

About learning NetLogo simulation programming

Learning simulation programming is complex, and can not be achieved within a 5 day course. It is not a technique where a fixed series of 'steps' can be given, since by its very nature it is open-ended. However we can ease your entry to the process of learning and providing some guidance on how to go about it and help when you get stuck (as everybody does).

There are several sources or 'layers' of difficulty, each with different 'solutions':

- Getting used to the syntax and interface of programming. It is necessary to simply keep playing around with models, and trying to model. It takes time to get sufficiently used to this that one can 'see past' this and it does not take all of one's attention. This is a matter of practice but do keep returning to the manual, looking up details in the "NetLogo Dictionary" and re-reading relevant sections in the "Programming Guide" as you do.
- Understanding what each bit of the language and interface does, beneath the surface. This is essential if you are to make progress. Test your understanding by trying things different ways. Look at examples of code and try to follow what is going on at each bit. Ask experts to explain to you what bits of code do and how. Add in extra lines into the netlogo code on the lines of: show (word "got to this bit and variable xyz is: " xyz) so that you can see when it gets to that bit and what the state of a variable is. There are always 'gotchas' – things that are completely non-obvious and maybe not explained – that can stop you for days in bewilderment. It is best by far to ask for help on this – there is a programmers' norm to do this (like that of bikers that stop to help each other at the roadside).
- Understanding "patterns" of programming – good ways of organising code to achieve given effects. This is hard and even experts can always learn new and better ways! Look at examples in published models. Try different variations to see what works best. Ask for suggestions on the Netlogo discussion group.
- Learning advanced algorithms. These are technical pieces of code designed to do something difficult, complex or well. They often take a long time to develop and get right. They might be to model an aspect of cognition (e.g. a kind of learning), a statistical calculation (e.g. calculating the cluster coefficient of a network) etc. You probably have to read a paper to understand these and follow the instructions carefully, asking for help from the authors, or else by looking at their code.
- Deciding what to try to put into a model. This is a high art and no one has much of a systematic idea of this, and indeed there is lots of argument about this. This is the science bit of modelling. Look at what others do in published papers, come to your own conclusions about how successful they have been, join the debate yourself!

Good luck!

If learning more about programming NetLogo might be a part of your research plan then I suggest you do the following, coming to the remaining 3 days of the course with problems and questions:

- Go through the “**Learning NetLogo**” section in the Netlogo User Manual.
- Look at how the code is structured in some models in the **File >> Models Library** menu when NetLogo is loaded (or <http://ccl.northwestern.edu/netlogo/models/community> for a wider set of more recent examples but these are not guaranteed to be good examples!)
- Try programming a *VERY* simple model of your own... use a structure for the code from one of the example models, constantly referring to the NetLogo User Manual “**NetLogo Dictionary**” for help.
- Keep re-reading relevant sections of the “**Programming Guide**” in the manual for new areas of NetLogo that might be helpful. Every now and then read a section you don’t already know about.
- **Ask for help when stuck** at the open-ended sessions on the course. Use these sessions for trying to make progress learning NetLogo whilst there is help around (UoM have organised some collective sessions for this, maybe Leeds and others could do the same).
- *Use the ISS facebook page to ask for help, make suggestions.*

Resources for learning Netlogo

An up-to-date list of resources for using and learning netlogo is maintained at the NetLogo site <http://ccl.northwestern.edu/netlogo/resources.shtml>. This mentions 4 books:

- [Agent-based and Individual-based Modeling: A Practical Introduction](#) (2011)
by Steven F. Railsback and Volker Grimm

“This is not just a book on NetLogo, but a book on scientific modeling that includes learning to use NetLogo software... It is intended for classes at upper-undergraduate or higher levels, and for self-instruction by students and scientists.”

- [Artificial Intelligence—Agents and Environments](#) (2010)
by William John Teahan

Free online book at <http://bookboon.com/us/textbooks/it/artificial-intelligence-agents-and-environments>. “Topics include agents, environments, agent movement, and agent embodiment. It also provides an introduction to programming in NetLogo.” With two books of exercises and dozens of models.

- [Fundamentals of Multiagent Systems with NetLogo Examples](#) (2009)
by José M. Vidal

Free online textbook at <http://www.scribd.com/doc/2094479/Fundamentals-of-Multiagent-Systems> “for a graduate or advanced undergraduate audience... the reader is assumed to be familiar with basic Artificial Intelligence techniques.”

- [Simulation for the Social Scientist](#) (2005)
by Nigel Gilbert and Klaus G. Troitzsch

Covers NetLogo in addition to other tools, check you have the 2005 2nd edition