Neurons sensitive to visual stimulation in the lateral suprasylvian area of the cortex were investigated in cats with pretrigeminal brain section. About 25% of the neuron population responding to visual stimulation were shown to be highly sensitive to moving black objects. These neurons were called black-sensitive. Neurons of this group had a low level of spontaneous activity and were mainly directionally sensitive. Some of them exhibited summation of responses during successive enlargement of the stimulus. An important distinguishing feature of these neurons was a change in the temporal structure of their response after contrast reversal of the stimulus.

INTRODUCTION

In previous investigations [3, 8] neurons exhibiting special sensitivity to motion of dark (black) stimuli in the field of vision were observed on more than one occasion in extrageniculate visual structures. This topic has not yet been adequately discussed in the literature. The reason is evidently that the attention of physiologists has mainly been concentrated on structures of the geniculo-striate system in which the neurons as a rule have well marked sensitivity to light stimuli. Nevertheless, some workers have found neurons which differed from the well-known types of neurons that are sensitive to visual stimulation. In particular, Hoffman and Stone [7] found neurons of the W group among the retinal ganglion cells. Some of the units they described were highly sensitive to black stimuli. Spear and...
Fig. 1. Dimensions and distribution of centers of receptive fields of "black-sensitive" neurons in visual field. Origin of system of coordinates corresponds to retinal area centralis. Size of receptive fields, in deg², indicated by different symbols.

Baumann [9] also state that a certain number of neurons in the lateral suprasylvian area (LSA) are more sensitive to black stimuli than to light. However, they did not study this problem in detail.

This paper gives the results of an investigation of receptive fields (RF) of LSA neurons exhibiting high sensitivity to moving black stimuli, and their possible role in the central analysis of visual information.

**METHODS**

Experiments were carried out on 35 cats weighing 2.5–3.5 kg with pretrigeminal section of the brain stem. The technique of the operation, fixation of the head in the stereotaxic apparatus, and immobilization of the animal was described previously [5, 8]. The burr-hole above the lateral suprasylvian gyrus and sulcus of the same name was filled with 3% agar solution in physiological saline. The animal's physiological state was continuously monitored by recording the ECG and EEG. The mean blood pressure was 80–100 mm Hg. The body temperature was kept at 37–38°C by means of an electric blanket.

Single unit activity was recorded by tungsten electrodes. The black stimuli were shadows of rings of different sizes, projected on the screen of a perimeter. During reversal, contrast of the stimulus was maintained strictly identical to contrast with the background for both black and light stimuli. For instance, for black stimuli the parameters of intensity of illumination of the stimulus and background were as a rule 2 lx for the stimulus and 7 lx for the intensity of background illumination. For light stimuli the intensity of illumination of the spot was 7 lx and of the background 2 lx. The stimuli were moved by turning the spindle of a galvanometer which triggered a trapezoidal pulse generator. Unit activity was averaged and analyzed by means of an analyzer programmed to produce poststimulus (PST) histograms.

After each experiment the location of the electrode tip was coagulated, after which the brain was perfused with 10% formalin solution. The location of the electrode tip was verified histologically in sections 30–40 μ thick.

**RESULTS**

Altogether 45 cortical neurons in LSA, specially sensitive to movement of black objects but not responding, or responding only weakly, to light stimuli (these will subsequently be described as "black-sensitive" neurons) were investigated. Among the total population of neurons in the cortex of LSA sensitive to visual stimuli, this group accounted for about 28%. The dimensions of RF of the "black-sensitive" neurons had wide scatter and varied from 25 to 1600 deg² or more (Fig. 1). The distribution of centers of RF of the "black-sensitive" neurons over the field of vision showed no regular pattern other than a slight tendency for small RF to be concentrated nearer to the area centralis. Spontaneous activity in this group of neurons as a whole was weak, and in most cells it was absent. "Black-sensitive" neurons were distributed almost uniformly throughout LSA — in both the medial and the lateral side of the sulcus there was a slight tendency for them to be concentrated in the posterior part of LSA. Since the neurons responded either weakly or not at all to stationary light stimuli, the main method used to investigate them was by means of moving black stimuli. PST histograms of responses of one such neuron are illustrated in Fig. 2. The response of the neuron to movement...