Key Note

# Chapter 8: Touch and pain

## Key note 8C: Sensory coding in the cutaneous rabbit illusion

What does the rabbit illusion tell us about sensory coding? Flach and Haggard (2006) explained the basic tactile effect by postulating a model with the following general properties. First, taps are detected with some spatial uncertainty. One can think of this uncertainty as being governed by the sizes of receptive fields in that region of skin. If these are large, a tap anywhere within one of them will have the same effect on its neural output (and the two-point threshold for that region will be large). Secondly, the neural effects of the tap decay with time. Thirdly, the neural effects of repeated taps within the same area of skin are summed (over some limited time period), even if the taps did not occur at the same physical location. It is the distribution of neural activity which gives the perceived position of any tap. Consider the simplest case of two taps, close together in time, and separated by a distance within which summation occurs. The effects of the first tap will be to shift the distribution produced by it and the second tap in the direction of the first tap. Lengthening the time interval between the two taps will reduce the influence of the first tap on the second, and so reduce the rabbit illusion. Shortening it will strengthen the illusion. While the model is appealing in its simplicity, to explain the cross-modal results and those with the stick, the ideas would have to be extended to a more abstract representation of the stimuli, not just one of the surfaces of the skin. Further, more recent work investigating the cutaneous rabbit indicates that both earlier and later taps are perceptually displaced (i.e. undergo saltation) and it fails to satisfactorily account for the latter.

Flach R, Haggard P (2006) The cutaneous rabbit revisited. *Journal of Experimental Psychology: Human Perception and Performance* 32(3): 717–732.