

Introduction

Getting to grips with describing variables, and understanding the relationships between them, is a key area for all science concepts. This innovative modelling programme allows teachers and pupils to illustrate these relationships with an easy-to-build interactive model. Even the most nervous ICT model builder can be designing and running interactive relationships within minutes. Unlike many commercially available packages, this resource is not specific to a particular concept.

The *Modelling* programme requires a special piece of software (Java runtime) to work on your computer. Clear instructions on how to install this and begin *Modelling* are given below. The on-line HELP menu provides step-by-step instructions for each task, for building models and running them. The HELP menu also provides access to a few activities to get you started, with teachers' and pupils' guides and teachers' tips. The diagrams and screen pages are clear and fully annotated.

The simplicity of the *Modelling* programme, and the fact that it can be adapted to illustrate any concept, makes it a very powerful teaching tool. The learning focus for pupils is identifying the key variables, and how they relate to each other. This is an excellent example of ICT as a tool for developing scientific thinking. The programme includes three levels of complexity, which allow pupils to develop more sophisticated models as their understanding of concepts grows. Before you begin using *Modelling* with your pupils, it is worth spending time getting to know the features of the programme.

1. Read *Getting started with VnR* below to install the *Modelling* programme on your machine.
2. When you have launched the programme on your machine, there is an on-line Help menu to guide you through the features. You should also refer to the diagram sheets below, *Teacher's view of nearly everything*, *Building your first model* and *Running your first model*.
3. On some computer systems the on-line Help menu is not accessible. If this is the case for you, all the more detailed help is also available by browsing the CD ROM. Open the 'syncd' folder and then open 'modelling'. In here you will find a folder called 'VnR'. Open this folder. As well as the file 'VnR' which you click on to launch the programme, you will also see four more folders:
 - 'overview' – click on the 'index' file in here to get a quick idea of what VnR is all about, see a quick tour and access the teachers' guide.
 - 'help' – this has tutorials for both 'building' and 'running' models. Click on the 'index' files in either of these to begin the tutorial.
 - 'models' – access the ready-made models from here, or do it direct from the programme by using the 'Open' option.
 - 'activities' – access several activities using some of the models, with pre-prepared teacher and pupil guides which are also accessible from the Help menu within the programme.

The easiest way to get started with a class is to build and run a simple model. For example, pupils could be asked to model the relationship between the amount of time a person spends at work and their income. Further variables can then be added, such as time spent on holiday. Using everyday examples such as these, where pupils have a clear idea of the relationships, is one way of introducing the model building process. It also helps clarify the language of models, for example, variables and relationships. There are also several ready-made models and activities available as part of the package, which you could use with pupils at appropriate points in your curriculum.

[The ready-made models to choose from are:

aliens.vnr
balancing arguments.vnr
balancing levers.vnr
balancing many arguments.vnr
bandwidth.vnr
falling.vnr
heater_cooler.vnr
infections1.vnr
infections2.vnr
modelling tubes.vnr
orbits.vnr
populations.vnr
transport equation.vnr]



Getting started with VnR

Starting out

The Modelling package has to be accessed directly from folders on the CD ROM. If you are unsure how to find folders on your computer you will need assistance.

You need

- A modern browser (e.g. Internet Explorer, Netscape) to read the help files within the Modelling programme. If you cannot access the help files from here, browse the sycd folder, open the modelling then VnR folders, and double click Start Here.
- Java runtime software. To install this:
 - **Windows**
Install Java runtime edition 1.3.1 on your computer by double clicking on **j2re-1_3_1_02-win.exe**.
This can be found in the modelling folder within the sycd folder on this CD ROM.
 - **MacOS**
None is necessary for MacOSX.
For Mac OS9 and below the version of Java required is not available.
 - **Other operating systems**
Visit **www.sun.com/** to see if the appropriate version of Java is available for your platform of choice.
Download it and install onto your machine.

All systems

- 1 Copy the Modelling folder onto hard disks of individual machines as required.
- 2 Install Java runtime software as above. Locate the file **vnR.jar** inside the folder VnR.
- 3 Double click on this file to launch the programme.

Since the software is in development your feedback would be appreciated – particularly any ‘Lesson stories’.

1 Issues

Things that the modelling tool does not do, perhaps confounding your expectations, or that you would like it to do.

For these please attach a model to the e-mail and use the body of the email to explain how the model fails to fulfil your expectations. No reply is guaranteed, but everything will be read.

Please e-mail these to

I.Lawrence@bham.ac.uk
with ‘VnR issue’ in the subject line.



Known (major) issues at present include:

- 1 cursors scale to 16 by 16 under MacOSX. Not pretty!
- 2 calculated values can sometimes become locked at zero. Stop/ pause, and then drag the variable, can unlock them
- 3 switch values need adjusting
- 4 the integration engine produces runaway solutions if the rates of change are large
- 5 some menu and button items are not implemented yet (greyed out).

2 Lesson stories

Ways of sharing good practice

This is a new tool, and people will think of many ways to use it.

Please attach a model to the e-mail, as a partial illustration of the purposes that the tool has served. Please then complete the story in the body of the e-mail, using the following pattern to make the story as useful to others as possible.

- 1 name of model file
- 2 topic
- 3 year group
- 4 outline of lesson
- 5 sketch of how the model contributed to the lesson
- 6 your name and position.

It is likely that some of these will be useful to others, to help them see possibilities. Please say whether you are willing to have this contribution made available to others on the web, appropriately credited.

Please e-mail these to

I.Lawrence@bham.ac.uk
with ‘VnR lesson’ in the subject line.



Teacher's view of nearly everything

Build

use this pair to switch between running and building

choose select tool then:

drag to move

click on any piece of text in the model to change it

right click (Windows) or control click (MacOS) to set how the contributions combine

right click (Windows) or control click (MacOS) to put a relationship to sleep

drag to set value

choose, then click on workspace to place variables that

are positive only

can have any value

choose, then click on output, followed by input, to link a pair of variables by a relationship that is

a rate (accumulates)

a value (sets level)

an 'on above' switch

an 'on below' switch

choose, then click to delete

Run

use this pair to switch between running and building

click to play the model

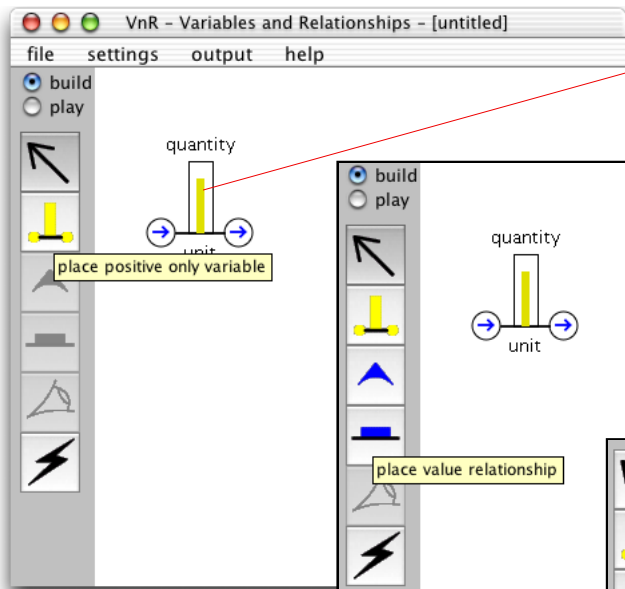
click to stop the model

drag to set value

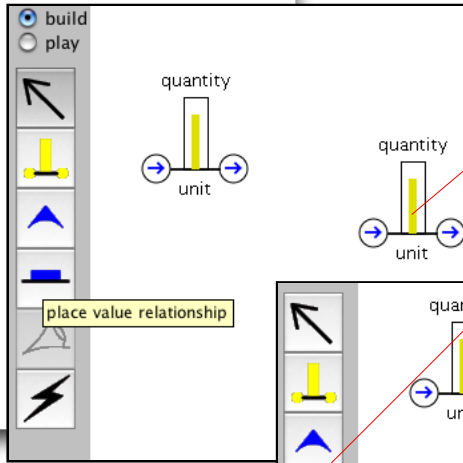
right click (Windows) or control click (MacOS) to set how the contributions combine

right click (Windows) or control click (MacOS) to put a relationship to sleep

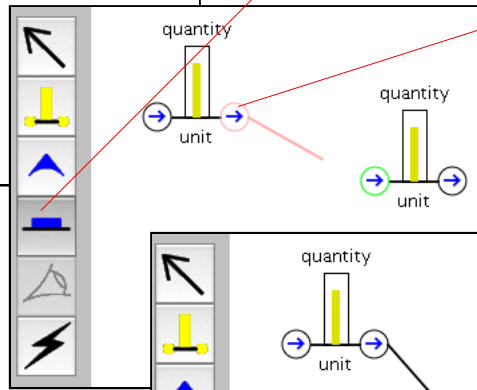
Building your first model



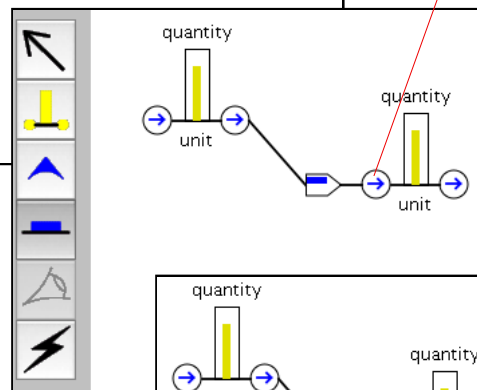
Click once to place a variable



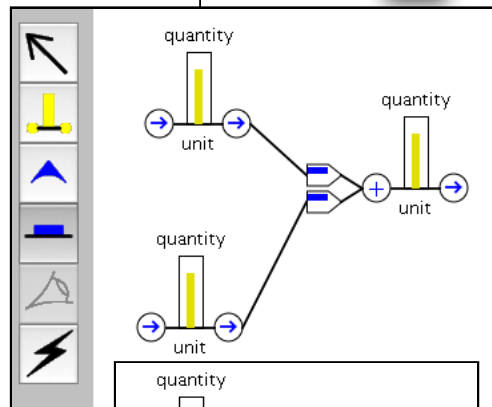
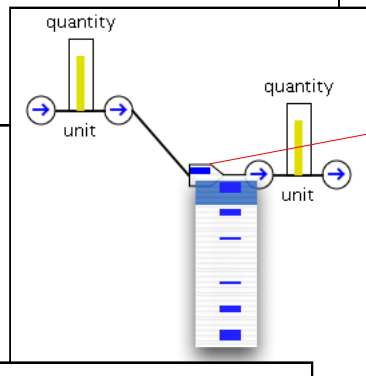
Click again to place another variable



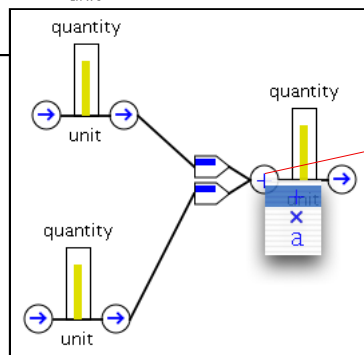
Click to start the link



Right click (Windows) or control click (MacOS) to set the strength and sense of the relationship

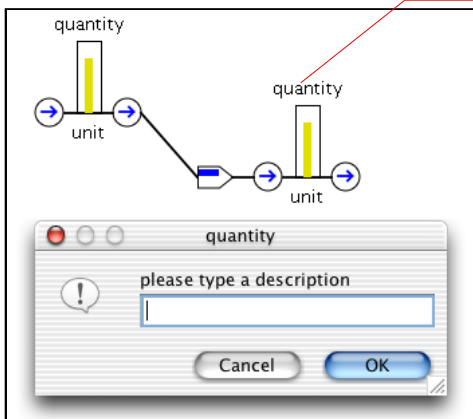


Repeat the steps above to place another variable and link it with the same kind of relationship



Right click (Windows) or control click (MacOS) to set how the contributions combine

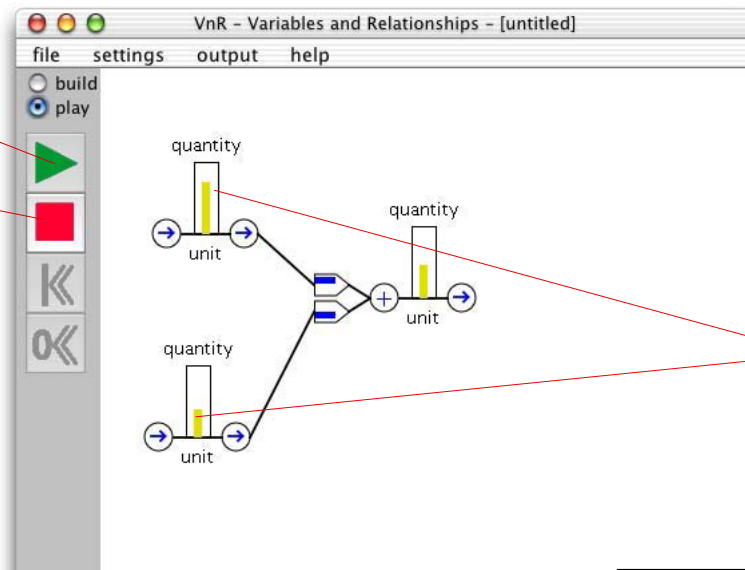
Optional: click on any piece of text in the model to change it



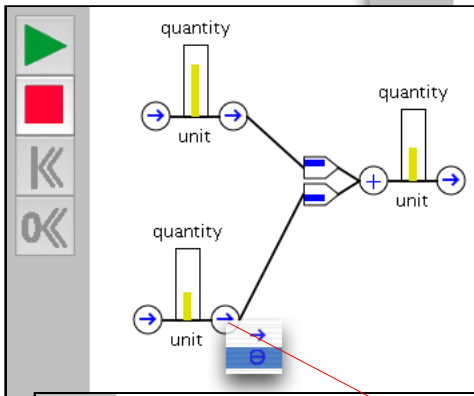
Running your first model

Click to run the model

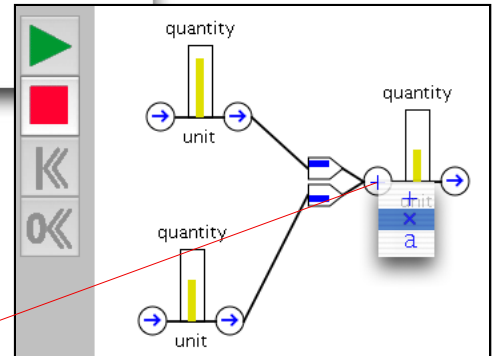
Click to stop the model



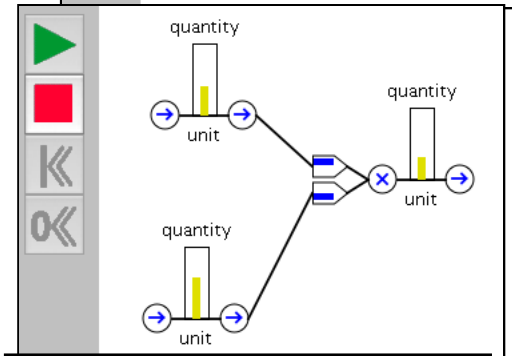
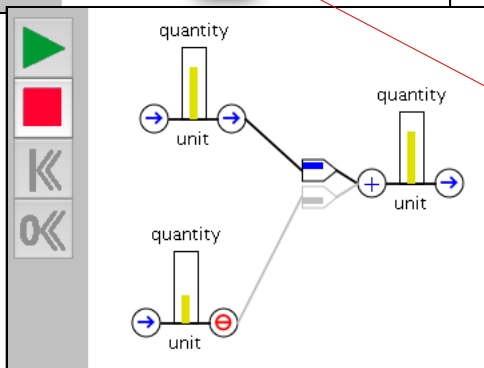
Drag either to set the values



Right click (Windows) or control click (MacOS) to put a relationship to sleep



Right click (Windows) or control click (MacOS) to set how the contributions combine



Right click (Windows) or control click (MacOS) to set the strength and sense of the relationship

