- Friday, January 6, 1995
  Oculomotor Proprioception

1.1 I am afraid I have rather lost track of whose coming. I am concerned about this because if I don't know half the people, I guess this probably applies to quite a few of you too! What to do about it? Well keeping up with the meetings can't ge a bad idea!

1.2 I raised the idea of using first-friday slots for formal, external invited speakers. Noone seemed to care very much. I guess the feeling is to some extent "as long as we have meetings of some kind". Anyway, I will try to arrange invited speakers (there is no money as far as I know, but some speakers might be picked up cheap!) for OTHER fridays (not the first of the month) and see how we go.

1.3 Although I didn't do it at the beginning of the meeting like I ought to have done, I did try to draw people's attention to our new faculty member, Doug Crawford.

2.0 Marty Steinbach gave an introduction to his research. Then Herb Goltz, presented some data.

2.1 Marty Steinbach's thesis is that proprioceptors in the extra-ocular muscles might contribute to ocular stability. In particular they might be involved in compensating for the continuous threat to ocular stability posed by the fact that the centre of mass of the eye is not in the same place as the centre of rotation. This was discovered in paralysed humans and paralysed cats by revealing an influence of gravity on the position of the eye.

2.2 The role of proprioceptors and a consequence of the misalignement of the centres of mass and rotation might be revealed in the position of the eye in unparalysed people when asked to hold their gaze steady in the dark. Under such conditions people usually show a slow nystagmus with the slow drift DOWN. This is unlikely to be due to a direct pull of gravity dragging the eyes down, since under paralysis, human eyes drift UP implying that the centre of mass is behind the centre of rotation.

2.3 Measurements of this drift have been made with the direction of gaze up/down and straightahead in the orbit while the subject was positioned nose down (prone) /nose up (supine) or normal posture.

2.4 For the straightahead posture, looking up ENHANCED the downward slow phase nystagmus, looking down slowed or even REVERSED the nystagmus. When the subject was supine this trend was made larger. These movements are in the same direction as the trend called Alexander's Law, in which pathological nystagmus is enhanced when the direction of gaze is in the direction of the FAST phases, ie. the slow phases are towards the resting central position. When the subjects were face down, however, (prone) looking up tended to encourage UPWARD slow phase nystagmus, and looking down was accompanied by downward slow phase nystagmus - the opposite of the trend when the subjects were up the other way. This would appear to be the OPPOSITE of Alexander's Law, since the trend of the nystagmus when looking up would be UP, away from the central resting position.

2.5 There was some discussion about what this could mean. Clearly there is a role of gravity but there doesn't seem any simple way to summarize its effects. And the theoretical imvolvement of the proprioceptors is also not clear. The possible involvement of a leaky integrator - encouraging the eyes to return to a resting position which may or not correspond to the straightahead - was discussed. It is not clear why gravity might reverse or even alter an effect due to integrator properties, however.

2.6 An interesting technical possibility was raised of trying to reverse the electrical arrangement of an eye-coil monitoring system to apply torque to the eye rather than using the system to measure eye position. This could then be used to cancel an ongoing nystagmus.

3.0 Ian Howard has agreed to do something for next time. The next meeting will be on Feb Friday 3rd at 10am in 061.

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