

List of Models in which Observed Patterns are Important

Supplemental material for Chapter 18 of *Agent-Based and Individual-Based Modeling, Second Edition*

This is a list of models for Exercise 1 of Chapter 18. The purpose of this exercise is to identify patterns that were used to structure and design agent-based (and sometimes other) models.

Please notify us of additional good models for this exercise! Many publications claim to use pattern-oriented modeling but few of them used patterns to *design* their model.

- A model of how people move and get trapped when trying to escape buildings in panic:
Helbing, D., I. Farkas, and T. Vicsek. 2000. Simulating dynamical features of escape panic. *Nature* 407:487-490.
- The many models of complex structures arising from individual traits in biological systems described in Part II of:
Camazine, S., J.-L. Deneubourg, N. R. Franks, J. Sneyd, G. Theraulaz, and E. Bonabeau. 2001. *Self-organization in biological systems*. Princeton University Press.
- A model of housing markets and what causes sudden drops in house prices:
Gilbert, Nigel, John C. Hawkesworth, and Paul A. Swinney. 2009. An agent-based model of the English housing market. *In: AAI Spring Symposium: Technosocial Predictive Analytics*, pp. 30-35.
- A model of land use change in rural China:
Magliocca, N. R. and Ellis, E. C. 2013. Using pattern-oriented modeling (POM) to cope with uncertainty in multi-scale agent-based models of land change. *Transactions in GIS* 17: 883–900. doi:10.1111/tgis.12012.
- A modular modelling framework for hypotheses testing in the simulation of urbanisation
Cottineau, C., Reuillon, R., Chapron, P., Rey-Coyrehourcq, S., & Pumain, D. 2015. A modular modelling framework for hypotheses testing in the simulation of urbanisation. *Systems*, 3(4), 348-377. doi:10.3390/systems3040348.
- A stock market model:
LeBaron, B. 2001. Empirical regularities from interacting long- and short-memory investors in an agent-based stock market. *IEEE Transactions on Evolutionary Computation* 5:442-455.

- Models of how rabies spreads in wild fox populations:

Jeltsch, F., M. S. Müller, V. Grimm, C. Wissel, and R. Brandl. 1997. Pattern formation triggered by rare events: lessons from the spread of rabies. *Proceedings of the Royal Society of London B* 264:495–503.

Thulke, H.-H., V. Grimm, M. S. Müller, C. Staubach, L. Tischendorf, C. Wissel, and F. Jeltsch. 1999. From pattern to practice: a scaling-down strategy for spatially explicit modelling illustrated by the spread and control of rabies. *Ecological Modelling* 117:179–202.
- A model of how species' geographical range size, shape, and location change over time:

Thiago Fernando L. V. B. Rangel, José Alexandre F. Diniz-Filho, and Robert K. Colwell. 2007. Species richness and evolutionary niche dynamics: a spatial pattern-oriented simulation experiment. *The American Naturalist* 170:602–616. doi:10.1086/521315.
- A model and field study of how vultures detect food by observing other vultures:

Cortés-Avizanda, A., R. Jovani, J. A. Donázar, and V. Grimm. 2014. Bird sky networks: how do avian scavengers use social information to find carrion? *Ecology* 95:1799–808. doi: 10.1890/13-0574.1.
- A model of how habitat affects survival of shorebirds:

Stillman, R. A., J. D. Goss-Custard, A. D. West, S. E. A. V. I. d. Durell, R. W. G. Caldow, S. McGrorty, and R. T. Clarke. 2000. Predicting mortality in novel environments: tests and sensitivity of a behaviour-based model. *Journal of Applied Ecology* 37:564–588.
- A model of how songbirds select feeding habitat and food sources:

Railsback, S. F., and M. D. Johnson. 2011. Pattern-oriented modeling of bird foraging and pest control in coffee farms. *Ecological Modelling* 222:3305–3319.
- A model of *in vitro* cell growth:

Stockholm, D., R. Benchaouir, J. Picot, P. Rameau, T. M. A. Neildez, G. Landini, C. Laplace-Builhé, and A. Paldi. 2007. The origin of phenotypic heterogeneity in a clonal cell population in vitro. *PLoS ONE* 2:e394. Available at: <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0000394>
- A model of the inflammatory system designed to understand Systemic Inflammatory Response Syndrome:

An, G. 2001. Agent-based computer simulation and SIRS: building a bridge between basic science and clinical trials. *Shock* 16:266–273.