


## ConstructMap v4.3

### Instructions for Generating the Chapter 8 Examples

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**Table 8.1 – Item statistics for the PF-10 example (selected items)<sup>1</sup>**

1. Select the menu option **Estimation Tasks – Results – Classical Item Statistics**.
2. Enter a **Title of Classical Item Statistics for Observed Responses**.
3. **Browse** to the directory where you want to store the file and enter a **File Name** of **pf10\_itanal**, then click on **Save**
4. Click on **OK** to continue. The Item Analysis report will be displayed on the screen and also stored on your system in the folder you specified.
5. Close the display by clicking on the close box, , in the upper right-hand corner.

pf10_itanal.txt		Sep 15, 2004 2:34:33 PM			
-----					
PF10 Trichotomous					
Classical Item Statistics for Observed Responses					
Number of Active Items = 10					
CASES = 2054 Filters: off					
-----					
.....					
Item: VigAct	Item Set: base				
	Infit MNSQ = 1.30 t = 8.75 Outfit MNSQ = 1.32 t = 8.75				
Categories	0	1	2	missing	
Count	1043	874	137	0	
Percent (%)	50.78	42.55	6.67		
Pt-Biserial	-0.63	0.53	0.20		
Mean Ability	0.15	2.87	3.28	NA	
SD Abilities	0.65	0.91	1.01	NA	
Step Difficulties		1.66	5.02		
Thresholds	NA	1.62	5.05		
Error	NA	0.04	0.11		
=====					

**Figure 1. Item analysis report content for item "VigAct" before reformatting in Word.**

To generate Table 8.1, open the pf10\_itanal.txt file using Word and modify the contents as follows:

- Replace the heading information with the Response Categories titles (including the "Statistics" heading and replacing "0 1 2" with "1 2 3").
- Modify the item heading lines
- Change "Mean Ability" in the file to "Mean Location"
- Change "SD Abilities" in the file to "Std Dev of Locations"
- Delete the lines relating to steps, thresholds, and error (these are the item parameters which are not shown on Table 8.1)
- Delete the "missing" column (since this is also not displayed on Table 8.1)


<sup>1</sup> These instructions assume the reader is continuing after completing the Chapter 7 instructions.

**Figure 8.3 – Examining item DIF – comparing the first thresholds and**


**Figure 8.4 – Examining item DIF – comparing the second thresholds**


1. Select the menu option **Estimation Tasks – Filter Students for DIF Analysis**.
2. Check the **Filter** checkbox. This turns filtering on.
3. Using the pull-down menu for the **Demographic** field, select **Gender** from the list.
4. Using the pull-down menu for the **Category** field, select **M** from the list.
5. Click on **Estimate with Selected Students**. Set the **Reset Parameters** option to **Yes**. Click on **OK** to compute item and population parameters using only the cases that meet the selection criteria.
6. Answer **Yes** to accept the parameters when prompted.
  
7. Select the menu option **Estimation Tasks – Results - Wright Map**.
8. Enter a **Title** of **Wright Map**.
9. **Browse** to the directory you want to store the file in and enter a **File name** of **wmpf10\_males**, then click on **Save**.
10. Confirm that the **Item Set** is set to **base** (not required for ConstructMap Lite).
11. Confirm that **Display Raw Scores** is set to **Yes**.
12. Set **Display Item Names** to **No**.
13. Set the **Show Estimation Type** to **No**.
14. Set the **Display Step Map** to **Yes**.
15. In the **Defined Range** section, confirm that the **Max. Range** is **5.0**, the **Min. Range** is **-5.0**, and set the **Rows** to **45**.
16. Click on **OK**

The Wright map will be displayed on the screen and also stored on your system in the folder you specified. Note that “Filters: Gender M included” appears in the heading of the report automatically. In addition to the Wright Map file, the file `tt_wmpf10_males.txt` will be generated automatically and placed in the `same` folder. This file contains the numeric values of the step thresholds.

17. Close the display by clicking on the close box, , in the upper right-hand corner.
  
18. Select the menu option **Estimation Tasks - Results – Item Estimates and Fit Graph**.
19. Enter a **Title** of **Item Estimates**.
20. **Browse** to the directory you want to store the file in and enter a **File name** of **fitpf10\_males**, then click on **Save**
21. Set the **Calculation Method** option to **By Parameter**.
22. Set the **Display Item Mean Square Graph** option to **No**
23. Set the **Re-Calculate Item Fit Statistics** to **No**
24. Set the **Save Item Fit Statistics** to **Yes**
25. Click on **OK** to continue.

The Item Fit Report for males will be displayed on the screen and also stored on your system in the folder you specified.

26. Close the display by clicking on the close box, , in the upper right-hand corner.

27. Repeat step 1 and steps 3 through 21 for females, naming the Wright Map file **wmpf10\_females** (which will also automatically generate the **tt\_wmpf10\_females.txt** file) and the Item Fit Report **fitpf10\_females**.
28. Close the display by clicking on the close box, , in the upper right-hand corner.
29. Exit ConstructMap by selecting **File – Exit** and selecting **Yes** to save the database.  
To generate the charts shown in Figures 8.4 and 8.5:
  - Start Excel
  - Open the file for males that was created above, **tt\_wmpf10\_males.txt**, by using **File – Open**, and selecting **Files of type: All Files (\*.\*)**.
  - The Text Import Wizard will be displayed:
    - Select **Delimited**
    - Select **Start import at Row 2**, then click on **Next**
    - Check the **Space** box, then click on **Next** (confirm that **Tab** is also checked)
    - Verify that the field separator lines are correct, and click on **Next**
    - If so, click on **Finish**; if not, create or drag the lines to appropriate locations and then click on **Finish**
  - Save this spreadsheet with the name **dif.xls** (be sure to change the **Save as type** to **Microsoft Excel Workbook**). Do not close the spreadsheet.
  - Open the file for females that you created above, **tt\_wmpf10\_females.txt**, and import the data as you did above for males.
  - Cut and paste this data into the **dif.xls** spreadsheet, adjacent to the data for males.
  - Add appropriate headings, such as "step" "male est" "male se" "female est" "female se", to identify the data.
  - Create a new work area to organize the data in the dif.xls spreadsheet with column headings of "step" "male est" "male se" "female est" "female se"
  - Copy and paste the Step 1 data into the new work area, and then copy and paste the Step 2 data below the Step 1 data.

step	male est	male se	female est	female se
1.1	1.883	0.07	1.469	0.055
2.1	-1.031	0.074	-1.297	0.055
3.1	-1.945	0.074	-1.547	0.057
4.1	-0.445	0.066	-0.164	0.051
5.1	-2.555	0.078	-2.18	0.062
6.1	-1.477	0.066	-1.289	0.055
7.1	-0.18	0.07	0.062	0.057
8.1	-0.953	0.082	-0.781	0.066
9.1	-2.391	0.1	-2.359	0.078
10.1	-3.227	0.109	-4.188	0.086
1.2	5.367	0.184	4.859	0.148
2.2	1.289	0.176	1.43	0.141
3.2	0.625	0.191	1.047	0.145
4.3	2.367	0.168	2.656	0.135
5.2	0.141	0.207	0.328	0.152
6.2	1.836	0.176	1.555	0.143

7.2	2.031	0.164	2.188	0.133
8.2	0.742	0.176	0.875	0.137
9.2	-0.668	0.219	-0.641	0.168
10.2	-1.414	0.254	-2.031	0.219

**Figure 2. Sample data from the threshold files, rearranged in an Excel spreadsheet.**

- Save the spreadsheet as dif\_1.xls.
- Select **Insert – Chart**, select **XY (Scatter)** as the type, and click **Next**
- Click on the **Series** tab, then click the **Add** button to add a new series
- Click in the **X Values** box to place the cursor there
- Highlight the values for the first step estimates for the males
- Click in the **Y Values** box and delete any text that may be already entered
- Highlight the values for the first step estimates for the females
- Click on **Next**
- Enter a **Chart title** of **First Step Thresholds** and label the **X-axis Males** and the **Y-axis Females**
- Click on the **Gridlines** tab and remove any checks in the boxes
- Click on the **Legend** tab and remove the check from the **Show legend** entry
- Click on **Finish** and position the chart to an open area on your spreadsheet
- Right-click on the X-axis to access the **Format Axis** dialog window
- Click on the **Scale** tab and change:
  - **Minimum** to -5
  - **Maximum** to 2
  - **Major unit** to 1
  - **Crosses at** to -5
  - Click on **OK**
- Right-click on the Y-axis to access the **Format Axis** dialog window
- Click on the **Scale** tab and make the settings identical to what you did for the X-axis above
- Right-click in the main plot area to access the **Format Plot Area** dialog window
- In the right-hand part of the window (Area), click on **None** (for no pattern), then click on **OK**

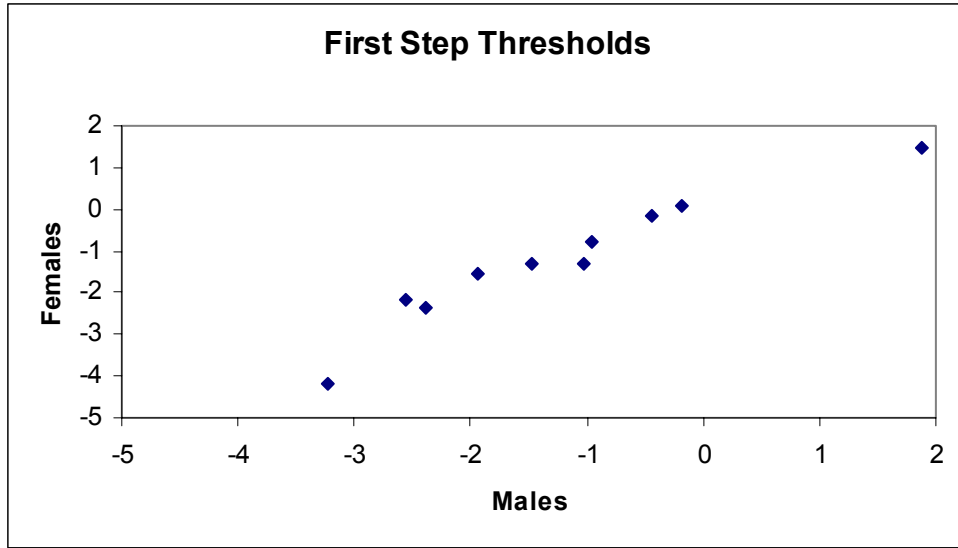


Figure 3. Excel chart of Thurstonian threshold values for step 1 of each item for males and females.

- To make the graph of the second thresholds:
  - Make a copy of the first chart
  - Modify the title by clicking on it and changing **First** to **Second**
  - To modify the source data, right-click in an area outside of the plot area to access the **Source Data** option, then delete the contents of the **X values** and the **Y values** and replace them with the step 2 data
  - Modify the axes as described above with the following settings:
    - **Minimum** to  $-2$
    - **Maximum** to  $6$
    - **Major unit** to  $2$
    - **Crosses at** to  $-2$
- Using the line drawing tool, draw diagonal lines on each chart from the origin to the upper right-hand corner.
- Save the spreadsheet with **File – Save**.
- To identify a particular point, point at it with the cursor. For example, in the First Threshold chart if you point to the point nearest the origin, which is quite far from the equality line, you will see that it is the point  $(-3.227, -4.188)$  which corresponds to item 10.

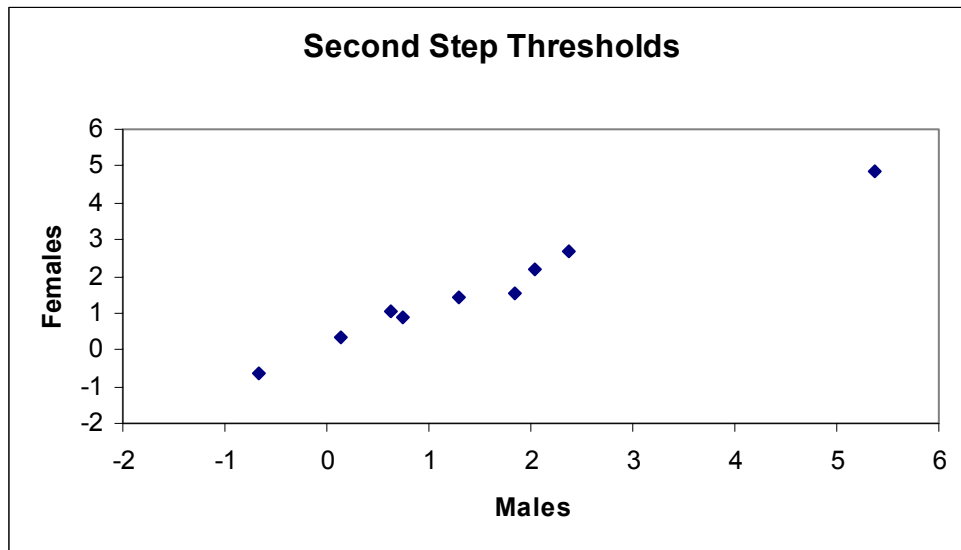


Figure 4. Excel chart of Thurstonian threshold values for step 2 of each item for males and females.

To generate the charts shown in Table 8A.2 Testing for DIF:

- Open the spreadsheet you created above and save as a new filename, such as **dif\_2.xls**
- To the right of the work area you created to prepare for constructing the charts, create column and row labels to those in Table 8A.2 (you can merge cells in the **Format – Cells – Alignment** option)
- Cut and paste the data (or use =cell) into the new work area columns

- Write the formulas for computing the lower and upper bounds of the 95% confidence interval (location – (1.96 \* std. err) and location + (1.96 \* std. err) respectively).
- Copy the formulas into the relevant cells
- Write the formulas for computing the average (=average(...)) and standard deviation (=stdev(...)) for females and males
- Format all the cells for two decimal places
- Save the spreadsheet

To identify the items with significant DIF, examine any gaps between the confidence intervals by computing the difference from a male confidence interval "edge" to a female confidence interval on the same item. An example is shown below. Note that only the gaps for items 1 and 10 on the first step are large (.44 and .58, respectively). There are no gaps in the confidence intervals for the second step.

Testing for DIF											
Item	Females				Males				logit diff	CI gap	
	Location	Std. Err.	95% CI		Location	Std. Err.	95% CI				
			Lower	Upper			Lower	Upper			
Threshold 1											
1	1.47	0.06	1.36	1.58	1.88	0.07	1.75	2.02	-0.41	0.44	
2	-1.30	0.06	-1.40	-1.19	-1.03	0.07	-1.18	-0.89	-0.27	0.01	
3	-1.55	0.06	-1.65	-1.44	-1.95	0.07	-2.09	-1.80	0.40	0.15	
4	-0.16	0.05	-0.26	-0.06	-0.45	0.07	-0.57	-0.32	0.28	0.05	
5	-2.18	0.06	-2.30	-2.06	-2.56	0.08	-2.71	-2.40	0.38	0.10	
6	-1.29	0.06	-1.40	-1.18	-1.48	0.07	-1.61	-1.35	0.19	0.05	
7	0.06	0.06	-0.05	0.17	-0.18	0.07	-0.32	-0.04	0.24	0	
8	-0.78	0.07	-0.91	-0.65	-0.95	0.08	-1.11	-0.79	0.17	0	
9	-2.36	0.08	-2.51	-2.21	-2.39	0.10	-2.59	-2.20	0.03	0.01	
10	-4.19	0.09	-4.36	-4.02	-3.23	0.11	-3.44	-3.01	-0.96	0.58	
Threshold 2											
1	4.86	0.15	4.57	5.15	5.37	0.18	5.01	5.73	-0.51	0	
2	1.43	0.14	1.15	1.71	1.29	0.18	0.94	1.63	0.14	0	
3	1.05	0.15	0.76	1.33	0.63	0.19	0.25	1.00	0.42	0	
4	2.66	0.14	2.39	2.92	2.37	0.17	2.04	2.70	0.29	0	
5	0.33	0.15	0.03	0.63	0.14	0.21	-0.26	0.55	0.19	0	
6	1.56	0.14	1.27	1.84	1.84	0.18	1.49	2.18	-0.28	0	
7	2.19	0.13	1.93	2.45	2.03	0.16	1.71	2.35	0.16	0	
8	0.88	0.14	0.61	1.14	0.74	0.18	0.40	1.09	0.13	0	
9	-0.64	0.17	-0.97	-0.31	-0.67	0.22	-1.10	-0.24	0.03	0	
10	-2.03	0.22	-2.46	-1.60	-1.41	0.25	-1.91	-0.92	-0.62	0	
mean	0.00				0.00						
std. Dev.	2.09				2.07						

Figure 5. Spreadsheet elaborated with calculations for the confidence interval gaps.