Optimizing Strategies in Choice Behaviour in the Honey Bee

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Single worker bees (*Apis mellifera*) were trained to feed exclusively from a single patch of four artificial flowers. The colour, position and continuous reward rate of each flower was adjustable for each experiment, and the time-course and frequency of four major behavioural components – licking, inter-flower tube returns, retries in flight, and inter-flower flights – were calculated from the inter-response times detected by a computer.

In a first series of experiments, all flowers were adjusted to equal reward rates. The inter-flower flight time increased when the overall patch reward decreased, and a symmetrical flight directionality distribution was observed, as already reported by Schmidt-Hempel (1985).

In a second series, reward rates were adjusted to the ratio 1:2:2:8. Colour signals and flower positions did not change in both experiments, and inter-flower flights now showed a small preference to the higher reward. In contrast,.retries in flight showed a stereotype time-course, matched by frequency, and were dominant in optimizing choice behaviour.

The foraging strategy of the honey bee in a single patch is interpreted as "moment-to-moment" decisions. The proposed mechanism for optimizing choice is sensitization, which is dependent on the strength of the US. The bees were conditioned to colour and position, as further experiments demonstrated.

Schmidt-Hempel, P. 1985. How do bees choose flight direction while foraging? Physiological Entomology **10**: 439-442