THE INSTITUTE OF OPTOMETRY

"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)

Interactive workshop: prescribing & binocular vision cases

Prof Bruce Evans
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Reference: Pickwell's Binocular Vision Anomalies, 5th Edition, Elsevier, 2007

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Is this art?

A. Yes
B. No

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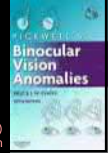
Case 1: 50y old female in contact lenses with PH of strab since teenager, now worsening (6274)

SYMPTOMS:	AHP gradually worse over last year or diplopia	
Rx:	R+6.00DS 6/6	L+6.25DS 6/6 Add+1.75
WEARING:	RGP R+6.00	L+8.50 (monovision)
COVER TEST:	D 10Δ L Hyperphoria → G5 → L hypertropia N 15Δ L Hyperphoria → G5 → L hypertropia	
FUNDUS:	fully described; all normal	
IOP:	R13	L14 mmHg

Grade	Description
1	rapid and smooth
2	slightly slow/jerky
3	definitely slow/jerky but not breaking down
4	slow/jerky and breaks down with repeat covering, or only recovers after a blink
5	breaks down readily after 1-3 covers



Video clip source: CD-ROM in Evans (2007) Pickwell's Binocular Vision Anomalies, 5th edition

Which muscle is palsied?

- LIR
- RSO
- LSO
- RSR

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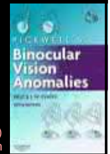
LSO palsy

- In SO palsy, usually:
  - Hyper-deviation of affected eye, worse in down-gaze
  - under-action of affected eye when looking down and in
  - More likely to have symptoms with reading than with distance
- But, may have secondary sequelae



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Why is the palsy decompensating?

- contact lenses
- presbyopia
- monovision
- menopause

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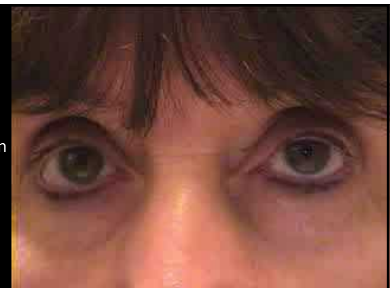
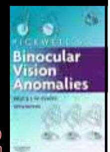
SO palsy

- Usually:
  - Hyper-deviation of affected eye, worse in down-gaze
  - under-action of affected eye when looking down and in
  - More likely to have symptoms with reading than with distance
- But, may have secondary sequelae
- May contraindicate fitting multifocal spectacles or monovision

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What management?

A. Refer urgently
B. Refer routinely
C. SV CL & large readers
D. Alternating vision MF CL
E. Stop CL, MF glasses
F. Stop CL, 2 pairs of glasses (DV & NV)

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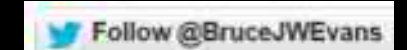

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Case 2: 2½ year old girl, 1st EE

History Notes | Basic Hx | Summary | Subjective | Rx Given | Auto-Refractor | Retinoscopy Result | History

Case 2: 2½ year old girl, 1st EE

Presenting Complaint
Last 4-5/52, LXT when tired, straightens when concs on something
D & N OK
GH OK

History / Medication
PH C-section as

Vision R 6/9, L 6/9
Kay crowded singles "breaks to L exotropia c small vertical element"

Cover Test: Horizontal 20.00 xp GS, Vertical 6.00 L/R; 4.00 xp G1, 0.00

Grade	Description
1	rapid and smooth
2	slightly slow/jerky
3	definitely slow/jerky but not breaking down
4	slow/jerky and breaks down with repeat covering, or only recovers after a blink
5	breaks down readily after 1-3 covers

What is the diagnosis?

A. Convergence excess
B. Convergence weakness
C. Divergence excess
D. Divergence weakness

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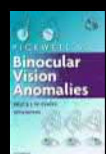
Divergence excess

- Characteristics:
  - D XOP > 15Δ greater than N XOP
  - Typically, no symptoms as suppress
  - Often worse at far distance cf 6m
  - Often worse with bright sunlight or alcohol
  - Often accompanied by a V-syndrome
  - Divergent fusional reserve very high
  - Can be classified according to effect of occlusion & AC/A ratio



What is your management?

monitor in 3-6 months

B. monitor in 12 months

C. refer urgently

D. refer routinely

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Case 2: 2½ year old girl, 1st EE

History Notes | Basic Rx | Summary | Subjective | Rx Given | Auto-Refractor | Retinoscopy Result | History

Conclusion

report to Mum to take to HES appt next month (booked) and cc to GP

COLE MARTIN TREGASKIS

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Mrs XXXX
xxxx@hotmail.com

3-Jul-2015

Dear Mrs XXXX

Thank you for bringing XXXX to see me for an eye examination. I hope that the attached report of my findings is useful and please give a copy to the staff at the hospital clinic at the appointment there. I have sent a copy to XXXX's GP.

Yours sincerely

Professor Bruce JW Evans BSc PhD FCOptom DipCLP DipOrth FAAO
Principal Optometrist, Cole Martin Tregaskis Optometrists
Visiting Professor, City University; Director of Research, Institute of Optometry

cc. The xxxx Medical Centre
xxxx
Essex xxxx

REPORT OF EYE EXAMINATION OF:
XXXX XXXX: born xx/xx/2013

Clinical results

Symptoms and history

XXXX's mother has noticed for the last 4-5 weeks that XXXX's left eye drifts out (diverges) when XXXX is tired. The eyes then straighten immediately when XXXX concentrates on something. XXXX was born 12 days late and there were birth complications resulting in a Caesarian, but XXXX had a normal birth weight. Her grandmother has mild myopia and a strabismus. XXXX does not seem to have any difficulty with her vision and is developing normally with good general health.

Visual acuities and refractive error

Vision: R. 6/9 L. 6/9 Kay matched singles
Near Vision: 6/9 binocularly
Refraction ("dry" retinoscopy): R. +0.75/-1.00x90
L. +0.75/-0.50x90

Ocular health

Ophthalmoscopy: all observations were within normal limits as far as seen. Discs glimpsed and look normal, CD approximately 0.4 each eye. Media clear. Fundi normal as far as seen.
Pupil reactions: normal (PERRLA)

Ocular motor function

Cover test: D. orthophoria until first cover when breaks down to large L exotropia with small L hypertropia
N. 4Δ exophoria, good recovery
Ocular Motility: Appears full
Near point of convergence: normal (to nose)
Stereo-acuity: normal (Lang 1: 3/3 targets identified)
Amplitude of accommodation: BE 6/9 Kay

Summary and Management

XXXX was, for her age, co-operative throughout my examination. I have not carried out a cycloplegic refraction as this will no doubt be carried out at the hospital clinic and my non-cycloplegic findings do not indicate any refractive error that would be likely to influence the intermittent divergence. This appears to be of the divergence excess type. I understand that XXXX has a hospital eye clinic appointment booked next week and I have recommended that she continue with this to further investigate whether there is any cause for the turning eye. I have advised her that since this only occurs when tired and the monocular vision is good the most likely management at the moment will be to monitor the situation.

I would be grateful to know of the hospital findings.

Professor Bruce JW Evans BSc PhD FCOptom DipCLP DipOrth FAAO FBCLA
Principal Optometrist, Cole Martin Tregaskis Optometrists
Visiting Professor, City University; Director of Research, Institute of Optometry

3rd July 2015

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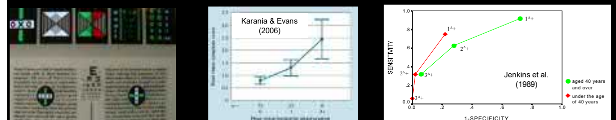
Case 3: 10y old female, monitoring early myopia (16379)

Symptoms:	D blur, occasional episodes N blur	
V:	R 6/15+	L 6/19
Ret:	R-0.25/-0.50x155	L-0.50/-0.50x175
Sub:	R-0.25/-0.50x155 6/7.5	L-0.50/-0.50x175 6/9
Cover test (s):	D orthophoria	N 3Δ esophoria G1
NPC & AA:	to nose	R 16D L15D
Ocular health:	Pupils, motility, ophthalmoscopy, fields, ret reflex: all normal	

Grade	*Description*
1	rapid and smooth
2	slightly slow/jerky
3	definitely slow/jerky but not breaking down
4	slow/jerky and breaks down with repeat covering, or only recovers after a blink
5	breaks down readily after 1-3 covers

Case 3: 10y old female – further tests

Accomm. lag:	not done (would do now!)
Cycloplegic:	done in 2009 showing early myopia
Maddox wing:	3Δ eso with subjective
Mallett unit s:	1Δ base out L aligning prism; or +0.50D aligning sphere
AC/A ratio:	3.5 Δ/D
(Sub:	R-0.25/-0.50x155 6/7.5 L-0.50/-0.50x175 6/9)



Preferred management?

A. No Rx

B. Single vision glasses

C. Multifocal glasses

D. Single vision contact lenses

E. Multifocal contact lenses

F. Orthokeratology

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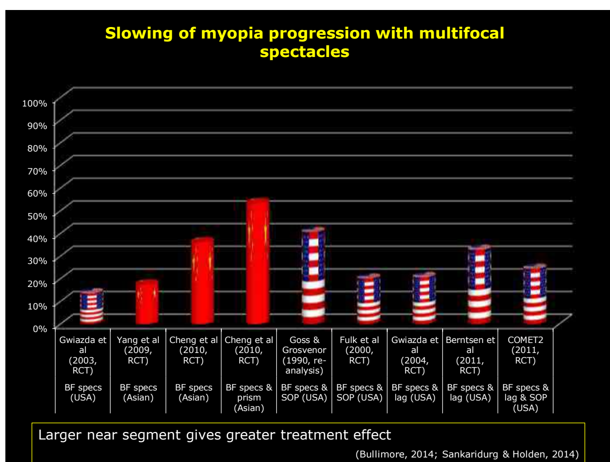
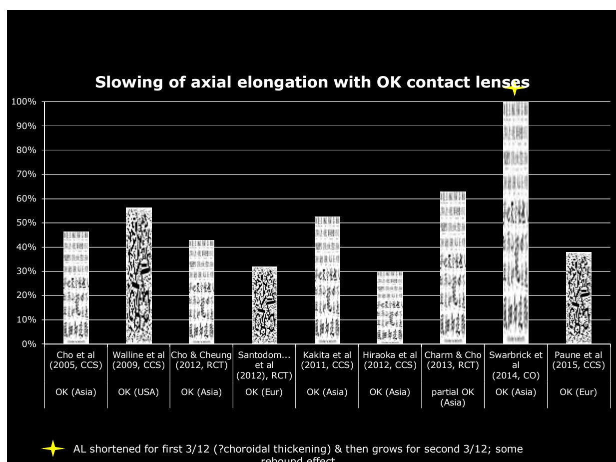
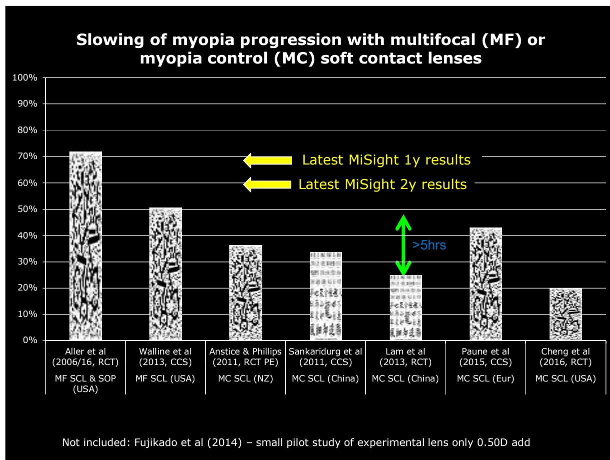
Why does myopia matter?

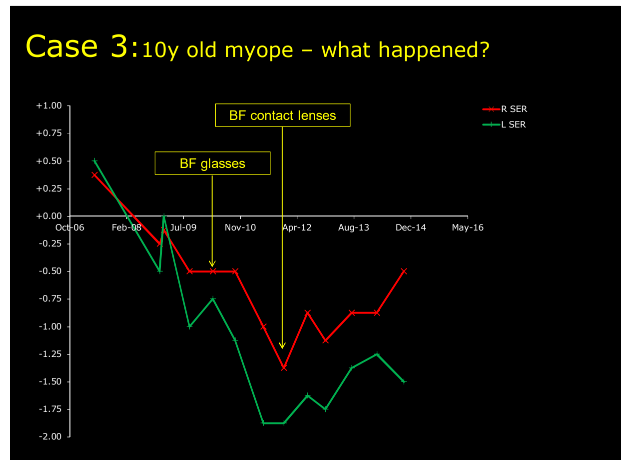
- Common and increasing prevalence
  - 93% of Taiwanese medical students are myopic (Lin et al., 1996)
  - Prevalence of myopia in USA has increased in last 30 years from 25% to 42% (Vitale et al, 2009)
  - 50-53% of UK university students are myopic (Logan et al., 2005)
  - Prevalence of myopia in UK has more than doubled in last 50 years (McCullough et al., 2016)
- Significant health impact
  - High myopia (≤-6) increases risk of retinal detachment, myopic macular degeneration, glaucoma, & other conditions
    - "no evidence of a safe threshold level of myopia for any of the known ocular diseases linked to myopia" (Flitcroft, 2012)
  - In the Copenhagen study myopia-related diseases were the most common cause of impaired vision (Holden et al., 2014)

Flitcroft (2012)









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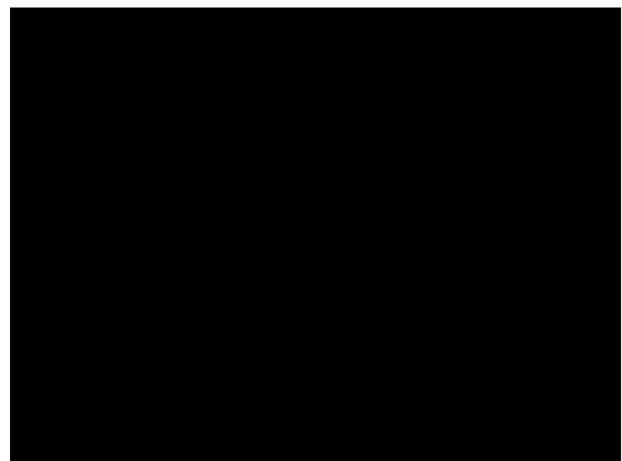


Case 4: 3y old boy; Mum says specs not needed (29673)

What next?

A. Accommodation
B. Cycloplegic
C. Near visual acuity
D. No Rx
E. Rx
F. Refer

0% 0% 0% 0% 0% 0%

Accommodation, Cycloplegic, Near visual acuity, No Rx, Rx, Refer

Multiple answers allowed

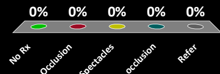
Case 4: 3y old boy; Mum says specs not needed (29673)

Case 4: 3y old boy; Mum says specs not needed (29673)

- Ophthalmoscopy normal

Recommended management option

A. No Rx
B. Occlusion
C. Spectacles
D. Spectacles + occlusion
E. Refer



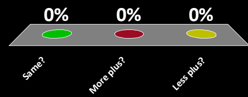
Up to two answers

Case 4: 3y old boy; Mum says specs not needed (29673)

- N.B., dry retinoscopy:
- What Rx would you have given:
  - Same?
  - More plus?
  - Less plus?

What Rx would you have given:

A. Same?
B. More plus?
C. Less plus?

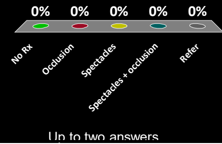


One answer allowed

Case 4: 3y old boy; 6 months later (29673)

Recommended management option

A. No Rx
B. Occlusion
C. Spectacles
D. Spectacles + occlusion
E. Refer



Up to two answers

Case 4: 3y old boy; 6 months later (29673)

Case 4: 3y old boy; 6 months later; referral letter

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Case 4: 3y old boy; 6 months later; referral letter (cont.)

I have explained to Mrs ▇▇▇ again that in my opinion spectacles are advisable to try to prevent the strabismus becoming constant and to reduce the risk of amblyopia. She is concerned that spectacles will make the refractive error worsen but I have explained that spectacles are neither likely to increase nor reduce the long-sightedness. I have suggested that Mrs ▇▇▇ sees a paediatric ophthalmologist and orthoptist for an additional opinion and I would be grateful if you could arrange the referral. I believe that Dr ▇▇▇ has a paediatric clinic at the ▇▇▇ Hospital. I enclose a copy of this letter for onward referral and I would be grateful to know of the outcome. Receiving a reply to referrals assists optometrists in providing continuing care to patients and also helps to avoid unnecessary re-referrals.

With kind regards

Professor Bruce JW Evans BSc PhD FCOptom DipCLP DipOrth FAAO FBCLA
Principal Optometrist, Cole Martin Tregaskis Optometrists
Visiting Professor, City University; Director of Research, Institute of Optometry

cc:

Case 4: 3y old boy; 9 months later; reply to referral

I saw ▇▇▇ in my clinic today. He initially went to the opticians as his mother noticed that he was blinking excessively. His own opticians found him to be hypermetropic but ▇▇▇ has not been wearing glasses. ▇▇▇'s mother now notices that his right eye turns inwards and she came to see me for a second opinion regarding the need to wear glasses.

On examination today ▇▇▇'s vision was reduced at 0.325 in the right and 0.375 in the left. He did have a manifest right esotropia particularly in the distance rather than near. This measured 10ΔBO at near and 16ΔBO in the distance. He had a full range of ocular movements and refraction did show a significant hypermetropic refractive error. Fundus examination was normal.

I have explained to ▇▇▇'s mother today that I think he would benefit from glasses as his right eye is now beginning to turn inwards and his vision is reduced in both eyes. I have given him a prescription of +3.00/+0.25x90 in the right and +3.00 in the left. This represents an under correction of +1.00 dioptre in either eye. He should wear his glasses full time and I will see him in three months' time to assess the situation.

Yours sincerely,

Consultant Ophthalmic Surgeon

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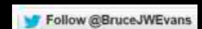

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Case 6: 5y old girl, new px, 2nd EE, May 2012 (26529)

Case 6: 5y old girl, new px, 2nd EE, May 2012 (26529)

What is the diagnosis?

A. Anisometropic amblyopia

B. Strabismic amblyopia

C. Mixed aniso & strabismic amblyopia

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Case 6: some literature on treatment

- Flow chart based on review of recent RCTs in Evans et al. (2011; OPO)
- Many cases of amblyopia can be cured by refractive correction alone;
  - 20% don't need occlusion (Gibson, 1955; Pickwell, 1984; Stewart et al., 2004; West & Williams, 2011)
  - Contact lenses are likely to be best (Evans, 2006)
- Many cases never require full-time occlusion
  - If 6/9 to 6/25, 2h occ. ≡ 6h
  - If ≤ 6/30, 6h > 2h
- Avoid full time occlusion for orthotropic anisometropia
- Timings approximate
  - See patients frequently during the treatment of amblyopia, to begin with every 4-6 weeks

Who can treat amblyopia?

A. hospital eye clinics

B. community optometrists

C. both

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Case 6: 2 years later, now 7y old girl (26529)

Case 6: 2 years later, now 7y old girl (26529)

Auto-Refractor: Sphere / Cylinder Axis V/A

Lens Meter: Type Right Left

Retinoscopy

	Sphere	/ Cylinder	Axis	V/A	
R	+1.75	-0.25	15		BVD
L	+5.50	-0.50	170		WD 0

Subjective Rx

	Vision	Sphere	/ Cylinder	Axis	D Prism	V/A	Nr Add	N Prism	N V/A	Int Add
R		+1.00				6/6				
L		+2.50	-0.50	155		6/12+				

Subjective Findings: spx R6/6 L6/9+; CTs D=N=0; NV fus res c: div-/12/10 -/10/8 con sup 25/sup/sup; test c: OK; overleys borderline but more comfy

Rx Given

	Sphere	/ Cylinder	Axis	D Prism	V/A	Nr Add	N Prism	N V/A	Int Add
R	+0.25				6/6				
L	+3.25	-0.75	150		6/12+				

Motility: Full, smooth, SV
Pupils: PERRLA
NPC: c 5cm
Acc: c R10D L13D
Stereopsis: c S-- C100

	Cover Test Horizontal	Cover Test Vertical	Muscle Balance Horizontal	Muscle Balance Vertical	Fixation Disparity Horizontal	Fixation Disparity Vertical
D	0.00	0.00 c	9.00 Out c	0.00 c	0 c	0 c
N	0.00	0.00 c	0.00 c spx	0.00 c --	0 c	0 c

Colour: Lime-green +yellow, 7
CV Test: pass Ishihara
Fields: 30 thresh R=L MS25 all seen
Other: PGT 1-0 2-0 MEM spx R+0.4 L+1.1 FS 0 AC/A2

Case 6: 2 years later, now 7y old girl (26529)

TIFFANY & Co. GUCCI Miu Miu Persol PRADA JIMMY CHOO Ray-Ban Dior

20/03/2012
Cycloplegic Refraction:
6/7.5 R+1.50
6/36 L+4.50
Glasses prescribed for constant wear
R: +1.00DS
L: +4.00DS

02/05/2012
R+1.00DS 6/7.5
L+4.00DS 6/24
Advised to patch R eye 4hours per day, and constant wear.

07/08/2012
R+1.25DS 6/7.5
L+4.75DS 6/24
Continue patching and constant wear

08/10/2012
R+1.25DS 6/6
L+4.75DS 6/12
Continue patching and constant wear

08/01/2013
R+1.00DS 6/6
L+4.00DS 6/9
Continue patching and constant wear

06/08/2013
R:0.00 6/6
L+2.50/-0.50 X180 6/7.5
Continue patching and constant wear

22/01/2014
R: 0.00 6/6
L+2.00/-0.50 X160 6/7.5
Continue patching and constant wear

1. Full correction of any significant refractive error

10 weeks

If still amblyopic → 2. Part-time occlusion

12 weeks

If still amblyopic → 3. Full-time occlusion

12 weeks

4. When no more improvement stop & monitor

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