Behavioural function of the VMH in the rat

Veening, Jan Gerrit

SUMMARY

To consider the question whether the VMH has only a specific influence on food intake or plays a more general role in behaviour, 8 male white rats (Wistar strain), implanted with unilateral electrodes in the VMH, were observed ethologically both with and without stimulation. This was done in 6 different situations: alone or together with an estrous female or a male partner, the experimental animals being non-deprived or hungry after fasting for 24 h.

During stimulation not only feeding but also resting, sexual and aggressive behaviour became clearly depressed in frequency and duration, whereas some other behavioural elements, such as sniffing and locomotion, showed increases; these increases were even more pronounced for scanning (attention posture).

The effects of stimulation proved to be so complex that it required a sequence analysis of the entire behaviour to study possible changes in the structures of behaviour that could throw more light upon the nature of the behavioural changes involved. This analysis showed that in normal behaviour there are clearcut sequences of elements of behaviour in each of the situations observed (e.g. a feeding, a sexual and an offensive sequence). For a given element of a sequence the probability that it will be succeeded by the next step in the sequence is greater than for any other activity. These preferential transitions become more marked as the individual progresses farther along the sequence. It seems that the behaviour is 'funnelled' towards the end point of the sequence (e.g. eating or sex behaviour). One element, scanning, takes a special position, because it is the starting point for each sequence, and thus is at the crossroads between different modes of behaviour.

The behavioural changes during stimulation can be described quite well in terms of this 'funnel model'. They consist of a lowered probability of completing the sequence in progress, especially during the earlier parts of the chain. Farther down the 'funnel', the chances that the end point will be reached despite stimulation are less severely reduced, but then performance of the terminal link is unusually brief.

It is concluded that the VMH, in addition to its specific satiety function in feeding, plays a broader role in behaviour in that it subserves the processes deciding which mode of behaviour will receive priority.

On the following pages the matrices are presented, according to the categories given on p. 18 (Table II.1). Explanation: see pages 17, 19 and 20.