

BEHAVIOURAL RESPONSES IN THE CAT TO SIMPLE PATTERNS OF ELECTRICAL STIMULATION OF THE TERMINAL AUDITORY NERVE FIBRES

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Behavioural studies on electrical stimulation of the terminal auditory nerve fibres have shown that there are limitations to the perception of rates of electrical stimulation above 200 Hz (Clark *et al.*, 1972), and that the difference limens for electrical stimulation are only similar to those of sound for frequencies below 200 Hz (Clark *et al.*, 1973). The present study has been undertaken to extend this research, and help determine whether the cat can not only detect a change in the rate of electrical stimulation, but also judge whether it is higher or lower than a reference frequency.

Four cats were trained by a reward conditioning technique to discriminate between a "go" stimulus consisting of a series of high tones alternating with a reference tone, and a "no-go" stimulus consisting of a series of low tones alternating with a reference tone. The responses were then recorded for electrical stimulation at the same rates before and after the administration of mycifradin sulphate (50 mg/kg, i.m.) to destroy the hair cells and reduce the possibility of electrophonic hearing leading to false results. The responses were considered as hits, misses, false alarms and correct rejections, and were used to estimate the area under a receiver operating curve and an index of discriminability, $P(\bar{A})$ (Norman, 1964).

The results showed that discrimination for an acoustic stimulus with a "go" stimulus of 0.49-0.78 kHz and a "no-go" stimulus of 0.30-0.49 kHz, was similar to the discrimination obtained with bipolar electrical stimulation at the same rates. Following a fourteen day course of mycifradin sulphate the index of discriminability was reduced, but was still well above the chance level. From this study it can be concluded that cats could discriminate a change in the rate of electrical stimulation of the terminal auditory nerve fibres, and were able to detect whether the change was in a higher or lower frequency direction. This suggests that electrical stimulation on a rate basis can lead to the perceived signal having tonal qualities.

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