(Non-Cooperative) Game Theory and Military Planning

I Fundamental concepts of game theory

0. Stories
   0.1. “An Apartment in New York”
   0.2. “Flat Tire”
   0.3. “A Family on the Brink”

1 The basics
   1.1. Strategies
   1.2. Pay-offs
   1.3. Order of play
   1.4. Information
   1.5. Non-cooperative versus cooperative games

2. Sequential games
   2.1. “Senate Race”
   2.2. Roll-back equilibrium
   2.3. Changing the order of play: first-mover advantage...
   2.4. ... or second-mover advantage: “D-Day”
   2.5. Experimental game theory and rational behaviour: “Ultimatum Game” and “Dictator Game”

3. Simultaneous games
   3.1 “Prisoners’ dilemma” and solutions: dominant strategies; max-min; Nash equilibrium
   3.2. “Bismarck Sea”
   3.3. “Stag Hunt”
   3.4. “Chicken”
   3.5. “Battle of the Sexes”

Appendix: Playing dominant strategies in sequential games?

4. Game theory in sports
   4.1. American Football
   4.2. Further examples: pit stops in Formula I; slipstreaming in NASCAR racing

5. No Nash equilibria?
   5.1. “D-Day”
   5.2. Penalties in football: (maximizing) expected utility and the indifference method
   5.3. Ticket checks and fare dodging

6. Nash versus max-min versus whatever? An experiment

II Strategic moves

7. Strategic moves: the general idea
   7.1. “Burning Bridges”
   7.2. “Dr Strangelove”
8. Strategic moves in simultaneous games
   8.1. The “Prisoners’ dilemma” and organised crime
   8.2. Cartels and “Price Matching”

9. Subgame perfectness
   9.1. Representing sequential games by a pay-off matrix
   9.2. Roll-back equilibrium and subgame perfectness
   9.3. (Empty) Threats and trembling hand

10. Strategic moves and public goods

11. Barriers to entry
   11.1. Threats: “Price War”...
   11.2. ... versus self-commitments: “Raising Rivals’ Cost”

III Asymmetric information

12. Signalling
   12.1. Signalling (and screening) in labour markets
   12.2. “Dating Game”
   12.3. Mating rituals in the animal world
   12.4. The USS Cole incident and 9/11

IV Game theory and warfighting

13. War as a game
   13.1. Clausewitz and the “Fog of War”
   13.2. “Picture-Centric Warfare” and “Network-Centric Warfare (NCW)”
   13.3. The NCW philosophy? A systematic analysis of simultaneous two-by-two zero-sum games

14. Military textbook examples
   14.0 “Bismarck Sea”
   14.1 “Avranches Gap”
   14.2 (New kinds of) Mixed strategy equilibria in mine warfare

15. Features of Irregular Warfare and Counter-Insurgent Operations (COIN)
   15.1. “Winning the Hearts and Minds”
   15.2. Leaving a footprint/body bags arriving home: “You have the watches, we have the time.”
   15.3. Irregular Warfare is not zero-sum
   15.4. Textbook examples from the Afghanistan war: Ambush; A 10 vs Special Forces
   15.5. “Operation Moshtarak”
   15.6. Counter-insurgency warfare: tactical operations and strategic moves

References

Norman Friedman (2009), Network-Centric Warfare, Naval Institute Press, Annapolis.
Lucia Martinez, Jörg Schimmelpfennig (2014), The War Against the Taliban: Tactical Operations and Strategic Moves, Ruhr-Universität Bochum.
Stuart Tootal (2009), Danger Close, John Murray, London.