Chapter 1

Introduction

Rufus A. Johnstone and David J. D. Earn

"Game Theory for Biologists"

Version of August 20, 2017 @ 23:13

Correspondence to: earn@math.mcmaster.ca

This book deals with the morphology, behaviour and life histories of living organisms.

Biologists study animal behaviour in two distinct ways. In the ***proximate*** approach, we seek to identify the physiological or molecular mechanisms that produce a behaviour of interest. In contrast, in the ***ultimate*** or ***functional*** approach we seek to identify the selective pressures that favour evolution of different behaviours.

In the rest of this book, we will explore how formal models can contribute to the functional approach.

1.1 Notes and Further Reading

Game theory was invented by John von Neumann and Oskar Morgenstern and made famous in their landmark book "Theory of Games and Economic Behavior"

http://www.amazon.ca/Theory-Games-Economic-Behavior-Neumann/dp/0691130612/

Some more recent books on game theory, especially evolutionary game theory, are listed in the bibliography below.

Bibliography

[1] Dockner EJ, Jorgensen S, Van Long N, Sorger G. Differential games in economics and management science. Cambridge: Cambridge University Press; 2000.

[2] Dugatkin LA, Reeve HK, editors. Game Theory and Animal Behavior. New York: Oxford University Press; 2000.

[3] Fudenberg F, Tirole J. Game Theory. Cambridge: The MIT Press; 1991.

[4] Gibbons R. A Primer in Game Theory. Toronto: Harvester Wheatheaf; 1992.

[5] Gintis H. Game Theory Evolving. Princeton: Princeton University Press; 2000.

[6] Hofbauer J, Sigmund K. Evolutionary Games and Population Dynamics. Cambridge: Cambridge University Press; 1998.

[7] Kuhn HW, editor. Classics in Game Theory. Princeton: Princeton University Press; 1997.

[8] Maynard Smith J. Evolution and the Theory of Games. Cambridge, UK: Cambridge University Press; 1982.

[9] Mesterton-Gibbons M. An introduction to game-theoretic modelling. vol. 11 of Student Mathematical Library. 2nd ed. Providence: American Mathematical Society; 2001.

[10] Morrow JD. Game Theory for Political Scientists. Princeton: Princeton University Press; 1994.

[11] Sigmund K. Games of Life. Oxford: Oxford University Press; 1993.

[12] Vincent TL, Brown JS. Evolutionary game theory, natural selection, and darwinian dynamics. New York: Cambridge University Press; 2005.