



8TH INTERNATIONAL CONGRESS OF BEHAVIOURAL OPTOMETRY

Speaker: Edwin Howell
Credentials: ACBO
Time/Date Scheduled: 1330 – 1500 on Saturday, 28 April
Location: Plenary
Biography: Prof Edwin Howell is an Adjunct Associate Professor in the School of Optometry & Vision Science at UNSW Sydney as well as working as an optometrist in Melbourne. He has been awarded the Skeffington-Alexander International Award from the Optometric Extension Program in the USA and the Skeffington Award from the College of Optometrists in Vision Development in the USA and is an Honorary Life Member of the Australasian College of Behavioural Optometrists.

Presentation Title: **Space and Time Encoding In The Brain**

Abstract: We now know that there are at least three separate parallel pathways and maps of visual space in the brain. The parvo ganglion cell / cortical "Ventral stream" / "Vision-for-Perception" / Focal pathway seems to enable conscious awareness of objects and their 3-D location in space, whereas magno ganglion cell 'ambient' pathways including cortical "Dorsal stream" and midbrain pathways independently encode 3-D spatial location and movement. These magno "Vision-for-action" pathways are primarily involved in guiding motor action including eye movements and function largely at a subconscious level. These brain areas have been implicated in establishing basic binocular fusion across the whole visual field to form a distance reference structure against which convergence and accommodation can move under voluntary control. Breakdown of this whole visual field system may manifest as a strabismus.

We know that the primary factor in fast initial convergence and accommodation to a new object is determined by the "Proximal" spatial object location relative to self. Recent research confirms that the Proximal information comes from these subconscious magno space maps rather than the parvo pathway "Perceived" location. Visual illusions can show that the eyes move to the subconscious Dorsal stream encoded location despite a different 'Perceived' object location in the conscious Ventral stream system. These two factors have been confounded in most of the ophthalmic research on the Proximal component including most of the current research! This distinction helps understand some of the anomalous

observations reported by patients in the training room when working with lenses and prisms.

The notion that Perceived distance cannot directly influence Proximal distance motor control has profound implications for the design of VT activities for rehabilitation of the subconscious magno 3-D space maps. VT activities should be directed at movement in real space involving multisensory peripheral field cues.