Research

My research interests in vision science at the School of Optometry fall into four main areas:

1. Investigation into the functional vision in persons with low vision and rehabilitation of the visually impaired, with particular emphasis on age-related macular degeneration and children. Psychophysics in low vision.
   - I am interested in the reading process in low vision, and have studied the factors which affect reading speed, such as contrast sensitivity, spectral sensitivity, eye movements and spatial frequency requirements.
   - I am studying age-related macular degeneration and the structural and functional changes that occur in this disease of aging. We have used imaging techniques such as scanning laser ophthalmoscope and optical coherence tomography, which have great potential to give anatomical information. Function is studied with contrast sensitivity measurements and visual acuity measurements across the retina. These data are being used to further our understanding of perceptual and adaptive mechanisms in low vision, and the disease process, and to improve low vision rehabilitation programmes.
   - I am interested in the potential of digital image processing to improve the visibility of computer images for people with low vision. We have developed specific algorithms which have been shown to improve visibility of colour digital images.

2. Mobility and the Useful Field of View in people with visual impairment is another current area of study.

3. I am also interested in measuring the impact of low vision rehabilitation in people’s lives e.g. the benefits gained by the use of low vision aids and other devices, and how low vision intervention affects quality of life. We are currently studying how vision-related quality of life may be predicted by contrast sensitivity measures.
2. Investigations into the visual characteristics of children and adults with multiple-handicaps including low vision, and in the development of new testing techniques for these populations. With any new test, validity, repeatability, sensitivity and specificity studies are required, plus the gathering of control data.

- I have measured accommodation in children and young adults, and in a number of special groups e.g. children with cerebral palsy, Down syndrome, and visual impairment. We have developed new tests to measure stereopsis and colour vision in infants and children with and without communication problems. I have a current longitudinal study of the effectivity of bifocals to correct reduced accommodation in children with Down syndrome and their impact on early reading skills and visual perceptual skills. We are also studying the effects of correcting reduced accommodation in young people with visual impairments on their reading speeds.


- My interest in low vision and children gives rise to investigations into the normal response. For example I have investigated the normal response to spatial frequency filtering on reading performance, the effects of attention and contour interaction on crowded visual acuity, and the development of stereopsis and colour vision. I am studying the visual development of contrast sensitivity and visual acuity in children using visually evoked potentials and psychophysical measures.

4. Aging and vision. I have recently become interested in the effects of aging on vision and am currently studying the prevalence of binocular vision anomalies in a clinical population of elderly people. If an increased prevalence is found, there may be implications for the prevention of falls in the elderly population by treatment of these anomalies.