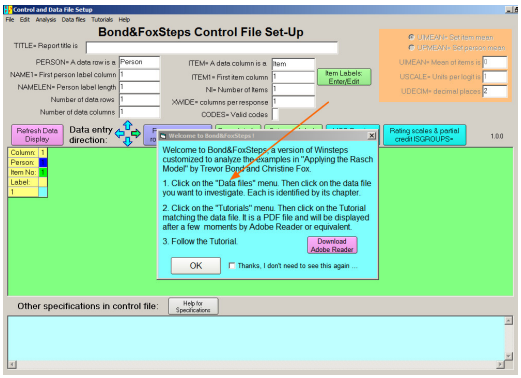
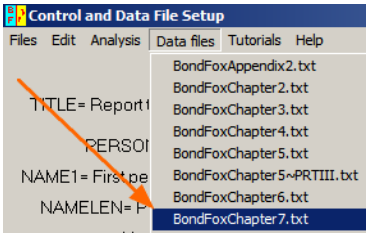
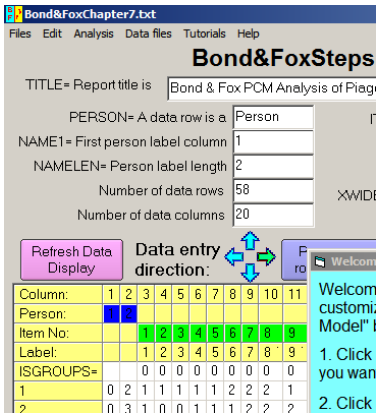
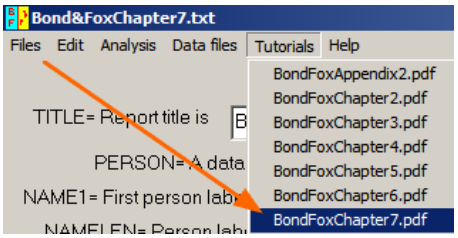
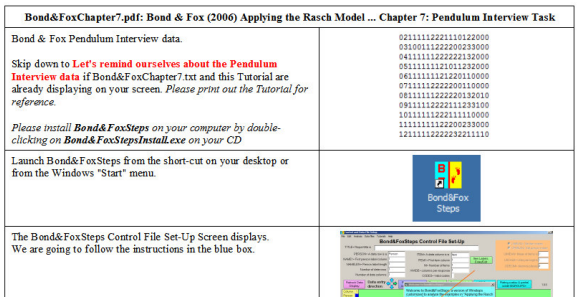
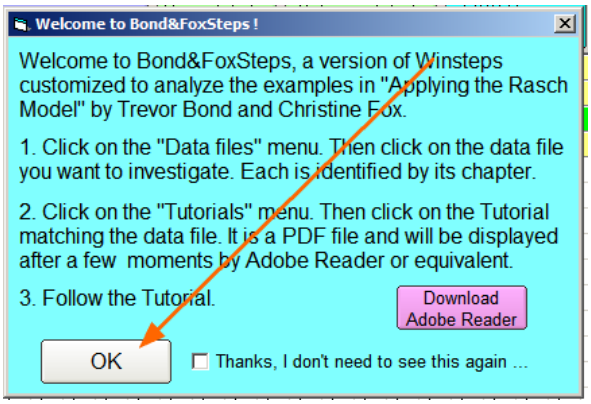
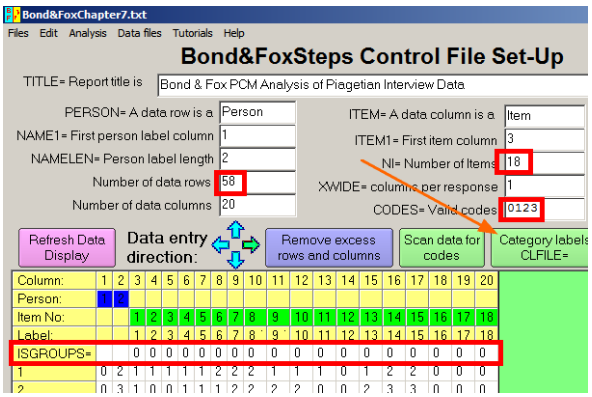
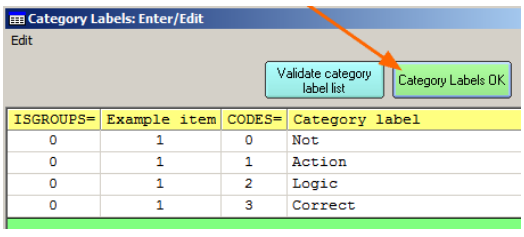
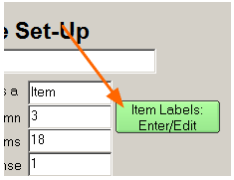
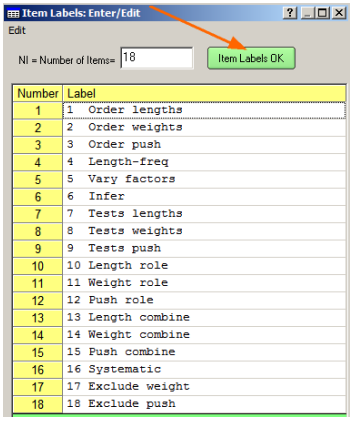
Bond&FoxChapter7.pdf: Bond & Fox (2006) Applying the Rasch Model ... Chapter 7: Pendulum Interview Task	
Bond & Fox Pendulum Interview data. Skip down to **Let's remind ourselves about the Pendulum Interview data** if Bond&FoxChapter7.txt and this Tutorial are already displaying on your screen. *Please print out the Tutorial for reference.* *Please install **Bond&FoxSteps** on your computer by double-clicking on **Bond&FoxStepsInstall.exe** on your CD*	02111112221110122000 03100111222200233000 04111111222222132000 05111111121011232000 06111111121220110000 07111112222200110000 08111111222220132010 09111112222111233100 10111111222111110000 11111111122200233000 12111112222232211110
Launch Bond&FoxSteps from the short-cut on your desktop or from the Windows "Start" menu.	
The Bond&FoxSteps Control File Set-Up Screen displays. We are going to follow the instructions in the blue box.	
Click on the "Data files" menu. Click on Bond&FoxChapter7.txt	
The Bond&FoxChapter7.txt control instructions and data are displayed on your screen.	

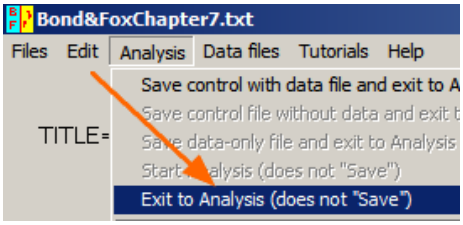
Click on the "Tutorials" menu. Click on " Bond&FoxChapter7.pdf" - this is the Tutorial matching Bond&FoxChapter7.txt	
This PDF file displays. It is what you are reading now. *Please print out the Tutorial for reference.*	
Now step-by-step through this Tutorial ... Click "OK" on the Welcome dialog	
Let's remind ourselves about the Pendulum Interview. It consists of the ratings of 58 interviews about solving the Pendulum expressed in terms of 18 items. The rating scale is 0,1,2,3. Each item is modeled to have its own rating scale structure. This is the Partial Credit model. It is indicated by the ISGROUPS= line. Let's look at the rating scale category names: Click on "Category labels CLFILE="	
The four categories are: 1. "Not " = nothing relevant to solving the problem 2. "Action" = relevant action 3. "Logic" = relevant logic 4. "Correct" = correct solution Click on "Category Labels OK"	
Let's take a look at the Item Labels. Click on "Item Labels: Enter/Edit"	

There are 18 items. More details about them are in Bond & Fox.

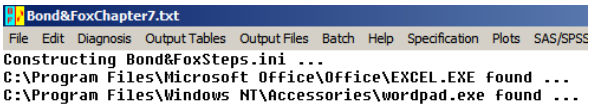
Click "Item Labels OK"



Let's perform the Analysis of these data.
Click on "Analysis" menu
Click on "Exit to Analysis (does not Save)"
- we don't want to make any changes at this point ...



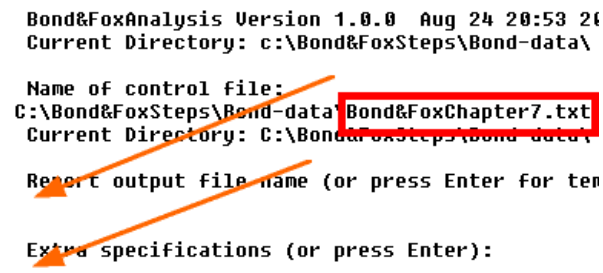
File Setup closes, and the Analysis phase begins. If this is the first time you have run an Analysis, it checks your computer for available resources ....



Bond&FoxSteps - Analysis phase - correctly reports that the analysis control file is Bond&FoxChapter7
.txt.

"Report output file name"?
Press your Enter key

"Extra specifications"?
Press your Enter key

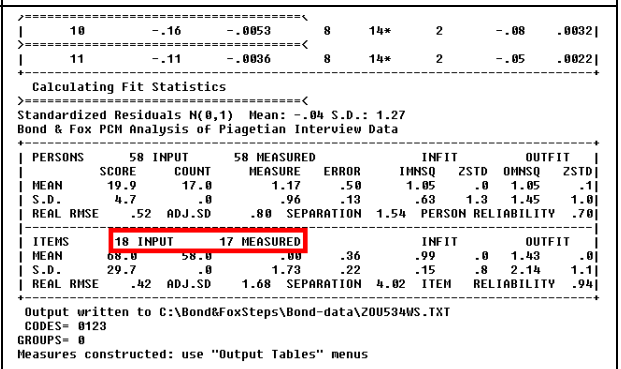


The Pendulum Interview data is Rasch-analyzed.

Measures (person abilities, item difficulties) are constructed.

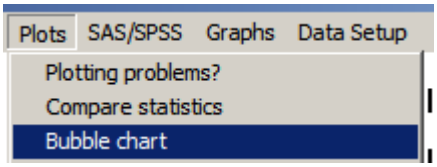
Notice that 18 items are input, but that only 17 are reported as measured. We will want to find out what has happened.

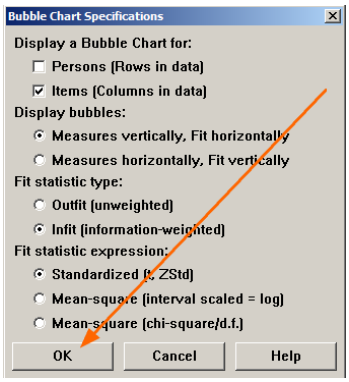
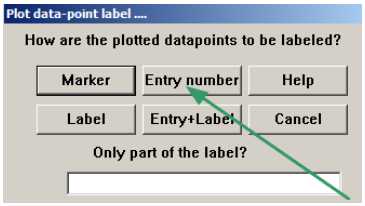
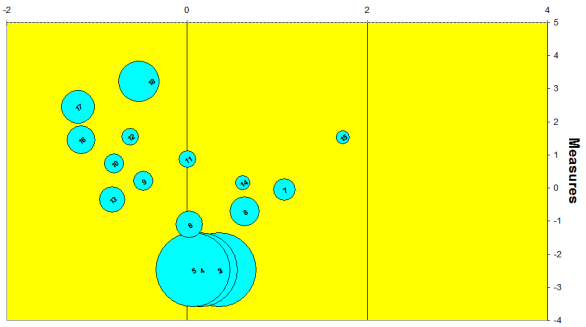
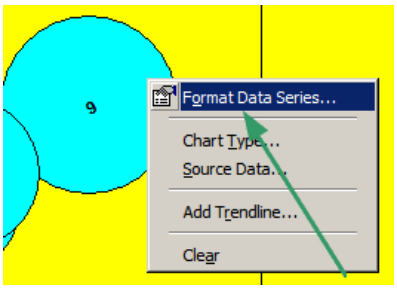
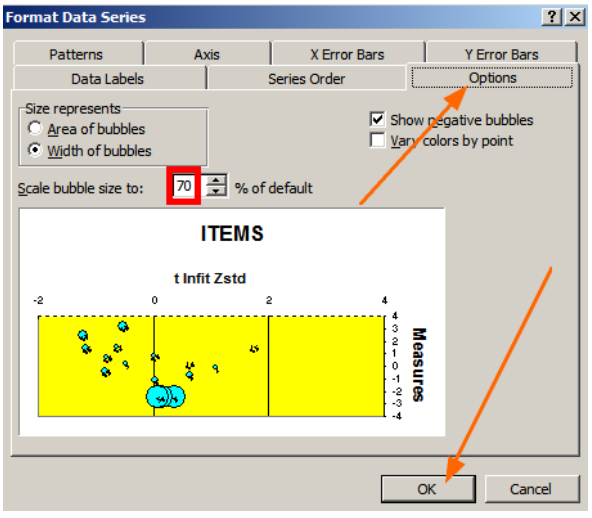
But first ....

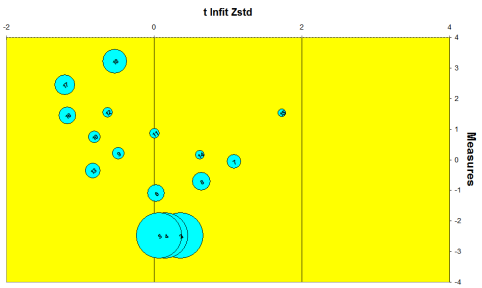
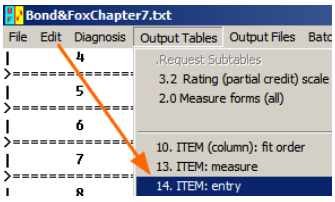
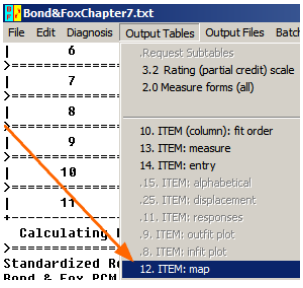


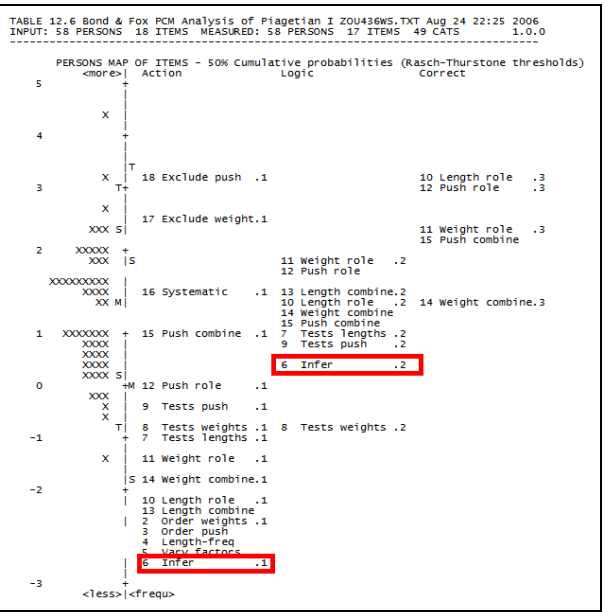
Bond & Fox Figure & 7.1 Pathway Bubble

Click on the "Plots" pull-down menu
Click on "Bubble Chart".



"Bubble Chart Specifications"? The options are pre-selected correctly. Click on "OK"	
"Plot data-point label ..."? Click on "Entry number"	
After a few moments, Excel displays a bubble chart of the pathway.	
Let's reduce size of the Bubbles. Their diameters should be twice the measure standard errors. So the diameter of the biggest bubble for item 5 should be 2 x .71 = 1.4 logits (as we will discover a little later). Right-click on a bubble. Click on "Format Data Series" (not "Format Data Labels" nor "Format Data Points") If "Format Data Series" is not listed, right-click a little lower in the bubble.	
Click on "Options" Tab Change "Scale bubble size to" 70% of default.	

You can also use other Excel functions to produce a bubble plot resembling the artist-drawn plot in Bond & Fox. But category thresholds are not shown in this plot, but we will see them shortly	
Close windows at any time - you can always get them again!	☒
You can quickly get back to the Analysis by clicking on Bond&FoxChapter7.txt on the Windows Taskbar	
Bond & Fox Table 7.3 Click on "Output Tables" menu Click on "14. ITEM: Entry"	
This shows the central item difficulties for all items. Notice that Item 1 is identified as "DROPPED". What's this?	TABLE 14.1 Bond & Fox PCM Analysis of Piagetian I ZOU534WS.TXT Aug 24 20:53 2006 INPUT: 58 PERSONS 18 ITEMS MEASURED: 58 PERSONS 17 ITEMS 49 CATS 1.0.0 PERSON: REAL SEP.: 1.54 REL.: .70 ... ITEM: REAL SEP.: 4.02 REL.: .94 ITEM STATISTICS: ENTRY ORDER |ENTRY TOTAL MODEL| INFIT | OUTFIT |PTMEA|EXACT MATCH| | |NUMBER SCORE COUNT MEASURE S.E. |MNSQ ZSTD|MNSQ ZSTD|CORR.| OBS% EXP%| ITEM G | | 1 DROPPED | 1 Order lengths 0 | | 2 56 58 -2.48 .71|1.10 .4|1.16 .5| .05| 96.6 96.6| 2 Order weights 0 | | 3 56 58 -2.48 .71|1.10 .4|1.16 .5| .05| 96.6 96.6| 3 Order push 0 | | 4 56 58 -2.48 .71| .96 .2| .37 -.6| .29| 96.6 96.6| 4 Length-freq 0 | | 5 56 58 -2.48 .71| .91 .1| .30 -.7| .33| 96.6 96.6| 5 Vary factors 0 | | 6 96 58 -1.10 .27| .99 .0| .94 -.2| .40| 69.0 70.7| 6 Infer 0 | | 7 85 58 -.06 .22|1.19 1.1|1.14 .7| .33| 46.6 60.3| 7 Tests lengths 0 | | 8 108 58 -.71 .29|1.23 .6|9.90 3.4| .17| 91.4 92.0| 8 Tests weights 0 | | 9 84 58 .21 .20| .91 -.5| .90 -.3| .52| 51.7 56.2| 9 Tests push 0 | | 10 91 58 .74 .20| .85 -.8| .86 -.8| .60| 60.3 57.2| 10 Length role 0 | | 11 85 58 .86 .17| .99 .0|1.05 .3| .50| 51.7 52.1| 11 Weight role 0 | | 12 70 58 1.55 .17| .88 -.6| .89 -.6| .62| 55.2 49.5| 12 Push role 0 | | 13 81 58 -.36 .25| .87 -.8| .84 -.9| .54| 69.0 63.9| 13 Length combine 0 | | 14 114 58 .16 .15|1.09 .6|1.18 .5| .54| 41.4 44.4| 14 Weight combine 0 | | 15 71 58 1.52 .14|1.31 1.7|1.50 1.6| .49| 34.5 42.0| 15 Push combine 0 | | 16 25 58 1.45 .28| .89 -1.2| .86 -.8| .49| 75.9 66.9| 16 Systematic 0 | | 17 14 58 2.44 .32| .80 -1.2| .66 -1.3| .56| 81.0 77.8| 17 Exclude weight 0 | | 18 8 58 3.21 .39| .84 -.5| .60 -.9| .50| 87.9 87.1| 18 Exclude push 0 |
Scroll down to Table 14.2 Item 1 has 58 responses of "1". Everyone was rated in the same category. But we specified are 4 possible categories 0, 1, 2, 3. So is this "1" the top category of a 0-1 item? Or near the bottom of a 0-3 item? Or what? Bond&FoxSteps doesn't know, so dropped Item 1 from the estimation. This is a draw-back to the Partial Credit model. When we know in advance which are the dichotomous 0-1 items, then it is better to specify them as sharing the same response structure. rather than as each defining its own response structure.	TABLE 14.3 Bond & Fox PCM Analysis of Piagetian I ZOU534WS.TXT Aug 24 20:53 2006 INPUT: 58 PERSONS 18 ITEMS MEASURED: 58 PERSONS 17 ITEMS 49 CATS 1.0.0 ITEM CATEGORY/OPTION/DISTRACTOR FREQUENCIES: ENTRY ORDER |ENTRY DATA SCORE | DATA | AVERAGE S.E. OUTF PTMEA| | |NUMBER CODE VALUE | COUNT % | MEASURE MEAN MNSQ CORR.| ITEM | | 1 1 *** | 58 100*| 1.17 .13 .00 |1 Order lengths | 1 Action | 2 0 0 | 2 3 | .91 .09 1.2 -.05 |2 Order weights | 0 Not | 1 1 | 56 97 | 1.18 .13 1.1 .05 | | 1 Action | 3 0 0 | 2 3 | .91 .09 1.2 -.05 |3 Order push | 0 Not | 1 1 | 56 97 | 1.18 .13 1.1 .05 | | 1 Action | 4 0 0 | 2 3 | -.29 .11 .3 -.29 |4 Length-freq | 0 Not | 1 1 | 56 97 | 1.23 .13 1.0 .29 | | 1 Action
You can quickly get back to the Analysis by clicking on Bond&FoxChapter7.txt on the Windows Taskbar	
Bond & Fox Fig. 7.2 Click on "Output Tables" Menu Click on "12. ITEM: Map"	

Scroll down to Table 12.6 The thresholds shown in Bond & Fox Fig. 7.1 and 7.2 are the "Rasch-Thurstone Thresholds", the points at which there is a 50% probability of being observed in categories below and 50% being observed in categories at or above the category transition point. Example: Item 6 has categories 0, 1 and 2. So, at the bottom of the map, **6 Infer.1** is the location where there is a 50% chance of being observed in category 0 of item 6 and a 50% chance of being observed in categories 1 or 2. In the second column, about halfway up is **6 Infer.2**. This is located where there is a 50% chance of being observed in categories 0 or 1 and a 50% chance of being observed in category 2. Item 6 has not category 3, so does not appear in the right-hand column.	
Close all open and output windows	☒