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# Australian Orthoptic Journal

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2011 Volume 43 (2)

**Myasthenia Gravis and Defective Accommodation**

**Competencies for Vision Screening**

**Reading with the Peripheral Retina**

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# A Child with Myasthenia Gravis and Defective Accommodation: A Case Study

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## ABSTRACT

**Background:** This case details a 14-year old female with myasthenia gravis (MG) who on presentation had ocular symptoms, which included bilateral ptosis and vertical diplopia. Four weeks after the onset of the MG she developed accommodative insufficiency. This condition has not been reported before in childhood MG, but has been documented in adult onset MG. The onset in this case was later in the course of the disease, not initially, as found in the adult cases reviewed in the literature.

**Method:** Measurements were taken at different stages over an 18-month period to determine the impact of medication and fatigue. Tests for near vision, accommodation, convergence, bar reading and near deviation were performed.

**Results:** All measurements were reduced and further affected by fatigue with the exception of the size of the near deviation. The patient was symptom-free by 15 weeks post onset. Eighteen months later the patient remained symptom-free with all measurements normal with the exception of accommodation, which remained below normal and affected by fatigue after reading.

**Conclusion:** This single case highlights the occurrence of smooth muscle involvement in MG and its debilitating effect. It is recommended that testing of accommodation function becomes standard practice in patients with MG and the use of additional plus lenses considered if required.

**Keywords:** Myasthenia gravis, accommodative insufficiency, child

## INTRODUCTION

Myasthenia Gravis (MG) is a disorder of neuromuscular transmission where antibodies that work against the acetylcholine receptors are produced. MG characteristically affects striate or skeletal muscles resulting in weakness and fatigue with ophthalmic involvement of the extraocular muscles.[1] Commonly affecting adults, MG is not often seen in children.[2]

Ocular characteristics seen in patients with MG are diplopia, ptosis and lid closure problems. Diplopia is the most common symptom, with the medial recti, inferior recti and superior oblique most frequently affected.[3,4] A less commonly reported ocular feature of myasthenia gravis is the effect on accommodation. The ciliary nerve is involved in accommodation and innervates the smooth muscle via muscarinic acetylcholine receptors,[5] therefore in MG accommodation should remain unaffected.

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Reduced accommodation has been reported in single case studies of adults[1,6] and in eight of nine cases in a series of adults with myasthenia gravis.[7] In childhood MG, the reported ocular presenting characteristics to date include unilateral or bilateral ptosis, strabismus, limitation of ductions and Cogan's lid twitch.[2,8-15]

There have been no reports of accommodative involvement in childhood MG. This report details the ocular findings in a child with MG who had affected accommodation. The results of other near functions are also described.

## CASE REPORT

A previously well 14-year old female presented to the emergency department where her results were recorded as bilateral ptosis, which was more marked for the right eye, plus a head tilt to the right. Straightening of the head revealed vertical diplopia. Other symptoms documented included dysarthria, weakness when walking and an increased physical effort required when writing. The medical notes further reported that the pupillary reflexes and accommodation

were normal as was the visual field, visual acuity and ocular fundi. A clinical diagnosis of myasthenia gravis was made based on ocular findings and the impact of fatigue. The acetylcholine receptor antibody result was 0.01 nmol/L (0 - 0.25 nmol/L = negative) referred to as seronegative MG. Prednisolone and pyridostigmine were commenced and a single dose of intravenous immunoglobulin (Intragam) was given. This resulted in a symptomatic improvement, with a reduction in the ptosis and fatigability within 24 hours. The patient was discharged three days later, with a plan for continued current medications plus monthly Intragam infusions for three months.

Four weeks after the diagnosis, the patient was referred for an orthoptic assessment, with the referral noting "complaining of difficulty reading". The assessment revealed the symptom of blurry vision when reading, no previous history of eye problems, no diplopia or ptosis, visual acuity unaided right and left 6/6, N8 both eyes open, a near exophoria of 2 prism dioptres, full ocular motility, reduced binocular accommodation of 5.50 dioptres (D) (40 years of age equivalent), reduced monocular accommodation right eye 4.75 D and left eye 4.50 D and a convergence near point (CNP) of 5 cms. The diplopia and ptosis, as reported at the initial examination, had resolved. At this point a diagnosis of accommodative insufficiency was made.

Additional plus lenses were recommended for near as required, to relieve the ocular symptoms. The choice of +1.00 D or +1.50 D lenses was offered, based on the presbyopic correction that correlated with the accommodation level measured. The patient preferred the +1.50 D lenses over the +1.00 D and was asymptomatic. With the plus +1.50 D lenses, the near vision improved to N5 and the binocular accommodation to 11.00 D. The patient was not given orthoptic exercises at this stage as a gradual improvement in accommodation was expected in line with the improvement of the patient's other general symptoms.

Further orthoptic assessments were conducted over a 3-month period. An additional follow-up assessment was conducted at 18 months after diagnosis to determine the longer-term outcome for this patient. The assessments included near vision with both eyes open, accommodation and convergence near points using a RAF rule, motor control of the near deviation by testing bar reading using the Merrick Children's Bar Reading Book, and measurement of the near deviation using a subjective test, the Maddox Wing. Both the monocular and binocular accommodation were measured at four weeks and nine weeks after diagnosis, and both were found to be reduced. At subsequent visits the accommodation was measured binocularly only to avoid fatigue (Table 1). Overall there was a gradual improvement in near function (near vision, accommodation, convergence and bar reading) from the first orthoptic assessment to the visit at 18 months after diagnosis and apart from the accommodation all measurements attained a normal result. Interestingly though, at nine weeks after diagnosis, the convergence near point showed a large reduction to 17 cms, with diplopia reported on convergence break point. Convergence exercises were introduced at 15 weeks after diagnosis when the gradual improvement in convergence near point reached a plateau.

Table 1. Effect of time over an 18-month period

| Time post-diagnosis | Near vision | Accommodation (14 years age-normal = 13 D) | CNP | Bar reading | Near deviation |
|---|---|---|---|---|---|
| 4 weeks | N8 | RE 4.75 D<br>LE 4.50 D<br>Binoc 5.50 D | 5 cm | * | Exophoria 2Δ |
| 9 weeks | N8 | RE 4.75 D<br>LE 4.50 D<br>Binoc 5.25 D | 17 cm | N8 | Exophoria 2Δ |
| 12 weeks | N8 | Binoc 5.50 D | 11 cm | N8 | Exophoria 2Δ |
| 15 weeks | N8 | Binoc 7.50 D | 11 cm | N8 | Exophoria 2Δ |
| 18 months | N4.5 | Binoc 10.00 D | 5 cm | N5 | Exophoria 3Δ |

* Not assessed at this visit

The influence of medication was also noted on the ocular posture. Measurements were taken four days prior to the use of Intragam when the ocular function was at its worst, then three days after the Intragam administration when the impact should be at its most effective. No short-term improvement was seen. In fact, there was a decrease in all measurements except the near deviation post the drug administration (Table 2).

Table 2. Short-term effect of Intragam infusion medication

| 9 weeks post-diagnosis | Near vision | Binocular accommodation (14 years age-normal = 13 D) | CNP | Bar reading | Near deviation |
|---|---|---|---|---|---|
| 4 days before medication @ 1800 | N8 | 4.50 D | 21 cm | N10 | Exophoria 2Δ |
| 3 days after medication @ 1900 | N10 | 3.75 D | 23 cm | N12 | Exophoria 2Δ |

Between nine weeks and 18 months after diagnosis, both the accommodation and convergence showed improvement. However, it was found that at each session when the patient was asked to read for 10 minutes, both the accommodation and the convergence decreased, indicating an additional impact of fatigue on the accommodative insufficiency.

Twelve weeks after diagnosis, the convergence near point showed a greater effect by fatigue than on other visits, however there was no change in near control as assessed by bar reading. A change in bar reading/near control was only observed at week nine after the same reading period. Throughout all visits the deviation size remained constant (Table 3). Although the accommodation improved overall, the fatigue factor was consistent at each visit (Figure 1).

Fatigue from morning to night affected the convergence near point and bar reading at all visits. The near vision remained unaffected by fatigue until 18 months, where the response is seen to be slightly reduced in the evening compared with the morning (Table 4). Binocular accommodation was consistently affected until 18 months where the response improved (Figure 2). The near deviation was not affected.

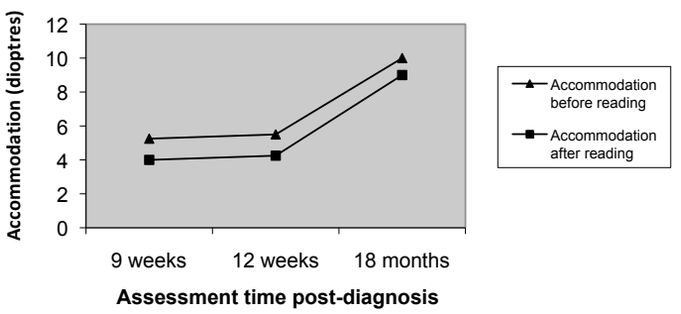


**Figure 1.** Effect over time on accommodation from 10 minutes of reading.

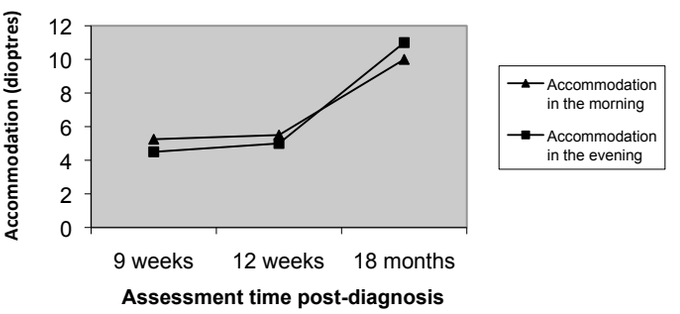


**Figure 2.** Effect of fatigue from morning to night (8.5hrs).

Table 3. Impact of fatigue from 10 minutes of reading

| Time post- diagnosis | Before and after reading | Binocular accommodation (14 years age-normal = 13 D) | CNP | Bar reading | Near deviation |
|---|---|---|---|---|---|
| 9 weeks | Before reading | 5.25 D | 17 cm | N8 | Exophoria 2Δ |
| | After reading | 4.00 D | 19 cm | N12 | Exophoria 2Δ |
| | *Near function change* | *-1.25 D* | *-2 cm* | | |
| 12 weeks | Before reading | 5.50 D | 11 cm | N8 | Exophoria 2Δ |
| | After reading | 4.25 D | 17 cm | N8 | Exophoria 2Δ |
| | *Near function change* | *-1.25 D* | *-6 cm* | | |
| 18 months | Before reading | 10.00 D | 5 cm | N5 | Exophoria 3Δ |
| | After reading | 9.00 D | 7 cm | N5 | Exophoria 2Δ |
| | *Near function change* | *-1.00 D* | *-2 cm* | | |

Table 4. Impact of fatigue from morning to night (8.5 hours)

| Time post-diagnosis | Time | Near vision | Binocular accommodation (14 years age-normal = 13 D) | CNP | Bar reading | Near deviation |
|---|---|---|---|---|---|---|
| 9 weeks | 0930 | N8 | 5.25 D | 17 cm | N8 | Exophoria 2Δ |
| | 1800 | N8 | 4.50 D | 21 cm | N10 | Exophoria 2Δ |
| | *Near function change* | | *-0.75 D* | *-4 cm* | | |
| 12 weeks | 0930 | N8 | 5.50 D | 11 cm | N8 | Exophoria 2Δ |
| | 1800 | N8 | 5.00 D | 18 cm | N10 | Exophoria 2Δ |
| | *Near function change* | | *-0.50 D* | *-7 cm* | | |
| 18 months | 0930 | N4.5 | 10.00 D | 5 cm | N5 | Exophoria 3Δ |
| | 1800 | N5 | 11.00 D | 9 cm | N6 | Exophoria 2Δ |
| | *Near function change* | | *+1.00 D* | *-4 cm* | | |

## DISCUSSION

The initial presentation of vertical diplopia, along with the improvement gained with medication is consistent with findings in the literature on childhood MG.[2] The development of near problems is not. The presence of reduced accommodation in this case is consistent with the findings of other authors of adult MG cases.[1,6,7] However in the adult cases detailed by Cooper et al (2000) and Matsui et al (1995), the accommodation defect was present on diagnosis of the illness.

Another possibility is that the patient had Miller Fisher syndrome and not MG. This can also cause external and internal ophthalmoplegia with abnormalities in pupils and accommodation. However, our patient did not have systemic manifestations such as ataxia and areflexia, and did not have abnormal pupils recorded. Our patient was not tested for anti-GQ1b antibody, a very sensitive test for Miller Fisher syndrome and the treatment of immunosuppression does overlap for the two diseases.[16]

In our patient, responses showed that along with the decrease in accommodation, near vision and near control were also decreased. Neither near vision nor bar reading skills have been reported by other authors, but provide added insight into the impact of the MG. The convergence near point remained normal for several weeks after the reduction in accommodation was documented. The convergence was at maximal level so there was no link between decreased convergence and defective binocular accommodation. The presence of reduced monocular and binocular accommodation confirms the diagnosis of accommodative insufficiency. Cooper et al (2000) also reported the delayed onset of convergence near point involvement. Reflexes of accommodation and convergence occur simultaneously and can function individually, so it may be possible that they can also be affected individually. At 12 weeks after diagnosis, the convergence near point was shown to be more affected by fatigue than on other visits. This could be explained by the fact that the patient had received an Intragam infusion earlier that week. Table 2 showed that the short-term effect of the Intragam was in fact a reduction in all measurements except for the near deviation.

The near deviation remained unaffected by both short-term and long-term fatigue, which is surprising as striate muscles are responsible for maintaining ocular balance. This finding is inconsistent with Cooper et al (2000), who noted an increase in the heterophoria throughout the day, typical of MG fatigue. Our use of subjective measurements instead of objective measurements[1] may explain this.

Bilateral ptosis was present at the initial visit along with vertical diplopia, which was managed by adopting a head tilt. Both the ptosis and the diplopia responded to medication and had resolved at four weeks post diagnosis, with no recurrence during the 18-month period. Unlike the accommodative fatigue, the diplopia was not debilitating as it was managed by a slight head tilt. Manson (1965) suggested that the presence of diplopia in his subjects may have prevented them noticing the near vision problems.[7]

Consistent with other studies, the ptosis and vertical imbalance responded well to treatment, with no permanent harm to these muscles.[8,10,14,17] Unlike the ptosis and vertical imbalance, the other near skills affected showed no benefit from Intragam infusion. This response to medication is inconsistent with reports from other authors where their cases all showed an improvement in near function with medication.[1,6,7] Ocular motility assessment is usually limited to the striate muscles in patients with MG. Manson and Stern (1965) and Matsui et al (1995) focused only on measuring accommodation, whereas Cooper et al (2000) measured accommodation, pursuits, saccades and near heterophoria. In our case report near vision, accommodation, convergence near point and bar reading were measured, with accommodation and convergence fatiguing the most, which is consistent with the findings of Cooper et al (2000).[1] To validate which additional ocular tests are essential in managing ocular symptoms of MG a larger sample would be required.

In this case report a subjective measure of accommodative amplitude was used, the RAF rule. Matsui (1995) and Manson (1965) also used subjective measurements, whereas Cooper et al (2000) used objective measurements. Use of subjective measures can be limiting but in this case, the patient was consistent with her responses. In all reported studies, contrary to our case, the subjects had an improvement in near function from medication.[1,6,7] Similarly, Cooper et al (2000) reported that the use of additional lenses assisted in eliminating symptoms of near vision problems.

## CONCLUSION

This case study demonstrates that in childhood myasthenia gravis, accommodation, near vision, convergence near point and bar reading can all be affected, but the near deviation may remain unchanged. This case along with others reported in the literature demonstrates the occurrence of smooth muscle as well as striate muscle involvement in MG and its debilitating effect. This case report highlights the need to assess accommodative function in all patients with myasthenia gravis, not only on diagnosis but also later on, and in cases where medication may not assist with near function problems, that management with additional plus lenses be considered.

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# Visual Screening Competencies Questionnaire (VSCQ) and Orthoptic Practice

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## ABSTRACT

The identification of core competencies which are important for undertaking accurate visual screening by orthoptists is considered in this study. The aim was to construct and validate a questionnaire for orthoptists to assess visual screening competency. This study comprised three steps. The first step involved a 69-item self-assessment questionnaire constructed to assess orthoptists' perception of their competencies in visual screening programs for children. This questionnaire was constructed with statements from the Orthoptic Benchmark Statement for Health Care Programmes (Quality Assurance Agency for Higher Education, United Kingdom) and included three competency dimensions: interpersonal (IP), instrumental (IT) and systemic (ST). The second step involved questionnaire translation. Statements were translated into Portuguese and survey items were then reviewed by two experts. The third step involved questionnaire validation for internal consistency (n = 36 orthoptists) and factorial dimension analysis (n = 58 orthoptists). Questionnaire dimensions presented the following internal consistency: α (ST) = 0.916; α (IP) = 0.949; α (IT) = 0.892. After performing the factorial analysis of principal components, results showed a total explained variance of 61.21% (KMO = 0.795). The IP dimension demonstrated 35.88% of the variance and IT 14.45% of the variance. Each dimension item was shown to be a good measure of ST, IP and IT. The questionnaire provides a method of measurement of orthoptists' perception of their competencies in the visual screening of children.

**Keywords**: orthoptists, children's visual screening, competencies, factorial analysis of principal components, validation

## INTRODUCTION

In recent years there has been a growing interest in the study of competency-based performance of health professionals for enhancing organisational and individual practice.[1] The concept of professional competence arose in the early 1970s when mass produced goods were in decline and a need for a different type of workforce with differing skills emerged. Workers needed to be more adaptable to changing demands, able to solve problems, work as a team and take responsibility for the quality of their work.[2] This more dynamic way of working questioned the importance of learning environments. In this changing model it was considered that the work environment should be linked with the educational environment so that learning is better integrated into the workplace. Formal learning programs were no longer the only access route to professional qualifications.[2] Learning through experience becomes an important factor in acquired competencies.

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Subject benchmarking was designed in the United Kingdom[3] to provide a means of describing the nature and characteristics of higher education programs and training in health care. This also represented general expectations about standards for the award of qualifications and provided general guidance for articulating the learning outcomes associated with the training program.[3] The subject specific statements for orthoptics is outlined in three main headings:[3] 1. the expectations of the health professional in providing patient services; 2. the application of practice in securing, maintaining or improving health and well-being; and 3. the knowledge, understanding and skills that underpin the education and training of health care professionals.

Orthoptics is a health profession concerned with the study of the visual system and the development and management of binocular vision and ocular motility. Orthoptists work with patients of all ages but are recognised for their expertise in the assessment of vision in children and in the field of paediatric vision screening.[4] Orthoptists play an essential role in visual screening of children and the detection of strabismus, amblyopia and ocular motility defects. In Portugal a large group of orthoptists are employed in the National Health Care Service. According to the Portuguese

Government Health Department there are approximately 400 registered orthoptists.[5] The visual screening of children requires technical proficiency, technical skills and interpersonal skills.

In Portugal visual screening is commonly undertaken by registered orthoptists. A core competency model to guide strategic visual screening improvement programs does not exist and there is no method available to assess this subject. Within the context of this study we adopted the professional competencies definition of Janssen-Noordman et al,[6] where a meaningful task is performed in professional practice with the integration of knowledge, skills and attitudes.

The aim of this study was to construct and validate a questionnaire to define a competency model for the visual screening of children. The intent was to provide a method of skills measurement for effective performance applied to visual screening and to identify core competencies in visual screening. This approach may then inform guidelines, providing suggestions and advice on how to design a competency-based educational program for orthoptists.

## METHODS

Ethics approval for this study was obtained from the Portuguese Professional Society Committee. All participants gave fully informed consent. This study comprised three steps that are summarised below.

### FIRST STEP

The first step involved the development of a 69-item self-assessment questionnaire called the Visual Screening Competencies Questionnaire (VSCQ). This questionnaire was developed in 2009, based on statements from the Orthoptic Benchmark Statement for Health Care Programmes document of the Quality Assurance Agency for Higher Education.[3] The questionnaire aimed to assess orthoptists' perception of their competencies and professional practice in visual screening programs for children.

The constructed model (VSCQ) or theoretical framework was divided into three competency dimensions: interpersonal (IP), instrumental (IT) and systemic (ST). These dimensions were identified according to the Tuning Methodology of Educational Structures in Europe.[7] The systemic competencies category described the orthoptists' understanding and knowledge of key orthoptic concepts. It was composed of three subcategories: knowledge and understanding; skills; and problem-solving. The interpersonal competencies category described the orthoptists' communication with the patients and the healthcare team. It also included descriptions of expectations about safe and competent practice according to four subcategories: professional autonomy and accountability; professional relationships; personal and professional skills; and profession and employer context. The instrumental competencies category relates to the decision-making process in healthcare within a range of skills and behaviours. It was composed of four subcategories: identification and assessment of health and social care needs; formulation of plans; strategies for meeting health and social care needs; practice and evaluation. The described dimensions contained statements mutually exclusive and functionally different from each of the others to avoid duplication and confusion.[8]

### SECOND STEP

The second step involved the translation and validation of the questionnaire. The questionnaire was translated into Portuguese by the authors. Questionnaire items were then reviewed by two experts; one expert in orthoptics and one in competency-based education. The experts analysed the statements in a four-step sequence: items translation evaluation and accuracy in the original language; concordance/discordance with the sentence introduction in the questionnaire; pertinence in competencies evaluation; and introduction of commentaries or changes in an objective way.

### THIRD STEP

The third step involved the evaluation of the questionnaire's internal consistency (n = 36 orthoptists) and factorial dimension (n = 58 orthoptists). The questionnaire was administered to orthoptists who had to rate the degree of agreement with the competency statements and frequency of application in professional practice. All responses to individual items were organised in a Likert scale of 5 levels. To evaluate the degree of agreement with the statement, 1 on the Likert scale was totally disagree, 2-disagree, 3-undecided, 4-agree and 5-totally agree. To evaluate the frequency of the competency in professional practice on a Likert scale, 1 was never, 2-rarely, 3-sometimes, 4-often and 5-always.

A pre-test was undertaken and Cronbach's alpha reliability coefficient ($\alpha$) was calculated for each competency dimension. This study also used factorial dimensional analysis. The questionnaire responses were analysed using factorial analysis with principal components. The data adjustment was analysed according to communalities, Kaiser-Meyer-Olkin (KMO), Bartlett's test and correlation matrix. To identify the correct dimensions, three different methods were taken into account: screeplot graph analysis, component matrix analysis (eigenvalues greater than 1 were used)[9] and parallel analysis[10].

## RESULTS

After expert validation of the translated Portuguese version, three items were eliminated due to lack of pertinence in competency evaluation and seven items were rewritten according to the experts' suggestions related to translation evaluation and accuracy in the original language. The questionnaire was therefore reduced to 66 items.

### QUESTIONNAIRE VALIDATION WITH INTERNAL CONSISTENCY

To determine the questionnaire's internal consistency, a pre-test was undertaken using a convenience sample of 36 respondents. Cronbach's alpha scores were used to evaluate internal consistency for each dimension. Deletion of 19 items of the scale improved Cronbach's alpha. The internal consistency estimated for reliability of each dimension was as follows: systemic competencies ($\alpha = 0.916$); interpersonal competencies ($\alpha = 0.949$); instrumental competencies ($\alpha = 0.892$). Following the consistency evaluation, the questionnaire was developed with 47 statements to identify the perception of orthoptists about their competencies and the frequency of their application in professional practice (Table 1).

Table 1. Questionnaire dimensions after the pre-test

| Competencies | Items (no of questions) |
|---|---|
| **Systemic**<br>Eg. I am able to demonstrate knowledge and understanding of human anatomy and physiology, emphasising the dynamic relationships of human structure and function and focusing on the central nervous system, brain and ocular structures. | 14<br>Q.1 - Q.14 |
| **Interpersonal**<br>Eg. I am able to educate others in the promotion of visual health such as the training of health visitors in the practice of visual screening. | 21<br>Q.15 - Q.35 |
| **Instrumental**<br>Eg. I am able to conduct my performance of appropriate, prioritised health promoting/health educating/caring/diagnostic activities.. | 12<br>Q.36 - Q.47 |

Statements 1 to 14 were grouped as representing systemic competencies, statements 15 to 35 were grouped as representing interpersonal competencies and statements 36 to 47 were grouped as representing instrumental competencies.

### FACTORIAL DIMENSIONAL ANALYSIS

A convenience sample of 58 Portuguese orthoptists (44 female and 14 male) completed the validated questionnaire. Their median age was 28.48 years (SD = 7.57). According to respondents, they spent between 5 and 50 hours per week in visual screening in their professional practice.

The questionnaire responses were analysed using factorial analysis with principal components. The data adjustment was analysed according to communalities, Kaiser-Meyer-Olkin (KMO), Bartlett's test and correlation matrix. Thirty-two items with low communalities were deleted (items below 0.7). Kaiser-Meyer-Olkin was greater than 0.6 (KMO = 0.683) and Bartlett's test was significant at a level of 5% ($\chi^2_{(190)} = 554.779$; $p<0.05$). The correlation matrix also showed a good data fit with all correlations above 0.3.

To identify the correct dimensions, eigenvalues greater than 1 were used.[9] The screeplot graph was also analysed. Exploratory analysis identified eight competency dimensions with a total explained variance of 80.82%.

### FINAL QUESTIONNAIRE COMPETENCY DIMENSIONS

As described previously, identification of the correct dimensions used three complementary methods. The questionnaire was developed with three dimensions and although the model identified eight competency dimensions the authors reviewed the suitability of the data regarding three competency dimensions. Three steps were taken: screeplot graph analysis, parallel analysis and component matrix analysis.

The screeplot graph involves plotting each of the eigenvalues of the dimension and inspecting the plot to find a point at which the shape of the curve changes direction.[9] Dimensions above the elbow or break in the plot should be retained. The screeplot graph analysis showed a clear break after the third dimension. This was further supported by the results of parallel analysis of Watkins[10] which showed

Table 2. Total explained variance for the competency dimensions

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5.383 | 35.884 | 35.884 | 5.383 | 35.884 | 35.884 | 4.278 | 28.518 | 28.518 |
| 2 | 2.167 | 14.446 | 50.329 | 2.167 | 14.446 | 50.329 | 2.714 | 18.096 | 46.614 |
| 3 | 1.632 | 10.881 | 61.210 | 1.632 | 10.881 | 61.210 | 2.189 | 14.596 | 61.210 |

Extraction Method: Principal Component Analysis

only three dimensions with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix (dimension 1 = 5.798>2.217; dimension 2 = 2.320>1.967; dimension 3 = 1.652<1.781). The three-dimension solution as in the initial classification explained a total of 61.21% (KMO = 0.795) of the variance. The first dimension contributes with 35.88% of the variance and the second dimension contributes with 14.45% of the variance (Table 2).

Table 3 shows the questionnaire: the initial classification of the sentences (before validation); the final classification (after validation) and; the total scores for each dimension.

To analyse the competencies score, the classification shown in Table 3 can be used. The sum of the responses (1 to 5 Likert scale) allows a scale of maximum competencies which equals a score of 75 (total score of 40 for ST; total score of 20 for IP; and total score of 15 for IT).

Table 3. Final classification of competency dimensions

| **Final classification: Competency dimensions** | **Items** | **Initial classification** |
|---|---|---|
| **1 - Interpersonal**<br>Maximun score = 40<br>Medium score = 24<br>Minimum score = 8 | 1. I am able to contribute to the well-being and safety of all people in the screening environment (team and patients). | Systemic |
| | 2. I am able to respect the patients and preserve their integrity and human rights. | Interpersonal |
| | 3. I am able to demonstrate knowledge and understanding of a professional code of conduct, values and beliefs. | Interpersonal |
| | 4. I am able to act with responsibility in a healthcare setting adopting an ethical approach with patients and the screening team. | Interpersonal |
| | 5. I am able to understand the legal responsibilities and ethical considerations of my profession. | Interpersonal |
| | 6. I am able to be committed to continuing professional development as recommended by the professional body. | Interpersonal |
| | 7. I am able to contribute to the well-being and safety of all people in the screening work-place. | Systemic |
| | 8. I am able to respect the professional orthoptic practice. | Interpersonal |
| **2 - Instrumental**<br>Maximun score = 20<br>Medium score = 12<br>Minimum score = 4 | 9. I am able to apply measurement techniques to assess binocular vision and other ocular conditions. | Instrumental |
| | 10. I am able to identify the socioeconomic context factors that impact on the practice of Orthoptics such as the need for screening specific patient groups. | Interpersonal |
| | 11. I am able to educate other orthoptists in the promotion of visual health such as training in the practice of visual screening. | Interpersonal |
| | 12. I am able to select and use appropriate orthoptic assessment techniques within my own practice accurately. | Interpersonal |
| **3 - Systemic**<br>Maximun score = 15<br>Medium score = 9<br>Minimum score = 3 | 13. I am able to use a range of assessment techniques appropriate to the situation and make provisional identification of relevant determinants of health and physical, psychological, social and cultural needs/problems. | Interpersonal |
| | 14. I am able to demonstrate knowledge and understanding of binocular vision and its disruption. | Systemic |
| | 15. I am able to carry out an appropriate orthoptic investigation, using suitable methods for age and intellectual ability of the patient, eg. clinical examination by subjective and objective means. | Instrumental |

The varimax method was used to arrive at the final designation of dimensions. The initial designation of the three dimensions was preserved: systemic competencies (ST), interpersonal competencies (IP) and instrumental competencies (IT). The final questionnaire presented a total of 15 items, with eight items in the ST dimension, four items in the IP dimension and three items in the IT dimension.

## DISCUSSION

There has been little investigation regarding orthoptists' professional competencies. For the purposes of this study a self-assessment tool was considered the most appropriate. The use of critical reflection of professional practice is positively related to quality of care and it is a

powerful method for assessing performance and clinical competence.[11]

In order to guarantee the quality of competencies measurements the instrument was subjected to a process of validation. Carefully performed translation alone does not ensure validity of the translated instrument.[12] The findings of the current study provide preliminary support for the use of the VSCQ instrument in a sample of Portuguese orthoptists. Our study provides a valid questionnaire to measure perception of competencies in visual screening. Statistical analysis was undertaken on the quantitative data. The rationale for the survey was to elicit data on orthoptists' competencies in order to develop a competency matrix. Despite recommendations, vision screening still varies in the United Kindom. It is important to clarify who undertakes such screening, on what age group of children and what tests are performed.[13] The development of competency frameworks is important to clarify role boundaries and promote professional accountability.[14] In addition, the authors consider that they have constructed an instrument to consider individual/team capabilities that are expected for the workforce to be effective in the visual screening of children.

The results are considered good evidence that all items measured the same underlying construct and that the items were internally consistent. In this study reliabilities for the scales were excellent and therefore validity has been demonstrated. The dimensionality of the questionnaire was also assessed using factor analysis. These results supported the original theoretical classification used for constructing the VSCQ. The findings revealed that the three common factors resulting from the analysis explained 61.21% of the total variance. This suggests that the questionnaire has stable dimensions that can be used to assess orthoptists' visual screening competencies. The survey showed broad acceptance for final items. It is important to note that 35.88% of the variance is explained by the interpersonal competencies, supporting the importance of this domain to perform visual screening in children.

The validated version of the VSCQ is going to be used by a random sample of Portuguese orthoptists. This version has an introduction, with investigation objectives and completion instructions. The questionnaire has three sections and items will be presented randomly to avoid order presentation bias. The last section requests personal data about the respondent orthoptists.

## CONCLUSION

During the past decade in Portugal, many visual screenings have been performed without a core competency model to guide strategic improvement programs. A 15-item self-assessment questionnaire was constructed to obtain orthoptists' perceptions about their professional competencies and frequency of application in professional visual screening practice with children.

The questionnaire will enable us to study and rate the competencies and frequency of application in professional practice of orthoptists who screen children. Although we assume validity, further studies should be done to validate this scale with a larger sample to confirm the findings of this study. A model will be constructed and developed to provide a common language and framework to guide health professionals in the field of visual screening. Suggestions for further research include the application of this questionnaire to determine more frequently applied competencies and intervention studies to determine which training methods promote effective competencies.

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# Effect of Vertical Interline Spacing on Word Recognition and Reading Speed using the Peripheral Retina

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## ABSTRACT

The purpose of this study was to investigate the effect of increasing the spacing between sentences upon word recognition speed and word recognition accuracy when using the peripheral retina. By identifying optimal interline spacing for patients with central field loss, this could determine guidelines for best presentation of written materials in the presence of central scotoma. Seventeen participants with no ocular pathology were recruited and asked to read words with their fovea and peripheral retina (at 6 degrees from the fovea) whilst their fixation was monitored using an infra-red eye tracker. Whilst improvement in reading speed can be gained by increasing interline spacing to 1.5x when reading with the fovea, there is no effect (or detriment) of manipulating interline spacing when reading with the peripheral retina. There is also no effect on word recognition accuracy.

**Keywords**: reading, low vision, scotoma, crowding phenomenon

## INTRODUCTION

The task of reading is carried out by the central retina, specifically the fovea, in individuals with no retinal pathology. Fluent reading is important for maintaining many activities of daily living and the inability to read can be considered a serious handicap.[1] Age-related macular degeneration (AMD) is the most common cause of visual impairment in industrialised countries[2] and is an ocular condition that can cause structural damage to the anatomy of the central retina. Consequently it results in a loss of central vision and impacts upon reading with the fovea.

When a person with central field loss reads, they use a peripheral retinal point termed the *preferred retinal locus* (PRL).[3-5] Whilst the PRL can be useful for reading, a common complaint from people who use it to read is that they are unable to read as fast as they did before the central field loss.[6-8] When print is increased in size to compensate for decreased acuity in the peripheral retina, reading speeds still remain slower compared to reading speeds using the central retina.[1,9] The decreased number of letters read during each forward saccade while reading may account for decreased reading speeds.[6,10,11]

Studies that have used Rapid Serial Visual Presentation (RSVP), a method that eliminates the need for eye movements while reading, report that when acuity and abnormal eye movements are controlled, reading speeds still remain slower when using the peripheral retina.[12,13] As decreased acuity and abnormal saccades cannot fully provide an answer to the poorer reading speeds experienced by those with central field loss it has prompted researchers to concentrate on the psychophysical aspects of reading, particularly the crowding phenomenon. The crowding phenomenon is defined as 'the adverse spatial interaction due to the proximity of adjacent targets'.[7] It is present in the central retina but is increasingly evident in the peripheral retina and is thought to contribute to slower reading.[4,14,15] Studies have investigated the effect of crowding with interletter spacing within words and have found that when interletter spacing is increased above the standard 1x spacing, it does not result in a decrease of the crowding phenomenon within words in the central or peripheral retina.[1,4,14,16,17] Increasing interletter spacing may in fact cause the visual span in the peripheral retina to shrink further. The visual span in reading is defined as the number of letters that are able to be seen at a single glance without having to make an eye movement.[18] It has been reported that the visual span in people without retinal pathology, at the fovea, is 10 letters in size and decreases to 1.7 letters at 15° in the periphery.[19] These results were based on normal participants and may be different in people with a central scotoma. In a study by Cheong,[20] participants without retinal pathology were compared with participants with central field loss resulting from AMD. Findings showed that participants with AMD who fixated eccentrically using various retinal locations, had significantly smaller visual spans than normal participants who were tested at 10

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degrees eccentrically, thereby suggesting that scotoma interference is thought to play a part in the reduced visual span in the peripheral retina of patients with AMD.

Other studies have focused attention on another aspect of crowding in the form of vertical interline spacing between a target word and the flanking words above and below. In a two-phase experiment using the RSVP method and testing the reading speed of participants at the fovea, 5 and 10 degrees in the lower visual field, Chung[7] found a significant impact on reading speed when interline spacing was increased from 1x to 2x the standard interline spacing. Bernard et al[21] utilised a gaze-contingent visual display with an artificially simulated central scotoma at 6 and 10 degrees and found a significant advantage for 1.25x interline spacing on reading speeds. However, the increase in reading rates found by Bernard et al were not as large as the increase in reading rates found by Chung.[7] Studies investigating interline spacing that have used participants with central field loss report different findings. Chung et al[22] found no significant effect on reading speed when interline spacing was increased, whilst Calabrese[3] found that there was an improvement of 7.1 words per minute (w/pm) when interline spacing was increased from 1x to 2x interline spacing.

Studies in the area of vertical interline spacing do not report on whether word accuracy is affected when interline spacing is increased. It raises the question of whether word accuracy in the peripheral retina is decreased when using a smaller interline spacing and there are conflicting findings as to the range of improvement in reading speed when interline spacing is manipulated. The aim of this study was to investigate the effect of interline spacing on both reading speed and word recognition accuracy in the normal peripheral retina.

## MATERIAL AND METHODS

A repeated-measures study design was implemented to determine the effect of interline spacing and retinal eccentricity on word recognition speed and word accuracy. Word recognition speed was measured as the number of words read correctly per minute (w/pm) and word accuracy was recorded as the number of words read correctly. Vertical interline spacing at 1x, 1.5x and 2x were presented to participants at the fovea and 6 degrees in the inferior visual field.

Participants were students of a tertiary institution with good general health, no ocular pathology and able to read a minimum of N8 font using the Bailey-Lovie Word Reading Chart[23] at 40 centimetres (cm) either without correction or with contact lenses. All procedures have been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans; informed consent was obtained from all participants and the procedures used were approved by the La Trobe University Faculty Health Sciences Human Ethics Committee (Approval number: 10/69).

As the participants had normal vision with no central scotoma but were required to read print with their peripheral retina, their fixation patterns were monitored to ensure that they utilised the correct retinal area for reading. This was done using the Tobii Eye Tracker Series 1750 binocular infrared eye tracker (Tobii Technology, Danderyd, Sweden) (Figure 1). The Tobii 1750 has an integrated 1280 × 1024 pixel 17 inch monitor. Participants viewed the monitor from a distance of approximately 60 cm so that the visual angle of the screen was 30° × 24° (W × H). The Tobii Eye Tracker Series 1750 has accuracy within 0.5 degrees of the visual angle when head movements are kept to a minimum. Eye fixations were defined as an eye position which remained within a 30 pixel area for a duration that was greater than 100 milliseconds (ms). An automatic 9-point (3 × 3) calibration reference grid[24] was used to calibrate each individual participant prior to data acquisition. The configuration of the testing apparatus included a dual computer and dual monitor setup. Computer 1 was a HP Compaq Pentium 4.2.60 GHz with 504 MB RAM and computer 2 was a Dell Pentium D 2.8 GHz with 1 GB RAM, the TET server enabled communication between computers. The dual computer configuration is generally faster than presenting stimuli using one computer alone and is the reason why this setup was chosen.


**Figure 1.** Tobii Eye Tracker Series 1750.

Stimuli were generated on Microsoft PowerPoint 2007 and slides were converted to a JPEG file and re-sized to 1024 × 768 pixels in Adobe Photoshop Elements 2.0. Each condition consisted of a string of 10 unrelated target words of the most commonly used five-letter words in the English language.[25] Each target word consisted of five letters rendered in lowercase courier new font. To simulate vertical crowding five 'x' were positioned above and below corresponding to the same letter length as the

target words. During study design, the 'x' was replaced with letters comprising five-letter words but this was found to be confusing to participants as to which word to read. Target words at the fovea were of N8 font size and at the 6 degrees eccentric point they were of N50 size. This font size reflected the critical print size (the smallest print that can be seen and read fluently) at the fovea and at 6 degrees. Stimuli were presented as black letters on a white background (Figure 2). The presentation of these stimuli was similar to that described by Chung.[7] When testing was conducted at 6 degrees eccentricity a red fixation cross was positioned 6.3 cm from the centre of the target word to indicate where the participant was to maintain fixation while reading. ClearView 2.7.1 eye gaze analysis software (Tobii Technology, Danderyd, Sweden) was used to organise and present stimuli. Reading speed data was recorded automatically by this software, by recording the amount of time (duration) each slide was displayed to the participant.


**Figure 2.** Example of stimuli at 1x spacing.

Participants were seated in front of the Tobii eye tracker and undertook six reading conditions. They were required to read aloud as fast as they normally read and were in control of when the words would appear on the screen by pressing the space bar on the key board to advance to the next word in the trial. When reading with the fovea the participants looked directly at the target word, when reading with the 6 degree eccentric point the participant maintained fixation on a red cross positioned above the target word. The reading trials were reviewed to ensure that participants' fixations did not deviate by more than 1 cm (0.95°) below the middle of the red cross. If a fixation deviated more than 1 cm or the participant made an eye movement to look at the word, the reading trial was discarded and repeated a maximum two times.

Twenty tertiary students aged from 19 to 48 years (Mean = 24 years, SD = 6.58) were recruited for this study. There were 14 females and three participants required contact lens correction. After a review of the reading trials, three participants were excluded from the analysis as they had poor fixation throughout all reading trials at the 6 degree eccentric point. Data presented here is for the remaining 17 participants. Word recognition speed results were not normally distributed, therefore were analysed using non-parametric tests including the Wilcoxon signed-ranks test or Friedman test. Where data were normally distributed the one-way repeated-measures ANOVA or t-test was used.

## RESULTS

### WORD RECOGNITION SPEED

As expected, participants read significantly slower with their peripheral retina (Mean = 37.62 w/pm, SD = 7.56) compared to the fovea (Mean = 60.63 w/pm, SD = 10.29) when text was presented with 1x interline spacing [$t(16) = 9.22$, $p<0.0005$]. Foveal word recognition speed significantly improved when interline spacing was increased above the standard 1x and is shown in Figure 3 [Wilks' $\lambda = 0.43$, $F(2,15) = 10.07$, $p<0.0005$, multivariate eta squared = 0.57]. The greatest improvement was at 1.5x spacing, improving from a mean of 60.03 (SD = 10.29) to 67.43 w/pm (SD = 11.20) [$t(16) = -4.463$, $p<0.0005$]. There was no statistically significant difference in speed between 1.5x spacing (Mean = 67.43 w/pm, SD = 11.20) and 2x spacing (Mean = 68.5 w/pm 0, SD = 13.31) [$t(16) = -0.769$, $p>0.05$].

There was no significant effect for interline spacing on word recognition speed when reading with the peripheral retina at 6 degrees (Figure 4) [Wilks' $\lambda = 0.86$, $F(2,15) = 1.22$, $p>0.05$].

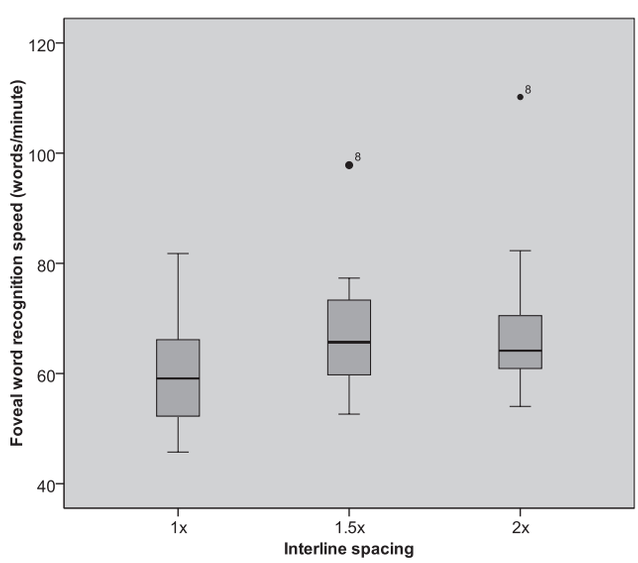


**Figure 3.** Foveal word recognition speed at 1x, 1.5x and 2x vertical interline spacing.

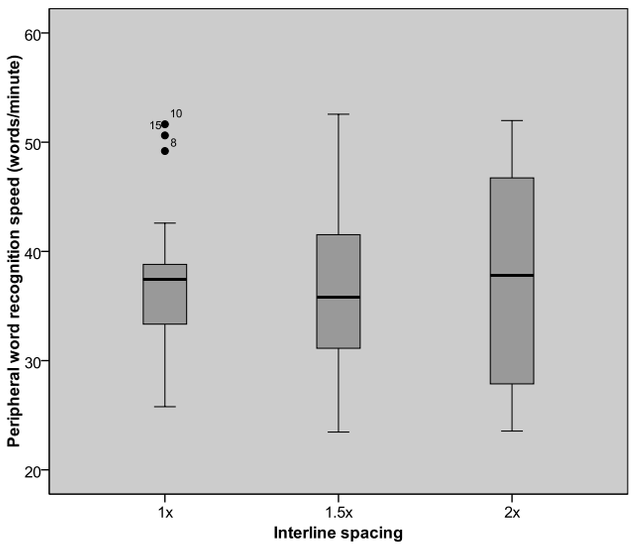


**Figure 4 period** Peripheral word recognition speed at 1x, 1.5x and 2x vertical interline spacing.

### WORD RECOGNITION ACCURACY

Using the peripheral retina to read negatively affected word recognition accuracy ($Z = -3.13$, $p=0.002$). Word accuracy at the fovea was 100% correct for every participant regardless of the interline spacings used for reading. When participants used their peripheral retina, there was great variability in their word recognition accuracy and no significant effect of increased interline spacing was found ($\chi^2 = 3.79$, $p>0.05$), as shown in Figure 5.

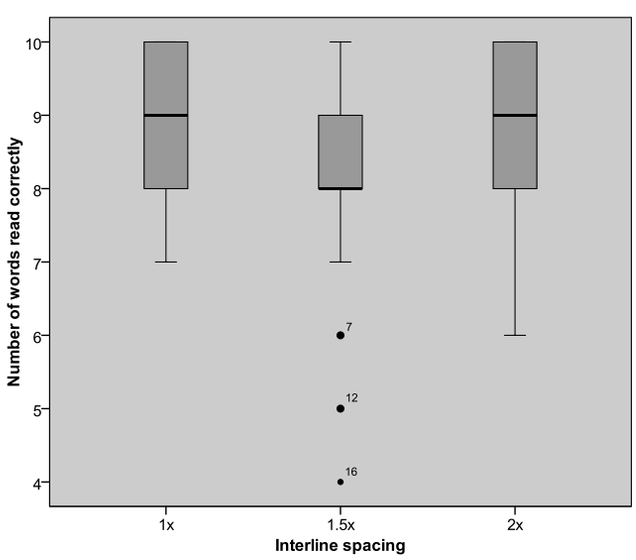


**Figure 5 period** Peripheral word recognition accuracy at 1x, 1.5x and 2x vertical interline spacing.

## DISCUSSION

Slower reading rates using the peripheral retina are caused by multiple factors such as decreased acuity,[1,9,26] abnormal saccadic eye movements[6,10-13] and a decreased visual span.[19,20] The methodological design of this study intended to isolate the effect of interline spacing on word recognition speed from other factors by controlling known aspects that contribute to slower reading. Therefore font was increased in size when participants read with the 6 degree eccentric point to compensate for decreased acuity, a red fixation cross and single words were used to eliminate saccadic eye movements, and word length was restricted to five letters to account for the decreased visual span in the peripheral retina.

Normally-sighted participants were chosen for two reasons. One was to determine whether reading speeds can be increased in the normal peripheral retina. Secondly it has been shown that the visual span can be reduced in the presence of central field loss as the most viable PRL can be located near the border of the scotoma, which can interfere with letter identification of the target word.[20] This would therefore not be a factor with normal retinas.

The finding that reading using the fovea is significantly faster than using a peripheral eccentric point is in agreement with previous research.[1,7,9,13,14] At the fovea participants read an average of 60.63 w/pm compared with 37.62 w/pm in the periphery, an average decrease of 23.01 ($p<0.0005$). Whilst there is much variability in foveal reading speed reported in the literature, the foveal reading speed measured in the current study was found to be slower overall than the speeds reported in several other studies.[7,9,12,13] Large variations in reading speed with the peripheral retina are also reported in the literature[3,9,13] and the reading speeds reported in the current study are slower than most other reports. However, the reading speed reported by Calabrese et al[3] is similar to that found in the current study.

The difference between the method of determining reading speed could account for the higher speeds measured in other studies, especially those in which the RSVP paradigm was used where reading speed is pre-programmed, that is, participants read at the rate determined by the program rather than at their natural pace. We therefore attempted to maintain a natural reading situation by allowing the participant to control when words would appear on the monitor and to read as fast as they normally would. This methodology most likely accounts for the slower reading speeds measured.

The statistically significant improvement in foveal word recognition speed when interline spacing was increased to 1.5x spacing, but no further improvement at 2x spacing, is in agreement with the study by Chung.[7] The findings of the current study suggest that reading with the peripheral retina does not significantly benefit from an increase in

interline spacing, however there is also no disadvantage to providing text at a larger spacing if the preference is to read with 1.5x or 2x spacing.

We also sought to determine if a participant could identify words more accurately when interline spacing was increased. As expected, word accuracy was not dependant on interline spacing when reading with the fovea and this is in agreement with some other studies.[27,28] There was no effect on ability to accurately recognise words using the peripheral retina when interline spacing was increased. Some participants reported that they were "able to make out the first and last letter of the word, but the letters in the middle were harder to see" and this inability to identify the middle letter could account for lack of improvement in accuracy. This finding was also reported by Sommerhalder et al.[27]

## CONCLUSION

The findings of this study suggest that there is no particular benefit to increasing interline spacing for patients with a macular scotoma, however there is also no detriment. Thus patients can read print with the interline spacing for which they have a personal preference. The greatest limitation of this study was that participants did not have a central scotoma and further research is planned to study the effect of interline spacing on reading speed and word accuracy in the presence of a central scotoma.

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# Selected Abstracts from the Orthoptics Australia 68th Annual Scientific Conference held in Canberra 20 to 22 November 2011

## PATRICIA LANCE LECTURE ON BEING AN ORTHOPTIST

**Neryla Jolly**

The aim of the presentation was, through the history of the orthoptic profession in Australia, to encourage strong identification with the orthoptic role; ongoing improvement of patient care by innovation and research; transmission and publication of the orthoptic role and encourage new ventures. The definitions of an orthoptist were reviewed and a simple outcome was posed. Information regarding the role of an orthoptist was reviewed from manpower data collected between 1940 and 2000, and information from transactions and journals of Orthoptics Australia between 1944 and 2010. The role was shown to fall into four areas – conventional practice, ophthalmic practice, rehabilitation, and a combination area which included vision screening, treating learning disability, sport assessment, driver testing, ergonomics and community health.

The outcome revealed that orthoptists in Australia are active in patient care, are enquiring, problem solving, innovative and adaptable.

## MY WORLD ENDS AT THE TIPS OF MY TOES, FINGERS AND NOSE – THE DEVELOPMENTAL JOURNEY OF A VISUALLY-IMPAIRED OR BLIND BABY

**Louise Brennan**

Vision is the most functional sense for development. It holds a central place in how we learn the most information from our environment. Vision is the main provider of information about threats and opportunities in the world and to a large extent it drives behaviour. If vision is impaired it has the potential to impact on the fine motor, gross motor, social, emotional, communicative and cognitive development of the child. The developmental milestones of the sighted child compared to the visually-impaired or blind child along with case examples will be used to highlight the obstacles faced in reaching developmental milestones. The role of early intervention services and how all orthoptists can help will be discussed.

## BROKEN HILL, A HEALTH WORKFORCE AUSTRALIA INITIATIVE TO INCREASE AND DIVERSIFY STUDENT CLINICAL PLACEMENTS

**Michelle Courtney-Harris, Angelique Antoniou, Judy Chen, Matt Jacobs, Sasha Maroon, Elton Phung, Jessica Schenk**

The federal Health Workforce Australia (HWA) taskforce has been implementing clinical education funding grants to assist in the training of medical, nursing and allied health personnel. In 2010, a grant to the Faculty of Health Sciences and the University of Sydney's Department of Rural Health in Broken Hill, helped establish orthoptic clinical placements to provide vision screening in primary schools in Broken Hill and surrounds. In discussion it became evident that there were no systematic screening services being conducted in Broken Hill.

In consultation with local optometrists and visiting ophthalmic specialists, a service learning fieldwork placement for final year orthoptic students has been piloted in September 2011. Because there is no direct orthoptic support, a number of strategies were employed to support the students while on placement. These included parent information and consent letters, screening protocols, weekly video/tele-conference support, referral protocols and standardised referral letters. Preliminary results from the vision screening of children aged 4 to 7 years will be reported.

## THE 'MISSING' NUMBERS IN THE STATEWIDE EYESIGHT PRESCHOOLER SCREENING (StEPS) 2010 IN THE SYDNEY SOUTH WEST AREA HEALTH SERVICE (SSWAHS)

**Katrina Cramp, Sue Topham**

The presentation is an exploration of the concern from the orthoptists, the StEPS Coordinator and the Deputy Director of Child and Family Services Community Health, that approximately twenty percent of children eligible for StEPS vision screening in SSWAHS were missed during 2010, despite many innovative attempts by all staff members to provide access to the StEPS screening service. Across the area there were a number of disadvantaged schools selected for StEPS screening to be offered to kindergarten children who had not been captured by the StEPS program in 2010. In the disadvantaged schools targeted, there was an overwhelming acceptance by the principals of the offer. Information pamphlets, letters and consent forms were distributed to the parents of kindergarten children and screening commenced.

It became apparent that there were a significant number of children who had not been screened in 2010, and the uptake of the offer was warmly received by parents and caregivers. The results of this primary screening done over seven targeted schools, screening 194 children, will be presented.

Conclusions drawn from this experience will be highlighted against the current model for StEPS screening, recommendations made, and discussion undertaken as to how best capture this twenty percent of children in 2011.

## OCULAR COMPLICATIONS ASSOCIATED WITH CRANIOSYNOSTOSIS IN A PAEDIATRIC POPULATION

**Stephanie Crofts**

Craniosynostosis is a congenital condition in which one or more of the cranial sutures of the skull fuse prematurely during embryonic life. It occurs in approximately 1 in 2,000 births and can occur in isolation or as part of a syndrome. Ocular complications are associated with craniosynostosis, including strabismus, amblyopia, exophthalmos, papilloedema and optic atrophy. A review of children who presented to the eye clinic at The Children's Hospital at Westmead with craniosynostosis will be discussed.

## NEURO-IMAGING THE VISUAL PATHWAY – BASICS FOR ORTHOPTISTS

**Caroline Fang**

This presentation will educate the audience on the basics of neuro-imaging of the visual pathway, including an overview of CT and MRI, which scan to order, how to look at a scan and what can be seen. Some case examples will be shown.

## REVIEW OF ACRYSOF® CACHET™ IMPLANTABLE LENSES IN REFRACTIVE PATIENTS

**Jane Farley**

Purpose: To assess the visual outcomes of correcting moderate to high levels of myopia using the Acrysof® Cachet™ Lens.

Methods: This is a retrospective case series comprising 38 eyes of 22 patients who presented for refractive surgery in a private ophthalmology clinic setting, from December 2009 to September 2011. All surgery was performed by the one surgeon at the same day surgery. A preoperative and postoperative standard refractive exam was performed, including best-corrected visual acuity (BCVA), uncorrected visual acuity (UCVA), subjective refraction and specular microscopy. A comparison of BCVA, UCVA and refraction were performed at three weeks, three months, six months and yearly post operation. Patients' subjective comments on their visual quality compared to preoperatively was also noted. Any operative or postoperative complications were also noted.

Results: Final analysis of this cohort is currently being undertaken and will be presented, however preliminary analysis shows a strong correlation between the targeted correction and the postoperative outcome.

## MODIFIED VERSIONS OF ECCENTRIC VIEWING TRAINING PROGRAMS SUITABLE FOR CHILDREN

**Kerry Fitzmaurice, Norliza Fadzil**

Background: Eccentric viewing is an established strategy to ameliorate the impact of macular vision loss. However the focus of this training has been toward older adults with age-related macular degeneration or young adults with juvenile forms of macular degeneration and Leber's optic atrophy. A study has been undertaken to consider the efficacy of a range of vision rehabilitation strategies with children, including eccentric viewing. To provide an appropriate training program for eccentric viewing with children, suitable images and activities needed to be selected.

Method: An age-appropriate series of images and activities were selected. The images and activities were incorporated into a PowerPoint presentation format for validation. One-hundred-and-twenty fully-sighted children aged 7 to 12 years were recruited into the validation study.

Results: Four of the twenty-six images selected for validation could not be reliably identified or were not interesting to the participants and were therefore not used in the final study. Activities were based on matching or finding games and were validated in terms of understanding, interest and visual discrimination. All of the activities were selected.

Discussion and conclusions: The validation process revealed some interesting data in relation to the impact of cultural beliefs, prior knowledge and concepts on the ability of participants to identify images and their responses to them. These observations are discussed in relation to the literature. The selected images and activities were combined to form training activities for the vision-impaired participants in the impact of rehabilitation study.

## LIGHT: ITS MEASUREMENT AND APPLICATION TO FUTURE STUDIES FOR THE DEVELOPMENT OF MYOPIA

**Amanda French, Kathryn Rose**

Recent studies have shown that time spent outdoors is protective for the development of myopia, and intervention programs to increase time spent outside have commenced. However, a reliable measure of light exposure is still required.

We compared two measures of light exposure; a week-long daily light exposure diary and a data logger (HOBO UA-002-64, Onset Computer Corporation, Cape Cod, US) measuring luminosity (LUX), to determine the most appropriate tool for future myopia studies.

A highly motivated population of 48 university students participated in the study, both wearing the data logger and completing the diary for seven consecutive days. The diary was modified from one developed for an intervention study in Singapore. Participants recorded all activities performed throughout the day including whether they were indoors or outdoors. At completion, participants attended focus groups to discuss problems and possible discrepancies they noted between the two measures. The measures from the data logger and the questionnaire were compared in relation to the qualitative data obtained from the focus groups.

The differences in LUX measured indoors (mean 600 LUX) and outdoors (mean 25,000 LUX) were high. Analysis of responses from focus groups indicated that the diary was time-intensive and needed to be filled out continuously through the day to ensure accuracy. It was also noted that discrepancies in the two methods may occur when using transport. The data logger may be less onerous and prove a more reliable measure of light exposure.

## COMPARISON OF THE DISTRIBUTION OF REFRACTION AND OCULAR BIOMETRY IN EUROPEAN CAUCASIAN CHILDREN LIVING IN NORTHERN IRELAND AND SYDNEY

**Amanda French, Kathryn Rose**

Aim: The comparison of age and ethnicity-matched samples from different locations can reveal important information about the role of environment and genetics in the development of refractive error. This study compares the distribution of refraction and ocular biometry in European Caucasian children aged 6-7 and 12-13 years living in Sydney and Northern Ireland (NI).

Methods: All children had a comprehensive eye examination, including cycloplegic (cyclopentolate 1%) autorefraction (Sydney; Canon RK-F1, NI; Shin-Nippon SRW-5000) and ocular biometry (IOLMaster, Carl Zeiss). Hypermetropia was defined as a right spherical equivalent refraction (SER) of ≥+2.00 dioptres (D), myopia as ≤-0.50 D and astigmatism as a cylindrical error of ≥1.00 D.

Results: The mean SER was similar at age 6-7 years ($p=0.9$), however, at 12-13 years, children in NI had a significantly less hypermetropic mean SER (+0.66D) than children in Sydney (+0.83D, $p=0.008$). The prevalence of myopia, hypermetropia and astigmatism was significantly greater in children living in NI than Sydney at both ages (all $p\leq0.03$). Consequently, distribution of refraction while highly kurtotic (peaked), was less so in NI (kurtosis, 6-7 yrs, 7.2; 12-13 yrs, 5.9) than Sydney (6-7 yrs, 15.0; 12-13 yrs, 19.5).

Conclusion: European Caucasian children in NI have a greater prevalence of refractive errors, in particular astigmatism, when compared to children living in Sydney. In addition, the lower kurtosis of the distribution in NI could indicate less robust emmetropisation mechanisms compared to children in Sydney. This may be in part the result of less daylight hours and lower light levels in NI compared to Sydney.

## KERATOCONUS: BEYOND THE CORNEAL TOPOGRAPHER

**Chris Hodge**

Keratoconus is a progressive corneal disease which leads to thinning of the corneal stroma. As the condition increases the patient may be impaired by increasing myopia and irregular astigmatism. Traditionally, diagnosis is confirmed by the use of corneal topography. Developments in genetic and proteinomic research may assist an early diagnosis and allow for implementation of treatment earlier, increasing the potential benefits for patients. Novel research results will be discussed.

## UNSYNCHRONISED EYELID BLINKING: A CASE STUDY

**Bronwyn Jennings**

A case study of a 4-year old child presenting to an orthoptic secondary screening clinic with unsynchronised eyelid blinking is presented. The possible aetiology of the unsynchronised eyelid blinking will be discussed as well as the spontaneous resolution of the condition.

## UNDERSTANDING STURGE-WEBER SYNDROME AND THE RELATED OCULAR COMPLICATIONS

**Suzy King**

The eye clinic at The Children's Hospital Westmead sees a large variety of paediatric conditions each year. Sturge-Weber syndrome is a rare congenital disorder that can have significant systemic and ocular complications.

Sturge-Weber syndrome, also known as encephalofacial or encephalotrigeminal angiomatosis, is a neuro-oculocutaneous syndrome that is characterised by facial cutaneous, meningeal and ocular haemangiomas. The most recognisable clinical feature is a haemangioma of the face, or naevus flammeus, commonly referred to as a 'port wine stain'. This usually presents unilaterally, however the location on the face and whether or not there is involvement of the brain is important in determining the risk of other symptoms of the condition, including epilepsy and glaucoma.

The classic ocular findings include choroidal haemangioma and glaucoma, most commonly unilateral and ipsilateral to the port wine stain. Choroidal haemangiomas usually remain stable, not requiring treatment, however they may lead to cystoid macular oedema and exudative retinal detachments. Glaucoma, involving an increase in intra-ocular pressure, occurs in up to 70% of people with Sturge-Weber syndrome and often requires surgical intervention.

Sturge-Weber syndrome requires a multidisciplinary approach for treatment and management. The condition will be discussed in detail along with treatment/management strategies, followed by a case study.

## FUNDAMENTALS OF VISION SCREENING: GETTING IT RIGHT

**Jody Leone, Kathryn Rose**

Visual Acuity (VA) is the gold standard ophthalmic test and the primary method of detecting ocular conditions in screening programs. VA norms have long been established for adults, but are less certain in children. We aim to provide population-based normative data for monocular visual acuity, in children aged 6 to 78 months.

In the Sydney Paediatric Eye Disease Study, VA was measured using Teller Acuity Cards II (TACII) (≥6 months), the Amblyopia Treatment Study (ATS) single surround HOTV letters (≥24 months), and LogMAR LEA, HOTV or ETDRS charts (≥30 months). Normative VA measures were analysed after excluding children with ophthalmic abnormalities or significant refractive error.

Data was available for 499 children using LogMAR charts, 934 children using ATS and 544 using TACII binocularly and 444 monocularly. VA improved with age, with the most rapid change occurring from 12 to 24 months of age. After this age, the rate of improvement slowed. VA approached adult normal levels in children ≥54 months. A one-line difference in VA is noted with the ATS in comparison to the LogMAR charts. In the ages where the VA tests overlap (24-40 months) the differences in VA between resolution and recognition acuity is evident.

Early rapid improvements in VA are likely to be due to both the emmetropisation of refractive error and maturation of the retina and visual pathways in the first year of life. Differences in VA measured by the three tests may reflect differences in the cognitive capacities of children.

## COMPLICATIONS AND CONSIDERATIONS OF REMOTE AREA WORK

**Aimee Leong**

The Kimberley region has a population of more than 40,000 people; of this 47.3 percent are indigenous people. This indigenous population demographic is considered unique compared to around 3.5 percent of the Western Australian population and 25 percent in the Northern Territory. There are approximately 200 indigenous communities across the Kimberley and over 34 indigenous languages spoken. In this region there are three main hospitals: Broome, Derby and Kununarra where patients are consulted and operated on; as well as smaller hospitals in Fitzroy Crossing and Halls Creek. This presentation aims to discuss the challenges of rural work experienced in the Kimberley Region as well as the benefits of having an orthoptist as part of the ophthalmology team in remote area work.

## EXAMINING NYSTAGMUS IN CHILDREN

**Wendy Liang**

Concerned parents often bring in young children wondering why their eyes are 'wobbly' or 'keep shaking' and it frequently surprises them to learn that these pendular or jerky movements are not part of a normal development process. So what are the causes of nystagmus in young infants?

Whereas acquired nystagmus in older patients brings to mind neurological causes or medications, nystagmus in early childhood may be caused by a variety of eye conditions. These include anterior segment pathology such as cataracts, or posterior segment pathology including retinal dystrophy, albinism or optic nerve pathology. Nystagmus may also occur in children with multiple disabilities such as in Down syndrome.

A review was conducted in a private paediatric ophthalmic practice of children who presented with nystagmus from January to October 2011, looking for the most common causes of nystagmus. By excluding ocular and neurological causes, many children were found to have congenital motor (idiopathic) nystagmus. Other causes will also be discussed as well as the management plans for the best possible vision.

## CONVERGENCE PARESIS

**Nicole Martinovic**

A case study of a 9-year old child with a loss of convergence is presented. The signs, symptoms and treatment are discussed, along with the differential diagnosis and aetiology.

## CYCLOPLEGIC REFRACTION IN ADULTS

**Nhung Nguyen, Ross Fitzsimons**

Purpose: To determine if cycloplegic refraction in adults is necessary to identify true refractive error prior to vision correction with laser surgery.

Methods: This retrospective clinical audit compared pre-cycloplegic refraction with post-cycloplegic refraction using two doses of cyclopentolate 1% and waiting 45 minutes. All refractions were performed subjectively by the one clinician. The shift of refractive error with cycloplegia was then compared in two age groups (20-40 years and 40-60 years) to determine if there is a correlation with age.

Results: The prevalence rates of refractive changes as a spherical equivalent post-cycloplegia equal to or greater than 0.5, 1.0, 2.0 and 3.0 dioptres (D) were 60.98%, 30.08%, 6.50% and 2.44% respectively. With these definitions within their age group, there seemed to be no direct relationship between the amount of cycloplegic shift and age.

Conclusions: The results obtained suggest that the normal reduction of accommodative ability observed with age in distance refraction is not always the case. This raises the question of what other underlying cause can contribute to the refractive hypermetropic shift in refraction post-cycloplegia in adults. The finding of more than 39% of patients having 1D or more of hypermetropic shift post-cycloplegia deems it necessary to perform a cycloplegic refraction on patients prior to laser vision correction.

## GRADUATE ENTRY MASTERS: BRIDGING KNOWLEDGE

**Jean Pollock, Connie Koklanis**

The two-year Master of Orthoptics was introduced at La Trobe University in Melbourne this year. In order to support the Graduate Entry Masters (GEM) students, an orthoptic bridging program was designed and implemented. GEM students were surveyed with a questionnaire and attended a Focus Group Interview after completing the one month bridging program and before joining the existing undergraduate students. An additional questionnaire was completed by the GEM students at the completion of their first year to ascertain their views of the bridging program upon reflection of their studies thus far. We aimed to evaluate the effectiveness of a bridging course. The preliminary outcomes of this study will be presented.

## StEPS – CLINICAL FINDINGS FROM SYDNEY HOSPITAL AND SYDNEY EYE HOSPITAL 2008-2011

**Chantelle Robertson**

Statewide Eyesight Preschooler Screening (StEPS) was introduced by the NSW Department of Health in 2008. StEPS is a vision screening program for four-year old preschool children. The Orthoptic Department at Sydney Hospital and Sydney Eye Hospital is involved in the assessment and management of StEPS referrals in the south-eastern Sydney local hospital district. The poster presents the clinical findings of the children referred from the StEPS program between October 2008 and September 2011. It illustrates the number of patients referred and treated, diagnoses and the type of treatment used.

## MUCOPOLYSACCHIRIDOSES AND THE ASSOCIATED OCULAR COMPLICATIONS

**Katie Scanlon**

The ophthalmology and orthoptic departments at The Children's Hospital at Westmead have recently commenced a research project for children with mucopolysaccharidoses (MPS). We aim to determine the prevalence and severity of ocular complications among this group of children across Australia. Financial assistance and support has been received from Genzyme and Biomarin in order to conduct this research.

The MPS disorders (classified from MPS I to MPS IX) are rare inherited metabolic diseases caused by a defect in the genes coding for specific lysosomal enzymes. These enzymes break down complex sugars called glycosaminoglycans (GAGs) within the body, a process necessary for normal growth and tissue maintenance. Lack of these enzymes leads to a build-up of GAGs within various tissues and organs, resulting in irreparable damage.

Deposition of GAGs occurs extensively in the eye, in particular the cornea, sclera, retina and optic nerve. This leads to typical corneal clouding seen in several different types of MPS disorders, which can significantly reduce vision. Deposition within the retina may also occur, causing retinal degeneration and further vision loss. Deposition of GAGs in the angle of the anterior chamber or narrowing of the angle can result in glaucoma. It is known that the GAGs deposit within the optic nerve, compressing the optic nerve from within. Marked scleral deposition may also occur externally compressing the optic nerve, as can deposition within the optic nerve sheath. If this is coupled with a rise in intracranial pressure, marked vision loss may occur and in some cases, blindness may ensue. Other contributing factors to the optic neuropathy include glaucoma and retinal degeneration.

MPS disorders will be discussed as well as results from our current, ongoing research project.

## THE AUSTRALIAN CHILDHOOD VISION IMPAIRMENT REGISTER – A 2011 UPDATE

**Sue Silveira**

The Australian Childhood Vision Impairment Register is sponsored by the Royal Institute for Deaf and Blind Children and is the first nation-wide register which is gathering data on children with vision impairment who live in Australia. The Register collects data from the child's family and the child's eye professional. This ensures each child's situation is comprehensively represented, including their ongoing medical, educational and low vision needs.

This paper will present an update on the progress of the Register and key findings which are providing a picture of childhood vision impairment in Australia. Additional projects supporting the Register such as the VI Family Network will also be discussed.

## VISION SCREENING IN THE SOLOMON ISLANDS

**Sue Silveira**

This presentation will describe a project funded by the AusAID Avoidable Blindness Initiative and managed by Foresight Australia. The project's objective was to upgrade the National Vision Centre in the Solomon Islands. A central component of the project was the establishment of a community-based vision screening program for children aged between the ages of 0 and 12 years, which Foresight Australia engaged the Royal Institute for Deaf and Blind Children to design and implement. The project was two-fold, firstly to design a vision screening framework which would be acceptable for local implementation; and secondly, to deliver a 'train the trainer' course to educate participants to eventually train Solomon Island health workers to become competent childhood vision screeners.

The challenges of education and delivery of health services in an environment of limited resources will be discussed. A preliminary outcome from recent Solomon Islands childhood vision screening conducted by the course participants is also presented.

## A PARADIGM SHIFT FROM 'TOUCH' TO 'NO TOUCH' SURFACE LASER VISION CORRECTION

**Kathleen Suarez, Ilan Sebban**

Purpose: To evaluate outcomes of the TransPRK ('no touch') versus PRK ('touch') techniques using the Schwind Amaris laser.

Methods: A clinical study of 75 consecutive eyes for each PRK and TransPRK group were treated for myopia (mean spherical equivalent (SE) -3.81 D), performed by a single doctor, using the ORK-CAM software module and aberration-free protocol. Patients with SE <-1.25 D, previous PRK, large prescriptions (>5.00 D) or thin corneas were excluded from the study. The length of surgery time was recorded on each patient's treatment sheet. Pain was registered at 1 day and 3 days postoperatively on a pain scale from 1 to 4 (1=great recovery to 4=bad recovery). Patients attended their 4-day postoperative check-up and were objectively assessed. Outcomes were evaluated at 1 week, 1 month and 3 months on the progression of their visual acuity.

Results: TransPRK performed faster with minimal preparation and an absence of instruments, whilst PRK involved more preparation and the use of debriding instruments prior to ablation. TransPRK patients reported a mean score of 2 on the pain scale, whilst PRK patients averaged a score of 3. The average epithelial healing time was 3.8 days for TransPRK versus 4.1 days for PRK and was statistically significant (p=0.003). The mean spherical equivalent refraction for all participants at one week was -0.16 D, and at 3 months -0.07 D.

Conclusions: Uncorrected visual acuity over time showed comparable results for both groups. TransPRK treatments proved to be significantly faster, less painful, with quicker epithelial healing resulting in more accurate refractive outcomes.

## SAME & DIFFERENT: CASES OF IDENTICAL TWINS WITH INTERESTING OCULAR FINDINGS IDENTIFIED BY THE STATEWIDE EYESIGHT PRESCHOOLER SCREENING (StEPS) PROGRAM, SOUTH EASTERN SYDNEY LOCAL HEALTH DISTRICT

**Melinda Symyniuk**

Several sets of identical twins were highlighted as being 'interesting cases' as part of the StEPS program in the south-eastern Sydney local health district. The presentation will outline the findings of a few of these paediatric cases. The first cases discuss Twin I with the presentation of marked unilateral reduced visual acuity and strabismus, and Twin II with normal presentation. The second cases include 'mirror image' identical twins, both preschoolers having a constant exotropic strabismic deviation occurring in the opposite eye to each other. The third cases document identical twins with evidence of having similar ocular pathology. Along with the presentations and discussion of clinical findings, the challenges faced by clinicians when working with identical twins and their families in the community health setting will be considered. The cases serve to highlight the varied ocular findings noted with identical twins, aiding the awareness of these clients as being unique individuals, rather than simply being 'the same'.

## IRIS INDIGENOUS AND REMOTE EYE HEALTH SERVICE FUNDING FOR ORTHOPTISTS

**Angus Turner, Sandra Oates**

The Pilbara region was the site of the first IRIS project based in Karratha and Roebourne Aboriginal Medical Service. This federal government initiative involved an eye team setting up a new remote eye health service with infrastructure for surgery and clinics. The orthoptist was included as an integral part of the eye service team. The role has varied challenges and rewards which will be demonstrated in this presentation. New orthoptic roles involving tele-ophthalmology services for rural areas will also be discussed.

## EVALUATING THE EFFECTIVENESS OF AN E-LEARNING RESOURCE IN THE TEACHING OF VERTOMETRY TO SECOND-YEAR ORTHOPTIC STUDENTS

**Suzane Vassallo**

Vertometry is a necessary technical skill for orthoptic students to learn. In the Bachelor of Health Sciences/Master of Orthoptics program, all students are introduced to vertometry in the first semester of second year. Traditionally, vertometry has been taught over multiple practical classes where students (who work in pairs in a class size of about 25 students) are firstly introduced to the various components of the instrument. They then, over the course of about two to three weeks, work their way through measuring and recording various lens types.

While students report that they enjoy learning about how to use the vertometer, in recent subject evaluations, many have indicated that there is a lack of assistance provided to them during practical classes. More specifically, they have indicated their preference for smaller group sizes to enable the demonstrator to provide more individual assistance. In order to address these concerns, an on-line DVD entitled 'Understanding Vertometry' was developed as a resource for second-year students who undertook vertometry for the first time in 2011. All students were required to watch the DVD prior to attending their practical workshops. This presentation will discuss the differences in learning outcomes when vertometry is solely taught using the traditional practical approach versus blended learning.

## THE EFFECT OF INTERLINE SPACING ON READING SPEED IN PATIENTS WITH AGE-RELATED MACULAR DEGENERATION

**Meri Vukicevic, Elizabeth Baglin, Lauren Ayton, Chi Luu**

Introduction: Difficulty reading is a common complaint of people with central vision loss. The crowding phenomenon in the peripheral retina is thought to contribute to slower reading in these patients. Some studies suggest that increasing the interline spacing when presenting text to patients with central vision loss above the standard 1x spacing improves reading speed and reading ability but findings are inconclusive.

Methods: Participants with age-related macular degeneration were recruited and asked to read passages of text at interline spacing of 1x, 1.5x and 2x. The size of their macula scotoma was mapped using a microperimeter, their eye movements tracked using an infra-red eye tracker and reading speed and word accuracy measured.

Results: Study findings will be presented.

## WESTERN AUSTRALIAN BIRTH COHORT: DESIGN AND METHODOLOGY FOR A POPULATION-BASED STUDY OF OCULAR BIOMETRY AND DISEASE

**Seyhan Yazar, Hannah Forward, Charlotte McKnight, Alex Tan, Alla Soloshenko, David Mackey**

Purpose: The Raine Eye Health Study (REHS) will establish the prevalence of eye diseases and define ocular biometry in a young adult population in Western Australia. This presentation summarises the rationale and study design of REHS including recruitment, assessments and retention strategies.

Methods: The REHS benefits from an existing pregnancy cohort in Western Australia. Participants were initially recruited at 18 weeks gestation from the state's largest maternity hospital. Participants have been examined two-yearly by medical researchers in a wide variety of specialties including cardiovascular, metabolic and respiratory. In 2010, the members of Raine cohort were invited to attend a comprehensive eye assessment and provide DNA sampling for genetic analysis. In addition, participants were asked to complete questionnaires on their general, ocular and family history.

Results: A total of 1,188 participants were assessed in a 17-month period: 49.1% females and 50.9% males. The majority of participants (86.2%) had both Caucasian parents.

Conclusion: The REHS design and methodology will ensure valid findings on ocular development for comparison with other population-based studies of eye disease. The study will establish the prevalence of eye disorders in a large sample of young Australian adults. The study will also investigate the role of genes and environment in refractive error, strabismus, amblyopia, pterygium and keratoconus.

# Named Lectures, Prizes and Awards of Orthoptics Australia

## THE PATRICIA LANCE LECTURE

| | | |
|---|---|---|
| 1988 | Elaine Cornell | Home exercises in orthoptic treatment |
| 1989 | Alison Pitt | Accommodation deficits in a group of young offenders |
| 1990 | Anne Fitzgerald | Five years of tinted lenses for reading disability |
| 1992 | Carolyn Calcutt | Untreated early onset esotropia in the visual adult |
| 1993 | Judy Seaber | The next fifty years in orthoptics and ocular motility |
| 1995 | David Mackey | The Glaucoma Inheritance Study in Tasmania (GIST) |
| 1997 | Robin Wilkinson | Heredity and strabismus |
| 1998 | Pierre Elmurr | The visual system and sports perfomance |
| 1999 | Kerry Fitzmaurice | Research: A journey of innovation or rediscovery? |
| 2005 | Kathryn Rose | The Sydney Myopia Study: Implications for evidence based practice and public health |
| 2006 | Frank Martin | Reading difficulties in children - evidence base in relation to aetiology and management |
| 2008 | Stephen Vale | A vision for orthoptics: An outsider's perspective |
| 2009 | Michael Coote | An eye on the future |
| 2010 | John Crompton | The pupil: More than the aperture of the iris diaphragm |
| 2011 | Neryla Jolly | On being an orthoptist |

## THE EMMIE RUSSELL PRIZE

| | | |
|---|---|---|
| 1957 | Margaret Kirkland | Aspects of vertical deviation |
| 1959 | Marion Carroll | Monocular stimulation in the treatment of amblyopia exanopsia |
| 1960 | Ann Macfarlane | A study of patients at the Children's Hospital |
| 1961 | Ann Macfarlane | A case history "V" Syndrome |
| 1962 | Adrienne Rona | A survey of patients at the Far West Children's Health Scheme, Manly |
| 1963 | Madeleine McNess | Case history: Right convergent strabismus |
| 1965 | Margaret Doyle | Diagnostic pleoptic methods and problems encountered |
| 1966 | Gwen Wood | Miotics in practice |
| 1967 | Sandra Hudson Shaw | Orthoptics in Genoa |
| 1968 | Leslie Stock | Divergent squints with abnormal retinal correspondence |
| 1969 | Sandra Kelly | The prognosis in the treatment of eccentric fixation |
| 1970 | Barbara Denison | A summary of pleoptic treatment and results |
| 1971 | Elaine Cornell | Paradoxical innervation |
| 1972 | Neryla Jolly | Reading difficulties |
| 1973 | Shayne Brown | Uses of fresnel prisms |
| 1974 | Francis Merrick | The use of concave lenses in the management of intermittent divergent squint |
| 1975 | Vicki Elliott | Orthoptics and cerebral palsy |
| 1976 | Shayne Brown | The challenge of the present |
| 1977 | Melinda Binovec | Orthoptic management of the cerebral palsied child |
| 1978 | Anne Pettigrew | |
| 1979 | Susan Cort | Nystagmus blocking syndrome |
| 1980 | Sandra Tait | Foveal abnormalities in ametropic amblyopia |
| 1981 | Anne Fitzgerald | Assessment of visual field anomalies using the visually evoked response |
| 1982 | Anne Fitzgerald | Evidence of abnormal optic nerve fibre projection in patients with dissociated vertical deviation: A preliminary report |
| 1983 | Cathie Searle | Acquired Brown's syndrome: A case report |
| | Susan Horne | Acquired Brown's syndrome: A case report |
| 1984 | Helen Goodacre | Minus overcorrection: Conservative treatment of intermittent exotropia in the young child |
| 1985 | Cathie Searle | The newborn follow up clinic: A preliminary report of ocular anomalies |
| 1988 | Katrina Bourne | Current concepts in restrictive eye movements: Duane's retraction syndrome and Brown's syndrome |
| 1989 | Lee Adams | An update in genetics for the orthoptist: A brief review of gene mapping |
| 1990 | Michelle Gallaher | Dynamic visual acuity versus static visual acuity: Compensatory effect of the VOR |
| 1991 | Robert Sparkes | Retinal photographic grading: The orthoptic picture |
| 1992 | Rosa Cingiloglu | Visual agnosia: An update on disorders of visual recognition |
| 1993 | Zoran Georgievski | The effects of central and peripheral binocular visual field masking on fusional disparity vergence |

| | | |
|---|---|---|
| 1994 | Rebecca Duyshart | Visual acuity: Area of retinal stimulation |
| 1995-7 | Not awarded | |
| 1998 | Nathan Clunas | Quantitative analysis of the inner nuclear layer in the retina of the common marmoset callithrix jacchus |
| 1999 | Anthony Sullivan | The effects of age on saccades made to visual, auditory and tactile stimuli |
| 2001 | Monica Wright | The complicated diagnosis of cortical vision impairment in children with multiple disabilities |
| 2005 | Lisa Jones | Eye movement control during the visual scanning of objects |
| 2006 | Josie Leone | The prognostic value of the cyclo-swap test in the treatment of amblyopia using atropine |
| 2007 | Thong Le | What is the difference between the different types of divergence excess intermittent exotropia? |
| 2008 | Amanda French | Does the wearing of glasses affect the pattern of activities of children with hyperopic refractive errors? |
| 2009 | Amanda French | Wide variation in the prevalence of myopia in schools across Sydney: The Sydney Myopia Study |
| 2010 | Alannah Price | Vertical interline spacing and word recognition using the peripheral retina |
| 2011 | Amanda French | Comparison of the distribution of refraction and ocular biometry in European Caucasian children living in Northern Ireland and Sydney |

## PAEDIATRIC ORTHOPTIC AWARD

| | | |
|---|---|---|
| 1999 | Valerie Tosswill | Vision impairment in children |
| 2000 | Melinda Syminiuk | Microtropia - a challenge to conventional treatment strategies |
| 2001 | Monica Wright | The complicated diagnosis of cortical vision impairment in children with multiple disabilities |
| 2005 | Kate Brassington | Amblyopia and reading difficulties |
| 2006 | Lindley Leonard | Intermittent exotropia in children and the role of non-surgical therapies |
| 2007 | Jody Leone | Prevalence of heterophoria in Australian school children |
| 2008 | Jody Leone | Can visual acuity screen for clinically significant refractive errors in teenagers? |
| 2009 | Jody Leone | Visual acuity testability with the electronic visual acuity-tester compared with LogMAR in Australian pre-school children |
| 2010 | Fiona Gorski | Neurofibromatosis and associated ocular manifestations |
| 2011 | Suzy King | Understanding Sturge-Weber syndrome and the related ocular complications |

## THE MARY WESSON AWARD

| | |
|---|---|
| 1983 | Diana Craig (Inaugural) |
| 1986 | Neryla Jolly |
| 1989 | Not awarded |
| 1991 | Kerry Fitzmaurice |
| 1994 | Margaret Doyle |
| 1997 | Not Awarded |
| 2000 | Heather Pettigrew |
| 2004 | Ann Macfarlane |
| 2008 | Julie Barbour |
| 2010 | Elaine Cornell |

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| 1973-4 | Jill Taylor |
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| 2010 | Connie Koklanis |

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| Vol 10 1970 | Neryla Heard |
| Vol 11 1971 | Neryla Heard & Helen Hawkeswood |
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| Vol 13 1973-74 | Diana Craig |
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| Vol 20 1983 | Margaret Doyle |
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| Vol 23 1986 | Elaine Cornell |
| Vol 24 1987 | Elaine Cornell |
| Vol 25 1989 | Elaine Cornell |
| Vol 26 1990 | Elanie Cornell |
| Vol 27 1991 | Julia Kelly |
| Vol 28 1992 | Julia Kelly |
| Vol 29 1993 | Julia Kelly |
| Vol 30 1994 | Alison Pitt |
| Vol 31 1995 | Julie Green |
| Vol 32 1996 | Julie Green |
| Vol 33 1997-98 | Julie Green |
| Vol 34 1999 | Julie Green |
| Vol 35 2000 | Neryla Jolly & Nathan Moss |
| Vol 36 2001-02 | Neryla Jolly & Kathryn Thompson |
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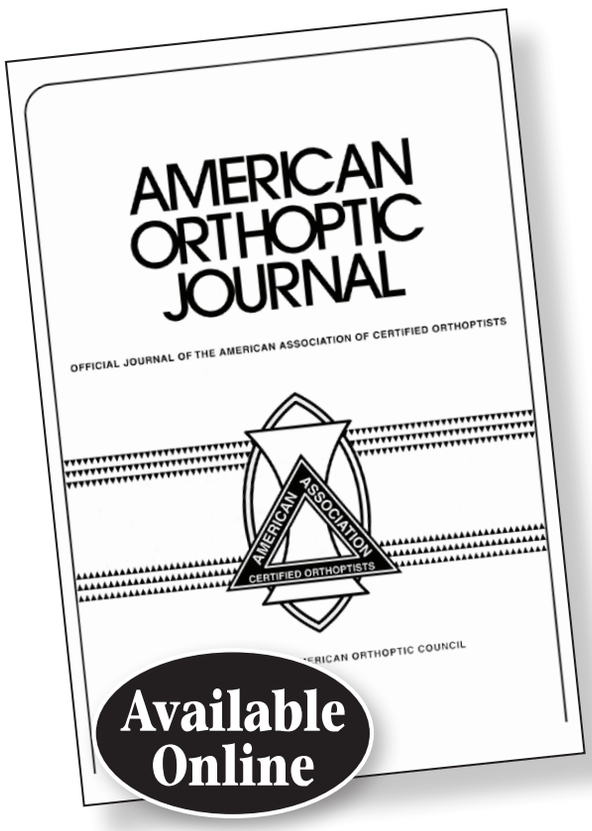


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