Strategic Pilfering By Least Chipmunks (Tamias minimus)

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Caching & Pilfering

Cache Recovery

Least chipmunks bury small quantities of food among multiple locations, and return later to retrieve their hidden food stores. Caching animals are equipped with learned and cognitive adaptations (including cryptic cache placement), vigilance, cache defense, and memory for specific cache sites that minimize retrieval rates, initiation time and energy spent searching for unknown food stores, and deter pilferers.

Cache Pilfering

While cache recovery represents a risk to cache owners, it can be a beneficial foraging strategy for pilferers. The benefits of pilfering are low-risk—pilferers can directly supplement their own food stores in addition to inflicting costs on their competitors, the original cache owners. At least some animals exploit these gains, as pilfering rates are often as high as thirty percent. Leading recent theorists to explore pilfering as a foraging strategy in and of itself, and one that contributes substantially to the evolution of pilfering in caching communities.

Size Matters

Caching may be especially lucrative for small animals who can satisfy their lower caloric demands relatively quickly by robbing the sizable caches of their larger competitors, an advantage exploited by at least some species. The advantages of robbing for small competitors who are often out-competed at the site of harvest suggest that animals might actually prefer to steal. I addressed this question using least chipmunks, a small cacher and successful pilferer. I used conspecific competitors in my experiment to control for cache size, placement, and competition, as these are known to affect cache species.

My research question: Will least chipmunks preferentially exploit conspecific caches in the presence of their own certain food stores?

Methods

Animals

All chipmunks were wild-caught from Seney National Wildlife Refuge in Seney, Michigan and housed in naturalistic group living areas in the Animal Cognition Lab at the University of Oklahoma.

Making caches

Chipmunks were all allowed to cache sunflower seeds in a dry, sand-filled arena measuring 1.8 X 1.8 m. Caching sessions were monitored remotely, and individual caches were marked with unique codes. On the day prior to testing, caches were encapsulated with small cache seeds in separate compartments of a partitioned enclosure. Caches were left overnight and observed between caching and test sessions.

Searching for caches

Transcribed to 48 hours after caching sessions, the duration of the foraging session was monitored and individual caches were marked with unique codes. Cache recovery and test sessions were returned to the arena to search for caches. Cache discovery and seed retrieval was monitored remotely via overhead cameras.

Results

Least chipmunks prefer to take stolen seeds over recovering their own.

In the current study, the two sets of caches were spatially distinct, allowing animals to concentrate their pilfering efforts after the discovery of the first caches. Caches were initially discovered, on-cache digging. On-cache digging and searching (off-cache digging) were significantly different (Wilcoxon Z-test, P<0.01).

And they spend more time foraging for their competitors’ caches.

Chipmunks based their searching efforts (as measured by exploratory, off-cache digging) on the conspecific side (Fig. 2), even though they spent the same amount of time overall in both sides of the arena (P>0.05). After caches were initially discovered, chipmunks spent more time searching conspecific caches (on-cache digging). Chipmunks scored more time excavating conspecific caches (on-cache digging). Despite a reduction in foraging efficiency when searching for conspecific caches.

Conclusions

Least chipmunks discriminate between their own and conspecific caches, and preferentially exploit their competitors’ caches over their own certain food stores.

Chipmunks actively search for seeds that have been harvested and stored by a competitor.

Pilfering may be an effective foraging strategy for least chipmunks and other small caching animals.

When potential payoffs are high, strategic pilfering is a likely foraging tactic that may maximize the highest foraging rates reported for most caching communities. Least chipmunks were allowed to cache sunflower seeds in a dry, sand-filled arena measuring 1.8 X 1.8 m. Caching sessions were monitored remotely, and individual caches were marked with unique codes. On the day prior to testing, caches were encapsulated with small cache seeds in separate compartments of a partitioned enclosure. Caches were left overnight and observed between caching and test sessions.

Despite a reduction in foraging efficiency when searching for conspecific caches.

Chipmunks scored more time searching conspecific caches (Fig. 2), resulting in a lower encounter rate for their competitors’ caches (1.5 times found per min of exploratory digging [1.2, 2.4]) compared to that of their own own caches (1.5, 8, 12, 24-0.05, P<0.01). Despite a reduction in foraging efficiency when searching for conspecific caches.

Literature Cited


8. Penner, J. 2010. Strategic pilfering by least chipmunks (Tamias minimus): a foraging strategy for small caching animals that maximizes the potential benefits of pilfering over caching. M.S. Thesis, University of Oklahoma, Norman, OK.


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