- Friday, May 21, 1999
  Parietal and Collicular Representation of Saccades

1.0 These are the minutes for YORKVIS. Friday, May 21st, 1999

1.1 Our next talk was to be by Jose Rivest and was scheduled to be quite soon - however this has now been postponed till next term. Details closer to the time.

1.2 YORK CONFERENCE on Vision and Attention next week!!!

2.0 The meeting was given by Martin Par of the Laboratory of Sensorimotor Research, National Eye Institute, National Institutes of Health, Bethesda, Maryland, USA and was entitled "Sensory-motor Representations for Saccadic Eye Movements: Contribution of Parietal Cortex to Visual Behaviour"

2.1 The talk explored the functional connections between two parts of the brain known to be intimately connected with eye movement generation in monkeys: the parietal cortex and the superior colliculus (SC). 64% of cells in the Lateral Intra-Parietal cortex (LIP) that send fibres to the colliculus display saccade-related activity. 87% of the collicular neurones getting input from LIP discharge in a way related to saccades.

3.1 PART 1 looked at the response before a saccade. A distinctive feature of LIP neurones is that they maintain a high firing rate while waiting to perform a saccade to a target in their receptive field even when the stimulus is removed during a "delayed saccade task". In this task, the monkey is required to wait between being told WHERE his saccade to be directed and WHEN he is to make the saccade. The fact that LIP neurones continue to fire during the delay indicates that the LIP area is somehow involved in storing the information necessary for the saccade that is going to be produced.

3.2 Oculomotor-related collicular cells can be broadly divided into two categories: (i) burst cells that have a discrete burst of activity starting just before a saccade and (ii) build-up cells that show an increase of activity that builds up between the sensory response and the motor act. Collicular build-up cells also maintain their firing during the period before a delayed saccade like LIP neurones; the burst cells do not.

3.3 However the distinction between burst and build-up cells in terms of what they do during a delayed saccade task is not absolute but more of a continuum. And both types of cells get input from LIP.

4.0 PART 2 tried to address the LIP/SC system in more functional terms. How might information carried in this link represent the plan for a saccade?

4.1 The delayed saccade task can be made more interesting by, at some point during the delay, indicating to the monkey (by a change in colour of the fixation light) whether he is to make a saccade to the target or not: the so-called GO/NO GO task.

4.2 Most (57%) of LIP cells do not differentiate between GO and NO GO trials and so they cannot be holding the plan to make a saccade, since this plan is obviously DIFFERENT between the two conditions. This implicates the other 43% in saccadic planning although as a rule, the difference in cell activity is not as dramatic as the difference in behaviours.

4.3 More than 60% of collicular build-up cells differentiate the go/no go conditions. Interestingly, when the monkey makes a (rare) mistake and 'goes' during a NO GO trial, cells' activity is correlated to the behaviour. And no burst cells ever fire when there is no saccade at the time when there should be one.

5.0 Since there is only a partial overlap in the properties of LIP cells with those of SC cells the LIP cannot be solely responsible for the behaviour of collicular neurones. In summary the activity in LIP seems to be more stimulus dependent whereas the collicular cells are more instruction dependent.

Martin Par