



8TH INTERNATIONAL CONGRESS OF BEHAVIOURAL OPTOMETRY

Speaker:	Caroline Hurst
Credentials:	BABO, OEPP
Time/Date Scheduled:	1330 – 1500 on Thursday, 28 April
Location:	Plenary
Biography:	<p>Caroline M. F. Hurst BSc FCOptom FBABO is a full-time optometrist working in private practice in partnership with her husband, Alan Hurst, practising Behavioural Optometry since 1997. Caroline graduated with 2.1 honors degree from Bradford University Ophthalmic Optics Course, in 1977, completing her professional qualification in 1978. Mrs. Hurst was the Chair of the British Association of Behavioural Optometrists (BABO) from 2004 until 2011, and is currently the Chairman of the BABO Education Committee. She earned her BABO Fellowship in April 2007 on the first occasion the Fellowship programme was completed. Caroline is the lecturer for the BABO Core Courses OVT1a and b, OVT2 and OVT5, and an RCS for OEPP. She is the Clinical Director for SOLCIOE GB. Caroline has been published in Ophthalmic and Physiological Optics, Improvements in performance following optometric vision therapy in a child with dyspraxia and Behavioural Optometry, and The Hurst Model of Vision Balances.</p>

Presentation Title: **Neural Integrators, Particularly the Oculomotor Neural Integrator**

Abstract: This paper will discuss Neural Integrators in general, and particularly those relating to oculomotor function, including the works of Goldman, Edelman and Bruenech.

It will describe a number of papers that approach the subject from different directions, including papers describing models, animal models, and some describing robots.

The presentation will describe and discuss the papers in four sections.

(i) Cerebellum structure and function in motor learning with the links between motor learning and learning timing. The cerebellum is associated with motor coordination through learning with timing. It also includes a description of how neural integration takes place at the cellular level.

(ii) An alternative view of Neural Integrators by Alain Berthoz. Rather than considering the neural integrator in terms of a complex combination of multiple signals to integrate their messages, Berthoz considered integration in the literal mathematical sense of progression from the derivative of a

variable of movement to its integral; ie, of acceleration to velocity or of velocity to position.

(iii) The cerebellum and primitive reflexes by Edelman. A theory of the cerebellum, consistent with much of the neurophysiological, behavioural, and imaging data regarding motor control, proposed that the cerebellum learned to replace reflexes with a predictive controller. This predictive controller produced a correct motor control signal earlier than less adaptive reflex responses.

(iv) The Neural Integrator view from Dick Bruenech, considering somatic and ocular proprioception and the role of the myotendinous cylinders at the distal ends of the extraocular muscles.

Then the presentation will bring together conclusions from all the papers, and consider their effect on the development of oculomotor control. The role of Neural Integrators will then be discussed in relation to Optometric Vision Therapy.