lular layers of LGN does not evoke activity among foveal ganglion cells (34; see ref 21). These facts suggest that the magnocellular system may undergo extensive branching at the striate level. This could explain why 16 of 74 units (Fig. 5 and Table 2), classified on the basis of latency, were accessible to the magnocellular system, while the ratio of magno- to parvocellular elements in the LGN of the macaque (8) and squirrel monkey (unpublished observations) is estimated to be 1:8. Such discrepancy could, of course, arise simply because of the greater excitability of the larger magnocellular fibers. In any event, some units within the foveal representation are capable of registering the very earliest events reaching striate cortex following both natural and electrical stimulation of the visual system (Table 2).

The great range, 30–300 ms, in latencies for the response to movement raises the possibility that more than one functional category of movement-sensitive units is involved (see, e.g., ref 32). In the cat (6) corresponding figures for measurements on nine units are 40–70 ms, with an average of about 50 ms, half that found for the squirrel monkey. In the squirrel monkey striate cortex the direction-sensitive units tend to have longer latencies both to movement and to stroboscopic flash (Table 3) than do units responding independently of direction of movement, but, on the other hand, some direction-sensitive units have very short latencies in responding to onset of movement.

Luxotonic units

Our working hypothesis is that these units are driven by the cone, midget bipolar, midget ganglion cell system (37), in which inhibitory surround may be minimal or absent with white light (22, 29). The fact that this "midget" system is predominant only in the primate fovea, together with our observations on the effects of minimal anesthesia (Figs. 11, 12), might to a large degree account for the failure of previous investigators to find cortical luxotonic units.

The evidence for the relation of luxotonic units to cones is not definitive, but the facts are consistent with this idea. Where tested (e.g., Fig. 12*B*), luxotonic units have not distinguished between darkness and a luminance $\leqq 0.05$ cd/m^2, the threshold for cones in the squirrel monkey (28). They usually show no change in their characteristics as luminance increases above the level of rod saturation (30 cd/m^2) (28), and their rate of adpatation is compatible with expectations for a cone system.

The sensitivity of luxotonic units to anesthetic or ataraxic agents (Figs. 11, 12) is actually rather puzzling. Marrocco (31) has found monotonic luminance functions both for OT fibers and LGN cells in macaques under pentobarbital anesthesia. In cats anesthetized with a mixture of pentobarbital and urethan, 80% of the 45 units studied by Papaioannou and White (35) seem to be luxotonic by our criteria. If, then, luxotonic activity is common in the LGN of anesthetized cats and monkeys, its absence at striate cortex must indicate a remarkable susceptibility of certain geniculocortical synapses to depression by anesthetic agents, as suggested by Figs. 11 and 12 and by the total absence of reports of luxotonic activity by the dozens of laboratories that have examined single-unit activity in striate cortex (see ref 27). On the other hand, reports of luxotonic activity for striate cortex in unanesthetized cats and monkeys are equally lacking, and this either represents a remarkable restriction in experimental procedures or a mysterious disappearance of luxotonic activity between LGN and cortex.

Whether luxotonic units can be related to the "fast-conducting, transient" versus "slowly-conducting, sustained" system of retinal, geniculate, and cortical cells presently being discovered in the cat (see, e.g., ref 23, 24, 42) remains to be seen. The sustained response in retinal ganglion (9, 10, 19) or geniculate cells (9) of the cat are by no means luxotonic, at least under anesthesia, since essentially no response is given to diffuse light. For the anesthetized macaque the behavior of the tonic retinal ganglion cells to diffuse white light remains unspecified (22), but a priori it seems likely that a sustained response would be obtained (29). In any event, information presently available clearly suggests a parallel between the sustained-transient systems in