Glossary of Symbols

A_1, A_2, B_1, B_2, etc.: Designations of strategies available to players in two-person games. The subscripts refer to players 1 and 2. Player 1 always chooses the rows of the strategy matrix; player 2, the columns.

C, C_1, C_2: The cooperative strategies in Prisoner's Dilemma; also the frequencies of the corresponding choices.

C: If in a sequence of plays of Prisoner's Dilemma a player decides to play C, he is in state C.

$C(1)$: The frequency of cooperative choices on the first play of a sequence of plays in a population of players.

$C(2)$: The frequency of cooperative choices on the second play of a sequence of plays in a population of players.

(C_1C_2) or (CC): The outcome in Prisoner's Dilemma which results when both players choose the cooperative strategy. Also the frequency of such outcomes in a given universe of outcomes.

(C_1D_2) or (CD): The outcome in Prisoner's Dilemma which results when player 1 chooses the cooperative strategy, while player 2 chooses the defecting strategy. Also the frequency of

such outcomes in a given universe of outcomes.

D, D_1, D_2: The defecting strategies in Prisoner's Dilemma; also the frequencies of the corresponding choices.

D: If in a sequence of plays of Prisoner's Dilemma a player decides to play D, he is in state D.

$D^{(n)}$: The strategy consisting exclusively of D's in Prisoner's Dilemma played n consecutive times.

(D_1D_2) or (DD): The outcome in Prisoner's Dilemma which results when both players choose the defecting strategy. Also the frequency of such outcomes in a given universe of outcomes.

(D_1C_2) or (DC): The outcome in Prisoner's Dilemma which results when player 1 chooses the defecting strategy while player 2 chooses the cooperative strategy. Also the frequency of such outcomes in a given universe of outcomes.

G_i: Expected payoff to player i (i = 1, 2) under steady state conditions.

L_{CC}: Fraction of pairs in a population of paired players of Prisoner's Dilemma who obtained at least twenty-three (CC) outcomes out of the last twenty-five plays of a sequence.

L_{DD}: Fraction of pairs in a population of paired players of Prisoner's Dilemma who obtained at least

twenty-three (DD) outcomes out of the last plays of a sequence.

M: The ratio $(1 - y_1)(1 - z_2)/y_1z_2$ or $(1 - y_2)(1 - z_1)/y_2z_1$.

m: The reciprocal of the average life expectancy in a population of processes, each of which may end with equal probability at any moment. It is assumed that m is the same for each process in the population.

MM: The population of players in which both players of a pair are male.

MW: The population of players in which the first player of a pair is male and the second, female.

$N(i)$: The number of runs (consecutive outcomes of one kind) at least i plays long in a sequence of plays.

P: The payoff to each player in Prisoner's Dilemma when both choose the defecting strategy.

$P(t)$: The probability that a process, the time of whose termination is a random variable, will not have terminated at time t.

$p_i(t)$: The probability that a system, passing through a sequence of states, will find itself in state i at time t.

$p_i(\infty)$: The steady state probability that a system subject to a stochastic process, passing from state to state, is in state i.

R: The payoff to each player in Pris-

oner's Dilemma when both choose the cooperative strategy.

r_1: The ratio $(R - P)/(T - S)$.

r_2: The ratio $(R - S)/(T - S)$.

$r_{CC}^{(i)}$: The ratio $N(i)/N(i - 1)$, related to runs of (CC) outcomes.

$r_{CD}^{(i)}$ [or $r_{DC}^{(i)}$]: The ratio $N(i)/N(i - 1)$ related to runs of (CD) [or (DC)] outcomes.

$r_{DD}^{(i)}$: The ratio $N(i)/N(i - 1)$ related to runs of (DD) outcomes.

S: The payoff to the cooperating player in Prisoner's Dilemma when the other player chooses the defecting strategy.

s_i: The i-th state of a set of states in which a given system can be.

T: The payoff to the defecting player in Prisoner's Dilemma when the other player chooses the cooperative strategy.

t: Time, measured in terms of the number of plays made in a sequence of plays of Prisoner's Dilemma.

w_i: The probability that player i chooses cooperatively following a (DD) outcome on the preceding play.

$\tilde{w}_i$: $1 - w_i$.

WM: The population of players in which the first player is female and the second male.

WW: The population of players in which both players are female.

x_i: The probability that player i

chooses cooperatively following a (CC) outcome on the preceding play.

$\tilde{x}_i$: $1 - x_i$.

x^*: If two players adjust their x_i so as to maximize their expected payoffs, x^* is the value of x_i for which the partial derivative $\partial G_i / \partial x_i$ vanishes.

y_i: The probability that player i chooses cooperatively following a (CD) outcome if $i = 1$ or follow- a (DC) outcome if $i = 2$.

$\tilde{y}_i$: $1 - y_i$.

z_i: The probability that player i chooses cooperatively following a (DC) outcome if $i = 1$ or following a (CD) outcome if $i = 2$.

$\tilde{z}_i$: $1 - z_i$.

α: A learning parameter in a stochastic learning model.

α_{ij}: The probability that a system, passing through a sequence of states and finding itself in state i, will next pass into state j. Also called a transition probability.

Γ: If in a sequence of plays of Prisoner's Dilemma a player decides (irrevocably) to choose C regardless of outcomes, he is in state Γ.

γ: The probability that a player will pass from state C to state Γ.

δ: The probability that a player will pass from state D to state Δ.

Δ: If in a sequence of plays of Prisoner's Dilemma, a player decides

(irrevocably) to choose D, regardless of outcomes, he is in state Δ.

ζ_i: The probability that player i chooses cooperatively following his own defecting choice.

η_i: The probability that player i chooses cooperatively following his own cooperative choice on the preceding play.

λ: The asymptotic frequency of a response in a stochastic learning model.

ξ_i: The probability that player i ($i = 1, 2$) chooses cooperatively following the other's cooperative choice on the preceding play.

μ: Same as m except that each process may be characterized by a different life expectancy $1/\mu$.

$\rho_{C_1C_2}$ or ρ_C: The product moment correlation between the frequencies of cooperative choices by players 1 and 2 respectively in a population of paired players.

ρ_0: The product moment correlation between two random variables, each referring to one of paired players in a sequence of plays of Prisoner's Dilemma and taking on value 1 or 0 depending on whether the player in question chose strategy C or D.

ρ_1: The same as ρ_0 except that one player's choice is matched with the other player's immediately preceding choice.

ρ_i $(i = 2, 3, \ldots 6)$: The same as ρ_1 except that one player's choice is matched with the choice made by the other i plays previously.

$\rho_{w_1w_2}$ or ρ_w: The product moment correlation between w_1 and w_2 in a population of paired players.

$\rho_{x_1x_2}$ or ρ_x: The product moment correlation between x_1 and x_2 in a population of paired players.

$\rho_{y_1y_2}$ or ρ_y: The product moment correlation between y_1 and y_2 in a population of paired players.

$\rho_{z_1z_2}$ or ρ_z: The product moment correlation between z_1 and z_2 in a population of paired players.

$\rho_{\zeta_1\zeta_2}$ or ρ_ζ: The product moment correlation between ζ_1 and ζ_2 in a population of paired players.

$\rho_{\eta_1\eta_2}$ or ρ_η: The product moment correlation between η_1 and η_2 in a population of paired players.

$\rho_{\xi_1\xi_2}$ or ρ_ξ: The product moment correlation between ξ_1 and ξ_2 in a population of paired players.

$\rho_{\omega_1\omega_2}$ or ρ_ω: The product moment correlation between ω_1 and ω_2 in a population of paired players.

$\psi(\mu)$: A density distribution function of μ.

ω_i: The probability that player i chooses cooperatively following the other's defecting choice.

$>$: The "greater than" sign, used also to rank order games. Thus I $>$ II means that the frequency of co-

operative choices in Game I was observed to be greater than in Game II.

I, II, etc.: Roman numerals designate different variants (with respect to their payoff matrices) of the Prisoner's Dilemma game. Specifically, the seven games discussed are labeled I, II, III, IV, V, XI, and XII.