Optimization of Honeybees with Balanced US - qualities

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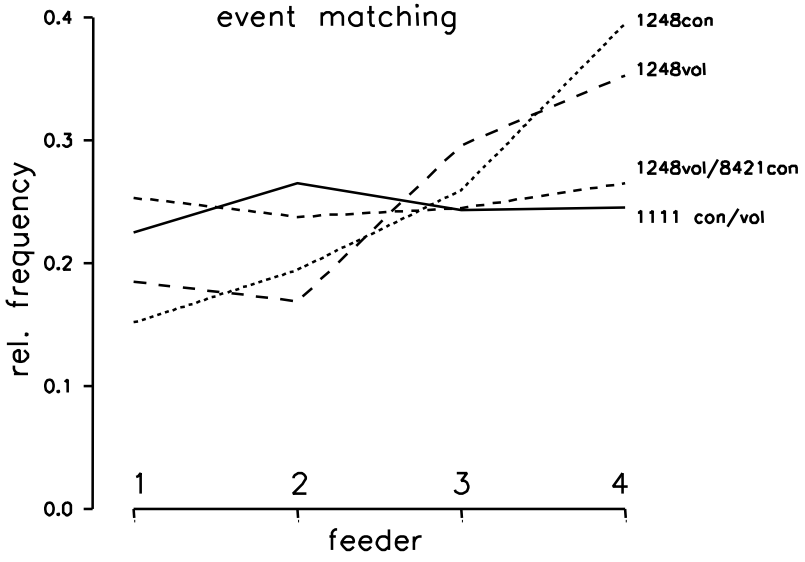
The foraging behavior of single bees in a patch of 4 electronic feeders was studied with the aim of analyzing the informational components in the choice process. Optimization in appetitive behavior during foraging can be described as a sequence of trials of acquisition in an instrumental learning situation in wich the various stimuli of locations become predictive for the unconditioned stimulus (US) sucrose solution (Greggers and Menzel 1993). The probability of response to a particular feeder strongly depends on the associative strength formed due to the intensity of the US experienced at this feeder, i. e. the bee otimizes by matching its choice behavior to the reward rates of the feeders. Experiments with equal reward rates and concentrations of the four feeders were compared to arrangements with different reward situtations. A prominent feature of the graded reward situations is a prolonged lick time for revisits to the same feeder (stay flights) as an after-effect of momentary high rewards resulting from a suboptimal frequency of visits to the high rewarding feeders. This effect was taken as a sensitive measure of the bee´s US-experience in an experiment with balanced reward rates of graded concentrations and volumes of sucrose solution i. e. employing the two US-qualities simultaneously. It is demonstrated that the effective component for optimization is the integral number of sucrose molecules perceived per visit at each particular feeder.



Greggers and Menzel, Memory dynamics and foraging strategies of honeybees, Behav. Ecol. Sociobiol. (1993) 32:17-29