The Institute of Optometry is unique in being an independent self-financing charity dedicated to the promotion of clinical excellence, research, and education in optometry.

Roberson (1989)

KIDS R FUN
The busy optometrist’s guide to paediatric eyecare

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References

Vision & Reading Difficulties, www.optometry.co.uk/bookshop

PLAN

INTRODUCTION

OCULAR HEALTH

VISUAL ACUITY

REFRACTION

ORTHOPTIC FUNCTION

CONCLUSIONS

Paediatrics: general approach
- small, inexperienced adults
- put child at ease; have fun; praise
- may need to be quick
- do what you can, where you can, when you can
- dim lights slowly
- explain, in appropriate language
- train them and give prizes

Paediatrics: when to refer
- active & some old pathology
- Fundus photography useful from age 4-5y
- visual conversion reactions can mask pathology
- non-accidental injury

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for regular tweets on optometric research

DISCLOSURE
- Paid lectures & KOL/product feedback programmes:
  - Hoya, CibaVision, CooperVision, Johnson & Johnson, Cerenus Visual Technologies, Black & Libran, Sotirana, Specavers
  - Lecture content always my own
- Author of Pickwell's Binocular Vision Anomalies, editions 3-5
- i.O.O. Sales Ltd markets IFS orthoptic exercises, which the speaker designed, and for which he receives a small royalty
- Community optometric practice in Brentwood, Essex

COLE MARTIN TREGASKIS
OPTOMETRISTS

References

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Non-accidental injury (NAI)

- Ocular signs
  - Peripheral retinal haemorrhages
  - Periocular bruising
  - Subconjunctival haemorrhages
  - Hyphaema
  - Dislocated lens
  - Retinal detachment
- Systemic signs
  - Surface bruises
  - Multiple fractures & injuries
  - Scalds & burns

Child protection

- Avoid unnecessary physical contact
- To protect yourself against unfounded allegations you may:
  - Ensure presence of parent/carer at all times
  - Door ajar so parent/carer can hear
  - Open access policy: staff knock & enter any time
- But take reasonable precautions to preserve confidentiality

Development of binocular vision

- Occasional (<15% of the time) neonatal misalignments are common and OK in the first month of life and only require referral if
  - they worsen after 2 months or
  - there is an intermittent deviation at 4 months
- For most infants, motor fusion and sensory fusion develop at about 3-4 months
- By 6 months children should converge to a 20Δ base out prism and, if cooperative, should be able to fixate coarse stereoscopic targets

Symptoms, history, family history

- Symptoms:
  - Do you ever see an eye turning?
  - Distance vision (birds, planes)
  - Near vision (detail in pictures)
- History:
  - Birth on time
  - Birth weight
  - Birth complications
- Family history
  - Esotropia, amblyopia, Rx

Ocular health

- With pre-school, optometrist unlikely to get more than a glimpse
- Pupil reactions possibly, indirect can be useful
- If in doubt, dilate. Photos if possible
- If still in doubt, refer
- Colour vision
  - Ishihara
  - TCU (1 & 2)

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HVID NORMS

- neonate: 9.0-10.5 mm
- 6 months: 11.5 mm ± 0.50 mm

PLAN

INTRODUCTION
OCULAR HEALTH
VISUAL ACUITY
REFRACTION
ORTHOPTIC FUNCTION
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Visual acuity: overview

- Macular is poorly developed at birth
- Large variation in rate of development
- Results vary with different test methods
- VEPs are an option
- We need to detect strabismic amblyopia
  - So, do crowded tests as soon as you can

Visual acuity: grating preferential looking

- Teller or Keeler or Lea
- Suitable from birth
- Two out of three
- Easier to do than you think!
- No peeping!
- Not good at detecting strabismic amblyopia
  - Vernier is the future
  - (Drover et al., 2010)

Visual acuity: Cardiff cards

- Vanishing optotypes suitable from 6 months
- Binocular readings possible for 96% aged 12-36 months
  - Adoh and Woodhouse (1994)
- A “game” that children enjoy
- Encourage them (noises etc.)
- Poor at detecting strabismic amblyopia

Visual acuity: shapes and pictures

- Manageable by many 2 year olds
- Avoid isolated uncrowded optotypes
  - Poor at detecting strabismic amblyopia
- Lea & Kay have LogMAR design
- Test Chart 2000 is ideal
- Most children who can do these can match crowded letters
**Visual acuity: letter matching**

- **Worst:**
  - Sheridan Gardiner
  - Sonksen Silver
  - Cambridge cards
  - Glasgow Acuity Test

- **Better:**
  - Test Chart 2000

- **Best:**
  - Possible from c. 2.5 years

**Visual acuity: near charts**

- **Lea, Patti pics, Kay near VA cards**
- **Avoid stories**
- **Institute of Optometry near test card**
- **Many others**

**Visual acuity: “better than nothing”**

- **Reaction to occlusion**
- **10s up one eye**
- **Should alternate freely**

---

**Refraction: Basic minimum**

- Are the retinoscopy reflexes symmetrical and no large refractive errors?
- Be adaptable about working distance
- Hold trial lenses with infants
- Fixation target is anything that will attract their attention, ideally Test Chart 2000

**Refraction: Mohindra retinoscopy**

- Working distance = 55cm
- Totally darkened room
- Occlude one eye
- Fixate retinoscope light
- -1.00 to -1.25D allowance
- High correlation with cycloplegic retinoscopy for over 2 yr-olds

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**VISUAL ACUITY**

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**Refraction: accommodative lag**

- MEM retinoscopy
  - P x binocularly fixes target on retinoscope at normal reading distance
  - Practitioner monocularly rapidly interposes lenses to neutralise reflex
  - Mean +/- 1 SD quoted as plano to +0.75
- Nott retinoscopy
  - UC-CUBE

**Refraction: cycloplegic**

- Indications for cycloplegic:
  - Symptom of intermittent SOT
  - Sign of SOP or SOT
  - Unexplained poor VA
  - Unexplained symptoms
  - Variable or suspicious Rx
- Refer if under 3 months
  - Under 12 months use 0.5% cyclo
  - Dark pigmentation leave for longer

**Refraction: normal development**

- At birth +2.00 DS (SD = 2.00 DS)
- Very variable in first year
- On average, hypermetropia decreases rapidly during the first year to a mean level of about +1.50 D at age one year
- High astigmatism in first year often reduces

**Refraction: when to prescribe (Leat 2011)**

- Nearly 75% of children with esotropia &/or amblyopia have a significant Rx
- Hyperopia
  - Age 1+: ≥3.50D in any meridian (give partial Rx)
  - Age 4+: ≥2.50D in any meridian (give partial Rx; reduce by 1-1.50D)
  - School age: ≥1.50D
- Astigmatism
  - Age 1.5+: ≥1.00DC; give partial up to age 3-4y
  - Age 4+: ≥0.50DC
  - Correct oblique astigmatism ≥0.50DC from 1y onwards
- Anisometropia: prescribe full aniso correction if amblyopia

**Myopia control**

- Dual focus soft CL slow myopia progression (Anstice & Phillips, 2010)
  - 40 children aged 11-14y, cross-over RCT, 2x 10 month periods, CV MiSight
  - In 70%, myopia progression reduced by 30% or more
- Soft CL to reduce hyperopic defocus works
  - Slow myopia progression by 30-50% (Sankaridurg et al, 2011; Anstice & Phillips, 2011; Lam et al, 2013)
- Bifocal soft CL can slow myopia progression by 60-70% if esphoric at near, at least for 1y
  - (Aller et al., 2006)
- Bifocal soft CL (CD) can slow myopia progression by 50%
  - (Walline et al., 2013)
- Orthokeratology slows myopia progression by 30-50%

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- **CONCLUSIONS**

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Orthoptics: development

- VOR present at full term birth
- Saccades improve over first 2 months
- Pursuit improves over the first 3 months
- Bifoveal fixation occurs at about 2-3 months
- Sensory & motor fusion & stereopsis at 3-4 months
- Accommodation relatively inaccurate, in line with sensory abilities until about 3 months

Orthoptics: tests of alignment

- Cover test: the gold standard
- Hirschberg: inaccurate 1 mm = 15-20 Δ
- Krimsky: ± 14 Δ
- Brückner
  - Symmetry of red reflexes, direct ophthalmoscope at 80-100 cm, dial in correction for clear view. Darker reflex in strabismic eye
  - Detects strabismus, anisometropia, anisocoria or pathology

Orthoptics: motility

- Infants don’t like having head held
  - Move around
  - Or parent can rotate the child

Orthoptics: motor fusion

- Base out prism test
  - Have child fix a detailed picture
  - Can measure in older children with prism bar
  - Measure the reserve that opposes the phoria first

<table>
<thead>
<tr>
<th>age (months)</th>
<th>test</th>
<th>response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20 Δ out</td>
<td>unlikely to make any response</td>
</tr>
<tr>
<td>15–18</td>
<td>20–30 Δ out</td>
<td>measure phoria first</td>
</tr>
</tbody>
</table>


Orthoptics: sensory fusion & stereo

- Lang works well with infants; look at eye movements
- Frisby makes a good game with squeaky toy
- Recommended from age 2y is Randot
  - Random dot
  - Contoured
  - Mallett polarised letters test

STEREOTESTS

www.bernell.com
Orthoptics: stereotest norms

- Generally, different tests give different results
- But Titmus circles similar to Randot circles

<table>
<thead>
<tr>
<th>Age (mo)</th>
<th>Test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Lang 1</td>
<td>Any unlikely to make any response</td>
</tr>
<tr>
<td>6-18</td>
<td>Lang 1 or 2</td>
<td>Should be able to point and name pictures</td>
</tr>
<tr>
<td>&gt; 24</td>
<td>Lang 1 or 2</td>
<td>Should be able to point and name pictures</td>
</tr>
<tr>
<td>≥ 24</td>
<td>Randot (shapes)</td>
<td>Indicates no strabismus</td>
</tr>
<tr>
<td>≥ 24</td>
<td>Randot (animals)</td>
<td>Should be able to see all animals</td>
</tr>
<tr>
<td>3-5 yrs</td>
<td>Titmus</td>
<td>70&quot;</td>
</tr>
<tr>
<td>&gt; 5 yrs</td>
<td>Titmus</td>
<td>40&quot; or better</td>
</tr>
<tr>
<td>3.5 yrs</td>
<td>Titmus</td>
<td>300&quot; (Romano et al., 1975)</td>
</tr>
<tr>
<td>5 yrs</td>
<td>Titmus</td>
<td>140&quot; (Romano et al., 1975)</td>
</tr>
<tr>
<td>6 yrs</td>
<td>Titmus</td>
<td>80&quot; (Romano et al., 1975)</td>
</tr>
<tr>
<td>7 yrs</td>
<td>Titmus</td>
<td>60&quot; (Romano et al., 1975)</td>
</tr>
<tr>
<td>9 yrs</td>
<td>Titmus</td>
<td>40&quot; (Romano et al., 1975)</td>
</tr>
<tr>
<td>3-5 yrs</td>
<td>Frisby</td>
<td>250&quot;</td>
</tr>
<tr>
<td>3-5 yrs</td>
<td>TNO</td>
<td>120&quot;</td>
</tr>
</tbody>
</table>

Orthoptics: summary

- Try to do more than one method
- Record quality of response

Strabismus: the bottom line for the busy optometrist

- Is it new or changing?
  - Yes
    - Any treatment needed? (probably not)
  - No
    - Any treatment needed? (probably not)

KEY SIGNS OF DECOMP. PHORIA

- Symptoms
- Poor cover test recovery

KEY SIGNS OF DECOMP. PHORIA

- Symptoms
- Poor cover test recovery
- Aligning prism (FD test)
- Low fusional reserve opposing phoria
  - Sheard's criterion
  - Particularly useful for exophorias
- For esophorias, size and imbalanced fusional reserves are relevant
- For hyperphorias, size matters
Profound learning difficulties

- e.g., Downs syndrome
- often associated with:
  - refractive error
  - strabismus
  - poor accommodation
  - reduced VA
- paediatric techniques may work; be quick
- need eyecare, often need Rx (bilocals)

Specific learning difficulties (SpLD) e.g., dyslexia

- vision is not main cause, BUT:
  - can have refractive error
  - often have subtle orthoptic anomaly
  - may benefit from coloured filters
  - SpLD need specialist (non-NHS) eyecare

Common visual problems in dyslexia

- Meares-Irlen Syndrome/ Visual Stress (MISVIS)
- Binocular instability
- Accommodative insufficiency

Conclusions: they need us

- Young children need and deserve more than once only vision screening on school entry
- Many subtle orthoptic anomalies can be best managed in primary optometric care
- Accept that you won’t get perfect results
  - Record the quality of the response

Conclusions: we need them

- c. 10% of population is under 16 yrs
- children need regular brief exams
- some orthoptic patients prefer exercises in primary care
- specialist care for SpLD
A personal perspective: Dr Optometry

- In 2008 the Institute of Optometry launched a Doctor of Optometry degree in collaboration with London South Bank University
- 5 year part-time professional doctorate
  - Year 1 has 13 taught days & 2 assignments
  - Year 2 has 8 taught days & 2 assignments
  - Years 3-5 are supervised doctoral research
    - Research most likely to be clinical, in practice
- “the ultimate HQ for UK optometrists”