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Note

All analyses were performed using the R statistical software

- R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org/>.
- Bates D, Maechler M, Bolker B and Walker S (2015). lme4: Linear mixed-effects models using Eigen and S4 R package version 1.1-8, URL <http://CRAN.R-project.org/package=lme4>
- Wickham H ggplot2: elegant graphics for data analysis. Springer New York, 2009
- Yihui Xie (2015). knitr: A General-Purpose Package for Dynamic Report Generation in R. R package version 1.10.5

Some of the graphs in this document make meaningful use of colour. This means that important differences may not be visible if the report is printed out in grey scale rather than viewed on screen.

This report was produced in \LaTeX , using Lyx as an editor and using knitr to process R code embedded in the source files.

1 overview

This appendix contains tables and graphs providing technical information in support of the discussions in annexes A, B and C of this report.

This information is not intended to be self-explanatory, providing only notes that allow the reader to find on the web many explanations of the technical issues involved. There are three sections:

- detailed information about the analysis of UCE data in described in annex A and referred to in annex C
- IRT analyses of NAPE data discussed in annex B
- IRT analyses of PLE marks at the item level described in annex A and referred to in annex C.

The main text of the report includes high-level descriptions of key aspects of the issues explored at greater length in the annexes.

2 UCE data

Table 1 provides the distributions (as percentages) of the divisions in the UCE sample data set we analysed. The table has been sort by the total number in each subject (as a percentage

of the total number in the sample – this column is headed ‘% of total’). The column headed ‘Prop Div 1’ is a simple categorisation of the proportion (shown in the column headed ‘%1’) of the total subject getting division 1. The column headed ‘Prop PLE Div 1’ is a categorisation of the proportion of the subject cohort with a Division 1 result in PLE – a measure of the academic competitiveness of the subject cohort. Those subjects with a proportion of students getting PLE Division 1 similar (+/- 10%) to the proportion in the total cohort who got Division 1 in PLE have been labelled ‘similar’. Those labelled ‘lower’ have a lower proportion than this, those labeled ‘much higher’ have a proportion twice (or more) that found in the cohort as a whole.

The overwhelming impression is that division 1 and division 2 results in the larger subjects are very rare.

Setting aside the very small subjects, there are several subjects showing a tendency for a larger proportion of division 1s to be associated with a cohort having a higher proportion of PLE division 1s (a more ‘academic’ cohort) – for example, Luganda, Political Education, French, Foods & Nutrition, Lango and Typewriting. However, there are significant exceptions – for example, Art, Lusoga, Technical Drawing, Computer Studies. There may be some other factors at work, such as the difference between more ‘academic’ and more ‘practical’ studies as well as, perhaps, some gender-related differences in participation and achievement.

Table 2 provides the distribution (in percentages) of the PLE results of students in this sample data set.

Table 3 summarises the results of using mixed effects modelling of UCE English division¹ in terms of so-called² fixed effects of BirthYear (number of years before or after 1996), Gender, PLE Year (number of years before or after 2010), PLE English, Mathematics, Science and SST. Examination Centre (coded as ‘CenterNo’) was used as a so-called ‘random’ effect to see if there are any systematic differences between groups of students in different centres, once the fixed effects have been taken into account.

The technique of mixed effects modelling goes by a range of names in different disciplines. In education, it is often known as hierarchical linear modelling (HLM). It is a technique that is very useful where data sets at the individual level – in this case, students taking UCE examinations – have a meaningful grouping – in this case, examination centres and where the numbers in each group vary.

The information about each fixed effect in table 3 is a coefficient (with an indicator of the extent to which it may be thought of as different from zero) and a standard error in parentheses – for example 0.002). For the random effect (an intercept for each centre), the variance is listed (0.34). This can be compared with the total variance unaccounted for by the fixed effects: the sum of the random effect variance and the residual variance. In this case, centre number accounts for about 19.5 per cent of this variance – a noticeable proportion.

The title of the table includes a pseudo R squared value (the ratio of the explained variance to the total variance). Such values cannot be used to compare models but do give some idea of how well the model works.

Table 4 summarises the results of similar analyses for the nine large and medium sized subjects and the overall UCE division. Values are given for fixed effects coefficients when these are significant (a t-value greater than 3.0).

¹As discussed in annex A, divisions are probably not an interval scale and would be better modelled as ordinal categories or in terms of the underlying raw scores.

²These are neither fixed nor effects in the implied sense of causation.

Road-map: tables and graphs

	% 1	% 2	% 3	% 4	% 5	% 6	% 7	% 8	% 9	% of total	Prop Div 1	Prop PLE Div 1
English Language	1	2	5	10	16	24	13	13	16	98	tiny	similar
History	3	4	6	9	11	14	11	11	31	98	tiny	similar
Geography	0	2	4	9	14	19	16	15	21	98	tiny	similar
Mathematics	1	2	4	6	8	13	19	28	19	98	tiny	similar
Physics	0	1	1	3	5	8	10	18	56	98	tiny	similar
Chemistry	1	1	2	2	3	6	9	20	55	98	tiny	similar
Biology	0	0	1	2	4	7	10	18	57	91	tiny	similar
Agric Principles and Practices	0	0	2	7	13	22	20	19	16	64	tiny	lower
Christian Religious Education	2	5	8	12	15	18	16	13	11	61	tiny	similar
Commerce	3	4	7	10	13	16	8	10	29	13	tiny	similar
Luganda	12	15	18	17	13	10	7	4	4	12	small	lower
Art	1	1	1	2	5	18	18	27	27	12	tiny	lower
Literature in English	5	9	12	17	17	15	10	7	7	7	small	much higher
Islamic Religious Education	11	14	15	16	15	11	7	5	7	7	small	higher
IPS	0	0	2	9	21	34	21	4	9	6	tiny	lower
Lugha ya Kiswahili	4	13	15	17	16	13	6	5	10	4	small	higher
Political Education	13	18	7	12	12	17	7	6	9	2	larger	much higher
French	32	12	10	11	12	9	7	4	3	1	larger	much higher
Lusoga	14	19	19	17	11	7	8	3	2	1	larger	lower
Foods & Nutrition	15	24	28	18	9	4	1	0	1	1	larger	much higher
Arabic	12	19	18	18	15	9	5	2	1	1	small	higher
Principles of Accounts	4	5	8	11	10	13	13	13	24	1	small	higher
Christian Religious Education (224)	3	6	11	18	13	15	11	9	16	1	tiny	higher
Lango	0	5	15	29	27	14	4	3	2	1	tiny	lower
Technical Drawing	1	8	16	19	19	16	11	6	3	1	tiny	much higher
Computer Studies	1	2	6	15	14	12	9	11	30	1	tiny	much higher
Entrepreneurship Education	0	0	1	3	5	9	18	21	43	1	tiny	lower
Runyankore/Rukiga		6	11	19	22	21	15	5	2	1		similar
German	18	20	26	17	11	6	1			0	larger	
Dhopadhola	33	18	17	15	10	4	2		2	0	larger	lower
Additional Mathematics	16	17	19	13	14	11	3	3	4	0	larger	
Power and Energy	67	33								0	larger	
Typewriting	40	20	10	7	10		13			0	larger	much higher
Ateso	10	17	23	17	15	9	6	2	1	0	small	lower
General Science	4		4	4	4	4	4	21	54	0	small	lower
Music	5	10	13	13	15	18	9	9	9	0	small	much higher
Home Management	4	15	17	26	17	11	5	3	3	0	small	much higher
Metalwork	7	7	21	7	21	14	14	7		0	small	much higher
Building Construction	12	18	30	19	11	3	2	2	1	0	small	much higher
Electricity and Electronics	9	18	45	9	18					0	small	
Latin	3	6	9	20	25	17	12	6	2	0	tiny	much higher
Lugbarati	2	10	21	29	17	5	8	5	2	0	tiny	lower
Health Education	1	1	2	8	16	24	19	15	14	0	tiny	lower
Woodwork	2	14	33	27	9	6	5	5		0	tiny	much higher
Office Practice	3	7	10	7	10	16	10	4	34	0	tiny	higher
Fasihi ya Kiswahili		100								0		
Acoli			6	50	25	12			6	0		much higher
Clothing and Textiles			10	23	34	18	8	5	3	0		much higher
Building Practice			4	14	29	32	18	4		0		higher

Table 1: Distribution (as rounded percentages) of results in (200,000 random sample) of students with UCE results in 2015

	English	Mathematics	Science	SST
Division 1	1.4		1.1	1.3
Division 2	17.4		6.7	13.4
Division 3	14.8		8.1	14.7
Division 4	16.5		11.3	19.9
Division 5	18.0		17.2	22.2
Division 6	20.0		24.9	18.4
Division 7	7.5		14.6	6.9
Division 8	3.8		12.3	2.7
Division 9	0.7		3.8	0.5

Table 2: Distribution (as rounded percentages) of the PLE results in (200,000 random sample) of students with UCE results in 2015

mixed effects UCE English	
(Intercept)	3.031 (0.019)***
BirthYear	-0.174 (0.002)***
GenderM	0.075 (0.006)***
PLEYear	0.296 (0.005)***
PLEEnglish	0.349 (0.003)***
PLEMaths	0.105 (0.002)***
PLEScience	0.038 (0.003)***
PLESST	0.170 (0.003)***
AIC	569360.272
BIC	569461.134
Log Likelihood	-284670.136
Num. obs.	177393
Num. groups: CenterNo	2881
Var: CenterNo (Intercept)	0.340
Var: Residual	1.398

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 3: Mixed effect model for UCE English (pseudo R2 is 0.62)

	BirthYear	GenderM	PLEYear	PLEEnglish	PLEMaths	PLEScience	PLESST	Subject	Approxvar
Chemistry	-0.11	-0.24	0.09	-0.02	0.22	0.09	0.10	Chemist	20.10
Physics	-0.11	-0.35	0.09		0.24	0.07	0.08	Physics	20.30
Mathematics	-0.13	-0.34	0.14	-0.02	0.55	0.01	0.07	Mathema	13.40
Geography	-0.16	-0.33	0.20	0.03	0.24	0.11	0.22	Geograp	19.30
History	-0.19	-0.45	0.15		0.14	0.18	0.34	History	19.00
English Language	-0.17	0.08	0.30	0.35	0.11	0.04	0.17	English	19.50
Biology	-0.09	-0.22	0.07		0.16	0.13	0.10	Biology	20.20
Agric Principles and Practices	-0.10	-0.51	0.17	0.04	0.06	0.20	0.22	AgricPr	20.70
Christian Religious Education	-0.12	0.04	0.19	0.18	0.05	0.09	0.27	Christi	23.00
All	-0.08	-0.17	0.08	0.03	0.13	0.07	0.10	UCEDivision	19.30

Table 4: Coefficients in mixed effect modelling UCE result from various parameters

3 NAPE

This section provides tables and Wright Maps (item-person maps) for selected NAPE tests in P 3, P6 and S2.

For each test, we provide

- three tables:
 - the outfit and infit statistics
 - the item parameters from fitting a one parameter IRT model (location values)
 - the item parameters from fitting a two parameter IRT model (location and slope values)
- one wright map, in which item thresholds are plotted on the right with a histogram showing, on the same logit scale, the distribution of person scores on the left

Basic IRT models are based on an assumption that a single latent trait (or ability) is measured by a test. The probability that a person will get an item right, says the model, is a function of a person's ability and the characteristics of an item. The item's characteristics are represented as a probability curve. Such a curve is specified by its mathematical form and two parameters: a location (interpretable for dichotomous items as a difficulty) and a slope (intepretable as discrimination – steep curves mean that the probability of getting the item right changes rapidly with ability).

Using IRT means the data set is analysed to identify information about items in a way that means that information about items is, unlike classical test statistics, intentionally not dependent on the information about persons – if the model applies, then the information about items is separated from the information about the persons who actually took the test.

IRT requires that items are locally independent – the chance of getting any item correct is dependent on ability, not on getting another item.

Tables such as 5 provide an indication of how well the items in the test fit the model. Two measures are given (both based on a chi-square measure of the difference between observed and predicted):

- outfit (together with a t-value and associated probability of getting a value as large as this if the model is correct)
- infit (together with a t-value and associated probability of getting a value as large as this if the model is correct).

Outfit and infit values have an expected value of 1.0 – so values close to 1.0 (say from 0.5 towards 2.0) suggest a more-or-less satisfactory fit. A value for an item outside this range suggests some potential issues with the item. Outfit values will be outside the expected range when there are enough exceptions to the expected patterns of responses (for example, low ability persons getting a 'difficult' item correct). Infit is a weighted measure that pays more attention to the middle ranges of ability and reflects the extent to which the actual variance on the item is close to the variance predicted by the model.

Tables such as 6 and 7 provide item parameters resulting from fitting IRT models. Item parameters appear in columns headed Ax_{si_cat1} (location) and Bx_{si_cat1} (slope).

Table 6 provides the results of fitting a one parameter IRT model. Using a one parameter IRT model means assuming that the slope parameters for items are all the same – for dichotomous items, a value of 1.0 and, as can be seen in this table, 1.0, 2.0, 3.0 and so on for each score category.

Where the response is dichotomous, the item parameters for location in the tables can be seen as difficulties. Where the response is polytomous, the item parameters are the δ (delta) parameters in the partial credit model. These are not interpretable as difficulties.

Using a two parameter IRT model means assuming that the slope parameters for items can be different – see for example, table 7.

We used the information in these tables to support our comments about redundancy of items – items providing essentially the same information.

The Thurstonian thresholds (item thresholds) in the wright maps (for example, 1) show the ability (on the logit scale) at which the probability of getting at least this score or higher (if the item is polytomous) is 0.5. Thresholds are represented by coloured symbols. Wright maps give a visual sense of the spread of items across the ability scale and the extent to which categories in polytomous items are separated. Overlapping or nearly overlapping category symbols suggest that the different categories (scores) on this item do not represent real differences in ability. Tables such as table 8 provide the numerical values of these thresholds.

We did not have the data we would have needed to put the cut-offs for proficiency levels onto these maps.

item	fitgroup	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
n1	1	2.51	28.42	0.00	1.30	8.63	0.00
n2	2	0.99	-1.05	0.30	1.00	0.11	0.92
n3	3	0.96	-3.33	0.00	0.97	-3.74	0.00
n4	4	0.96	-4.69	0.00	0.97	-4.60	0.00
n5	5	1.11	1.97	0.05	0.98	-0.56	0.58
n6	6	1.70	5.71	0.00	0.98	-0.35	0.73
n7	7	1.00	0.06	0.96	0.98	-0.51	0.61
n8	8	0.98	-0.66	0.51	1.07	5.65	0.00
n9	9	2.09	22.94	0.00	1.30	28.32	0.00
n10	10	0.81	-13.47	0.00	0.88	-15.95	0.00
n11	11	1.27	11.35	0.00	1.16	16.54	0.00
n12	12	0.74	-21.11	0.00	0.79	-27.01	0.00
n13	13	5.36	40.57	0.00	1.46	27.06	0.00
n14a	14	1.21	9.38	0.00	1.05	3.58	0.00
n14b	15	0.75	-23.70	0.00	0.81	-29.30	0.00
n14c	16	0.85	-5.03	0.00	0.91	-4.22	0.00
n15	17	1.05	2.76	0.01	1.02	1.45	0.15
n16a	18	0.99	-0.73	0.47	0.98	-2.63	0.01
n16b	19	0.97	-5.59	0.00	0.98	-4.44	0.00
n16c	20	0.89	-6.54	0.00	0.94	-7.64	0.00
n17	21	1.18	6.90	0.00	1.09	8.86	0.00
n18	22	1.10	6.62	0.00	1.08	8.37	0.00
n19	23	0.83	-9.09	0.00	0.91	-10.90	0.00
n20	24	0.89	-12.42	0.00	0.92	-12.27	0.00
n21	25	1.03	2.09	0.04	1.03	2.85	0.00
n22	26	0.98	-1.23	0.22	1.00	-0.38	0.70
n23	27	1.65	39.76	0.00	1.43	41.29	0.00
n24	28	0.93	-9.95	0.00	0.95	-10.54	0.00
n25	29	0.78	-17.77	0.00	0.83	-23.07	0.00
n26	30	0.67	-17.08	0.00	0.80	-21.48	0.00
n27	31	0.82	-14.09	0.00	0.86	-18.53	0.00
n28	32	1.09	7.32	0.00	1.04	5.70	0.00
n29	33	0.87	-13.26	0.00	0.90	-13.45	0.00
n30	34	1.05	7.79	0.00	1.04	8.54	0.00
n31	35	0.93	-10.62	0.00	0.95	-9.06	0.00
n32	36	0.83	-14.06	0.00	0.89	-16.02	0.00
n33	37	1.89	19.57	0.00	1.26	21.82	0.00
n34	38	1.45	30.03	0.00	1.28	28.06	0.00
n35	39	0.74	-18.16	0.00	0.88	-11.63	0.00
n36	40	0.85	-27.69	0.00	0.88	-28.89	0.00
n37	41	1.43	23.69	0.00	1.20	22.84	0.00

Table 5: infit and outfit statistics for IRT analysis of 2015 NAPE numeracy grade 3

Road-map: tables and graphs

Item	N	M	AXsi_.Cat1	AXsi_.Cat2	AXsi_.Cat3	AXsi_.Cat4	AXsi_.Cat5	AXsi_.Cat6	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1	B.Cat6.Dim1
Item n1	24020	5.83	-0.65	-3.54	-4.51	-6.87	-9.19	-11.97	1.00	2.00	3.00	4.00	5.00	6.00
Item n2	24018	1.48	-0.73	-1.91					1.00	2.00				
Item n3	24039	1.12	1.28	-0.41					1.00	2.00				
Item n4	24039	0.97	-0.16	0.11					1.00	2.00				
Item n5	24039	1.92	-0.88	-4.71					1.00	2.00				
Item n6	24034	2.96	-0.28	-2.77	-7.50				1.00	2.00	3.00			
Item n7	24028	2.89	-1.07	-1.66	-6.07				1.00	2.00	3.00			
Item n8	24027	2.55	-1.32	0.43	-3.84				1.00	2.00	3.00			
Item n9	24012	2.10	1.90	2.42	-1.65				1.00	2.00	3.00			
Item n10	24017	1.29	1.58	-0.94					1.00	2.00				
Item n11	24028	2.06	0.41	0.86	-1.67				1.00	2.00	3.00			
Item n12	24029	1.55	1.00	0.51	-0.14				1.00	2.00	3.00			
Item n13	24021	2.63	2.51	0.06	-3.56				1.00	2.00	3.00			
Item n14a	24032	1.70	-1.10	-3.02					1.00	2.00				
Item n14b	24028	1.05	1.34	-0.19					1.00	2.00				
Item n14c	24031	1.87	-1.77	-4.51					1.00	2.00				
Item n15	24025	3.39	-0.60	-2.24	-3.85	-4.95			1.00	2.00	3.00	4.00		
Item n16a	24025	0.63	2.50	1.15					1.00	2.00				
Item n16b	24025	0.54	-0.18						1.00					
Item n16c	24025	0.55	2.36	1.46					1.00	2.00				
Item n17	23987	0.82	2.07	3.56	1.83				1.00	2.00	3.00			
Item n18	24024	2.77	0.20	-0.40	-1.62	-2.21			1.00	2.00	3.00	4.00		
Item n19	24001	0.53	2.70	1.50					1.00	2.00				
Item n20	24026	1.10	0.29	-0.36					1.00	2.00				
Item n21	24020	0.48	1.03	2.12					1.00	2.00				
Item n22	24019	0.39	1.63	2.41					1.00	2.00				
Item n23	24025	2.31	0.72	0.43	0.37	0.71	0.50		1.00	2.00	3.00	4.00	5.00	
Item n24	24028	0.62	-0.58						1.00					
Item n25	24034	1.34	0.40	-1.17					1.00	2.00				
Item n26	24033	1.57	0.76	-1.96					1.00	2.00				
Item n27	24033	1.33	0.35	-1.16					1.00	2.00				
Item n28	24021	1.30	0.09	-1.05					1.00	2.00				
Item n29	24021	1.26	-0.20	-0.98					1.00	2.00				
Item n30	24030	0.55	-0.26						1.00					
Item n31	24031	0.37	0.58						1.00					
Item n32	24005	0.88	1.92	0.35					1.00	2.00				
Item n33	23995	2.37	1.79	0.48	-2.50				1.00	2.00	3.00			
Item n34	23996	2.27	0.27	0.40	0.31	0.84	0.51		1.00	2.00	3.00	4.00	5.00	
Item n35	24002	0.82	-1.72						1.00					
Item n36	24028	0.48	0.10						1.00					
Item n37	24018	1.80	-0.38	2.30	-1.13				1.00	2.00	3.00			

Table 6: item parameters from 1 parameter IRT analysis of 2015 NAPE numeracy grade 3

Item	Z	M	AXsi_Cat1	AXsi_Cat2	AXsi_Cat3	AXsi_Cat4	AXsi_Cat5	AXsi_Cat6	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1	B.Cat6.Dim1
Item n1	24020	5.83	1.52	-1.16	0.45	-1.68	-3.68	-6.48	-0.16	1.01	-0.04	0.57	1.01	1.80
Item n2	24018	1.48	-0.48	-1.73					0.36	1.46				
Item n3	24039	1.12	1.33	-0.36					0.57	1.64				
Item n4	24039	0.97	-0.13	0.23					0.62	1.69				
Item n5	24039	1.92	-0.75	-4.54					0.69	1.40				
Item n6	24034	2.96	0.91	-2.69					0.08	1.98				
Item n7	24028	2.89	-0.55	-0.94					0.43	0.88				
Item n8	24027	2.55	-0.89	1.39					0.40	0.36				
Item n9	24012	2.10	2.19	2.91					0.52	0.76				
Item n10	24017	1.29	1.57	-1.03					0.58	2.11				
Item n11	24028	2.06	1.05	1.32					-0.05	0.69				
Item n12	24029	1.55	0.59	0.16					1.55	2.76				
Item n13	24021	2.63	3.63	1.35					-0.29	0.19				
Item n14a	24032	1.70	-1.11	-2.91					0.97	1.38				
Item n14b	24028	1.05	1.06	-0.23					1.49	2.77				
Item n14c	24031	1.87	-2.08	-4.99					0.89	1.98				
Item n15	24025	3.39	-0.54	-1.78					0.79	1.17				
Item n16a	24025	0.63	2.57	1.20					1.07	1.68				
Item n16b	24025	0.54	-0.17						0.88					
Item n16c	24025	0.55	2.40	1.62					1.05	1.89				
Item n17	23987	0.82	2.26	3.74					1.34	1.76				
Item n18	24024	2.77	0.33	-0.15					0.68	1.32				
Item n19	24001	0.53	2.87	1.69					1.35	1.95				
Item n20	24026	1.10	0.16	-0.43					1.22	1.98				
Item n21	24020	0.48	1.04	2.09					0.70	1.45				
Item n22	24019	0.39	1.63	2.46					0.75	1.59				
Item n23	24025	2.31	0.99	0.80					0.46	1.08				
Item n24	24028	0.62	-0.60						1.00					
Item n25	24034	1.34	-0.16	-1.62					1.69	2.70				
Item n26	24033	1.57	-0.38	-3.02					2.20	3.14				
Item n27	24033	1.33	-0.13	-1.54					1.66	2.50				
Item n28	24021	1.30	0.11	-1.02					0.94	1.42				
Item n29	24021	1.26	-0.21	-0.96					0.65	2.04				
Item n30	24030	0.55	-0.24						0.65					
Item n31	24031	0.37	0.64						1.02					
Item n32	24005	0.88	1.86	0.44					1.11	2.05				
Item n33	23995	2.37	2.19	1.08					0.43	0.98				
Item n34	23996	2.27	0.12	0.48					1.19	2.18				
Item n35	24002	0.82	-2.13						1.55					
Item n36	24028	0.48	0.13						1.41					
Item n37	24018	1.80	-0.18	2.64					0.57	0.60				

Table 7: Item parameters from 2 parameter IRT analysis of 2015 NAPE numeracy grade 3

	Cat1	Cat2	Cat3	Cat4	Cat5	Cat6
n1	-2.295	-2.185	-2.009	-1.955	-1.868	-1.686
n2	-1.346	-0.564				
n3	-0.317	-0.091				
n4	-0.533	0.638				
n5	-2.469	-2.241				
n6	-2.572	-2.500	-2.429			
n7	-2.188	-1.931	-1.871			
n8	-1.693	-1.005	-0.974			
n9	-0.589	-0.531	-0.512			
n10	-0.532	-0.403				
n11	-0.736	-0.485	-0.393			
n12	-0.331	-0.104	0.256			
n13	-1.223	-1.206	-1.148			
n14a	-1.835	-1.181				
n14b	-0.212	0.025				
n14c	-2.557	-1.950				
n15	-1.739	-1.481	-1.207	-0.607		
n16a	0.501	0.646				
n16b	-0.181					
n16c	0.631	0.828				
n17	0.497	0.652	0.715			
n18	-0.965	-0.732	-0.551	-0.051		
n19	0.680	0.823				
n20	-0.488	0.125				
n21	0.564	1.555				
n22	0.884	1.529				
n23	-0.403	-0.165	0.056	0.314	0.654	
n24	-0.575					
n25	-0.769	-0.397				
n26	-1.067	-0.892				
n27	-0.774	-0.382				
n28	-0.791	-0.259				
n29	-0.858	-0.124				
n30	-0.265					
n31	0.583					
n32	0.089	0.265				
n33	-0.897	-0.848	-0.771			
n34	-0.489	-0.111	0.105	0.372	0.663	
n35	-1.720					
n36	0.096					
n37	-0.775	-0.107	-0.078			

Table 8: thresholds for IRT analysis of NAPE Numeracy 2015 grade 3

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
I1	3.13	10.78	0.00	1.04	0.73	0.47
I2	0.97	-2.71	0.01	0.97	-3.07	0.00
I3	0.91	-8.31	0.00	0.93	-7.62	0.00
I4	1.14	2.55	0.01	1.06	3.00	0.00
I5	0.90	-8.91	0.00	0.90	-10.86	0.00
I6	0.91	-6.19	0.00	0.93	-8.72	0.00
I7	1.66	43.09	0.00	1.24	24.70	0.00
I8	0.79	-15.08	0.00	0.85	-17.13	0.00
I9	5.41	89.63	0.00	2.49	84.68	0.00
I10	1.75	40.54	0.00	1.23	20.25	0.00
I11	2.05	33.17	0.00	1.23	13.90	0.00
I12	3.31	46.39	0.00	1.34	24.20	0.00
I13	0.63	-31.12	0.00	0.69	-36.48	0.00
I14	0.71	-30.07	0.00	0.75	-32.38	0.00
I15	0.94	-4.41	0.00	0.95	-5.42	0.00
I16	1.18	15.80	0.00	1.12	12.64	0.00
I17	0.89	-9.21	0.00	0.93	-8.12	0.00
I18	1.16	13.40	0.00	1.09	9.45	0.00
I19	0.78	-20.50	0.00	0.81	-22.86	0.00
I20	0.67	-26.95	0.00	0.74	-31.69	0.00
I21	0.76	-23.22	0.00	0.79	-26.06	0.00

Table 9: infit and outfit statistics for IRT analysis of 2015 NAPE literacy grade 3

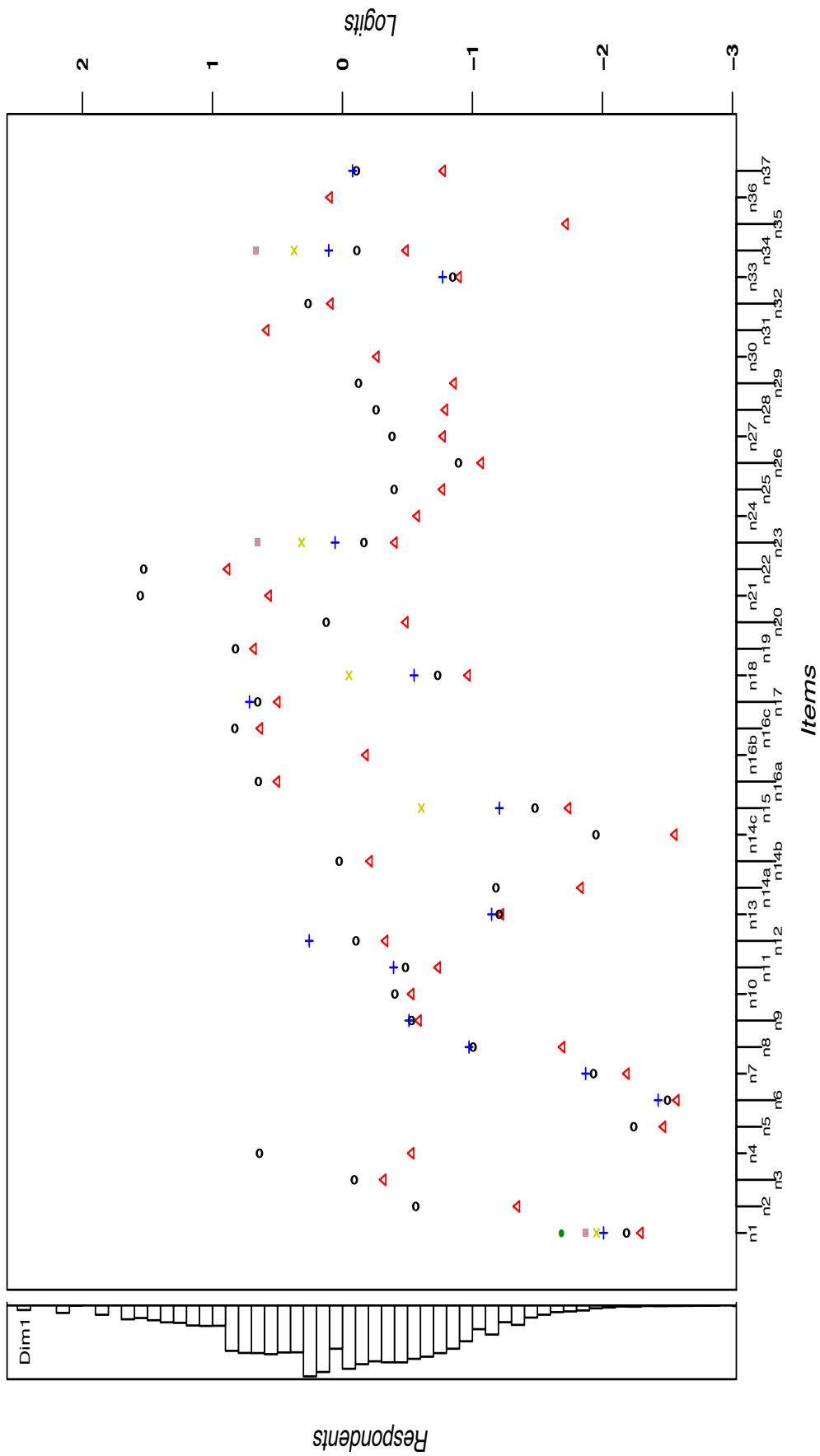


Figure 1: Wright Map for items in 2015 NAPE numeracy grade 3

Item	N	M	AXsi_Cat1	AXsi_Cat2	AXsi_Cat3	AXsi_Cat4	AXsi_Cat5	AXsi_Cat6	AXsi_Cat7	AXsi_Cat8	AXsi_Cat9	AXsi_Cat10	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1	B.Cat6.Dim1	B.Cat7.Dim1	B.Cat8.Dim1	B.Cat9.Dim1	B.Cat10.Dim1
Item11	24027	3.96	-0.87	-2.38	-3.27	-8.63							1.00	2.00	3.00	4.00						
Item12	24023	3.33	1.75	-0.00	1.29	0.26	1.35					4.26	1.00	2.00	3.00	4.00	5.00					
Item13	24025	1.84	0.20	0.26	0.54	1.97	1.50						1.00	2.00	3.00	4.00	5.00					
Item14	24028	1.83	2.39	-3.15									1.00	2.00								
Item15	24027	2.47	1.90	-0.24	1.02	0.37	1.28	1.24					1.00	2.00	3.00	4.00	5.00	6.00				
Item16	24025	2.41	-0.41	-0.92	1.74	-1.61							1.00	2.00	3.00	4.00						
Item17	24011	4.06	0.02	-1.42	-2.22	-2.53	-2.26	-3.20					1.00	2.00	3.00	4.00	5.00	6.00				
Item18	24020	1.70	0.37	0.74	2.00	0.38							1.00	2.00	3.00	4.00						
Item19	24017	3.57	3.77	1.26	2.07	-0.37	1.07	-1.57					1.00	2.00	3.00	4.00	5.00	6.00				
Item110	24023	3.20	0.49	-2.62	-2.59	-3.99							1.00	2.00	3.00	4.00						
Item111	24019	4.31	0.33	-0.60	-1.76	-3.34	-4.97						1.00	2.00	3.00	4.00	5.00					
Item112	24015	3.33	2.51	0.16	-1.18	-3.46							1.00	2.00	3.00	4.00						
Item113	24011	1.15	1.02	1.23	1.71	2.63							1.00	2.00	3.00	4.00						
Item114	24009	2.64	-0.54	-0.77	-0.75	-0.71	-0.76						1.00	2.00	3.00	4.00	5.00					
Item115	24009	2.82	1.85	0.73	0.64	-0.13	0.03						1.00	2.00	3.00	4.00	5.00	6.00				
Item116	24000	3.11	0.52	-0.73	-1.94	-2.40	-1.18	0.59					1.00	2.00	3.00	4.00	5.00					
Item117	24019	1.27	0.31	1.55	0.39								1.00	2.00	3.00	4.00						
Item118	24014	1.25	0.54	0.35	3.33	2.06							1.00	2.00	3.00	4.00						
Item119	24012	1.62	0.20	0.14	1.83	0.71							1.00	2.00	3.00	4.00						
Item120	24011	1.55	1.83	0.53	1.91	0.98							1.00	2.00	3.00	4.00						
Item121	23987	2.11	0.54	0.62	0.16	0.01	1.53						1.00	2.00	3.00	4.00	5.00					

Table 10: Item parameters from 1 parameter IRT analysis of 2015 NAPE literacy grade 3

Item	N	M	AXsl_Cat1	AXsl_Cat2	AXsl_Cat3	AXsl_Cat4	AXsl_Cat5	AXsl_Cat6	AXsl_Cat7	AXsl_Cat8	AXsl_Cat9	AXsl_Cat10	B_Cat1_Dim1	B_Cat2_Dim1	B_Cat3_Dim1	B_Cat4_Dim1	B_Cat5_Dim1	B_Cat6_Dim1	B_Cat7_Dim1	B_Cat8_Dim1	B_Cat9_Dim1	B_Cat10_Dim1
Item 11	24027	3.96	-0.97	-1.84	-2.36	-7.49							0.89	1.26	2.01	1.96						
Item 12	24023	3.33	1.35	-0.33	1.01	0.13	1.41	0.95	2.52	2.79	4.36	5.51	1.38	2.12	3.29	4.28	5.22	6.11	6.85	7.69	8.29	9.62
Item 13	24025	1.84	0.06	0.20	0.58	2.25	1.73						1.06	1.64	2.49	3.43	4.05					
Item 14	24028	1.83	2.69	-2.83									0.34	1.00								
Item 15	24027	2.47	1.62	-0.49	0.90	0.35	1.48	1.79					1.17	2.01	3.30	4.01	4.95	5.93				
Item 16	24025	2.41	-0.21	-0.72	1.91	-1.28							0.45	1.10	1.96	3.00						
Item 17	24011	4.06	0.26	-1.03	-1.86	-1.92	-1.59	-2.71					0.47	0.99	2.21	2.24	2.62	2.94				
Item 18	24020	1.70	0.37	0.74	2.21	0.89							0.72	1.40	2.78	3.76						
Item 19	24017	3.57	4.48	2.32	3.44	1.05	2.44	-0.43					-0.21	0.02	0.02	0.57	0.53	0.93				
Item 110	24023	3.20	1.01	-1.88	-1.56	-2.99							0.28	0.94	0.96	1.44						
Item 111	24019	4.31	0.39	0.14	-0.44	-1.80	-3.40						0.95	1.04	1.00	1.33	1.82					
Item 112	24015	3.33	3.15	1.29	0.16	-2.08							0.17	0.28	0.72	1.00						
Item 113	24011	1.15	0.69	1.38	2.62	4.71							2.03	3.72	5.20	6.70						
Item 114	24009	2.64	-0.83	-1.27	-1.38	-1.02	-0.12						0.95	2.00	3.51	5.34	7.07					
Item 115	24009	2.82	1.78	0.71	0.72	0.05	0.05	1.57					0.85	1.55	1.78	3.60	3.89	5.66				
Item 116	24000	3.11	0.85	-0.22	-1.26	-1.69	-0.57						0.40	0.94	1.29	1.90	2.47					
Item 117	24019	1.27	0.28	1.62	0.53								0.86	1.70	2.42							
Item 118	24014	1.25	0.58	0.39	3.15	1.98							0.98	1.17	1.56	2.54						
Item 119	24012	1.62	0.05	0.02	1.86	1.50							1.04	1.75	2.90	4.39						
Item 120	24011	1.55	1.35	0.26	1.70	1.74							2.01	3.42	4.11	5.94						
Item 121	23987	2.11	0.21	0.32	-0.11	0.13	3.18						1.25	2.05	2.99	4.46	6.36					

Table 11: item parameters from 2 parameter IRT analysis of 2015 NAPE literacy grade 3

	Cat1	Cat2	Cat3	Cat4	Cat5	Cat6	Cat7	Cat8	Cat9	Cat10
I1	-2.280	-2.136	-2.070	-2.049						
I2	-0.360	-0.279	0.015	0.080	0.283	0.374	0.676	0.817	1.163	1.411
I3	-0.470	0.022	0.371	0.734	0.930					
I4	-1.586	-1.567								
I5	-0.394	-0.317	0.126	0.243	0.580	0.907				
I6	-0.995	-0.436	-0.010	0.016						
I7	-1.228	-1.003	-0.705	-0.387	-0.077	0.185				
I8	-0.318	0.096	0.325	0.416						
I9	-0.390	-0.384	-0.330	-0.314	-0.153	-0.113				
I10	-1.545	-1.431	-0.723	-0.367						
I11	-1.238	-1.123	-1.041	-0.948	-0.708					
I12	-0.966	-0.949	-0.879	-0.753						
I13	0.050	0.383	0.739	1.394						
I14	-1.048	-0.429	-0.092	0.192	0.641					
I15	-0.366	-0.304	-0.176	-0.058	0.273	0.995				
I16	-1.026	-0.871	-0.660	-0.156	1.378					
I17	-0.262	0.287	0.461							
I18	-0.217	0.299	1.006	1.087						
I19	-0.448	0.076	0.531	0.666						
I20	-0.095	0.016	0.432	0.602						
I21	-0.449	-0.169	0.011	0.358	1.690					

Table 12: thresholds for IRT analysis of NAPE Literacy 2015 grade 3

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
n1	1.59	13.29	0.00	1.04	1.32	0.19
n2	1.24	5.18	0.00	0.99	-0.63	0.53
n3	2.03	23.15	0.00	1.20	13.63	0.00
n4	0.87	-3.69	0.00	0.95	-1.99	0.05
n5	1.06	2.62	0.01	0.97	-2.44	0.01
n6	0.98	-1.44	0.15	0.96	-5.03	0.00
n7	0.83	-7.75	0.00	0.89	-10.23	0.00
n8	0.87	-14.82	0.00	0.89	-16.75	0.00
n9	0.87	-16.33	0.00	0.87	-19.31	0.00
n10	0.88	-14.57	0.00	0.92	-12.44	0.00
n11	0.91	-9.46	0.00	0.93	-11.23	0.00
n12	0.74	-30.10	0.00	0.78	-32.22	0.00
n13	1.30	12.86	0.00	1.15	14.80	0.00
n14	1.15	23.19	0.00	1.11	24.13	0.00
n15	0.91	-7.03	0.00	0.93	-7.39	0.00
n16	0.83	-17.12	0.00	0.88	-16.30	0.00
n17	0.84	-19.83	0.00	0.89	-19.84	0.00
n18	0.82	-20.76	0.00	0.88	-19.35	0.00
n19	0.90	-19.32	0.00	0.92	-19.58	0.00
n20	0.87	-11.57	0.00	0.91	-11.01	0.00
n21	0.90	-5.27	0.00	0.96	-3.21	0.00
n22	0.88	-13.85	0.00	0.92	-13.38	0.00
n23	0.88	-14.62	0.00	0.91	-14.79	0.00
n24	0.98	-0.91	0.36	0.98	-0.89	0.37
n25	1.03	1.01	0.31	0.99	-0.31	0.76
n26	0.92	-5.85	0.00	0.97	-3.28	0.00
n27	1.08	5.08	0.00	1.07	8.45	0.00
n28	0.91	-11.93	0.00	0.93	-12.34	0.00
n29	0.84	-9.55	0.00	0.94	-5.03	0.00
n30	1.52	22.28	0.00	1.27	25.78	0.00
n31	0.96	-0.62	0.54	0.99	-0.31	0.76
n32	0.86	-6.28	0.00	0.94	-4.59	0.00
n33	0.90	-10.43	0.00	0.93	-10.57	0.00
n34	1.36	18.63	0.00	1.23	25.10	0.00
n35	0.94	-6.18	0.00	0.97	-4.19	0.00
n36	2.61	63.49	0.00	1.64	65.38	0.00
n37	0.81	-6.61	0.00	0.90	-7.08	0.00
n38	0.77	-8.80	0.00	0.88	-9.85	0.00
n39	1.45	27.12	0.00	1.25	27.34	0.00
n40	1.31	10.30	0.00	1.10	7.60	0.00
n41	0.87	-8.43	0.00	0.91	-9.53	0.00
n42	1.54	29.95	0.00	1.28	28.49	0.00
n43	1.09	8.72	0.00	1.09	9.32	0.00
n44	0.87	-7.80	0.00	0.89	-10.72	0.00
n45	1.30	23.41	0.00	1.16	19.69	0.00
n46	0.97	-2.91	0.00	0.97	-3.65	0.00
n47	1.14	8.97	0.00	1.10	11.69	0.00
n48	0.86	-8.90	0.00	0.89	-13.76	0.00
n49	0.92	-4.51	0.00	0.94	-7.62	0.00
n50	0.92	-2.24	0.03	0.91	-5.86	0.00
n51	1.02	1.52	0.13	0.99	-0.56	0.58
n52	1.14	8.71	0.00	1.08	10.25	0.00
n53	0.90	-6.50	0.00	0.92	-9.75	0.00
n54	0.98	-1.38	0.17	0.98	-2.72	0.01
n55	1.60	45.01	0.00	1.39	52.03	0.00
n56	0.96	-2.57	0.01	0.98	-2.39	0.02
n57	0.86	-4.37	0.00	0.90	-7.44	0.00
n58	0.79	-5.81	0.00	0.92	-5.28	0.00
n59	1.83	12.61	0.00	1.16	4.27	0.00
n60	0.89	-10.90	0.00	0.93	-9.86	0.00
n61	0.97	-4.59	0.00	0.98	-3.95	0.00
n62	1.07	8.74	0.00	1.06	8.19	0.00

n63	0.96	-5.43	0.00	0.96	-5.03	0.00
n64	1.55	18.12	0.00	1.30	18.09	0.00
n65	0.95	-1.19	0.24	0.99	-0.53	0.60
n66	0.95	-3.29	0.00	0.96	-4.97	0.00

Table 13: infit and outfit statistics for IRT analysis of 2015 NAPE numeracy grade 6

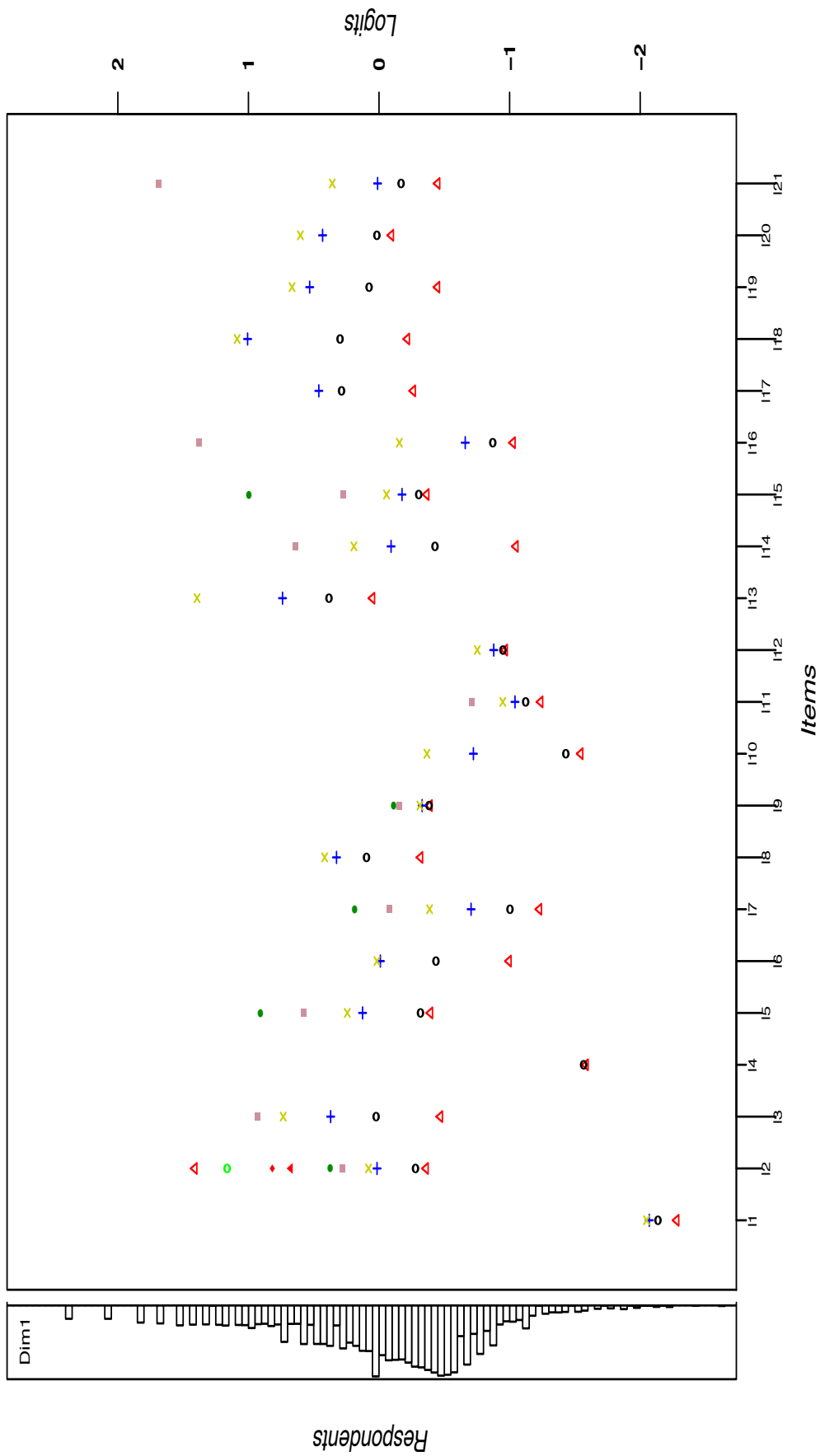


Figure 2: Wright Map for items in 2015 NAPE literacy grade 3

Item	N	M	AXsi_.Cat1	AXsi_.Cat2	AXsi_.Cat3	AXsi_.Cat4	AXsi_.Cat5	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1
Item n1	22722	0.95	-3.22					1.00				
Item n2	22722	1.85	-0.05	-3.57				1.00	2.00			
Item n3	22644	2.55	0.56	-0.40	-3.12			1.00	2.00	3.00		
Item n4	22720	0.95	-3.12					1.00				
Item n5	22719	1.65	0.31	-2.26				1.00	2.00			
Item n6	22633	1.94	0.54	0.44	-1.16			1.00	2.00	3.00		
Item n7	22687	1.62	0.49	-2.07				1.00	2.00			
Item n8	22709	1.13	-0.13	-0.45				1.00	2.00			
Item n9	22596	1.05	0.04	-0.13				1.00	2.00			
Item n10	22685	0.69	-0.85					1.00				
Item n11	22528	0.94	0.92	0.24				1.00	2.00			
Item n12	22567	0.79	0.46	0.83				1.00	2.00			
Item n13	22648	0.46	2.71	1.79				1.00	2.00			
Item n14	22702	0.57	-0.30					1.00				
Item n15	22678	0.79	-1.47					1.00				
Item n16	22546	0.73	-1.09					1.00				
Item n17	22648	0.67	-0.77					1.00				
Item n18	22491	0.30	0.97					1.00				
Item n19	22597	0.46	0.19					1.00				
Item n20	22609	0.76	-1.29					1.00				
Item n21	22458	0.13	2.11					1.00				
Item n22	22629	0.69	-0.86					1.00				
Item n23	22527	0.33	0.83					1.00				
Item n24	22701	0.90	-2.43					1.00				
Item n25	22672	0.07	2.89					1.00				
Item n26	22554	0.19	1.61					1.00				
Item n27	22571	0.58	1.90	1.42				1.00	2.00			
Item n28	22484	0.34	0.77					1.00				
Item n29	22397	0.15	1.93					1.00				
Item n30	22291	0.97	1.81	2.68	1.43			1.00	2.00	3.00		
Item n31	22033	0.08	4.01	4.61				1.00	2.00			
Item n32	22143	0.30	2.35	2.70				1.00	2.00			
Item n33	22558	0.93	0.89	0.28				1.00	2.00			
Item n34	22552	1.43	1.00	-1.31				1.00	2.00			
Item n35	22518	0.29	1.03					1.00				
Item n36	22271	0.63	3.00	1.14				1.00	2.00			
Item n37	22147	0.27	3.04	2.76				1.00	2.00			
Item n38	22051	0.33	3.06	2.39				1.00	2.00			
Item n39	22581	1.23	1.16	1.41	0.79			1.00	2.00	3.00		
Item n40	22126	0.34	3.08	2.33				1.00	2.00			
Item n41	22342	0.49	1.76	1.80				1.00	2.00			
Item n42	22322	1.99	0.82	1.59	-1.17	4.99	4.49	1.00	2.00	3.00	4.00	5.00
Item n43	22562	1.71	-0.51	-0.12	0.11	2.50	2.62	1.00	2.00	3.00	4.00	5.00
Item n44	22243	0.42	1.66	2.24				1.00	2.00			
Item n45	22509	1.32	0.03	-1.03				1.00	2.00			
Item n46	22607	0.73	-1.09					1.00				
Item n47	22645	1.41	0.41	-1.29				1.00	2.00			
Item n48	22590	0.59	2.12	1.34				1.00	2.00			
Item n49	22218	0.61	2.89	1.24				1.00	2.00			
Item n50	22137	0.21	3.61	3.05				1.00	2.00			
Item n51	22663	0.82	-1.64					1.00				
Item n52	22570	1.39	0.66	-1.20				1.00	2.00			
Item n53	22537	0.59	2.17	1.32				1.00	2.00			
Item n54	22600	0.75	-1.20					1.00				
Item n55	22516	1.02	1.26	-0.02				1.00	2.00			

Road-map: tables and graphs

Item n56	22210	0.65	2.27	1.13				1.00	2.00			
Item n57	22254	0.28	3.78	2.60				1.00	2.00			
Item n58	22094	0.23	3.88	2.89				1.00	2.00			
Item n59	21992	0.06	3.64	5.46	10.02			1.00	2.00	3.00		
Item n60	21507	0.27	1.14					1.00				
Item n61	21654	0.39	0.53					1.00				
Item n62	21805	1.07	-0.47	-0.23				1.00	2.00			
Item n63	21371	0.94	-0.22	0.31				1.00	2.00			
Item n64	21411	0.63	1.62	3.38	5.57	4.06		1.00	2.00	3.00	4.00	
Item n65	21422	0.05	3.25					1.00				
Item n66	21249	0.59	1.95	1.41				1.00	2.00			

Table 14: item parameters from 1 parameter IRT analysis of 2015 NAPE numeracy grade 6

item	Z	M	AXsi_L_Cat1	AXsi_L_Cat2	AXsi_L_Cat3	AXsi_L_Cat4	AXsi_L_Cat5	B_Cat1_Dim1	B_Cat2_Dim1	B_Cat3_Dim1	B_Cat4_Dim1	B_Cat5_Dim1
Item n1	22722	0.95	-3.00					0.16				
Item n2	22722	1.85	0.00	-3.52				0.68	1.38			
Item n3	22644	2.55	1.21	0.25	-2.46			0.10	0.82	1.29		
Item n4	22720	0.95	-3.40					1.08				
Item n5	22719	1.65	0.14	-2.38				1.05	1.58			
Item n6	22633	1.94	0.50	0.39	-1.19			0.75	1.22	2.51		
Item n7	22687	1.62	0.20	-2.44				0.94	2.05			
Item n8	22709	1.13	-0.39	-0.61				1.26	2.21			
Item n9	22596	1.05	-0.13	-0.12				1.01	2.25			
Item n10	22685	0.69	-0.97					1.17				
Item n11	22528	0.94	0.87	0.31				0.64	1.92			
Item n12	22567	0.79	0.27	1.28				1.44	3.13			
Item n13	22648	0.46	2.69	1.61				-0.08	1.12			
Item n14	22702	0.57	-0.29					0.34				
Item n15	22678	0.79	-1.63					1.09				
Item n16	22546	0.73	-1.34					1.44				
Item n17	22648	0.67	-0.94					1.41				
Item n18	22491	0.30	1.21					1.52				
Item n19	22597	0.46	0.21					1.18				
Item n20	22609	0.76	-1.49					1.25				
Item n21	22458	0.13	2.27					1.05				
Item n22	22629	0.69	-0.98					1.19				
Item n23	22527	0.33	0.94					1.23				
Item n24	22701	0.90	-2.47					0.79				
Item n25	22672	0.07	2.90					0.78				
Item n26	22554	0.19	1.69					0.96				
Item n27	22571	0.58	1.90	1.32				0.65	1.29			
Item n28	22484	0.34	0.83					1.09				
Item n29	22397	0.15	2.13					1.14				
Item n30	22291	0.97	1.87	2.59	1.14			0.51	0.81	1.46		
Item n31	22033	0.08	3.82	4.92				0.41	1.77			
Item n32	22143	0.30	2.32	3.08				0.76	1.97			
Item n33	22558	0.93	0.82	0.26				1.09	1.87			
Item n34	22552	1.43	1.36	-1.08				0.00	0.74			
Item n35	22518	0.29	1.06					0.92				
Item n36	22271	0.63	3.10	0.80				-0.37	0.06			
Item n37	22147	0.27	3.04	3.26				0.86	2.11			
Item n38	22051	0.33	2.99	2.96				0.72	2.25			
Item n39	22581	1.23	1.31	1.43	0.69			0.24	0.61	1.45		
Item n40	22126	0.34	2.97	2.16				0.12	1.25			
Item n41	22342	0.49	1.75	2.04				0.92	1.98			
Item n42	22322	1.99	1.02	1.91	-0.94	5.01	3.64	0.58	0.68	1.29	1.88	2.02
Item n43	22562	1.71	-0.73	-0.26	-0.10	2.03	1.57	1.15	1.97	2.43	2.89	3.24
Item n44	22243	0.42	1.67	2.68				0.99	2.17			
Item n45	22509	1.32	0.19	-0.92				0.50	0.89			

Item n46	22607	0.73	-1.13					0.83		
Item n47	22645	1.41	0.55	-1.18				0.50	1.09	
Item n48	22590	0.59	2.07	1.62				0.86	2.14	
Item n49	22218	0.61	2.83	1.38				0.63	1.85	
Item n50	22137	0.21	3.46	3.66				0.39	2.15	
Item n51	22663	0.82	-1.64					0.70		
Item n52	22570	1.39	0.79	-1.11				0.50	1.12	
Item n53	22537	0.59	2.12	1.51				0.79	1.96	
Item n54	22600	0.75	-1.24					0.80		
Item n55	22516	1.02	1.42	-0.03				0.17	0.50	
Item n56	22210	0.65	2.22	1.19				0.57	1.67	
Item n57	22254	0.28	3.71	3.03				0.70	2.06	
Item n58	22094	0.23	3.80	3.35				0.66	2.04	
Item n59	21992	0.06	3.38	4.47	7.63			0.13	0.44	0.39
Item n60	21507	0.27	1.27					1.13		
Item n61	21654	0.39	0.53					0.83		
Item n62	21805	1.07	-0.37	-0.16				0.40	1.22	
Item n63	21371	0.94	-0.22	0.42				0.58	1.68	
Item n64	21411	0.63	1.61	3.19	4.94	3.10		0.50	1.01	1.37 2.02
Item n65	21422	0.05	3.32					0.87		
Item n66	21249	0.59	1.96	1.46				0.91	1.67	

Table 15: item parameters from 2 parameter IRT analysis of 2015 NAPE numeracy grade 6

	Cat1	Cat2	Cat3	Cat4	Cat5
n1	-3.224				
n2	-1.874	-1.699			
n3	-1.170	-1.035	-0.911		
n4	-3.116				
n5	-1.250	-1.014			
n6	-0.620	-0.358	-0.164		
n7	-1.142	-0.924			
n8	-0.665	0.219			
n9	-0.501	0.372			
n10	-0.854				
n11	-0.104	0.339			
n12	-0.048	0.877			
n13	0.812	0.974			
n14	-0.297				
n15	-1.474				
n16	-1.092				
n17	-0.769				
n18	0.968				
n19	0.191				
n20	-1.288				
n21	2.110				
n22	-0.855				
n23	0.826				
n24	-2.427				
n25	2.890				
n26	1.614				
n27	0.559	0.861			
n28	0.765				
n29	1.926				
n30	0.330	0.505	0.622		
n31	2.214	2.396			
n32	1.168	1.535			
n33	-0.096	0.371			
n34	-0.748	-0.558			
n35	1.026				
n36	0.526	0.614			
n37	1.288	1.477			
n38	1.120	1.275			
n39	-0.006	0.260	0.530		
n40	1.089	1.236			
n41	0.690	1.108			
n42	-0.525	-0.327	-0.265	2.814	2.850
n43	-0.841	0.101	0.600	1.324	1.548
n44	0.833	1.409			
n45	-0.801	-0.229			
n46	-1.094				
n47	-0.819	-0.472			
n48	0.553	0.788			
n49	0.570	0.674			
n50	1.465	1.589			
n51	-1.644				
n52	-0.742	-0.460			
n53	0.548	0.770			
n54	-1.204				
n55	-0.149	0.131			
n56	0.475	0.657			
n57	1.257	1.341			
n58	1.400	1.487			
n59	2.483	2.834	4.637		
n60	1.145				
n61	0.530				
n62	-0.775	0.548			
n63	-0.520	0.830			
n64	0.771	1.060	1.171	1.212	

n65	3.247	
n66	0.564	0.850

Table 16: thresholds for IRT analysis of NAPE Numeracy 2015 grade 6

literacy 6

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
I1	1.00	-0.15	0.88	1.00	-0.13	0.89
I2	1.31	27.22	0.00	1.27	26.35	0.00
I3	1.18	13.20	0.00	1.24	20.77	0.00
I4	1.04	3.09	0.00	1.05	5.94	0.00
I5	2.02	65.14	0.00	1.66	60.92	0.00
I6	0.79	-6.66	0.00	0.93	-3.95	0.00
I7	1.06	4.50	0.00	1.05	5.70	0.00
I8	1.09	8.90	0.00	1.06	5.96	0.00
I9	0.90	-9.53	0.00	0.89	-11.48	0.00
I10	1.25	19.03	0.00	1.15	12.47	0.00
I11a	0.70	-16.42	0.00	0.86	-14.13	0.00
I11b	1.12	11.62	0.00	1.10	15.76	0.00
I11c	1.12	11.40	0.00	1.08	11.76	0.00
I11d	0.75	-16.38	0.00	0.86	-16.96	0.00
I11e	0.87	-14.22	0.00	0.90	-17.00	0.00
I11f	0.94	-2.75	0.01	1.01	0.58	0.56
I11g	0.78	-9.91	0.00	0.90	-8.70	0.00
I11h	1.10	4.73	0.00	1.05	5.03	0.00
I11i	0.87	-13.56	0.00	0.90	-16.96	0.00
I11j	0.74	-27.31	0.00	0.79	-34.50	0.00
I12	1.83	54.18	0.00	1.49	52.48	0.00
I13	2.33	49.47	0.00	1.61	53.16	0.00
I14	0.98	-1.85	0.06	0.99	-0.87	0.38
I15a	1.10	3.67	0.00	1.05	4.09	0.00
I15b	1.07	6.85	0.00	1.05	7.46	0.00
I15c	1.06	2.61	0.01	1.06	5.16	0.00
I15d	1.05	2.78	0.01	1.05	5.96	0.00
I16a	1.12	12.86	0.00	1.09	9.86	0.00
I16b	0.84	-14.95	0.00	0.88	-19.25	0.00
I16c	0.79	-20.03	0.00	0.85	-23.58	0.00
I16d	1.29	14.19	0.00	1.13	12.76	0.00
I16e	0.73	-23.08	0.00	0.82	-26.62	0.00
I16f	0.68	-25.35	0.00	0.78	-30.44	0.00
I16g	0.85	-7.44	0.00	0.95	-4.60	0.00
I16h	0.88	-12.74	0.00	0.91	-15.54	0.00
I16i	0.83	-19.32	0.00	0.85	-25.13	0.00
I17a	0.98	-1.40	0.16	0.97	-3.13	0.00
I17b	1.06	5.29	0.00	1.03	4.21	0.00
I17c	0.77	-19.99	0.00	0.84	-24.20	0.00
I17d	0.92	-8.91	0.00	0.96	-6.94	0.00
I17e	0.74	-20.96	0.00	0.84	-22.56	0.00
I17f	0.75	-16.22	0.00	0.88	-13.75	0.00
I17g	1.13	2.84	0.00	1.11	4.61	0.00
I17h	0.89	-8.93	0.00	0.95	-6.78	0.00
I17i	0.84	-17.57	0.00	0.88	-19.99	0.00
I18	1.30	5.13	0.00	1.03	0.98	0.33
I19a	1.11	10.94	0.00	1.00	0.10	0.92
I19b	0.80	-21.43	0.00	0.86	-23.21	0.00
I19c	1.05	5.49	0.00	1.05	7.41	0.00
I19d	0.83	-10.23	0.00	0.91	-10.00	0.00
I19e	1.02	0.78	0.43	1.00	0.34	0.73
I19f	0.85	-8.29	0.00	0.97	-3.08	0.00
I19g	0.83	-9.46	0.00	0.89	-11.32	0.00
I20	1.28	9.72	0.00	1.05	3.44	0.00
I21a	1.28	10.07	0.00	1.14	10.40	0.00
I21b	0.93	-5.19	0.00	0.96	-5.22	0.00
I21c	0.80	-12.57	0.00	0.88	-13.47	0.00
I21d	0.72	-14.13	0.00	0.86	-13.30	0.00
I21e	0.70	-16.74	0.00	0.84	-16.49	0.00
I21f	0.74	-15.96	0.00	0.85	-16.24	0.00
I21g	0.74	-12.36	0.00	0.89	-10.08	0.00
I21h	0.75	-9.10	0.00	0.91	-5.91	0.00
I21i	0.95	-2.53	0.01	1.00	-0.03	0.98

<u>I21j</u>	<u>0.94</u>	<u>-3.87</u>	<u>0.00</u>	<u>0.97</u>	<u>-2.94</u>	<u>0.00</u>
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Table 17: infit and outfit statistics for IRT analysis of 2015 NAPE literacy grade 6

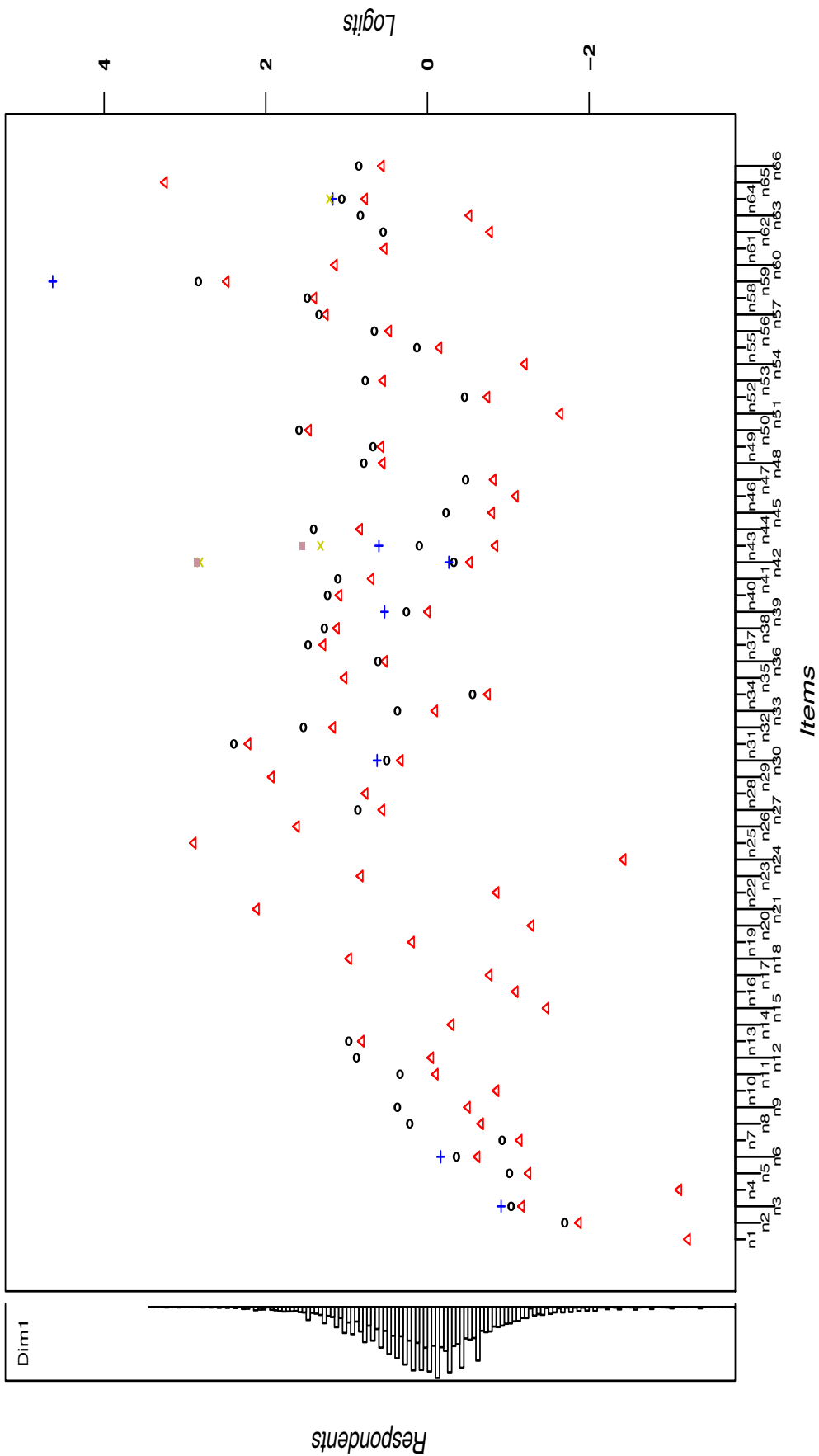


Figure 3: Wright Map for items in 2015 NAPE numeracy grade 6

Item I17d	20697	0.46	0.31		1.32
Item I17e	20691	0.31	1.44		2.00
Item I17f	20688	0.25	1.78		1.81
Item I17g	20683	0.09	2.91	6.03	0.94
Item I17h	20686	0.34	0.96		1.36
Item I17i	20696	0.55	-0.22		1.62
Item I18	22583	0.95	-3.33		0.79
Item I19a	20965	0.56	-0.34		1.07
Item I19b	20913	0.42	0.44		1.73
Item I19c	20789	0.48	0.06		0.97
Item I19d	20814	0.24	1.59		1.56
Item I19e	20721	0.16	2.05		1.17
Item I19f	20710	0.23	1.59		1.34
Item I19g	20578	0.22	1.84		1.63
Item I20	22507	0.86	-2.07		0.83
Item I21a	18754	0.17	1.82		0.70
Item I21b	18715	0.32	1.17		1.40
Item I21c	18696	0.27	1.80		1.86
Item I21d	18689	0.20	2.48		2.08
Item I21e	18685	0.22	2.42		2.24
Item I21f	18684	0.25	2.07		2.09
Item I21g	18683	0.19	2.47		1.92
Item I21h	18684	0.13	2.91		1.75
Item I21i	18711	0.23	1.70		1.26
Item I21j	18839	0.74	-1.21		1.21

Table 19: item parameters from 2 parameter IRT analysis of 2015 NAPE literacy grade 6

	Cat1	Cat2	Cat3	Cat4	Cat5	Cat6	Cat7	Cat8
I1	-1.504	1.800						
I2	-1.637	-1.226	-0.825	-0.407	0.020	0.375	0.955	1.734
I3	-0.314	0.421	0.949	1.267	1.853	2.292		
I4	-1.837	-0.289						
I5	-0.559	0.210	1.047					
I6	-2.707							
I7	-0.644	-0.029	0.718					
I8	-2.434	-0.023	0.991	1.676	2.280	3.315		
I9	-0.654	0.845	1.808	2.764				
I10	-0.207	1.300	1.881	2.549	3.613			
I11a	-1.729							
I11b	0.191							
I11c	0.451							
I11d	-1.366							
I11e	-0.126							
I11f	1.897							
I11g	1.954							
I11h	1.728							
I11i	0.223							
I11j	0.462							
I12	-0.290	0.663						
I13	-1.579	-0.504	-0.206					
I14	-0.648	2.627						
I15a	-2.120							
I15b	-0.313							
I15c	-1.917							
I15d	-1.340							
I16a	-1.515	0.833						
I16b	-0.642							
I16c	0.648							
I16d	1.515							
I16e	0.855							
I16f	1.028							
I16g	1.695							
I16h	0.058							
I16i	-0.139							
I17a	-1.112							
I17b	-0.377							
I17c	-0.783							
I17d	0.320							
I17e	1.116							
I17f	1.470							
I17g	2.870	4.446						
I17h	0.922							
I17i	-0.167							
I18	-3.546							
I19a	-0.300							
I19b	0.404							
I19c	0.102							
I19d	1.431							
I19e	2.077							
I19f	1.527							
I19g	1.613							
I20	-2.189							
I21a	2.126							
I21b	1.097							
I21c	1.433							
I21d	1.874							
I21e	1.739							
I21f	1.536							
I21g	1.953							
I21h	2.450							
I21i	1.661							
I21j	-1.146							

Table 20: thresholds for IRT analysis of NAPE Literacy 2015 grade 6

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
e1	0.93	-4.04	0.00	0.99	-0.65	0.52
e2	0.86	-8.07	0.00	0.95	-4.36	0.00
e3	0.89	-15.94	0.00	0.91	-17.73	0.00
e4	0.81	-16.04	0.00	0.88	-14.69	0.00
e5	0.86	-14.83	0.00	0.90	-15.54	0.00
e6	0.98	-0.52	0.60	0.99	-0.42	0.67
e7	0.86	-21.88	0.00	0.89	-22.94	0.00
e8	0.82	-19.69	0.00	0.87	-21.12	0.00
e9	0.99	-0.63	0.53	0.99	-1.19	0.24
e10	0.87	-20.20	0.00	0.89	-21.87	0.00
e11	0.89	-13.52	0.00	0.92	-12.64	0.00
e12	0.92	-8.38	0.00	0.95	-7.64	0.00
e13	1.09	7.90	0.00	1.06	7.66	0.00
e14	0.80	-6.56	0.00	0.95	-2.24	0.03
e15	0.83	-27.08	0.00	0.86	-29.14	0.00
e16	1.08	9.26	0.00	1.05	7.73	0.00
e17	1.06	3.34	0.00	1.04	3.33	0.00
e18	1.08	4.89	0.00	1.05	4.89	0.00
e19	0.87	-20.05	0.00	0.90	-20.88	0.00
e20	0.84	-24.10	0.00	0.87	-26.23	0.00
e21	0.74	-10.49	0.00	0.93	-4.01	0.00
e22a	1.09	8.26	0.00	1.06	8.42	0.00
e22b	0.87	-7.18	0.00	0.96	-3.49	0.00
e22c	1.43	36.29	0.00	1.29	32.14	0.00
e23a	0.88	-17.87	0.00	0.90	-19.01	0.00
e23b	1.32	26.33	0.00	1.22	22.86	0.00
e24a	1.34	16.99	0.00	1.13	10.21	0.00
e24b	0.84	-13.91	0.00	0.90	-12.24	0.00
e24c	1.61	21.96	0.00	1.28	21.38	0.00
e24di	1.08	9.35	0.00	1.07	11.19	0.00
e24dii	1.00	0.18	0.86	1.01	1.36	0.17
e24e	1.14	7.01	0.00	1.05	4.18	0.00
e24f	0.96	-5.33	0.00	0.97	-6.46	0.00
e24g	1.07	9.76	0.00	1.06	10.52	0.00
e24h	0.96	-4.81	0.00	0.97	-5.79	0.00
e25a	1.08	4.22	0.00	1.05	6.19	0.00
e25b	0.81	-27.35	0.00	0.85	-28.60	0.00
e25c	0.83	-19.87	0.00	0.87	-20.74	0.00
e25d	1.20	14.20	0.00	1.17	15.87	0.00
e25e	0.84	-24.03	0.00	0.87	-25.51	0.00
e25f	0.98	-3.37	0.00	0.98	-3.19	0.00
e25g	1.02	2.52	0.01	1.01	1.98	0.05
e26a	0.85	-8.22	0.00	0.95	-4.28	0.00
e26b	1.02	1.38	0.17	1.02	2.42	0.02
e26c	1.03	2.00	0.05	1.01	0.81	0.42
e26d	1.04	3.04	0.00	1.01	1.32	0.19
e26e	0.95	-3.23	0.00	0.97	-3.29	0.00
e26f	0.90	-6.30	0.00	0.96	-3.95	0.00
e26g	0.87	-19.73	0.00	0.90	-21.01	0.00
e26h	1.15	14.93	0.00	1.08	12.14	0.00
e27a	1.03	2.20	0.03	1.01	0.82	0.41
e27b	0.99	-0.77	0.44	0.98	-3.36	0.00
e27c	1.36	33.12	0.00	1.23	32.73	0.00
e27d	0.91	-10.51	0.00	0.95	-8.91	0.00
e27e	0.94	-6.31	0.00	0.95	-7.81	0.00
e27f	0.82	-27.79	0.00	0.85	-30.26	0.00
e27g	0.94	-7.81	0.00	0.95	-8.50	0.00
e27h	1.04	2.20	0.03	1.02	1.98	0.05
e27i	0.77	-18.69	0.00	0.87	-15.57	0.00

e27j	1.03	3.92	0.00	1.03	4.45	0.00
e28a	0.80	-8.42	0.00	0.94	-3.68	0.00
e28b	0.93	-3.89	0.00	0.96	-2.92	0.00
e28c	0.95	-7.11	0.00	0.97	-6.76	0.00
e28d	1.10	11.65	0.00	1.07	11.65	0.00
e28e	0.98	-3.19	0.00	0.99	-2.63	0.01
e28f	1.27	24.16	0.00	1.22	22.87	0.00
e28g	1.02	2.79	0.01	1.02	3.80	0.00
e28h	0.97	-3.67	0.00	0.97	-4.44	0.00
e28i	0.98	-2.91	0.00	0.98	-4.14	0.00
e28j	1.08	4.44	0.00	1.03	3.04	0.00
e29a	0.86	-14.00	0.00	0.90	-14.05	0.00
e29b	1.33	34.58	0.00	1.22	34.21	0.00
e29c	0.88	-8.40	0.00	0.93	-8.00	0.00
e29d	0.99	-0.36	0.72	0.98	-2.40	0.02
e29e	0.95	-7.02	0.00	0.96	-7.99	0.00
e29f	1.08	5.61	0.00	1.06	6.64	0.00
e29g	0.92	-4.30	0.00	0.99	-0.94	0.35
e30a	0.97	-2.04	0.04	0.98	-1.92	0.05
e30b	1.94	62.96	0.00	1.73	60.41	0.00
e30c	1.07	5.46	0.00	1.04	4.28	0.00
e30d	0.90	-6.14	0.00	0.97	-2.89	0.00
e30e	1.13	13.25	0.00	1.12	12.51	0.00
e30f	0.97	-1.84	0.07	0.99	-0.71	0.48

Table 21: infit and outfit statistics for IRT analysis of 2014 NAPE English grade s2

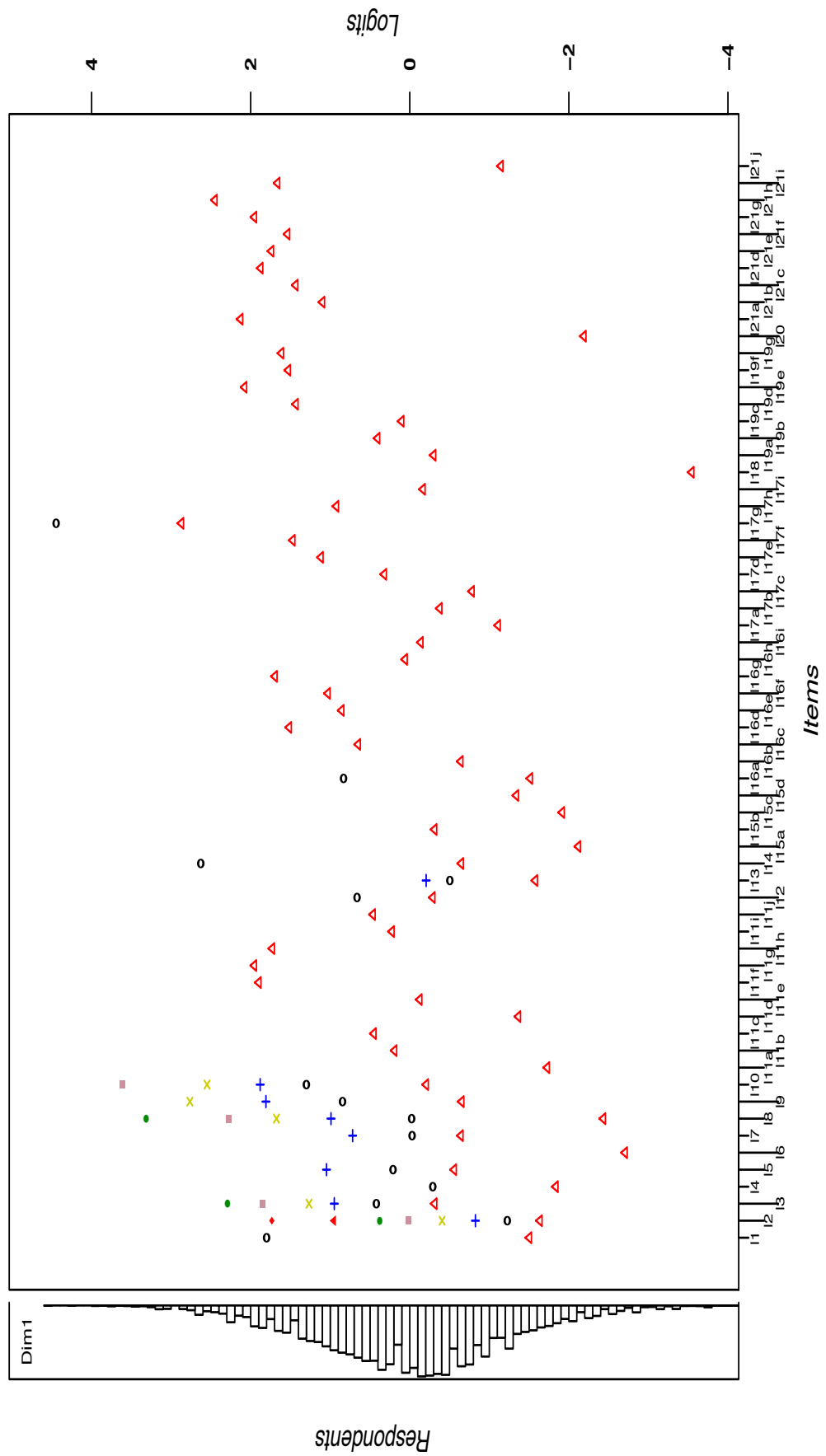


Figure 4: Wright Map for items in 2015 NAPE literacy grade 6

item	N	M	AXsl_Cat1	AXsl_Cat2	AXsl_Cat3	AXsl_Cat4	AXsl_Cat5	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1
Item e1	19361	0.81	-1.65					1.00				
Item e2	19361	0.82	-1.70					1.00				
Item e3	19360	0.44	0.28					1.00				
Item e4	19361	0.27	1.16					1.00				
Item e5	19360	0.32	0.87					1.00				
Item e6	19359	0.93	-2.80					1.00				
Item e7	19360	0.54	-0.16					1.00				
Item e8	19359	0.33	0.81					1.00				
Item e9	19361	1.07	-1.03	-0.33				1.00	2.00			
Item e10	19360	0.54	-0.17					1.00				
Item e11	19360	0.63	-0.61					1.00				
Item e12	19359	0.68	-0.85					1.00				
Item e13	19360	0.71	-1.04					1.00				
Item e14	19360	0.93	-2.81					1.00				
Item e15	19359	0.49	0.04					1.00				
Item e16	19360	0.37	0.63					1.00				
Item e17	19359	0.18	1.76					1.00				
Item e18	19359	0.79	-1.47					1.00				
Item e19	19358	0.50	0.01					1.00				
Item e20	19362	0.47	0.17					1.00				
Item e21	19362	0.10	2.44					1.00				
Item e22a	19362	0.70	-0.97					1.00				
Item e22b	19362	0.83	-1.81					1.00				
Item e22c	19362	0.78	0.31	0.89				1.00	2.00			
Item e23a	19361	0.43	0.32					1.00				
Item e23b	19361	1.19	0.41	0.13	1.43			1.00	2.00	3.00		
Item e24a	19356	0.82	-1.75					1.00				
Item e24b	19355	0.73	-1.13					1.00				
Item e24c	19357	1.63	-0.43	-2.44				1.00	2.00			
Item e24di	19356	0.38	0.59					1.00				
Item e24dii	19356	0.66	-0.74					1.00				
Item e24e	19356	0.84	-1.84					1.00				
Item e24f	19356	0.57	-0.34					1.00				
Item e24g	19355	0.44	0.28					1.00				
Item e24h	19355	0.58	-0.37					1.00				
Item e25a	19354	1.18	2.68	-0.55				1.00	2.00			
Item e25b	19354	0.59	-0.39					1.00				
Item e25c	19353	0.65	-0.68					1.00				
Item e25d	19353	0.76	0.62	1.40	3.34			1.00	2.00	3.00		
Item e25e	19353	0.56	-0.29					1.00				
Item e25f	19354	0.57	-0.33					1.00				
Item e25g	19352	0.65	-0.70					1.00				
Item e26a	19361	0.84	-1.89					1.00				
Item e26b	19361	0.71	-1.02					1.00				
Item e26c	19361	0.80	-1.56					1.00				
Item e26d	19361	0.74	-1.19					1.00				
Item e26e	19361	0.21	1.54					1.00				
Item e26f	19361	0.21	1.53					1.00				
Item e26g	19361	0.51	-0.05					1.00				
Item e26h	19359	0.67	-0.78					1.00				
Item e27a	19355	0.75	-1.25					1.00				
Item e27b	19355	0.46	0.17					1.00				
Item e27c	19355	0.34	0.79					1.00				
Item e27d	19355	0.64	-0.63					1.00				
Item e27e	19355	0.67	-0.79					1.00				
Item e27f	19355	0.54	-0.17					1.00				
Item e27g	19355	0.58	-0.39					1.00				
Item e27h	19355	0.17	1.78					1.00				
Item e27i	19355	0.25	1.28					1.00				
Item e27j	19355	0.37	0.62					1.00				

Road-map: tables and graphs

Item e28a	19359	0.89	-2.35							1.00							
Item e28b	19359	0.83	-1.80							1.00							
Item e28c	19359	0.54	-0.18							1.00							
Item e28d	19359	0.62	-0.55							1.00							
Item e28e	19357	0.45	0.24							1.00							
Item e28f	19358	1.45	-0.37	-0.17	0.16					1.00	2.00	3.00					
Item e28g	19357	0.50	0.02							1.00							
Item e28h	19357	0.64	-0.65							1.00							
Item e28i	19359	0.61	-0.50							1.00							
Item e28j	19359	0.19	1.67							1.00							
Item e29a	19358	0.31	0.93							1.00							
Item e29b	19358	0.37	0.61							1.00							
Item e29c	19358	0.24	1.36							1.00							
Item e29d	19352	0.21	1.49							1.00							
Item e29e	19353	0.51	-0.04							1.00							
Item e29f	19353	0.78	1.41	0.75						1.00	2.00						
Item e29g	19353	0.16	1.85							1.00							
Item e30a	19353	0.23	1.36							1.00							
Item e30b	19353	2.68	0.20	-0.71	-1.03	-0.92	-0.20			1.00	2.00	3.00	4.00	5.00			
Item e30c	19352	0.27	1.17							1.00							
Item e30d	19353	0.81	-1.67							1.00							
Item e30e	19353	1.00	-0.31	0.33	2.79					1.00	2.00	3.00					
Item e30f	19353	0.24	1.35							1.00							

Table 22: item parameters from 1 parameter IRT analysis of 2014 NAPE English grade s2

item	N	M	AXsi_.Cat1	AXsi_.Cat2	AXsi_.Cat3	AXsi_.Cat4	AXsi_.Cat5	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1
Item e1	19361	0.81	-1.70					0.95				
Item e2	19361	0.82	-1.86					1.15				
Item e3	19360	0.44	0.33					1.27				
Item e4	19361	0.27	1.44					1.51				
Item e5	19360	0.32	1.04					1.38				
Item e6	19359	0.93	-2.85					0.90				
Item e7	19360	0.54	-0.19					1.41				
Item e8	19359	0.33	1.04					1.59				
Item e9	19361	1.07	-0.98	-0.22				0.69	1.75			
Item e10	19360	0.54	-0.20					1.38				
Item e11	19360	0.63	-0.68					1.20				
Item e12	19359	0.68	-0.92					1.11				
Item e13	19360	0.71	-0.98					0.62				
Item e14	19360	0.93	-3.11					1.23				
Item e15	19359	0.49	0.05					1.56				
Item e16	19360	0.37	0.60					0.66				
Item e17	19359	0.18	1.68					0.66				
Item e18	19359	0.79	-1.40					0.64				
Item e19	19358	0.50	0.02					1.35				
Item e20	19362	0.47	0.21					1.50				
Item e21	19362	0.10	2.91					1.46				
Item e22a	19362	0.70	-0.91					0.61				
Item e22b	19362	0.83	-1.95					1.10				
Item e22c	19362	0.78	0.41	0.70				0.39	0.76			
Item e23a	19361	0.43	0.37					1.27				
Item e23b	19361	1.19	0.56	0.19	1.28			0.55	1.01	1.69		
Item e24a	19356	0.82	-1.57					0.28				
Item e24b	19355	0.73	-1.30					1.31				
Item e24c	19357	1.63	-0.06	-1.99				0.69	0.85			
Item e24di	19356	0.38	0.55					0.60				
Item e24dii	19356	0.66	-0.74					0.81				
Item e24e	19356	0.84	-1.72					0.56				
Item e24f	19356	0.57	-0.35					0.97				
Item e24g	19355	0.44	0.27					0.62				

Road-map: tables and graphs

Item e24h	19355	0.58	-0.38					0.96					
Item e25a	19354	1.18	2.68	-0.55				0.85	1.69				
Item e25b	19354	0.59	-0.51					1.69					
Item e25c	19353	0.65	-0.84					1.53					
Item e25d	19353	0.76	0.68	1.23	2.65			0.88	1.25	1.66			
Item e25e	19353	0.56	-0.35					1.51					
Item e25f	19354	0.57	-0.34					0.95					
Item e25g	19352	0.65	-0.69					0.82					
Item e26a	19361	0.84	-2.08					1.18					
Item e26b	19361	0.71	-1.00					0.78					
Item e26c	19361	0.80	-1.54					0.78					
Item e26d	19361	0.74	-1.17					0.78					
Item e26e	19361	0.21	1.60					0.98					
Item e26f	19361	0.21	1.63					1.05					
Item e26g	19361	0.51	-0.06					1.31					
Item e26h	19359	0.67	-0.73					0.54					
Item e27a	19355	0.75	-1.23					0.79					
Item e27b	19355	0.46	0.18					0.91					
Item e27c	19355	0.34	0.68					0.11					
Item e27d	19355	0.64	-0.68					1.10					
Item e27e	19355	0.67	-0.84					1.06					
Item e27f	19355	0.54	-0.21					1.62					
Item e27g	19355	0.58	-0.41					1.04					
Item e27h	19355	0.17	1.74					0.75					
Item e27i	19355	0.25	1.64					1.64					
Item e27j	19355	0.37	0.60					0.74					
Item e28a	19359	0.89	-2.60					1.22					
Item e28b	19359	0.83	-1.88					0.99					
Item e28c	19359	0.54	-0.19					0.98					
Item e28d	19359	0.62	-0.52					0.59					
Item e28e	19357	0.45	0.25					0.88					
Item e28f	19358	1.45	-0.35	-0.12	-0.14			1.06	1.46	1.76			
Item e28g	19357	0.50	0.02					0.76					
Item e28h	19357	0.64	-0.66					0.93					
Item e28i	19359	0.61	-0.51					0.91					
Item e28j	19359	0.19	1.59					0.65					
Item e29a	19358	0.31	1.09					1.32					
Item e29b	19358	0.37	0.52					0.15					
Item e29c	19358	0.24	1.51					1.20					
Item e29d	19352	0.21	1.53					0.92					
Item e29e	19353	0.51	-0.04					1.01					
Item e29f	19353	0.78	1.42	0.72				0.72	1.53				
Item e29g	19353	0.16	1.90					0.94					
Item e30a	19353	0.23	1.38					0.87					
Item e30b	19353	2.68	0.68	0.11	-0.15	-0.24	-0.05	0.45	0.67	0.97	1.27	1.51	
Item e30c	19352	0.27	1.11					0.63					
Item e30d	19353	0.81	-1.69					0.87					
Item e30e	19353	1.00	-0.20	0.29	2.54			0.61	1.06	1.81			
Item e30f	19353	0.24	1.33					0.78					

Table 23: item parameters from 2 parameter IRT analysis of 2014 NAPE English grade s2

	Cat1	Cat2	Cat3	Cat4	Cat5
e1	-1.653				
e2	-1.697				
e3	0.284				
e4	1.164				
e5	0.873				
e6	-2.803				
e7	-0.165				
e8	0.814				
e9	-1.176	0.843			
e10	-0.171				
e11	-0.610				
e12	-0.855				
e13	-1.035				
e14	-2.805				
e15	0.037				
e16	0.629				
e17	1.758				
e18	-1.474				
e19	0.009				
e20	0.166				
e21	2.442				
e22a	-0.965				
e22b	-1.812				
e22c	-0.098	0.991			
e23a	0.317				
e23b	-0.341	0.221	1.498		
e24a	-1.751				
e24b	-1.133				
e24c	-1.447	-0.995			
e24di	0.586				
e24dii	-0.743				
e24e	-1.842				
e24f	-0.338				
e24g	0.285				
e24h	-0.368				
e25a	-0.300	-0.248			
e25b	-0.394				
e25c	-0.682				
e25d	0.141	0.981	2.203		
e25e	-0.289				
e25f	-0.331				
e25g	-0.697				
e26a	-1.894				
e26b	-1.020				
e26c	-1.563				
e26d	-1.185				
e26e	1.537				
e26f	1.532				
e26g	-0.052				
e26h	-0.784				
e27a	-1.250				
e27b	0.174				
e27c	0.792				
e27d	-0.633				
e27e	-0.792				
e27f	-0.167				
e27g	-0.389				
e27h	1.779				
e27i	1.275				
e27j	0.620				
e28a	-2.347				
e28b	-1.805				
e28c	-0.179				
e28d	-0.554				

e28e	0.243				
e28f	-0.777	0.100	0.846		
e28g	0.021				
e28h	-0.646				
e28i	-0.495				
e28j	1.672				
e29a	0.934				
e29b	0.609				
e29c	1.355				
e29d	1.489				
e29e	-0.043				
e29f	0.196	0.549			
e29g	1.850				
e30a	1.364				
e30b	-0.871	-0.576	-0.211	0.260	1.106
e30c	1.171				
e30d	-1.672				
e30e	-0.580	0.770	2.599		
e30f	1.348				

Table 24: thresholds for IRT analysis of NAPE English 2014 grade s2

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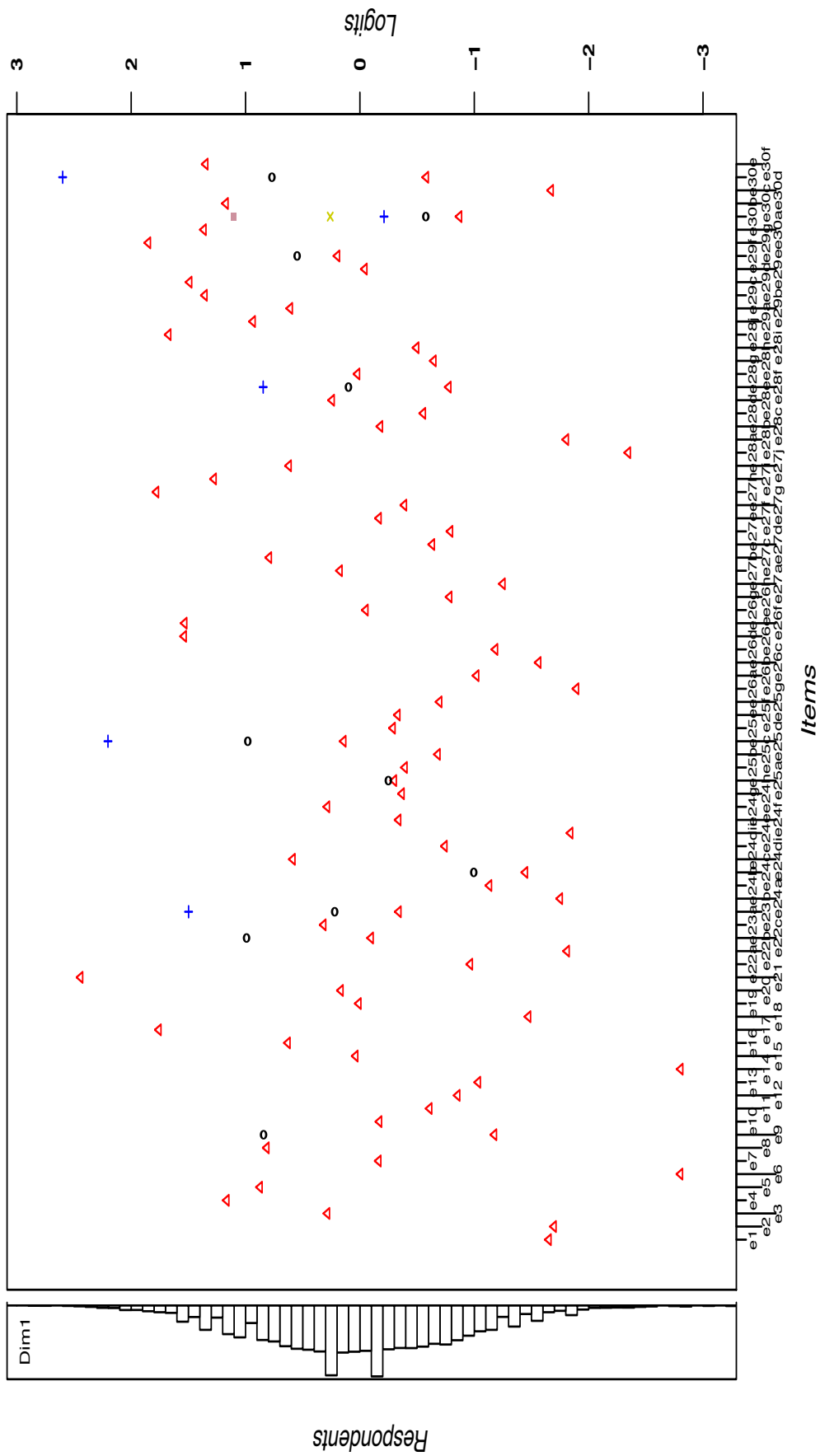


Figure 5: Wright Map for items in 2014 NAPE English grade S2

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
b1	1.22	22.39	0.00	1.17	20.23	0.00
b2	1.11	13.34	0.00	1.10	12.84	0.00
b3	0.89	-8.33	0.00	0.93	-5.91	0.00
b4	0.95	-1.20	0.23	1.02	0.82	0.41
b5	0.89	-9.20	0.00	0.92	-6.79	0.00
b6	1.33	4.44	0.00	1.08	2.51	0.01
b7	1.19	22.12	0.00	1.13	19.04	0.00
b8	1.05	4.35	0.00	1.02	2.48	0.01
b9	0.88	-8.84	0.00	0.92	-6.09	0.00
b10	1.04	1.89	0.06	1.03	1.67	0.09
b11	0.91	-2.69	0.01	0.98	-0.79	0.43
b12	0.90	-6.06	0.00	0.96	-2.56	0.01
b13	0.96	-4.83	0.00	0.96	-4.89	0.00
b14	0.97	-3.41	0.00	0.97	-3.36	0.00
b15	0.83	-7.80	0.00	0.93	-3.82	0.00
b16	0.92	-9.22	0.00	0.93	-8.77	0.00
b17	1.00	0.18	0.86	1.02	1.73	0.08
b18	0.93	-7.86	0.00	0.94	-7.51	0.00
b19	1.41	12.15	0.00	1.13	8.10	0.00
b20	1.05	5.85	0.00	1.03	4.57	0.00
b21	0.94	-3.86	0.00	0.98	-1.77	0.08
b22	0.94	-4.54	0.00	0.96	-4.06	0.00
b23	1.15	11.84	0.00	1.12	12.91	0.00
b24	0.88	-10.79	0.00	0.90	-9.37	0.00
b25	0.86	-5.21	0.00	0.96	-1.48	0.14
b26	1.02	1.14	0.26	1.01	0.56	0.57
b27	1.03	3.73	0.00	1.03	3.57	0.00
b28	1.45	29.95	0.00	1.26	24.71	0.00
b29	1.04	3.99	0.00	1.04	3.92	0.00
b30	1.11	11.61	0.00	1.09	10.93	0.00
b31	1.03	2.22	0.03	1.01	0.51	0.61
b32	1.09	1.35	0.18	0.99	-0.20	0.84
b33	1.03	3.51	0.00	1.02	3.14	0.00
b34	0.96	-4.43	0.00	0.97	-3.71	0.00
b35	1.11	7.73	0.00	1.06	4.55	0.00
b36	0.85	-4.76	0.00	0.96	-1.93	0.05
b37	1.02	2.28	0.02	1.03	2.73	0.01
b38	0.94	-1.67	0.10	0.98	-0.62	0.54

Table 25: infit and outfit statistics for IRT analysis of 2014 NAPE Biology grade s2

Road-map: tables and graphs

item	N	M	AXsl_Cat1	AXsl_Cat2	AXsl_Cat3	AXsl_Cat4	AXsl_Cat5	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1
Item b1	19387	1.14	0.32	0.69	1.03			1.00	2.00	3.00		
Item b2	19384	1.54	0.10	-0.27	0.02			1.00	2.00	3.00		
Item b3	19384	0.54	1.04	1.86	3.87			1.00	2.00	3.00		
Item b4	19386	0.23	3.27	3.54	4.17	6.10		1.00	2.00	3.00	4.00	
Item b5	19388	0.46	0.42	3.29	4.99			1.00	2.00	3.00		
Item b6	19389	0.15	4.01	4.61	6.58	5.23		1.00	2.00	3.00	4.00	
Item b7	19392	1.20	0.59	-0.55				1.00	2.00			
Item b8	19393	0.48	0.80	2.09				1.00	2.00			
Item b9	19393	0.43	0.81	2.72	4.75			1.00	2.00	3.00		
Item b10	19393	0.36	1.43	2.80	4.31			1.00	2.00	3.00		
Item b11	19393	0.11	2.79	3.94				1.00	2.00			
Item b12	19392	0.13	1.95					1.00				
Item b13	19390	1.11	0.16	0.50	1.29			1.00	2.00	3.00		
Item b14	19389	0.65	0.09	1.57				1.00	2.00			
Item b15	19389	0.28	2.05	2.87	4.73			1.00	2.00	3.00		
Item b16	19389	1.28	-0.33	0.16	0.63			1.00	2.00	3.00		
Item b17	19388	1.31	0.86	1.01	1.19	2.32	4.09	1.00	2.00	3.00	4.00	5.00
Item b18	19387	1.41	-0.72	-0.91	0.69			1.00	2.00	3.00		
Item b19	19392	0.37	3.27	3.26	2.95			1.00	2.00	3.00		
Item b20	19392	0.28	0.98					1.00				
Item b21	19392	0.41	1.08	2.52	4.77			1.00	2.00	3.00		
Item b22	19392	0.65	1.08	1.67	2.79			1.00	2.00	3.00		
Item b23	19389	1.12	1.48	1.35	1.13	3.69	6.10	1.00	2.00	3.00	4.00	5.00
Item b24	19389	0.50	0.70	2.10	5.28	8.67		1.00	2.00	3.00	4.00	
Item b25	19389	0.16	2.23	4.06	6.00			1.00	2.00	3.00		
Item b26	19389	0.60	1.15	1.72	3.11			1.00	2.00	3.00		
Item b27	19389	1.84	-0.04	-0.54	-0.25	1.43	2.48	1.00	2.00	3.00	4.00	5.00
Item b28	19392	3.18	0.74	0.05	0.06	-0.82	-1.16	1.00	2.00	3.00	4.00	5.00
Item b29	19392	1.11	-1.52	-0.57				1.00	2.00			
Item b30	19392	1.78	-0.13	-0.78	-0.70			1.00	2.00	3.00		
Item b31	19392	0.33	1.05	3.51	5.64			1.00	2.00	3.00		
Item b32	19392	0.10	4.17	4.77	5.43	6.87	8.64	1.00	2.00	3.00	4.00	5.00
Item b33	19392	1.22	1.09	1.02	0.72			1.00	2.00	3.00		
Item b34	19392	1.72	-0.94	-1.47	-0.66			1.00	2.00	3.00		
Item b35	19389	0.34	0.93	3.69	6.00			1.00	2.00	3.00		
Item b36	19389	0.25	2.95	3.33	3.95			1.00	2.00	3.00		
Item b37	19388	0.72	0.20	1.34	3.34			1.00	2.00	3.00		
Item b38	19389	0.21	2.64	3.73	4.50	7.03	9.23	1.00	2.00	3.00	4.00	5.00

Table 26: item parameters from 1 parameter IRT analysis of 2014 NAPE Biology grade s2

Item	N	M	AXsi_Cat1	AXsi_Cat2	AXsi_Cat3	AXsi_Cat4	AXsi_Cat5	B_Cat1.Dim1	B_Cat2.Dim1	B_Cat3.Dim1	B_Cat4.Dim1	B_Cat5.Dim1
Item b1	19387	1.14	0.38	0.72	0.83			0.35	0.56	0.65		
Item b2	19384	1.54	0.21	-0.17	0.04			0.26	0.56	0.96		
Item b3	19384	0.54	1.06	2.00	4.32			0.83	1.41	2.10		
Item b4	19386	0.23	3.42	3.58	4.14	5.69		0.84	1.05	1.45	1.68	
Item b5	19388	0.46	0.44	3.88	6.06			0.97	1.97	2.64		
Item b6	19389	0.15	4.18	4.57	6.41	4.62		0.81	0.91	1.28	1.48	
Item b7	19392	1.20	0.70	-0.50				0.15	0.42			
Item b8	19393	0.48	0.82	1.94				0.58	0.70			
Item b9	19393	0.43	0.85	3.15	5.45			0.89	1.74	2.31		
Item b10	19393	0.36	1.43	2.78	4.08			0.51	0.94	1.23		
Item b11	19393	0.11	2.87	4.19				0.69	1.27			
Item b12	19392	0.13	2.15					0.94				
Item b13	19390	1.11	0.09	0.48	1.33			0.66	1.25	1.78		
Item b14	19389	0.65	0.07	1.57				0.71	1.18			
Item b15	19389	0.28	2.20	3.23	5.09			0.96	1.54	1.94		
Item b16	19389	1.28	-0.40	0.09	0.87			0.54	1.21	2.11		
Item b17	19388	1.31	0.90	1.01	1.24	2.39		0.30	0.85	1.48	1.96	2.35
Item b18	19387	1.41	-0.93	-1.09	0.53		4.06	0.77	1.50	1.96		
Item b19	19392	0.37	3.44	3.15	2.51			0.81	0.69	0.86		
Item b20	19392	0.28	0.95					0.27				
Item b21	19392	0.41	1.11	2.60	4.88			0.72	1.21	1.68		
Item b22	19392	0.65	1.09	1.76	2.85			0.87	1.37	1.77		
Item b23	19389	1.12	1.52	1.35	1.04	3.39	5.13	0.36	0.64	1.05	1.35	1.23
Item b24	19389	0.50	0.77	2.41	4.95	7.94		1.25	1.88	1.61	1.88	
Item b25	19389	0.16	2.35	4.35	6.71			0.79	1.36	2.04		
Item b26	19389	0.60	1.17	1.72	2.92			0.67	1.02	1.30		
Item b27	19389	1.84	-0.09	-0.58	-0.28	1.29	1.88	0.56	1.03	1.49	1.80	1.81
Item b28	19392	3.18	0.94	0.46	0.55	-0.39	-0.82	0.35	0.48	0.53	0.85	1.27
Item b29	19392	1.11	-1.49	-0.60				0.43	0.69			
Item b30	19392	1.78	-0.01	-0.64	-0.60			0.34	0.50	1.04		
Item b31	19392	0.33	1.05	3.44	5.12			0.48	0.86	0.89		
Item b32	19392	0.10	4.37	5.04	5.20	7.39	8.22	0.86	1.27	1.27	2.28	2.24
Item b33	19392	1.22	1.10	1.02	0.71			0.38	0.86	1.35		
Item b34	19392	1.72	-1.07	-1.63	-0.80			0.61	1.26	1.73		
Item b35	19389	0.34	0.89	3.54	5.65			0.10	0.59	0.97		
Item b36	19389	0.25	3.03	3.62	4.22			0.75	1.38	1.77		
Item b37	19388	0.72	0.21	1.29	3.19			0.49	0.86	1.26		
Item b38	19389	0.21	2.83	3.84	4.40	6.98	8.41	0.90	1.15	1.43	1.97	2.02

Table 27: item parameters from 2 parameter IRT analysis of 2014 NAPE Biology grade s2

	Cat1	Cat2	Cat3	Cat4	Cat5
b1	-0.274	0.352	0.958		
b2	-0.629	-0.095	0.705		
b3	0.439	1.124	2.272		
b4	1.108	1.190	1.398	2.210	
b5	0.327	2.116	2.598		
b6	1.240	1.275	1.340	1.376	
b7	-0.483	-0.067			
b8	0.443	1.646			
b9	0.541	1.709	2.525		
b10	0.811	1.421	2.073		
b11	1.753	2.192			
b12	1.946				
b13	-0.348	0.403	1.231		
b14	-0.100	1.667			
b15	1.029	1.399	2.229		
b16	-0.676	0.303	1.024		
b17	-0.091	0.242	0.561	1.167	2.129
b18	-1.081	0.012	1.745		
b19	0.863	0.930	1.112		
b20	0.983				
b21	0.644	1.534	2.583		
b22	0.328	0.842	1.585		
b23	0.081	0.284	0.600	2.111	2.944
b24	0.376	1.553	2.914	3.838	
b25	1.472	1.963	2.553		
b26	0.390	0.909	1.766		
b27	-0.766	-0.236	0.427	1.260	1.799
b28	-0.625	-0.459	-0.285	-0.154	0.261
b29	-1.597	1.022			
b30	-0.873	-0.346	0.478		
b31	0.829	2.090	2.762		
b32	1.410	1.445	1.525	1.742	2.270
b33	-0.081	0.196	0.575		
b34	-1.342	-0.360	1.026		
b35	0.775	2.300	2.961		
b36	1.098	1.225	1.556		
b37	-0.083	1.123	2.299		
b38	1.179	1.350	1.558	2.202	2.824

Table 28: thresholds for IRT analysis of NAPE Biology 2014 grade s2

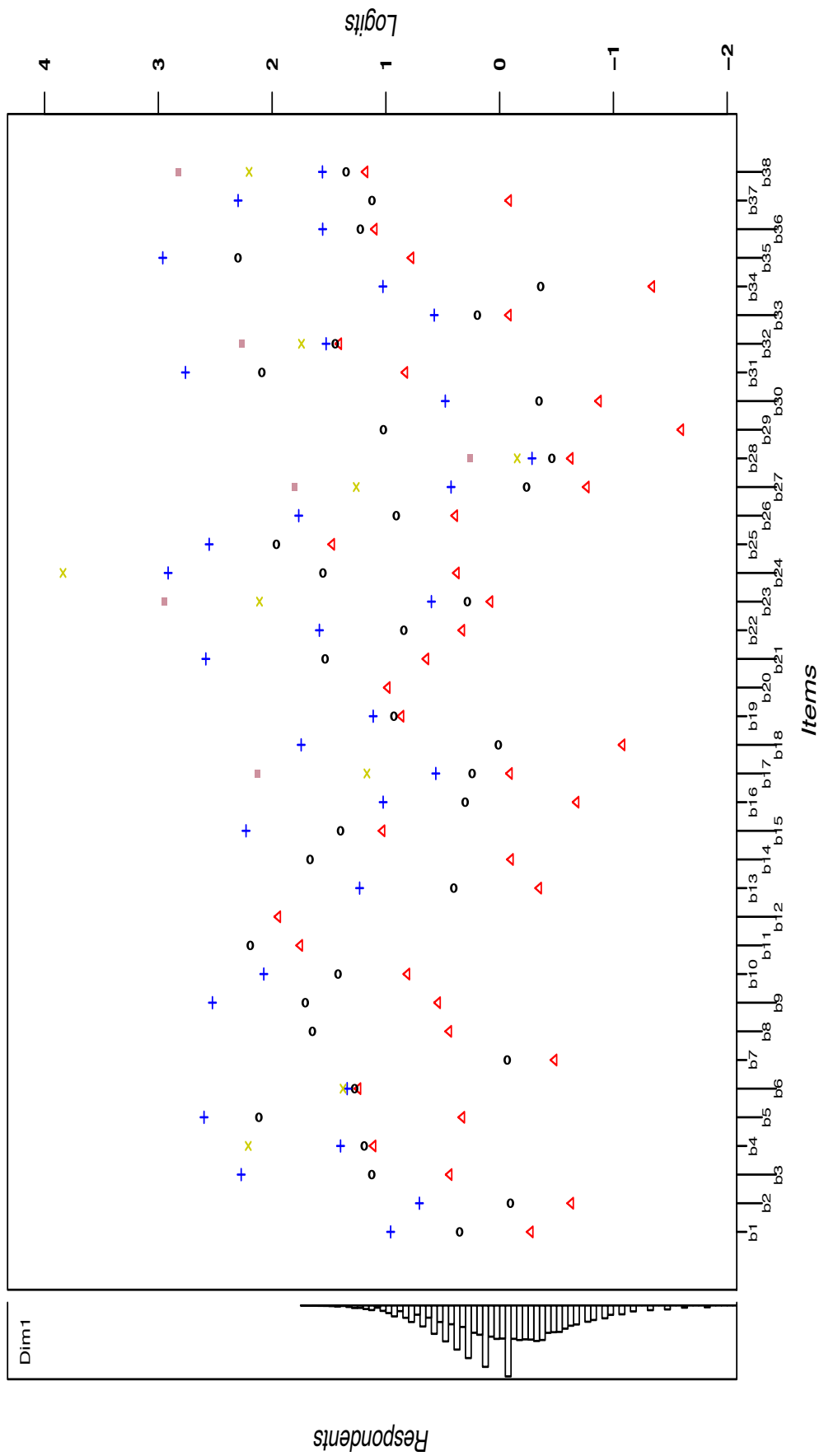


Figure 6: Wright Map for items in 2014 NAPE Biology grade S2

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
m1	1.04	7.89	0.00	1.03	7.66	0.00
m2	1.00	0.27	0.79	1.01	0.56	0.57
m3	0.92	-2.57	0.01	0.98	-0.56	0.58
m4	0.67	-6.34	0.00	0.98	-0.43	0.67
m5	1.41	20.59	0.00	1.22	17.85	0.00
m6	1.55	32.51	0.00	1.27	30.95	0.00
m7	1.14	3.51	0.00	0.99	-0.42	0.67
m8	0.98	-1.06	0.29	0.96	-3.68	0.00
m9	0.97	-4.30	0.00	0.97	-4.32	0.00
m10	0.87	-20.18	0.00	0.90	-18.30	0.00
m11	0.84	-8.07	0.00	0.95	-3.06	0.00
m12	1.23	19.83	0.00	1.13	16.39	0.00
m13	0.90	-10.92	0.00	0.93	-11.66	0.00
m14	1.53	13.50	0.00	1.05	2.31	0.02
m15	2.67	14.47	0.00	1.11	1.92	0.06
m16	0.98	-1.45	0.15	0.99	-0.86	0.39
m17	0.98	-2.47	0.01	0.98	-2.35	0.02
m18	1.31	9.27	0.00	1.11	5.74	0.00
m19	1.00	0.09	0.93	1.00	-0.02	0.98
m20	0.81	-4.75	0.00	0.96	-1.88	0.06
m21	0.97	-1.15	0.25	1.02	0.85	0.40
m22	0.97	-1.69	0.09	0.99	-1.27	0.20
m23	0.89	-12.79	0.00	0.92	-13.44	0.00
m24	1.38	24.93	0.00	1.25	28.88	0.00
m25	1.22	14.79	0.00	1.12	13.93	0.00
m26	0.82	-19.25	0.00	0.86	-19.90	0.00
m27	0.91	-11.79	0.00	0.93	-11.57	0.00
m28	0.98	-1.50	0.13	1.01	0.81	0.42
m29	0.90	-5.91	0.00	0.95	-4.38	0.00
m30	1.08	2.22	0.03	1.02	1.04	0.30
m31	0.91	-17.67	0.00	0.92	-17.50	0.00
m32	0.95	-4.52	0.00	0.96	-5.58	0.00
m33	1.05	1.82	0.07	1.02	1.04	0.30
m34	1.10	7.25	0.00	1.07	7.76	0.00
m35	0.98	-0.36	0.72	0.99	-0.13	0.90
m36	1.00	0.35	0.73	1.00	0.47	0.64
m37	0.97	-3.27	0.00	0.97	-4.45	0.00
m38	1.02	0.20	0.84	1.00	-0.01	0.99
m39a	0.79	-20.74	0.00	0.84	-18.60	0.00
m39b	1.13	4.17	0.00	0.97	-1.43	0.15
m40a	0.94	-17.39	0.00	0.94	-17.53	0.00
m40b	1.64	2.96	0.00	0.96	-0.27	0.79
m41	1.49	12.76	0.00	1.25	17.24	0.00
m42	1.07	8.33	0.00	1.05	6.66	0.00
m43	1.02	1.50	0.13	1.00	0.53	0.60
m44	1.37	14.30	0.00	1.13	10.66	0.00

Table 29: infit and outfit statistics for IRT analysis of 2014 NAPE Mathematics grade s2

Item	N	M	AXsi_.Cat1	AXsi_.Cat2	AXsi_.Cat3	AXsi_.Cat4	AXsi_.Cat5	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1
Item m1	19515	0.59	-0.39					1.00				
Item m2	19517	0.22	1.36					1.00				
Item m3	19516	0.06	2.97					1.00				
Item m4	19518	0.02	4.12					1.00				
Item m5	19518	0.62	1.54	2.42	2.39			1.00	2.00	3.00		
Item m6	19518	1.86	1.88	1.46	-0.71			1.00	2.00	3.00		
Item m7	19518	1.86	0.57	-3.18				1.00	2.00			
Item m8	19518	1.61	0.27	-1.88				1.00	2.00			
Item m9	19521	0.90	0.83	0.31				1.00	2.00			
Item m10	19520	0.33	0.75					1.00				
Item m11	19521	0.11	2.25					1.00				
Item m12	19521	1.74	0.71	0.63	-0.55			1.00	2.00	3.00		
Item m13	19521	0.77	2.92	0.61				1.00	2.00			
Item m14	19521	1.84	1.02	-2.90				1.00	2.00			
Item m15	19521	0.05	4.82	4.76	8.83	7.77		1.00	2.00	3.00	4.00	
Item m16	19521	1.47	0.41	-1.38				1.00	2.00			
Item m17	19521	0.82	0.02	0.67				1.00	2.00			
Item m18	19518	0.32	2.47	3.81	3.42			1.00	2.00	3.00		
Item m19	19517	0.14	1.95					1.00				
Item m20	19518	0.19	3.02	4.69	4.08			1.00	2.00	3.00		
Item m21	19518	0.56	2.27	2.47	4.65	6.06	4.65	1.00	2.00	3.00	4.00	5.00
Item m22	19517	0.42	1.72	1.90				1.00	2.00			
Item m23	19521	0.86	3.22	0.36				1.00	2.00			
Item m24	19521	1.92	1.05	1.07	-0.91			1.00	2.00	3.00		
Item m25	19521	1.45	2.40	-1.19				1.00	2.00			
Item m26	19521	0.69	1.82	0.86				1.00	2.00			
Item m27	19520	1.17	0.39	-0.47				1.00	2.00			
Item m28	19521	0.75	0.48	2.88	1.97			1.00	2.00	3.00		
Item m29	19519	0.68	1.24	2.70	2.12			1.00	2.00	3.00		
Item m30	19519	0.21	2.44	5.79	4.06			1.00	2.00	3.00		
Item m31	19519	0.39	0.47					1.00				
Item m32	19519	1.35	0.98	-0.94				1.00	2.00			
Item m33	19519	0.22	2.83	2.74				1.00	2.00			
Item m34	19519	1.71	0.91	1.38	2.49	0.46		1.00	2.00	3.00	4.00	
Item m35	19518	0.03	3.79					1.00				
Item m36	19520	0.64	-0.62					1.00				
Item m37	19520	1.29	0.52	-0.82				1.00	2.00			
Item m38	19520	0.01	5.09					1.00				
Item m39a	19520	0.56	0.99	1.53				1.00	2.00			
Item m39b	19520	0.27	2.15	4.03	3.88			1.00	2.00	3.00		
Item m40a	19520	0.51	-0.04					1.00				
Item m40b	19514	0.01	5.97	7.29	7.59			1.00	2.00	3.00		
Item m41	19517	1.51	2.94	4.57	4.24	2.83	1.74	1.00	2.00	3.00	4.00	5.00
Item m42	19516	1.50	0.38	-0.27	0.22			1.00	2.00	3.00		
Item m43	19516	1.50	0.61	-1.45				1.00	2.00			
Item m44	19521	2.44	0.42	0.25	-2.33			1.00	2.00	3.00		

Table 30: item parameters from 1 parameter IRT analysis of 2014 NAPE Mathematics grade s2

item	N	M	AXsi_Cat1	AXsi_Cat2	AXsi_Cat3	AXsi_Cat4	AXsi_Cat5	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1
item m1	19515	0.59	-0.39					0.33				
item m2	19517	0.22	1.35					0.51				
item m3	19516	0.06	3.09					0.76				
item m4	19518	0.02	5.02					1.52				
item m5	19518	0.62	1.56	2.25	2.05			-0.06	0.25	0.83		
item m6	19518	1.86	2.08	1.71	-0.56			0.13	0.19	0.68		
item m7	19518	1.86	0.61	-3.17				0.42	0.95			
item m8	19518	1.61	0.23	-1.98				0.47	1.20			
item m9	19521	0.90	0.81	0.34				0.43	1.22			
item m10	19520	0.33	0.93					1.32				
item m11	19521	0.11	2.59					1.14				
item m12	19521	1.74	0.75	0.72	-0.54			0.89	0.48	1.17		
item m13	19521	0.77	2.87	0.68				0.73	1.47			
item m14	19521	1.84	1.44	-2.63				0.48	0.48			
item m15	19521	0.05	4.70	4.25	7.85	6.34		-0.14	-0.07	0.63	1.17	
item m16	19521	1.47	0.44	-1.39				0.36	1.07			
item m17	19521	0.82	0.01	0.72				0.46	1.18			
item m18	19518	0.32	2.43	3.73	2.98			0.32	0.86	1.06		
item m19	19517	0.14	1.95					0.54				
item m20	19518	0.19	3.15	4.64	4.61			0.83	1.06	2.06		
item m21	19518	0.56	2.35	2.63	4.83	6.43	4.78	0.89	1.41	1.88	2.54	2.88
item m22	19517	0.42	1.84	1.85				0.91	1.07			
item m23	19521	0.86	3.17	0.40				0.43	1.46			
item m24	19521	1.92	1.24	1.32	-0.74			0.19	0.36	0.70		
item m25	19521	1.45	2.54	-1.07				0.25	0.54			
item m26	19521	0.69	1.80	1.07				1.24	1.96			
item m27	19520	1.17	0.29	-0.53				0.65	1.42			
item m28	19521	0.75	0.48	3.05	2.05			0.37	1.27	1.63		
item m29	19519	0.68	1.22	2.81	2.38			0.62	1.37	2.00		
item m30	19519	0.21	2.36	5.90	4.20			0.06	1.15	1.67		
item m31	19519	0.39	0.53					1.02				
item m32	19519	1.35	0.95	-1.00				0.44	1.21			
item m33	19519	0.22	2.84	2.65				0.53	0.93			
item m34	19519	1.71	0.94	1.41	2.42	0.43		0.43	0.94	1.12	1.86	
item m35	19518	0.03	3.86					0.66				
item m36	19520	0.64	-0.63					0.50				
item m37	19520	1.29	0.39	-0.95				0.95	1.27			
item m38	19520	0.01	5.16					0.65				
item m39a	19520	0.56	0.92	2.36	3.98			0.95	2.56	1.67		
item m39b	19520	0.27	2.13	4.05				0.46	1.08			
item m40a	19520	0.51	-0.06					0.91				
item m40b	19514	0.01	5.83	7.29	8.29			0.08	1.06	2.00		
item m41	19517	1.51	2.98	4.62	4.12	2.48	1.58	0.42	0.28	0.56	0.95	2.01
item m42	19516	1.50	0.42	-0.24	0.33			0.49	0.62	1.47		
item m43	19516	1.50	0.73	-1.41				0.19	0.91			
item m44	19521	2.44	0.68	0.62	-1.99			0.43	0.43	0.87		

Table 31: item parameters from 2 parameter IRT analysis of 2014 NAPE Mathematics grade s2

	Cat1	Cat2	Cat3	Cat4	Cat5
m1	-0.394				
m2	1.358				
m3	2.969				
m4	4.115				
m5	0.499	0.809	1.095		
m6	-0.325	-0.245	-0.148		
m7	-1.650	-1.535			
m8	-1.088	-0.792			
m9	-0.098	0.405			
m10	0.749				
m11	2.250				
m12	-0.439	-0.170	0.072		
m13	0.268	0.341			
m14	-1.493	-1.409			
m15	1.813	1.843	2.045	2.071	
m16	-0.854	-0.521			
m17	-0.303	0.972			
m18	0.980	1.156	1.300		
m19	1.947				
m20	1.249	1.376	1.468		
m21	0.707	0.832	1.024	1.079	1.121
m22	0.721	1.181			
m23	0.156	0.204			
m24	-0.453	-0.281	-0.157		
m25	-0.619	-0.569			
m26	0.304	0.553			
m27	-0.500	0.026			
m28	0.142	0.918	1.044		
m29	0.412	0.798	0.977		
m30	1.218	1.443	1.473		
m31	0.470				
m32	-0.588	-0.354			
m33	1.254	1.484			
m34	-0.122	0.118	0.255	0.315	
m35	3.789				
m36	-0.620				
m37	-0.606	-0.216			
m38	5.094				
m39a	0.375	1.155			
m39b	1.070	1.351	1.507		
m40a	-0.043				
m40b	2.484	2.505	2.576		
m41	0.276	0.307	0.314	0.329	0.427
m42	-0.541	-0.113	0.815		
m43	-0.855	-0.592			
m44	-0.935	-0.735	-0.626		

Table 32: thresholds for IRT analysis of NAPE Mathematics 2014 grade s2

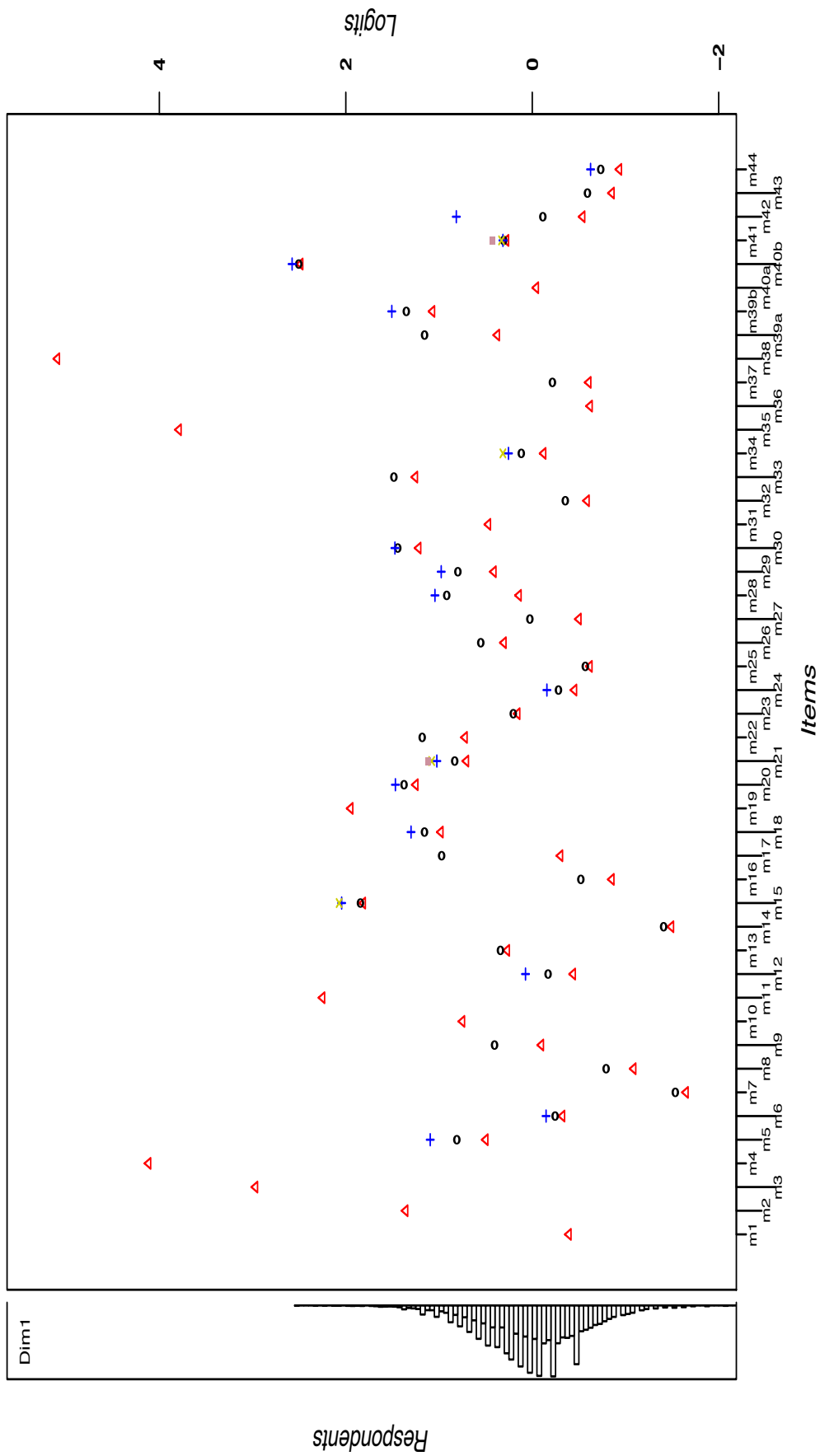


Figure 7: Wright Map for items in 2014 NAPE Mathematics grade S2

4 PLE

We had item scores for 300 sample papers in each of four PLE subjects. As is clear from figure 8, the distributions of raw scores in these samples was very different from what might be expected in a random sample.

This does not prevent us from using IRT to analyse these sets of scores, since IRT analysis (if the data fits the model) produces item parameters that are independent of person parameters. This section provides tables and Wright Maps (item-person maps) for PLE examinations in English, Mathematics, Science and SST for 2015.

For each examination, we provide

- three tables:
 - the outfit and infit statistics
 - the item parameters from fitting a one parameter IRT model (location values)
 - the item parameters from fitting a two parameter IRT model (location and slope values)
- one wright map, in which item thresholds are plotted on the right with a histogram showing, on the same logit scale, the distribution of person scores on the left

Basic IRT models are based on an assumption that a single latent trait (or ability) is measured by a test. The probability that a person will get an item right, says the model, is a function of a person's ability and the characteristics of an item. The item's characteristics are represented as a probability curve. Such a curve is specified by its mathematical form and two parameters: a location (interpretable for dichotomous items as a difficulty) and a slope (intepretable as discrimination – steep curves mean that the probability of getting the item right changes rapidly with ability).

Using IRT means the data set is analysed to identify information about items in a way that means that information about items is, unlike classical test statistics, intentionally not dependent on the information about persons – if the model applies, then the information about items is separated from the information about the persons who actually took the test.

IRT requires that items are locally independent – the chance of getting any item correct is dependent on ability, not on getting another item.

Tables such as 33 provide an indication of how well the items in the test fit the model. Two measures are given (both based on a chi-square measure of the difference between observed and predicted):

- outfit (together with a t-value and associated probability of getting a value as large as this if the model is correct)
- infit (together with a t-value and associated probability of getting a value as large as this if the model is correct).

Oufit and infit values have an expected value of 1.0 – so values close to 1.0 (say from 0.5 towards 2.0) suggest a more-or-less satisfactory fit. A value for an item outside this range suggests some potential issues with the item. Outfit values will be outside the expected range when there are enough exceptions to the expected patterns of responses (for example, low ability persons getting a 'difficult' item correct). Infit is a weighted measure that pays more attention to the middle ranges of ability and reflects the extent to which the actual variance on the item is close to the variance predicted by the model.

Tables such as 34 and 35 provide item parameters resulting from fitting IRT models. Item parameters appear in columns headed *Axsi_cat1* (location) and *Bxsi_cat1* (slope).

Table 34 provides the results of fitting a one parameter IRT model. Using a one parameter IRT model means assuming that the slope parameters for items are all the same – for dichotomous items, a value of 1.0 and, as can be seen in this table, 1.0, 2.0, 3.0 and so on for each score category.

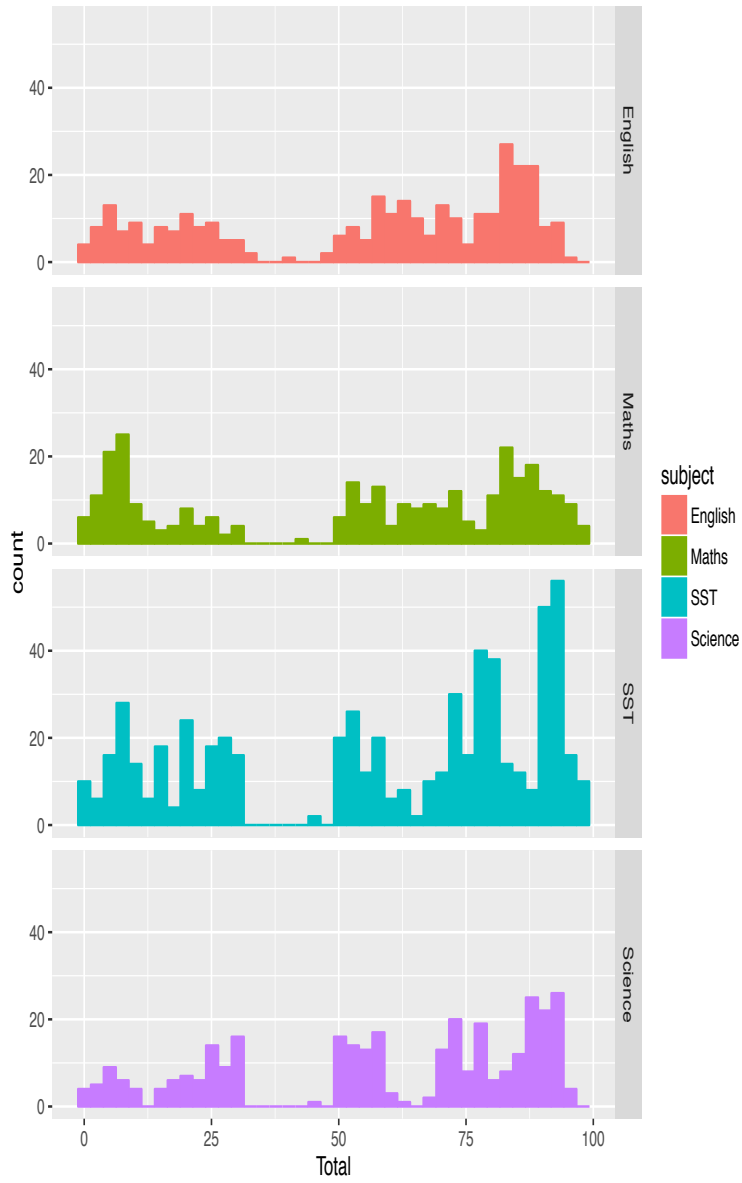


Figure 8: Distributions of raw score totals in (non-random) sample of PLE scores for four subjects 2015

Where the response is dichotomous, the item parameters for location in the tables can be seen as difficulties. Where the response is polytomous, the item parameters are the δ (delta) parameters in the partial credit model. These are not interpretable as difficulties.

Using a two parameter IRT model means assuming that the slope parameters for items can be different – see for example, table 35.

We used the information in these tables to support our comments about redundancy of items – items providing essentially the same information.

The Thurstonian thresholds (item thresholds) in the wright maps (for example, 12) show the ability (on the logit scale) at which the probability of getting at least this score or higher (if the item is polytomous) is 0.5. Thresholds are represented by coloured symbols. Wright maps give a visual sense of the spread of items across the ability scale and the extent to which categories in polytomous items are separated. Overlapping or nearly overlapping category symbols suggest that the different categories (scores) on this item do not represent real differences in ability.

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
Item 1	0.95	-0.17	0.86	0.97	-0.28	0.78
Item 2	0.42	-1.82	0.07	0.79	-2.00	0.05
Item 3	0.75	-1.32	0.19	0.84	-1.69	0.09
Item 4	0.53	-2.04	0.04	0.78	-2.23	0.03
Item 5	0.33	-4.70	0.00	0.52	-6.11	0.00
Item 6	0.44	-3.08	0.00	0.69	-3.28	0.00
Item 7	0.36	-3.54	0.00	0.58	-4.54	0.00
Item 8	0.84	-0.71	0.48	0.89	-1.40	0.16
Item 9	0.59	-2.27	0.02	0.77	-2.41	0.02
Item 10	0.50	-1.79	0.07	0.87	-1.25	0.21
Item 11	1.03	0.19	0.85	0.86	-2.31	0.02
Item 12	0.45	-3.44	0.00	0.64	-3.94	0.00
Item 13	0.71	-1.57	0.12	0.80	-2.40	0.02
Item 14	0.51	-2.99	0.00	0.62	-4.37	0.00
Item 15	0.76	-0.80	0.42	0.89	-1.00	0.32
Item 16	0.58	-2.17	0.03	0.76	-3.38	0.00
Item 17	0.94	-0.17	0.86	0.87	-1.25	0.21
Item 18	0.60	-2.37	0.02	0.74	-2.99	0.00
Item 19	0.39	-2.73	0.01	0.68	-3.26	0.00
Item 20	1.10	0.55	0.58	1.18	1.74	0.08
Item 21	3.00	1.37	0.17	1.17	0.81	0.42
Item 22	2.76	3.83	0.00	1.76	5.81	0.00
Item 23	1.13	0.71	0.48	1.06	0.61	0.54
Item 24	1.12	0.41	0.68	0.86	-1.25	0.21
Item 25	0.65	-1.53	0.13	0.86	-2.06	0.04
Item 26	1.15	0.63	0.53	1.13	1.87	0.06
Item 27	0.59	-0.55	0.58	0.92	-1.04	0.30
Item 28	0.51	-2.83	0.00	0.67	-3.56	0.00
Item 29	0.50	-2.45	0.01	0.74	-2.63	0.01
Item 30	0.35	-3.36	0.00	0.57	-4.68	0.00
Item 31	0.94	-0.10	0.92	0.80	-1.93	0.05
Item 32	0.53	-2.87	0.00	0.64	-4.37	0.00
Item 33	0.50	-2.27	0.02	0.71	-4.59	0.00
Item 34	0.65	-1.26	0.21	0.83	-2.68	0.01
Item 35	0.56	-2.59	0.01	0.74	-2.87	0.00
Item 36	0.60	-1.32	0.19	0.82	-3.00	0.00
Item 37	0.68	-1.53	0.13	0.85	-2.00	0.05
Item 38	0.64	-1.78	0.08	0.83	-2.23	0.03
Item 39	0.59	-2.32	0.02	0.69	-3.31	0.00
Item 40	0.64	-2.05	0.04	0.83	-1.92	0.05
Item 41	0.58	-1.83	0.07	0.78	-3.38	0.00
Item 42	2.90	1.36	0.17	1.05	0.35	0.72
Item 43	0.49	-1.10	0.27	0.77	-3.74	0.00
Item 44	4.82	6.97	0.00	1.55	7.18	0.00
Item 45	0.54	-2.26	0.02	0.75	-3.71	0.00
Item 46	0.84	-0.40	0.69	1.05	0.80	0.42
Item 47	0.68	-1.79	0.07	0.82	-2.07	0.04
Item 48	0.53	-1.71	0.09	0.74	-4.45	0.00
Item 49	0.62	-1.45	0.15	0.81	-3.03	0.00
Item 50	0.69	0.02	0.99	1.00	0.04	0.97
Item 51a	1.03	0.23	0.82	1.06	0.78	0.43
Item 51b	1.19	0.80	0.43	1.04	0.44	0.66
Item 51c	1.73	2.15	0.03	1.37	5.02	0.00
Item 51d	0.95	0.03	0.98	1.01	0.19	0.85
Item 51e	0.91	-0.39	0.70	1.02	0.25	0.80
Item 51f	0.93	-0.19	0.85	1.00	0.03	0.98
Item 51g	4.74	3.17	0.00	1.14	1.67	0.09
Item 51h.i.	0.96	-0.16	0.87	0.92	-0.87	0.38
Item 51h.ii.	0.95	-0.17	0.86	0.95	-0.57	0.57
Item 51i	0.98	-0.01	0.99	1.09	1.24	0.22
Item 52a	0.83	-0.62	0.54	0.82	-1.73	0.08
Item 52b	3.49	6.53	0.00	1.79	8.80	0.00
Item 52c	0.66	-1.44	0.15	0.82	-1.71	0.09
Item 52d	1.49	2.21	0.03	1.47	4.02	0.00

Item 52e	1.00	0.22	0.82	1.21	2.42	0.02
Item 52f	0.99	0.09	0.93	1.19	2.88	0.00
Item 52g	0.66	-1.81	0.07	0.74	-2.75	0.01
Item 52h	1.80	3.40	0.00	1.47	4.30	0.00
Item 52i	1.87	3.60	0.00	1.64	5.42	0.00
Item 52j	0.97	0.07	0.95	1.01	0.11	0.92
Item 53A.i.	3.84	7.01	0.00	1.86	9.47	0.00
Item 53A.ii.	1.41	1.44	0.15	1.38	3.20	0.00
Item 53A.iii.	2.13	2.26	0.02	1.01	0.17	0.87
Item 53A.iv.	3.34	7.43	0.00	2.10	9.72	0.00
Item 53A.v.	1.25	0.83	0.40	1.14	1.30	0.19
Item 53Ba	1.76	3.19	0.00	1.21	1.98	0.05
Item 53Bb	0.79	-1.09	0.28	0.90	-1.12	0.26
Item 53Bc	1.41	1.82	0.07	1.08	1.00	0.32
Item 53Bd	0.80	-0.93	0.35	0.92	-1.01	0.31
Item 53Be	2.07	2.73	0.01	1.10	1.51	0.13
Item 54a	0.62	-2.06	0.04	0.75	-2.59	0.01
Item 54b	0.84	-0.76	0.45	0.83	-2.06	0.04
Item 54c	2.48	5.42	0.00	1.67	5.52	0.00
Item 54d	1.07	0.36	0.72	1.13	1.76	0.08
Item 54e	0.75	-0.94	0.35	0.90	-1.42	0.16
Item 54f	0.91	-0.42	0.68	0.99	-0.11	0.91
Item 54g	0.88	-0.58	0.56	0.95	-0.50	0.62
Item 54h.i.	2.14	2.03	0.04	0.91	-1.48	0.14
Item 54h.ii.	0.79	-0.08	0.94	0.95	-0.64	0.52
Item 54i	0.74	-1.17	0.24	0.91	-1.26	0.21
Item 55a	0.84	-0.47	0.64	0.92	-0.70	0.49
Item 55b	1.46	2.11	0.03	1.35	3.15	0.00
Item 55c	1.17	0.83	0.40	1.19	1.77	0.08
Item 55d	1.09	0.39	0.70	0.96	-0.31	0.76
Item 55e	1.10	0.38	0.71	1.17	2.52	0.01
Item 55f	0.62	-2.01	0.04	0.82	-2.37	0.02
Item 55g	1.55	2.18	0.03	1.11	1.41	0.16
Item 55h	0.66	-1.66	0.10	0.83	-2.35	0.02
Item 55i	1.05	0.25	0.80	1.20	3.02	0.00
Item 55j	1.58	2.15	0.03	1.18	2.38	0.02

Table 33: infit and outfit statistics for IRT analysis of PLE English

item	N	M	AXsl_Cat1	B.Cat1_Dim1
Item 1	316	0.60	-0.35	1.00
Item 2	316	0.80	-2.29	1.00
Item 3	316	0.60	-0.35	1.00
Item 4	316	0.73	-1.55	1.00
Item 5	316	0.61	-0.38	1.00
Item 6	316	0.69	-1.14	1.00
Item 7	316	0.71	-1.26	1.00
Item 8	316	0.51	0.35	1.00
Item 9	316	0.66	-0.85	1.00
Item 10	316	0.77	-1.96	1.00
Item 11	316	0.38	1.29	1.00
Item 12	316	0.65	-0.76	1.00
Item 13	316	0.58	-0.12	1.00
Item 14	316	0.64	-0.68	1.00
Item 15	316	0.75	-1.75	1.00
Item 16	316	0.52	0.33	1.00
Item 17	316	0.71	-1.26	1.00
Item 18	316	0.59	-0.28	1.00
Item 19	316	0.75	-1.69	1.00
Item 20	316	0.63	-0.59	1.00
Item 21	316	0.96	-5.08	1.00
Item 22	316	0.77	-1.96	1.00
Item 23	316	0.63	-0.59	1.00
Item 24	316	0.83	-2.69	1.00
Item 25	316	0.47	0.64	1.00
Item 26	316	0.44	0.84	1.00
Item 27	316	0.20	2.56	1.00
Item 28	316	0.67	-0.90	1.00
Item 29	316	0.71	-1.33	1.00
Item 30	316	0.72	-1.46	1.00
Item 31	316	0.75	-1.75	1.00
Item 32	316	0.60	-0.30	1.00
Item 33	316	0.45	0.77	1.00
Item 34	316	0.42	0.99	1.00
Item 35	316	0.63	-0.57	1.00
Item 36	316	0.39	1.22	1.00
Item 37	316	0.50	0.42	1.00
Item 38	316	0.51	0.35	1.00
Item 39	316	0.66	-0.82	1.00
Item 40	315	0.57	-0.12	1.00
Item 41	315	0.46	0.73	1.00
Item 42	316	0.06	4.19	1.00
Item 43	316	0.26	2.07	1.00
Item 44	316	0.41	1.05	1.00
Item 45	316	0.49	0.51	1.00
Item 46	316	0.39	1.22	1.00
Item 47	316	0.58	-0.15	1.00
Item 48	316	0.40	1.14	1.00
Item 49	316	0.43	0.95	1.00
Item 50	316	0.10	3.55	1.00
Item 51a	316	0.54	0.14	1.00
Item 51b	316	0.72	-1.36	1.00
Item 51c	316	0.42	0.99	1.00
Item 51d	316	0.31	1.72	1.00
Item 51e	316	0.60	-0.35	1.00
Item 51f	316	0.47	0.69	1.00
Item 51g	316	0.18	2.72	1.00
Item 51h.i.	316	0.57	-0.05	1.00
Item 51h.ii.	316	0.53	0.19	1.00
Item 51i	316	0.46	0.71	1.00

Item 52a	316	0.72	-1.42	1.00
Item 52b	316	0.48	0.55	1.00
Item 52c	316	0.72	-1.46	1.00
Item 52d	316	0.65	-0.70	1.00
Item 52e	316	0.19	2.67	1.00
Item 52f	316	0.37	1.31	1.00
Item 52g	316	0.66	-0.79	1.00
Item 52h	315	0.61	-0.43	1.00
Item 52i	315	0.63	-0.54	1.00
Item 52j	316	0.82	-2.52	1.00
Item 53A.i.	316	0.48	0.60	1.00
Item 53A.ii.	316	0.73	-1.55	1.00
Item 53A.iii.	316	0.81	-2.41	1.00
Item 53A.iv.	316	0.56	-0.00	1.00
Item 53A.v.	316	0.77	-1.89	1.00
Item 53Ba	316	0.65	-0.70	1.00
Item 53Bb	316	0.58	-0.15	1.00
Item 53Bc	316	0.54	0.14	1.00
Item 53Bd	316	0.52	0.31	1.00
Item 53Be	316	0.40	1.14	1.00
Item 54a	316	0.66	-0.82	1.00
Item 54b	316	0.57	-0.08	1.00
Item 54c	316	0.64	-0.65	1.00
Item 54d	316	0.46	0.75	1.00
Item 54e	316	0.45	0.77	1.00
Item 54f	316	0.62	-0.49	1.00
Item 54g	316	0.59	-0.25	1.00
Item 54h.i.	316	0.28	1.92	1.00
Item 54h.ii.	316	0.17	2.78	1.00
Item 54i	316	0.49	0.49	1.00
Item 55a	316	0.75	-1.75	1.00
Item 55b	316	0.64	-0.65	1.00
Item 55c	316	0.66	-0.85	1.00
Item 55d	316	0.75	-1.72	1.00
Item 55e	316	0.34	1.54	1.00
Item 55f	316	0.53	0.24	1.00
Item 55g	316	0.51	0.35	1.00
Item 55h	316	0.51	0.35	1.00
Item 55i	316	0.32	1.67	1.00
Item 55j	316	0.48	0.55	1.00

Table 34: item parameters from 1 parameter IRT analysis of PLE English

item	N	M	AXsi_Cat1	B.Cat1.Dim1
Item 1	316	0.60	-0.77	1.79
Item 2	316	0.80	-3.55	2.41
Item 3	316	0.60	-0.81	2.12
Item 4	316	0.73	-2.47	2.31
Item 5	316	0.61	-1.05	5.45
Item 6	316	0.69	-2.16	2.69
Item 7	316	0.71	-2.73	3.14
Item 8	316	0.51	-0.00	1.90
Item 9	316	0.66	-1.48	2.24
Item 10	316	0.77	-2.86	2.18
Item 11	316	0.38	1.12	2.09
Item 12	316	0.65	-1.57	2.80
Item 13	316	0.58	-0.54	2.26
Item 14	316	0.64	-1.48	3.00
Item 15	316	0.75	-2.45	2.03
Item 16	316	0.52	0.09	2.57
Item 17	316	0.71	-1.83	1.96
Item 18	316	0.59	-0.74	2.38
Item 19	316	0.75	-3.02	2.68

Item 20	316	0.63	-0.92	1.44
Item 21	316	0.96	-4.22	1.08
Item 22	316	0.77	-1.57	0.80
Item 23	316	0.63	-0.95	1.57
Item 24	316	0.83	-3.40	1.94
Item 25	316	0.47	0.39	2.17
Item 26	316	0.44	0.35	1.34
Item 27	316	0.20	2.73	2.27
Item 28	316	0.67	-1.72	2.59
Item 29	316	0.71	-2.20	2.36
Item 30	316	0.72	-3.18	3.23
Item 31	316	0.75	-2.61	2.18
Item 32	316	0.60	-0.83	3.14
Item 33	316	0.45	0.97	3.37
Item 34	316	0.42	0.87	2.32
Item 35	316	0.63	-1.16	2.46
Item 36	316	0.39	1.19	2.37
Item 37	316	0.50	0.14	2.22
Item 38	316	0.51	0.08	2.36
Item 39	316	0.66	-1.53	2.47
Item 40	315	0.57	-0.54	2.26
Item 41	315	0.46	0.65	2.61
Item 42	316	0.06	3.27	1.08
Item 43	316	0.26	2.89	3.16
Item 44	316	0.41	0.36	0.60
Item 45	316	0.49	0.37	2.71
Item 46	316	0.39	0.78	1.54
Item 47	316	0.58	-0.57	2.13
Item 48	316	0.40	1.47	3.16
Item 49	316	0.43	0.85	2.39
Item 50	316	0.10	3.29	1.75
Item 51a	316	0.54	-0.26	1.54
Item 51b	316	0.72	-1.66	1.55
Item 51c	316	0.42	0.36	0.89
Item 51d	316	0.31	1.25	1.52
Item 51e	316	0.60	-0.74	1.63
Item 51f	316	0.47	0.28	1.62
Item 51g	316	0.18	1.71	0.77
Item 51h.i.	316	0.57	-0.45	1.81
Item 51h.ii.	316	0.53	-0.19	1.78
Item 51i	316	0.46	0.27	1.49
Item 52a	316	0.72	-2.10	2.07
Item 52b	316	0.48	0.02	0.53
Item 52c	316	0.72	-2.20	2.14
Item 52d	316	0.65	-0.89	1.08
Item 52e	316	0.19	1.76	0.94
Item 52f	316	0.37	0.71	1.19
Item 52g	316	0.66	-1.43	2.31
Item 52h	315	0.61	-0.67	1.00
Item 52i	315	0.63	-0.72	0.92
Item 52j	316	0.82	-2.83	1.64
Item 53A.i.	316	0.48	0.05	0.48
Item 53A.ii.	316	0.73	-1.57	1.20
Item 53A.iii.	316	0.81	-2.59	1.53
Item 53A.iv.	316	0.56	-0.30	0.44
Item 53A.v.	316	0.77	-2.10	1.51
Item 53Ba	316	0.65	-0.95	1.26
Item 53Bb	316	0.58	-0.56	1.94
Item 53Bc	316	0.54	-0.26	1.42
Item 53Bd	316	0.52	-0.07	1.80
Item 53Be	316	0.40	0.59	1.25

Item 54a	316	0.66	-1.45	2.28
Item 54b	316	0.57	-0.48	1.99
Item 54c	316	0.64	-0.77	0.82
Item 54d	316	0.46	0.27	1.32
Item 54e	316	0.45	0.47	1.92
Item 54f	316	0.62	-0.88	1.69
Item 54g	316	0.59	-0.66	1.78
Item 54h.i.	316	0.28	1.64	1.80
Item 54h.ii.	316	0.17	2.62	1.89
Item 54i	316	0.49	0.15	1.94
Item 55a	316	0.75	-2.27	1.83
Item 55b	316	0.64	-0.88	1.17
Item 55c	316	0.66	-1.13	1.42
Item 55d	316	0.75	-2.15	1.74
Item 55e	316	0.34	0.93	1.22
Item 55f	316	0.53	-0.07	2.31
Item 55g	316	0.51	-0.08	1.40
Item 55h	316	0.51	0.08	2.33
Item 55i	316	0.32	1.02	1.16
Item 55j	316	0.48	0.08	1.22

Table 35: item parameters from 2 parameter IRT analysis of PLE English

	Cat1
item 1	-0.354
item 2	-2.291
item 3	-0.354
item 4	-1.553
item 5	-0.380
item 6	-1.142
item 7	-1.265
item 8	0.351
item 9	-0.846
item 10	-1.962
item 11	1.287
item 12	-0.760
item 13	-0.125
item 14	-0.676
item 15	-1.753
item 16	0.328
item 17	-1.265
item 18	-0.276
item 19	-1.686
item 20	-0.594
item 21	-5.082
item 22	-1.962
item 23	-0.594
item 24	-2.686
item 25	0.643
item 26	0.839
item 27	2.562
item 28	-0.904
item 29	-1.327
item 30	-1.455
item 31	-1.753
item 32	-0.302
item 33	0.774
item 34	0.989
item 35	-0.566
item 36	1.224
item 37	0.420
item 38	0.351
item 39	-0.817
item 40	-0.124
item 41	0.728
item 42	4.191
item 43	2.074
item 44	1.053
item 45	0.509
item 46	1.224
item 47	-0.150
item 48	1.138
item 49	0.946
item 50	3.546
item 51a	0.142
item 51b	-1.359
item 51c	0.989
item 51d	1.717
item 51e	-0.354
item 51f	0.687
item 51g	2.723
item 51h.i.	-0.051
item 51h.ii.	0.189
item 51i	0.708
item 52a	-1.423
item 52b	0.554
item 52c	-1.455
item 52d	-0.704

item 52e	2.669
item 52f	1.309
item 52g	-0.789
item 52h	-0.428
item 52i	-0.535
item 52j	-2.523
item 53A.i.	0.598
item 53A.ii.	-1.553
item 53A.iii.	-2.406
item 53A.iv.	-0.002
item 53A.v.	-1.891
item 53Ba	-0.704
item 53Bb	-0.150
item 53Bc	0.142
item 53Bd	0.305
item 53Be	1.138
item 54a	-0.817
item 54b	-0.075
item 54c	-0.648
item 54d	0.752
item 54e	0.774
item 54f	-0.486
item 54g	-0.251
item 54h.i.	1.916
item 54h.ii.	2.779
item 54i	0.487
item 55a	-1.753
item 55b	-0.648
item 55c	-0.846
item 55d	-1.719
item 55e	1.544
item 55f	0.236
item 55g	0.351
item 55h	0.351
item 55i	1.673
item 55j	0.554

Table 36: thresholds for IRT analysis of PLE English

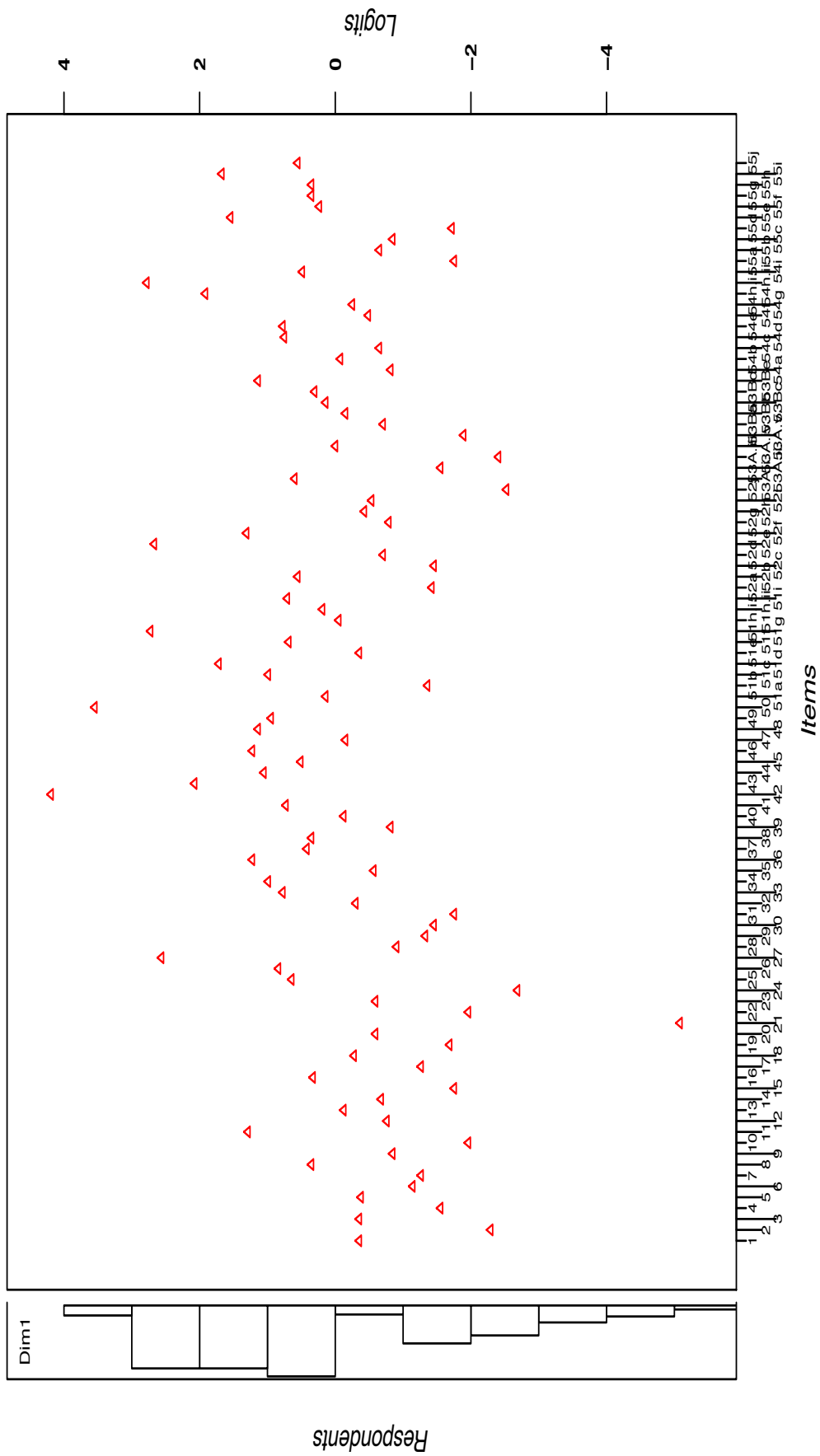


Figure 9: Wright Map for items in sample of 300 PLE English scores 2015

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
Item 1	2.28	1.30	0.19	1.14	1.25	0.21
Item 2	5.42	5.83	0.00	1.78	4.62	0.00
Item 3	0.97	0.05	0.96	1.02	0.21	0.83
Item 4	0.86	-0.29	0.77	0.91	-0.65	0.52
Item 5	0.87	-0.93	0.35	0.90	-1.07	0.29
Item 6	0.90	-0.15	0.88	0.87	-1.30	0.19
Item 7	1.48	1.47	0.14	0.80	-1.69	0.09
Item 8	0.62	-1.56	0.12	0.76	-2.64	0.01
Item 9	1.47	1.77	0.08	1.31	2.39	0.02
Item 10	3.17	4.28	0.00	2.12	7.08	0.00
Item 11	0.87	-0.68	0.50	0.75	-2.66	0.01
Item 12	0.75	-0.67	0.51	0.77	-2.76	0.01
Item 13	0.69	-2.54	0.01	0.73	-3.06	0.00
Item 14	0.85	-0.74	0.46	0.73	-2.84	0.00
Item 15	1.18	0.58	0.56	0.92	-0.79	0.43
Item 16	0.83	-0.42	0.67	0.91	-0.62	0.53
Item 17	1.15	0.74	0.46	0.83	-1.61	0.11
Item 18	1.04	0.24	0.81	0.85	-1.25	0.21
Item 19	1.01	0.14	0.89	1.02	0.30	0.76
Item 20	0.43	-3.77	0.00	0.54	-4.80	0.00
Item 21a	0.59	-3.69	0.00	0.65	-4.20	0.00
Item 21b	0.97	0.01	0.99	0.92	-0.63	0.53
Item 22a	1.25	0.72	0.47	0.94	-0.36	0.72
Item 22b	0.83	-0.48	0.63	0.83	-1.12	0.26
Item 23a	16.46	19.54	0.00	1.34	0.77	0.44
Item 23b	8.29	7.70	0.00	1.05	0.37	0.71
Item 24	2.25	2.82	0.00	2.07	7.81	0.00
Item 25a	0.68	-2.28	0.02	0.80	-2.44	0.01
Item 25b	1.93	3.04	0.00	1.55	3.39	0.00
Item 25c	1.01	0.12	0.90	1.02	0.28	0.78
Item 26a	1.29	0.77	0.44	1.17	1.61	0.11
Item 26b	1.21	0.74	0.46	1.21	1.96	0.05
Item 27a	0.75	-1.29	0.20	0.76	-2.45	0.01
Item 27b	0.71	-1.00	0.32	0.91	-1.06	0.29
Item 27c	0.69	-0.68	0.49	0.92	-0.96	0.34
Item 28a	0.79	-0.94	0.35	1.09	1.04	0.30
Item 28b	1.29	1.30	0.19	1.32	3.45	0.00
Item 29a	1.03	0.22	0.83	1.18	1.56	0.12
Item 29b	1.40	0.77	0.44	0.92	-0.87	0.38
Item 30	0.91	-0.09	0.93	1.25	2.51	0.01
Item 31	0.60	-0.53	0.60	0.96	-0.40	0.69
Item 32a	0.63	-3.10	0.00	0.78	-4.37	0.00
Item 32b	1.04	0.22	0.83	1.20	2.03	0.04
Item 32c	0.61	-1.75	0.08	0.86	-2.02	0.04

Table 37: infit and outfit statistics for IRT analysis of PLE Mathematics

Road-map: tables and graphs

Item	N	M	AXsi_Cat1	AXsi_Cat2	AXsi_Cat3	AXsi_Cat4	AXsi_Cat5	AXsi_Cat6	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1	B.Cat6.Dim1
Item 1	311	1.69	1.25	-4.16					1.00	2.00				
Item 2	311	1.36	2.72	-1.77					1.00	2.00				
Item 3	311	0.99	2.87	0.30					1.00	2.00				
Item 4	311	1.44	0.85	-2.32					1.00	2.00				
Item 5	311	1.25	-0.60	-1.29					1.00	2.00				
Item 6	311	1.10	3.28	-0.19					1.00	2.00				
Item 7	311	1.41	0.47	-2.18					1.00	2.00				
Item 8	311	1.07	1.74	-0.11					1.00	2.00				
Item 9	310	1.40	-0.16	-2.17					1.00	2.00				
Item 10	310	1.47	0.21	-2.59					1.00	2.00				
Item 11	310	1.15	0.43	-0.61					1.00	2.00				
Item 12	310	0.99	2.57	0.32					1.00	2.00				
Item 13	310	1.19	-0.46	-0.95					1.00	2.00				
Item 14	310	1.50	-1.42	-3.03					1.00	2.00				
Item 15	310	1.11	3.22	-0.27					1.00	2.00				
Item 16	311	1.39	1.18	-1.97					1.00	2.00				
Item 17	311	1.45	-0.78	-2.55					1.00	2.00				
Item 18	311	1.20	2.22	-0.77					1.00	2.00				
Item 19	311	0.73	2.18	1.39					1.00	2.00				
Item 20	311	1.28	0.04	-1.35					1.00	2.00				
Item 21a	309	1.59	-3.28	-4.33					1.00	2.00				
Item 21b	309	1.20	2.25	-0.71					1.00	2.00				
Item 22a	309	1.89	1.79	0.59	-1.40				1.00	2.00	3.00			
Item 22b	309	1.93	1.02	-0.05	-1.70				1.00	2.00	3.00			
Item 23a	309	0.03	12.29	14.05	8.45				1.00	2.00	3.00			
Item 23b	309	0.01	12.64	7.84					1.00	2.00				
Item 24	311	2.54	2.04	1.39	1.96	1.74	2.76	3.18	1.00	2.00	3.00	4.00	5.00	6.00
Item 25a	311	0.73	-1.52						1.00					
Item 25b	311	1.97	-0.20	-0.41	-2.17				1.00	2.00	3.00			
Item 25c	311	0.74	1.33	1.49	5.63				1.00	2.00	3.00			
Item 26a	311	1.10	4.37	-0.22					1.00	2.00				
Item 26b	311	1.12	2.35	-0.30					1.00	2.00				
Item 27a	311	1.18	0.62	-0.72					1.00	2.00				
Item 27b	311	0.99	1.98	0.29					1.00	2.00				
Item 27c	311	0.89	2.95	0.74					1.00	2.00				
Item 28a	311	1.03	1.14	3.85	2.25				1.00	2.00	3.00			
Item 28b	311	1.25	0.99	2.07	1.45				1.00	2.00	3.00			
Item 29a	311	1.97	0.94	2.20	2.48	0.90			1.00	2.00	3.00	4.00		
Item 29b	311	1.20	3.13	3.03	1.77				1.00	2.00	3.00			
Item 30	311	1.07	2.36	2.48	3.56	5.17	7.08		1.00	2.00	3.00	4.00	5.00	
Item 31	311	0.90	3.46	2.46	6.22	4.88			1.00	2.00	3.00	4.00		
Item 32a	311	0.40	0.59						1.00					
Item 32b	311	1.78	1.44	0.97	1.83	1.62			1.00	2.00	3.00	4.00		
Item 32c	311	0.21	1.77						1.00					

Table 38: item parameters from 1 parameter IRT analysis of PLE Mathematics

Item	N	M	AXsi_Cat1	AXsi_Cat2	AXsi_Cat3	AXsi_Cat4	AXsi_Cat5	AXsi_Cat6	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1	B.Cat5.Dim1	B.Cat6.Dim1
Item 1	311	1.69	3.58	-3.62					-0.29	2.66				
Item 2	311	1.36	5.11	-1.36					-0.97	1.90				
Item 3	311	0.99	2.78	-0.03					0.94	3.23				
Item 4	311	1.44	1.46	-2.60					0.68	3.64				
Item 5	311	1.25	-0.80	-1.61					1.70	3.85				
Item 6	311	1.10	2.98	-0.54					2.18	4.20				

Item 7	311	1.41	-0.02	-2.73						2.19	3.83								
Item 8	311	1.07	1.36	-0.50						3.44	5.12								
Item 9	310	1.40	0.41	-1.92						0.85	2.64								
Item 10	310	1.47	1.51	-1.63						0.19	1.54								
Item 11	310	1.15	-0.11	-1.11						2.49	4.77								
Item 12	310	0.99	2.22	0.13						1.82	5.08								
Item 13	310	1.19	-1.36	-1.82						2.90	5.04								
Item 14	310	1.50	-0.93	-3.47						0.93	4.55								
Item 15	310	1.11	3.96	-0.58						-0.16	4.17								
Item 16	311	1.39	2.32	-2.25						0.09	3.73								
Item 17	311	1.45	0.24	-2.61						0.37	4.05								
Item 18	311	1.20	2.31	-1.12						0.88	4.11								
Item 19	311	0.73	1.96	1.07						1.26	3.25								
Item 20	311	1.28	-1.56	-2.84						3.81	6.74								
Item 21a	309	1.59	-3.33	-5.12						1.44	5.18								
Item 21b	309	1.20	2.29	-1.02						0.98	3.81								
Item 22a	309	1.89	1.68	0.39	-1.94					1.66	4.60	5.31							
Item 22b	309	1.93	-0.17	-1.01	-2.76					3.86	4.49	6.64							
Item 23a	309	0.03	11.93	11.87	4.75					0.18	0.18	0.81							
Item 23b	309	0.01	11.93	5.72						0.18	0.18								
Item 24	311	2.54	2.43	1.66	1.63	0.88	1.38	0.99		0.64	2.79	1.75	2.79	3.80	4.44				
Item 25a	311	0.73	-2.04							2.34									
Item 25b	311	1.97	-0.55	-0.37	-2.46					2.63	2.92	3.90							
Item 25c	311	0.74	1.14	1.28	3.50					1.40	3.39	2.19							
Item 26a	311	1.10	5.56	-0.53						-0.60	3.00								
Item 26b	311	1.12	2.53	-0.57						0.63	2.87								
Item 27a	311	1.18	0.24	-1.13						2.05	4.35								
Item 27b	311	0.99	1.78	-0.05						2.21	3.73								
Item 27c	311	0.89	4.25	0.40						5.16	3.84								
Item 28a	311	1.03	1.03	3.03	1.42					1.97	1.93	4.28							
Item 28b	311	1.25	0.96	1.53	0.51					1.94	2.09	3.52							
Item 29a	311	1.97	0.67	1.69	1.69	-0.27				3.88	3.24	4.82	6.07						
Item 29b	311	1.20	3.10	2.29	1.15					2.40	1.73	4.62							
Item 30	311	1.07	2.25	1.78	2.48	3.47	3.83			1.37	1.87	3.26	4.21	4.18					
Item 31	311	0.90	3.62	2.65	4.43	3.39				2.83	4.35	2.73	5.48						
Item 32a	311	0.40	0.78							3.24									
Item 32b	311	1.78	1.20	0.60	0.98	0.45				3.71	4.28	4.94	6.38						
Item 32c	311	0.21	2.41							3.28									

Table 39: item parameters from 2 parameter IRT analysis of PLE Mathematics

	Cat1	Cat2	Cat3	Cat4	Cat5	Cat6
1	-2.100	-2.064				
2	-0.897	-0.870				
3	0.119	0.185				
4	-1.227	-1.092				
5	-1.108	-0.183				
6	-0.112	-0.078				
7	-1.197	-0.987				
8	-0.140	0.026				
9	-1.280	-0.886				
10	-1.407	-1.187				
11	-0.542	-0.065				
12	0.113	0.203				
13	-0.951	-0.001				
14	-1.952	-1.073				
15	-0.154	-0.119				
16	-1.044	-0.930				
17	-1.574	-0.975				
18	-0.421	-0.347				
19	0.583	0.809				
20	-0.915	-0.431				
21a	-3.377	-0.953				
21b	-0.392	-0.318				
22a	-0.571	-0.502	-0.357			
22b	-0.742	-0.607	-0.383			
23a	2.816	2.816	2.816			
23b	3.921	3.921				
24	0.075	0.160	0.329	0.459	0.794	1.206
25a	-1.517					
25b	-1.042	-0.654	-0.425			
25c	0.462	0.996	4.160			
26a	-0.113	-0.102				
26b	-0.192	-0.110				
27a	-0.546	-0.172				
27b	0.063	0.223				
27c	0.331	0.406				
28a	0.471	0.920	0.981			
28b	0.166	0.559	0.773			
29a	0.004	0.258	0.333	0.416		
29b	0.512	0.565	0.669			
30	0.752	0.905	1.228	1.670	2.387	
31	0.941	1.001	1.453	1.496		
32a	0.594					
32b	0.011	0.197	0.541	0.830		
32c	1.774					

Table 40: thresholds for IRT analysis of PLE Mathematics

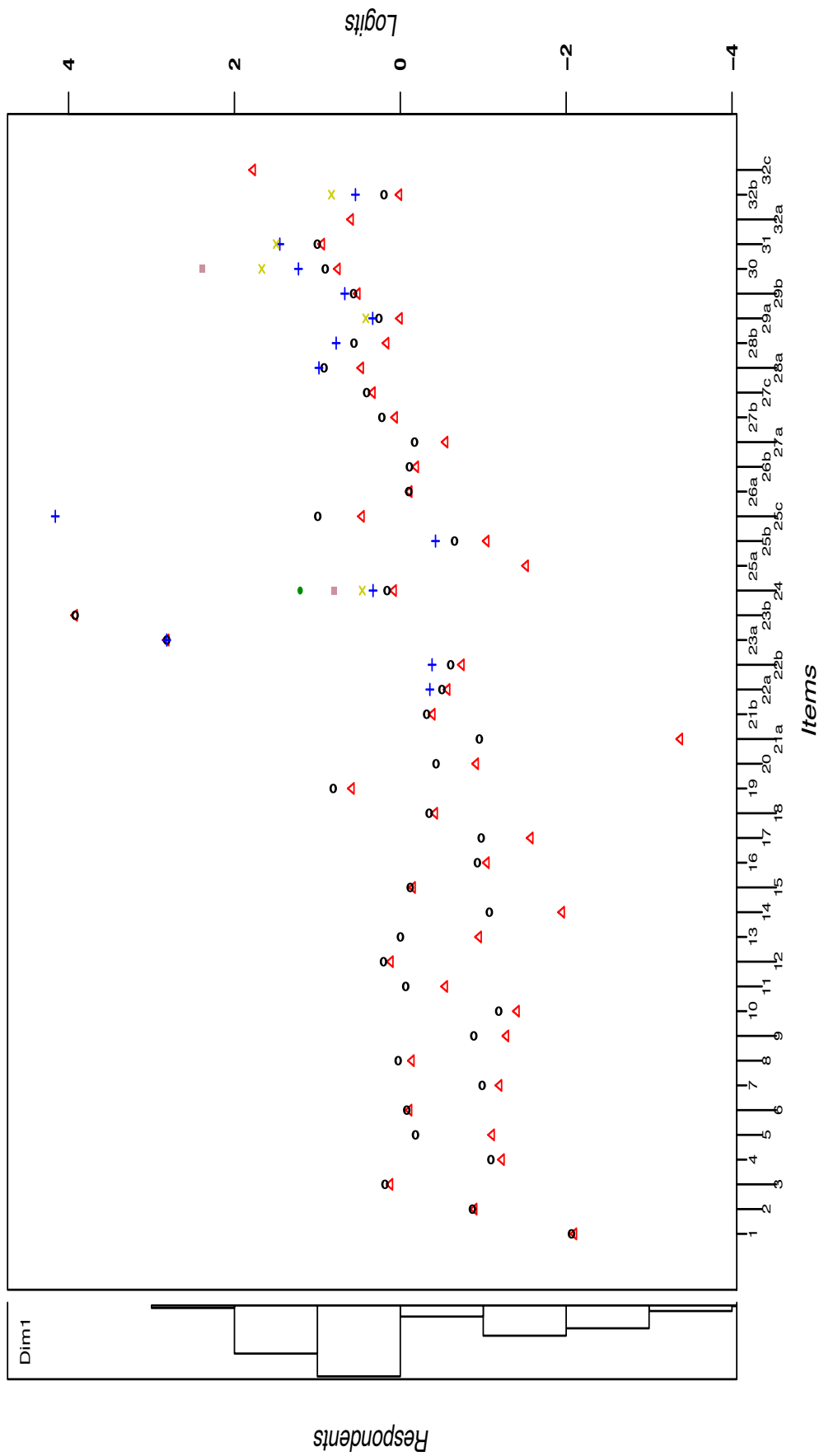


Figure 10: Wright Map for items in sample of 300 PLE Maths scores 2015

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
Item 1	0.58	-1.06	0.29	0.94	-0.48	0.63
Item 2	0.79	-1.23	0.22	0.85	-1.95	0.05
Item 3	0.71	-1.66	0.10	0.84	-1.87	0.06
Item 4	1.13	0.71	0.48	1.12	1.62	0.11
Item 5	0.88	-0.51	0.61	0.97	-0.46	0.65
Item 6	0.96	-0.02	0.98	1.07	0.70	0.48
Item 7	1.25	0.87	0.38	1.15	1.47	0.14
Item 8	0.77	-1.07	0.28	0.85	-2.28	0.02
Item 9	0.70	-1.09	0.28	0.97	-0.27	0.79
Item 10	0.88	-0.63	0.53	0.97	-0.29	0.77
Item 11	0.56	-2.97	0.00	0.73	-3.75	0.00
Item 12	0.64	-2.39	0.02	0.79	-2.75	0.01
Item 13	0.43	-1.78	0.08	0.76	-2.35	0.02
Item 14	0.74	-1.14	0.25	0.90	-1.51	0.13
Item 15	1.05	0.33	0.74	1.15	1.80	0.07
Item 16	0.60	-2.64	0.01	0.79	-2.81	0.01
Item 17	0.65	-1.76	0.08	0.80	-3.00	0.00
Item 18	0.79	-0.79	0.43	0.96	-0.56	0.57
Item 19	0.77	-0.99	0.32	0.93	-0.95	0.34
Item 20	0.86	-0.75	0.45	0.96	-0.50	0.62
Item 21	1.75	3.50	0.00	1.33	3.97	0.00
Item 22	1.68	3.34	0.00	1.24	2.78	0.01
Item 23	0.67	-1.71	0.09	0.84	-2.36	0.02
Item 24	2.20	4.40	0.00	1.17	1.82	0.07
Item 25	0.70	-1.71	0.09	0.92	-0.93	0.35
Item 26	1.28	1.53	0.13	1.06	0.71	0.48
Item 27	0.77	-0.53	0.59	0.93	-0.57	0.57
Item 28	0.45	-2.82	0.00	0.72	-3.31	0.00
Item 29	0.54	-2.53	0.01	0.73	-4.13	0.00
Item 30	0.82	-0.87	0.39	0.92	-1.09	0.28
Item 31	0.48	-3.75	0.00	0.67	-4.55	0.00
Item 32	0.83	-0.94	0.35	0.92	-0.95	0.34
Item 33	0.88	-0.23	0.82	1.09	0.82	0.41
Item 34	0.61	-2.58	0.01	0.73	-3.78	0.00
Item 35	0.72	-1.73	0.08	0.80	-2.49	0.01
Item 36	2.41	2.74	0.01	1.35	4.58	0.00
Item 37	2.62	4.89	0.00	1.43	4.08	0.00
Item 38	1.15	0.91	0.36	0.98	-0.21	0.83
Item 39	1.13	0.41	0.68	1.25	3.11	0.00
Item 40	3.30	3.79	0.00	1.59	7.15	0.00
Item 41a(i)	0.66	-2.19	0.03	0.81	-2.55	0.01
Item 41a(ii)	0.74	-1.59	0.11	0.85	-2.07	0.04
Item 41b(i)	1.02	0.19	0.85	1.07	0.90	0.37
Item 41b(ii)	0.93	-0.20	0.84	1.03	0.52	0.60
Item 42a	1.10	0.61	0.54	1.08	1.06	0.29
Item 42b	0.72	-1.78	0.07	0.87	-1.67	0.10
Item 42c	0.69	-1.93	0.05	0.84	-1.92	0.05
Item 42d	0.86	-0.22	0.83	1.10	1.41	0.16
Item 43a(i)	0.92	-0.34	0.73	0.90	-1.08	0.28
Item 43a(ii)	1.26	1.44	0.15	1.17	2.05	0.04
Item 43b(i)	0.69	-0.65	0.52	0.79	-1.87	0.06
Item 43b(ii)	1.83	2.90	0.00	1.34	3.30	0.00
Item 44a	1.38	1.48	0.14	1.04	0.43	0.67
Item 44b(i)	0.63	-0.67	0.50	0.94	-0.76	0.45
Item 44b(ii)	0.59	-0.73	0.46	0.91	-1.10	0.27
Item 44c	0.82	-0.78	0.44	0.89	-1.65	0.10
Item 45(i)	1.06	0.38	0.70	1.23	2.47	0.01
Item 45(ii)	0.77	-1.37	0.17	0.90	-1.22	0.22
Item 45(iii)	0.82	-1.00	0.32	0.94	-0.72	0.47
Item 45(iv)	0.79	-0.73	0.46	0.95	-0.74	0.46
Item 46a(i)	0.53	-3.23	0.00	0.73	-3.81	0.00
Item 46a(ii)	1.95	4.34	0.00	1.47	5.32	0.00
Item 46b(i)	2.16	2.34	0.02	1.18	1.50	0.13
Item 46b(ii)	1.49	1.99	0.05	1.30	3.06	0.00

Item 47a	0.47	-3.55	0.00	0.68	-4.19	0.00
Item 47b	0.93	-0.34	0.73	1.01	0.18	0.86
Item 47c	0.71	-1.77	0.08	0.88	-1.62	0.10
Item 47d	0.83	-0.64	0.52	1.03	0.38	0.70
Item 48a	1.02	0.18	0.86	0.95	-0.58	0.56
Item 48b	0.84	-0.92	0.36	0.96	-0.45	0.65
Item 48c	1.00	0.10	0.92	1.06	0.92	0.36
Item 48d	0.72	-1.40	0.16	0.82	-2.07	0.04
Item 49(i)	1.45	2.00	0.05	1.28	2.91	0.00
Item 49(ii)	1.42	2.13	0.03	1.21	2.37	0.02
Item 49(iii)	1.31	1.29	0.20	1.16	1.71	0.09
Item 49(iv)	0.80	-0.67	0.50	1.06	0.60	0.55
Item 50a	0.85	-0.62	0.54	0.88	-1.72	0.08
Item 50b	1.50	2.40	0.02	0.98	-0.16	0.87
Item 50c	0.86	-0.80	0.42	0.94	-0.82	0.41
Item 50d	1.19	1.11	0.27	1.09	1.14	0.25
Item 51a(i)	2.19	3.17	0.00	1.12	1.22	0.22
Item 51a(ii)	1.22	1.27	0.20	1.13	1.56	0.12
Item 51b(1)	1.74	2.33	0.02	1.15	1.52	0.13
Item 51b(ii)	2.41	5.86	0.00	1.61	6.19	0.00
Item 52a(i)	0.98	-0.08	0.94	0.99	-0.16	0.88
Item 52a(ii)	0.75	-1.06	0.29	0.86	-2.13	0.03
Item 52b	1.06	0.29	0.77	1.16	1.61	0.11
Item 52c	0.71	-1.20	0.23	0.90	-1.48	0.14
Item 53a	0.36	-1.85	0.06	0.76	-2.19	0.03
Item 53b	0.30	-2.14	0.03	0.68	-3.02	0.00
Item 53c(i)	1.13	0.78	0.43	1.07	0.90	0.37
Item 53c(ii)	0.86	-0.75	0.45	0.96	-0.56	0.58
Item 54a	1.21	1.03	0.30	1.06	0.69	0.49
Item 54b	1.04	0.26	0.80	1.11	1.57	0.12
Item 54c(i)	0.82	-0.96	0.34	0.90	-1.18	0.24
Item 54c(ii)	1.04	0.24	0.81	1.14	1.94	0.05
Item 55a	1.31	1.43	0.15	1.26	2.72	0.01
Item 55b(i)	0.60	-2.65	0.01	0.75	-3.40	0.00
Item 55b(ii)	0.63	-2.36	0.02	0.71	-4.14	0.00
Item 55c	1.03	0.19	0.85	1.09	0.97	0.33

Table 41: infit and outfit statistics for IRT analysis of PLE Science

Road-map: tables and graphs

item	N	M	AXsi_Cat1	B.Cat1.Dim1
Item 1	320	0.84	-2.80	1.00
Item 2	320	0.60	-0.59	1.00
Item 3	320	0.67	-1.13	1.00
Item 4	320	0.50	0.11	1.00
Item 5	320	0.46	0.36	1.00
Item 6	320	0.80	-2.33	1.00
Item 7	320	0.79	-2.20	1.00
Item 8	320	0.44	0.51	1.00
Item 9	320	0.78	-2.07	1.00
Item 10	320	0.66	-1.06	1.00
Item 11	320	0.57	-0.38	1.00
Item 12	320	0.59	-0.50	1.00
Item 13	320	0.83	-2.64	1.00
Item 14	320	0.43	0.59	1.00
Item 15	320	0.60	-0.59	1.00
Item 16	319	0.60	-0.60	1.00
Item 17	319	0.45	0.42	1.00
Item 18	319	0.39	0.83	1.00
Item 19	319	0.43	0.56	1.00
Item 20	319	0.65	-0.93	1.00
Item 21	319	0.54	-0.15	1.00
Item 22	319	0.61	-0.64	1.00
Item 23	319	0.46	0.36	1.00
Item 24	319	0.70	-1.35	1.00
Item 25	319	0.66	-1.05	1.00
Item 26	319	0.61	-0.69	1.00
Item 27	319	0.83	-2.60	1.00
Item 28	319	0.74	-1.71	1.00
Item 29	319	0.46	0.38	1.00
Item 30	319	0.47	0.31	1.00
Item 31	320	0.61	-0.65	1.00
Item 32	320	0.65	-0.96	1.00
Item 33	320	0.82	-2.53	1.00
Item 34	320	0.57	-0.41	1.00
Item 35	320	0.63	-0.84	1.00
Item 36	319	0.27	1.66	1.00
Item 37	319	0.73	-1.66	1.00
Item 38	319	0.59	-0.54	1.00
Item 39	319	0.22	2.07	1.00
Item 40	319	0.26	1.71	1.00
Item 41a(i)	319	0.56	-0.32	1.00
Item 41a(ii)	319	0.55	-0.25	1.00
Item 41b(i)	319	0.54	-0.14	1.00
Item 41b(ii)	319	0.40	0.74	1.00
Item 42a	319	0.54	-0.16	1.00
Item 42b	319	0.59	-0.49	1.00
Item 42c	320	0.64	-0.86	1.00
Item 42d	319	0.26	1.71	1.00
Item 43a(i)	319	0.69	-1.28	1.00
Item 43a(ii)	319	0.59	-0.54	1.00
Item 43b(i)	319	0.85	-2.91	1.00
Item 43b(ii)	319	0.74	-1.69	1.00
Item 44a	319	0.74	-1.71	1.00
Item 44b(i)	319	0.20	2.19	1.00
Item 44b(ii)	319	0.19	2.27	1.00
Item 44c	319	0.43	0.57	1.00
Item 45(i)	319	0.66	-1.08	1.00
Item 45(ii)	319	0.58	-0.45	1.00
Item 45(iii)	319	0.54	-0.14	1.00
Item 45(iv)	319	0.37	0.95	1.00
Item 46a(i)	319	0.57	-0.40	1.00
Item 46a(ii)	319	0.56	-0.32	1.00
Item 46b(i)	319	0.84	-2.72	1.00
Item 46b(ii)	319	0.72	-1.52	1.00

Item 47a	319	0.66	-1.06	1.00
Item 47b	319	0.59	-0.54	1.00
Item 47c	320	0.56	-0.32	1.00
Item 47d	320	0.75	-1.77	1.00
Item 48a	320	0.63	-0.82	1.00
Item 48b	320	0.57	-0.36	1.00
Item 48c	320	0.36	1.02	1.00
Item 48d	320	0.71	-1.44	1.00
Item 49(i)	320	0.69	-1.31	1.00
Item 49(ii)	320	0.64	-0.89	1.00
Item 49(iii)	320	0.73	-1.60	1.00
Item 49(iv)	319	0.78	-2.07	1.00
Item 50a	319	0.42	0.61	1.00
Item 50b	319	0.66	-1.03	1.00
Item 50c	319	0.57	-0.36	1.00
Item 50d	319	0.56	-0.32	1.00
Item 51a(i)	319	0.78	-2.10	1.00
Item 51a(ii)	319	0.57	-0.40	1.00
Item 51b(1)	319	0.76	-1.95	1.00
Item 51b(ii)	319	0.63	-0.82	1.00
Item 52a(i)	319	0.53	-0.10	1.00
Item 52a(ii)	319	0.42	0.66	1.00
Item 52b	319	0.76	-1.95	1.00
Item 52c	319	0.40	0.78	1.00
Item 53a	320	0.85	-2.91	1.00
Item 53b	320	0.85	-2.87	1.00
Item 53c(i)	320	0.57	-0.36	1.00
Item 53c(ii)	320	0.53	-0.10	1.00
Item 54a	320	0.70	-1.36	1.00
Item 54b	320	0.47	0.30	1.00
Item 54c(i)	320	0.66	-1.06	1.00
Item 54c(ii)	320	0.46	0.38	1.00
Item 55a	320	0.70	-1.34	1.00
Item 55b(i)	320	0.60	-0.61	1.00
Item 55b(ii)	320	0.55	-0.23	1.00
Item 55c	320	0.72	-1.49	1.00

Table 42: item parameters from 1 parameter IRT analysis of PLE Science

item	N	M	AXsi_Cat1	B.Cat1.Dim1
Item 1	320	0.84	-2.39	2.14
Item 2	320	0.60	-0.03	2.62
Item 3	320	0.67	-0.68	2.63
Item 4	320	0.50	0.50	1.77
Item 5	320	0.46	0.87	2.10
Item 6	320	0.80	-1.76	1.83
Item 7	320	0.79	-1.56	1.63
Item 8	320	0.44	1.30	2.67
Item 9	320	0.78	-1.62	2.13
Item 10	320	0.66	-0.57	2.17
Item 11	320	0.57	0.32	3.18
Item 12	320	0.59	0.12	2.91
Item 13	320	0.83	-2.70	2.92
Item 14	320	0.43	1.23	2.34
Item 15	320	0.60	-0.14	1.74
Item 16	319	0.60	-0.00	2.93
Item 17	319	0.45	1.34	2.98
Item 18	319	0.39	1.41	2.19
Item 19	319	0.43	1.15	2.24
Item 20	319	0.65	-0.44	2.19
Item 21	319	0.54	0.12	1.25
Item 22	319	0.61	-0.24	1.36
Item 23	319	0.46	1.14	2.72

Road-map: tables and graphs

Item 24	319	0.70	-0.81	1.43
Item 25	319	0.66	-0.57	2.43
Item 26	319	0.61	-0.22	1.92
Item 27	319	0.83	-2.22	2.20
Item 28	319	0.74	-1.61	3.47
Item 29	319	0.46	1.45	3.33
Item 30	319	0.47	0.90	2.28
Item 31	320	0.61	-0.00	3.92
Item 32	320	0.65	-0.47	2.32
Item 33	320	0.82	-1.94	1.79
Item 34	320	0.57	0.32	3.35
Item 35	320	0.63	-0.32	2.93
Item 36	319	0.27	1.39	0.95
Item 37	319	0.73	-1.01	1.15
Item 38	319	0.59	-0.07	1.94
Item 39	319	0.22	1.88	1.19
Item 40	319	0.26	1.18	0.46
Item 41a(i)	319	0.56	0.34	2.83
Item 41a(ii)	319	0.55	0.37	2.62
Item 41b(i)	319	0.54	0.27	1.78
Item 41b(ii)	319	0.40	1.12	1.84
Item 42a	319	0.54	0.27	1.83
Item 42b	319	0.59	0.08	2.63
Item 42c	320	0.64	-0.36	2.65
Item 42d	319	0.26	2.00	1.77
Item 43a(i)	319	0.69	-0.82	2.34
Item 43a(ii)	319	0.59	-0.11	1.65
Item 43b(i)	319	0.85	-2.86	2.64
Item 43b(ii)	319	0.74	-1.05	1.26
Item 44a	319	0.74	-1.19	1.88
Item 44b(i)	319	0.20	3.23	2.59
Item 44b(ii)	319	0.19	3.55	2.82
Item 44c	319	0.43	1.29	2.50
Item 45(i)	319	0.66	-0.58	1.62
Item 45(ii)	319	0.58	0.10	2.42
Item 45(iii)	319	0.54	0.42	2.32
Item 45(iv)	319	0.37	1.53	2.18
Item 46a(i)	319	0.57	0.35	3.52
Item 46a(ii)	319	0.56	-0.05	1.03
Item 46b(i)	319	0.84	-1.91	1.40
Item 46b(ii)	319	0.72	-0.94	1.40
Item 47a	319	0.66	-0.68	4.04
Item 47b	319	0.59	-0.05	2.08
Item 47c	320	0.56	0.27	2.53
Item 47d	320	0.75	-1.26	1.95
Item 48a	320	0.63	-0.32	2.20
Item 48b	320	0.57	0.15	2.19
Item 48c	320	0.36	1.38	1.82
Item 48d	320	0.71	-1.05	2.65
Item 49(i)	320	0.69	-0.76	1.34
Item 49(ii)	320	0.64	-0.43	1.47
Item 49(iii)	320	0.73	-1.03	1.57
Item 49(iv)	319	0.78	-1.55	1.93
Item 50a	319	0.42	1.29	2.40
Item 50b	319	0.66	-0.54	1.91
Item 50c	319	0.57	0.18	2.29
Item 50d	319	0.56	0.11	1.78
Item 51a(i)	319	0.78	-1.45	1.54
Item 51a(ii)	319	0.57	0.02	1.71
Item 51b(1)	319	0.76	-1.32	1.54
Item 51b(ii)	319	0.63	-0.42	0.87

Item 52a(i)	319	0.53	0.39	2.06
Item 52a(ii)	319	0.42	1.41	2.55
Item 52b	319	0.76	-1.36	1.71
Item 52c	319	0.40	1.51	2.46
Item 53a	320	0.85	-3.32	3.26
Item 53b	320	0.85	-3.73	3.90
Item 53c(i)	320	0.57	0.07	1.80
Item 53c(ii)	320	0.53	0.43	2.18
Item 54a	320	0.70	-0.85	1.88
Item 54b	320	0.47	0.69	1.82
Item 54c(i)	320	0.66	-0.58	2.41
Item 54c(ii)	320	0.46	0.72	1.68
Item 55a	320	0.70	-0.80	1.49
Item 55b(i)	320	0.60	0.01	3.20
Item 55b(ii)	320	0.55	0.58	3.39
Item 55c	320	0.72	-0.96	1.78

Table 43: item parameters from 2 parameter IRT analysis of PLE Science

	Cat1
1	-2.795
2	-0.586
3	-1.132
4	0.111
5	0.361
6	-2.328
7	-2.197
8	0.506
9	-2.071
10	-1.058
11	-0.384
12	-0.495
13	-2.644
14	0.589
15	-0.586
16	-0.597
17	0.418
18	0.832
19	0.563
20	-0.927
21	-0.153
22	-0.643
23	0.355
24	-1.354
25	-1.049
26	-0.690
27	-2.603
28	-1.709
29	0.376
30	0.314
31	-0.654
32	-0.960
33	-2.535
34	-0.406
35	-0.841
36	1.660
37	-1.659
38	-0.539
39	2.065
40	1.705
41a(i)	-0.316
41a(ii)	-0.250
41b(i)	-0.142
41b(ii)	0.738
42a	-0.163
42b	-0.494
42c	-0.865
42d	1.706
43a(i)	-1.283
43a(ii)	-0.539
43b(i)	-2.914
43b(ii)	-1.687
44a	-1.715
44b(i)	2.194
44b(ii)	2.273
44c	0.572
45(i)	-1.082
45(ii)	-0.449
45(iii)	-0.142
45(iv)	0.946
46a(i)	-0.404
46a(ii)	-0.316
46b(i)	-2.718
46b(ii)	-1.521

47a	-1.057
47b	-0.539
47c	-0.318
47d	-1.773
48a	-0.817
48b	-0.362
48c	1.024
48d	-1.441
49(i)	-1.310
49(ii)	-0.888
49(iii)	-1.604
49(iv)	-2.070
50a	0.614
50b	-1.032
50c	-0.360
50d	-0.316
51a(i)	-2.101
51a(ii)	-0.404
51b(1)	-1.948
51b(ii)	-0.816
52a(i)	-0.099
52a(ii)	0.655
52b	-1.948
52c	0.779
53a	-2.914
53b	-2.874
53c(i)	-0.362
53c(ii)	-0.101
54a	-1.362
54b	0.299
54c(i)	-1.058
54c(ii)	0.382
55a	-1.336
55b(i)	-0.609
55b(ii)	-0.231
55c	-1.495

Table 44: thresholds for IRT analysis of PLE Science

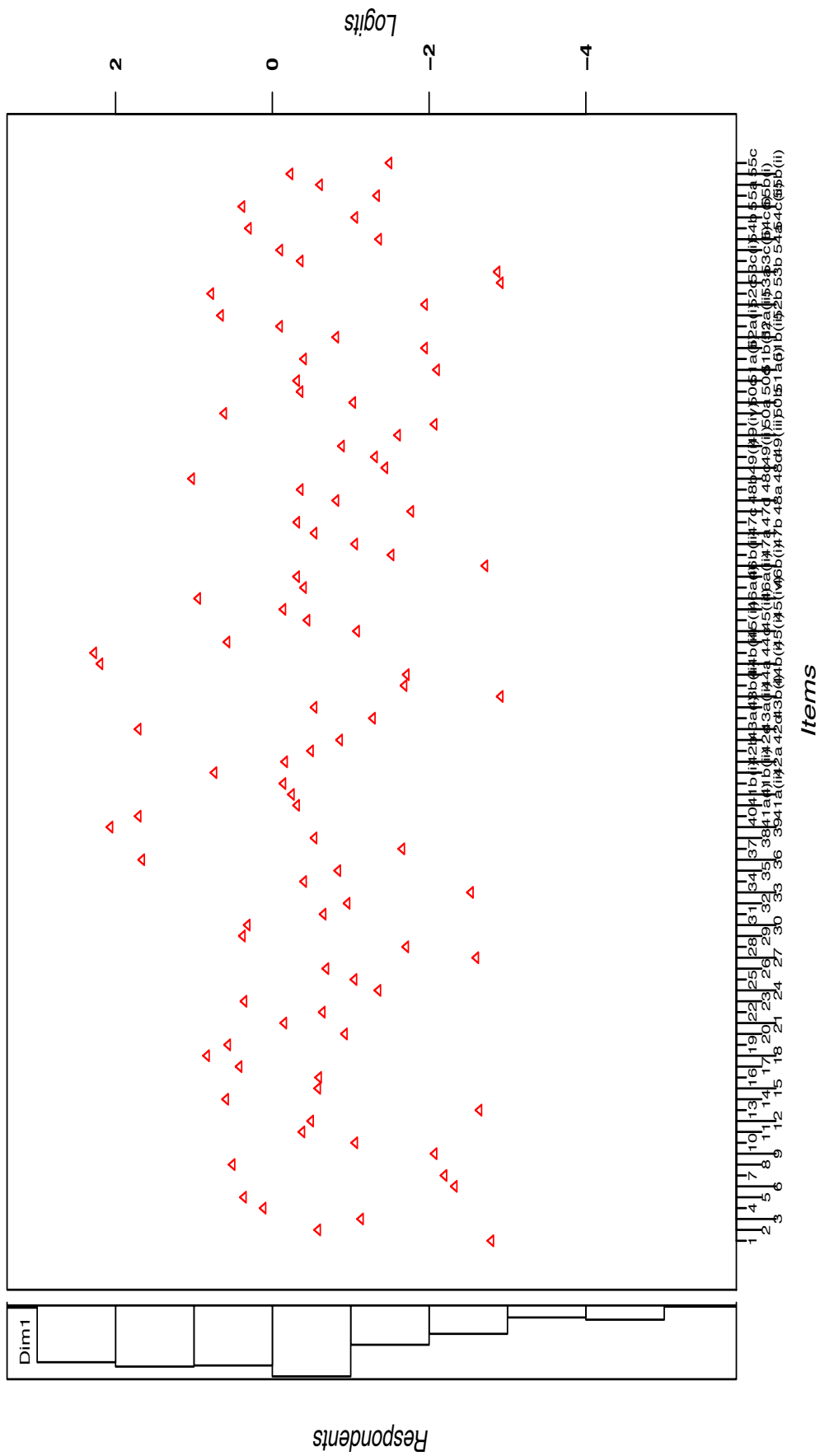


Figure 11: Wright Map for items in sample of 300 PLE Science scores 2015

item	Outfit	Outfit_t	Outfit_p	Infit	Infit_t	Infit_p
Item 1	0.42	0.48	0.63	0.95	-0.08	0.94
Item 2	0.98	0.02	0.98	0.98	-0.18	0.85
Item 3	0.99	0.02	0.98	0.96	-0.32	0.75
Item 4	1.19	0.89	0.37	0.96	-0.47	0.64
Item 5	2.24	3.92	0.00	1.49	5.13	0.00
Item 6	3.21	5.44	0.00	1.34	2.90	0.00
Item 7	1.29	1.29	0.20	1.17	1.70	0.09
Item 8	1.35	1.30	0.19	1.04	0.48	0.63
Item 9	0.59	-1.34	0.18	0.81	-1.93	0.05
Item 10	1.14	0.71	0.48	0.92	-0.83	0.41
Item 11	0.62	-1.66	0.10	0.75	-2.52	0.01
Item 12	1.86	2.36	0.02	1.28	2.42	0.02
Item 13	0.68	-1.47	0.14	0.82	-2.32	0.02
Item 14	1.25	1.04	0.30	1.22	2.49	0.01
Item 15	0.38	-3.34	0.00	0.58	-4.74	0.00
Item 16	0.61	-1.90	0.06	0.84	-1.65	0.10
Item 17	0.52	-2.62	0.01	0.69	-3.41	0.00
Item 18	1.07	0.37	0.71	1.15	1.62	0.11
Item 19	0.71	-0.31	0.76	0.98	-0.10	0.92
Item 20	0.67	-1.68	0.09	0.80	-2.20	0.03
Item 21	0.36	-2.10	0.04	0.66	-3.60	0.00
Item 22	1.47	1.80	0.07	1.13	1.21	0.23
Item 23	0.54	-1.85	0.06	0.81	-1.84	0.07
Item 24	0.90	-0.39	0.70	0.98	-0.16	0.88
Item 25	1.28	1.07	0.28	1.20	2.34	0.02
Item 26	1.94	3.02	0.00	1.52	4.30	0.00
Item 27	1.76	1.57	0.12	1.82	9.33	0.00
Item 28	1.41	1.34	0.18	0.89	-1.08	0.28
Item 29	0.81	-0.61	0.54	0.80	-1.94	0.05
Item 30	0.59	-1.97	0.05	0.77	-2.89	0.00
Item 31	0.81	-0.74	0.46	0.96	-0.45	0.65
Item 32	0.38	-2.46	0.01	0.66	-3.62	0.00
Item 33	0.37	-2.64	0.01	0.57	-4.78	0.00
Item 34	0.55	-1.58	0.11	0.79	-3.07	0.00
Item 35	0.70	-1.45	0.15	0.86	-1.59	0.11
Item 36	1.24	0.95	0.34	0.98	-0.14	0.88
Item 37	1.06	0.34	0.73	0.88	-1.29	0.20
Item 38	0.48	-2.87	0.00	0.69	-3.89	0.00
Item 39	0.74	-1.11	0.27	0.86	-1.33	0.18
Item 40	1.11	0.51	0.61	1.15	1.37	0.17
Item 41a(i)	0.84	-0.72	0.47	0.84	-1.88	0.06
Item 41a(ii)	1.06	0.32	0.75	1.07	0.85	0.40
Item 41b(i)	1.35	0.97	0.33	1.01	0.17	0.87
Item 41b(ii)	1.16	0.47	0.64	1.06	0.86	0.39
Item 42a	0.78	-0.67	0.50	0.93	-0.94	0.34
Item 42b	1.76	1.92	0.06	0.99	-0.10	0.92
Item 42c(i)	2.12	2.02	0.04	1.42	5.25	0.00
Item 42c(ii)	2.66	2.64	0.01	1.35	4.38	0.00
Item 43a	0.84	-0.72	0.47	0.86	-1.55	0.12
Item 43b	1.19	0.89	0.37	1.12	1.33	0.18
Item 43c	0.51	-1.87	0.06	0.75	-3.67	0.00
Item 43d	0.75	-1.09	0.27	0.84	-2.00	0.05
Item 44a(i)	1.02	0.19	0.85	1.22	2.91	0.00
Item 44a(ii)	0.98	0.16	0.88	1.33	3.90	0.00
Item 44b	0.91	-0.29	0.77	1.02	0.27	0.79
Item 44c	0.83	-0.60	0.55	0.97	-0.36	0.72
Item 45a	0.99	0.03	0.98	0.98	-0.24	0.81
Item 45b	0.60	-2.07	0.04	0.71	-3.55	0.00
Item 45c(i)	0.52	-1.27	0.20	0.76	-3.72	0.00
Item 45c(ii)	0.47	-1.20	0.23	0.69	-4.80	0.00
Item 46a	0.72	-1.30	0.19	0.86	-1.41	0.16
Item 46b(i)	0.42	-2.97	0.00	0.64	-3.91	0.00
Item 46b(ii)	0.88	-0.46	0.65	0.70	-3.25	0.00
Item 46c	1.39	1.64	0.10	1.07	0.71	0.48

Item 47a	1.07	0.30	0.77	0.99	-0.06	0.95
Item 47b	1.12	0.44	0.66	1.03	0.29	0.77
Item 47c	0.74	-0.19	0.85	0.72	-3.75	0.00
Item 47d	1.74	1.90	0.06	1.54	4.36	0.00
Item 48a	0.98	0.03	0.97	0.88	-1.73	0.08
Item 48b	1.31	1.26	0.21	1.08	0.79	0.43
Item 48c	0.57	-1.65	0.10	0.83	-2.28	0.02
Item 48d	0.88	-0.50	0.62	1.02	0.20	0.84
Item 49	1.37	2.09	0.04	1.27	2.24	0.02
Item 50a	0.58	-2.27	0.02	0.78	-2.37	0.02
Item 50b	0.44	-2.14	0.03	0.74	-2.71	0.01
Item 50c(i)	0.63	-1.91	0.06	0.81	-1.98	0.05
Item 50c(ii)	1.26	1.10	0.27	1.07	0.87	0.39
Item 51a	0.60	-0.93	0.35	0.78	-3.35	0.00
Item 51b(i)	0.73	-1.31	0.19	0.84	-1.62	0.11
Item 51b(ii)	1.10	0.44	0.66	1.12	1.49	0.14
Item 51c	1.10	0.51	0.61	1.12	1.15	0.25
Item 52a	1.07	0.31	0.76	1.30	2.59	0.01
Item 52b	0.77	-1.05	0.30	0.95	-0.58	0.56
Item 52c(i)	1.11	0.40	0.69	1.01	0.18	0.85
Item 52c(ii)	0.75	-0.77	0.44	0.92	-1.03	0.30
Item 53a(i)	0.88	-0.49	0.62	0.99	-0.06	0.95
Item 53a(ii)	0.86	-0.54	0.59	1.01	0.19	0.85
Item 53b	1.84	2.97	0.00	1.60	4.92	0.00
Item 53c	3.02	5.95	0.00	1.96	7.40	0.00
Item 54a	0.69	-1.54	0.12	0.91	-0.91	0.36
Item 54b(i)	0.76	-0.69	0.49	0.93	-0.65	0.52
Item 54b(ii)	0.66	-0.96	0.34	0.86	-1.37	0.17
Item 54c	1.18	0.68	0.50	1.02	0.35	0.73
Item 55a	1.04	0.24	0.81	1.22	1.98	0.05
Item 55b	0.87	0.08	0.94	0.99	-0.01	0.99
Item 55c	1.16	0.45	0.65	1.25	2.04	0.04
Item 55d	0.88	-0.06	0.96	1.22	1.92	0.05

Table 45: infit and outfit statistics for IRT analysis of PLE SST

item	N	M	AXsi_ Cat1	AXsi_ Cat2	AXsi_ Cat3	AXsi_ Cat4	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1
Item 1	297	0.97	-5.90				1.00			
Item 2	297	0.69	-1.46				1.00			
Item 3	297	0.64	-1.03				1.00			
Item 4	297	0.55	-0.24				1.00			
Item 5	297	0.50	0.15				1.00			
Item 6	297	0.69	-1.46				1.00			
Item 7	297	0.61	-0.73				1.00			
Item 8	297	0.47	0.32				1.00			
Item 9	297	0.74	-1.96				1.00			
Item 10	297	0.60	-0.68				1.00			
Item 11	298	0.68	-1.36				1.00			
Item 12	298	0.72	-1.78				1.00			
Item 13	298	0.50	0.10				1.00			
Item 14	298	0.51	0.07				1.00			
Item 15	298	0.66	-1.18				1.00			
Item 16	298	0.64	-1.05				1.00			
Item 17	298	0.61	-0.79				1.00			
Item 18	298	0.54	-0.16				1.00			
Item 19	298	0.85	-3.23				1.00			
Item 20	298	0.60	-0.70				1.00			
Item 21	298	0.77	-2.27				1.00			
Item 22	298	0.66	-1.18				1.00			
Item 23	298	0.71	-1.65				1.00			
Item 24	298	0.56	-0.32				1.00			
Item 25	298	0.47	0.37				1.00			
Item 26	298	0.67	-1.33				1.00			
Item 27	298	0.32	1.47				1.00			
Item 28	298	0.71	-1.68				1.00			
Item 29	298	0.71	-1.65				1.00			
Item 30	298	0.51	0.05				1.00			
Item 31	298	0.50	0.15				1.00			
Item 32	298	0.73	-1.92				1.00			
Item 33	298	0.72	-1.82				1.00			
Item 34	298	0.40	0.86				1.00			
Item 35	298	0.55	-0.26				1.00			
Item 36	298	0.68	-1.36				1.00			
Item 37	298	0.60	-0.65				1.00			
Item 38	297	0.54	-0.16				1.00			
Item 39	297	0.66	-1.15				1.00			
Item 40	297	0.67	-1.31				1.00			
Item 41a(i)	297	0.55	-0.21				1.00			
Item 41a(ii)	297	0.51	0.10				1.00			
Item 41b(i)	297	0.36	1.15				1.00			
Item 41b(ii)	297	0.27	1.82				1.00			
Item 42a	297	0.41	0.76				1.00			
Item 42b	297	0.75	-2.04				1.00			
Item 42c(i)	297	0.30	1.57				1.00			
Item 42c(ii)	297	0.30	1.59				1.00			
Item 43a	297	0.58	-0.50				1.00			
Item 43b	297	0.54	-0.18				1.00			
Item 43c	297	0.42	0.70				1.00			
Item 43d	297	0.51	0.03				1.00			
Item 44a(i)	297	0.30	1.61				1.00			
Item 44a(ii)	297	0.25	2.00				1.00			
Item 44b	297	0.48	0.28				1.00			
Item 44c	297	0.46	0.38				1.00			
Item 45a	297	0.53	-0.13				1.00			
Item 45b	297	0.55	-0.23				1.00			
Item 45c(i)	297	0.33	1.36				1.00			
Item 45c(ii)	296	0.28	1.70				1.00			

Road-map: tables and graphs

Item 46a	297	0.62	-0.87							1.00
Item 46b(i)	297	0.66	-1.23							1.00
Item 46b(ii)	297	0.64	-1.02							1.00
Item 46c	297	0.63	-0.90							1.00
Item 47a	296	0.80	-2.63							1.00
Item 47b	296	0.76	-2.14							1.00
Item 47c	296	0.21	2.33							1.00
Item 47d	296	0.74	-2.00							1.00
Item 48a	296	0.41	0.82							1.00
Item 48b	296	0.66	-1.18							1.00
Item 48c	296	0.44	0.60							1.00
Item 48d	297	0.57	-0.39							1.00
Item 49	297	2.73	-2.25	-3.81	-5.33	-5.48				1.00
Item 50a	297	0.60	-0.64					2.00	3.00	4.00
Item 50b	297	0.73	-1.88							1.00
Item 50c(i)	297	0.60	-0.70							1.00
Item 50c(ii)	297	0.51	0.06							1.00
Item 51a	297	0.32	1.46							1.00
Item 51b(i)	297	0.62	-0.81							1.00
Item 51b(ii)	297	0.45	0.46							1.00
Item 51c	297	0.62	-0.81							1.00
Item 52a	298	0.75	-2.06							1.00
Item 52b	298	0.53	-0.11							1.00
Item 52c(i)	298	0.36	1.17							1.00
Item 52c(ii)	298	0.40	0.84							1.00
Item 53a(i)	297	0.55	-0.28							1.00
Item 53a(ii)	297	0.49	0.18							1.00
Item 53b	297	0.65	-1.08							1.00
Item 53c	297	0.64	-0.99							1.00
Item 54a	297	0.57	-0.45							1.00
Item 54b(i)	297	0.74	-1.95							1.00
Item 54b(ii)	297	0.75	-2.09							1.00
Item 54c	296	0.44	0.57							1.00
Item 55a	296	0.80	-2.68							1.00
Item 55b	296	0.88	-3.61							1.00
Item 55c	296	0.85	-3.32							1.00
Item 55d	296	0.82	-2.93							1.00

Table 46: item parameters from 1 parameter IRT analysis of PLE SST

	item	N	M	AXsi_.Cat1	AXsi_.Cat2	AXsi_.Cat3	AXsi_.Cat4	B.Cat1.Dim1	B.Cat2.Dim1	B.Cat3.Dim1	B.Cat4.Dim1
1	Item 1	297	0.97	-5.22				2.08			
2	Item 2	297	0.69	-0.98				2.44			
3	Item 3	297	0.64	-0.56				2.58			
4	Item 4	297	0.55	0.24				2.44			
5	Item 5	297	0.50	0.27				1.27			
6	Item 6	297	0.69	-0.84				1.53			
7	Item 7	297	0.61	-0.29				1.97			
8	Item 8	297	0.47	0.68				2.09			
9	Item 9	297	0.74	-1.76				3.14			
10	Item 10	297	0.60	-0.20				2.47			
11	Item 11	298	0.68	-1.05				3.35			
12	Item 12	298	0.72	-1.12				1.77			
13	Item 13	298	0.50	0.87				3.26			
14	Item 14	298	0.51	0.39				1.88			
15	Item 15	298	0.66	-0.98				4.67			
16	Item 16	298	0.64	-0.62				3.05			
17	Item 17	298	0.61	-0.27				3.74			
18	Item 18	298	0.54	0.23				2.05			

19	Item 19	298	0.85	-2.77							2.40			
20	Item 20	298	0.60	-0.18							3.20			
21	Item 21	298	0.77	-2.75							4.20			
22	Item 22	298	0.66	-0.66							2.04			
23	Item 23	298	0.71	-1.35							3.05			
24	Item 24	298	0.56	0.19							2.59			
25	Item 25	298	0.47	0.64							1.86			
26	Item 26	298	0.67	-0.73							1.48			
27	Item 27	298	0.32	1.00							0.77			
28	Item 28	298	0.71	-1.27							2.64			
29	Item 29	298	0.71	-1.32							2.95			
30	Item 30	298	0.51	0.88							3.49			
31	Item 31	298	0.50	0.68							2.57			
32	Item 32	298	0.73	-2.06							3.93			
33	Item 33	298	0.72	-2.38							5.04			
34	Item 34	298	0.40	2.21							3.95			
35	Item 35	298	0.55	0.32							2.91			
36	Item 36	298	0.68	-0.87							2.34			
37	Item 37	298	0.60	-0.15							2.61			
38	Item 38	297	0.54	0.82							4.29			
39	Item 39	297	0.66	-0.71							2.81			
40	Item 40	297	0.67	-0.79							2.15			
41	Item 41a(i)	297	0.55	0.41							3.05			
42	Item 41a(ii)	297	0.51	0.48							2.12			
43	Item 41b(i)	297	0.36	1.57							2.30			
44	Item 41b(ii)	297	0.27	2.01							1.99			
45	Item 42a	297	0.41	1.39							2.69			
46	Item 42b	297	0.75	-1.51							2.27			
47	Item 42c(i)	297	0.30	1.25							1.14			
48	Item 42c(ii)	297	0.30	1.32							1.23			
49	Item 43a	297	0.58	0.02							2.79			
50	Item 43b	297	0.54	0.21							2.04			
51	Item 43c	297	0.42	1.94							3.86			
52	Item 43d	297	0.51	0.71							3.06			
53	Item 44a(i)	297	0.30	1.53							1.55			
54	Item 44a(ii)	297	0.25	1.71							1.33			
55	Item 44b	297	0.48	0.77							2.44			
56	Item 44c	297	0.46	0.94							2.61			
57	Item 45a	297	0.53	0.34							2.37			
58	Item 45b	297	0.55	0.55							3.69			
59	Item 45c(i)	297	0.33	3.12							4.27			
60	Item 45c(ii)	296	0.28	4.32							5.16			
61	Item 46a	297	0.62	-0.39							2.80			
62	Item 46b(i)	297	0.66	-0.97							3.93			
63	Item 46b(ii)	297	0.64	-0.59							3.32			
64	Item 46c	297	0.63	-0.43							2.17			
65	Item 47a	296	0.80	-2.17							2.42			
66	Item 47b	296	0.76	-1.62							2.31			
67	Item 47c	296	0.21	4.94							4.66			
68	Item 47d	296	0.74	-1.20							1.45			
69	Item 48a	296	0.41	1.64							3.03			
70	Item 48b	296	0.66	-0.68							2.19			
71	Item 48c	296	0.44	1.67							3.60			
72	Item 48d	297	0.57	0.07							2.35			
73	Item 49	297	2.73	-1.69	-2.07	-3.13	-3.10				2.43	3.74	6.00	7.88
74	Item 50a	297	0.60	-0.09							3.30			
75	Item 50b	297	0.73	-1.83							3.53			
76	Item 50c(i)	297	0.60	-0.17							3.25			
77	Item 50c(ii)	297	0.51	0.42							2.06			
78	Item 51a	297	0.32	2.81							3.64			
79	Item 51b(i)	297	0.62	-0.32							2.96			

80	Item 51b(ii)	297	0.45	0.77	2.01
81	Item 51c	297	0.62	-0.35	2.10
82	Item 52a	298	0.75	-1.34	1.78
83	Item 52b	298	0.53	0.44	2.68
84	Item 52c(i)	298	0.36	1.57	2.25
85	Item 52c(ii)	298	0.40	1.48	2.71
86	Item 53a(i)	297	0.55	0.18	2.36
87	Item 53a(ii)	297	0.49	0.66	2.43
88	Item 53b	297	0.65	-0.55	1.40
89	Item 53c	297	0.64	-0.49	0.92
90	Item 54a	297	0.57	0.09	2.80
91	Item 54b(i)	297	0.74	-1.53	2.56
92	Item 54b(ii)	297	0.75	-1.78	2.80
93	Item 54c	296	0.44	0.97	2.24
94	Item 55a	296	0.80	-1.88	1.83
95	Item 55b	296	0.88	-3.03	2.25
96	Item 55c	296	0.85	-2.36	1.72
97	Item 55d	296	0.82	-2.09	1.83

Table 47: item parameters from 2 parameter IRT analysis of PLE SST

	Cat1	Cat2	Cat3	Cat4
1	-5.899			
2	-1.461			
3	-1.027			
4	-0.239			
5	0.149			
6	-1.461			
7	-0.734			
8	0.325			
9	-1.961			
10	-0.677			
11	-1.361			
12	-1.784			
13	0.100			
14	0.074			
15	-1.175			
16	-1.054			
17	-0.789			
18	-0.158			
19	-3.231			
20	-0.704			
21	-2.272			
22	-1.175			
23	-1.651			
24	-0.317			
25	0.375			
26	-1.330			
27	1.467			
28	-1.684			
29	-1.651			
30	0.049			
31	0.150			
32	-1.919			
33	-1.817			
34	0.861			
35	-0.264			
36	-1.361			
37	-0.647			
38	-0.161			
39	-1.152			
40	-1.307			
41a(i)	-0.214			
41a(ii)	0.098			
41b(i)	1.150			
41b(ii)	1.820			
42a	0.763			
42b	-2.038			
42c(i)	1.566			
42c(ii)	1.591			
43a	-0.503			
43b	-0.179			
43c	0.702			
43d	0.029			
44a(i)	1.607			
44a(ii)	1.997			
44b	0.283			
44c	0.383			
45a	-0.126			
45b	-0.232			
45c(i)	1.358			
45c(ii)	1.700			
46a	-0.873			
46b(i)	-1.234			
46b(ii)	-1.021			
46c	-0.902			

47a	-2.630			
47b	-2.143			
47c	2.334			
47d	-2.001			
48a	0.824			
48b	-1.179			
48c	0.605			
48d	-0.392			
49	-2.634	-1.754	-1.175	0.068
50a	-0.642			
50b	-1.883			
50c(i)	-0.698			
50c(ii)	0.057			
51a	1.459			
51b(i)	-0.814			
51b(ii)	0.458			
51c	-0.814			
52a	-2.058			
52b	-0.106			
52c(i)	1.175			
52c(ii)	0.837			
53a(i)	-0.285			
53a(ii)	0.183			
53b	-1.081			
53c	-0.991			
54a	-0.448			
54b(i)	-1.952			
54b(ii)	-2.092			
54c	0.573			
55a	-2.683			
55b	-3.608			
55c	-3.319			
55d	-2.926			

Table 48: thresholds for IRT analysis of PLE SST

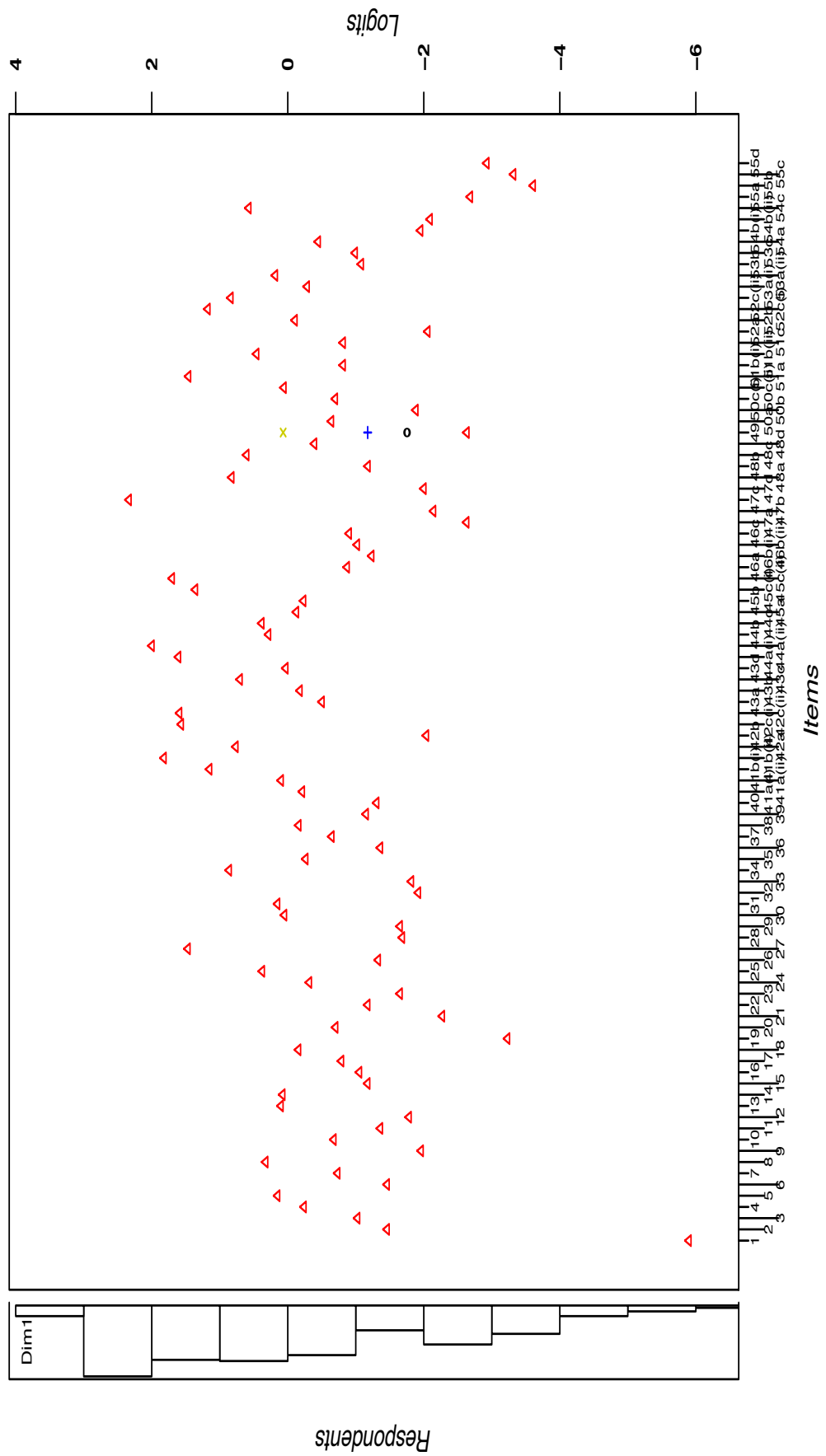


Figure 12: Wright Map for items in sample of 300 PLE SST scores 2015