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How do foraging honeybees decide to quit in natural conditions?

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Honeybees (*Apis mellifera*) are well known for their ability to efficiently find and exploit resources. However, the factors surrounding individuals' decisions to stop foraging at a site are not well understood. Two hypotheses exist in the literature: (1) a decline in reward or (2) an imbalance in task allocation within the colony may lead foragers to abandon a resource. When a bee returns to the hive with nectar, she needs a food storer, to receive and store the nectar. If many foragers are successful, receivers may be in short supply. This could indicate that enough bees are foraging and other tasks may be more important. Alternatively, receiver bees may prefer to unload other bees, indicating that the forager's nectar is of low quality compared to that being collected by others. Thus the amount of time that an individual forager spends looking for a food storer bee is indicative of the colony's need for this forager's nectar. In such a natural setting, bees visit many types of resources, which change quality at different timescales. Using marked bees in an observation hive, we construct foraging histories for individual bees and identify when an individual stops foraging at a particular resource. Using unload time to represent the balance of foragers and receiver bees, and trophallaxis duration to estimate amount of nectar collected and thus quality of the resource, we ask which of the two factors seems to influence the decision to stop foraging most strongly under natural conditions. Surprisingly, neither our estimate of resource quality nor the delay to unload predicted a forager's decision to abandon a resource in our data. Our study indicates that the collective foraging process of honeybees is a mosaic of individual decisions, and its outcome in a natural setting is not predictable based on a few simple factors.