

ConstructMap v4.3

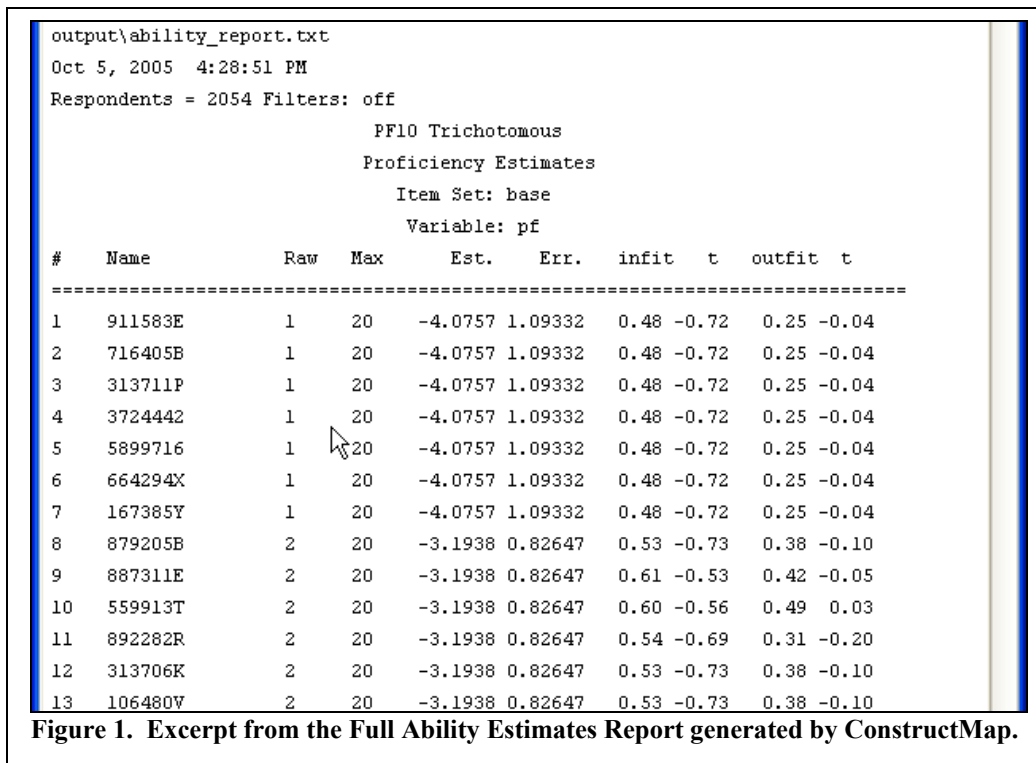
Instructions for Generating the Chapter 7 Examples¹

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Figure 7.1 – The standard error of measurement for the PF-10 instrument

1. Select the menu option **Estimation Tasks – Results – Full Ability Estimates Report**.
2. Enter a **Title of Proficiency Estimates**.
3. **Browse** to the directory where you want to store the file and enter a filename of **mlep10**, click on **SAVE**.
4. Confirm that the **Item Set** is set to **base** (not required for ConstructMap Lite).
5. Confirm that the **Respondent Detail** option is set to **Yes**.
6. Confirm that the **Import Matrices** option is set to **No**.
7. Set the **Show Estimation Type** option to **No**, then click on **OK**.

The proficiency estimates and standard errors for each person will be displayed on the screen and also stored on your system in the folder you specified with the filename **mlep10.txt**.



¹ These instructions assume the reader is continuing after completing the Chapter 6 instructions.

To generate the graph in Figure 7.1:

- Start Excel
- Open the file you created above, `mlep10.txt`, by using **File – Open**, and selecting **Files of type: All Files (*.*)**.
- The Text Import Wizard will be displayed:
 - Select **Fixed width**, set the **Start import at row** option to **11**, then click on **Next**
 - Scroll down to verify that the vertical lines are properly placed between each data column (between the Case Number, Name, Raw score, Maximum score, Estimate, Error, Infit, Outfit, and t-statistic columns). Drag lines to the proper positions as needed.
 - Click on **Finish**

1	911583E	1	20	-4.0757	1.09332	0.48	-0.72
2	716405B	1	20	-4.0757	1.09332	0.48	-0.72
3	313711P	1	20	-4.0757	1.09332	0.48	-0.72
4	3724442	1	20	-4.0757	1.09332	0.48	-0.72
5	5899716	1	20	-4.0757	1.09332	0.48	-0.72
6	664294X	1	20	-4.0757	1.09332	0.48	-0.72
7	167385Y	1	20	-4.0757	1.09332	0.48	-0.72
8	879205B	2	20	-3.1938	0.82647	0.53	-0.73
9	887311E	2	20	-3.1938	0.82647	0.61	-0.53
10	559913T	2	20	-3.1938	0.82647	0.6	-0.56
11	892282R	2	20	-3.1938	0.82647	0.54	-0.69
12	313706K	2	20	-3.1938	0.82647	0.53	-0.73
13	106480V	2	20	-3.1938	0.82647	0.53	-0.73
14	943681X	2	20	-3.1938	0.82647	0.94	0.1
15	943309V	2	20	-3.1938	0.82647	0.61	-0.53

Figure 2. Excerpt of data after transferring into Excel.

- Highlight the data in the Estimate and Error columns (columns E and F in the spreadsheet)
- Select **Insert – Chart**
- In the Chart dialog window, select **XY (Scatter)** and click on **Next**
- You will see a rough version of the graph, click on **Next** again
- Enter appropriate titles for the chart, clear all the Gridlines and the Legend, and then click on **Finish**
- Right-click on the X-axis to access the **Format Axis** dialog window
- Click on the **Scale** tab and change the **Crosses at** value to **-6**, then click on **OK**
- 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**
- Save the spreadsheet with **File – Save As**

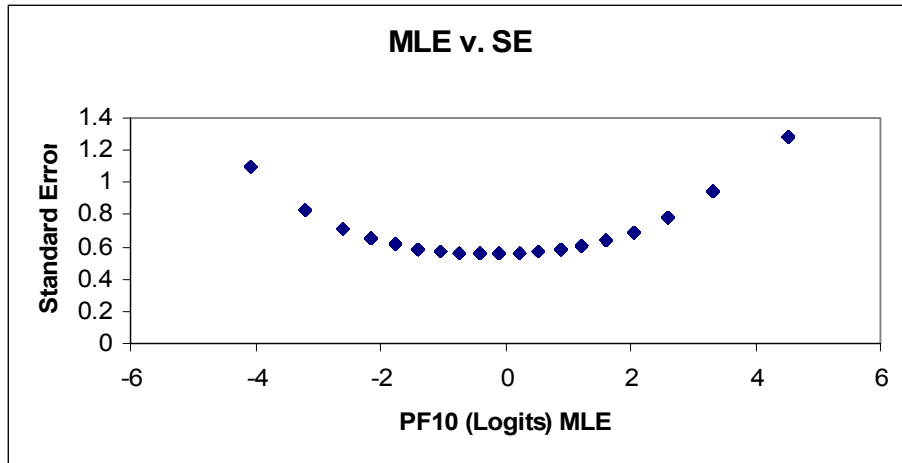


Figure 3. Chart as it appears in Excel with appropriate titles.

Figure 7.2 – The information for the PF-10 instrument

1. Select the menu option **Estimation Tasks – Results – Test Information Curve.**
2. Enter a **Title** of **Test Information.**
3. For **Cases to Include**, select **No Missing Data.**
4. Set the **Logit Range** to **-4.0 to 4.0.**
5. Click on **OK.**

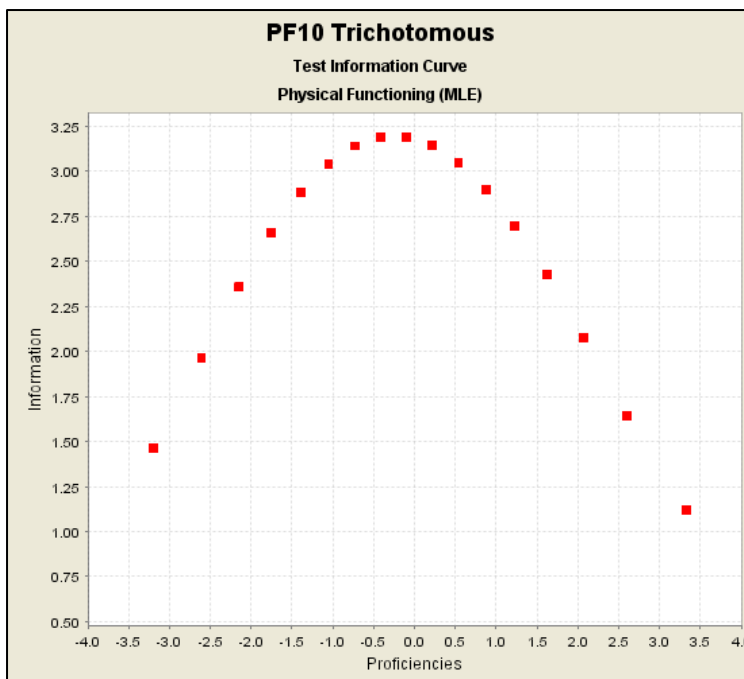


Figure 4. Test information curve for PF10 Trichotomous data produced by ConstructMap.

To generate the values in Section 7.2.1:

- Start with the spreadsheet you saved above.
- Insert a column to the right of the standard errors, which are in column F, and enter the formula for the square of the standard error for each row (i.e. $=F8 * F8$). Label this column "err2"
- Insert another column to the right and enter the formula for the inverse of the square of the standard error for each row (i.e. $=1 / G8$). Label this column "Information"
- Highlight and drag the two formulas to the bottom of the table area to copy them into each row.

				err2	Information
911583E	1	-4.075	1.093	1.194649	0.837066
716405B	1	-4.075	1.093	1.194649	0.837066
313711P	1	-4.075	1.093	1.194649	0.837066
3724442	1	-4.075	1.093	1.194649	0.837066
5899716	1	-4.075	1.093	1.194649	0.837066
664294X	1	-4.075	1.093	1.194649	0.837066
167385Y	1	-4.075	1.093	1.194649	0.837066
879205B	1	-3.193	0.826	0.682276	1.465683
887311E	1	-3.193	0.826	0.682276	1.465683
559913T	1	-3.193	0.826	0.682276	1.465683
892282R	1	-3.193	0.826	0.682276	1.465683
313706K	1	-3.193	0.826	0.682276	1.465683
106480V	1	-3.193	0.826	0.682276	1.465683
943681X	1	-3.193	0.826	0.682276	1.465683

Figure 5. Excerpt of data from Excel spreadsheet with err2 and information columns added.

- In a cell below all of the data, such as C2075, enter the formula to compute the variance of the proficiency estimates (i.e. $=\text{var}(E8 : E2061)$). Label this "total variance".
- In the next cell down, enter the formula to compute the sum of the squared errors divided by N (i.e. $=\text{sum}(G8 : G2061) / \text{count}(G8 : G2061)$). Label this "MSE".
- In the next cell down, enter the formula to compute the difference between the total variance and the MSE. Label this "variance accounted for by model".
- In the next cell down, enter the formula for r (variance by model/total variance) and label it "reliability".
- Save the spreadsheet with a new name.

4.469 Total Variance
0.678 MSE
3.791 Variance accounted for by model
0.848 reliability

Figure 6. Summary calculations in Excel.

The Student Abilities report also contains much of this information. The "MLE Variance" value is the total variance, the "Model Variance" is the variance accounted for in the model, and the "Person Separation Reliability" is the reliability coefficient.

```
pf
Student count      = 2054
Average MLE        = 1.51857
MLE Variance       = 4.47092
SE Mean            = 0.04666
Model Variance     = 3.64231
Person sep. rel.   = 0.84835
```

Figure 7. Summary calculations from the Full Ability Estimates Report generated by ConstructMap.