Functional Response Curves.

TYPE 1: Daphnia eating yeast prey.

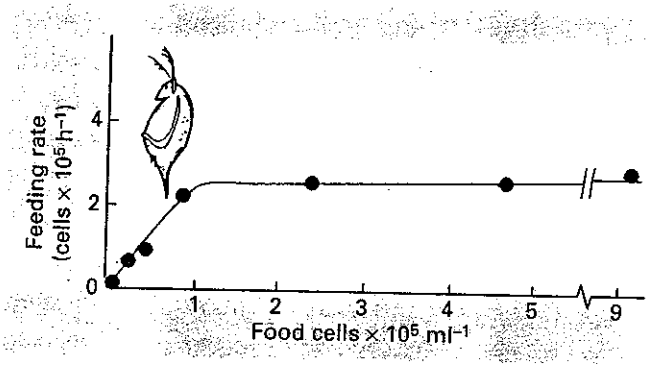
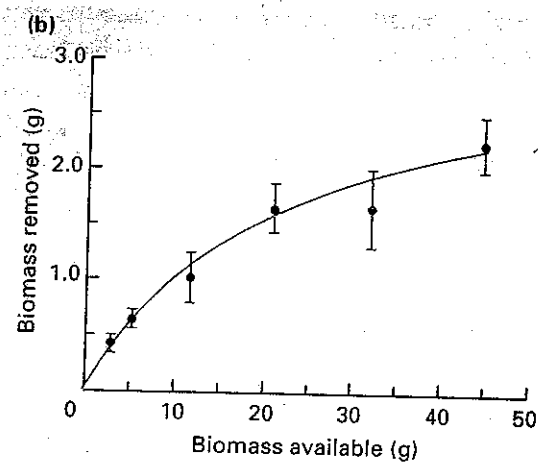
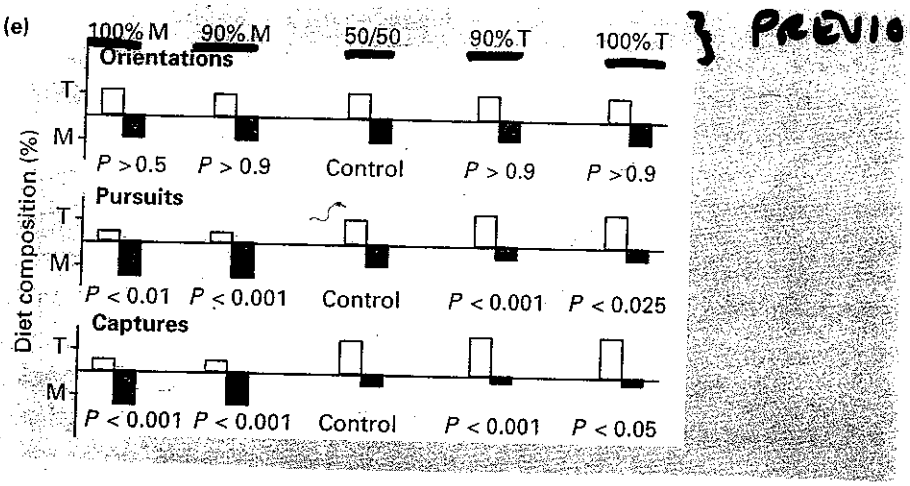


Figure 9.8 The type 1 functional response of *Daphnia magna* to different concentrations of the yeast *Saccharomyces cerevisiae*. (After Rigler, 1961.)



Type 2: Bank voles eating willows

LEARNING BY PREDATOR AS A CAUSE FOR TYPE 3 FUNCTIONAL RESP.



} PREVIOUS EXPERIENCE

Predator = Dragonfly nymphs

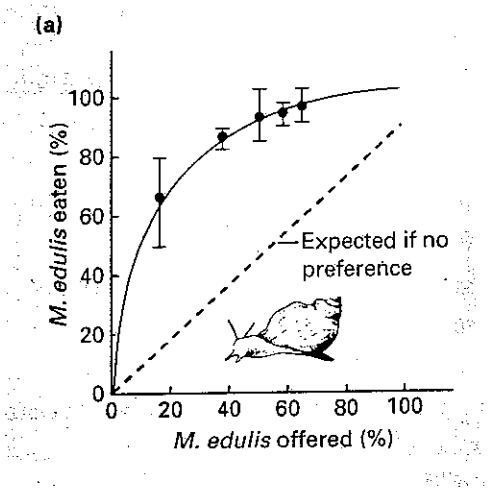
Prey = Mayfly (M, ■)
= Tubifex worm (T, □)

1) Prior to trial, Dragonfly exposed to different conditions: some only familiar with M, some only familiar with T, some intermediate.

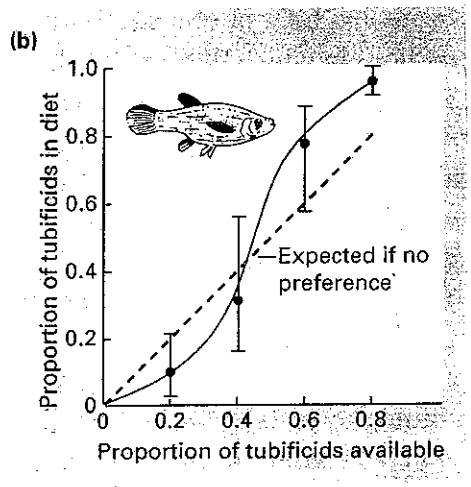
2) In trial, presented with 50% M, 50% T.

3) Orientations - no effect of experience
Pursuits, Captures } show experience (learning) effects

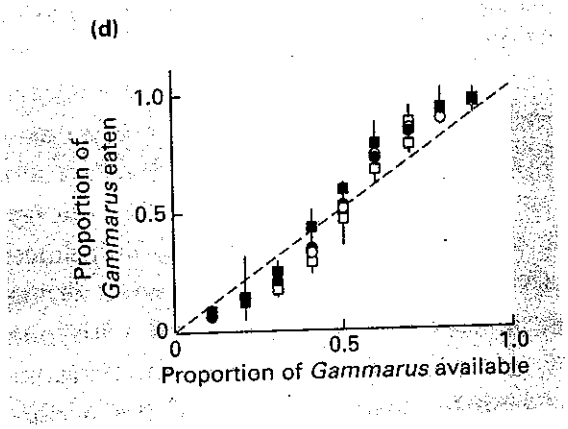
Prey Switching → Type 3 Functional Resp.



Snails eating 2 spp. of mussels – no switching
– Type 2 F.R.



Guppies eating Mayflies and Tubifex worms.
– strong switch to T as proportion of T in prey population increases.
– type 3 F.R.



Stickle backs eating Gammarus + Artemia.

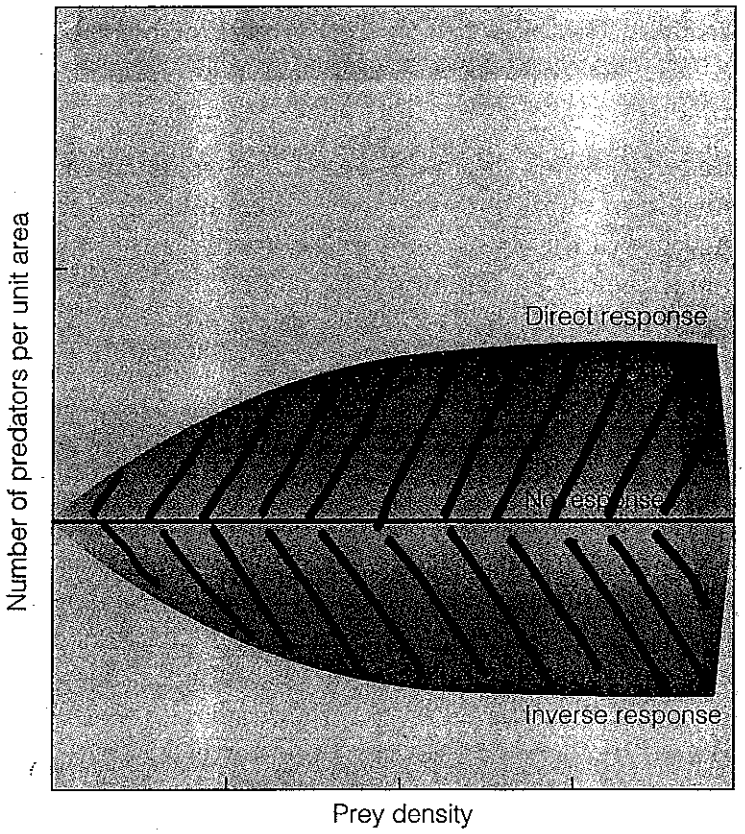
A) Type 3 due to prey switch.

B) Can also see learning effect

filled symbols: % G ↑ in subsequent trials. Stickle backs take more G on day one (■) than on day 3 (●).

open symbols: % ↑ of G in successive trials: take more G on 3

NUMERIC RESPONSES



DIRECT
NO RESP.
INVERSE

Figure 16.7 Basic forms of numerical response.

Weasel / Rodent.

Inverse Numerical Response.

WHY?

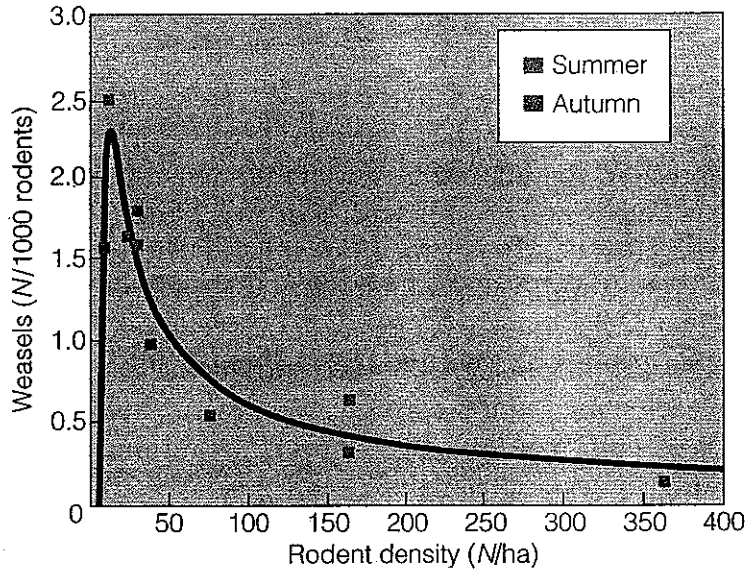
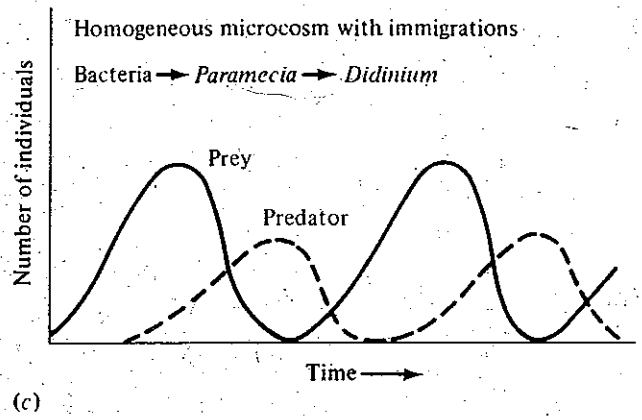


Figure 16.9 Inverse numerical response of weasels to rodent density in the reproductive seasons. Note that weasel response cannot keep up with rodent density.



(c)

Inverse Numerical Response

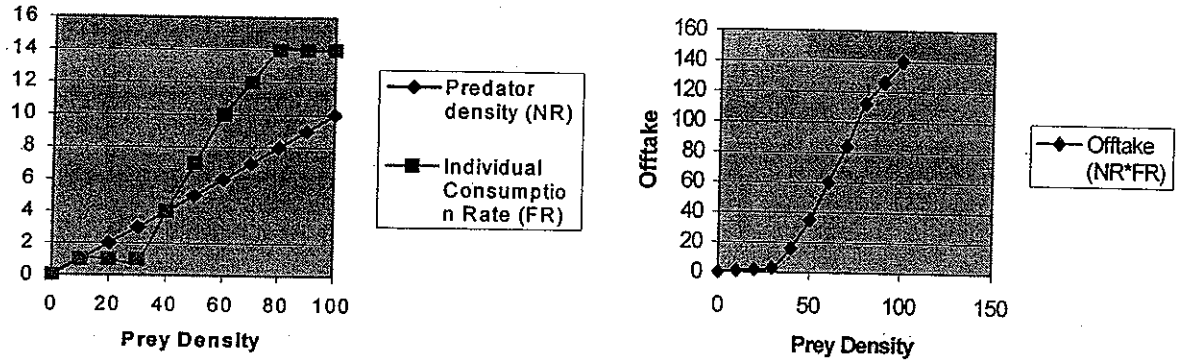
⇒ pred-prey cycles

⇒ out of phase, predator lags prey (by 1/4 cycle in L-V model)

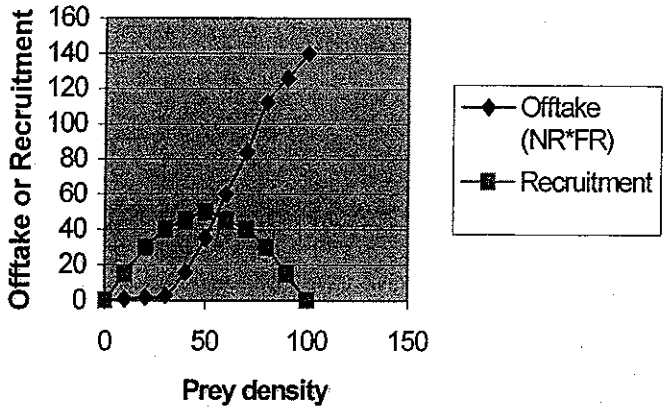
⇒ so Pred is dense when prey is not, + vice-versa → inverse response.

Offtake = N.R. * F.R.

prey killed/time = $\frac{\text{predators}}{\text{prey}}$ * $\frac{\text{prey killed/pred/time}}{\text{prey}}$



After determining offtake, can plot against recruitment (as in last lecture) to determine predator prey dynamics.



offtake compared with recruitment to determine population dynamics