EXPECTATION & MODELING

purchasing ticket

EXPECTATION

E[X] = Σ E[X | Y = y] P(Y = y), sum over y

    E[X | Y = y] will be gains (*i.e.*, scalars)

    P(Y = y) is P(y)

    (*e.g.*, lottery ticket)

ECOLOGICAL MODEL

    an organism chooses to dwell on a
        patch for time interval t

    two patches j are available:
        j = 1, safe; j = 2, risky

    4 parameters characterise each patch:
        p, c, f, v

p, predation

describes the probability per time period for the organism to fall prey to predator

(*e.g.*, $p_1 = 0$ (*i.e.*, safe)

$p_2 = 0.5$ (*i.e.*, risky))

c, cost

describes the cost per time period for the organism to inhabit a patch

(*e.g.*, $c_1 = 1$ (safe)

$c_2 = 1$ (risky))

f, finding

describes the probability per unit time for the organism to find food

(*e.g.*, $f_1 = 0$ (safe)

$f_2 = 0.5$ (risky))

v, value

describes the value per time period for the food that is available on a patch

(*e.g.,* $v_1 = 0$ (safe)

$v_2 = 4$ (risky))

OPTIMAL FORAGING THEORY

Variable
Energy, Q
organism must survive to reproduce

Conditions
$Q = 0$ organism expires
$Q = 4$ maximum sustainable
$t = 4$ time period

$E[Q_{gained}] = f\,v$

$E[Q_f] = (1 - p)\,(Q_i - c + E[Q_{gained}]))$

$Q_f = (1 - p)\,(Q_i - c + f\,v)$