1.2 Modelling Players' Preferences

In *two-person games*, each of the two players has only n possible *actions*:

$\therefore$ represent the game with a $n \times n$ payoff matrix.

Two actions per player: $n = 2$.

$\therefore$ Each player faces four possible combinations.

For a one-shot game in *pure strategies*
(i.e., no dice rolling or mixing of pure strategies):

need only *rank* the four combinations:

best, good, bad, worst:

$\rightarrow$ payoffs of 4, 3, 2, and 1, respectively

Larger numbers of possible actions:

harder to rank the larger number of outcomes (with three actions there are $3 \times 3 = 9$), but ranking sufficient.

(i.e. *ordinal preferences*, instead of asking "by how much is one outcome preferred to another?")

Later, with **mixed strategies** (probabilistic or dice-throwing) and unpredictability:

- use *probabilities* over actions and
- the *expected values* of the possible outcome
- use *cardinal measures* over the amounts, usually dollar amounts, which are unambiguous, *and the numbers matter*!

Simple Games:

- The Dollar Auction
- The *n*-person Prisoner's Dilemma
- The Ice Cream Sellers
- The Prisoner's Dilemma
- The Battle of the Bismark Sea
- Chicken!
- The Boxed Pigs
- The Battle of the Sexes
- The Gift of the Magi
- Bargaining
- Vickrey auction

Further games, from Gardiner (pp.):

- Battle of the Networks: 38–41
- Video System Coordination (2P & 3P): 50–51, 99–100
- Cigarette Advertising on TV: 51–53
- Matching Pennies: 68–69
- Market Niche (Symm. & Asymm, 2P & 3P): 69–70,79–81,97–99
- Everyday Low Pricing — Sears: 81–84
- 3P Competitive Advantage: 96–97
- Stonewalling Watergate: 102–104
- Tragedy of the Commons: 108–111
- Cournot Competition: 124–127
- Bertrand Market Game: 129–133
- Telex versus IBM: 149–151
- Conscription: Reluctant Volunteers: 157–159
- Mutually Assured Destruction — MAD: 160–164
- Hawk versus Dove: 213–215
- Caveat Emptor (Buyer Beware): 240–242
- Depositor versus Savings & Loan: 286–288
- Voting Game: 440–443

1.3 Concepts and Tools

The following **concepts & tools** are introduced:

The Ice-Cream Sellers:

- payoff matrix
- incentives to change — use arrows!
- dominant strategy

The Prisoner's Dilemma:

- possibility of repetition
- efficiency — Pareto Optimality
- bimatrix of payoffs — both players'
- non-zero-sum game
- Nash equilibrium

The Battle of the Bismark Sea:

- zero-sum game
- dominated strategies
- iterated dominant equilibrium

Boxed Pigs:

- rationality
- game in normal form (payoff matrix)
- weakness may be strength
- game in extensive form (game tree)
- information set

The Battle of the Sexes:

- coordination, not rivalry
- first-mover advantage
- focal points

See the Definitions below (from Rasmusen), and the on-line Glossary.