

- [Home](#)
- [About the CVR](#)
- [News](#)
- [Members](#)
- [Seminar Series](#)
- [Conference](#)
- [Resources](#)
- [CVR Summer School](#)
- [Research Labs](#)
- [Training at the CVR](#)
- [Partnering with the CVR](#)
- [Contact Us](#)

- Friday, December 6, 1996  
Eye Fixations Over Displays

2.0 John Senders (6 Dec 96) gave an interesting talk with a distinctly historic flavour.

2.1 John showed a couple of movies which, apart from their grainy cinematic quality, looked very modern.

2.1.1 The first was from the Applied Psychology Unit in Cambridge, England from the time of Macworth probably in the late 1940's showing the direction of gaze in a multi-instrument monitoring task. The eye movements were monitored by a reflecting infra-red from the cornea picked up by telescope and superimposed on a simultaneous motion picture film of the scene recorded through a telescope but the end result looked to have the temporal and spatial resolution to rival modern techniques!

2.1.2 The second was from Oliver Selfridge group at MIT called 'Twinkle' from around 1952 showing form-from-motion in dynamic random dot pattern. Again rivalling modern video displays!

2.2 John presented a discussion of why it is important to know where aircraft pilots are looking, referring back to the work of Paul Fitts and John's own work in the 1950's working at the Aero Medical Lab at the Wright-Patterson Air Force Base.

2.3 How often do you need to look at the road while driving? John showed an amusing film (on video) of his attempt to measure this in the 1960's using a large plastic visor that could be opened briefly under foot-pedal control but that clanged shut half a second later. There's a lot of variability depending on risk acceptance, personality, training and experience. John asserted that the data fit the mathematical model very well.

2.4 There was a discussion of "what is the purpose of looking at things anyway?" Is it to reduce uncertainty? It turns out that where you look cannot be predicted entirely on statistical grounds, although signal bandwidth (or rate of information production) is dominant, other things being equal. A comprehensive model has to take into account the task in hand, the state of learning of the subject, their information processing rate, the complexity of the scene, the rate of change of the scene (as in driving) and probably many more factors but all controlled ultimately by the rate at which uncertainty grows in time since the last observation of any point in the scene.

3.0 [added Dec 31st, 1996] Subsequent to my distribution of the above minutes, Paul Stager (Psychology, York; [pstager@yorku.ca](mailto:pstager@yorku.ca)) sent me the following note which I thought of sufficient interest to append here:

3.1 Laurence

The description of the Norman Mackworth film for eye-movement recording identifies the recording system as the same that I used in 1973-74 at DCIEM. The helmet-mounted Mackworth eye-marker camera for our work was provided by Dr. Llewellyn-Thomas at the University of Toronto. His own work with the Mackworth system was described in an article that he published in Scientific American. I realize it has been 20 years plus since the research was done but it doesn't seem that long ago. The work involved tracking the eye movements of search and rescue technicians for airborne search. We found that we couldn't use the camera in flight and still maintain calibration so the work was done in a lab with 16mm air-ground film. The results of the study were reported in Human Factors (Stager, P., and Angus, R.,(1978). Locating crash sites in simulated air-to-ground visual search. Human Factors, 20(4), 453-466.).

Paul

John Senders