

## PROCEDURE FOR COMMON PERSON LINKING OF PRTIII AND BLOT USING EXCEL

1. Run PRTIII analysis in WINSTEPS and obtain person ability estimates and error estimates. Do the same for BLOT. In each analysis:  
     Click on "Output files" menu  
     Click on "PERSON File PFILE=" and create a file of person measures from BLOT and from PRTIII.  
     Import these measures, including the ID number, into an Excel spreadsheet.
2. Merge the two files by ID (column A) and obtain the file shown in Figure 1.

	A	B	C	D	E	F
	ID	BLOTERR	PRTER	BLOT	PRT	
1	1	48	82	1.85	1.85	
2	2	1.03	1.18	3.96	3.70	
3	3	48	74	1.85	1.24	
4	4	1.03	82	3.96	1.85	
5	5	75	82	3.20	1.85	
6	6	63	75	2.73	-1.22	
7	7	75	68	3.20	- .22	
8	8	75	94	3.20	2.61	
9	9	1.03	74	3.96	1.24	
10	10	75	1.92	3.20	5.18	
11	11	1.03	70	3.96	.72	
12	12	43	75	1.43	-1.22	
13	13	56	70	2.37	.72	
14	14	56	70	2.37	- .70	
15	15	56	75	2.37	-1.22	
16	16	75	82	3.20	1.85	
17	17	75	74	3.20	1.24	
18	18	56	75	2.37	-1.22	
19	19	1.03	82	3.96	1.85	
20	20	63	70	2.73	- .70	
21	21	56	74	2.37	1.24	

Figure 1. The merged file from PRTIII and BLOT person estimates.

3. Compute the average of ability estimates for BLOT (column D) and PRTIII (column E) and obtain the file demonstrated in Figure 2.

Average measure for BLOT = 1.6461  
 $D152 = \text{AVERAGE}(D2:D151)$   
 Average measure for PRTIII = -0.6323  
 $E152 = \text{AVERAGE}(E2:E151)$

	A	B	C	D	E	F
1	ID	BLOTERR	PRTERR	BLOT	PRT	
2	1	.48	.82	1.85	1.85	
3	2	1.03	1.18	3.96	3.70	
4	3	.48	.74	1.85	1.24	
5	4	1.03	.82	3.96	1.85	
6	5	.75	.82	3.20	1.85	
7	6	.63	.75	2.73	-1.22	
8	7	.75	.68	3.20	-2.22	
9	8	.75	.94	3.20	2.61	
140	139	.37	.83	.07	-1.84	
141	140	.37	1.92	.21	-5.20	
142	141	.39	.95	-.77	-2.62	
143	142	.40	.75	1.09	-1.22	
144	143	.63	.70	2.73	-.70	
145	144	.43	.83	-1.43	-1.84	
146	145	.37	.95	.34	-2.62	
147	146	.43	.70	1.43	-.70	
148	147	.37	1.18	-.07	-3.73	
149	148	.63	.70	2.73	.72	
150	149	.37	1.92	.34	-5.20	
151	150	.42	.68	1.25	.24	
152	MEAN			1.65	-.63	

Figure 2. Calculating the means of PRTIII and BLOT person estimates.

4. Calculate the difference between the two means:  
 $\text{Difference} = 1.6461 - (-.6323) = 2.2784 = 2.28$   
 $= (D152 - E152)$
5. Adjust the PRTIII person measures by incorporating the mean difference, as shown in Figure 3:

Person ability estimates of PRTIII adjusted for BLOT  
 $= \text{person ability estimates of PRTIII} + 2.28$   
 PRTADJ: F2 = (E2 + 2.28) then Fill Down.

	A	B	C	D	E	F	G	H
	ID	BLTERR	PRTERR	BLT	PRT	PRTADJ		
1	1	.48	.82	1.85	1.85	4.13		
2	2	1.03	1.18	3.96	3.70	5.98		
3	3	.48	.74	1.85	1.24	3.52		
4	4	1.03	.82	3.96	1.85	4.13		
5	5	.75	.82	3.20	1.85	4.13		
6	6	.63	.75	2.73	-1.22	1.06		
7	7	.75	.68	3.20	-.22	2.06		
8	8	.75	.94	3.20	2.61	4.89		
9	9	1.03	.74	3.96	1.24	3.52		
10	10	.75	1.92	3.20	5.18	7.46		
11	11	1.03	.70	3.96	.72	3.00		
12	12	.43	.75	1.43	-1.22	1.06		
13	13	.56	.70	2.37	.72	3.00		
14	14	.56	.70	2.37	-.70	1.58		
15	15	.56	.75	2.37	-1.22	1.06		
16	16	.75	.82	3.20	1.85	4.13		
17	17	.75	.74	3.20	1.24	3.52		
18	18	.56	.75	2.37	-1.22	1.06		
19	19	1.03	.82	3.96	1.85	4.13		
20	20	.63	.70	2.73	-.70	1.58		
21	21	.56	.74	2.37	1.24	3.52		
22	22	.45	.68	1.63	-.22	2.06		
23	23	1.84	.82	5.21	1.85	4.13		
24	24	1.03	.95	3.96	-2.62	-.34		
25	25	1.03	.82	3.96	1.85	4.13		
26	26	.48	.68	1.85	.24	2.52		
27	27	1.84	.70	5.21	.72	3.00		
28	28	.51	.94	2.09	2.61	4.89		

Figure 5.13. Adjusting PRTIII measures by incorporating the mean difference.

6. Compute the paired 95% quality control lines:

D-2\*EBLOT:

$$G2 = ((D2+F2)/2 - \text{SQRT}(B2*B2 + C2*C2))$$

D+ 2\*EPRT:

$$H2 = ((D2+F2)/2 + \text{SQRT}(B2*B2 + C2*C2))$$

D+ 2\*EBLOT:

$$I2 = ((D2+F2)/2 + \text{SQRT}(B2*B2 + C2*C2))$$

D- 2\*EPRT

$$J2 = ((D2 + F2)/2 - \text{SQRT}(B2*B2 + C2 * C2))$$

By now, the working file should have the following variables added:  
PRTIII adjusted ability estimates, and a1 ( $D - 2*EBLOT$ ), b1 ( $D + 2*EPRT$ ),  
a2 ( $D - 2*BLOT$ ), b2 ( $D - 2*EPRT$ ), as demonstrated in Figure 4.

	D	E	F	G	H	I	J	K
1	BLOT	PRT	PRTADJ	D-2*EBLOT	D+2*EPRT	D+2*EBLOT	D-2*EPRT	
2	1.85	1.85	4.13	2.04	3.94	3.94	2.04	
3	3.96	3.70	5.98	3.40	6.54	6.54	3.40	
4	1.85	1.24	3.52	1.80	3.57	3.57	1.80	
5	3.96	1.85	4.13	2.73	5.36	5.36	2.73	
6	3.20	1.85	4.13	2.55	4.78	4.78	2.55	
7	2.73	-1.22	1.06	0.92	2.87	2.87	0.92	
8	3.20	-2.22	2.06	1.62	3.64	3.64	1.62	
9	3.20	2.61	4.89	2.84	5.25	5.25	2.84	
10	3.96	1.24	3.52	2.47	5.01	5.01	2.47	
11	3.20	5.18	7.46	3.27	7.39	7.39	3.27	
12	3.96	.72	3.00	2.23	4.73	4.73	2.23	
13	1.43	-1.22	1.06	0.38	2.11	2.11	0.38	
14	2.37	.72	3.00	1.79	3.58	3.58	1.79	
15	2.37	-.70	1.58	1.08	2.87	2.87	1.08	
16	2.37	-1.22	1.06	0.78	2.65	2.65	0.78	
17	3.20	1.85	4.13	2.55	4.78	4.78	2.55	
18	3.20	1.24	3.52	2.31	4.41	4.41	2.31	
19	2.37	-1.22	1.06	0.78	2.65	2.65	0.78	
20	3.96	1.85	4.13	2.73	5.36	5.36	2.73	
21	2.73	-.70	1.58	1.21	3.10	3.10	1.21	

Figure 5.14. The complete working file.

- Plot the obtained results in EXCEL using scatterplot. There are three series to be plotted: Series 1 contains BLOT ability estimates on the x axis and PRTIII ability estimates on the y  
Series 2 contains a1 on the x axis and b1 on the y axis.  
Series 3 contains a2 on the x axis and b2 on the y axis.  
The resulting graph is shown in Figure 5.

(Note: Values for a1 are in Column G, b1 values are in H, a2 values are in I, and values for b2 are in Column J)

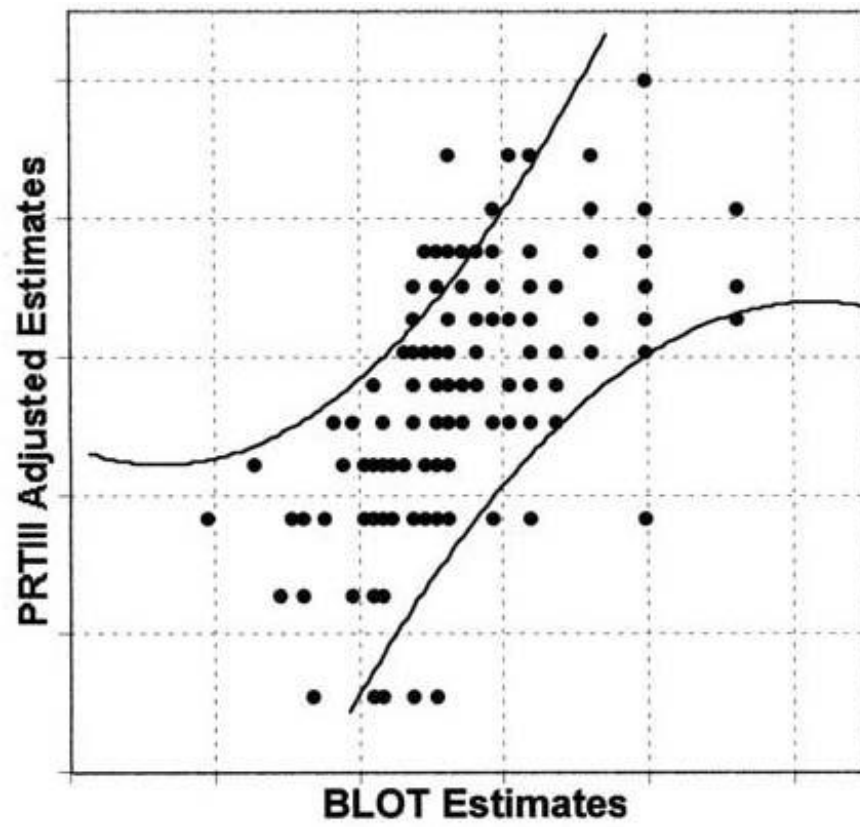
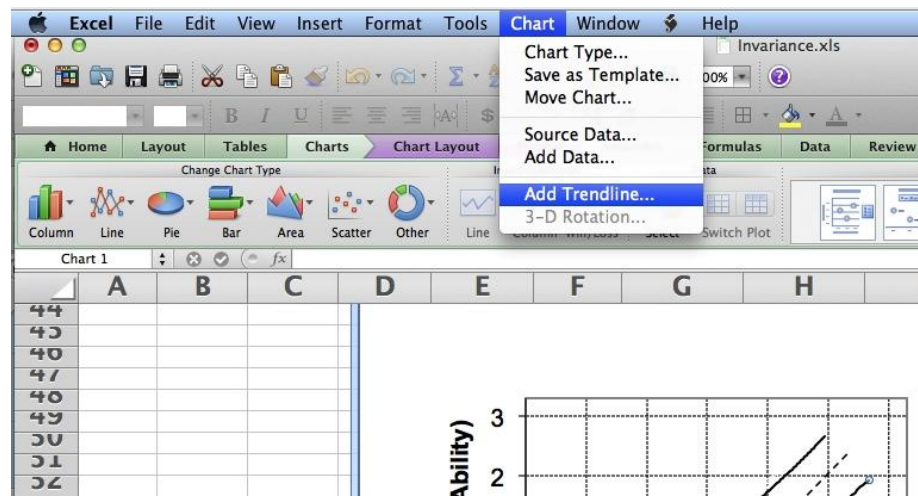
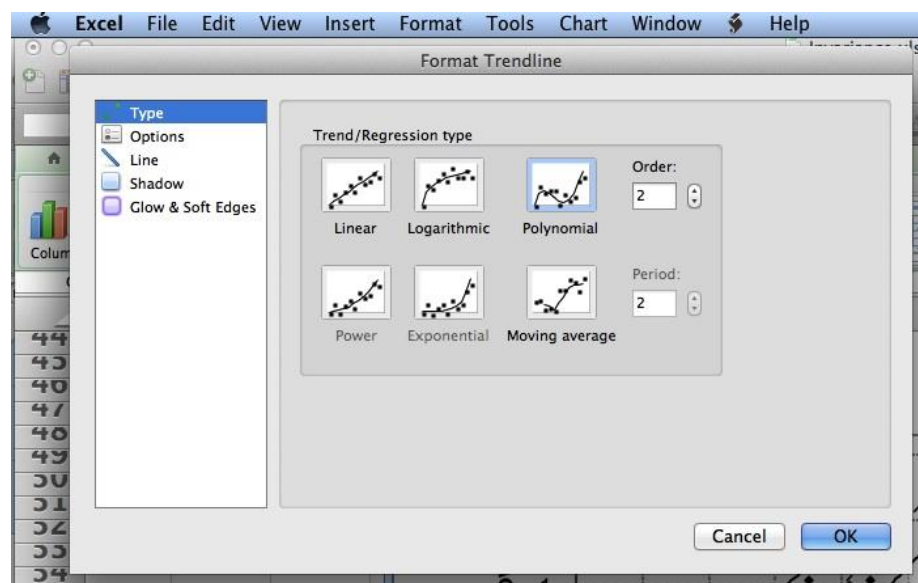


Figure 5. Common person linking BLOT and PRTIII.

To neaten up the 95% control lines, add a trendline in place of them:



Select Polynomial:



The spreadsheet “Invariance.xls” provides the data and graphs for checking the Invariance of BLOT item measures (Top Students v Bottom Students):

Figure 5.1 Item Difficulty Invariance – Bond’s Logical Operations Test; and

Invariance of BLOT person measures (Odd items v Even Items):

Figure 5.3 Invariance of BLOT Person Abilities, each estimated with half the items (odd v even)

Bond&Foxsteps can use the whole host of Winsteps control lines to select persons or items for these analyses, incl.:

PSELECT= person selection criterion; ISELECT= item selection criterion

To do so, paste in the following into "Other specification in control file" box on the data set-up screen next time you run the analysis.