ABSTRACT

Temporal processing in the human visual system is not well understood. This is partly because it is impossible to monitor any signal in the visual pathway. However, a "threshold response" was derived which possibly represents such a signal.

A number of related experiments were performed in order to determine whether the threshold response can be a useful tool in investigations of visual processing. In order to avoid the known non-linearities in this response at low frequencies, measurements were made only at high frequencies. To facilitate linear analysis techniques, sine wave stimuli were used throughout.

In the first set of experiments it was ascertained that, although the response itself was non-linear, its peak value was indistinguishable from that of a linear response. An underlying linear signal was therefore postulated, the amplitude and phase shift of which could be determined from the threshold response.

Bode plots (gain and phase shift) for the system were determined on this basis. These did not correspond to any simple linear system.

An alternative interpretation of the threshold response was examined in the same way; but the resulting gain and phase

shift curves were not compatible.

A similarity was noted however between the first gain curve and the De Lange (gain) curve derived from flicker detection experiments. This was investigated experimentally and the two gain curves were found to be identical at high frequencies. It was therefore concluded that the threshold response did indeed reflect a signal in the visual pathway (at the level of the flicker detector). The implications of this are discussed.

The results of a subsidiary experiment at low frequencies suggest a different flicker detection criterion in this region. It is proposed that further clarification of this detection process should precede any further analysis of the Bode plots obtained.