Newly certified models in the CoMSES model library and newly published models added to the model library.

... a node in the CoMSES Network

CoMSES Digest: Summer 2016

Volume 4, No. 2 March 16, 2015 – June 15, 2016

Greetings and welcome to the CoMSES Digest, Summer 2016 Edition!

OpenABM Activity

The top 5 model downloads include our first 4-way tie for first place: Four models we downloaded exactly the same number times. The number 5 slot was downloaded only one time less than this. The four co-leaders included two from last quarter's list (Schindler's Land Use model and Kim's model of worker protest) and two new models (one of them also by Schindler). The fifth model is also new to the list, giving a nice break to a few models that been repeatedly in the top spots and demonstrating that the modeling community continues to generate and use new models all the time.

In the same vein, the 18 models that were newly uploaded is a record number for a single quarter, and pushes the 12-month running total to its highest value yet: 47 models have been uploaded in the past year- nearly one per week. The topics include:

- Heterogeneity and Learning
- Forager Mobility and Cultural Diversity
- Effective Population Size and Cultural Evolution
- Using empirical survey data with ABMs
- Diffusion of Innovations
- Double-Auction Financial Markets
- Disease Transmission among Mobile Herds
- Irrigation Management
- Attitudinal Dynamics
- Agreement in Cooperative Teams
- Food Supply Chains
- Land Use Decision-Making
- Conflict Diamonds in Sierra Leone
- Time Management

- Reinforcement Learning
- Cooperative Strategies in Groups
- Product Diffusion

The eighteenth is a pedagogical tutorial model, a good reminder that the OpenABM library includes not only models archived for reproducibility and transparency, but as a teaching resource as well.

CoMSES Board Meeting

The CoMSES Executive Board met in May, welcoming the newly elected members (Moira Zellner and Forrest Stonedahl) and new staff members at ASU, Mady Tyson and Calvin Pritchard. They joined Board Members Mariam Kiran, Gary Polhill, and Bill Rand (missing Christophe LePage due to scheduling issues), as well as ASU members Michael Barton, Marco Janssen, and Allen Lee.

The Board were presented with an update on the current revisions to the CoMSES website; these are still in progres and will be announced soon. An additional update was provided on the outcomes- negative, unfortunately- of grant proposals to continue to maintain and expand the CoMSES network.

Marco Janssen presented an outline of the current status of the ongoing bibliometrics project. A full paper is planned on this soon. During the discussion, Board Members focused on using Marco's team's results for understanding how funding was distributed across fields that incorporate modeling, and on the issue of how code can be productively reused. This led to a rather spirited discussion on the broader issue of reuse: both the advantages of model reuse and the possible pitfalls if models are reused outside of the intent of the original author. There is a difficult collection of issues involved in this, including the oft-discussed ideal of making available model component libraries (presumably encouraging reuse) to the licensing issues involved in model software, and the possibility of automated detection of copied code using software ordinarily employed to detect plagiarism.

A Note on the Future of the CoMSES Digest

This collection of issues will for the initial basis for an expanded CoMSES Digest. Articles of a number of kinds- certified model extended descriptions, commentaries, reports from the field, etc.- are being collected for the Fall 2016 issue. Articles reflecting topics from the board meeting and others are in prep. You may be contacted for submissions; if you have an idea for something that would be of value to the CoMSES community, contact me at johntmurphy@uchicago.edu, or open a discussion on the OpenABM forums.

Best regards from warm and humid Chicago,
John T. Murphy,
CoMSES Digest Editor

Newly Published Models in the Model Library

Behavior Space Tutorial Model

Colin D. Wren

This is based off a previous Profiler tutorial model, but with an added tutorial on converting it into a model usable with BehaviorSpace, and creating a BehaviorSpace experiment.

Central-place Forager Mobility and Cultural Diverity

Luke Premo

The mobility of hunter-gatherers and cultural diversity has been studied based on the amount of diversity in cultural material and regional differentiation. This work presents a spatially explicit implementation of the central-place foraging model designed to address the research question: How does length of effective foraging radius affect the effective size of a metapopulation composed of central-place foraging groups? Mobility strategies that emphasize logistical mobility can inhibit intergroup interaction and therefore increase the effective population of a selectively neutral cultural trait within a subdivided population of forager groups. This finding has potential effects for cultural differentiation between groups.

Effective Population Size and Cultural Evoluiton

Luke Premo

This model investigates 1) to what extent the effective population size of a cultural trait departs from the cultural equivalent N under non-ideal conditions and 2) how the differences between Shennan's 2001 and Henrich's (2004) model assumptions influence the effect of demography on the rate of change in the mean skill level of a cultural trait. The model shows how natural selection and cultural selection affect the effective population size of a cultural trait, in many cases causing it to depart not only from census population size but also from the number of potential (and even actual) teachers in the population.

SimPLS - The PLS Agent

Iris Lorscheid, Sandra Schubring, Matthias Meyer, Christian Ringle

This model investigates 1) to what extent the effective population size of a cultural trait departs from the cultural equivalent N under non-ideal conditions and 2) how the differences between Shennan's 2001 and Henrich's (2004) model assumptions influence the effect of demography on the rate of change in the mean skill level of a cultural trait. The model shows how natural selection and cultural selection affect the effective population size of a cultural trait, in many cases causing it to depart not only from census population size but also from the number of potential (and even actual) teachers in the population.

Diffusion of Innovations on Social Networks

Hang Xiong

The diffusion of innovations can be affected by the interactions between individuals in a social group. Such peer effects can occur through different mechanisms. The basic mechanisms are classified as information effect (i.e., the transmission of information), experience effect (i.e., the sharing of experience), and externality effect (i.e., externalities). We model how these effects occur through different types of ties in social networks

An Agent Based Model for Implementing a Double Auction Financial Market

Annalisa Febretti

The model implements a double auction financial markets with two types of agents: rational and noise. Rational agents submit orders maximizing their expected utility while noise traders act randomly just caring of their budget constraints. Rational agents are endowed with a linear or a convex payoff. An agent with a linear payoff is a trader investing her own wealth, while an agent with a linear payoff is a portfolio manager investing on behalf of others. The model aims to study the impact of different compensation structure on the market stability and market quantities as prices, volumes, spreads. The convex payoffs increase prices, volatility and spreads while decrease volumes, letting the market to be less liquid.

Simulating the Transmission of Foot-And-Mouth Disease Among Mobile Herds in the Far North Region, Cameroon

Hyeyoung Kim, Ningchuan Xiao, Mark Moritz, Rebecca Garabed, Laura W. Pomeroy

The purpose of the model is to understand how host mobility affects disease transmission. More specifically, we examine the impact of seasonal movements and daily grazing activities of mobile pastoralists on the transmission of foot-and-mouth disease (FMD) in the Far North Region of Cameroon.

An Agent-based Model of Collective Self-Organisation in Irrigation Management

Hang Xiong, Jingjing Cai

This model simulates how collective self-organisation among individuals that manage irrigation resource collectively.Collective self-organisation is formed when the majority of the population (80% of the owners of the resource, in our case) participates the cooperation that aims at sustainable use of the irrigation resource. Whether an owner participates the cooperation depends on not only on his social economic characteristics, but also the proportion of his neighbors that have participated the cooperation. To investigate the influence of social structure, the social network in which owners interact is modeled as random network, small-world network and scale-free network separately.

Multi-level Model of Attitudinal Dynamics

Ingo Wolf

This model is based on theories of emotional cognition from cognitive science, theories of attitudes and persuasion from social psychology, and theories of social networks from sociology. Agents' beliefs and emotions about attitude objects are modeled as a parallel constraint satisfaction networks. In two case studies we showed, how the model can be used to address theoretical and practical research questions in the context of innovation diffusion and environmental psychology.

Simulation of Self-enforcing Agreement in Cooperative Teams

Hang Xiong

This study develops a simulation model to test two typical hypotheses in the theory of self-enforcing agreements. In cooperative teams (such as agricultural cooperatives), a self-enforcing agreement plays a critical role to guarantee members' work incentives when the monitoring from a third party is absent. In order to provide effective sanction to the violators so as to maintain the agreement, two seemly conflicting strategies are proposed. One is allowing the members to exit the team freely, while the other is imposing a high exit cost to restrict members from leaving the team. The views upholding each of the two strategies are elaborated in Lin (1993) and Dong and Dow (1993), respectively. We summarise the views as two hypotheses for a test using an agent-based model. The model incorporates factors that were not explicitly examined in previous discussions, such as the heterogeneity of households in terms of leisure preference and its distributions amongst team members.

A Simulation of Food Supply Chain

Hang Xiong, Jingjing Cai

We present an agent-based model that simulates the structural evolution in food supply chain. This model allows us to explore how to improve the food quality safety in China. We consider three types of agents, namely, producer, middleman and government in the food supply chain system. They correspond to farmer, wholesaler and food safety regulator in real world, respectively. We model two modes of supply chain management: spot market transaction and contract transaction.

FEARLUS-SPOMM

Gary Polhill, Nick Gotts, Alistair Law, Luis Izquierdo, Alessandro Gimona, Lee-Ann Sutherland, Dawn Parker

FEARLUS-SPOMM is a coupled agent-based model of land use decision-making and stochastic patch occupancy metacommunity model.

The Geography of Conflict Diamonds: The Case of Sierra Leone

Bianica Pires, Andrew Crooks

In the early 1990s, Sierra Leone entered into nearly 10 years of civil war. The ease of accessibility to the country's diamonds is said to have provided the funding needed to sustain the insurgency over the years. According to Le Billon, the spatial dispersion of a resource is a major defining feature of a war. Using geographic information systems to

create a realistic landscape and theory to ground agent behavior, an agent-based model is developed to explore Le Billon's claim. An ABM is integrated with geographic information systems (GIS) for this purpose. This is an exploratory model and was thus developed for researchers and students interested in agent-based modeling, specifically the role of geography in conflict.

Agent-based Simulation of Time Management

Hang Xiong

This agent-based model simulates how the strategy one manages time affect the well-being that he/she can obtain. Two strategies of time management are simulated: Urgency-first strategy and importance-first strategy. One adopts urgency-first strategy will allocate time to accomplishing urgent tasks first, whereas one adopts importance-first strategy will allocate time to accomplishing important tasks first.

Hedonic and Eudaimonic Well-being Based Reward for Intrinsic Motivated Reinforcement Learning Agents

Yue Gao, Shimon Edelman

How can an autonomous agent guide its actions with the goal of being happy and self-motivated? In this paper, we investigate the use of hedonic and eudaimonic well-being in the learning process of autonomous agents. We construct hedonic and eudaimonic well-being based reward features to guide the learning process and behavior of a intrinsic motivated reinforcement learning agent with only limited perception. Much like what occurs in human, the reward features evaluates its well-being associated with the interaction history of the agent in the environment. Our experiments in several foraging scenarios demonstrate that by optimizing the relative contributions of hedonia and eudaimonia as reward features, the resulting "happier" agents perform better than standard fitness-oriented agents. Our experiments show that well-being based features can provide a robust, general-purpose reward mechanisms for intrinsic motivated autonomous agents.

Walk Away in Groups

Athena Aktipis

The evolution of cooperation through partner choice mechanisms is often thought to involve relatively complex cognitive abilities. Using agent-based simulations I model a simple partner choice rule, the 'Walk Away' rule, where individuals stay in groups that provide higher returns (by virtue of having more cooperators), and 'Walk Away' from groups providing low returns. Implementing this conditional movement rule in a public goods game leads to a number of interesting findings: 1) cooperators have a selective advantage when thresholds are high, corresponding to low tolerance for defectors, 2) high thresholds lead to high initial rates of movement and low final rates of movement (after selection), and 3) as cooperation is selected, the population undergoes a spatial transition from high migration (and a many small and ephemeral groups) to low migration (and large and stable groups). These results suggest that the very simple 'Walk Away' rule of leaving

uncooperative groups can favor the evolution of cooperation, and that cooperation can evolve in populations in which individuals are able to move in response to local social conditions.

Product Diffusion Model in an Advance Selling Strategy

Peng Shao

This agent-based model extends traditional SIR diffusion models by adding a B. SIRB stands for Susceptible, Infected, Remove and Buy. Whereas infected agents may pass information about a product to their S neighbors, R agents impede the flow of information, and neighboring B agents can influence I agents to adopt or S to transform to an I. The proportions of different agents are tested.

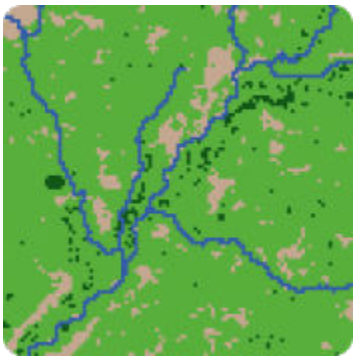
Most Downloaded Models in the Model Library

(March 15, 2015 – June 15, 2016)

1. (40 Downloads) A LandUse Model to Illustrate Ambiguity in Design ***by Julia Schindler***

2. (40 Downloads) A Computational Model of Workers Protest ***by Jae-Woo Kim***

3. (40 Downloads) A Simple Multi-Agent System of the Tragedy of the Commons (MASTOC-s) ***by Julia Schindler***



4. (40 Downloads) A Simple Behavioral Model Predicts the Emergence of Complex Animal Hierarchies ***by Takao Sasaki, Clint A Penick, Zachary Shaffer, Stephen C Pratt,*** **Jürgen Liebig**

5. (39 Downloads) A Multi-Agent Simulation Approach to Farmland Auction Markets **by James Nolan**

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