Models and Simulations II – Signals

Winter 2014/15

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Classroom: Ludwigstr. 31, 021
Meeting Times: Tuesday 14:00 - 16:00 s.t.

Course Description

This course is an introduction to the use of agent-based computer models (ABMs) in value theory and philosophy of language. ABMs are used in value theory and the philosophy of language to address two central topics: (*i*) the emergence of norms and morality, and (*ii*) the emergence of "signaling systems" and language. The course is an introduction to these two topics.

In addition to discussing contemporary philosophical positions on these topics, students will construct and analyze the types of models and simulation techniques that are employed regularly in these debates. Specifically, students will learn how to program in NetLogo , a programming language and simulation environment designed for ABMs. No previous programming experience is required.

Course Goals

The course has three objectives. First, students will learn the types of questions that ABMs are used to address, how ABMs differ from models in classical economics and mathematical biology, and some of the difficulties one faces in interpreting and validating ABMs. Second, by the end of the course, students should able to explain the central philosophical questions that are currently being addressed with ABMs and to identify new questions that have not yet been considered. Finally, students will learn to implement an ABM in NetLogo that is designed to address one of those open questions.

Requirements

The central requirement is to design and implement an ABM within NetLogo for the purpose of answering some question about the evolution of norms, morality, or language. Students will write a final paper that describes the question the model is intended to answer and the results of that model obtained from computer simulations.

To prepare for the final project, there will be weekly programming assignments for the first half of the course. One cannot learn to program without practicing regularly. The weekly assignments are designed to help you practice the skills and employ the concepts taught in class.

Software

We will be using NetLogo, which can be downloaded at https://ccl.northwestern.edu/netlogo/.

Grading

Your final grade will be calculated by a weighted average using the following weights:

Final Paper/Project ($\sim$ 10 pages): 50%

Project Proposal ($\sim$ 3 pages): 20%

Weekly Programming Assignments: 30%

Online Registration

To access course materials and submit programming assignments, students must register for *Models and Simulations II* online at gregorywheeler.coursesites.com.

To register for the course, **email me to receive an invitation to join the course**.

Turning in Assignments

Beginning on **November 11th**, programming assignments are due at the beginning of each class. To submit an assignment, follow the procedure described in the document called "Instructions for Assignment Submission" on the course page at gregorywheeler.coursesites.com. Doing so will ensure that I can easily find your programs if they go missing, and more importantly, it ensures that I can evaluate your work and return it with feedback in a quick and orderly fashion.

References

[1] (Alexander, J 2007) *The Structural Evolution of Morality*. Cambridge University Press.

[2] (Bicchieri, C 2005) *The Grammar of Society*. Cambridge University Press.

[3] (Epstein, J M 2008) "Why Model?", *Journal of Artificial Societies and Social Simulation* 11(4): 12.

[4] (Gauthier, D 1967) "Morality and Advantage", *Philosophical Review* 76(4): 460-75.

[5] (Gauthier, D 1986) *Morals by Agreement*, Oxford University Press.

[6] (Humphreys, P 2007) *Extending Ourselves*, Oxford University Press.

[7] (Lewis, D 1969) *Convention*, Wiley-Blackwell.

[8] (Maynard Smith, J and Harper, D (2004) *Animal Signals*, Oxford University Press.

[9] (Muldoon et al. 2014) "Why are there descriptive norms? Because we looked for them", *Synthese*, in press.

[10] (Osborne, M 2003) *Introduction to Game Theory*, Oxford University Press.

[11] (Railsback and Grimm 2011) *Agent-based and Individual-based Modeling: A Practical Introduction*

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

[13] (Skyrms, B 2010) *Signals*, Oxford University Press.

Course Schedule

	Date	Topic	Readings & Assignments	Deadlines
1	07/10	Introduction to ABMS	Railsback and Grimm, Ch 1	
		NetLogo Interface	In Class Tutorial	
2	14/10	Decision & Game Theory	Osborne §2.0-§2.7	
		Manipulating Data Types	In Class Tutorial	
3	21/10	Contractarian Theories of Morality	Gauthier (1986), pp.1-16	
		If-then Statements & Loops	Assignment A1	
4	28/10	NO CLASS		
5	04/11	Bounded Rationality, Population Models, and ABMS	Skyrms (2003), Preface; Alexander Ch 1.	
		Procedures & Reporters	Assignment A2	A1 Due
6	11/11	NO CLASS		
7	18/11	Evolution of Cooperation	Alexander, Ch3	
		World Commands, Patches, Agents and Agentsets	Assignment A3	A2 Due
8	25/11	Evolution of Trust	Alexander, Ch4	
		More World Commands and Links	Assignment A4	A3 Due
9	02/12	Signaling Games	Lewis, pp. 1-16 , pp.24-58 & 122-35	
		Recursion and NetLogo Extensions	Assignment A5	A4 Due
10	09/12	Evolution of Signaling I	Skyrms *Signals* Ch1-2	
			Assignment A6	A5 Due
11	16/12	Evolution of Signaling II	Skyrms *Signals* Ch4-5; Skyrms *Stag Hunt* pp. 49-60; Millikan Ch1	
		Randomization and Debugging		A6 Due
12	23/12	Evolution of Signaling III	Skyrms *Signals* Ch7-8	
		Work on Proposal		
	03/01			Proposal Due
13	13/01	Norms	Bicchieri pp.1-42	
		Work on Project		
14	20/01	Evolution of Norms	Bicchieri Ch 6	
			Muldoon et al.	
15	27/01	Models	Epstein, Maynard Smith & Harper §1.1	
				Project Due