



Tail Communication in the Least Chipmunks (*Neotamias minimus*)

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Hypothesis

The purpose of the current study is to record chipmunk behavior and analyze categorical behavior for uniformed responses to similar situations. Do chipmunks use physical tail movements to aid their vocal communication? If this is the case, then chipmunks should be seen/heard making similar calls in related types of situations. Responses to stimuli such as danger should have a semiuniform response.

Materials and Method

Materials for this research included a field notebook, pencil, binoculars, stopwatch, temperature gauge, animal guides and small flags (used as markers). Observations were made on an unconfined population of chipmunks at the COEFS field station outside of Jamestown, Colorado. Most of the animals were viewed near a rock outcrop situated just off Solitude Camp in Cal-Wood. Observations began by recording concentrated events of behavior by numerous individual chipmunks. Chipmunks were not tagged, therefore behavior is recorded by instance, not by the individual displaying the behavior. Chipmunks were observed during varying times of the day, in which the environment fluctuated from sunny to blustery. Through the week, behavior was recorded in the morning and evening as well as various times during the day. Time and location was randomized as much as possible. Behaviors were recorded on a field notebook with a description of the physical and vocal aspects as well as the time it took to complete such behaviors (duration). After two days of behavior classification, 17 behaviors were recorded that incorporated tail and vocal displays, tail only movement, or an alert still poise. Using the 17 behaviors as an ethogram template, observation then continued as a time sampling record with a coding sheet to record date, time, temperature, location, weather, behavior, situation, duration and description. Six sites that granted easy access of behavior were marked, A, B, C, D, E and F and used for observation over the week. The observer would sit at the designated site and wait for up to fifteen minutes for a chipmunk to appear before rotating to the next site. The observe remained at sites with continuous activity, until chipmunks were out of sight/hearing. A guide to squirrel and prairie dog behavior was used to generalize rodent behavior in response to certain stimuli (predators, kin, competitors, etc.) Rocky Mountain guides to rodents were also used to classify chipmunks as true chipmunks and not ground squirrels (Wassink, 1993). Several guides were handy in classifying foraging techniques, where to find chipmunks near their homes, and how chipmunks generally use their tails.

Results

Twelve days of time/scan sampling resulted in 17 overall behaviors observed where chipmunks used either vocal calls and tail movement, tail only movement, or stationary behavior. Behaviors were described alphabetically in an ethogram, which provides an abbreviation, as well as full explanation of behaviors. Results were highly qualitative, with coding sheets individually tailored to display durations of behaviors, situational basis of behavior, and behaviors sorted together. The majority of behaviors fell within nine situational categories: Alert, Cleaning, Curious, Fight, Flee, Forage, No Apparent Stimulus (NAS), resting, and robin response. In the situational category, Alert, chipmunks spent significantly ($H=7.738$, 2 d.f., $P=0.021$) more time (in seconds) remaining still than displaying tail only or vocal paired with tail behavior. Other comparisons of situations and durations did not result in significant patterns.

The Question

Have you ever watched your dog/cat, animals at the zoo, or a wild animal and wondered, “What are they thinking?” There is an obvious communication barrier between humans and non-humans. What is it that separates human language from animal communication? It is assumed that only humans use novel sentence structure, grammar, have the largest set of language symbols, and have multiple meanings per symbol (Singham, 2008). Assuming this is true, it is still hard to ignore the complexities of animal signaling. The bark of a dog, the song of a bird, even the twitch of a tail could all be communication signals. The difficulty is in decoding these signals. Currently, ethologists use the aide of an ethogram to catalogue an animal’s behavior in order to look for communicational patterns. Which leads to research discussed on this poster, what can chipmunk behavior reveal about their communication capabilities?



Previous Research

This study was conducted to provide further insight into the physical and auditory communication within the Colorado chipmunk, *Neotamias minimus*. Among the rodent order, the strongest language research comes from the study of prairie dogs. Prairie dogs are social individuals. When a predator enters their village, a call is produced to warn fellow villagers which is specific to the type of predator they encounter. They are known to differentiate between hawks, coyotes, foxes, and humans (Slobodchikoff, 1997). Alert calls can also be heard in chipmunks. Previous research compares alarm calls of the east chipmunk to the west chipmunk, as well as describes the alarm calls (Burke da Silva, Kramer, & Weary, 1994). Although chipmunks are not social animals, they have wide territories and usually cross others’ paths during daily foraging. Chipmunks do not travel far from where they are born, so it is possible that chipmunks within an observable population are related. Developing warning or other specific calls would be advantageous to kin survival. Chipmunks observed in this study were identified as the Least Chipmunk. This mammal, the smallest of the squirrel family, is a dusky chestnut color with two dark gray stripes on its back. The Least Chipmunk’s face is triangular with two parallel stripes on top, and small, round eyes. Chipmunks are only active during the day. Daytime activity means the chipmunk is prone to attack and must stay alert at all times (Mass Audubon, 2001). The purpose of this study is to record chipmunk behavior and analyze categorical behavior for uniformed responses to similar situations.

References

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Situation: Alert

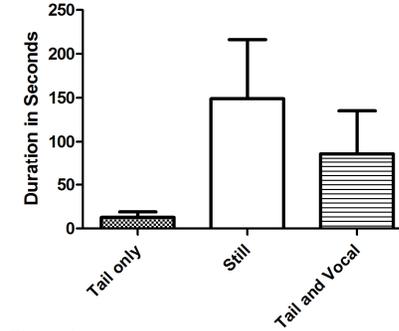


Figure 1. Bar graph showing duration, in seconds, that chipmunks spent carrying out all combined tail only behaviors, still behaviors, and tail and vocal behaviors. Durations taken as total time spent in each behavior category, as observed from June 21st to July 3rd, 2011.

Discussion

My results were inconclusive with respect to supporting my original hypothesis. Non-parametric tests were used to analyze the patterns of behavior, due to the descriptive nature of the data. Numerical data would have been better, had the data been recorded systematically with video/audio footage. Rather than tail movement being regularly paired with vocal calls, it was more common to find tail only behaviors. In terms of communicative expressiveness, the tail signaled curiosity, animosity, fear or sociability. Chipmunks seen interacting with each other rarely made vocal calls (or none audible to humans), so it is likely they rely on body language. Chipmunks also responded consistently to calls of birds. A common vocal behavior among the chipmunk population was the alarm call. Similarly to the absence of known stimuli in the current study, it has been documented in several other studies that chipmunks call for long periods of time for no apparent reason. In a recent study by Burke Da Silva and associates (1994), a stimulus was detected in only 19 of 42 alarm incidences. The 19 responses were tied to the spotting of nonthreatening birds, perhaps suggesting an intra-communication between species. Previous research with chipmunks confirmed that the AST call (short, frequent squeaks) is mostly associated with predator occurrences. Call frequency/duration has been linked with the distance that the predator is from the chipmunk, a relationship noticed in the current study (Wolfe, 1969). Individuals directly approaching the predator will flee and resume calling from a distant perch. Predators often depart after alarm call, as alerted prey are unlikely to be captured.

Future research could expand on the idea of tail-only communication and alert calls in response to predators. Specificity of alarm calls could also be analyzed. Prairie dogs are able to differentiate in this way with a danger call for humans, hawks, and coyotes. One prairie dog researcher, Slobodchikoff, measures prairie dog frequencies for layers and tones to test his theory (Abumrad & Krulwich, 2011). Burke Da Silva and fellow researchers (1994) found that alarm calls of the eastern chipmunk indeed have a separation of calls for aerial and terrestrial predators.

Human error was an issue in this naturalistic observation. A chipmunk would be heard but not seen, which would exclude them from observation, resulting in the loss of some data. Some data was initially recorded and then scratched once it was realized that the animal being observed was a ground squirrel and not a chipmunk. Twelve days is simply not enough time to accurately portray animal behavior, better descriptions would be made if more time was spent. Animals displayed a certain amount of reactivity to the researcher and would raise alert calls when interacting with the researcher.

It can be concluded that chipmunks frequently use their tails for communication. It is not necessary for the tails to be paired with a vocal call, but the distinctions between several tail actions imply that the chipmunk is physically expressive. Humans use the definition of language to separate higher cognitive function of humans from that of lesser animals. It is important that humans remember that language evolves when it is advantageous, not as a divider of ‘superior’ and ‘inferior’. Who knows the true complexity of chipmunk communication? One thing is for sure, it’s all in the tail.