

Risk-Sensitive Foraging

Individual Search / Consumption of Food Items/Clumps

Stochastic (uncertain, probabilistic, random) Process

1. Search time per Clump Random and/or
2. Amount of Food per Clump Random

Foraging Time Constrained:

Variance-sensitive ***Fitness Currency***

Foraging Uncertainty, Physiological Constraint

T Foraging time available (day)

R Energetic requirement

Food intake at time $T \leq R$, Starvation (penalty)

time = T , individual's *total energy intake* $X(T)$

Central Limit Theorem, $X(T)$ *Normal*

Currency of Fitness (hypothesis): $\Pr[X(T) \leq R]$

\Rightarrow Forager should minimize $\Pr[X(T) \leq R]$

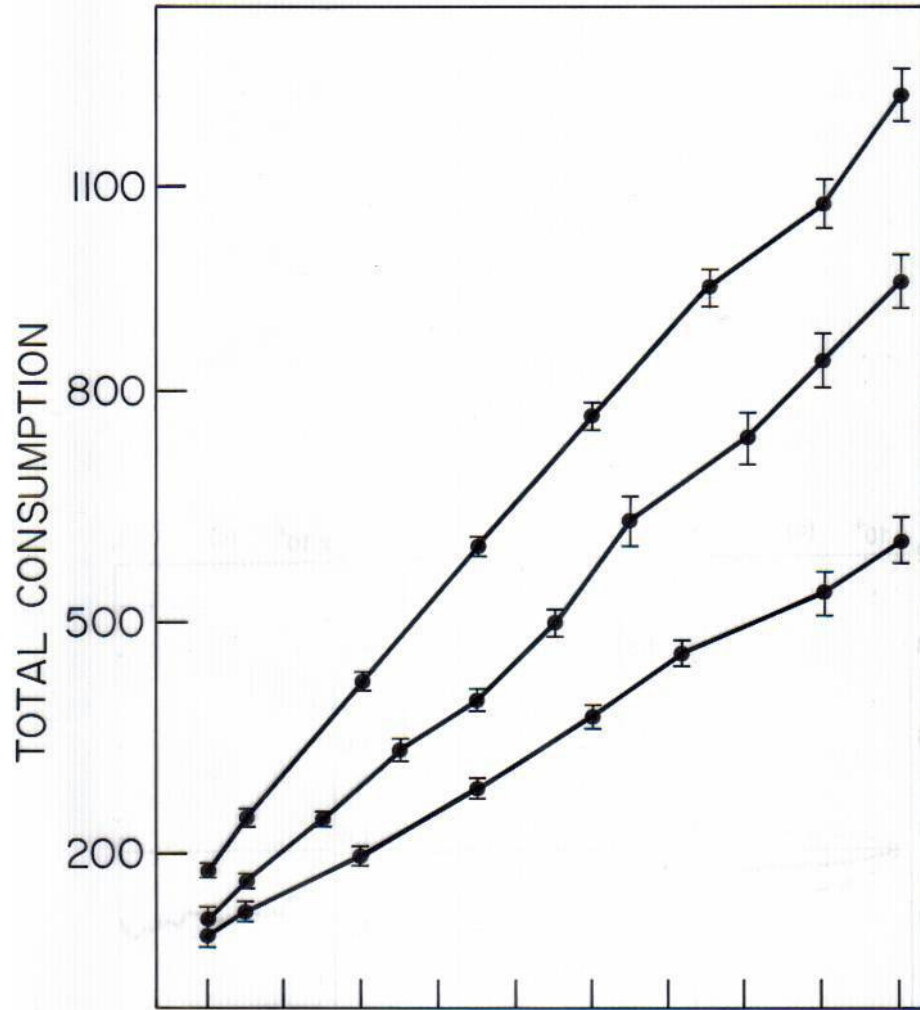
$E[X]$ Expected value, mean food intake at time T

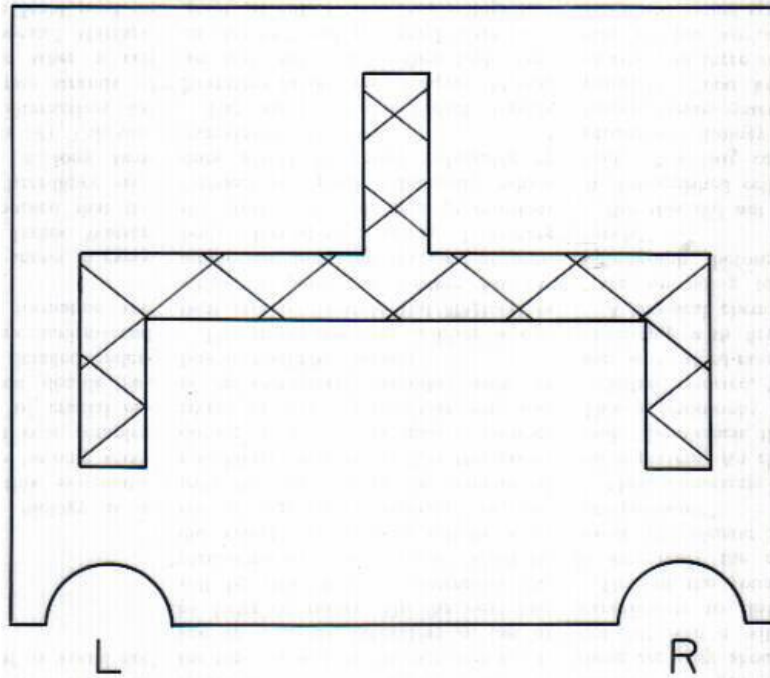
$V[X]$ Variance, uncertainty of food intake

$E[X] > R$: Positive energy budget, Risk-averse

$E[X] < R$: Negative energy budget, Risk-prone







PATCHES

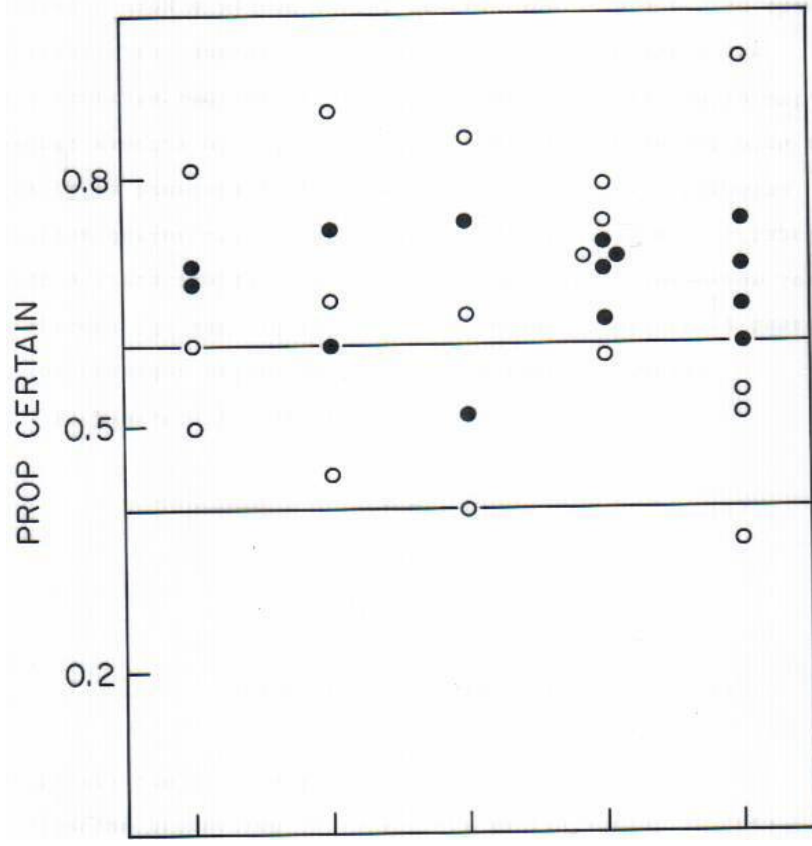
$$X_i : (\mu_i, \sigma_i); i=L,R$$

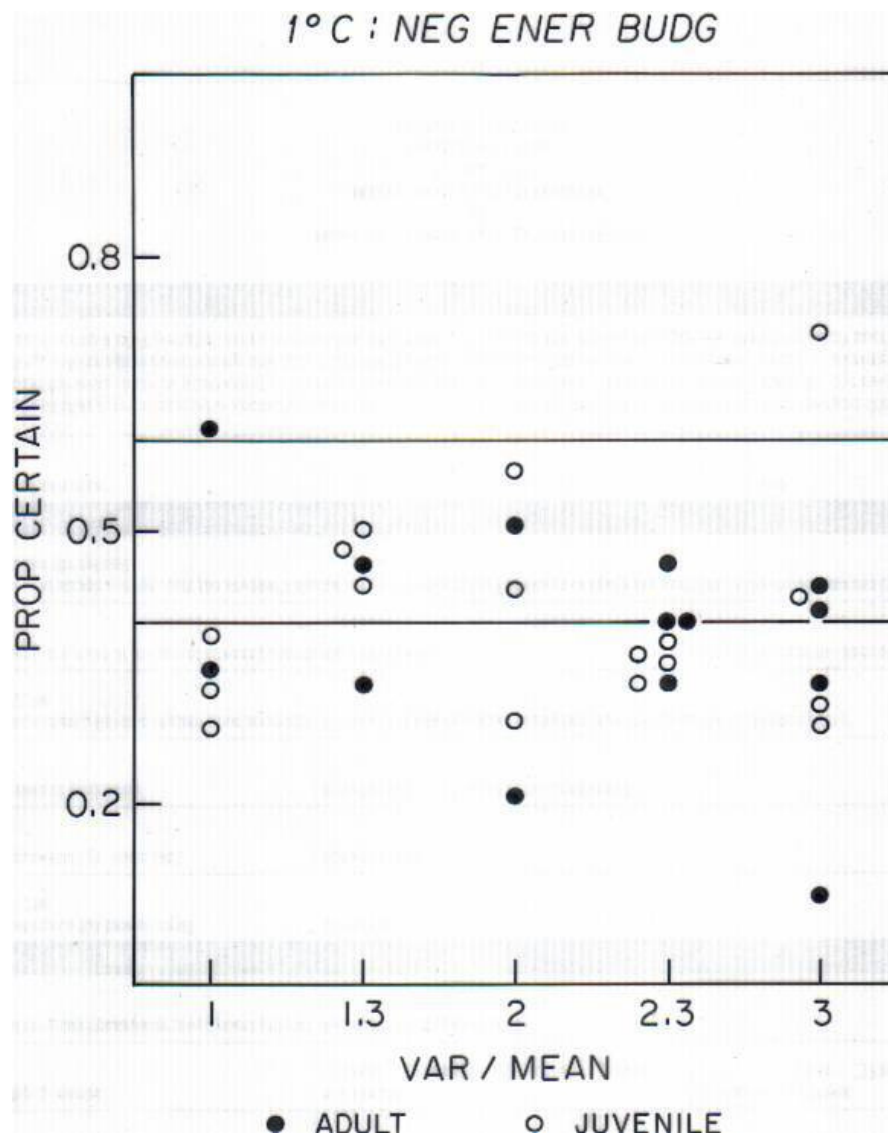
TRAIN : FULL INFO

MODEL : PREFERENCE

NULL : INDIFFERENCE

19° C ; POS ENER BUDG





Foragers Under Physiological Constraint

“Required” Food Intake, Avert Penalty

Risk: Behavioral/Ecological Significance

General Implications Beyond Foraging Paradigm