

Signaling
Carnegie Mellon University
Spring 2008

This course will focus on a few models of the evolution of very simple languages, known as signaling systems. In the first half of the course we will look at several evolutionary and learning models of, so-called, costless signaling. In addition to analyzing the plausibility of these as models for the evolution of proto-languages, we will consider the ways this model has been applied to some old philosophical problems (convention, natural kinds, and the descriptive/normative distinction). One handy feature of signaling games is that many different modeling strategies have been applied to them. This will give us an opportunity to see the variety of strategies used in this literature.

In the second half of the course we will turn to different models of the evolution of language which relax the pure common interest assumption of the previous models. Here we will look at the problem of “signal cost” and attempt to determine the extent to which this feature expands the set of explanations available for the evolution of simple languages. Costly signaling has been used by both biologists and economists and we will have a look at the similarities between these two approaches.

Week 1: Introduction to evolutionary game theory

No reading

Week 2: In the beginning, there was David Lewis

Required (83 pages):

Lewis Chapter 1 and 4 of *Convention* (46+37 pgs)

Additional reading:

Quine “Truth by convention” (29 pgs)

Crawford and Sobel “Strategic Information Transmission”

Week 3: Intro to Evolution and Experimental Evidence

Required (55 pages):

Skyrms *Signals* Chap 1 - 3 (39 double spaced pgs)

Maynard Smith and Harper *Animal Communication* Chapter 1 (15 pgs)

Nowicki and Searcy *The Evolution of Animal Communication* Chapter 1 (21 pgs)

Additional reading:

Blume et al. “Experimental evidence on the evolution of meaning” (15 big pgs)

Snowdon, “Language capacities of non-human animals” (28 pgs)

Week 4: Evolutionary Dynamics

Required (51 pages):

Skyrms Chap 4 & 5 (23 double spaced pages)

Huttegger “Evolution and the Explanation of Meaning” (18 pgs)

Huttegger, Smead, Skyrms, and Zollman “Evolutionary Dynamics of Lewis Signaling Games” (22 double spaced pgs)

Additional Reading:

Blume, Kim, and Sobel “Evolutionary Stability in Games of Communication” (24 pgs)

Warneryd, “Cheap Talk, Coordination and Evolutionary Stability” (13pgs)

Week 5: Learning

Required (53 pages):

Skyrms Chap 6 -8 (25 pgs)

Barrett “Numerical Simulations...” (20pgs)

Zollman and Barrett “The Role of Forgetting in the Evolution and Learning of Language” (~21 pgs)

Additional Reading:

Argento et al “Learning to Signal: Analysis of a Micro-Level Reinforcement Model”

Week 6: Primitve Content and the Shift to Human Language

Required (58 pages):

Millikan “On Reading Signs” in *Evolution of Communication Systems* (14 pgs)

Harms “Primitve Content” in *Evolution of Communication Systems* (17pgs)

Huttegger “Indicatives and Imperatives” (27 pgs)

Week 7: Signaling Games and Natural Kinds

Required (81 pages):

Skyrms Chapter 9 (16 double spaces pgs)

Goldman, *Fact, Fiction and Forecast* Chapter 4 (40 pgs)

Barrett “The Evolution of Coding in Signaling Games” (13 pgs)

Barrett “Dynamic Partitioning and the Conventionality of Kinds” (20 double spaced pgs)

Week 8: Signaling in games with partial common interest

Required (51 pages):

Skyrms, “Transient information” (20 pgs)

Zollman “Talking to neighbors” (15pgs)

Warneryd “Evolutionary Stability in Unanimity Games with Cheap Talk” (4 pgs)

Kim and Sobel “An Evolutionary Approach to Pre-Play Communication” (12 pgs)

Additional Reading:

Robson “Secret Handshake” (17pgs)

Week 9: Intro to costly signaling

Required (50 pages):

Zahavi “Mate Selection – A Selection for a Handicap” (9 pgs)

Hurd “Communication in Discrete Action-Response Games” (5 pgs)

Gibbons *Game Theory for Applied Economists* Chapter 4 to page 210 (37 pgs)

Additional Reading:

Spence “Job Market Signaling” (19 pgs)

Week 10: Relaxing pure coordination and signal cost

Required (50 pages):

Maynard Smith and Harper Chapter 2 (15 pgs)

Searcy and Nowicki *The Evolution of Animal Communication* Chapter 2 through pg 53 (30pgs)

Bergstrom and Lachmann “Signaling among relatives III” (5 pgs)

Additional Reading:

Bergstrom and Lachmann “Signaling among relatives I” (8 pgs)

Bergstrom and Lachmann “Signaling among relatives II” (14 pgs)

Week 11: Common Interest and Alarm Calls

Required (44 pages):

Searcy and Nowicki *The Evolution of Animal Communication* Remaining part of Chapter 2 (25 pgs)

Zahavi *The Handicap Principle* Chapter 1 (12 pgs)

Bergstrom and Lachman "Alarm Calls" (7 pgs)

Week 12: Partial overlapping interests

Required (87 pages):

Searcy and Nowicki *The Evolution of Animal Communication* Chapter 3 (58 pgs)

Kim "Status Signaling Games in Animal Contests" (10 pgs)

Hurd "Resource Holding Potential, subjective resource value, and game theoretic models of aggressive signaling" (19 pgs)

Week 13: Divergent interests

Required (85 pages):

Searcy and Nowicki *The Evolution of Animal Communication* Chapter 4 (66 pgs)

Hurd "Is Signaling of Fighting Ability Costlier for Weaker Individuals?" (5 pgs)

Hurd and Enquist "Conventional Signaling in aggressive interactions" (14 pgs)

Week 14: Networks

Required (>58 pages):

Searcy and Nowicki Chapter 5-6 (42 pages)

Skyrms Chapters 10-11 (?)

Skyrms and Huttegger "Emergence of Information Transfer by Inductive Learning" (16 pgs)