention-to-treat (ITT) and per-protocol (PP): completed ≤4 sessions) analysis was conducted. ITT analysis of the primary outcome showed a significant treatment effect at 6-months (Cohen’s d = -0.81, 95% CI -1.15 to -0.46) in the intervention group and 40% achieved a CSC compared to 14% of controls (adjusted odds ratio 5.72, 95% CI 1.61 to 20.36). Treatment effects were maintained at 12-month follow-up in the PP sample (d’=0.59, 95% CI 1.09 to -0.08) but not ITT analysis. The intervention group had greater improvements in HRQoL (ITT d’=0.39, 95% CI 0.05 to 0.72) and vision-specific distress (ITT d’=0.40, 95% CI 0.07 to 0.73) at 6 but not at 12 months. Telephone-delivered PST administered by a LVR practitioner is an effective model for reducing depressive symptoms experienced by people with VI attending Australian LVR centres. Findings underscore the importance of sustained participant engagement with PST-PC (≤4 sessions) to achieve...
significantly increased the number of rehab goals they wished to pursue (p<.001). Self reading (2.82 logits, p<.001), visual info (1.20 logits, p<.001), visual motor (0.50 logits, p<.025). Participants 1.8

(PLE06.03)

Screening for visual perceptual disorders with the DiaNAH test battery: validity and efficacy in rehabilitation practice

Joost Heutink1, Stefanie de Vries2, Bart Melis-Dankers3, Frans Cornelissen4, Oliver Tucha5
1Royal Dutch Visio / University of Groningen, HUIZEN, Netherlands
2University of Groningen, GRONINGEN, Netherlands
3Royal Dutch Visio, HAREN, Netherlands
4University Medical Centre Groningen, GRONINGEN, Netherlands

Introduction: Adequate assessment of visual perception is crucial for diagnosis and rehabilitation of patients with acquired brain damage. We developed the DiaNAH test battery for the screening of mid-level and higher-order visual perceptual disorders in clinical practice. The DiaNAH battery consists of 11 different tests and can be administered in 30-60 minutes. An essential feature of the DiaNAH battery is that it is administered on a 24” tablet, connected to a laptop. This allows dual screen technology, enabling the assessor to follow the patient’s activities on the tablet. The tablet is to be used with a wireless, battery-free electronic pen, which imitates paper and pencil administration. The software (DiagnosIS, developed by Metrisquare; www.diagnoseis.com) processes performance online and generates a clinical report (including comparison to normative data) and a scientific report.

Methods: The DiaNAH test battery is implemented in 19 rehabilitation centers of Royal Dutch Visio and Bartiméus in the Netherlands. So far, we performed a validation study, a normative study and a simulation (malingering) study, including healthy controls (n=600) and patients with visual problems after neurological disease (n=600). Anonymised data of the scientific reports are linked to independent variables such as age, sex, visual field deficits and type of neurological disease.

Conclusions: Evidence suggests that the DiaNAH test battery is of added value for the assessment of visual perceptual disorders in clinical practice. It gives quick insight into the likelihood that a patient has perceptual disorders. It provides information about the possible nature and severity or the perceptual problem (e.g. mid-level, spatial, object-based) and may give direction to additional perceptual and neuropsychological assessment.

(PLE06.04)

E-Sight Quality of life and Efficacy Study (eQUEST)

Gislin Dagnelie1, Marie-Céline Lorenzini2, Judith Goldstein1, Samuel N. Markowitz3, Sophia Reyes3, Beatriz Patino3, Kristen Lindeman1, Sonya Braudway1, Michael Tolentino1, Scott Gartner1, Kanishka Jayasundera1, Lindsay Godsey1, Ashley Howson1, Walter Wittich1
1Johns Hopkins University, BALTIMORE, U.S.A.
2School of Optometry, University of Montreal, MONTREAL, QC, Canada
3Dept. of Ophthalmology, Univ. of Toronto, TORONTO, ON, Canada
4Center for Retina and Macular Disease, WINTER HAVEN, FL, U.S.A.
5Kellogg Eye Inst, Univ of Michigan, ANN ARBOR, MI, U.S.A.

Purpose: eSight Eyewear is a head-worn video imaging system intended to facilitate activities of daily living and improve quality of life for individuals with severe vision loss. The present clinical trial (NCT02616900) evaluated effects of eSight exposure and training on functional vision and vision-related quality of life.

Methods: In a prospective study, 60 participants (mean age 47, range 13-75) with stable central vision loss (acuity 20/80-20/400, visual field > 20°) were recruited across 6 sites (USA & Canada). Exclusion criteria were recent surgical/medical interventions or scoring <18 on the Montreal Cognitive Assessment-blind version. Data were collected at baseline (no device), at device fitting (with device), and after three months of training with and use of the device. Dependent variables were visual ability on a low vision questionnaire (VALVFQ-48), letter acuity (ETDRS), critical reading print size (MNRead), contrast sensitivity (MARS), face recognition, and a modified version of the Melbourne Low Vision ADL Index.

Results: First introduction of eSight Eyewear caused a significant improvement in VA (0.70±0.29 logMAR), CS (0.58±0.53 log units), and critical print size (0.58±0.34 logMAR), all p<.001. Home exercises did not result in significant further changes. Immediate changes in Melbourne ADL score (6.5±18.1, p<.004) and face recognition (7.9±14.5; p<.001) were followed by trends towards further improvement at follow-up: 3.3±16.5, (p=.17) and 1.8±17.7 (p=.32), respectively. VALVFQ-48 person measures improved overall (0.91 logits, p<.001), and for reading (2.82 logits, p<.001), visual info (1.20 logits, p<.001), visual motor (0.50 logits, p<.025). Participants significantly increased the number of rehab goals they wished to pursue (p<.001). Self-reported qualitative
improvements in object vision were common.
Conclusions: Introduction of eSight Eyewear resulted in immediate improvements in all measures; continued use did not lead to major improvements. Further studies will examine benefits of directed training, and possible differential effects of disease and vision rehab history.

PLE06.05

The Veterans Affairs Low Vision Intervention Trial (LOVIT II)
Joan Stelmack
MPH Hines VA Blind Rehabilitation Center, Illinois Eye and Ear Infirmary, CHICAGO, U.S.A.

Purpose: A clinical trial was conducted to determine if low vision (LV) devices with LV rehabilitation (including therapy and homework to teach device use, eccentric viewing, and environmental modification) is more effective than basic LV (devices dispensed without therapy) for U.S. Veterans with macular diseases and best-corrected distance visual acuity in their better-seeing eye (BCDVA better-eye) of 20/50 to 20/200.

Methods: Telephone interviews of patients were conducted in their homes before and after participation in an outpatient LV program at a VA facility. Outcome measures were comparison of changes (baseline to 4 months) in overall visual ability and in 4 functional domains (reading, mobility, visual motor and visual information processing) estimated from responses to the VA LV VFQ-48 and comparison of MNREAD changes (baseline to end of treatment).

Results: Basic LV was effective in improving visual ability. However, the LV rehabilitation group improved more in all visual domains except mobility and in all MNREAD measures except critical print size. Differences were 0.34 logit reading (P=.05), 0.27 logit visual information (P=.04), 0.37 logit visual motor (P=.01), and .27 logit overall (P=.01). -0.11 logMAR reading acuity (P<.001), and maximum reading speed mean increase of 21.0 words/min (P=.05). In stratified analyses, the LV rehabilitation group with BCDVA better-eye worse than 20/63 to 20/200 improved more in visual ability (reading, visual motor and overall). Differences were 0.56 logit reading (P=.02), 0.40 logit visual motor (P=.4) and 0.34 logit overall (P=.2). There were no significant differences between treatment groups for those with BCDVA better-eye 20/50 to 20/63.

Conclusions: Both basic LV alone and combined with LV rehabilitation were effective, but the added LV rehabilitation increased the effect only for patients with visual acuity 20/63 to 20/200. Basic LV services may be sufficient for most patients with macular diseases and mild visual impairment.

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SYM01.01

Understanding the complexity of congenital deafblindness
Jude Nicholas
, Norway

UMERIC

SYM01.02

Effective Instruction of Students who are Deafblind: What is the State of Our Evidence?
Susan Bruce
, U.S.A.

UMERIC

SYM01.03

Intersubjective communication: A model for guiding high quality communication interventions in people with deafblindness
Marleen Janssen
University of Groningen, GRONINGEN, Netherlands
The family has the most significant influence in the life of a young child. Parents are first and most important teachers from infancy through the preschool years. Nowadays, Early Intervention programs are more focused on parents and their needs. Informing and education of parents is crucial moment in every Early Intervention program. It is based evidence that the more parents are informed, the less is the level of stress. There is a huge and constant impact of Visual Impairment on whole development. Visual impairment has a serious consequence for early development, particularly in those with most profound impairment.

Aim of this paper is impact of early education on parents’ attitude and behaviour regarding child. Sample was consisted of group of 20 parents with visually impaired children. All families were included in Early Intervention program in “Mali dom – Zagreb” during the first year of child’s life. Vision Therapist was a member of Early Intervention team. While were included in Early Intervention program, the education of parents was focused on following subjects considering vision:

- Knowledge about child’s functional vision
- Steps in conducting Visual Stimulation
- Handling/posture of a child during everyday activities
- Adaptation of everyday activities and toys
- Adaptation of environment
- Procedures in everyday activities regarding visual impairment

Impact of education on parent’s attitude and behaviour was investigated through next items:

- Comprehension of recommendations
- Feasibility of recommendations
- Modifying and management of parent’s behaviour
Introduction/aim: An estimated 19 million of the world’s children are low vision. The rehabilitative outcomes of these children may vary, depending on a number of factors, including the severity of the relative’s visual impairment, cognitive functioning, family support (parent education) and access to services. The aim of this study was to identify the role of parents education and support in the rehabilitation process of low vision children.

Methods: A longitudinal study was conducted. 24 low vision children and their parents were recruited. The rehabilitation followed these steps: examination to establish the cause of visual loss, surgical or drug interventions (if necessary), assessment of the child’s various visual functions (distance vision, near vision, chromoptometry, contrast sensitivity and visual field), accurate refraction and provision of spectacles, assessment for and prescription of low vision devices (such as magnifiers), suggestions for non-optical low vision devices (such as reading stands or reading slits), training in the use of low vision devices (with follow-up), parents education (including given information about their child’s condition and its implications, how to help their child to improve the activity of daily living (ADL) and learning ability). Data were collected using the visual function survey scale, low vision quality of life questionnaire, rehabilitation needs assessment table and parents support questionnaire. Collected data were analyzed using multiple linear regression.

Results: The mean age of children was 8.4±1.6 years. After four times of follow-up, 8 children (33.33%) obviously improved their ADL and learning ability, 11 children (45.83%) mildly improved while 5 (20.83%) children did not improve. Significant correlation existed between rehabilitative outcomes and parents support.

Conclusion: These findings showed the important role of parents education and support in the rehabilitation process of low vision children. Routinely incorporate parents into different aspects of low vision children rehabilitation services was suggested.
and 1.96% (95% CI: 1.20 to 3.61) respectively.

Conclusion
This study is the first to use capture-recapture methods for measuring the prevalence of visual impairment in any region of New Zealand. The results are useful for planning vision health and rehabilitation services in this country.

SYM07.04
Study of the Uptake of Low Vision Rehabilitation Services
Judith Goldstein, Bonnielin Swenor
Johns Hopkins School of Medicine, LUTHERVILLE, U.S.A.

Aim: To determine the incidence and prevalence of low vision (LV) among patients seeking ophthalmic care, and estimate the percentage of low vision rehabilitation (LVR) service uptake.

Methods: Electronic medical record (EMR) data was obtained for all patient encounters in 2014 (n=104,668) at the Wilmer Eye Institute. LV status at each visit was categorized as visual acuity (VA) worse than 20/40 in the better eye. Best-corrected VA was primarily used, and if not recorded, the better of pinhole or habitual VA was relied upon. Prevalence and incidence estimates, and 95% confidence intervals (CI) were determined. Utilization of LVR services at Wilmer was determined over the subsequent 12 months from the date first identified as meeting LV criteria (index appointment). The characteristics of those with and without LV, and LVR “users” and “nonusers” were evaluated.

Results: In 2014, 93,455 patients had VA data recorded during at least one visit (89.3%). The prevalence of LV was 10.5% (95% CI: 10.3% to 10.7%) and incidence was 3.5% (95% CI: 3.4% to 3.7%). LV patients were more likely to be older (61 vs 55 years old) and male (43% vs 41%), and less likely to be white (64% vs 70%) (p<0.001 for all) than those without LV. Of patients with LV, 1,568 (16.3%) utilized LVR services at Wilmer. The mean time from the LV index appointment to the initial LVR appointment was 221 days. LVR users were more likely to be older (67 vs 60 years old) and female (60% vs 56%) (p<0.01 for all) than non-users.

Conclusions: This data provides an estimate of the number of patients seeking eye care who may benefit from LVR and the magnitude of potential underutilization of LVR services. These estimates may be informative for health care planning and developing interventions aimed at improving LVR utilization.

SYM07.05
An online community of practice developed in co-creation with professionals to share practice based knowledge
Marit Van Buijsen¹, Lisanne Teunissen¹, Uta Roentgen², Peter Verstraten¹, Luc de Witte³
¹Robert Coppes Foundation, VUgHt, Netherlands
²Zuyd University of Applied Sciences, HEERLEN, Netherlands
³University of Sheffield, SHEFFIELD, United Kingdom

INTRODUCTION / AIM
Supporting adults who are visually impaired and have psychiatric disorders and possibly other additional disorders (adults with ViP) can be challenging for professionals. Evaluated methods and protocols for the guidance of this target-group are lacking. Professionals use a lot of practical knowledge and experience and this helps them to support their clients with solving their complex problems. This implicit knowledge is valuable but needs to be made explicit to make this expertise available for others.

CONTENT
For this purpose an online Community of Practice (o-CoP) was built in an interdisciplinary collaboration of professionals (behavioral scientist, psychiatrist, recreation therapist, sheltered housing supervisor) from different organizations who work with adults with ViP. This o-CoP provides the professionals with an online platform where they can share their best practices, knowledge and expertise and learn from each other. It creates a possibility to interact with professionals from (other) organizations who work with this complex target-group and to ask professionals worldwide for advice in specific situations.

IMPLICATIONS
The o-CoP was developed in an iterative process using (online) focus groups, and (online) interviews with professionals working with adults with ViP to establish their needs and requirements for the o-CoP. In this iterative process the end-users proposed desired functionality, lay-out, and content, and provided feedback on first drafts so that the o-CoP could be built and adjusted. By involving the end-users from the start, feasibility and implementation of the o-CoP were fostered. In this first phase, professionals from organizations specialized in the care for adults with ViP in the Netherlands were involved. In subsequent phases, professionals from adjacent organizations and
from other countries will be invited. Continued use of the o-CoP will improve professionals’ knowledge and can result in a higher quality of care.

**SYM07.06**

**Characterization of patients treated at the low vision service, clinical hospital university of chile**
Joaquin Varas, Patricio Bustamante, María Cecilia Oyarzún, Paola Pizarro, Marlene Vogel, Fabiola Werlinger
Universidad de Chile, SANTIAGO, Chile

Introduction/aim: In Chile there is scarce research in the low vision and visual rehabilitation field. The main aim of this research was to perform an epidemiological characterization of patients at the low vision service of the Clinical Hospital University of Chile.

Methods: A descriptive, cross-sectional, and retrospective study of data from patients treated in between March 2015 and October 2016 was created. All the data and profiles were made using the electronic clinical record and the entry form of the Unit. For the compilation and analysis, the MS Excel software was used and the relative frequencies for all the variables were calculated.

Results: The most frequent ophthalmological diseases found were genetic eye diseases (22.2%) and the age macular degeneration (17.8%). 57.8% of the patients presented some systemic pathology associated with low vision. 22.0% of the patients have used optical aids and only 6.0% of the patients received previously visual rehabilitation. In this study, the majority of the patients were female (55.5%), 60 years old or older (53.3%) and from urban areas (97.8%). 35.6% belonged to a low educational background. 80.0% were in the working age and 63.9% of them were inactive. Regarding their health insurance, 73.3% of the patients belonged to the public sector and 22.2% private.

Conclusion: It is very important to work on public health measures to ensure the prevention, access, rehabilitation and social and occupational inclusion of people with disabilities. In addition, it is relevant to invest in the creation of services focused on rehabilitation and in the training of professionals with necessary skills for the multidisciplinary work required in visual rehabilitation.

Supporting institutions:
- Departamento de Tecnología Médica, Facultad de Medicina. Universidad de Chile.
- Unidad de Baja visión. Hospital Clínico Universidad de Chile.

Disclosure: none.

**SYM08.04**

**Clinical experience with the WV bioptic driving program**
Monique Leys¹, Rebecca Coakley¹, Chuck Huss², Charles Moore¹, J.Vernon Odom¹
¹WVU Eye Institute, MORGANTOWN, U.S.A.
²Division of Rehabilitation Services, NITRO, WEST VIRGINIA, U.S.A.

Introduction
To evaluate the success of the West Virginia bioptic driving program by comparing our referrals to the graduates of the program.

Methods
We reviewed records of visually impaired individuals from the medical retina clinic and the adult low vision clinic at WVU who were referred to the Division of Rehabilitation for bioptic driving. Reason for vision loss, age of enrollment, and employment status were recorded.

Results
We identified 11 patients who were fitted with a bioptic driving lens. Five patients who used to be licenced drivers, received formal training and fulfilled the requirements instituted by the State of West Virginia to obtain a driver’s licence. Diagnosis were Best dystrophy (N=2), Stargardt dystrophy (N=2) and one patient with cone dystrophy. Four older adults who used to have a driver’s licence prior to loosing central vision qualified after limited instruction for a driver’s licence. Diagnosis were auto immune retinopathy (N=2), branch retinal artery occlusion and Stargardt Disease. One teen age Stargardt patient was enrolled in the course as a new driver, but did not pass the test. One patient with enhanced S cone syndrome developed additional visual loss before completion of the training. No patients with diabetic retinopathy or age related macular degeneration from our clinic enrolled in the program.

Conclusion
Those who were successful at completion of the program and who were granted a bioptic drivers license were typically employed, suffered from a retinal dystrophy and were highly motivated, educated and able to afford the device and time commitment. Although much more prevalent, age related macular degeneration or diabetic
retinopathy patients did not seem to take advantage of this important program in West Virginia.

**SYM08.05**

**Visual reaction time abilities relation to driving performance**

Jan Andersson  
Swedish National Road and Transport Research Institute, VTI, LINKÖPING, Sweden

Background: The literature suggests that ocular diseases are negatively related to driving performance. The summarised data on patients with Glaucoma, Cataract, age-related macular degeneration (AMD), and diabetic retinopathy reveal, on a general level, that ocular diseases impair driver performance. The literature also suggests, for instance, that not all Glaucoma patients fail on-road driving tests. In summary, the majority of the research literature results indicate, a) general decline in driving performance due to a visual impairment, but b) this is not true for all patients with the same visual deficit. Method: Twenty participants with a visual deficit and 83 without, took part in a high-fidelity simulator based experiment. All participants completed a scenario that took approximately 50 minutes and included 37 events of special interest. All participants completed several perceptually demanding reaction time tasks as a complement to the simulator drive. Visual deficits participants were also rated as pass or fail on the driving test by independent traffic inspectors and/or traffic safety researchers (agreement 18 out of 20). Result: Nine of the 20 visual deficit patients failed and 11 passed the driving test. On a general level, visual deficits patients were slower to react but not on all tasks. The results revealed that participants who passed were faster than participants that failed the driving test on driving related reaction time tasks. The opposite was true for tasks unrelated to the driving task. The visual deficit group also revealed no inhibition effects measured by the Simon task. Conclusion: Hence, the results from the study support the general findings on visual deficits patients but also reveal a complexity where context dependency and/or developed strategies seems to be crucial.

**SYM08.06**

**Development of an assessment system of driver visual behaviour on car simulator**

Josee Duquette¹, Walter de Abreu Cybis², Marie-Chantal Wanet-Defalque², Isabelle Gelinas³, Genevieve Lize²  
¹Institut Nazareth et Louis-Braille, LONGUEUIL, Canada  
²CRIR-Institut Nazareth et Louis-Braille, LONGUEUIL, Canada  
³McGill University and CRIR-Jewish Rehabilitation Hospital, MONTREAL, Canada

Driving relies heavily on vision. Driving simulators offer a safe, controlled and standardized evaluation of the effect of visual impairment on various aspects of the driving performance. Visual behaviours are most of the time inferred from operational and tactical ones. However, their measurement is of upmost importance, especially with visually impaired persons. To achieve this goal, a driving assessment system, including a driving simulator and a wearable eye tracker, has been developed by the Research Centre of the Institut Nazareth et Louis-Braille (INLB). Purpose: To describe the development and components of the INLB assessment system of driver visual behaviour on car simulator. Methods: Modified driving scenarios of an immersive high-fidelity car driving simulator are projected on three large-screen panels with a 180-degree field of view. The 7.5 km total drive, performed on highways and urban boulevards, under light to heavy traffic conditions, includes common driving situations (pedestrians, cross intersections, merging, lane change, etc.). Operational data are collected by the simulator (eg: driving speed); a Tobii Pro Glasses 2 eye tracker shows what the person is looking at. Expected visual behaviours for safe driving (235 items), determined from literature data, a scientific committee and an expert consultation, are assessed with a grid specifically developed for the simulator scenarios, along with general driving behaviours (eg: safety, lane position). A software platform synchronizes the eye tracker video, specific simulator data (eg: driving speed) and the driving assessment grid, for data collection and analysis. A validity and reliability study of the driving assessment system is ongoing. Conclusions: The INLB assessment system of driver visual behaviour on car simulator has been developed to answer clinical and research needs. It will allow a better understanding of the visual and global behaviours during driving activity and how the type and severity of the visual impairment influences them.

**SYM09.05**

**Stroke-related visual field loss and its impact on daily life: a qualitative exploration**

Christine Hazelton¹, Alex Pollock¹, Anne Taylor², Marian Brady¹

¹Institut Nazareth et Louis-Braille, LONGUEUIL, Canada  
²McGill University and CRIR-Jewish Rehabilitation Hospital, MONTREAL, Canada
Introduction
Visual field loss (VFL) persists in 20% of stroke survivors. There is, however, little research into the impact of such sensory loss on people’s lives. The aim of this study was to explore stroke survivors’ experiences of VFL and its impact on their everyday life.

Methods
Home dwelling adult stroke survivors with VFL, at least six months post-stroke, were recruited from two Scottish rehabilitation centres. All gave written consent after the provision of accessible study information. Semi-structured interviews were conducted in their homes; these were audio-recorded, transcribed and analysed thematically using nVivo software. An analysis framework was developed and applied by two researchers. This was summarised and interpreted by one researcher, firstly into descriptive themes, followed by themes that provided explanation.

Results
Twelve stroke survivors were recruited (6 right-sided VFL, 6 males, 6-16 months post-stroke). Three broad descriptive themes were identified, with participants experiencing the impact of VFL on their everyday activities, personal relationships & emotional responses. Participants described difficulty navigating; many had stopped driving and all struggled to read. Social difficulties relating to the hidden nature of visual loss were common and participants reported fear and loss of self-confidence. Further analysis identified lack of sensory awareness of VFL underpinned these effects, and made it difficult for individuals to recognise and compensate for their vision loss. Two distinct responses to VFL were identified (i) avoidance of tasks or activities and (ii) adaptation to changed vision, associated with new head and eye movements.

Conclusion
VFL has a very broad effect on daily life so must be managed appropriately to minimise its consequences. As such, more research is urgently needed into effective, feasible rehabilitation. Work should specifically explore how best to address the lack of sensory awareness, as well as how variations in response to VFL affect the rehabilitation process.

SYM09.06
A 30-minute screening to assess visual perceptual disorders following acquired brain injury
Stefanie de Vries1, Joost Heutink1, Bart Melis-Dankers2, Anne Frijling3, Frans Cornelissen3, Oliver Tucha1
1University of Groningen, GRONINGEN, Netherlands
2Royal Dutch Visio, HUIZEN, Netherlands
3University Medical Center Groningen, GRONINGEN, Netherlands

Introduction: Visual perceptual disorders are common after acquired brain injury (ABI). Since these impairments are known to affect daily functioning of patients, adequate assessment is of importance for diagnosis and rehabilitation. However, there is no consensus yet on how to assess these disorders. The aim of the present study was to explore what measures are considered as important to be part of a test battery for the screening of mid-level and higher-order visual perceptual disorders. Methods: This study is performed in the context of an InSight-project. A Delphi method was used to achieve consensus on the content of the test battery. The opinions of 28 international multidisciplinary experts in visual perception were collected. Initially, the experts were asked to anonymously suggest visual perceptual disorders that are relevant for such a battery and to propose tests that, according to their expert opinion, are suited for the assessment of these disorders and by this important to include in the screening. Subsequently, the experts were asked to select and rank the most important tests for inclusion in the test battery.

Results: Seventeen experts evaluated the test battery proposed in the final round of the Delphi process. Consensus was achieved (94%) on a battery of 11 distinctive visual perceptual tests with an expected administration time of 30 minutes. Conclusion: The current study provides an essential step in the development and implementation of a standardized test battery for the screening of mid-level and higher-order visual perceptual disorders. The battery may improve effectiveness of clinical assessment by providing insight into potential deficits in little time, thereby initiating further assessment. The test battery is implemented in 19 rehabilitation centers of Royal Dutch Visio and Bartiméus in the Netherlands. Further studies are currently performed that focus on the validation of the suggested test battery and that collect normative data.

SYM10.05
Developing human resources for low vision in Shanxi Province, China
Suit May Ho1, April Zhou1, Li Hua Zhang2, Luigi Blotto3, Mitasha Yu1, Hasan Minto1

1Glasgow Caledonian University, GLASGOW, Scotland
2University of Stirling, STIRLING, Scotland
Background/Aim: Shanxi province is located in a disadvantaged part of China. Eye care for the 7.8 million children is provided by 20 paediatric ophthalmologists, largely clustered in the capital city, Taiyuan. The Shanxi Provincial Eye Hospital (SPEH) in Taiyuan is the main provider of eye care services. As part of the Seeing is Believing “Children’s Healthy Eyes bring Educational Rewards” project, a network of low vision (LV) clinics was established and a multilevel education program introduced to develop human resources to provide LV rehabilitation and services.

Content: In order to update and upskill practitioners in provision of refraction services, refresher training was conducted for 21 Shanxi optometrists and ophthalmologists at project commencement. Three optometrists based at SPEH were selected and supported to become master LV trainers and 12 candidates from the refresher group were chosen to undertake LV training. The LV practitioners trained 1,500 key informants to refer for services. The master trainers are responsible for the provision of refresher training and mentoring of other LV practitioners.

Implications: Ten LV clinics have been established in Shanxi. While there is a network of key informants, low referral numbers remain a problem. Challenges faced by the LV practitioners include lack of confidence due to limited clinical exposure from low patient numbers, low community awareness including among ophthalmologists, low priority due to limited income generation and time allocation. Strategies to overcome these include LV refresher training to improve confidence, a mentoring network, meetings with department heads to strengthen support and increase time allocation for LV services, an incentive scheme, prioritising LV services as a charitable service, increasing linkages and building referral networks. LV services were also extended to the elderly to increase awareness, clinical exposure and provide assistance to those in need. Increasing patient numbers and workplace support have increased LV practitioners’ confidence.

SYM10.06
THE DEVELOPMENT OF LOW VISION SERVICES IN THE REPUBLIC OF MOLDOVA
Tatiana Ghidirimschi1, Hans Bjorn Bakketeig2, S May Ho3
1LOW VISION CENTRE, CHISINAU, Moldova
2Hjelp Moldova, OS, Norway
3Brien Holden Vision Institute, SYDNEY, Australia

Background/Aim: Moldova is a disadvantaged Eastern European country. A survey conducted in 2012 found the prevalence of vision impairment (VI) to be 19.5% in people aged over 50 years. Hjelp Moldova, a Norwegian organization established to work with people with low vision (LV), found children with correctable refractive errors attending blind schools as they had not been properly assessed or had access to spectacles. They also identified a lack of eye care equipment, rehabilitation services for people with VI and knowledge among health professionals, teachers and families about people with VI. Eye care professionals also lacked adequate training in performing refractions. Hjelp Moldova started a program with the aim to create sustainable LV services and strengthening of eye care in Moldova.

Content: A LV Center was established in 2009. Forty-five hospitals and polyclinics were equipped with primary eye care equipment. Nine hospitals were provided with advanced equipment for treatment of ocular disease. Refraction courses were conducted for 39 ophthalmology residents and ophthalmologists in conjunction with the Brien Holden Vision Institute. Six ophthalmologists were trained as refraction trainers. Seminars were held to educate over 300 health professionals and 110 teachers on the rehabilitation of people with VI.

Implications: The LV program has provided services to 5700 people with VI. Some 30 children with LV are able to study in general schools with another 50 in universities. There is an increased understanding of LV rehabilitation and its need amongst health professionals and teachers. The refraction courses highlighted the need for optometry services and had led to the initiation of an optometry education in Moldova. While development of human resources is a step towards sustainability, for long term sustainability, the Government of Moldova needs to assume responsibility for the services and advocacy for this is ongoing.

SYM11.05
Screening Technology: the gateway to vision rehabilitation
Karen Seidman, Mary Ann Lang Phd
North Star Vision Group, NEW YORK, U.S.A.

Vision is critical to children’s development as the major sense that they use to gather information about the world.
Vision loss can affect all developmental domains. The vital precursor to the commendable goal of low vision rehabilitation as a global right is the early detection of vision problems. The earlier that vision problems can be found, the greater the likelihood that vision-threatening conditions can be corrected or improved or that vision rehabilitation interventions can be initiated. Pre-school and school-age vision screening on a global scale is key to the approach that is needed to stem the spread of undetected vision loss in children. Instrument-based and optotype-based screening each have their place, but the earlier that optotype-based testing can be used, the more pertinent. Emerging technologies provide us with opportunities for large scale, cost effective interventions. Of equal importance is the collection of useful data for the appropriate management of individual children’s vision care and aggregate data for large-scale advocacy. This talk will present the advantages and disadvantages of several screening methods in the context of both the 2016 Policy Statement of the American Academy of Pediatrics and broad-based data needs. Examples of a large-scale international pilot project and US-based school district-wide screenings will illustrate replicable approaches to children’s vision screening and suggest opportunities for further research.

SYM11.06

Validation of ASTEROID v0.933, an engaging and glasses-free stereotest on a 3D tablet
Kathleen Vancleef¹, Ignacio Serrano-Pedraza², Graham Morgan¹, Craig Sharp³, Carla Black¹, Therese Casanova¹, Jessica Hugill¹, Sheima Rafiq¹, Kate Taylor³, Helen Haggerty¹, Michael Clarke¹, Jenny Read¹
¹Newcastle University, NEWCASTLE UPON TYNE, United Kingdom
²Complutense University of Madrid, MADRID, Spain
³Newcastle Eye Centre (Royal Victoria Infirmary), NEWCASTLE-UPON-TYNE, United Kingdom

Stereoacuity is impaired in children with strabismus or amblyopia. However, measuring it can be challenging because of low reliability of the stereotests, reluctance of children to wear 3D glasses, and keeping the viewing distance constant. To facilitate stereotesting, we have developed an Accurate STEReotest On a mobile Device (ASTEROID). ASTEROID runs on a glasses-free 3D tablet and viewing distance is automatically controlled. A dynamic random-dot stereogram is shown to avoid monocular cues. To keep children engaged the test is embedded in a game. In the current study we evaluate the validity of ASTEROID version 0.933. 172 children between 6 and 11 years old participated in the validation study to evaluate agreement between stereothresholds on ASTEROID and a gold standard stereotest. All children were screened for amblyopia and strabismus. They completed ASTEROID, the Randot Preschool stereotest, a Cover Test, and a logMAR visual acuity test in a random order.

We observed a correlation of 0.44 (p < .001) between stereothresholds on ASTEROID and the Randot Preschool stereotest. However, stereothresholds on ASTEROID were significantly higher than on Randot (t(171) = -16.50, p < .001). 24% of the children with normal vision failed on ASTEROID (thresholds > 1000 arcsec), while only 2% failed on Randot. The three children that failed the Cover Test, which indicates strabismus, could not demonstrate stereovision with ASTEROID or Randot. Of the five children with a significant difference between left and right visual acuity, which indicates anisometropic amblyopia, four also failed on ASTEROID, all failed on Randot. We observed higher stereothresholds with ASTEROID compared to a gold standard stereotest. As expected, children with suspicion of strabismic or anisometropic amblyopia showed stereothresholds above 1000 arcsec on ASTEROID. We are continuing to modify ASTEROID to try and reduce the number of failures in children with normal vision.

SYM12.06

Relocation of the Preferred Retinal Locus With Prism in Subjects With a Central Scotoma
David Lewerenz¹, Daniel Blanco², Chase Ratzlaff², Ashley Zodrow²
¹University of Colorado School of Medicine, AURORA, U.S.A.
²Northeastern State University, TAHELLEQUAH OK, U.S.A.

Introduction
The relocation of the preferred retinal locus (PRL) with prism continues to be controversial since its introduction 35 years ago. A study from 2001 showed that foveal fixation did not change location in normally sighted subjects when analyzed with a scanning laser microperimeter. This study aims to explore the same question, but in patients with central scotoma.

Methods
We determined the location of the PRL by performing scanning laser microperimetry using the MAIA instrument by CenterVue on 14 subjects with central scotoma. Each subject was tested on their better eye without any lens. The
same eye was then evaluated in random order through a “control” lens without prism, with 6 prism diopters base-up and with 10 prism diopters base-up. The examiner and subject were masked as to which lens was placed before the subject’s tested eye.

Results 
There was no significant difference between the PRL location without a lens and with the “control” lens. With both of the prism lenses, the PRL was shifted superiorly (in the direction of the prism base) nearly 85% of the time, but the amount of relocation was far less than the power of the prism. Furthermore, the amount of vertical displacement of the PRL was not significantly different from the horizontal relocation, and no horizontal prism was used. Results were not significantly different in subjects with superior vs. inferior PRLs, steady vs. unsteady fixation or by age. 

Conclusion 
It appears from the results of this small study that there was not a clinically significant relocation of the PRL when prism was introduced. 

Institution: Northeastern State University Oklahoma College of Optometry 
Disclosures: None 

SYM15.06

Deafblind people dreaming about an accessible life
Eric van Heuvelen
Bartimeus, institute for the visually impaired, DEVENTER, Netherlands

For Deafblind people it is very difficult to find the right aids: aids for blind or visually impaired people are often not applicable to them. Also many aids specific developed for deaf and hard-of-hearing people are difficult to use by them. Especially if combining of these aids is necessary then these aids turns out to be difficult to connect or aren’t able to work together. Furthermore, the specific combined disability “deaf blindness” needs specific tools which can realize and ensure accessibility. Increasingly, these problems and questions about accessibility were heard more and more at the Bartiméus Institute and this has led to an unique approach: Within small groups of deafblind people brainstorming sessions are held. To them was asked to indicate which (practical) problems they run into and specially, for which of those problems (as far as known by them) are no solutions available. For this there were no limits: everything could be brought up for discussion! These sessions were the starting point of finding solutions, often by thinking “out of the box”. Thereby the Deafblind people were actively involved and were also part of development pathways and test panels. The desire to be able to use a database in which aids for Deafblind people are reflected also has been realized. In the setting up of this database and also in its management, deafblind people are actively involved. We want to tell you about the way we started up the brainstorming sessions and want to discuss about the problem which were mentioned during those sessions and the way we worked on solutions. Also we want to exchange the experience of participating Deafblind people in this process. Finally we give attention to the realization of the developed database and in which way the Deafblind people have participated.

SYM18.03

The mediating role of mobility restrictions in the association between glaucomatous visual impairment and depression
Ger van Rens, Hpa van der Aa, Jl Schroevers, Jl van Rijn, H Tan, Rma van Nispen
VUmc, HELMOND, Netherlands

Purpose: To determine the optimal approach for treating depression in patients with glaucoma, we investigated the potential mediating role of mobility restrictions in the association between visual impairment and depression. 

Methods: Cross-sectional study in 83, mean age 71 years, 60% male, (24% low vision) glaucoma patients. Mean deviation of -12dB or less and/or a decimal visual acuity of 0.32 or less in the best eye indicated having low vision. Depression was measured with the Patient Health Questionnaire-9 and mobility-related quality of life was assessed with the Glaucoma Quality of Life Questionnaire-15, with a central-, peripheral-, dark/light and outdoors subscale.

Results: A significant association between glaucomatous visual impairment and depression was found (OR 1.7, p=0.02). Visual impairment was strongly associated with dark/light-and peripheral-related mobility restrictions (β 6.2, p<0.001 and β 5.6, p<0.001, respectively), followed by central- and outdoors-related mobility restrictions(β 2.2, p<0.001 and β 0.9, p<0.001, respectively). Depression was most strongly associated with outdoors- and central-related mobility restrictions (OR 2.4, p<0.001 and OR 1.6, p<0.001, respectively), followed by dark/light-and peripheral-related mobility restrictions (OR 1.2, p<0.001 and OR 1.2, p<0.001, respectively). When all mobility-related quality of life subscales were included as mediators, central- and peripheral-related mobility most strongly influenced the association between visual impairment and depression (indirect effect 0.6, 95% CI 0.02 – 1.1 and
indirect effect 0.5, 95% CI 0.2 – 1.0, respectively). The total indirect effect of all subscales was greater than 1, complicating the interpretation of the mediated proportions.

Conclusion: Especially, central- and peripheral-related mobility play a significant role in the association between glaucomatous visual impairment and depression. Glaucoma patients with higher central- and peripheral-related mobility restrictions could be identified as those at risk of developing depression. Rehabilitation interventions could be targeted both directly at depression and at improving mobility to prevent and reduce mental health problems.

SYM18.05

Gaze scanning and detection of hazards by drivers with hemianopia

Alex Bowers, Concetta Alberti, Robert Goldstein, Eli Peli
Schepens Eye Research Institute, Harvard Medical School, BOSTON, U.S.A.

Introduction: We investigated whether people with homonymous hemianopia (HH) were able to adapt their blind-side scan magnitudes (without training or instructions) in response to differing scanning requirements for detection of pedestrians in a driving simulator.

Methods: Two types of pedestrians were presented in the driving simulator. Stationary pedestrians outside the travel lane were presented in one session and approaching pedestrians on a collision course in the other. Equal numbers of pedestrians were presented at the same eccentricities on the left and right. Eye and head movements of 12 participants with complete HH were tracked while they drove in the simulator and performed the pedestrian detection task. No instructions were given about how far to scan to the blind side. After appearing, the stationary pedestrians’ eccentricity increased rapidly from ≈14° to median 31° after 2.5 s requiring increasingly larger scans for detection on the blind side. By comparison the approaching pedestrians’ eccentricity remained constant at ≈14°, requiring a more moderate scan (≈14°) for detection on the blind side.

Results: Contrary to expectations, median blind-side gaze scan magnitudes did not differ in the two conditions (approaching: 14° [IQR 9-15°]; stationary: 13° [IQR 9-20°]; p = 0.43). Only three subjects showed evidence of adapting (increasing) their blind-side gaze scan magnitudes in the stationary condition between the start and end of the session. One subject also showed adaptive behavior in the approaching condition, decreasing blind-side gaze scan magnitudes from 27° (larger than needed to detect pedestrians at 14°) to 11°.

Conclusions: Our results suggest the majority of participants did not apply voluntary cognitive control to modify their blind-side gaze scanning in response to the differing scanning requirements for successful detection of the two types of pedestrians despite the information about pedestrian eccentricity available in the seeing hemifield.

SYM19.06

Improving the education, rehabilitation and integration of learners with visual impairment in north-eastern D.R.Congo: success and challenges

Byaruhanga Ismael Kusemererwa¹, Buurmeijer Annelies²
1Centre for Education and Community Based Rehabilitation CERBC-DRCongo, ARU, Zaire
2Royal Dutch Visio, AMERSFOORTSESTRAATWEG, Netherlands

Access to information about people with visual impairment is relatively minimal in the Democratic Republic of Congo (DRC) and the efficient planning for their education and social integration has been significantly hindered for decades. In 2004 a local non-governmental organization < CERBC-DRCongo> was initiated with the purpose to tackle exclusion and poverty through education and rehabilitative to restore the dignity of people with disabilities through an integrated approach. In order to improve the education of learners who are blind and Low vision in the North-eastern of the DRCongo, a partnership was concluded between Royal Dutch Visio. The objective of this paper was to determine the educational support provided to learners who are blind and low Vision and the impact to their academic performance. Training of teachers and the educational leaders was found to be one of the key success for the implementation and organisation of education for children who are blind and low vision. Although teachers have been trained, they accounted some major challenges during preparation and teaching Arithmetics and Mathematics due to lack of long-term exposure to practice post training. Some educational books are difficult to interpret after the teachers leave; Absence of audio material constituted also a major challenge to improve services for learners who are blind and Low vision In order to improve more the education and integration of learners who are blind and low vision in the North-eastern of the DRCongo, there is need for more collaboration between CERBC- DRCongo and Royal Dutch Visio for knowledge transfer, as well as the duration of the training should be sufficient to allow teachers to practice under mentorship. In long run, a training collage for qualified teachers is of paramount.
SYM20.03

The progress of visual assistive technology in China
Chaokang Tan
Beijing Qibo Medical Research Institute, BEIJING, China

With the rapid development of social economy and science, Chinese visual assistive technology has made considerable progress. Social development has led to increased interest in knowledge among people with visual impairment, so a huge market has been grow up and promoted the development of visual assistive technology enterprises. From the earliest production of optical aids to the electronic devices now, Chinese enterprises to make various visual aids and rehabilitation equipments to meet the needs of China and various countries in the world. Chinese companies on visual assistive technology have also developed from a few to more than 100, and have been the brands manufacturers too, gotten the constant innovation especially in China 2020 program and the national science and technology plan. In the future, the clinical application of bionic eye, the innovation of software and various perceptual compensation devices, more and more Chinese visual assistive technology will be created from the perspective of ophthalmology, vision science, neuroscience and brain science, which improves visual cognition and functional vision for those patients with visual impairment.

SYM20.04

Real-time image enhancement in virtual reality applications for low vision people
Manuela Chessa¹, Alberto Patino-Saucedo¹, Horacio Rostro², Eric Castet³, Fabio Solari¹, Pierre Kornprobst⁴
¹University of Genoa, GENOVA, Italy
²University of Guanajuato, GUANAJUATO, Mexico
³Aix-Marseille Université - CNRS Laboratoire de Psychologie Cognitive, MARSEILLE, France
⁴UCA, Inria, Biovision team, SOPHIA ANTIPOLIS, France

In the last years, virtual reality technology has experienced a boost in affordability, and an increasingly number of applications have emerged proposing new immersive 360 degrees visual content. To make this content accessible for low vision people, one should adopt the same strategies as in traditional displays, i.e., use dedicated image enhancement methods to facilitate their interpretation. This work introduces a virtual reality application for mobile devices that implements real-time content enhancement. It is implemented as a visual search task in a set of static 360 degrees environments; the immersed user can manipulate the parameters of the enhancement algorithm in an intuitive way, using an external controller. In particular, we focus on the transform proposed by Peli et al (IOVS, 1991), which is based on an adaptive filter that controls the local contrast as a function of the local mean luminance of an image. Such a transform has been shown to improve recognition tasks in patients with moderate visual loss, central scotoma or cataracts. Our application is, to our knowledge, the first attempt to evaluate the impact of this image enhancement in an immersive virtual reality environment. In particular, our system allows the real time tuning of the transform, and provides all the quantitative data to analyse a posteriori users’ behavior and how parameters may impact their performance. Designed as a game, it is perceived as more enjoyable than traditional ophthalmologic experiments. More generally, this application could be a way for low vision people to adjust vision enhancements to their needs in everyday virtual reality applications, also for entertainment purposes. Acknowledgements: This work was partially funded by CONACYT (Consejo Nacional de Ciencia y Tecnología, Mexico)

SYM20.05

Mobile Applications (APPS) in the daily life of people with low vision
Maria Angeles Matey García, Concepcion Blocona Santos, Maria Jesus Vicente Mosquete
ONCE, MADRID, Spain

Over the last several years, mobile applications (apps) have become an essential tool for many people with visual disabilities, allowing them to continue enjoying their favourite pastimes, such as reading, while facilitating everyday activities. Thanks to these new technologies, they are more likely to integrate socially, enter the labour market and engage in leisure activities. Many people, especially the elderly, are very reluctant to use new technologies as they feel intimidated and insecure and this is even more the case when there is a visual impairment. To help remedy this situation, new apps are being
developed every day but information about their benefits does not always reach potential users. That is why we have incorporated some of these applications in rehabilitation programmes enabling users to:

- Gain confidence in using the apps by becoming familiar with the advantages they pose and their usefulness in everyday activities.
- Become more motivated to enter the realm of new technologies.
- Incorporate apps into their general repertoire of aids.

The apps that have been used enable users to recognise objects, coins and banknotes, detect light and obtain information on medicines. Tests have also been run on applications acting as a “magnifying glass” increasing text size and providing high contrast and audio. These studies compare user satisfaction with manual electronic magnifying glasses.

The communication will show the findings of this experience and present the conditions under which the apps can be used and their usefulness in everyday life.

**SYM20.06**

**Clinical applications of a new perimeter with video imaging technology**

Jacques Charlier¹, Xavier Zanlonghi²

¹Metrovision, PERENCHIES, France  
²Clinique Jules vernes, NANTES, France

Purpose

Video imaging consists in recording the entire visual field process in synchrony with the video of the patient’s head. Several clinical applications have been investigated to evaluate the clinical usefulness of this new technology.

Methods

The study included results from 48 visual field exams performed on a MonCvONE full field projection perimeter with synchronized video recording. The video from a large binocular viewing field camera was recorded in synchrony with the position of the visual stimulus, with other test parameters such as luminance and size and with the patient’s response obtained from the patient’s press button or from the operator judgment. The study included patients who were unable to perform automated perimetry due to young age or handicap, patients with low vision, abnormal eye movements, head posture or ptosis and controls performed after automated perimetry.

Results

Video recording was extremely useful in the majority of clinical cases. 24 exams were performed on young children (age between 2 and 5 years) using attraction perimetry. The eye orientation responses could be interpreted and validated after the exam. In other cases, the video recording facilitated the interpretation and documentation of visual field results with the inclusion of video snapshots in the examination report. Additional applications included the recording of cardinal eye gaze positions and of the fusion visual field.

Conclusion

Synchronized video imaging performed during visual field exams is a clinically useful tool for the examination of patients who cannot perform automated perimetry and for the documentation of artefacts and situations such as ptosis, abnormal eye movements, abnormal head posture and incorrect position of refraction.

**SYM28.06**

**Guiding the Visually impaired through the environment using EyeBeacons**

Jan Koopman¹, Timon van Hasselt¹, Joey van der Bie², Britte Visser², Mijnisha Singh², Jordy Matsari², Ben Krose²

¹Royal Dutch Visio, AMSTERDAM, Netherlands  
²Hogeschool van Amsterdam, CREATE-IT, AMSTERDAM, Netherlands

Visually impaired people often experience difficulties in navigating and orientating in the environment. Smartphones, more specifically the iPhone, are already popular amongst the visually impaired people and thereby serve as a good platform to explore in the development of new tools for visually impaired people. This study describes a pilot study on beacon-navigation in an urban environment.

Bluetooth beacons were connected to traffic signs, fences, lampposts and trees to create a trajectory from the train station to the office. Three different obstacle types were identified and implemented in the app: a crossover with traffic signs, a car parking entrance and objects blocking the pathway like stairs. Information was provided by high contrast images, written text and verbal communication (voiceover).

Five visually impaired subjects were asked to walk the route with and without use of the application. After each obstacle participants were asked how safe they felt using a five point Likert scale ranging from “feeling very safe” to “feeling very unsafe”. Qualitative feedback on the usability of the app was collected using the speak-a-loud method during walking and by interview after walking. Data of heartbeat rate or pupil dilatation as on objective measure of required effort appeared not to be useful due to aperture failures.

Feelings of safety increased by using the application in 2 of the 4 situations (unexpected obstacles and by crossing
a busy street. Based on the qualitative feedback, all participants indicated the type of instructions were very useful for walking and learning new routes. More specifically, it was suggested that:

- effort required for mobility was probably a better parameter to indicate benefit than safety.
- the required length of the message is user-dependent
- the location of the iPhone is very important (distance calculation is based on signal strength)

This research is part of the EyeBeacons project (ZonMW Inzicht program).

SYM29.05

Taking control: building connected communities of people with sight loss
Catherine Dennison, Josh Feehan
RNIB, LONDON, United Kingdom

Traditionally sight loss charities have provided services ‘for’ people with sight loss. This ethos has resulted in missed opportunities to capitalise on the potential power of people to bring change for themselves and the wider community. ‘RNIB Connect’ is radical shift in how the UK’s largest sight loss organisation engages with people with sight loss. It is a UK wide movement, providing opportunity for people to come together, already attracting 27,000 people.

In the UK four in ten blind and partially sighted people feel cut off from people and things around them. Peer support can be effective in reducing isolation, and loneliness. RNIB Connect is facilitating linking with peers through opportunities to join online discussions, chat over the phone, access news and features on a dedicated radio station and magazine. A network of volunteer community facilitators, spread across the UK, supports Connect members to organise their own activities locally.

A group of people with sight loss have been able to reach their peers with advice through the production of a booklet to support people at the time of their diagnosis. ‘Sight loss: what we needed to know’ was developed by a steering group of people with sight loss, who decided on the content based on their own experiences. Evaluation of the booklet confirms people have found it helpful.

RNIB Connect is also about providing opportunity for people with sight loss to lead and engage in campaigns for change. Local and national campaigns have been strengthened by the involvement of people with sight loss, such as by writing letters and visiting Members of Parliament, and have resulted in change.

RNIB Connect marks a definite shift in how a national sight loss organisation is engaging with the people it serves. Learning will be of significance for organisations internationally.

SYM30.06

Learning about the lighting revolution: adult education for people with low vision
Mary Butler
Otago Polytechnic, DUNEDIN, New Zealand

The aim of the study was to understand how adult education principles could be used to teach visually impaired persons (VIPs) about the science of lighting, in ways that empowered them to meet their own lighting needs at a low cost.

This was an action research project carried out in an urban setting in New Zealand. 17 participants took part, they were all over the age of 65 with varying degrees of low vision (NEI-VFQ25 scores of between 40 and 90), and with varying degrees of domestic light available (assessed using the Home Environment Lighting Assessment). Lighting needs were assessed using the LuxIQ. Data was collected through focus groups and home visits. Quirkos qualitative data analysis software was used to do a thematic analysis of learning by participants. Findings were checked with the participants through a telephone survey and through a public panel discussion at a film event.

Things that helped VIPs in their learning included: realizing they needed more light; learning to read a light bulb; having a lighting prescription; increased family understanding; cost effective and sustainable solutions. Things that continued to hinder their learning included: fears about changing technology; unhelpful sales people.

The findings indicate that adult education principles can successfully be used to teach VIPs about lighting. All the participants received a lighting prescription, which they understood and were able to fill. Results of the project have been used to develop and carry out workshops for occupational therapists and several consumer groups, using a basic portable lighting clinic; a film has been made about the project and showcased at a public event; occupational therapy students have integrated lighting assessments into their practice; and local lighting shops have been become actively involved and provide discounts and more reliable advice to VIPs.

Funded by Participatory Science Platform
SYM32.05

The development of an assessment instrument to measure the accessibility of the labour market for visually impaired people
Inge Houkes, Yvonne Goertz, Hans Bosma
Maastricht University, MAASTRICHT, Netherlands

Introduction/aim: Worldwide, the employment rate of visually impaired people (VIPs) is lower than the employment rate of the general working-age population. It was the aim of this study to generate more insight in labour participation of VIPs, modifiable differences between working and not working VIPs, and to develop an individual assessment instrument which would provide VIPs with starting points for improving their labour market position.

Methods: A cross-sectional telephone survey was conducted among 500 Dutch VIPs. Participants were recruited through two organizations which sell equipment. Data were collected by means of existing (validated) and self-developed scales, selection of scales was based on a systematic literature review. Descriptive, bivariate and logistic regression analyses were performed. Based on these results, the individual assessment instrument was developed and pre-tested in a focusgroup consisting of VIPs, experts and job coaches. This project was financed by ZonMW Inzicht (The Netherlands Organization for Health research and Development).

Results: The employment rate of Dutch VIPs is 36.8% as compared to an employment rate of 67.1% in the general working population. In comparison with non-working VIPs, working VIPs are more often male, aged between 30-44 years, and highly educated. We found three personal non-modifiable factors (educational level, comorbidity, level of visual impairment) and three modifiable factors (mobility, acceptance and optimism) to be significantly associated with labour participation. These variables were included in the individual assessment instrument. Experts and VIPs in the focusgroup acknowledged the importance of these factors, and gave several suggestions for improving and implementing this assessment instrument.

Conclusion: The employment rate of Dutch VIPs is relatively low. Mobility, acceptance and optimism are important success factors for labour participation of VIPs. These factors were included in an assessment instrument which can be used for improving the labour market position of VIPs in the Netherlands.

SYM32.06

Fatigue in visually impaired employees
Erna Luttik
Bartiméus Loopbaan Advies Centrum, ERMELO, Netherlands

BACKGROUND Many persons with visual impairments experience work to be strenuous. Some debate exists regarding whether this fatigue is person-specific and maybe avoidable by using technical tools. Bartiméus Werkpad provides consultation, assessment and job coaching to visually impaired people in their questions around work. Fatigue arises frequently in these contacts. A two-day training was developed to address these issues in order to prevent absenteeism or hindrance in the workplace.

AIM Aim of this study was to examine the degree of fatigue and associated factors in employees with visual impairment; and to study the effectiveness of a two-day group intervention to limit fatigue.

METHOD In 2015 a study was conducted in cooperation with VU University in Amsterdam. Questionnaires were given to 67 participants, who are working in medium to high qualified jobs and have a visual impairment. 31 participants took part in the two-day training, the rest being control group. 4-6 months later a second questionnaire was given to all participants, so that measures of fatigue could be compared.

RESULTSThe results show significant higher levels of fatigue for visually impaired employees than for employees without visual impairment; fatigue is mostly related to practical issues like working pace, visual effort and negatively associated with the use of adjustments and accessibility tools; it is also linked to a form of achievement motivation, but not linked to personality; For both groups a decrease in fatigue over time was found which was related to the number of actions initiated by the employees.

CONCLUSION Fatigue amongst workers with a visual impairment is severely stronger than in normal population. This study gives insight in contributing factors and provides starting points for energy conservation and fatigue management for this group.

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Eye gaze tracking and its relationship with visual acuity, central visual field and age-related macular degeneration features.
Introduction: We explore the relationship between logMAR visual acuity (VA), central visual field and eye gaze as measured by a gaze tracker in eyes with age-related macular degeneration (AMD) features compared to those without.

Methods: In a cross-sectional observational study, 33 subjects with AMD in at least 1 eye were tested monocularly. Of these, 65 eyes were tested (50 with AMD features and 15 without). Computer generated target images moving in a sinusoidal pattern were presented on a monitor screen, while the subjects’ gazes were recorded on a desktop mounted eye tracker (Tobii TX300). How closely the gaze points matched the patterns of movement of the targets was analysed as the eye movement performance (EMP). Central visual field integrity was assessed by microperimetry (Nidek MP1) mapping central 10 degrees visual field using 33 points (0-20dB) and expressed as percentage of unseen (0dB) light stimuli points (PULSP). Linear regression analysis was conducted to assess the effect of VA, PULSP and AMD features on EMP, adjusting for age.

Results: After adjusting for age, EMP values correlated negatively with VA (coefficient β=-0.38; 95% CI -0.48 to -0.27; p<0.001), and PULSP (coefficient β=-0.007; 95% CI -0.009 to -0.005; p<0.001). Eyes with clinical features of AMD had smaller EMP values compared to eyes without (β=-0.3; 95% CI -0.38 to -0.22; p<0.001).

Conclusions: Independent of age, those with poorer VA or higher PULSP had poorer EMP. Eyes without AMD features had better EMP when compared to those with AMD. Eye gaze tracking may be useful in personalised visual function evaluation in AMD.