of a receptive field and its size within the 10–20° of central visual field explored.

Only two bipartite receptive fields, i.e., with separate areas for "on" versus "off," were found. These, however, displayed other complications which precluded their being classified as "simple" cells by the criteria of Hubel and Wiesel (25, 26). Thus, no simple cells were found. Working also with the foveal representation of the unanesthetized monkey, Poggio (36) found only 3% of the units could be classified as simple. The deficiency in our population of 239 units is thus of the order of 7 units. Failure to observe simple cells can probably be attributed to a combination of overly rigid criteria as to what constitutes a "unit," size of the electrodes, and species differences, e.g., size and packing of cells in layer IV, Hubel and Wiesel (26) having noted that simple cells in macaques were difficult to isolate and were presumably small.

Early in the experiments we concluded that "hypercomplex" units (26) are rare, since extending a stimulating line beyond the "receptive field" seldom had any effect. This is again consistent with Poggio's finding that only about 5% of foveal units can be so classified. We had the additional difficulty that the majority of units failed to respond to stationary, flashing stimuli, and hence could not be tested for the effect of changing orientation of a flashing line. Thus, most of our effort at classification in terms of simple, "complex," and hypercomplex units was made with moving stimuli. Simple cells being absent and hypercomplex rare, such categorization did not prove very helpful, and in later experiments, where several hours were often spent on each unit defining its characteristics in terms of diffuse illumination, the search for hypercomplex features was understandably diminished. Similar problems were apparently also encountered by Poggio (36), who found it necessary to devise a new category, "'uniform," to describe about 45% of his foveal units that were insensitive to the orientation of the stimulus.

RESPONSES TO MOVEMENT. The majority of the units responding to movement were sensitive to the direction of the movement (e.g., Fig. 1). In all instances where bars or lines were moved, their long axis was perpendicular to the movement. However, units sensitive to movement responded equally well to small, moving spots. No rigid criterion was followed in classifying a unit as "direction sensitive," but analysis subsequent to the experiment showed all such units to have a response to movement in the "null" direction which was less than 40% of that to movement in the preferred direction. As can be seen in Fig. 2, some units showed direction sensitivity at some velocities of movement and not at others. A unit was thus not classified as being direction sensitive unless it showed a clear difference for movement in the null versus preferred directions over at least a twofold difference in velocity.

For most direction-sensitive units the response gradually decreased as direction

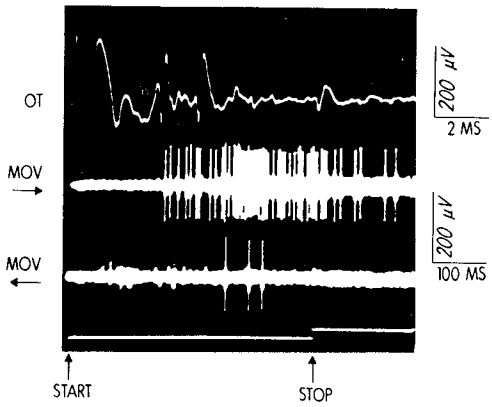

FIG. 1. Unit *700-6,* responding to stimulation of OT and displaying sensitivity to direction of movement of a line of light. Single traces in each case; negativity upward. Pulse to OT, applied at start of upper trace, yields rare instance of double discharge, 1.5 ms between spikes. Second spike, latency about 5.0 ms, always present; first spike present to less than 5% of stimuli; at other times spikes occurred at 5.5 and 7 ms (Figs. 4, 6 in ref 4). Middle traces, movement of 4° in preferred and in opposite direction, at 10°/s. Traverse, starting with CRO sweep (end indicated on lower trace), starts and stops from loci beyond and roughly symmetrical to somewhat elliptical receptive field of 19 deg^2 in area of fovea. Note variation in density of discharge, suggestive of variation in effectiveness of stimulus at different loci within receptive field, most effective locus yielding slight response to countermovement. Also note that discharge continues after cessation of movement.