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## Periodicity in complex cell responses

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Pollen & Ronner (1975) reported that averaged responses of complex cells in cat visual cortex to moving lines often exhibited periodic 'ripples'. They suggested that this periodicity reflected periodic excitability changes

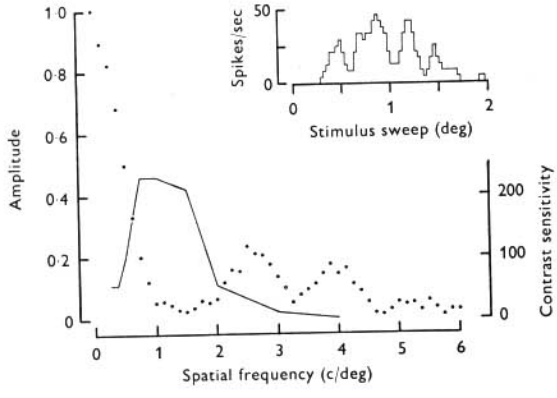


Fig. 1. Contrast sensitivity of a complex cell compared with the Fourier transform of its response to a thin (0·13 deg) bright line, moved across its receptive field at 4 deg sec$^{-1}$. The amplitudes of the transform of the response to the line (points, left-hand ordinate) were obtained from the PSTH (inset) summed over 30 stimulus sweeps. Sensitivity (threshold contrast$^{-1}$, solid line, right-hand ordinate) was determined with sine-wave gratings drifting at 2 Hz.

across receptive fields and could predict the sensitivity of cells to spatially periodic stimuli. But the 'optimum spatial frequencies' predicted by their data (mean 2·9 c deg$^{-1}$) are rather higher than we have obtained using sine-wave grating stimuli (mean 0·9 c deg$^{-1}$). We have tested their suggestion by comparing response periodicity with spatial frequency tuning in complex cells, using conventional recording techniques in paralysed cats anaesthetized with nitrous oxide (Movshon, 1975).

We were not often able to discern marked periodicity in complex cell responses; the histogram in Fig. 1 represents our clearest example. Fourier transformation of this response wave form shows that most energy is at spatial frequencies below 1 c deg$^{-1}$, while the response periodicity is reflected in the peaks near 2·5 and 4 c deg$^{-1}$. In fact, the cell's sensitivity to moving sine-wave gratings is highest around 1 c deg$^{-1}$; its sensitivity near the spatial frequencies of the periodicity is low. In this complex cell, and

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all others we have examined, periodicity seemed unrelated to spatial frequency tuning.

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