Evolutionarily Convergent Rodents do not Converge on Predator Evasion Strategy.

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Project Overview

- Most studies of invasive species are done post invasion; This project assess a controlled invasion at the time of invasion.
- In this project we assess the intrinsic response of a population of rodents to a known, compared with a novel, viper.
- After a the controlled bioassay, the rodents were exposed to a real threat of predation by the two species of viper, for a period of two lunar months.
- After the exposure, the individuals not selected against, were reassessed to observe changes in risk management.

The Test Species (figure 2)

- We used three species of granivorous rodents, convergent in both looks and ecological factors, from the Mojave Desert (North America) and the Negev Desert (Middle East):
  - A. Allenby's gerbils (*Gerbillus andersoni allenbyi*)
  - B. Desert pocket mice (*Chaetodipus penicillatus*)
  - C. Merriam's kangaroo rat (*Dipodomys merriami*)
- For predators, we used the (1) sidewinder rattlesnake (Crotalus cerastes) which employs infrared heat sensing pits to hunt, a constraint-breaking adaptation over it middleeastern counterpart, the (2) Saharan horned viper (Cerastes cerastes) which depends on moonlight.

Methods

- Each individual rodent (30 per population) was run through a test system ("interview chamber") exposing them to vipers from both ecosystems.
- The systems were modeled on "Y" maze tests but measures the perceived risk of the predator using optimal patch use theory (Brown, 1988).
- Based on this theory a forager will leave a higher density of food in a patch where the perceived risk of predation is high, than in a safe patch.

Figure 1. The test system ("interview chamber")

Results

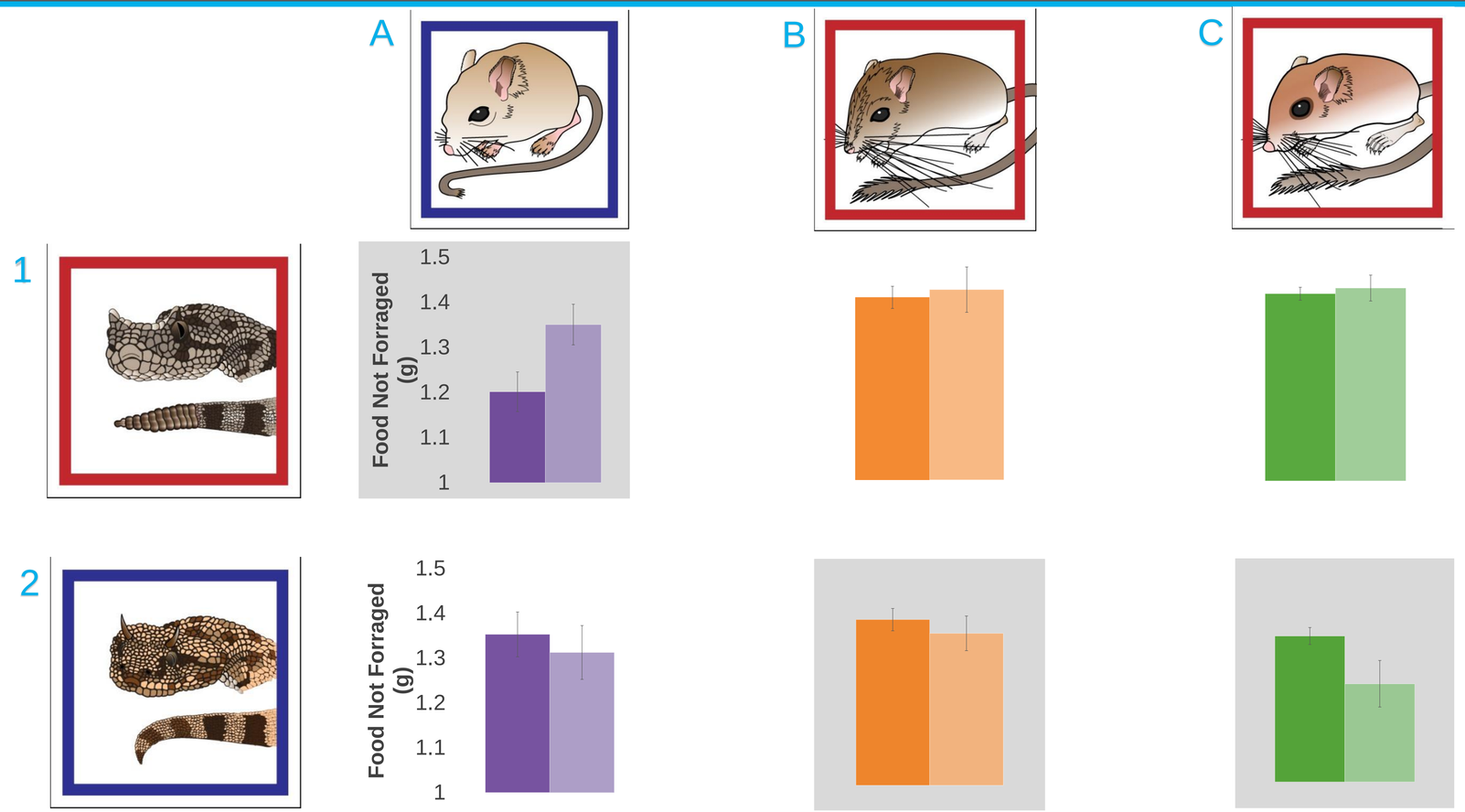

Figure 2. Giving Up Densities (GUDs) of food left in the patches in exposure to a known viper (which background) and novel viper (gray background), at first encounter (dark bars) and adjusted response post exposure and selection (light bar)

Conclusion

Each rodent employed a different predator evasion strategy:

A. Allenby's gerbil first responded with curiosity to the (A1) novel predator, but after selection feared it at least as much as it's known viper. The selection process selected individuals who fear their (A2) know viper (suggesting habituation of the population).

B. The desert pocket mice employed a risk avoidance strategy, This suggests a high level of fear of all vipers, as there was no statistical difference between initial encounter and post selection, nor between the (B1) known and (B2) novel predators.

C. Kangaroo rats distinguished between the vipers from the start, avoiding the (C1) known viper, and taking a risk with the (C2) novel viper. After selection the kangaroo rats employed an "in your face" strategy, preferring to forage in the presence of the novel predator, and showing they do not fear it.

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