

THE COLLEGE OF OPTOMETRISTS



HIGHER QUALIFICATIONS INFORMATION PACK

Orthoptics B

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The College of Optometrists			
Certificate:	Orthoptics B	Module:	1
Module Title:	Anatomy, physiology, and visual perception		
Module Size:	10 credits		
Assessment:	Modules 1, 2 & 3 of Certificate B are assessed together.		
Pre-requisites:	Orthoptics Certificate A	Co-requisites:	Modules 2 & 3
Aims and Objectives:			
To demonstrate an understanding of the gross anatomy, physiology and aspects of visual perception relevant to the binocular visual system			
Learning Outcomes:			
To be familiar with the anatomy of the eye and orbit including the innervation of the extraocular muscles and the perceptual pathways involved in binocular vision. The relevance and applications of electrodiagnostic techniques should be understood.			
Learning Strategies:			
For most optometry graduates this will be an enlargement of their U/G didactic course. It is anticipated that self help from textbooks is adequate although attendance at courses may be helpful.			
Outline Syllabus:			
The gross anatomy of the intrinsic and extrinsic ocular muscles including: <ul style="list-style-type: none"> - extraocular muscle origins, insertions - the muscles of the eye lids. 			
The orbital connective tissue structures including: <ul style="list-style-type: none"> - the orbital fascia - check ligaments - Tenon's capsule - muscle sheaths. 			
Anatomy of the orbit and related structures.			
The cranial nerves supplying the ocular muscles, <ul style="list-style-type: none"> - nuclei, - cortical and sub-cortical brain centres concerned in - eye movements, - eye position, - co-ordination of ocular muscles: - proprioception - ocular motor reflexes. 			
The role and basic structure of the vestibular apparatus.			
An overview of the blood supply to the orbit and brain, with an emphasis on the vessels most likely to be involved in pathology affecting binocular vision.			

An outline of the development of the eye, orbit, extra-ocular muscles, pre-and post-natal periods.

Visual perception

Sensory aspects of binocular vision including:

- space perception
- cortical integration
- stereopsis
- localisation.

Mechanisms of depth perception other than stereopsis, including monocular depth cues.

The existence of parallel visual pathways

A general knowledge of the different functions of the magno- and parvo-cellular visual sub-systems.

Electrophysiology of the retina, extra-ocular muscles, and cortex

- the main differences between the origin and uses of the electro-retinogram,
- electro-oculogram, and visual evoked response electro-encephalogram.

Indicative Reading (key texts in bold):

ADLER, F.H. & HART, W.M. (Eds) *Adler's Physiology of the Eye*, (9th Edition), C.V. Mosby, (St Louis) 1992.

BRON, A.J. et al. (Eds.) *Wolff's Anatomy of the Eye and Orbit*, (8th edition), Chapman and Hall 1997.

BAKER, T.G. Embryology of the eye: normal and abnormal development. IN: T. Buckingham (Ed) *Visual Problems in Childhood*, Butterworth-Heinemann, (Oxford), 1993; pp. 1-23.

BISHOP, P.O. Binocular vision. IN: Adler, F.H. & Hart, W.M. (Eds) *Adler's Physiology of the Eye*, (9th Edition), C.V. Mosby, (St Louis) 1992; pp. 619-689.

GROUND, A. Child visual development. IN: S. Barnard and D. Edgar (Eds), *Pediatric Eye Care*, Blackwell Science, (Oxford) 1995, pp. 43-74

HERSHENSON, M. Visual space perception: A primer. MIT Press (Cambridge MASS) 1999.

KRISS, A., THOMPSON, D. Visual electrodiagnostics. IN: D. Taylor (Ed), *Pediatric Ophthalmology*, (2nd edition), Butterworths, (Oxford) 1997.

LEIGH, R.J. & ZEE, D.S. The neurology of eye movements. Oxford University Press (Oxford) 1999.

NELSON, J. Binocular vision: disparity detection and anomalous correspondence. IN Eds. K. Edwards and R. Llewellyn, *Optometry*, Butterworths, (London), 1988; pp. 217-237

NOORDEN, G.K. VON, AND CAMPOS, E. Chapter 3 in *Binocular Vision and Ocular Motility: Theory and Management of Strabismus*, (6th Edition), Mosby, (St Louis) 2002.

PORTER, J.D., BAKER, R.S., RAGUSA, R.J., BRUECKNER, J.K. Extra-ocular muscles: basic and clinical aspects of structure and function. *Surv. Ophthalmol.* 1995; **39**, 451-484

SCHWARTZ, S.H. Chapter 12 in *Visual Perception: A Clinical Orientation*. Appleton & Lange, (Connecticut, USA) 1995

SIMONS, T. Embryology of the eye and adnexa. IN: S. Barnard and D. Edgar (Eds), *Pediatric Eye Care*, Blackwell Science, (Oxford) 1995; pp. 14-42

SLATER, A. Perceptual development in infancy. IN: T. Buckingham (Ed), *Visual Problems in Childhood*, Butterworth-Heinemann, (Oxford), 1993; pp. 105-123.

The College of Optometrists

Certificate:	Orthoptics B	Module: 2
Module Title:	Heterotropia & amblyopia	
Module Size:	10 credits	
Assessment:	Modules 1 2 & 3 of Certificate B are assessed together.	
Pre-requisites:	Orthoptics Certificate A	Co-requisites: Modules 1 & 3

Aims and Objectives:

To indicate an ability to detect and differentiate different types of heterotropia and amblyopia and apply suitable techniques of management.

Learning Outcomes:

Candidates will be able to diagnose and manage cases of heterotropia using appropriate techniques of investigation and management. Cases suitable for surgery will be able to be identified and referred.

Learning Strategies:

While a background knowledge of the techniques can be gained from private study, involvement in the clinical management of cases of heterotropia will be necessary.

Outline Syllabus:

Overview

Classifications of heterotropia according to comitancy, constancy, unilaterality, and age of onset. General awareness of the prevalence of different types of heterotropia.

An overview of sensory factors in heterotropia:

- normal and abnormal "retinal" correspondence
- suppression
- diplopia.

The definitions and characteristics of microtropia.

Definitions, classification, and characteristics of the amblyopias.

Investigation

Candidates should be able to identify and carry out appropriate investigative techniques, as outlined below, using methods suited to patients of any age.

Signs and symptoms associated with different types of heterotropia.

Clinical tests used to investigate motor function in heterotropia, including :

- cover test
- dissociation tests
- haploscopic device (e.g. synoptophore, single mirror haploscope).

The analysis of responses that can be obtained in the investigation of motor function in heterotropia, including horror fusionis and sensory fusion disruption syndrome.

Methods of assessing sensory binocular status in heterotropia including:

- Bagolini lenses
- polarised techniques,
- neutral density filters to grade suppression or anomalous "retinal" correspondence (ARC).

An awareness of other, less sensitive, methods (e.g., haploscopic, after-image, red filter)

Methods of investigating amblyopia, with an emphasis on the differential diagnosis of the cause of

the amblyopia.

The differential diagnosis of psychogenic visual loss.

The detection and investigation of eccentric fixation.

Detection and investigation of microtropia, including uses (and limitations) of 4Δ base out test.

The application of refractive techniques to the investigation of heterotropia, including indications for cycloplegia.

Potential pathological causes of binocular anomalies

Treatment

The refractive correction of heterotropia, including the use of:

- positive additions
- negative additions
- bifocal and multifocal lenses.

The use of prismatic lenses, including the prescribing of prismatic lenses to correct diplopia. Fresnel lenses.

The indications and contra-indications for orthoptic exercises to treat heterotropia

Orthoptic exercises to treat sensory factors (suppression and ARC) in heterotropia.

Indications and contra-indications for treatment.

Dangers of treating sensory or motor factors in isolation.

Complications of treatment

Indications and contraindications for surgical management and appropriate referral.

An overview of the principal surgical techniques used in the management of heterotropia.

Specialist techniques to treat intractable diplopia (e.g., occlusive contact lenses, hypnosis).

Indicative Reading (key texts in bold):

ANSONS, A.M. & DAVIS, H. Diagnosis and management of ocular motility disorders (3rd Edition). Blackwell Science (Oxford) 2000.

BISHOP, A. *Vision in Childhood: Young Children at Visual Risk*. British College of Optometrists, 1991.

COOPER, J. Intermittent exotropia of the divergence excess type. *Journal of the American Optometric Association*, 1977; **48**, 1261-1273

EVANS, B.J.W. Chapters 1-3, and 4-11. IN: *Pickwell's Binocular Vision Anomalies*, (4th Edition), Butterworth-Heinemann, (Oxford) 2002.

FIRTH, A.Y., WHITTLE, J.P. Clarification of the correct and incorrect use of ophthalmic prisms in the measurement of strabismus. *British Orthoptic Journal*, 1994; **51**, 15-18

FIRTH, A.Y., WHITTLE, J.P. Further clarification on the use of ophthalmic prisms in the measurement of strabismus. *British Orthoptic Journal*, 1995; **52**, 48-49

GARZIA, R.P. Efficacy of vision therapy in amblyopia: a literature review. *Am. J. Optom. Physiol. Opt.*, 1987; **64**, 393-405

GRIFFIN, J.R. Chapters 1-10, 12-13, 16. IN: *Binocular Anomalies: Procedures for Vision Therapy*. Butterworth-Heinemann, (Boston) 1982.

HESS, R.F. On the relationship between strabismic amblyopia and eccentric fixation. *British Journal of Ophthalmology*, 1977; **61**, 767-773

HOYT, C.S., FREDRICK, D.R. Serious neurologic disease presenting as comitant esotropia. IN: A.L. Rosenbaum, A.P. Santiago (Eds), *Clinical Strabismus Management*, W.B. Saunders Company, (Philadelphia), 1999; pp. 152-162

JENNINGS, J.A.M. Amblyopia and eccentric fixation. IN: B. Evans and S. Doshi (Eds), *Binocular Vision and Orthoptics*, Butterworth-Heinemann, (Oxford), 2001; pp. 73-78.

JENNINGS, J.A.M. (1996). Investigation of binocular vision in the child. IN: S. Barnard and D. Edgar (Eds), *Pediatric Eye Care*, Blackwell Science, (Oxford), 1996; pp. 168-190

JENNINGS, J.A.M. Anomalous retinal correspondence - a review. *Ophthalmic and Physiological Optics*, 1985; **5**, 367-368

MACEWAN, C.J. & GREGSON, R. Manual of strabismus surgery. Butterworth-Heinemann (Oxford) Forthcoming title.

MALLETT, R. Techniques of investigation of binocular vision anomalies. IN: K.EDWARDS and R. Llewellyn (Eds), *Optometry*, Butterworths, (London) 1988; pp. 238-269

MALLETT, R. The management of binocular vision anomalies. IN: K. Edwards and R. Llewellyn (Eds) *Optometry*, Butterworths, (London) 1988; pp.270-284

MOSELEY, M. & FIELDER, A. Amblyopia. Butterworth-Heinemann (Oxford) 2001.

NOORDEN, G.K. VON, AND CAMPOS, E. *Binocular Vision and Ocular Motility: Theory and Management of Strabismus*, (6th Edition), Mosby, (St Louis) 2002.

SANTIAGO, A.P., ING, M.R., KUSHNER, B.J., ROSENBAUM, A.L. Intermittent exotropia. IN: A.L. Rosenbaum, A.P. Santiago, W.B. (Eds), *Clinical Strabismus Management*, Saunders Company, (Philadelphia) 1999; pp.163-175

STIDWILL, D. Chapters 1-5, 7. IN: *Orthoptic Assessment and Management*, (2nd Edition) Blackwell Scientific Publications, (Oxford) 1988.

VON NOORDEN, K. & CAMPOS, E.C. Binocular vision and ocular motility. Theory and management of strabismus. (6th Edition) Mosby (St Louis) 2002.

The College of Optometrists			
Certificate:	Orthoptics B	Module:	3
Module Title:	Ocular motor control & incomitancy		
Module Size:	10 credits		
Assessment:	Modules 1 2 & 3 of Certificate B are assessed together.		
Pre-requisites:	Orthoptics Certificate A	Co-requisites:	Modules 1 & 2
Aims and Objectives:			
To demonstrate an ability to recognise and appropriately diagnose: incomitant deviations, gaze palsies, and nystagmus.			
Learning Outcomes:			
Candidates will be able to carry out appropriate investigations and decide upon a relevant management plan, with due attention to the urgency of the case.			
Learning Strategies:			
While a background knowledge of the techniques can be gained from private study, involvement in the clinical management of appropriate cases will be necessary.			
Outline Syllabus:			
Overview			
The actions of the extra-ocular muscles.			
The basic types and mechanics of :			
<ul style="list-style-type: none"> - eye movement - visual - postural and other ocular motor reflexes. 			
Diagnosis of incomitant deviations, differential diagnosis of old and new incomitancies, mechanical (restrictive) and neurogenic incomitancies.			
The prevalence of different types of extra-ocular muscle pareses in various age-groups with particular emphasis on the implications for the likelihood of ocular pathology.			
The relationship between incomitant deviations and systemic diseases, with emphasis on the need for appropriate referrals.			
Gaze palsies and supra-nuclear control of eye movements.			
Familiarity with the more common "syndromes" describing or relating to incomitant deviations.			
An overview of the classification and investigation of nystagmus with an emphasis on the possible relationship with pathology.			
Investigation			
Determination, where possible, of affected muscles in extra-ocular muscle palsies.			
Techniques that help in this diagnosis, especially :			
<ul style="list-style-type: none"> - ocular motility (versions and ductions) testing, - cover testing in different positions of gaze. 			
Candidates should have a detailed working knowledge of either the Hess or Lees screen, and should be able to interpret results from these instruments.			
The use and interpretation of other methods to investigate extra-ocular muscle palsies, including:			
<ul style="list-style-type: none"> - analysis of head position, - cover test result, 			

- dissociation test result,
- Bielschowsky head tilt test (and Parks three-step test),
- difference between primary and secondary deviation.

Differential diagnosis of mechanical (restrictive) from neurogenic palsies.

A detailed knowledge of common mechanical palsies:

- Duane's Syndrome,
- Brown's Syndrome,
- blow-out fracture

Latrogenic incomitancies following :

- anaesthesia
- surgery for retinal detachment
- the insertion of ocular drainage devices in glaucoma

Neurogenic syndromes (e.g., Internuclear ophthalmoplegia).

Detection of nystagmus

Differential diagnosis of:

- congenital nystagmus
- latent (including "manifest latent") nystagmus,
- acquired nystagmus.

The use of diagnosis of nystagmus to evaluate the need for and urgency of referral.

The principle characteristics and types of congenital nystagmus.

Aetiological significance of the different types of nystagmus, and limitations of the clinical observation of eye movements for the diagnosis of nystagmus.

Treatment

Identification of cases requiring surgical management including early detection.

An overview of the principal surgical techniques, including botulinum injections, used in the management of incomitancy.

An awareness of specialist techniques to treat intractable diplopia (e.g., occlusive contact lenses, hypnosis).

An awareness of putative treatments for nystagmus, including the limitations of research in this field.

The role of contact lenses in nystagmus.

Indicative Reading (key texts in bold):

ABADI, R.V. Mechanisms underlying nystagmus. *J. R. Soc. Med.*, 2002; 95, 231-234.

ANSONS, A.M. & DAVIS, H. Diagnosis and management of ocular motility disorders (3rd Edition). Blackwell Science (Oxford) 2000.

ANSONS, A., SPENCER, A. The medical management of strabismus. IN: B. Evans and S. Doshi (Eds), *Binocular Vision and Orthoptics*, Butterworth-Heinemann, (Oxford), 2001; pp.101-109

BIGLAN, A.W. Pattern strabismus. IN: A.L. Rosenbaum and A.P. Santiago (Eds) *Clinical Strabismus Management*, Saunders, (Philadelphia), 1999; pp. 202-216.

CIUFFREDA, K.J., TANNEN, B. *Eye movement basics for the clinician*. Mosby, (St. Louis) 1995.

DELL'OSSO, L.F., TRACCIS, S., ABEL, L., ERZURUM, S.I. Contact lenses and congenital nystagmus (Research Report). *Clinical Vision Sciences*, 1988; 3, 229-232

DeRESPINIS, P.A., CAPUTO, A.R., WAGNER, R.S., GUO, S. Duane's retraction syndrome. *Survey of Ophthalmology*, 1993; 38, 257-288

EVANS, B.J.W. Chapters 17-18. IN: *Pickwell's Binocular Vision Anomalies*, (4th Edition) Butterworth-Heinemann, (Oxford) 2002.

EVANS, B.J.W., BARNARD, N.A.S., ARKUSH, C. Optometric uses of hypnosis. *Contemporary Hypnosis*. 1996; 13 (2), 69-73

EVANS, B.J.W., EVANS, B.V., JORDAHL-MOROZ, J., NABEE, M. Double-masked randomised placebo-controlled trial of a treatment for congenital nystagmus. *Vision Research*. 1998; **38**, 2193-2202.

FINLAY, A. Differential diagnosis of diplopia. IN: *Optometry Today* 6th June 2000 issue.

JAMPOLSKY, A. Duane syndrome. IN: A.L. Rosenbaum, A.P. Santiago, W.B. (Eds) *Clinical Strabismus Management*, Saunders Company, (Philadelphia), 1999; pp. 325-346.

LEIGH, R.J. & ZEE, D.S. The neurology of eye movements. Oxford University Press (Oxford) 1999.

MALLETT, R.F.J. The sequelae of ocular muscle palsy. *Ophthalmic Optician*, 6 September 1969; 920-923

NOORDEN, VON G.K., CAMPOS, E. *Binocular Vision and Ocular Motility: Theory and Management of Strabismus*, Mosby, (St Louis) 2002.

RICHARDS, B.W., JONES, F.R., YOUNG, B.R. Cause and prognosis in 4278 cases of paralysis of the oculomotor, trochlear, and abducens cranial nerves. *American Journal of Ophthalmology*, 1992; 113, pp. 489-496

SANTIAGO, A.P., ROSENBAUM, A.L. Sixth cranial nerve palsy. IN: A.L. Rosenbaum, A.P. Santiago, W.B. (Eds) *Clinical Strabismus Management*, Saunders Company, (Philadelphia), 1999; pp.259-271.

SCHOR, C.M., CIUFFREDA, K.J. *Vergence Eye Movements: Basic and Clinical Aspects*, Butterworths (Boston) 1983.

SPECTOR, R.H. Vertical diplopia. *Survey of Ophthalmology*, 1993; 38 (1), 31-62.

STIDWILL, D. Chapters 8-9. IN: *Orthoptic Assessment and Management*, (2nd Edition), Blackwell Scientific Publications, (Oxford) 1998.

WEAKLEY, D.R., STAGER, D.R., STAGER, D.R. Brown syndrome. IN: A.L. Rosenbaum and A.P. Santiago (Eds), *Clinical Strabismus management*, Saunders, (Philadelphia), 1999; pp. 347-370.