IRTPRO™

Contents

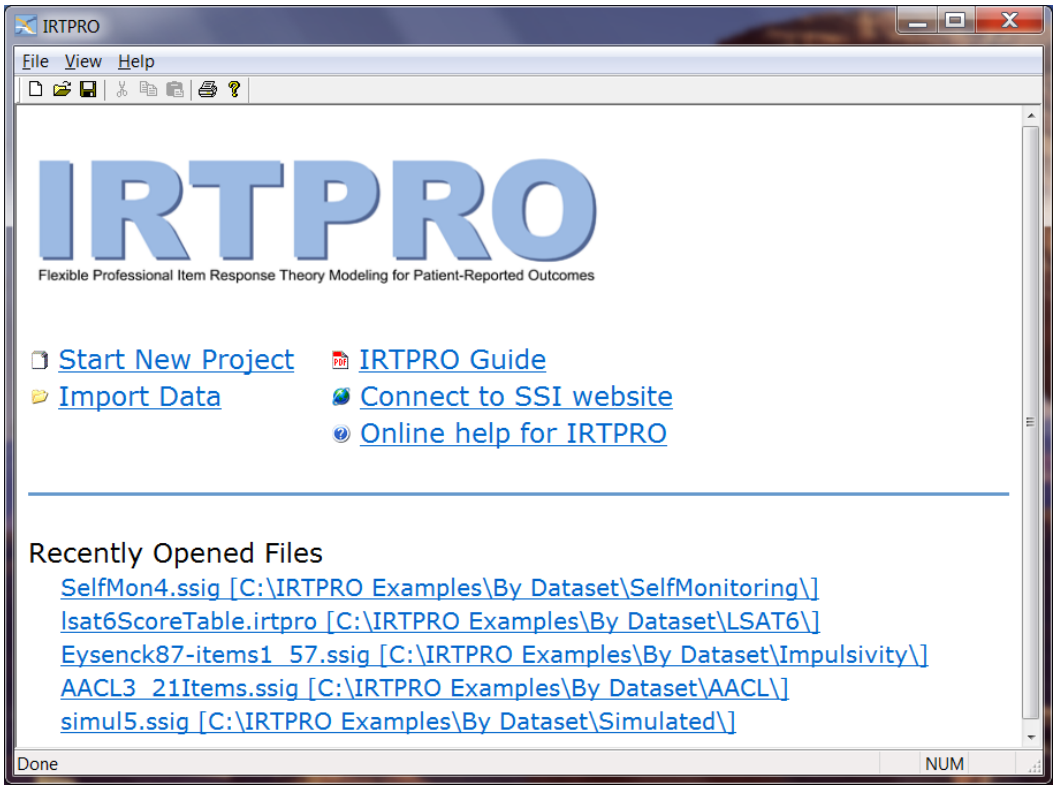
1. Graphical users interface

1.1 Introduction

In this document the main features of the IRTPRO graphical users interface (GUI) are

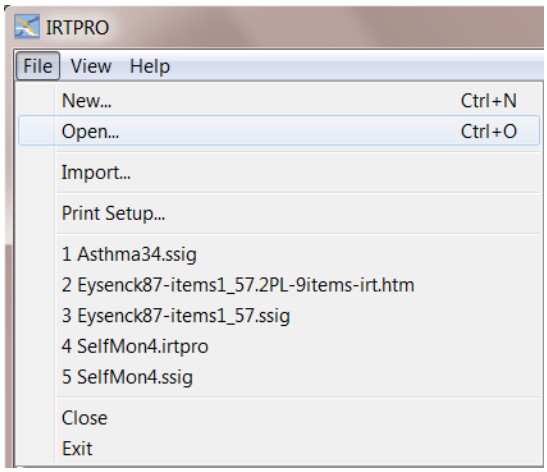
summarized.

When IRTPRO is launched (typically by clicking on the IRTPRO icon on the computer desktop), a page is opened containing clickable links to recently used files, the **Import Data** menu, online help documentation and to gain access to the SSI website. At this stage, the main menu bar displays the **File**, **View** and **Help** options.

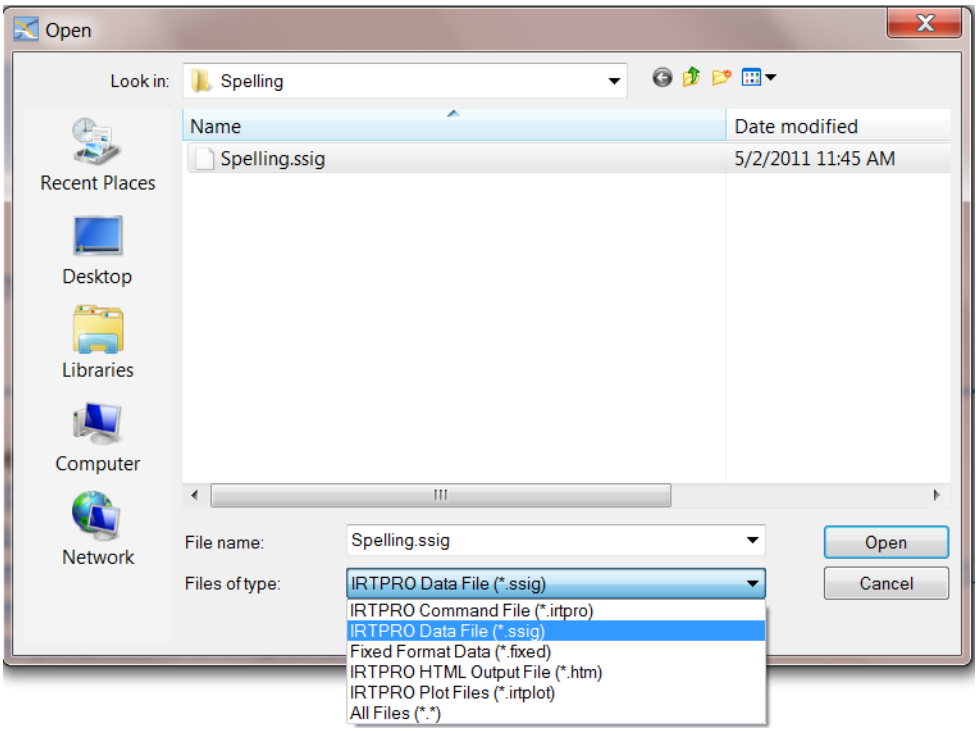


1.2 Opening an IRTPRO data (ssig) file

By clicking the **File** button, the drop-down menu shown below is activated.



By selecting the **Open** option, a standard **Open** dialog box is displayed.



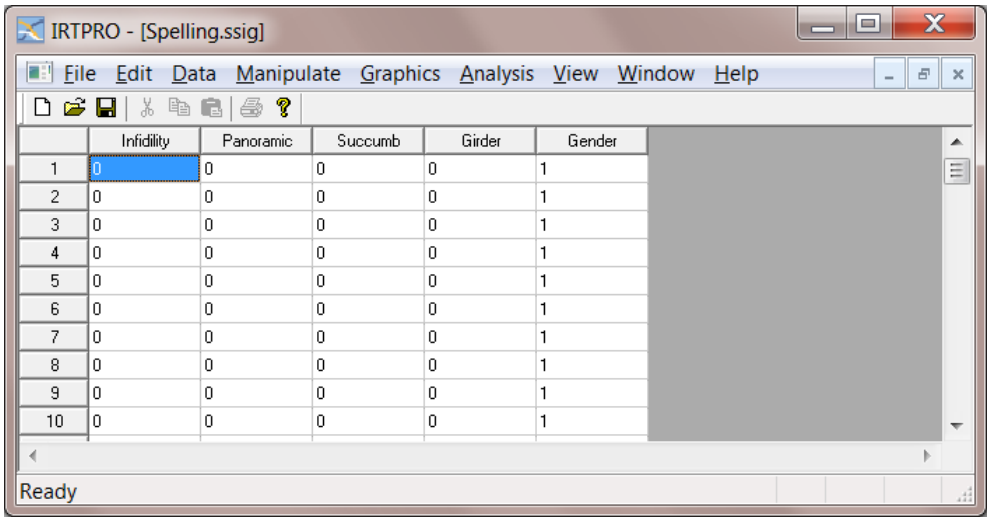
There are five main file types that IRTPRO can open, these being:

- An IRTPRO command (syntax) file with extension .**irtpro**
- An IRTPRO data file with extension .**ssig**
- Fixed format data with extension .**fixed**
- An IRTPRO HTML output file with extension .**htm**
- An IRTPRO plot file with extension .**irtplot**

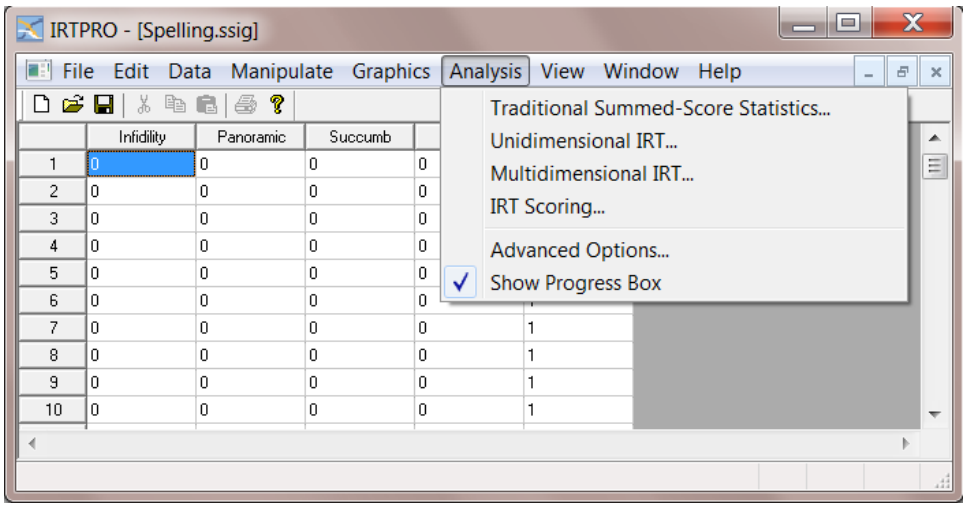
A file with extension .**ssig** refers to an IRTPRO data file and is typically created by importing data from a statistical software package such as SPSS or SAS or a spreadsheet program such as Excel.

1.3 Spreadsheet main menu bar

IRTPRO data files are displayed in spreadsheet form.



Once a file of type .**ssig** is opened, the main menu bar displays several options. For example, by clicking the **Analysis** button the drop-down menu shown below is obtained.



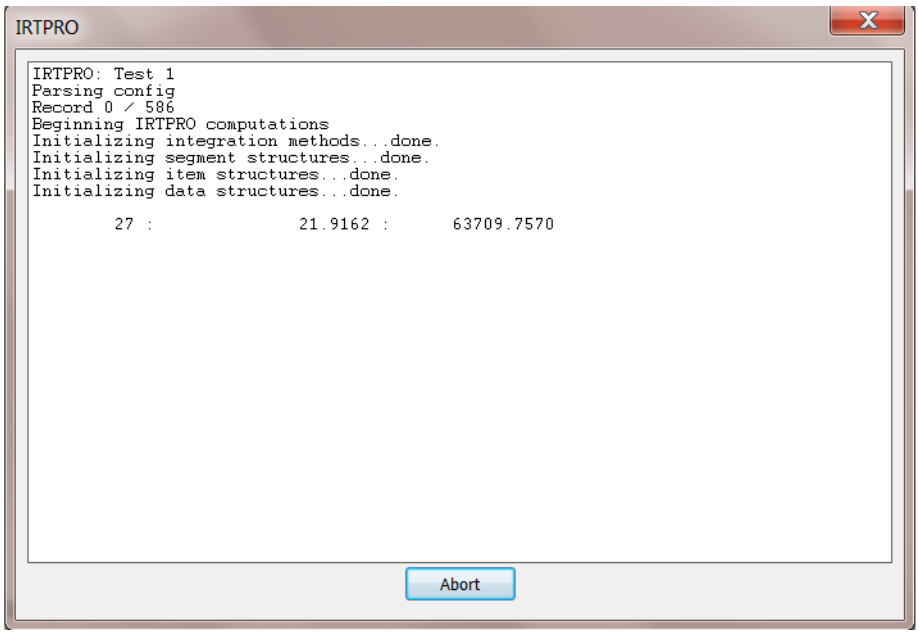
There are four main types of analyses, namely:

- Traditional summed-score statistics
- Unidimensional IRT

- Multidimensional IRT
- IRT scoring
- IRT simulation

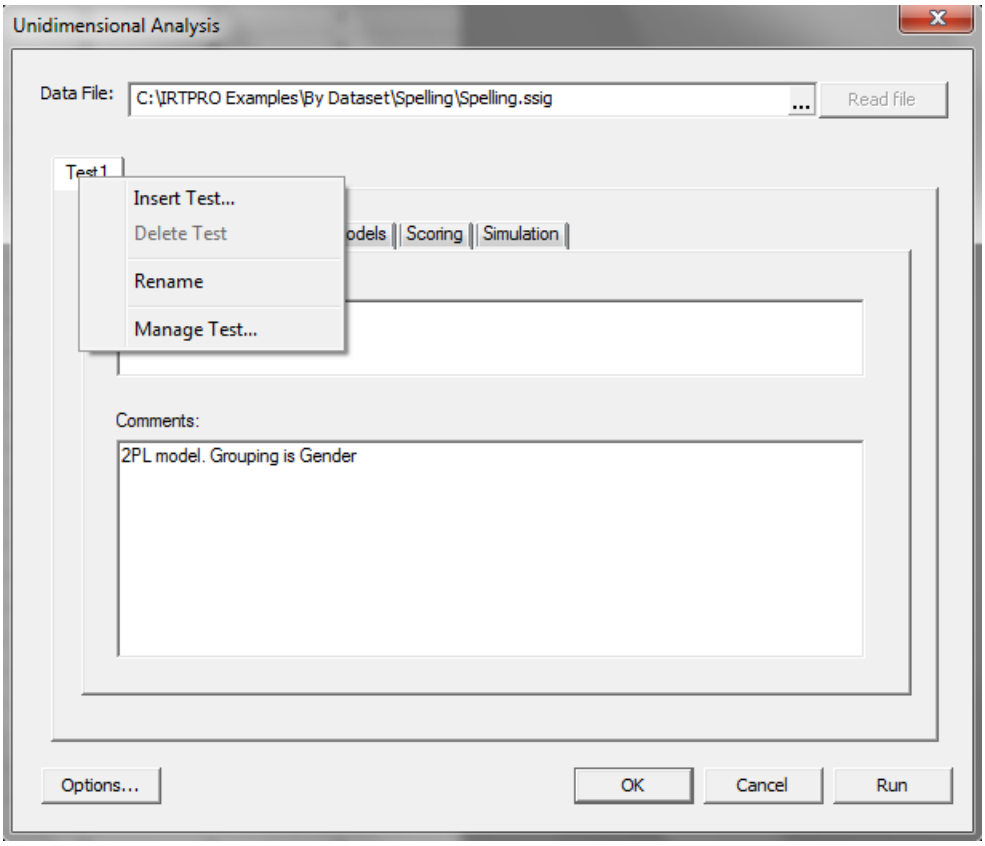
There are two additional items on the **Analysis** list, these being **Advanced Options…** (see Section 1.9) and **Show Progress Box**. By selecting the **Show Progress Box** option (the default), various results of the analysis are displayed, enabling the user to visually determine if the analysis is still running and what progress has been made.

The image below is a screen shot of the progress box for an analysis that is partially completed.



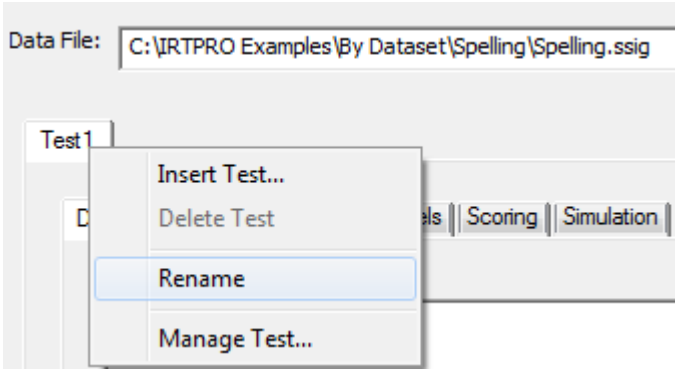
1.4 Test Tabs

Regardless of the type of analysis specified, several tests (analyses) may be created using the same IRTPRO dataset. To insert a new test, right-click on the right-hand side of a current test to insert a new test tab.

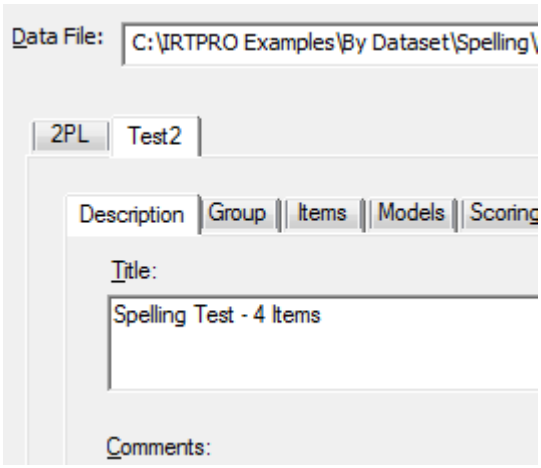


By right-clicking on a test tab, the test may be renamed or deleted. The sequence of steps to rename the first test tab to 2PL is shown below.

Select the **Rename** option



Enter 2PL

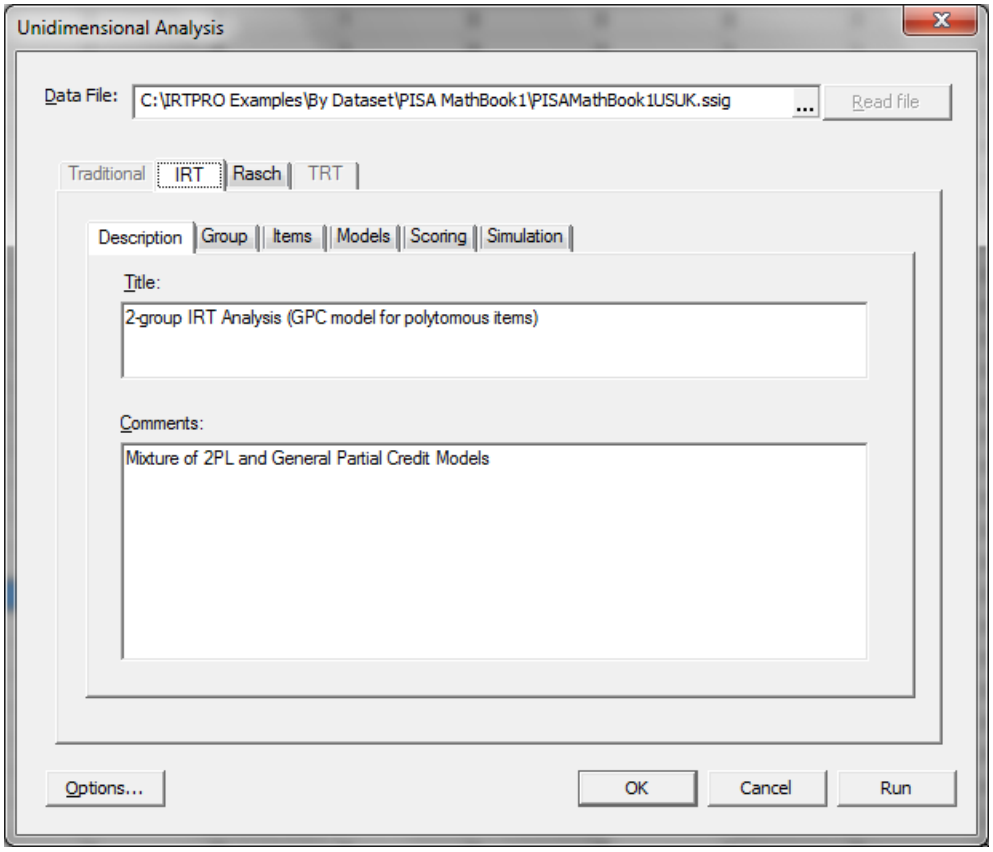


1.5 The Description, Group and Items tabs

When a traditional statistics, unidimensional, or multidimensional analysis is requested via the **Analysis** option, the first three tabs displayed in the corresponding analysis window are

Description, **Group** and **Items**. Each of the **Description**, **Group** and **Items** dialogs will be briefly discussed in Sections 1.5.1 to 1.5.3.

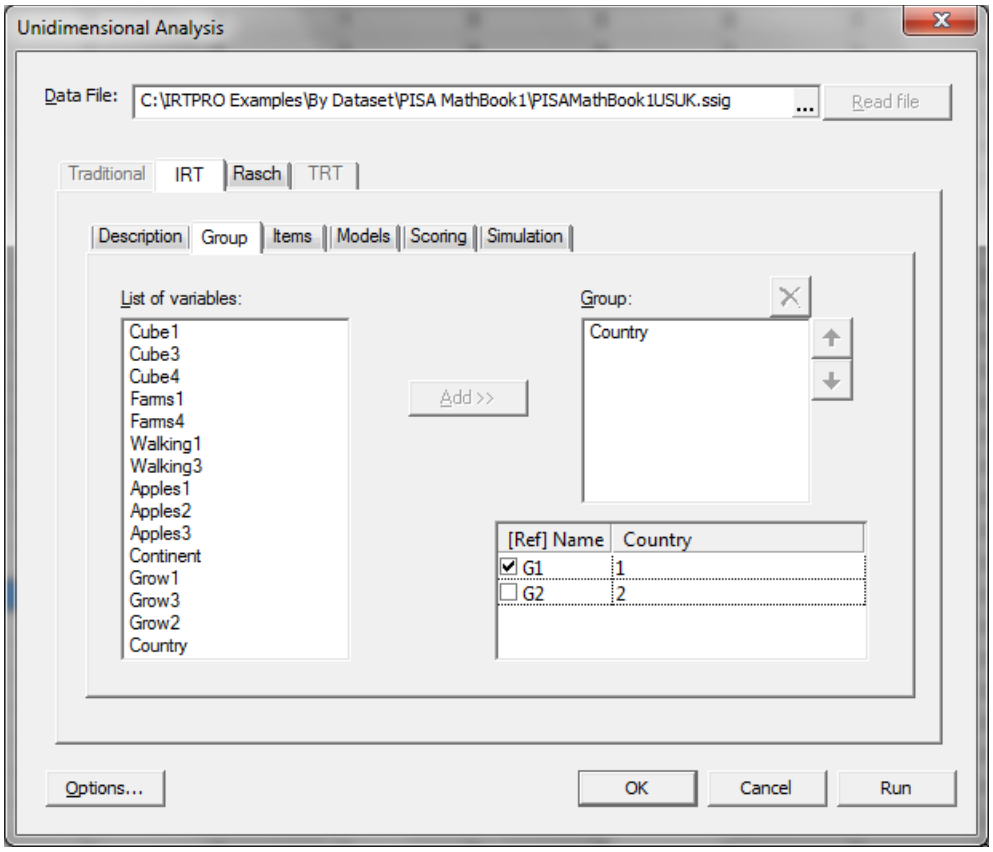
1.5.1 The Description tab



The **Description** tab has two text boxes that are used to enter a title (description) and optional comments for each test tab. Shown above is the **Description** tab for a **Unidimensional Analysis** based on the test named **IRT**.

1.5.2 The Group tab

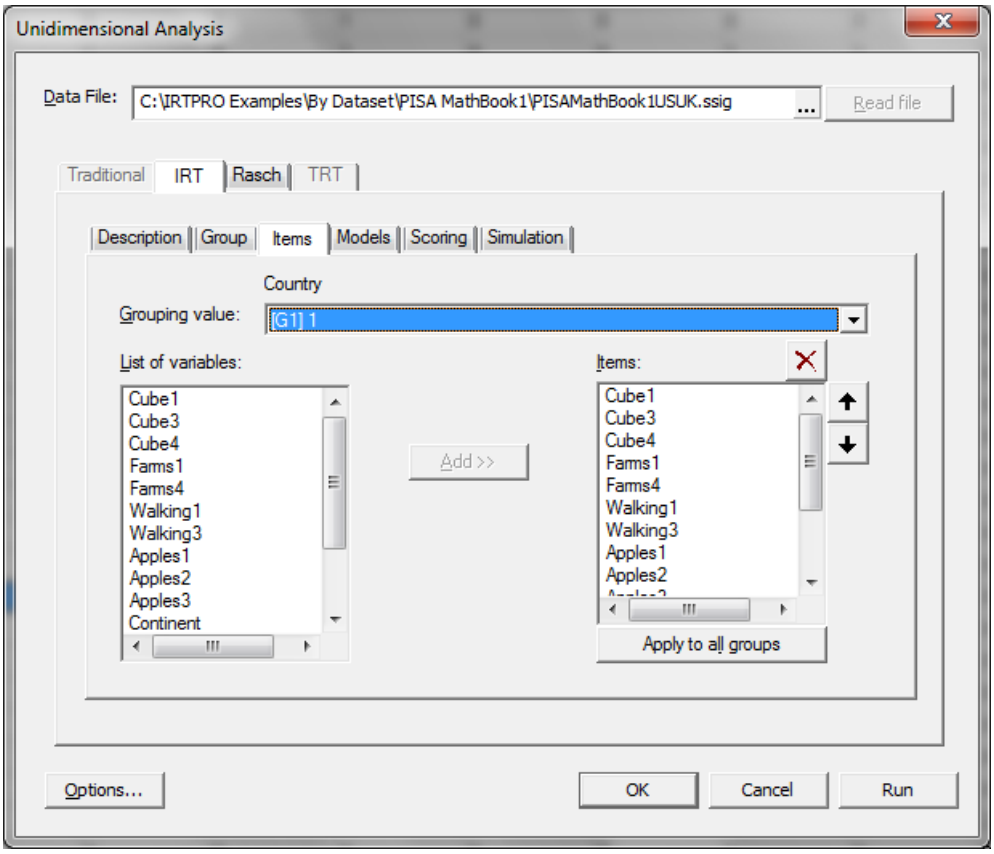
The **Group** tab allows one to select one or more grouping variable(s) from the **List of Variables:** text box. In the dialog shown below, the variable Country was selected as the grouping variable. By default, the first group is selected as the reference group. However, the **Group** dialog box allows the user to select any other group as the reference.



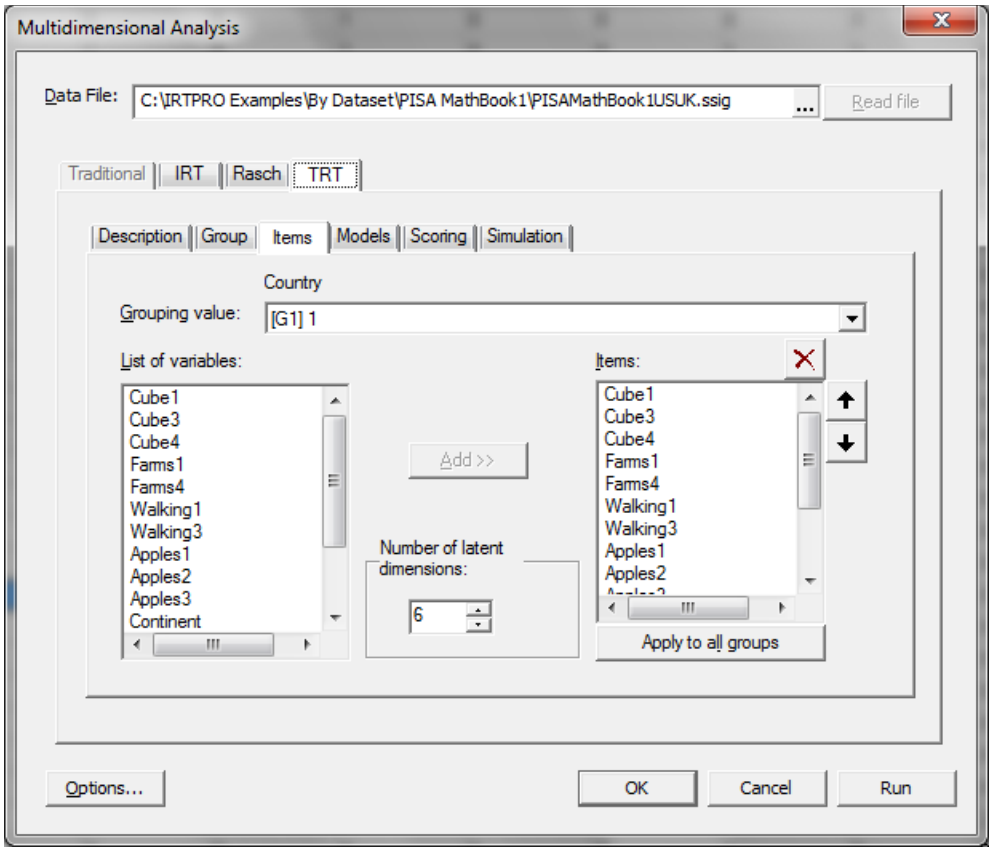
1.5.3 The Items tab

The **Items** tab dialog box for a traditional statistics or unidimensional IRT analysis is shown below. Items can be selected for each group from the **List of variables:** column and adding it to the **Items:** column.

In most practical applications, a multiple group analysis is based on the selection of the same set of items for each group. If this situation applies, the user selects the items from the **List of variables:** for the first group and then clicks on the **Apply to all groups** button to make the same selection for all groups.



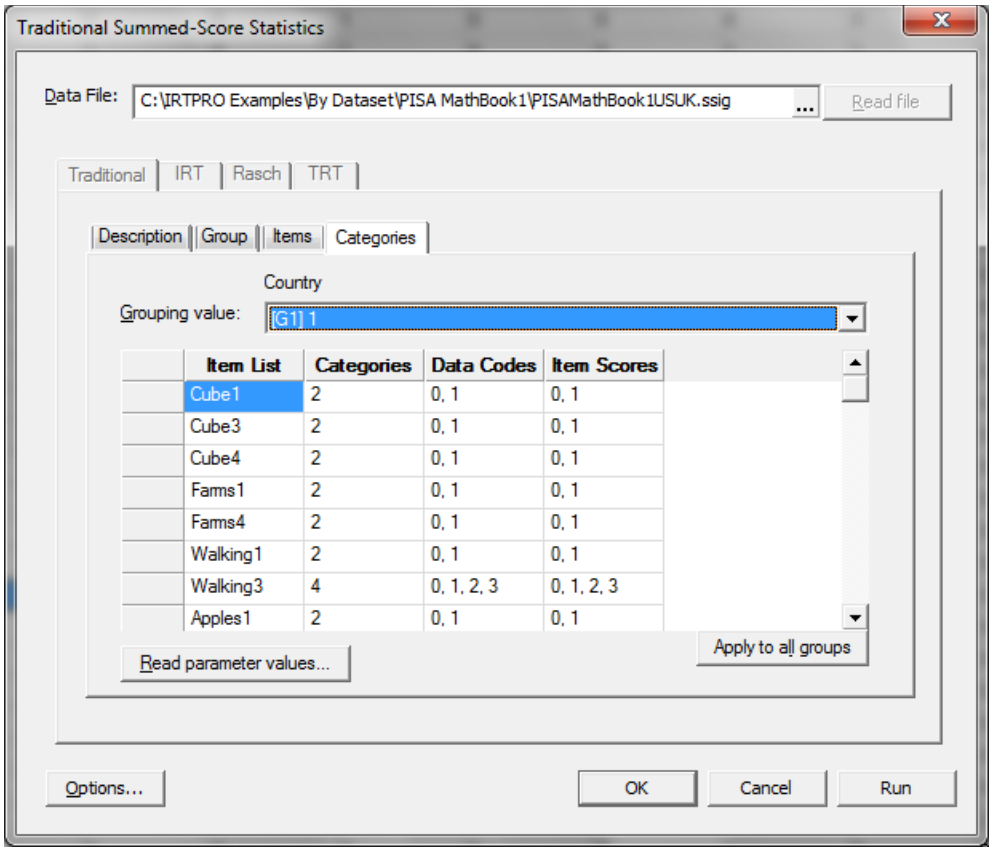
The **Items** tab dialog for a multidimensional IRT analysis is shown below.



The only difference between this dialog and the corresponding one for a traditional statistics or unidimensional IRT analysis is the presence of the text box **Number of latent dimensions:**. Note that the number of latent dimensions must be specified by the user.

1.6 The Categories tab

When a traditional summed-score statistics analysis is requested via the **Analysis** option, the fourth (and last) tab displayed in the corresponding analysis window, is the **Categories** tab. The dialog associated with the selection of this tab displays the default item scores associated with each of the selected items. A user may change these scoring values by selecting a cell and then right-clicking on the selected cell to display the **Recode Item Scores…** option as demonstrated in Section 1.7.1.



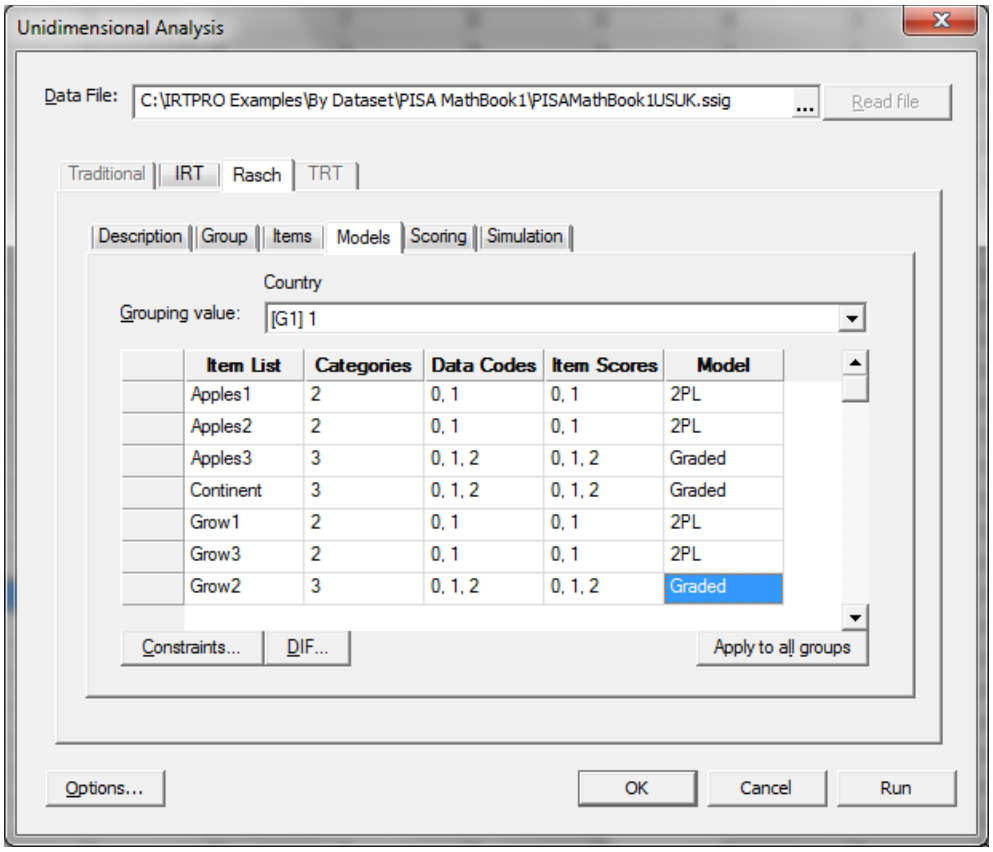
1.7 The Models tab

When a unidimensional IRT or multidimensional IRT analysis is requested via the **Analysis** option, the fourth tab displayed in the corresponding analysis window is the **Models tab**. The dialog associated with selection of this tab displays the default models associated with the items and allow a user to change the model type and scoring values of the items.

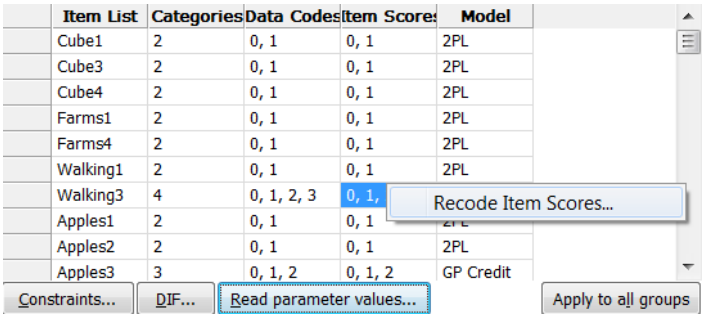
The dialogs for unidimensional and multidimensional IRT differ somewhat in functionality. These differences will be briefly discussed in Sections 1.7.1 and 1.7.2.

1.7.1 The Models tab, Unidimensional IRT Analysis

The **Models** dialog displays, for each group, five columns of information, namely an item list, the number of categories (distinct values) for each item, the data codes (values) extracted from the IRTPRO dataset, the item scores (coded as 0, 1, 2,… where 0 corresponds to the smallest data code value, etc.), and the model selected. For an item with two categories, the default model is the 2PL model and for an item with more than two categories, the default is the Graded model.

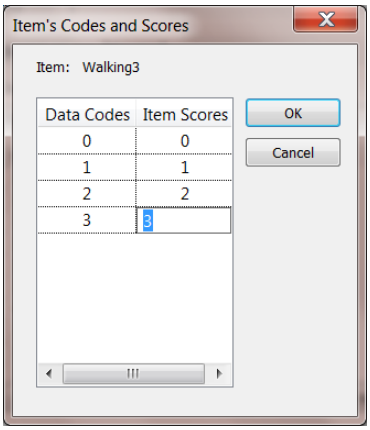


Item scores can be user-recoded. To do so, select a cell listing the scores to be changed. By right-clicking on the selected cell, the **Recode Item Scores…** option is displayed.

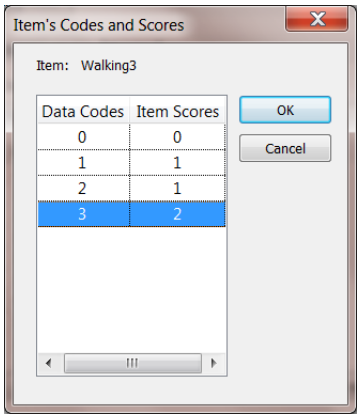


Selection of this option opens, for each of the groups, an **Item's Codes and Scores** dialog. By double-clicking on an **Item Score:** cell, the relevant cell may be edited and a new value entered. The screenshots below show the recoding of the scores for the item Walking3 from (0, 1, 2, 3) to (0, 1, 1, 2).

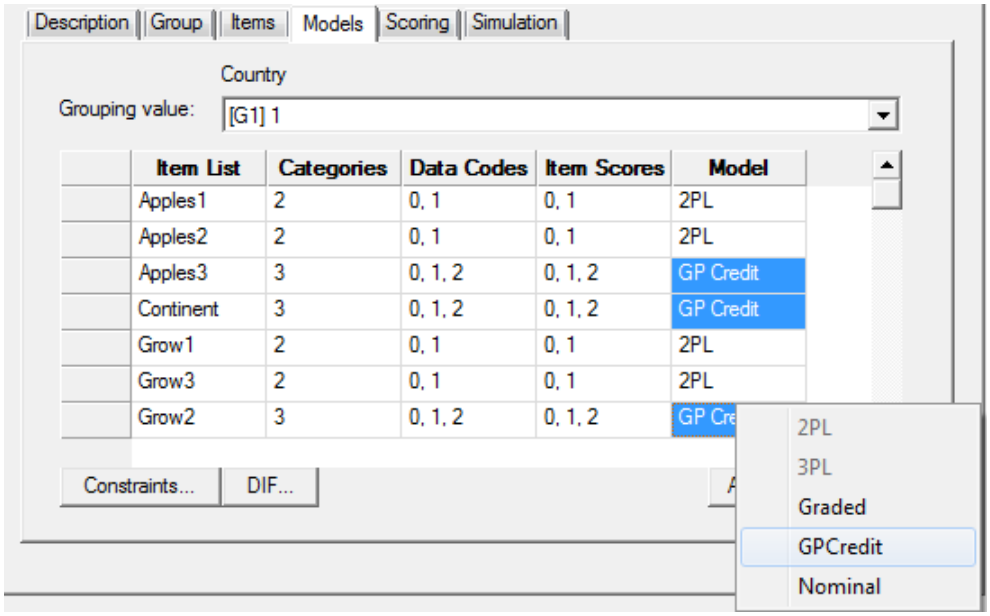
Double-click on row



Edit number and click **OK**



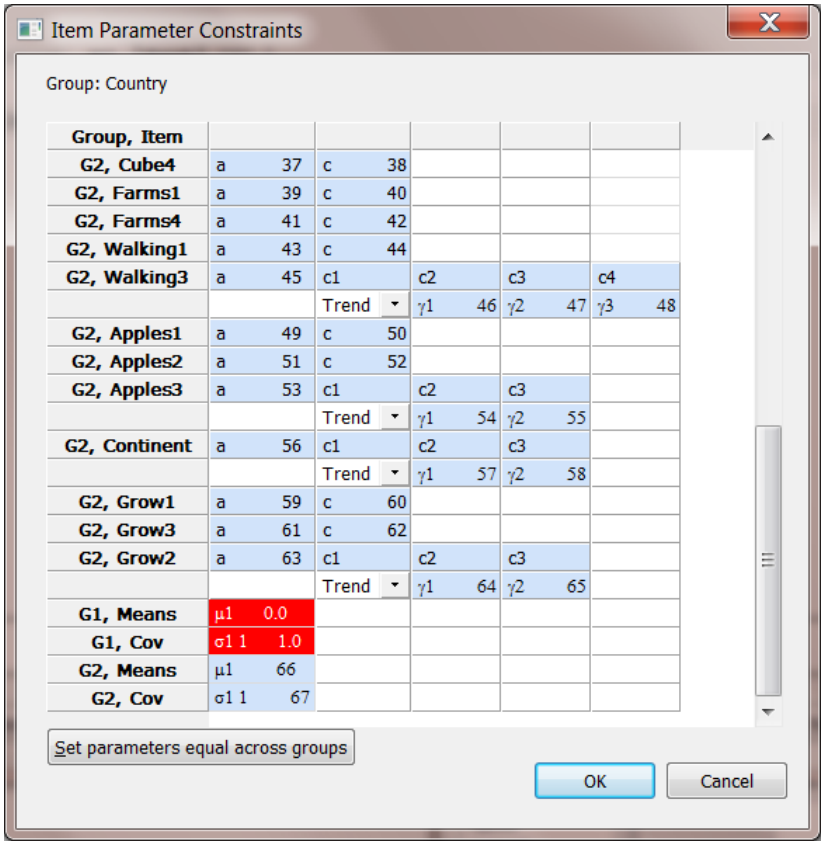
The user may also change the default model type. This is accomplished by selecting cell(s) that display a similar model type that needs to be changed. Right-click on any of the selected cells to display a drop-down list of available models and make a selection. See Section **Error! Reference source not found.** for an example that illustrates this function.



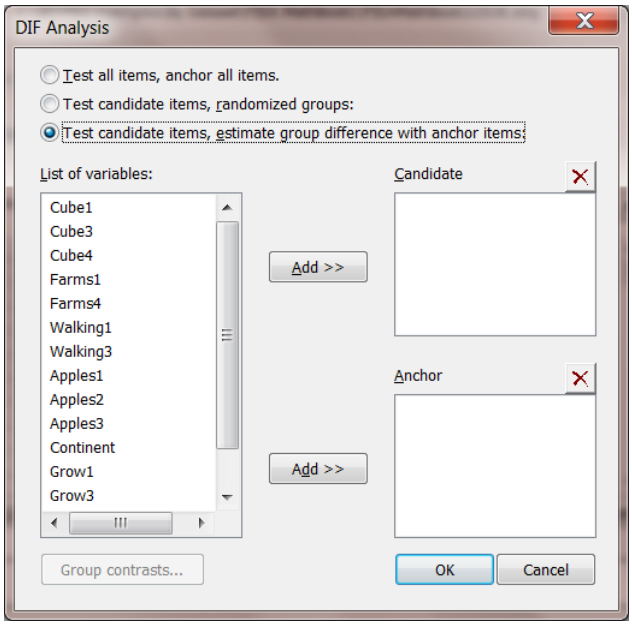
At the bottom left of the **Models** dialog there are two buttons, labeled **Constraints…** and **DIF...** respectively. The latter button gives access to a dialog for entering parameter values or reading them from a file. Typically, these values are used to score a set of items that were previously calibrated.

By clicking on the **Constraints…** button an **Item Parameter Constraints** window is invoked. Use of this window allows the user to fix or free parameters or to set selected parameters

equal.

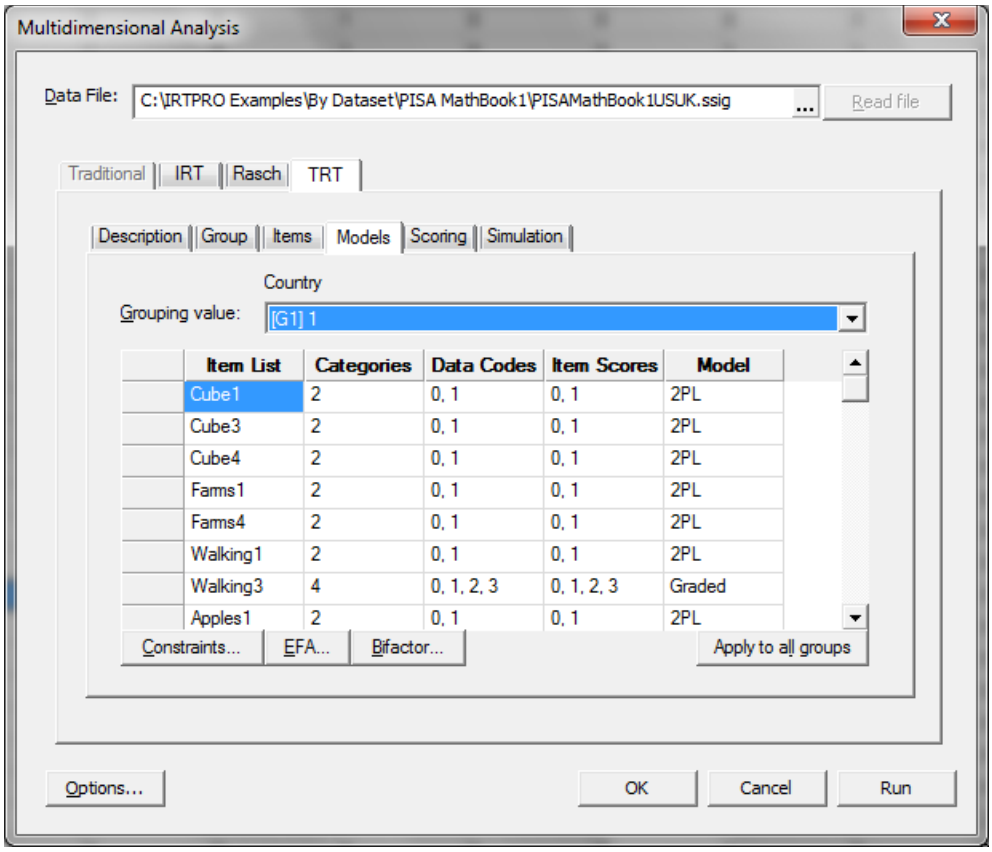


The DIF button (differential item functioning) is enabled when the analysis is to be performed for multiple groups.



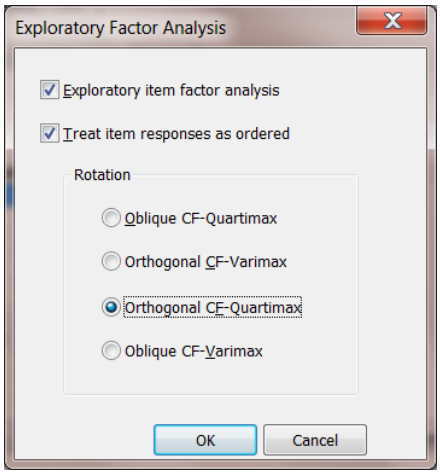
1.7.2 The Models tab, Multidimensional IRT Analysis

The **Models** tab for a multidimensional analysis has exactly the same functionality than that described in the previous section for the unidimensional case, except that the buttons below the **Multidimensional Analysis** window are labeled **Constraints…**, **EFA...**, and **Bifactor...**, where **EFA** denotes exploratory factor analysis and **Bifactor** denotes a bifactor analysis.

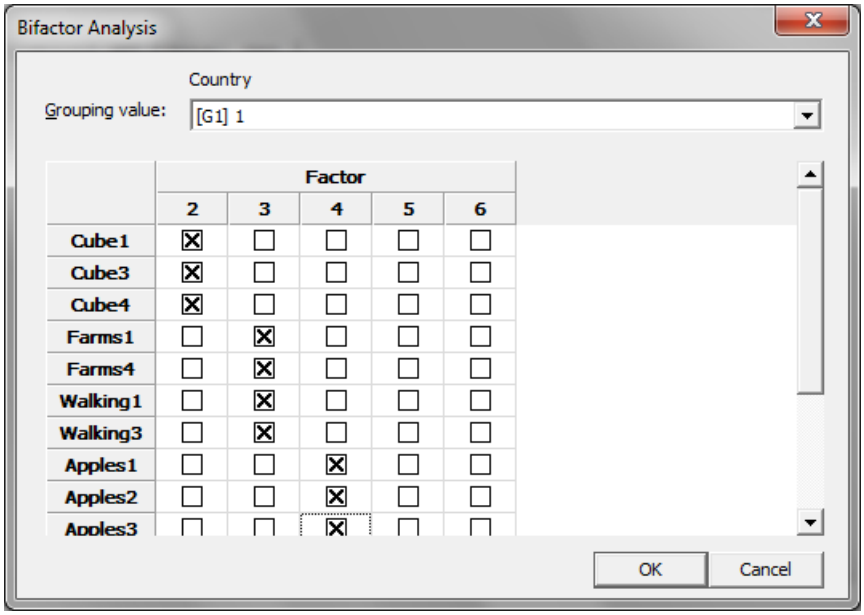


Clicking the **EFA...** button activates the **Exploratory Factor Analysis** dialog shown below. To verify that the user intends to specify EFA, the **Exploratory item factor analysis** box is checked. Additionally, a selection of one of the four available rotation methods can be made.

The reader should note that once the **EFA...** option is selected, the **Constraints...** option is no longer available, since IRTPRO automatically sets up the constraints in this case.

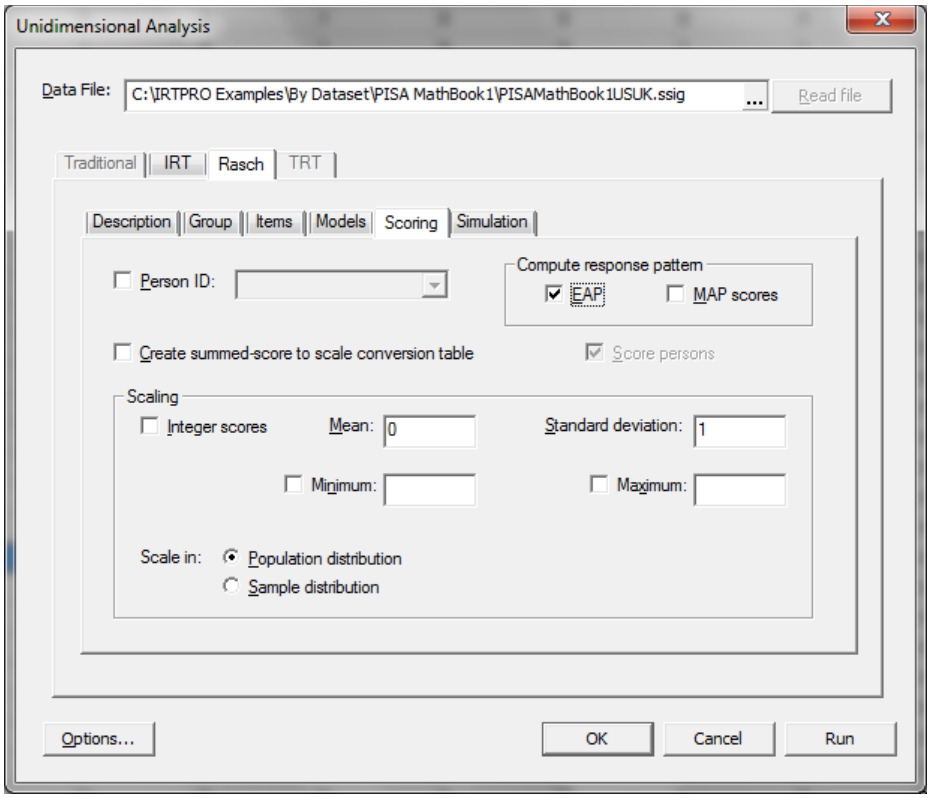


The **Bifactor…** option provides access to the **Bifactor Analysis** dialog that allows the user to select items associated with specific factors.



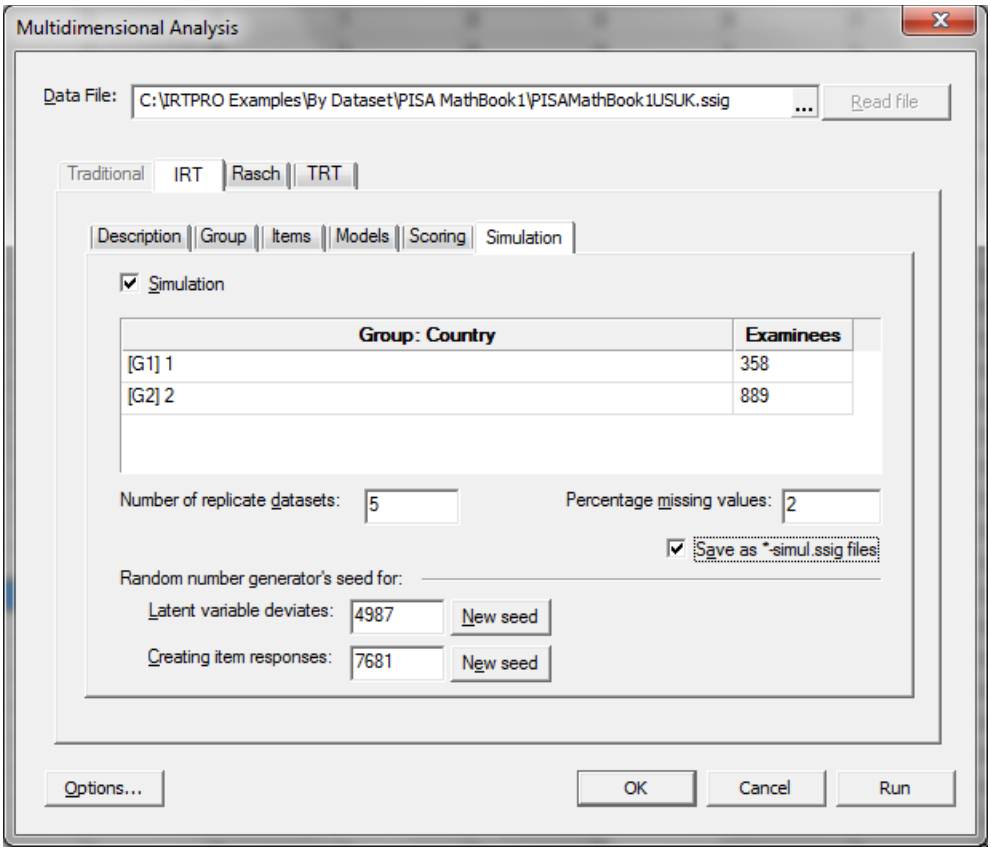
1.8 The Scoring tab

When a unidimensional IRT or multidimensional IRT analysis is requested via the **Analysis** option, the second last tab displayed in the corresponding analysis window is the **Scoring** tab.



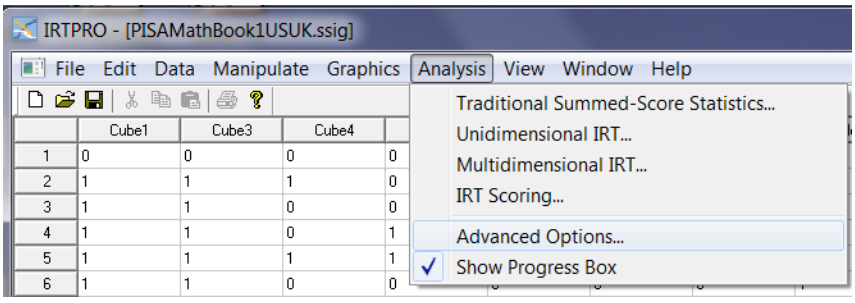
1.9 The Simulation tab

When a unidimensional IRT, or multidimensional IRT analysis is requested via the **Analysis** option, the last tab displayed in the corresponding analysis window, is the **Simulation** tab.



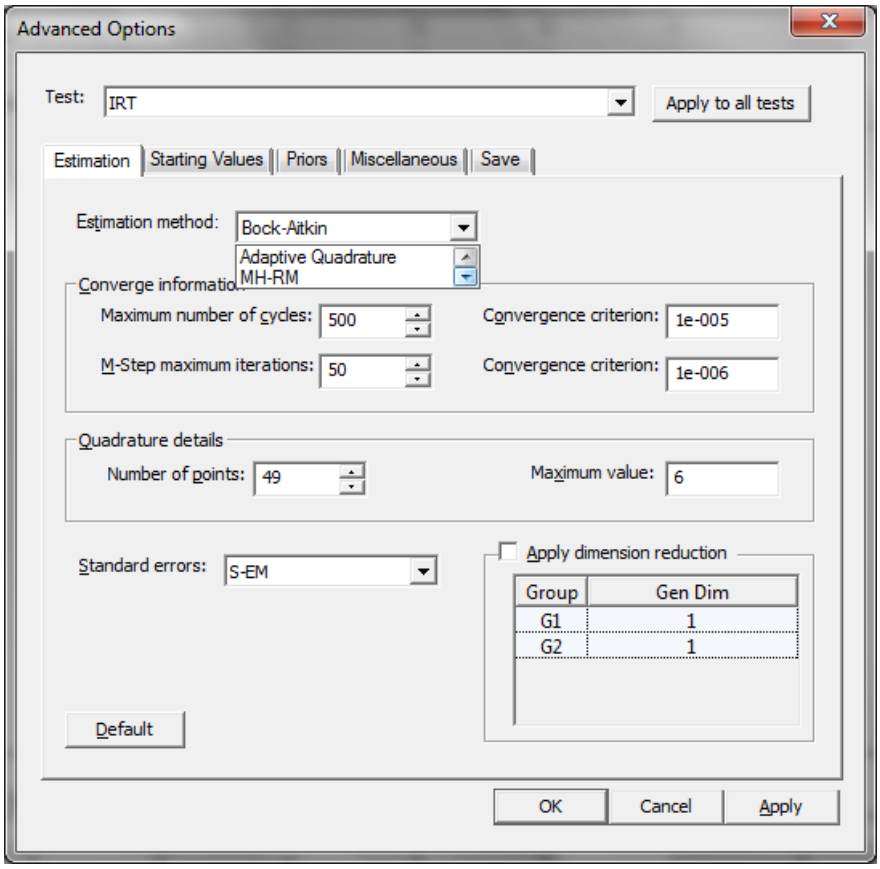
1.10 Advanced options window

The **Advanced options** window can be accessed using the **Analysis, Advanced Options…** selection via the main menu bar, or alternatively, by clicking the **Options…** button (lower right-hand corner of an **Analysis** window).

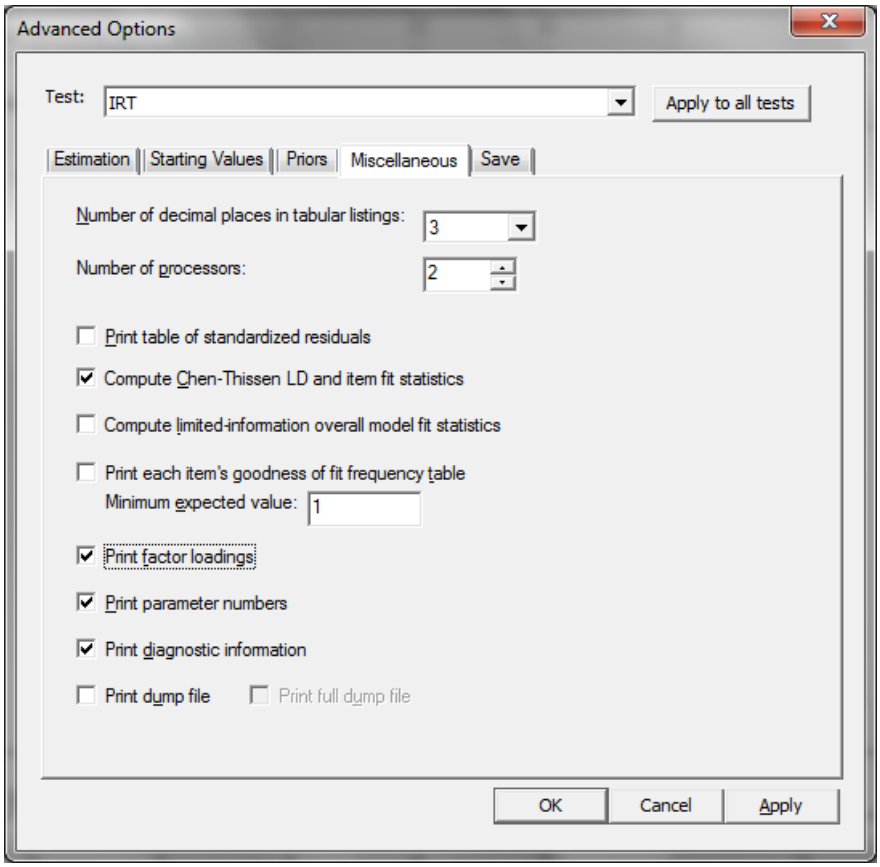


This window currently has five active tabs, these being **Estimation, Starting Values, Priors, Miscellaneous,** and **Save**. The estimation window is shown below and makes provision for three estimation methods:

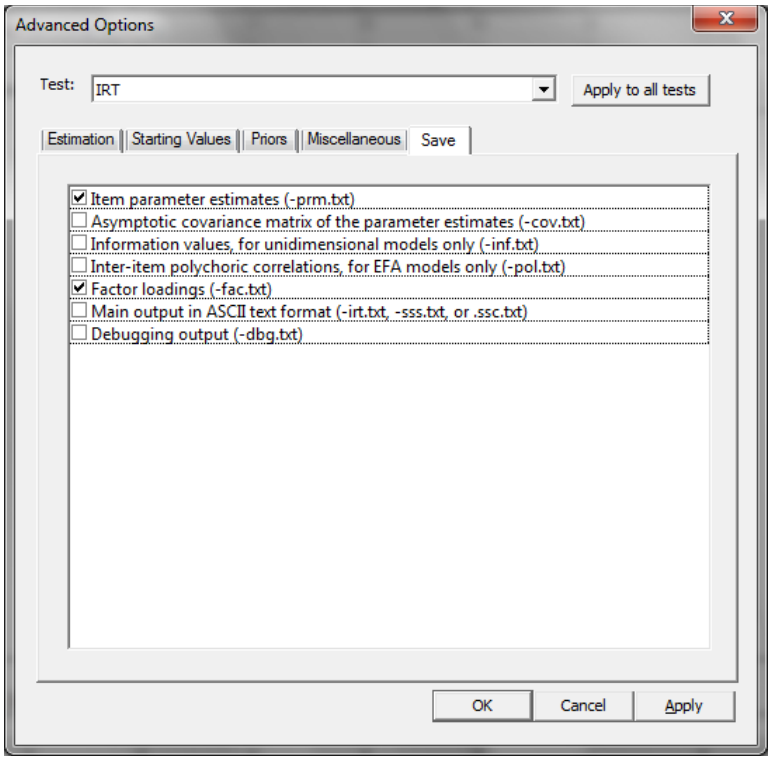
- Bock-Aitkin
- Adaptive quadrature
- MH-RM



The **Miscellaneous** dialog is used to control printout of results, and the number of processors to be used.

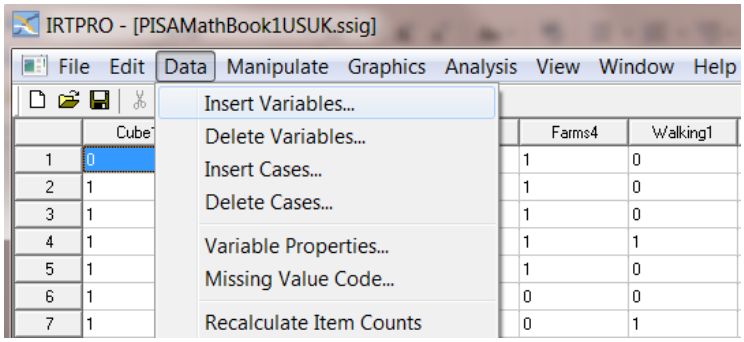


The **Save** dialog is used to request the print-out of results to specific files.



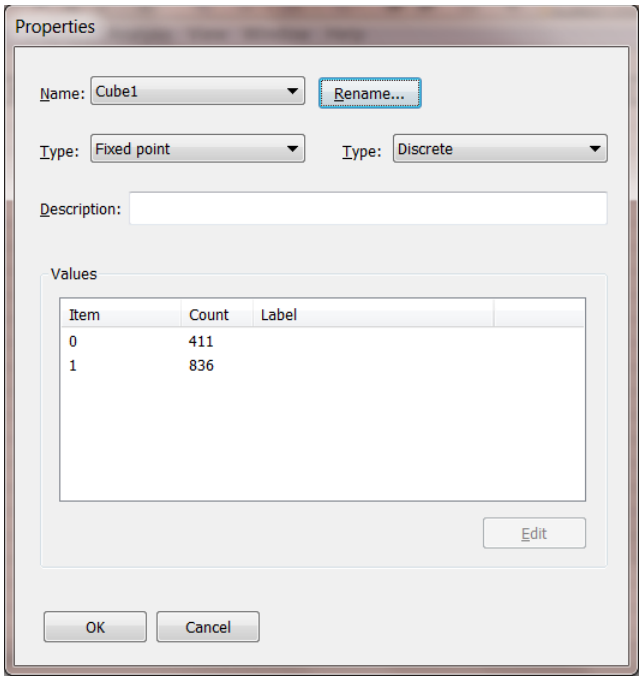
1.11 The Data menu

The **Data** option (main menu bar) enables one to insert or delete variables and/or cases from the IRTPRO data file that is currently open. In addition, the drop-down menu makes provision for the renaming of variables (**Variable Properties…** option) and for entering a missing value code.

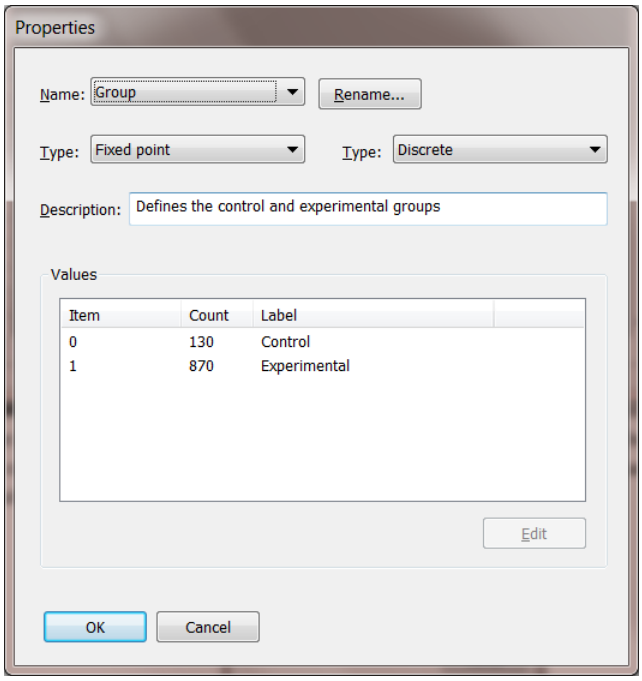


1.11.1 The Variable Properties… Option

The **Properties** dialog displays the distinct values (data codes) for each item, together with the frequency counts.



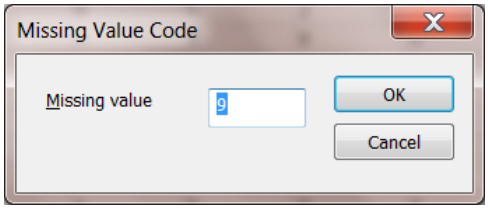
Variables may be renamed. A description of each item may be entered along with descriptive names for corresponding to the numeric values. For example 0 = Experimental, 1 = Control.



1.11.2 The Missing Value Code… Option

The **Missing Value Code…** option allows one to assign a missing value code by entering the appropriate value in the **Missing Value** text box. The value entered is accepted if the **OK**

button is clicked. In this case, the user must use the **File, Save** option to ensure that this change to the dataset definitions is permanent. The default missing value code is -1.



1.12 The Data Manipulation window

This window makes provision for the recoding of variables. Suppose, for example, that the variable Group is coded 0, 3 and 4 and that we want to recode these values so that 0 = 1; 3 and 4 = 2. This recoding is accomplished by clicking the **if…else…endif** button. Variable names can be entered by double-clicking on a variable name, or dragging it to the appropriate position in the recode window. The last statement shows the recoding of the variable Score to Score = exp(Score).