

EVOLUTION

convention

Hunt

Divide

Cake

Fairness

sex

Stag

commitment

Darwinian

aid

game

Dove/Hawk

fitness

mutual

structure

bargaining

contract

Ultimatum

correlation

social

replicator

simulation

convention

dynamics

inference

evolutionary

theory

commitment

dynamics

signaling

distributive

cooperation

Meaning

models

selection

Sex

ownership

justice

justice

justice

correlation

correlation

# 50033 - The Evolution of the Social Contract

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## Overview

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This course will provide an accessible introduction to recent research into the biological and cultural evolution of social structure, touching on important issues concerning the relation between rational choice and evolution. It will consist in a chapter-by-chapter examination of Skyrms' highly acclaimed work on the topic. We will be covering, back to back, both his Lakatos award-winning *The Evolution of the Social Contract* and its more recently published sequel, *The Stag Hunt and the Evolution of Social Structure*.

The first book discusses a variety of simple game-theoretic models—the game of Divide the Cake, the Ultimatum game, the Dove-Hawk game, the Prisoner's Dilemma and Lewisian signaling games—to shed light on social phenomena as varied as distributive justice, commitment, mutual aid, ownership and linguistic communication. The second book considers the effects of factors such as location, signaling and network formation on another important type of game known as the Stag Hunt.

## Background reading

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Although some of the issues discussed here can be rather complex, Skyrms' own exposition is impressively non-technical and assumes no background knowledge whatsoever. For those of you who are taking the course with low credit options, I will not be expecting you to delve any deeper into the subject than he does.

Those of you who are taking the course with high credit options—or who simply wish to go beyond the call of duty—could possibly benefit from some background reading. Prior familiarity with the rudiments of game theory, both classical and evolutionary, would be an asset. The following resources provide suitable preparatory reading:

McKenzie Alexander, J. [2009]: 'Evolutionary Game Theory', in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy* (Fall 2009 Edition). Skipping Section 4.

<http://plato.stanford.edu/archives/fall2009/entries/game-evolutionary/>

Ross, D. [2010]: 'Game Theory', in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy* (Fall 2010 Edition), Edward N. Zalta (ed.)

<http://plato.stanford.edu/archives/fall2010/entries/game-theory/>

A useful overview of some of the dynamical models encountered in the literature, expanding considerably on Section 2.2 of Alexander [2009], is:

McKenzie Alexander, J. [2007]: *The Structural Evolution of Morality*, Cambridge: Cambridge University Press. Ch. 2 'Types of Evolutionary Models'.

Finally, given the topic of the course, a basic grasp of the principles of evolution by natural selection might be desirable. For this, see the following excerpts from Sober's classic textbook:

Sober, E. [2005]: *Philosophy of Biology*. Oxford: OUP. Ch 1 'What is Evolutionary Theory?' (skipping sections 1.4, 1.6 and 1.7) and Ch 3 'Fitness', (skipping section 3.7).

If you require a copy of the excerpts from Alexander or Sober ahead of the start of the course, please get in touch and I will mail you a pdf.

## Admin

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The course will consist of 14 weekly 2-hour discussion sessions, every Thursday from 14:00 to 16:00, in S 35 (NW I). Attendance is compulsory. The working language of the seminar is English.

We shall be following a format already established in some of the modules at Bayreuth. Each session will be kickstarted by one or more beamer-based *student presentations*, based on a short essay (see below). Presentations will be expected to be 20 min long and will each be followed by a 10 min Q&A session. The essay on which the presentation is based is to be emailed to me by 09:00 on the morning of the day before the seminar and will be returned to the student, with marks and comments, at the end of the session.

The remainder of the session will be devoted to a *class discussion* of the topic. To help ensure that this is a productive exercise, you will be expected to have prepared a short list of issues that you think are worthy of general attention. Pertinent issues include points of unclarity, perceived weaknesses in the arguments or suggestions for further work on the topic.

Method of assessment will vary according to the amount of credits taken. For all credit options:

- (i) Short essay of 2 000  $\pm$  15% words + associated presentation (pass/fail).

In addition, for the 2 *credit* option:

- (ii) (a) Short review of 2 000  $\pm$  15% words (pass/fail) of one of the Skyrms books. Deadline for receipt, via email: 11 February 2011.

For the 6 credit option:

(ii) (b) Extended essay of 4 500  $\pm$  15% words. Deadline for receipt, via email: 25 March 2011.

For the 8/10 credit option:

(ii) (c) Extended essay of 7 000  $\pm$  15% words. Deadline for receipt, via email: 25 March 2011.

Regarding the short essay, you should be simply be aiming for a concise, well-structured critical overview of one of the session topics. Allocation of topics for this assignment will be made during the first session. For the extended essay, you will be expected to provide something more substantial, going beyond a mere literature review. For this assignment, you may chose any topic connected with the course, subject to my approval. Note that I am happy to make suggestions if you are stuck. Please book an appointment with me, via email, for the first week following the Christmas break to discuss your proposed choice. You will then be granted two weeks after the meeting to mail me a 750 word provisional abstract.

Essays must be word-processed (no handwritten contributions please!), double-spaced and properly referenced. Note that the deadlines are firm and are renegotiable only under exceptional circumstances.

### **Schedule & Reading**

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You will be required to get hold of a copy of the following two items:

Skyrms, B. [1996]: *The Evolution of the Social Contract*, Cambridge: Cambridge University Press.

Skyrms, B. [2003]: *The Stag Hunt and the Evolution of Social Structure*, Cambridge: Cambridge University Press.

If you are keen, you may also be interested in purchasing the slightly more detailed

McKenzie Alexander, J. [2007]: *The Structural Evolution of Morality*, Cambridge: Cambridge University Press.

I have collected, in the course readings, various general discussions and reviews of the Skyrms books. Regarding *The Evolution of the Social Contract*, see:

Danielson, P. [1998]: 'Review of *The Evolution of the Social Contract*', *Canadian Journal of Philosophy* 28(4), pp. 627-652

Barrett, M., E. Eells, B. Fitelson & E. Sober [1999]: 'Models and Reality-A Review of Brian Skyrms's Evolution of the Social Contract', *Philosophy and Phenomenological Research* 59(1), pp. 237-241.

Bicchieri, C. [1999]: 'Local Fairness', *Philosophy and Phenomenological Research* 59(1), pp. 229-236

Kitcher, P. [1999]: 'Games Social Animals Play: Commentary on Brian Skyrms's Evolution of the Social Contract', *Philosophy and Phenomenological Research* 59(1), pp. 221-228

Skyrms, B. [1999]: 'Reply to Critics', *Philosophy and Phenomenological Research* 59(1), pp. 243-254

Regarding *The Stag Hunt and the Evolution of Social Structure*:

van Rooij, R. [2007]: 'Review of *SHESS*', *Studia Logica* 85(1), pp. 133-138

Alexander, J.M. [2006]: 'Review of *SHESS*', *Economics and Philosophy* 22, pp. 441-448.

The EAME Project provides a series of online simulators for *The Evolution of the Social Contract*, courtesy of Bill Harms. The source code is also included. Check them out at

<http://www.ethics.ubc.ca/eame/eameweb/Skyrms/>

The course schedule will be the following, with compulsory reading marked with a ★:

### 1. Introduction to the course

#### PART I: THE EVOLUTION OF THE SOCIAL CONTRACT

2. *Sex & Justice* This chapter discusses the evolution of fair division of resources, modeled as a game of Divide the Cake (aka 'Nash bargaining game'). In this game, players simultaneously bid for a proportion of a resource, receiving the share demanded if the total demand fails to exceed the total amount available, and receiving nothing otherwise. Skyrms compares and contrasts the respective views of traditional game theory and evolutionary modeling on the matter.

★ Skyrms, B. [1996]: *The Evolution of the Social Contract*. Cambridge: Cambridge University Press. Ch. 1

D'Arms, J., R. Batterman, & K. Gorny [1998]: 'Game Theoretic Explanations and the Evolution of Justice', *Philosophy of Science* 65, pp. 76-102.

McKenzie Alexander, J. [2000]: 'Evolutionary Explanations of Distributive Justice', *Philosophy of Science* 67(3), pp. 490-516. Up to but excluding section 4.

McKenzie Alexander, J. [2007]: *The Structural Evolution of Morality*, Cambridge: Cambridge University Press. Ch. 5 'Fairness', up to and including Section 5.1.

3. *Commitment* Here we discuss a sequential variant on the previous game—the Ultimatum game—in which one player bids first and the other player has a choice between taking the remaining proportion of the resource or calling the division off altogether. Again

Skyrms contrasts traditional game theory with evolutionary approaches, discussing the emergence of punitive behaviour, in which the second player declines unfair bids at her own cost.

- ★ Skyrms, B. [1996]: *The Evolution of the Social Contract*. Cambridge: Cambridge University Press. Ch. 2

Harms, B. [1997]: ‘Evolution and Ultimatum Games’, *Theory and Decision* 42, pp. 147–175.

McKenzie Alexander, J. [2007]: *The Structural Evolution of Morality*, Cambridge: Cambridge University Press. Ch. 6 ‘Retribution’, up to and including Section 6.1.

4. *Mutual Aid* Skyrms offers an evolutionary perspective on the well-known one-shot Prisoner’s Dilemma game, discussing the evolution of cooperative behaviour in the light of correlated interaction between population members. We also find here an interesting discussion of the relation between the issue of correlated interaction and the causal vs evidential distinction in decision theory.

- ★ Skyrms, B. [1996]: *The Evolution of the Social Contract*. Cambridge: Cambridge University Press. Ch. 3

Skyrms, B. [1994]: ‘Darwin Meets the Logic of Decision: Correlation in Evolutionary Game Theory’, *Philosophy of Science* 61(4), pp. 503–528.

5. *Correlated Convention* We move on to the game of Hawk-Dove (aka ‘Chicken’). In this anti-coordination game, players can choose to either play a belligerent strategy (Hawk) or a submissive one (Dove), with a Hawk-Hawk play leading to catastrophic outcomes for both players. Skyrms discusses the evolution of correlated equilibria, in which the population is taken over by players who play complementary strategies conditional on the occurrence of a common random event. The potential relevance of this kind of phenomenon to the emergence of property is also discussed.

- ★ Skyrms, B. [1996]: *The Evolution of the Social Contract*. Cambridge: Cambridge University Press. Ch. 4

6. *The Evolution of Meaning* This chapter takes as a starting point David Lewis’ pioneering work on linguistic convention, offering an evolutionary perspective on the emergence of communicative action. In particular, Skyrms investigates the evolution of signalling systems, which are special types of equilibria in what are known as ‘signalling games’.

- ★ Skyrms, B. [1996]: *The Evolution of the Social Contract*. Cambridge: Cambridge University Press. Ch. 5 & Postscript

Hutteger, S. [2007]: ‘The Evolution of Meaning’, *Philosophy of Science* 74, pp. 1–27.

Hutteger, S. , B. Skyrms, R. Smead and K. Zollman [2010]: ‘Evolutionary dynamics of Lewis signaling games: signaling systems vs. partial pooling’, *Synthese* 172, pp. 177–191.

## PART II: THE STAG HUNT

7. *The Stag Hunt* Skyrms introduces the Stag Hunt game, which takes center stage in the book. In this game, players can choose to either hunt for stag or to hunt for hare. Hunting for stag requires cooperation of the other player for success, but yields a high payoff. Hunting for hare requires no such cooperation but yields a low payoff.

★ Skyrms, B. [2003]: *The Stag Hunt and the Evolution of Social Structure*. Cambridge: Cambridge University Press. Ch. 1

8. *Bargaining with Neighbours* We revisit the game of Divide the Cake from Session 2, this time with a different, non-evolutionary, model, in which player interaction is constrained by a fixed spatial structure and players can update their behaviour based on past experience.

★ Skyrms, B. [2003]: *The Stag Hunt and the Evolution of Social Structure*. Cambridge: Cambridge University Press. Ch. 2

McKenzie Alexander, J. [2000]: ‘Evolutionary Explanations of Distributive Justice’, *Philosophy of Science* 67(3), pp. 490-516. Section 4 onwards.

McKenzie Alexander, J. [2007]: *The Structural Evolution of Morality*, Cambridge: Cambridge University Press. Ch. 5 ‘Fairness’, Sections 5.2, 5.3 and 5.4.

9. *The Stag Hunt with Neighbours* The impact of fixed spatially-structured interaction is now evaluated with respect to the Stag Hunt. Skyrms discusses some of the repercussions of different combinations of fixed spatial structures and strategy-update rules.

★ Skyrms, B. [2003]: *The Stag Hunt and the Evolution of Social Structure*. Cambridge: Cambridge University Press. Ch. 3

McKenzie Alexander, J. [2007]: *The Structural Evolution of Morality*, Cambridge: Cambridge University Press. Ch. 4 ‘Trust’, Sections 4.2, 4.3 and 4.4.

10. *Evolution of Inference* Skyrms once again presents Lewis’ work on linguistic convention, and discusses it in the light of an evolutionary model. This time, he also gestures towards the evolution of more complex forms of communication and inference.

★ Skyrms, B. [2003]: *The Stag Hunt and the Evolution of Social Structure*. Cambridge: Cambridge University Press. Ch. 4

Forster, M. [ms]: ‘The Evolution of Inference’.

11. *Cheap Talk* Skyrms discusses the evolution of cost-free communication in games in which the interests of the players diverge. Games discussed include the Prisoner's Dilemma, the Stag hunt and Divide the Cake.

- ★ Skyrms, B. [2003]: *The Stag Hunt and the Evolution of Social Structure*. Cambridge: Cambridge University Press. Ch. 5

Skyrms, B. [2003]: 'Signals, Evolution and the Explanatory Power of Transient Information', *Philosophy of Science* 69(3), pp. 407–428.

12. *Choosing Partners* Another investigation into the effects of interaction structure on various games. In sessions 8 and 9, this structure was assumed to be invariant over time. This assumption is now relaxed, allowing for players to choose who they will interact with on the basis of past experience. Strategy-choice, however, is now held fixed.

- ★ Skyrms, B. [2003]: *The Stag Hunt and the Evolution of Social Structure*. Cambridge: Cambridge University Press. Ch. 6

Skyrms, B. and R. Pemantle [2000]: 'A dynamic model of social network formation', *Proceedings of the National Academy of the USA* 97, pp. 9340–9346.

13. *Coevolution of Structure and Strategy* The grand finale. Skyrms discusses models that allow for change in both strategy and interaction-structure and makes a number of interesting observations.

- ★ Skyrms, B. [2003]: *The Stag Hunt and the Evolution of Social Structure*. Cambridge: Cambridge University Press. Ch. 7 & Postscript

McKenzie Alexander, J. [2007]: *The Structural Evolution of Morality*, Cambridge: Cambridge University Press. Ch. 4 'Trust', Section 4.5, and Ch. 5 'Fairness', Section 5.5.

14. *Wrapping up: models and simulations* We finish off with a general philosophical discussion of the practises of model-building and simulation in science, based on two recent articles on the topic.

- ★ Weirich, P. [2008]: 'The Explanatory Power of Models and Simulations: A Philosophical Exploration', *Simulation & Gaming*.
- ★ Weirich, P., & T. Grüne-Yanoff [2010]: 'The Philosophy and Epistemology of Simulation: A Review', *Simulation and Gaming* 41(1), pp. 20-50. (Optional)