Stereopsis in the Workplace

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Driven Machinery Regulations
(Government Notice R.295 OF 26 Feb 1988)

Regulation 102 of National Traffic Act
(93 of 1996)
Driven Machinery Regulations

- Relevant visual requirements:

‘An optometrist’s certificate confirming the learner has adequate day and night vision, and depth perception (e.g., Purdue University standard vision test no 3): Provided that a valid PDP can be accepted in lieu…’
Road Traffic Act, regulation 102

- Visual requirements for PDP:

  ‘i) According to the Snellen rating, a minimum visual acuity with or without correction, of 6/9 for each eye; and

ii) A minimum visual field of 70 degrees temporal in respect of each eye, with or without refractive correction.’
Physiology of Stereopsis

- Physiological requirements for ‘true’ depth perception:
  - Frontally placed eyes
  - Overlapping visual fields
  - Co-ordinated eye movement such that objects stimulate corresponding retinal points (CRP)
  - A hemi-decussation of the optic pathway such that stimuli from CRP can be integrated
Physiology

- Stereo- estimates are made relative to the point of fixation.
- Horizontal separation of the eyes causes binocular parallax.
- ‘True’ stereopsis is generally taken as being limited to a distance of 500m.
Physiology

- Monocular depth perception – ‘Relative depth’

Clues:
- Object overlay
- Relative size
- Shadow
- Motion parallax …
Testing Stereopsis

- 3D TEST OBJ ECTS (real depth)
  - Verhoeff stereometer
  - Howard-Dolman apparatus
- 2D TEST OBJ ECTS (haploscopic devices)
  - Polaroid vectographs – Titmus test
Testing Stereopsis

- Not generally much clinical application
- Incidence of stereodeficiency in presence of normal acuity unknown. Estimates range up to 15% of population with normal visual acuity (Adler’s Physiology of the Eye).
Stereopsis and the Law

- Problems:
  - Measurement
  - Default regulations (Road Traffic Act) do not require stereopsis testing and assume normal stereopsis with normal acuity.
Night Vision

Physiology:

Scotopic vision = rods
Rods = peripheral vision (7’ from fixation)
Features: Maximal photosensitivity, poor spatial resolution, no colour
Night Vision

Physiology

Photopic vision = cones
Cones = central vision
Features: low photosensitivity, high spatial resolution, colour vision
Night Vision

Testing

Rod function:
- ERG
- Perimetry