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Human Resources Research Organization

Third-Party Checking of Calibration, Scaling and Equating of the 2009 Kentucky Core Content Test

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Executive Summary

Measured Progress and HumRRO independently scaled and equated the Kentucky Core Content Test (KCCT), and then produced the raw-score-to-scale-score tables to be applied to students' test results. The 2009 KCCT was equated to the 2007 KCCT results for high school Reading, Math, and Science. All other grades and subjects were equated to the 2008 KCCT results. Decisions regarding the handling of discrepancies that arose during the process of scaling, equating, and the production of raw-score-to-scale-score tables were discussed between Measured Progress and HumRRO, and in all cases both groups reached consensus. As a result of those discussions, a new procedures document for scaling and equating was developed by Measured Progress and approved with revisions by HumRRO and the Kentucky Department of Education (see Appendix A). This newly developed procedures document will guide scaling and equating for 2010. Ultimately, the 2009 results calculated by HumRRO were identical to those calculated by Measured Progress. Given that our results were identical with those of Measured Progress, we are assured that Measured Progress did not commit processing errors.

THIRD-PARTY CHECKING OF CALIBRATION, SCALING AND EQUATING OF THE 2009 KENTUCKY CORE CONTENT TEST

Introduction

Every year since 1998[1], the Kentucky Core Content Test (KCCT) has been scaled and equated, and then raw-score-to-scale-score tables have been produced to be applied to students' test results. Item parameters for the current year's test are estimated using Item Response Theory (IRT). These item parameters are linearly transformed (scaled) and equated (linked) with previous years' scales. The results of scaling and equating are then used to construct raw-score-to-scale-score tables for every KCCT test form. Cut points are also identified so that students' scores can be translated to performance categories: Novice, Apprentice, Proficient, and Distinguished (NAPD).

As a quality control step, the testing contractor's psychometric staff and personnel at the Human Resources Research Organization (HumRRO) conduct scaling and equating analyses simultaneously and independently. Researchers at both companies compare results at several steps throughout the process. If a result between the two companies is not identical, then procedures are reviewed until the issue is resolved and both staffs come to the same outcome. In this way, the item parameter estimation analyses, scaling, equating, raw-score-to-scale-score transformations, and cut point identifications are checked and verified by two autonomous agencies. HumRRO has served as the third-party checker or as the primary psychometric contractor for the KCCT since the 1998–1999 academic year. The results presented in this report are comparable to prior third-party investigations of KCCT psychometric processing (e.g., Sinclair, Bynum, Thacker, & Hoffman, 2008; 2007).

Background

The 2007 KCCT marked the beginning a new baseline year for several reasons. First, Measured Progress replaced CTB as the testing contractor. Second, along with the new testing contractor came the use of different IRT software. CTB used its propriety software (PARDUX), while Measured Progress uses PARSCALE. While the two software packages have been demonstrated to produce functionally equivalent results (Fitspatrick & Julian, 1997; Wise, Hoffman & Thacker, 1999), there are minor differences. For example, more hand steps are required for handling problematic items in PARSCALE than in PARDUX. Third, a new scale was implemented in 2007. An x0-x80 point scale (where the "x" denotes grade) replaced the former 325 - 800 point scale. Fourth, there were test construction changes to the 2007 KCCT. Most notably, the number of open-response items was reduced and the number of multiple-choice items was increased for several grades/subjects. Fifth, the number of grades and subjects tested was expanded to meet NCLB guidelines[2]. Sixth, the weighting of the multiple-choice items and open-responses items changed. Prior to 2007, open-response items were weighted twice as much as multiple-choice items. However, Kentucky legislation (703 KAR 5:020) now

[1] The test in use before 1998 was the Kentucky Instructional Results Information System (KIRIS) test.
[2] Augmented norm-referenced tests were used to meet this requirement in 2006 to allow time for the construction of tailored criterion-referenced tests.

requires that certain grades/subjects receive a 50-50 weighting, while others are weighted such that multiple-choice items account for 67% and open-response items account for 33% of the total score (Table 1 provides more detailed information on the individual weighting for each test). Finally, a new standards setting took place in 2007 that resulted in new cut scores for determining performance categorizations. While none of these changes precluded the possibility of equating the 2007 KCCT to prior years, the culmination of these changes led to Measured Progress's recommendation, and the Kentucky Department of Education's (KDE) ultimate decision, to start a new trend line in 2007 and not to equate the 2007 KCCT to prior years. Consequently, the 2008 KCCT represented the first time the KCCT had been equated since the new trend line was established on the 2007 KCCT.

Table 1. Information on Individual Kentucky Core Content Tests.

Grade	Subject	# MC	# OR	Weighting	OR Multiplier
3	Math	36	4	33% OR, 67% MC	1.1082089552
3	Reading	38	2	33% OR, 67% MC	2.3395522388
4	Math	32	4	50% OR, 50% MC	2.00
4	Reading	33	3	50% OR, 50% MC	2.75
4	Science	32	4	50% OR, 50% MC	2.00
4	PLVS	16	0	None	None
5	Math	32	4	50% OR, 50% MC	2.00
5	Reading	33	3	50% OR, 50% MC	2.75
5	Social Studies	32	4	50% OR, 50% MC	2.00
5	Arts & Humanities	16	1	33% OR, 67% MC	1.9701492537
5	Writing	12	2*	None	None
6	Math	32	4	50% OR, 50% MC	2.00
6	Reading	33	3	50% OR, 50% MC	2.75
7	Math	32	4	50% OR, 50% MC	2.00
7	Reading	33	3	50% OR, 50% MC	2.75
7	Science	32	4	50% OR, 50% MC	2.00
7	PLVS	16	0	None	None
8	Math	32	4	50% OR, 50% MC	2.00
8	Reading	33	3	50% OR, 50% MC	2.75
8	Social Studies	32	4	50% OR, 50% MC	2.00
8	Arts & Humanities	16	1	33% OR, 67% MC	1.9701492537
8	Writing	12	2*	None	None
10	Reading	33	3	50% OR, 50% MC	2.75
10	PLVS	16	0	None	None
11	Math	32	4	50% OR, 50% MC	2.00
11	Science	32	4	50% OR, 50% MC	2.00
11	Social Studies	32	4	50% OR, 50% MC	2.00
11	Arts & Humanities	16	1	33% OR, 67% MC	1.9701492537

Note. *For WRI05 and WRI08, there are two writing prompts. The student responds to one of the two prompts.
MC = Multiple-choice items, OR = Open-response items. Grade 12 contains only prompts and is administered in the Fall.

Sample Identification and File Construction

Measured Progress does not use any exclusion rules for identifying a calibration sample. Consequently, because Measured Progress essentially uses the full student data file for IRT calibration, there is no need for HumRRO to independently construct data matrix (student data) files. Data matrix files used by both Measured Progress and HumRRO come directly from the scoring centers where students' responses are either scanned (for multiple-choice items) or hand scored (for open-response items).

Overview of Scaling, Equating and Raw-Score-to-Scale-Score Procedures

Scaling Procedures

IRT scaling algorithms attempt to find item parameters that create a match between observed and theoretical response patterns as defined by the selected IRT models. Scaling produces item parameters for an achievement index called the theta scale. Item parameters for all of the 2009 test forms were estimated using PARSCALE 4.1. PARSCALE uses a three-parameter logistic model for producing parameters for multiple-choice items and a two-parameter partial credit model for producing parameters for open-response items. Item parameters from both of these models are transformed to a single theta scale with an approximate mean score of 0 and a standard deviation of 1.0.

For some items the pseudo-guessing parameter (i.e., the c-parameter) was not fully estimated during the IRT calibration. This is not an unusual occurrence, and is well-documented in the literature (e.g., see Measured Progress Equating Report). There were also some items for which the standard error of the *b* parameter was very large (i.e., SE > .30). During the 2008 scaling and equating of the KCCT, Measured Progress and HumRRO, with the approval of KDE, agreed to the following decision rules for handling items for which the c-parameter was not fully estimated (M. Nering, email communication, June 27, 2008):

1. If estimated c = 0.0000 and the standard error of c > 0.0000, then fix c = 0.0000.
2. If standard error of b > 0.30000, then fix c = 0.0000 (the value of 0.3000 is approximate, and generally we are looking for any aberrant values).
3. Special cases. There are occasionally places where special procedures need to be implemented. These will be discussed on a case-by-case basis, and decisions for handling these problematic items will be shared in Measured Progress's watch list document.

Because the technique of fixing the c-parameter to zero typically results in stable and reasonable estimates for both the *a* and *b* parameters, this was the agreed upon default option for handling problematic items in 2008. HumRRO followed these same guidelines for the 2009 KCCT. However, when HumRRO and Measured Progress compared their calibrated item parameters at the first check point for the 2009 KCCT, the two entities' parameters did not match. Upon discussion, HumRRO found that Measured Progress was not adhering to the same decision rules established in 2008. Rather, Measured Progress adopted a more subjective method of fixing parameters based on the shape of the curves in the fit plots for the problematic items. The result of this more subjective method was that Measured Progress fixed the c-parameters for some items that met the above criteria, but not for all of them. They also fixed parameters for some items that did not meet the above criteria. After considerable discussion between the two entities, and with KDE's approval, the decision was made to use the more objective criteria adopted in 2008. The primary reason for adopting the more objective criteria is that they are easily replicated from year to year, whereas the more subjective fixing of parameters based on the shape of the curves in item fit plots could lead to differences over time (See the "Issues and Recommendations" section for more detail on this discussion). As a result of this discussion, an expanded version of the 2008 decision rules was developed shortly after the completion of the

2009 scaling and equating. The procedures specific to calibration are reproduced below. The full document can be found in Appendix A.

Calibrate Data:

A. Run initial calibrations
    1. Just set and run for 100 cycles
B. Evaluate issues of non-convergence
    1. If it looks like it is converging (e.g. monotonically decreasing largest change)
        a) Increase number of cycles to allow for convergence
    2. If it is struggling with a specific item where largest change is non-monotonically decreasing
        a) If dichotomous
            (1) Fix c = 0
        b) If polytomous
            (1) Skip estimate of a parameter (SKIP = (1,0,0,0))
    3. re-run calibration
C. Evaluate c=0, Standard Error of c (SE(c)) > 0
    1. Set c = 0
    2. re-run calibration
D. Evaluate Standard Error of (b) (SE(b)) > 0.3 – no additional criteria
    1. Set c = 0
    2. re-run calibration
E. Re-check SE(c) > 0, c= 0; SE(b) > 0.3
    1. Set c = 0 if necessary
    2. re-run calibration if necessary
F. Evaluate model fit
    1. Examine fit plots to be sure there is no systemic problem introduced by fixing C=0

(see Appendix A for full document)

Equating Procedures

There are two types of equating that occur for the KCCT: 1) forms equating within a given test administration year and 2) equating across test administration years using common anchor items. The first of these, forms equating, is accomplished by calibrating all of the items for a given grade/subject together. By calibrating all of the items together (i.e., across all forms), this effectively equates the various forms for a given grade/subject such that test scores on form 2 and form 3, for example, are interchangeable in terms of difficulty. In other words, a student should get about the same score regardless of which form he/she takes.

In addition to the need to equate the forms of a test within a given year, there is also the need for the current year's scores to be comparable to scores from prior years. For 2009, we equated to the 2007 scale for high school Reading, Math, Science and Social Studies. For all other grades and subjects we equated to the 2008 scale, as was specified in the test design document for the 2009 KCCT. Because the prior years' scales were equated to each other, equating the 2009 results to 2007 should be equivalent to equating to 2008. To make 2009 scores comparable to the prior year scores, the data from the IRT model must be adjusted through an

equating process. Kentucky uses a common-item anchor design to equate KCCT scores across years. The anchor items are "internal" in the sense that they are dispersed across forms rather than externally located in a separate anchor item form. Both multiple-choice and open-response items are designated as anchor items for equating for all grades and subjects, although writing is handled a bit differently (see Issues and Recommendation Section for a further discussion of writing and also Appendix Q). By allowing open-response items to contribute to the equating solution, this allows for changes in student performance on open-response items, that might not have been mirrored by multiple-choice items, to be seen. In the prior system, open-response items were treated as new items each year. Equating constants were estimated using only multiple-choice items and the transformation constants were applied to all items, irrespective of item type. Any divergence of performance by item type would have been obsfuscated. As such, the inclusion of open-response items represents a substantial change from the prior testing contractor's equating design.

The common-item equating process involves the application of the Stocking-Lord procedure via the Scale Transformation under Unidimensional Item Response Theory (STUIRT) models software program[3]. Upon completion of scaling, the anchor items have two sets of item parameters: 1) the item parameters from 2007 or from 2008 (as specified in the test design document) and 2) the item parameters from 2009. The Stocking-Lord procedure uses the prior year anchor item parameters to locate the achievement index and then searches for a transformation multiplier (M1) and an additive constant (M2) that can be combined to make the current year anchor item parameters replicate the prior year achievement index as closely as possible. This is done by attempting to match test characteristic curves (which are summations of item characteristic curves) produced by the prior year parameters with the test characteristic curves produced by transformations of current year item parameters. The transformation constants are applied to current parameters using a simple linear algebraic equation (e.g. $y = mx + b$). Since the items are the same, a comparable index should result.

Item-level reviews were conducted during the equating process. Two methods are utilized to determine if there has been anamolous change on the equating items: one based on classical test theory statistics (i.e., p-values) and the second based on Item Response Theory. The first method, the delta anlysis, is the method used by Measured Progress. HumRRO replicates Measured Progress's delta analysis to verify that we get comparable results to Measured Progress (see "Issues and Recommendation" section for discussion of slight differences). HumRRO also independently conducts an analysis in which the squared mean difference between quadrature points on prior year Item Characteristic Curves and current year Item Characteristic Curves are investigated. The benefit of this method is that it is not dependent on within-test-scatter—it flags items in an absolute sense, whereas the delta method flags items that are outliers relative to other items on the test. Both of these methods are used to make decisions about whether to drop items from equating. Note that items that are flagged by the delta analyis and/or by the mean squared difference method can be dropped from equating, but still contribute to students' scores.

Shortly after the completion of the 2009 KCCT equating, Measured Progress, HumRRO and KDE had a meeting to further clarify equating procedures. As a result of that meeting,

[3] Downloaded from: http://www.education.uiowa.edu/casma/IRTPrograms.htm

clarifications were made to the equating procedures. The step-by-step equating procedures can be found in Section IV of the procedures document in Appendix A. For the 2010 KCCT, Measured Progress plans to replicate the IRT-based method that HumRRO currently uses to flag items for consideration to be dropped from equating.

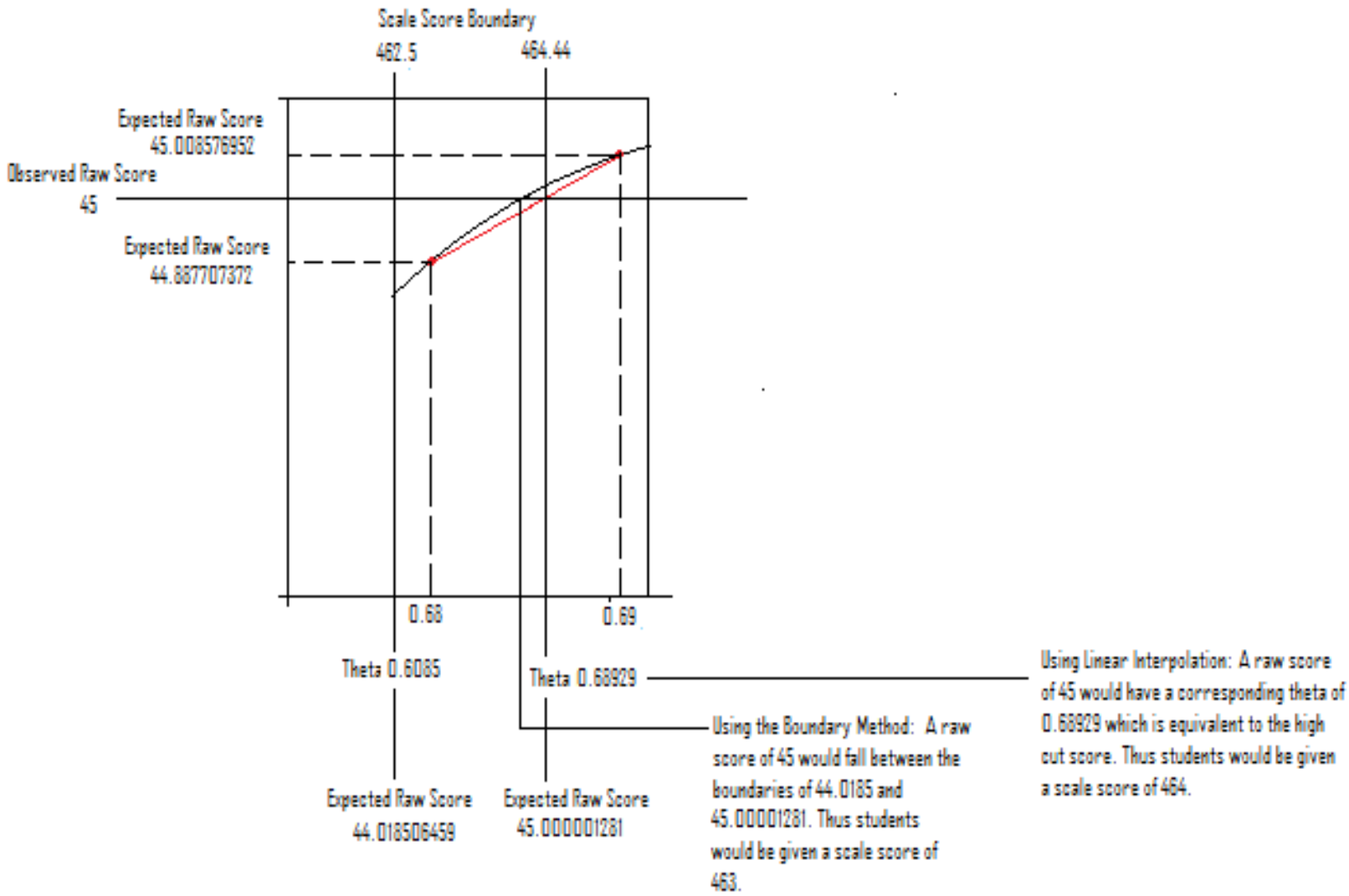
Raw-Score-to-Scale-Score Procedures

Item parameters are estimated on a theta metric (mean = 0, standard deviation =1). As a result of the 2007 standards setting, three cut points were identified on the theta scale. The scaling process involves transforming the item parameters on the theta metric to the "Kentucky metric" (0 to 80 scale). The 20 and 40 cut points were fixed on the 0 to 80 scale as the cut scores separating Novice from Apprentice performance, and Apprentice from Proficient performance, respectively. These two cut scores, along with their theta values were used to establish a linear transformation from the theta scale to the scale score metric. Consequently, the third (separating Proficient from Distinguished performance) cut point's position was defined by the line established from the other two cut points. That cut point was allowed to "float." For all grades/subjects, the first two cut scores are 20 and 40 on the scale score metric. The third cut score is not uniform across grades/subjects. The final step is to create raw-score-to-scale-score tables (i.e., "lookup tables") that can be used to convert students' number-correct score to Kentucky's reporting scale.

Background on Differences in Methods. Because the process of transforming raw scores to scale scores is independent and because HumRRO and Measured Progress use different methods, small differences between HumRRO's and Measured Progress's lookup tables are possible. In 2007, there were several instances of one point scale score differences, and a couple of two point scale score differences at the extreme ends of the scale. In 2008, HumRRO conducted additional investigations to try to account for these minor discrepancies between the two parties' results. With HumRRO's boundary method, scale score boundaries are converted to theta units. Then, PARSCALE parameters are used to compute expected points at those boundaries. It should be noted that Measured Progress's linear interpolation method and HumRRO's boundary method for constructing TCCs are built on the same algebraic relationships. HumRRO's method just happens to remove the need to do a linear interpolation. Consequently, when HumRRO was not able to exactly replicate Measured Progress's expected raw scores using Measured Progress' linear interpolation method, this led us to investigate differences in how the two parties calculate TCCs. It was this investigation that led to the discovery that HumRRO was using a scaling constant of d = 1.700 and Measured Progress was using a scaling constant of d = 1.701. When HumRRO changed their scaling constant from 1.700 to 1.701, this resulted in a much closer match with Measured Progress's look-up tables in 2008. Remaining differences are legitimately due to the differences between Measured Progress's linear interpolation method and HumRRO's boundary method. Using a linear interpolation on the Test Characteristic Curve (TCC) is an estimation process. When using linear interpolation, there will be some error in the estimation because a line will not perfectly fit a curve. In an effort to reduce this potential error, the TCC is divided into very small intervals and the linear interpolation is taken at the intervals. In contrast, HumRRO's boundary method computes the raw score that corresponds to the lower bound of each scale score. For example, for a scale score of 463 the lower bound scale score would be 462.5. We then compute the exact raw score that

matches the lower bound for each scale score. By using lower bounds we can take each raw score point and determine if the raw score is greater than or equal to the lower bound of a scale score and less than the lower bound of the subsequent scale score. Using this method requires no estimation; the raw score point is an exact interpolation of the lower bound scale score. In 2008, when HumRRO did not match Measured Progress, it was at a lower bound scale score in which the expected raw score differed from the raw score integer at around the sixth decimal place. Figure 1 (displayed below) illustrates how the two different methods can result in different scale scores for the observed raw score of 45. For example, in 2008 in Grade 4 math scale form 3, HumRRO's expected lower bound raw score for a scale score of 464 is 45.000001281 and the preceding lower bound raw score for a scale score of 463 is 44.018506459. For the corresponding raw score of 45, HumRRO assigned a scale score of 463 because 45 is greater than 44.018506459 but less than 45.000001281. However, Measured Progress assigned a scale score of 464 because using the linear interpolation method, a raw score of 45 has a corresponding theta of 0.68929, which is equivalent to a scale score of 464. Since HumRRO calculates the exact raw score for a lower bound scale score, we believe that this method creates a more precise raw score to scale score transformation. However, the instances of differences are very infrequent and only occur in the 5th and 6th decimals (far beyond measurement error).

Figure 1. HumRRO Boundary Method Compared to Measured Progress Linear Interpolation Method



Scope of Third-Party Checking

In addition to performing a parallel analysis with Measured Progress, HumRRO also conducts an in-house parallel analysis to accomplish scaling, equating and the production of raw-score-to-scale-score tables. A series of specialized SAS programs were written to carry-out most of these processing steps.

Processing Steps

1. Create anchor files for equating. A SAS program produces a file for each/grade subject with prior year(s) equating item parameters to be matched with their current year item parameters.

2. Execute a SAS program to create the command files (*.psl) for PARSCALE. In order to create the command files, the SAS program reads the Item Documentation File, which contains WestEd's item identification number and the SAS data file provided by Measured Progress that contains the walk-between from WestEd's item ID to Measured Progress's item ID (i.e., "IREF" number).

3. Estimate item parameters for KCCT items using PARSCALE 4.1.

4. Flag items for which PARSCALE produces problematic parameters (i.e., c = 0 and/or standard error of b > .30).

5. Verify that HumRRO flags the same items as Measured Progress. Once verified, HumRRO then implements the same fixes as specified by Measured Progress in their "watchlist" excel document (See Appendix B for "watchlist" document).

6. Rerun PARSCALE with the fixes implemented.

7. As a check on the reasonableness of the PARSCALE parameters, and, in particular, the items for which PARSCALE produces zero c-parameters and/or standard errors of b > .30, HumRRO produces log odds plots. Log odds is the log of "right" divided by "wrong." This value is adjusted by multiplying it by mean wrong/mean right, which effectively makes students with the mean raw score have an adjusted log odds of 0. Then, the adjusted log odds is rounded to 0.50. Next, students with log odds greater than or less than +/- 3.00 are deleted. This groups students on a raw score-based ability measure that mimics IRT thetas (adjusted log odds = -3.00, -2.50, -2.00 . . . +2.00, +2.50, +3.00). That is, item performance plotted by log odds takes on the s-shaped curve of IRT. Item p-values for each group of students are calculated and plotted. The plots mimic IRT's item characteristic curves (ICCs). These empirical plots should look similar to the item parameters produced by PARSCALE[4]. HumRRO pays particular attention to the items for which PARSCALE produced zero

[4] Typically there are few students with -3.00, -2.50, and sometimes, -2.00 scores. As a result, the point plotted for the lowest log odds tends to bounce around. Consequently, in these cases, the ending point of the curve (i.e., c parameter) must be estimated based on the whole curve.

c parameters and/or standard errors of the b > .30 in the first run. For these items, we can look at the slope and location of the empirical plots and use them to judge where the parameters ought to be located and thereby judge the reasonableness of the parameters that PARSCALE produces in the second run when the c-parameter has been fixed to zero for the problematic items.

8. Upon confirming that the actions listed in Measured Progress's watch list produce reasonable parameters, HumRRO then verifies that the PARSCALE parameter files (*.PAR) produced by Measured Progress are an identical match to the PARSCALE parameter files produced by HumRRO for all grades and subjects.

9. Execute the SAS program that writes STUIRT command files and then executes STUIRT. STUIRT is the software used by Measured Progress to produce the Stocking-Lord constants (i.e., the multiplicative constant and additive constant) that are used to equate the current year item parameters to the prior year(s) item parameters.

10. Use the Stocking-Lord constants produced in Step 9 to equate the current year item parameters to the prior year(s) item paramters.

11. Conduct equating item analysis to determine if there are any equating items with anamolous changes that should be dropped from equating.

12. If the equating item analysis in Step 11 results in the decision to drop any equating item(s), then those items are dropped and Steps 9 and 10 are repeated before moving on to Step 13.

13. Create lookup tables for each form and each KCCT test. This places student scores on the reporting scale.

14. Confirm that the lookup tables from Step 13 are virtually identical to those derived by Measured Progress and verify the cut points used to separate student performance into NAPD categories.

Results

Table 2 summarizes the results of the third-party checking. Table 2 reflects the results once the final decision was made for both parties to use the decision rules developed in 2008, as opposed to using the more subjective fixing of item parameters based on the shape of item fit curves Measured Progress used in their initial run of the 2009 psychometric analyses. Grade and subject are identified for each test in the first two columns of Table 2, respectively. The 3rd column indicates whether any actions were taken to handle items for which PARSCALE produced problematic parameters (see Appendix B for Measured Progress's watch list document). Those actions were implemented and thereby produced unequated parameter files that were identical to the unequated parameter files produced by Measured Progress (see column 4). The next step was to run STUIRT and produce transformation constants (M1 and M2) for

equating the 2009 KCCT to the 2007/2008 KCCT (delineated by the test design document). The equated parameters produced by HumRRO were an exact match to the equated parameters produced by Measured Progress (see column 5). Finally, the look-up tables (i.e., raw-score-to-scale score tables) were produced along with NAPD classifications. As seen in columns 6 and 7, HumRRO's NAPD classifications and look-up tables were an exact match with Measured Progress's NAPD classifications and look-up tables for all grades/subjects. Because HumRRO and Measured Progress reached exact agreement on calibration results and lookup tables, while using different methods to produce those results, HumRRO is assured that the results are accurate and that Measured Progress did not commit processing errors.

Table 2. 2009Final Results of Third-Party Calibration, Scaling and Equating Results Summary

Grade	Subject	Actions Taken?	Unequated Parameters Exact Match?	Equated Parameters Exact Match?	NAPD Classification Exact Match?	Look-up Tables Exact Match?
3	Math	Yes	Yes	Yes	Yes	Yes
3	Reading	Yes	Yes	Yes	Yes	Yes
4	Math	None	Yes	Yes	Yes	Yes
4	Reading	Yes	Yes	Yes	Yes	Yes
4	Science	None	Yes	Yes	Yes	Yes
5	Math	Yes	Yes	Yes	Yes	Yes
5	Reading	Yes	Yes	Yes	Yes	Yes
5	Social St.	Yes	Yes	Yes	Yes	Yes
5	Writing	None	Yes	Yes	Yes	Yes
6	Math	Yes	Yes	Yes	Yes	Yes
6	Reading	Yes	Yes	Yes	Yes	Yes
7	Math	Yes	Yes	Yes	Yes	Yes
7	Reading	Yes	Yes	Yes	Yes	Yes
7	Science	Yes	Yes	Yes	Yes	Yes
8	Math	Yes	Yes	Yes	Yes	Yes
8	Reading	Yes	Yes	Yes	Yes	Yes
8	Social St.	Yes	Yes	Yes	Yes	Yes
8	Writing	Yes	Yes	Yes	Yes	Yes
10	Reading	Yes	Yes	Yes	Yes	Yes
11	Math	Yes	Yes	Yes	Yes	Yes
11	Science	Yes	Yes	Yes	Yes	Yes
11	Social St.	Yes	Yes	Yes	Yes	Yes

Documentation[5]

To document the steps involved in scaling and equating of the 2009 KCCT, HumRRO saved all electronic files used in data preparation, such as SAS files, and all files produced during PARSCALE calibration. The core 2009 files have been submitted to KDE in electronic format. Note that HumRRO's procedures did not change from 2008 to 2009. As such, output from HumRRO's SAS programs in the appendices contain hardcopy examples from 2008, the structure of which is identical to the 2009 SAS output.

All KCCT electronic files submitted to KDE are named according to the code listed below (G = grade level, S = subject).

A. Data Matrix File (SSSGG.TXT). This file contains the student score data. It is coded such that a "1" indicates a correct answer for a multiple-choice question and actual score levels are recorded for student responses to open-response questions. For all grades/subjects, except writing, the score levels for open-response items are 0 – 4. For writing, because there were always two raters, the score levels for open-response items are either 0 – 8 or 2-8 (one writing dimension was scored 1- 4 rather than 0 - 4 by two raters and each prompt is scored for 3 dimensions). The data in the data matrix file is ordered such that common multiple-choice items are followed by matrix multiple-choice items in form 1 by item number, in form 2 by item number, etc., which are followed by common open-response items, which are finally followed by matrix open-response items in form 1 by item number, in form 2 by item number, etc (See Appendix C for an excerpt).

B. SAS program, "0 Create Anchor Files.SAS." This program produces a file for each/grade subject with prior year(s) equating item parameters to be matched with their current item parameters.

C. SAS program, "1a Itemdoc & Parscale file.SAS." This SAS program reads the Item Documentation File and the item ID walk-between file and creates PARSCALE command files. This SAS program automates the creation of PARSCALE command files for all grades/subjects except writing.

D. PARSCALE Command File (09GGSSS.PSL). This file contains the number of items for which parameters are being estimated, the maximum number of iterations for convergence, starting values for the c-parameter, the response model to be used (graded or partial), and the response function metric to be used (logistic or normal). It also contains information allowing the program to distinguish between open-response and multiple-choice items, and the number of score levels for open-response items (See Appendix D for an example).

[5] Note that due to the manner in which open-response items are handled for WRI05 and WRI08, these SAS programs had to be altered to handle writing. Consequently, there are separate, but analogous, programs to handle WRI05 and WRI08.

E. PARSCALE Output File Phase 0 (09GGSSS.PHO). This file evaluates the PARSCALE command file against the data matrix file (See Appendix E for an excerpt).

F. PARSCALE Output File Phase 1 (09GGSSS.PH1). This file starts the processing of the data matrix file. It displays the frequencies for correct and incorrect responses by item. The file also outputs point biserials (See Appendix F for an example).

G. PARSCALE Output File Phase 2 (09GGSSS.PH2). This file displays the history of the parameter estimation phase. It lists a systematic iteration of data, by item, during each stage of parameter estimation. This file is helpful in determining for which items PARSCALE is having problems estimating parameters (See Appendix G for an example).

H. PARSCALE Parameter File (SSS09GG.PAR). This file contains parameter estimates for all items designated in the *.PSL file. It is used for later data manipulation (See Appendix H for an example).

I. PARSCALE Fit File (SSS09GG.FIT). This file contains fit statistics for all items (See Appendix I for an excerpt).

J. Output from SAS program, "2a Check IRT parameters & Compare MP par files.SAS." This SAS program reads in the PAR file produced by PARSCALE and flags items that are not discriminating ($a < 0$), that are "easy" ($b < -2.0$), that are "hard" ($b > 2.0$), that are easy to guess ($c > .40$), and, most importantly, items with zero c-parameters and items for which the standard error of $b > .30$. This program also flags items for which the chi-square value is > 600 and items for which open-response items have non-sequential crossover points (a possible indication of scoring problems). A secondary purpose of this program is to split the PAR files produced by PARSCALE into individual forms for each grade/subject; this is the format needed to produce raw-score-to-scale-score tables. (See Appendix J for an excerpt of the output produced by this SAS program). Finally, this file flags any items for which HumRRO and Measured Progress do not produce identical unequated parameters.

K. Output from SAS program, "2c[6] make logodds.SAS." This SAS program serves as a reasonableness check. The log odds plots produced by this SAS program are consulted to see if the parameters produced by PARSCALE, after implementing fixes to problematic items, are reasonable. (See Appendix K for the output produced by this SAS program).

L. Output from SAS program, "3a equate across years with STUIRT.SAS." This program uses the anchor files that were created by the program, "0 Create Anchor Files.SAS" and matches those items with their current year item parameters. It then

[6] Note that SAS program "2b" is not listed here. There is a 2b program that conducts the delta analysis. However, this analysis is also embedded within program 3a, and so it is not listed separately here.

writes and executes STUIRT command files. Then, it reads the STUIRT output file and searches for the Stocking-Lord constants. It then uses the Stocking-Lord constants to create the current year equated item parameters. Next, this program performs delta analyses. It computes delta based on: (1) prior year anchor item p-values from Measured Progress's equate files and (2) current year anchor item p-values computed from frequency counts in the PARSCALE phase 2 output file. This program then compares HumRRO's computed deltas to the deltas reported by Measured Progress. Finally, this program plots ICCs from the current year and the anchor year and computes the mean squared difference between the curves so as to identify items with anomalous change. (See Appendix L for an example of the output produced by this SAS program).

M. Output from SAS program, "4a Compare MP & HumRRO equating.SAS." This program compares HumRRO's equated parameters with Measured Progress's equated parameters (See Appendix M for an example of the output produced by this SAS program).

N. Output from SAS program, "5a raw score to scale score 80 point version.SAS." This SAS program performs the raw score to scale score transformations using HumRRO's bounadary method. Lower boundaries are created for each raw score and, using the expected score, the theta value is classified into a raw score boundary. Lookup tables for each KCCT form are then produced. This program outputs the max score for each grade subject and the weight multiplier for open-response items. (See Appendix N for an example).

O. Raw-Score-to-Scale-Score Tables/Lookup Tables (SSS09GGrssshrX.SAS). A raw-score-to-scale-score table is produced for each KCCT form (the "X" at the end of the file name is a placeholder to denote form). (See Appendix O for an example)

P. Output from SAS program, "6a Compare MPresults with HumRROresults—RSSS.SAS." This SAS program compares the lookup tables produced by HumRRO to the lookup tables produced by Measured Progress and outputs any discrepancies in scale scores and NAPD classifications. (See Appendix P for the output produced by this program).

Issues and Recommendations

This section of the report documents the issues that arose during the course of the 2009 replication and checking process that warrant some explanation/clarification. The primary issues are discussed below in detail. A complete history of all the issues encountered, including specific item-level issues, is outlined in Table 3.

Issues Prior to Calibration

Prior to receiving student data files (i.e., matrix files), HumRRO pulls anchor items parameters from prior years in order to prepare for the equating step. In pulling anchor items,

HumRRO discovered some inconsistencies in a subset of IREF numbers from year to year. So as to prevent such sources of confusion in the future, the newly devised procedures (see Appendix A, Section I) include steps for HumRRO to receive information about parent/child relationships (where an item is edited and given a new item identification number when it is next used) for equating items from the Data Analysis department at Measured Progress.

Recommendation. HumRRO's recommendation is to carry forth the quality control guidelines that were established this year in the procedures document (See Appendix A, Sections I and II).

Calibrating items in PARSCALE

Background. During the calibration phase, there are typically some items for which the guessing parameter (i.e., the c-parameter) is not estimated. This is not an unusual occurrence with PARSCALE, and is well-documented in the literature (see Measured Progress Equating Report). When this occurs, some intervention is needed in the PARSCALE command file. In 2007, it was common to apply different starting values to c-parameters in order to "coerce" PARSCALE into providing believable estimated parameters. If adjusting the starting values failed, then sometimes c would be fixed to a particular value based on an examination of the empirical ICC plots. Such actions were only applied to items when an obvious problem (usually a c-parameter of zero) was encountered. In 2008, when Measured Progress first posted their "watch list," which is the document that specifies the actions applied to problematic items, HumRRO recognized a distinct difference in the actions that were being applied to items. The 2007 procedure of giving starting values to the problematic c-parameters was not being implemented. Rather, Measured Progress' action in 2008 was to automatically fix many of the c-parameters to zero. In 2007, this action was only applied to items for which PARSCALE produced zero c-parameters in the first run of PARSCALE. In 2008, however, this procedure was also applied to items for which PARSCALE had estimated reasonable c-parameters in the initial run. When HumRRO asked Measured Progress if they had changed their decision rules for applying actions to items, they responded that indeed they had. Mike Nering explained that since the 2007 KCCT calibration, they had been exploring the issue of fixing items and had found that, "it is more straight forward to fix c-parameters to 0.00 and this yields model fit that is nearly identical compared to previously used methods. Additionally, we have found better model fit through the chi-square statistic provided in the PARSCALE output files when we fix c to 0.00 (M. Nering, email communication, June 26th, 2008)." When asked why they had fixed items to zero for which PARSCALE had estimated reasonable parameters, Dr. Nering explained that it was based on a visual inspection of model fit. "We spend most of our time looking at expected versus real data to make sure that the IRT parameters are producing ICCs that best depict student-item interaction. If the ICC doesn't 'slice through' the observed data, we would try to do a better job by fixing parameters (M. Nering, email communication, June 26th, 2008)."

After internal discussion among HumRRO personnel, we came to the conclusion that automatically fixing items to zero, for which an initial PARSCALE run had produced zero c-parameters, was an acceptable decision rule. However, we were not comfortable endorsing the decision rule of fixing c-parameters to zero for items for which an initial PARSCALE run *had* produced reasonable c-parameters, but for which a visual inspection of the model fit plots <u>might</u>

suggest otherwise. Our reasoning was multi-fold. First, HumRRO does not have access to the same model fit ICCs that Measured Progress produces. HumRRO produces empirical log odds plots, which are comparable to Measured Progress's model fit plots; however, they are not sufficiently similar so as to allow us to come to the same decision as Measured Progress. Secondly, even if HumRRO were looking at the exact same model fit plots as Measured Progress, it is highly unlikely that we would come to the exact same conclusions as Measured Progress regarding which items to fix at zero. This is because a visual inspection of how the ICC "slices" through the observed data is a subjective appraisal. As such, the "fixers' eyes" are not going to be calibrated exactly alike, making it highly unlikely that two different individuals would arrive at exactly the same decisions for items in all grades/subjects. This brings us to our third point; if it is not possible for the two independent parties to replicate one another's work, then this limits the utility of the independent replication process. Fourth, the subjective nature of the visual inspection is problematic from a continuity perspective. For example, if psychometrician X makes the visual inspection of the ICC plots in 2008, but psychometrician Y, whose eyes are calibrated a bit differently, makes the visual inspection of the ICC plots in 2009, then this could present obvious issues for year-to-year equating. Fifth, when the c-parameter is fixed to zero, this causes a shift in the *a* and *b* parameters. HumRRO has concerns that this shift may introduce some systematic bias into the calibration results. Finally, HumRRO's perspective is that if you fix the c-parameters of items for which PARSCALE estimated reasonable parameters, then this suggests a degree of distrust in the IRT software program that you are using to calibrate items. If you distrust the software in these instances, then how do we judge when to trust the Parscale-estimated parameters versus when to base parameter estimation on visual inspection of graphics of the data? For these reasons, HumRRO's recommendation was to use more objective, verifiable criteria for fixing c-parameters to zero. After extensive discussion with Measured Progress and KDE, the following decision rules were agreed upon (M. Nering, email communication, June 27, 2008):

1. If estimated c = 0.0000 and the standard error of c > 0.0000, then fix c = 0.0000.
2. If standard error of b > 0.30000, then fix c = 0.0000 (the value of 0.3000 is approximate, and generally we are looking for any aberrant values).
3. Special cases. There are occasionally places where special procedures need to be implemented. These will be discussed on a cases-by-case basis, and decisions for handling these problematic items will be shared in Measured Progress's watch list document.

2009 Calibration. For the current year, HumRRO found that Measured Progress's item parameters from the initial PARSCALE run did not match HumRRO's item parameters. The reason for the mismatch was that Measured Progress had reverted back to the subjective "visual inspection" method of fixing parameters for problematic items. Measured Progress carried out their visual inspection method all the way through to scoring tables and then compared their scoring tables against HumRRO's scoring tables. When Measured Progress found that their alternative method did not result in a notably different solution than HumRRO's solution, Measured Progress agreed to go back and re-run all the analyses using the 2008 decision guidelines (that is, Measured Progress agreed to re-run everything using the objective decision rules due to the six reasons outlined in the above paragraph). It was reasoned that, since the method did not appreciably alter the final solution, we would be better served with a more

straightforward set of decision rules that both companies could follow. At the end of the 2009 scaling and equating of the KCCT, all parties participated in a conference call and devised specific step-by-step calibration procedures to be followed in subsequent years (see Appendix A, Section III). The hope is that this document will prevent such confusion regarding calibration procedures in years to come.

Recommendation. HumRRO's recommendation is to carry forth the calibration guidelines that were established this year in the procedures document (See Appendix A, Section III).

Equating Item Analyses

Measured Progress uses a delta analysis method which is based on Classical Test Theory (CTT) statistics, namely p-values. Measured Progress uses a least squares solution to fit a line of best fit among the anchor year and current year delta values. The standardized perpendicular distance to the line is used as the criterion. If that standard deviation is equal to or greater than 3.0, then Measured Progress flags that item to potentially be dropped from equating. HumRRO also conducts a delta analysis. Because many of the equating items were field-test items, for which HumRRO did not have data, HumRRO requested the p-values from Measured Progress. However, Measured Progress computes delta values at the subform level, and HumRRO was provided with p-values collapsed across forms and subforms. Because HumRRO computed their delta values based on p-values at the aggregate level, their delta analyses were not an exact match to Measured Progress's delta analyses. The new processing steps include guidance that HumRRO should receive from Measured Progress subform-level p-values for the equating year (See Appendix A, Section IIA).

In addition to conducting delta analyses, HumRRO also examines year-to-year item drift using an IRT method. For each equating item, the mean squared difference between quadrature points on the anchor year ICC and current year ICC are calculated. If the mean squared difference is greater than .008, then items are flagged to potentially be dropped as equating items.

The delta analysis method and the IRT method both offer advantages for identifying equating items with anomalous change. The benefit of the delta analysis is that it will flag items that exhibit a large difference relative to other items. However, because this method is based on an item's relative distance compared to other items, an otherwise acceptable item may be flagged for deletion if it is in a set of very closely matching items, or vice versa. For example, all (or most) of the items may be largely dispersed around the regression line. As such, items may have large differences, but may not be flagged because, relative to other items, the difference is not so large. In contrast, all of the items may be very closely clustered to the regression line with one that is just slightly more dispersed. This item would be flagged, even though its distance from the line is not all that large. The IRT method, in contrast, flags items based on an absolute, rather than relative, criterion of a mean square difference of .008 or greater. Because both of these methods offer advantages, Measured Progress agreed to use both their delta analysis method and HumRRO's IRT method in conjunction with one another for making decisions about dropping equating items. In most cases, the delta analysis method and the IRT method flagged the same

items. However, there were a few instances in which the delta analysis flagged an item, but not the IRT method, and vice versa. In the end, an item could be dropped from equating if it was flagged by either or both methods. The new procedures documents specifies that Measured Progress will also implement HumRRO's equating item check in subsequent years (see Appendix A, Section IVB).

Measured Progress and HumRRO also had discussions about dropping open-response items from equating. Because there are comparatively few open-response items, because open-response items comprise a significant portion of the test score, and because we might expect some dimensionality associated with item type, the two entities have agreed to err on the side of being more conservative regarding decisions to drop open-response items from equating. These items, when flagged, warrant additional discussion before decisions are made to drop them from equating.

Other Equating Issues in 2009. The initial equating run resulted in differences between HumRRO's and Measured Progress's additive and multiplicative constants for all grades and subjects. HumRRO requested that Measured Progress post their STUIRT files. Upon inspection of Measured Progress's STUIRT files, HumRRO found that Measured Progress had specified the open-response items as only having four categories, rather than five categories. Measured Progress then made the correction to their STUIRT files and re-ran Stocking-Lord. Equating constants matched at that point.

In 2009, writing also presented a special case for equating. In 2008, writing was equated on multiple-choice items only. The decision was made to equate on multiple-choice items only in 2008 because the writing prompts do not repeat from 2007 to 2008. Moreover, the scorer training changed from 2007 to 2008. Consequently, the decision was made to equate on multiple-choice items only in 2008 (see Appendix Q for additional background on writing). In 2009, writing was equated both ways—that is, with only multiple-choice items designated as anchor items and with both multiple-choice items and open response items as anchors. Results for the two equating solutions were very similar. The decision was made to use the multiple-choice only equating solution since a multiple-choice only equating solution was used for the 2008 KCCT, and consistency was desired.

All other issues with individual items in specific grades/subjects are identified in Table 3.

Recommendation. HumRRO's recommendation is to carry forth the equating guidelines that were established this year in the procedures document (See Appendix A, Section IV).

Raw-Score-to-Scale-Score Issues

Upon checking HumRRO's look-up tables against Measured Progress's look-up tables, HumRRO found considerable differences between tables. HumRRO investigated Measured Progress's TCC files from 2008 and compared them to Measured Progress's 2009 TCC. HumRRO noticed anomalous differences in the weights being applied to the TCCs from 2008 to 2009. HumRRO notified Measured Progress of this anomalous difference. Measured Progress

then verified that they had applied incorrect weights to the 2009 TCCs. Measured Progress then made the appropriate correction and the tables matched exactly.

When comparing the look-up tables for Writing, HumRRO found that Measured Progress had produced only six forms. Because each form contains two writing prompts and students respond to one of the two prompts, this means that there are 12 forms for writing. HumRRO notified Measured Progress of the error. Measured Progress made the correction. Even after this fix was applied, HumRRO found notable differences between their look-up tables and Measured Progress's look-up tables. Upon further investigation, HumRRO found that Measured Progress was applying weights to the open-response items, although no weights were required for open-response items for writing. Once Measured Progress removed the weights from the open-response items, this issue was resolved.

Table 3. Summary of 2009 Issues Encountered

GR	Sub	Notes	Match Fixes	Match Parms	EQ ITEM DROPS	Match Scale Constants	Equating Notes	Match EQ Parms	RSSS Match Status using Two Different Methods	Re-RUN RSSS Match Status
		1) Different IREFs for year to year for a subset of items.	2) Rules agreed upon last year for when to fix items were not being used by MP. They were fitting items based on 'eye ball' method. We agreed to proceed separately through RSSS with the expectation that the different fixes should not affect RSSS. We proceeded with two different methods.				Initial runs yielded mismatches for all grade subjects. MP had specified OR items as having only 4 categories in STUIRT files instead of 5.		Weight was not correctly applied to TCC on MP's part; Form order was wrong for Reading grades 3, 6, 8. Affected grade/subjects where there were repeat items across forms. Scale form order did not match book form order.	After seeing results didn't differ between two 'fixing' methods, MP agreed to implement HumRRO fixes and re-run analysis. They concluded that the solution was good. When MP went back and ran HumRRO solution noticed that Science grade 7 and 11 calibration did not reached convergence; we fixed two additional items, which were originally suggested by MP
3	MA		NO	NO	94345	Within .0001			Slight Differences in Form 2, 4, 6 ; NAPD differences in Form 2	YES
4	MA		YES	YES	52742	YES		YES	YES	YES
5	MA		YES		55258	YES	MP neglected to drop item with zero C estiamte	YES	YES	YES
	MA				93753	Within .0001				
6	MA		NO	NO	52015	Within .0001		NO	Slight differences in form 2, 6; No NAPD differences	YES
7	MA		NO	NO	95470	Within .0001		NO	Slight differences in form 5; No NAPD differences	YES
					53528	Within .0001				
8	MA		YES	YES	58549	YES	In STUIRT File, one item parameter was incorrect for HumRRO. When we pulled parameters from field test calibration, item was left free to vary, so did not have the correct item parameter.	YES	YES	YES
11	MA		YES	YES	51378	YES	High School, equate back to 2007. MP was using a combination of 2007 and 2008 item parameters.	YES	YES	YES
3	RD					Within .0001			Asked second time for weight issue to be changed. Asked third time for weight issue to be resolved.	YES
4	RD		NO	NO		Within .0001		NO	Slight differences in form 2, 5; No NAPD differences	YES
5	RD		NO	NO		Within .0001		NO	Slight differences in form 1, 3; No NAPD differences	YES

GR	Sub	Notes	Match Fixes	Match Parms	EQ ITEM DROPS	Match Scale Constants	Equating Notes	Match EQ Parms	RSSS Match Status using Two Different Methods	Re-RUN RSSS Match Status
6	RD					Within .0001			Differences in all forms; NAPD Differences in Forms 2, 3, 4, 5 and 6	YES
7	RD		YES	YES		YES		YES	YES	YES
8	RD		YES	YES	95049	YES		YES	NO	YES
10	RD		NO	NO	50864	Within .0001		NO	Slight Differences in forms 3, 4, 5, 6; No NAPD differences	YES
					50733			NO		YES
4	SCI		NO	NO		Within .0001		NO	Slight differences in form 2, 3, 6; No NAPD differences	YES
7	SCI		Yes	YES		Within .0001		YES	Slight Differences in all forms; No NAPD differences	YES
11	SCI				51450	Within .003			Differences in all forms; NAPD differences in form 4	YES
5	SOC		NO	NO	57227	Within .0001		NO	YES	YES
					93373					
					93438					
8	SOC		YES	YES	58899	YES	MP had one less item in Equating. Went back and checked for 2008 parameters and no parameters included, assumed this was a mistake in item doc. Re-examined issue and found that the IREF had changed from 2008. MP later told us that they dropped item because item had changed.	YES	YES	YES
11	SOC		YES	YES		YES		YES	YES	YES
	WRI						Last year writing was equated on MC items only. However, OR items were specified as EQ items. Ran Writing with OR equating items and without OR equating items. Decided to use the MC only solution.		1) MP Only produced 6 look up tables, instead of 12. Fixed at HumRRO's request. 2) MP applied weights to OR items where no weights should have been applied. Fixed at HumRRO's request.	
5	WRI		NO	NO				NO		YES
8	WRI		YES	YES				NO		YES

Conclusion

Measured Progress and HumRRO independently scaled and equated the Kentucky Core Content Test (KCCT) and produced the raw-score-to-scale-score tables for the 2009 administration. From these lookup tables, cut points were identified that can be used to (1) assign student performance classifications (Novice, Apprentice, Proficient, or Distinguished (NAPD)) and (2) convert to school accountability indexes. Decisions regarding the handling of discrepancies that arose during the process of scaling and equating were discussed between Measured Progress and HumRRO and in all cases both groups reached consensus. In the end, results calculated by HumRRO were identical to those calculated by Measured Progress. Given that our results were identical with those of Measured Progress, we are assured that Measured Progress did not commit processing errors.

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Appendix A – Procedures Document Developed at the Completion of the 2009 Psychometric Analyses

The Measured Progress (MP) Procedures for the Kentucky Core Content Test (KCCT) Calibration and Equating – Summer 2010

The decisions on how to handle the writing assessments are yet to be made. When it is made, this document will be updated to reflect these decisions.

An additional document provided by our Data Analysis department outlining the contents of the iAbs system dump and the timelines for data delivery will be appended.

II. Item Doc Quality Control(QC) (performed by Data Analysis [DA] at MP)
    A. Do iAbs dump and QC against Item Doc
    B. Provide iAbs dump, itemlist.txt, Item Doc, and walk-between SAS file of WestEd Item Identification Number to MP Item Reference Identifier (IREF) to Human Resources Research Organization (HumRRO) in advance of matrix files (Our goal is at least 2 weeks before matrix files are sent.)
    C. Provide information about parent/child relationships on equating items, and indicate which items are eliminated as equating items as a result of being child items.

III. Other HumRRO data requirements
    A. Provide subform-level p-values for equating year
    B. Documentation for any specially treated item(s).
    C. Provide PARSCALE parameter files for field test items
    D. Walk between for form numbers on books versus in MP files
    E. Test design document to identify items that repeat across forms

IV. Calibrate Data – Steps are run step-wise at MP. HumRRO should feel free, and in fact encouraged, to implement the steps based on their own philosophy and experience to cross validate our results.
    A. Run initial calibrations
        1. Just set and run for 100 cycles
    B. Evaluate issues of non-convergence
        1. If it looks like it is converging (e.g. monotonically decreasing largest change)
            a) Increase number of cycles to allow for convergence
        2. If it is struggling with a specific item where largest change is non-monotonically decreasing
            a) If dichotomous
                (1) Fix c = 0
            b) If polytomous
                (1) Skip estimate of a parameter (SKIP = (1,0,0,0))
        3. re-run calibration
    C. Evaluate c=0, Standard Error of c (SE(c)) > 0
        1. Set c = 0
        2. re-run calibration
    D. Evaluate Standard Error of (b) (SE(b)) > 0.3 – no additional criteria
        1. Set c = 0

        2. re-run calibration
    E. Re-check SE(c) > 0, c= 0; SE(b) > 0.3
        1. Set c = 0 if necessary
        2. re-run calibration if necessary
    F. Evaluate model fit
        1. Examine fit plots to be sure there is no systemic problem introduced by fixing C=0

V. Select Equating Items
    A. Perform delta analysis
        1. Delta values are computed using the following formula for each p value (old and new, all equating items).
            a) Delta = 4 * InverseNormal(1 - p_value) + 13
        2. Delta points for each equating item are formed using the previous year as the Y-value and current year as the X-value
        3. the best fit line through the data is found using a linear regression.
        4. The perpendicular distance between each delta point to the regression line is computed.
        5. The mean and standard deviation (SD) of these distances are computed.
        6. Any item with a distance greater than 3 * SD from the line is flagged.
    B. Perform HumRRO D-squared analysis
        1. Flag items at 95% and 99% levels for additional scrutiny
        2. MP needs a document outlining this procedure
    C. When steps A and B flag the same items, flag MC items for removal, flag OR items for additional consideration
    D. Explore additional evidence when delta analysis and d-squared do not flag same items, or when item type is OR
        1. Additional evidence might include scoring data, looking at the test question itself, results form the copy-match procedure, discussions between HumRRO and MP, any additional evidence HumRRO wishes to bring to the discussion.
            a) This additional evidence is generally just the discussions between HumRRO and MP, unless there is something really funny going on with an item that would lead to investigating any data/information we can get our hands on.
        2. Flag recommend items for exclusion based on additional evidence
    E. Compare list of items flagged for removal with HumRRO's list of flagged items
    F. Identify list of agreed upon equating items for removal, and perform equating

VI. Scale Test Forms
    A. Walk between for scaleforms and actual booklet form numbers will have already been provided at earliest possible date.

VII. When lookup tables are completed by MP, parallel results with DA before sending to HumRRO.

VIII. HumRRO comparison points (files posted for ease of investigating mismatching results)
    A. Calibrated parameters
    B. Item watch lists
    C. Equating sets
    D. Equated parameter files

E. STUIRT Stocking Lord constants (STUIRT output *.txt file)
F. Raw score to scale score (RS to SS) Tables
G. Student files will be placed in their own directories.

Appendix B – 2009 Measured Progress Watch List

Grade/Subject	IREF	Sequence	Intervention
MAT03	47194	5	fix c=0
MAT04	None		
MAT05	144147	16	fix c=0
MAT06	144490	31	fix c=0
MAT07	55301	53	fix c=0
MAT08	86430	1	fix c=0
MAT11	130616	9	fix c=0
MAT11	130613	5	fix c=0
MAT11	130610	1	fix c=0
REA03	52053	48	fix c=0
REA03	76650	123	fix c=0
REA03	52172	110	fix c=0
REA04	95038	34	fix c=0
REA04	153643	95	fix c=0
REA05	57364	92	fix c=0
REA05	96064	57	fix c=0
REA05	57363	65	fix c=0
REA06	51935	27	fix c=0
REA06	95943	55	fix c=0
REA06	76689	35	fix c=0
REA07	95532	45	fix c=0
REA07	95336	3	fix c=0
REA07	138335	12	fix c=0
REA08	94862	53	fix c=0
REA08	94878	32	fix c=0
REA08	86678	28	fix c=0
REA10	49028	7	fix c=0
REA10	50733	98	fix c=0
REA10	48988	21	fix c=0
REA10	92854	2	fix c=0
REA10	50708	136	fix c=0
REA10	92933	70	fix c=0
REA10	92930	74	fix c=0
SCI04	None		
SCI07	55035	7	fix c=0
SCI07	138101	5	fix c=0
SCI07	138141	15	fix c=0
SCI11	75109	25	fix c=0
SCI11	130674	5	fix c=0
SCI11	51313	71	fix c=0
SCI11	49719	15	fix c=0
SCI11	50580	31	fix c=0
SCI11	51181	68	fix c=0

SOC05	57609	12	fix c=0
SOC05	142518	19	fix c=0
SOC05	142470	31	fix c=0
SOC05	142507	13	fix c=0
SOC08	151264	20	fix c=0
SOC08	87274	22	fix c=0
SOC08	51738	6	fix c=0
SOC08	58831	45	fix c=0
SOC11	134044	22	fix c=0
SOC11	134029	13	fix c=0
SOC11	51498	52	fix c=0
SOC11	51264	16	fix c=0
SOC11	75021	7	fix c=0
SOC11	132318	1	fix c=0
WRI05	None		
WRI08	68892	3	fix c=0

Appendix C – Data Matrix Excerpt

Excerpt from MAT03:

```
1A  1301004412010111011111100111110111011110 01.....0043.....
1A  1301004123111101101111111101111111111111 01.....0102.....
1A  1301003552111101111111111111111111111111 01.....2242.....
1A  1301003694010101000000000000010000010010 01.....0000.....
1A  1301003972111101101110111111101011111010 1.....1031.....
1A  1301003413011111011111111011111111111111 01.....2033.....
1A  1301004261111101111010111111110101111101 01.....3132.....
1A  1301003133011000011010100101010000110111 00.....1101.....
1A  1301004570111101111111111111111011111110 1.....1142.....
1A  1301003206001001010001010111010010011110 01.....0130.....
1A  1301003767111101111011111111111111111111 11.....2443.....
1A  1301003902111101001110011000000000000011 11.....0000.....
1A  1301003341110111011111000111010111011110 01.....0022.....
1A  1301004048111100111111111111111111011111 01.....3243.....
1A  1301003062111111111111111101111111101111 011.....1231.....
1A  1301004190111111111011110110110111101110 00.....1140.....
1A  1301003482011001001111000101011111010110 00.....0010.....
1A  1301004342111111011111110111111111111111 01.....2244.....
1A  1301002916111111011111110011010111111111 011.....1031.....
1A  1301004484011100001010100010010000100100 10.....0101.....
1A  1301003622111101111111111111111111111111 11.....1344.....
1A  1301004679011001011011000001111111011100 01.....2131.....
1A  1301002950111111011111011111111111111101 11.....3243.....
1A  1301003731111111111111111111111111111111 01.....1143.....
1A  1301003240111111111111111111111111111101 11.....3243.....
1A  1301003801111101011111010101111111111111 01.....1232.....
1A  1301003869111101001111000111110100011100 00.....1032.....
1A  1301003306011011011101100011010010110001 01.....0011.....
1A  1301003938011111011101100101110111011111 10.....1122.....
1A  1301003028111101111111111111111111111111 01.....2344.....
1A  1301004012111111111111111111111111011111 01.....2012.....
1A  1301003376011111111111001111100111011101 00.....0011.....
1A  1301004083110101110111010010110110010110 00.....0000.....
1A  1301002883111111111110111111110111111010 110.....2242.....
1A  1301004157111101111110111111111111111111 01.....4232.....
1A  1301003447111111111111111111111111111111 11.....1144.....
1A  1301004226111001011001010001011110011111 01.....4222.....
1A  1301003098111111111111111011111110111111 01.....4344.....
1A  1301004298111111111111111011111111110101 001.....3223.....
1A  1301003517011100011111100111010111111111 01.....2141.....
1A  1301004379011101011111101001111111011100 01.....1012.....
```

Appendix D – PARSCALE Command File

```
Title 0903MAT HumRRO;
>Comment ;
>File DFNAME='C:\Data\Kentucky\KCCT2009\studentdata\MAT03matrix.txt',
NFNAME='C:\Data\Kentucky\KCCT2009\parscale\Omit_DoT.key',SAVE;
>SAVE PARM='C:\Data\Kentucky\KCCT2009\parscale\output\MAT0903.PAR',
     FIT='C:\Data\Kentucky\KCCT2009\parscale\output\MAT0903.FIT';
>INPUT NIDW=10,NTOTAl=81 ,NTEST=1;
(T5,10A1,81 A1)

>TEST1 TNAME=MAT03,NBLOCK=81 ;
>BLOCK1   BNAME='MC047191 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK2   BNAME='MC093164 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK3   BNAME='MC0140628',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK4   BNAME='MC076632 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK5   BNAME='MC047194 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK6   BNAME='MC052128 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK7   BNAME='MC0140630',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK8   BNAME='MC076637 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK9   BNAME='MC0140638',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK10  BNAME='MC052296 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK11  BNAME='MC047133 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK12  BNAME='MC047149 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK13  BNAME='MC093166 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK14  BNAME='MC0140674',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK15  BNAME='MC047257 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK16  BNAME='MC076635 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK17  BNAME='MC052299 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK18  BNAME='MC047153 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK19  BNAME='MC0140681',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK20  BNAME='MC047233 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK21  BNAME='MC0140683',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK22  BNAME='MC0140685',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK23  BNAME='MC093160 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK24  BNAME='MC094337 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK25  BNAME='MC147245 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK26  BNAME='MC147260 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK27  BNAME='MC193158 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK28  BNAME='MC193162 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK29  BNAME='MC147160 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK30  BNAME='MC152300 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK31  BNAME='MC194237 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK32  BNAME='MC147253 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK33  BNAME='MC252181 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK34  BNAME='MC252261 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK35  BNAME='MC247247 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK36  BNAME='MC247256 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK37  BNAME='MC247236 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK38  BNAME='MC252290 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK39  BNAME='MC252186 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK40  BNAME='MC294299 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK41  BNAME='MC394217 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK42  BNAME='MC352182 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK43  BNAME='MC352062 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK44  BNAME='MC352063 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK45  BNAME='MC394322 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK46  BNAME='MC394234 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK47  BNAME='MC352072 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK48  BNAME='MC352130 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK49  BNAME='MC494311 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK50  BNAME='MC452226 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK51  BNAME='MC494278 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK52  BNAME='MC494334 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK53  BNAME='MC494297 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK54  BNAME='MC452065 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK55  BNAME='MC452179 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK56  BNAME='MC452263 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK57  BNAME='MC552223 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK58  BNAME='MC552222 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
```

```
>BLOCK59  BNAME='MC552187 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK60  BNAME='MC594339 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK61  BNAME='MC594291 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK62  BNAME='MC594325 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK63  BNAME='MC594302 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK64  BNAME='MC594345 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK65  BNAME='MC652225 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK66  BNAME='MC652123 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK67  BNAME='MC694215 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK68  BNAME='MC694319 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK69  BNAME='MC652127 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK70  BNAME='MC652124 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK71  BNAME='MC652228 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK72  BNAME='MC694238 ',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
>BLOCK73  BNAME='OR076638 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>BLOCK74  BNAME='OR052301 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>BLOCK75  BNAME='OR052081 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>BLOCK76  BNAME='OR152189 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>BLOCK77  BNAME='OR247264 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>BLOCK78  BNAME='OR394329 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>BLOCK79  BNAME='OR494308 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>BLOCK80  BNAME='OR594349 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>BLOCK81  BNAME='OR652144 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>CAL PARTIAL,LOGISTIC,CYCLE=(100,1,1,1,1),TPRIOR,SPRIOR,GPRIOR;
>SCORE NOSCORE;
```

Appendix E – PARSCALE Output File Phase 0

```
                    PARSCALE V4.1

     MAXIMUM LIKELIHOOD ITEM ANALYSIS AND TEST SCORING: POLYTOMOUS
MODEL

     PROGRAM COPYRIGHT HELD BY SCIENTIFIC SOFTWARE
INTERNATIONAL,INC., 1985-2002

                 7383 N Lincoln Avenue, Suite 100
                      Lincolnwood, IL  60712
                    Phone:(800) 247-6113
                         (847) 675-0720
                    Fax:  (847) 675-2140
               Website: http://www.ssicentral.com



    [ PHASE 0 ]



    CURRENT DATE:  8- 7-2009
    CURRENT TIME: 14:45:46


              ***  POLYTOMOUS MODEL ITEM ANALYSER  ***

                     *** PHASE 0  ***


 Title 0903MAT HumRRO;
 >Comment ;

 >FILE
DFNAME='C:\DATA\KENTUCKY\KCCT2009\STUDENTDATA\MAT03MATRIX.TXT',
 NFNAME='C:\Data\Kentucky\KCCT2009\parscale\Omit_DoT.key',SAVE;
 >SAVE PARM='C:\DATA\KENTUCKY\KCCT2009\PARSCALE\OUTPUT\MAT0903.PAR',
       FIT='C:\Data\Kentucky\KCCT2009\parscale\output\MAT0903.FIT';
 >INPUT NIDW=10,NTOTAL=81 ,NTEST=1;

 SINGLE MAIN TEST IS USED.
 NUMBER OF ITEMS:    81
```

```
 FORMAT OF DATA INPUT IS
 (T5,10A1,81 A1)



 ---> FIND WARNING:    1 RECORDS NOT CONTAINING > IN COLUMN 1 HAVE BEEN
SKIPPED

 >TEST1 TNAME=MAT03,NBLOCK=81 ;

 BLOCK CARD:   1
 >BLOCK1   BNAME='MC047191
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:   2
 >BLOCK2   BNAME='MC093164
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:   3
 >BLOCK3
BNAME='MC0140628',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=
(2,ESTIMATE);

 BLOCK CARD:   4
 >BLOCK4   BNAME='MC076632
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:   5
 >BLOCK5   BNAME='MC047194
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.00),GUESSING=(2,FIXED);

 BLOCK CARD:   6
 >BLOCK6   BNAME='MC052128
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:   7
 >BLOCK7
BNAME='MC0140630',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=
(2,ESTIMATE);

 BLOCK CARD:   8
 >BLOCK8   BNAME='MC076637
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:   9
```

```
 >BLOCK9
BNAME='MC0140638',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=
(2,ESTIMATE);

 BLOCK CARD:  10
 >BLOCK10  BNAME='MC052296
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  11
 >BLOCK11  BNAME='MC047133
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  12
 >BLOCK12  BNAME='MC047149
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  13
 >BLOCK13  BNAME='MC093166
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  14
 >BLOCK14
BNAME='MC0140674',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=
(2,ESTIMATE);

 BLOCK CARD:  15
 >BLOCK15  BNAME='MC047257
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  16
 >BLOCK16  BNAME='MC076635
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  17
 >BLOCK17  BNAME='MC052299
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  18
 >BLOCK18  BNAME='MC047153
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  19
 >BLOCK19
BNAME='MC0140681',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=
(2,ESTIMATE);
```

```
 BLOCK CARD:  20
 >BLOCK20  BNAME='MC047233
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  21
 >BLOCK21
BNAME='MC0140683',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=
(2,ESTIMATE);

 BLOCK CARD:  22
 >BLOCK22
BNAME='MC0140685',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=
(2,ESTIMATE);

 BLOCK CARD:  23
 >BLOCK23  BNAME='MC093160
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  24
 >BLOCK24  BNAME='MC094337
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  25
 >BLOCK25  BNAME='MC147245
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  26
 >BLOCK26  BNAME='MC147260
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  27
 >BLOCK27  BNAME='MC193158
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  28
 >BLOCK28  BNAME='MC193162
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  29
 >BLOCK29  BNAME='MC147160
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  30
 >BLOCK30  BNAME='MC152300
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
```

```
 BLOCK CARD:  31
 >BLOCK31  BNAME='MC194237
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  32
 >BLOCK32  BNAME='MC147253
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  33
 >BLOCK33  BNAME='MC252181
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  34
 >BLOCK34  BNAME='MC252261
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  35
 >BLOCK35  BNAME='MC247247
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  36
 >BLOCK36  BNAME='MC247256
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  37
 >BLOCK37  BNAME='MC247236
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.00),GUESSING=(2,FIXED);

 BLOCK CARD:  38
 >BLOCK38  BNAME='MC252290
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  39
 >BLOCK39  BNAME='MC252186
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  40
 >BLOCK40  BNAME='MC294299
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  41
 >BLOCK41  BNAME='MC394217
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  42
```

```
 >BLOCK42  BNAME='MC352182
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  43
 >BLOCK43  BNAME='MC352062
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  44
 >BLOCK44  BNAME='MC352063
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  45
 >BLOCK45  BNAME='MC394322
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  46
 >BLOCK46  BNAME='MC394234
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  47
 >BLOCK47  BNAME='MC352072
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  48
 >BLOCK48  BNAME='MC352130
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  49
 >BLOCK49  BNAME='MC494311
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  50
 >BLOCK50  BNAME='MC452226
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  51
 >BLOCK51  BNAME='MC494278
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  52
 >BLOCK52  BNAME='MC494334
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  53
 >BLOCK53  BNAME='MC494297
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);
```

```
 BLOCK CARD:  54
 >BLOCK54  BNAME='MC452065
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  55
 >BLOCK55  BNAME='MC452179
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  56
 >BLOCK56  BNAME='MC452263
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  57
 >BLOCK57  BNAME='MC552223
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  58
 >BLOCK58  BNAME='MC552222
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  59
 >BLOCK59  BNAME='MC552187
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  60
 >BLOCK60  BNAME='MC594339
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  61
 >BLOCK61  BNAME='MC594291
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  62
 >BLOCK62  BNAME='MC594325
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  63
 >BLOCK63  BNAME='MC594302
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  64
 >BLOCK64  BNAME='MC594345
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  65
```

```
 >BLOCK65  BNAME='MC652225
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  66
 >BLOCK66  BNAME='MC652123
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  67
 >BLOCK67  BNAME='MC694215
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  68
 >BLOCK68  BNAME='MC694319
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  69
 >BLOCK69  BNAME='MC652127
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  70
 >BLOCK70  BNAME='MC652124
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  71
 >BLOCK71  BNAME='MC652228
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  72
 >BLOCK72  BNAME='MC694238
',NITEMS=1,NCAT=2,ORIGINAL=(0,1),GPARM=(0.22),GUESSING=(2,ESTIMATE);

 BLOCK CARD:  73
 >BLOCK73  BNAME='OR076638 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);

 BLOCK CARD:  74
 >BLOCK74  BNAME='OR052301 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);

 BLOCK CARD:  75
 >BLOCK75  BNAME='OR052081 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);

 BLOCK CARD:  76
 >BLOCK76  BNAME='OR152189 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);

 BLOCK CARD:  77
 >BLOCK77  BNAME='OR247264 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
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BLOCK CARD:  78
>BLOCK78  BNAME='OR394329 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);

BLOCK CARD:  79
>BLOCK79  BNAME='OR494308 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);

BLOCK CARD:  80
>BLOCK80  BNAME='OR594349 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);

BLOCK CARD:  81
>BLOCK81  BNAME='OR652144 ',NITEMS=1,NCAT=5,ORIGINAL=(0,1,2,3,4);
>CAL PARTIAL,LOGISTIC,CYCLE=(100,1,1,1,1),TPRIOR,SPRIOR,GPRIOR;

MODEL SPECIFICATIONS
=====================


LOGISTIC - PARTIAL CREDIT ITEM RESPONSE MODEL IS SPECIFIED.
          SCALE CONSTANT  1.70 FOR SLOPE PARAMETERS.

CALIBRATION PARAMETERS
======================


MAXIMUM NUMBER OF EM CYCLES:              100
MAXIMUM INNER EM CYCLES:                  1
MAXIMUM CATEGORY ESTIMATION CYCLES:       1
MAXIMUM ITEM PARAMETER ESTIMATION CYCLES:    1
MAXIMUM NUMBER OF NEWTON CYCLES:          0
CONVERGENCE CRITERION FOR EM CYCLES:      0.0010
CONVERGENCE CRITERION FOR SLOPE:          0.0010
CONVERGENCE CRITERION FOR THRESHOLD:      0.0010
CONVERGENCE CRITERION FOR CATEGORY:       0.0010
CONVERGENCE CRITERION FOR GUESSING:       0.0010
ORDER OF INNER EM CYCLES:                 CATEGORY - ITEM PARAMETERS
ESTIMATION ACCELERATOR:                   NO (DEFAULT)
RIDGE METHOD:                             NO (DEFAULT)
PRIOR DISTRIBUTION ON SLOPES:             YES
PRIOR DISTRIBUTION ON THRESHOLD:          YES
PRIOR DISTRIBUTION ON GUESSING:           YES
SOURCE OF HYPERPARAMETERS FOR ITEMS:      DEFAULT VALUES

THE FIXED PRIOR DISTRIBUTION FOR LATENT TRAITS
                              MEAN     :  0.0000
                              S.D.     :  1.0000
```

QUADRATURE POINTS AND PRIOR WEIGHTS (PROGRAM-GENERATED NORMAL APPROXIMATION):

	1	2	3	4	5
POINT	-0.4000E+01	-0.3724E+01	-0.3448E+01	-0.3172E+01	-0.2897E+01
WEIGHT	0.3692E-04	0.1071E-03	0.2881E-03	0.7181E-03	0.1659E-02
	6	7	8	9	10
POINT	-0.2621E+01	-0.2345E+01	-0.2069E+01	-0.1793E+01	-0.1517E+01
WEIGHT	0.3550E-02	0.7042E-02	0.1294E-01	0.2205E-01	0.3481E-01
	11	12	13	14	15
POINT	-0.1241E+01	-0.9655E+00	-0.6897E+00	-0.4138E+00	-0.1379E+00
WEIGHT	0.5093E-01	0.6905E-01	0.8676E-01	0.1010E+00	0.1090E+00
	16	17	18	19	20
POINT	0.1379E+00	0.4138E+00	0.6897E+00	0.9655E+00	0.1241E+01
WEIGHT	0.1090E+00	0.1010E+00	0.8676E-01	0.6905E-01	0.5093E-01
	21	22	23	24	25
POINT	0.1517E+01	0.1793E+01	0.2069E+01	0.2345E+01	0.2621E+01
WEIGHT	0.3481E-01	0.2205E-01	0.1294E-01	0.7042E-02	0.3550E-02
	26	27	28	29	30
POINT	0.2897E+01	0.3172E+01	0.3448E+01	0.3724E+01	0.4000E+01
WEIGHT	0.1659E-02	0.7181E-03	0.2881E-03	0.1071E-03	0.3692E-04

TOTAL WEIGHT: 1.00000
MEAN : 0.00000
S.D. : 0.99970

PRIOR DISTRIBUTIONS ON ITEM PARAMETERS
(THRESHOLDS, NORMAL; SLOPES, LOG-NORMAL)

	THRESHOLDS		SLOPES(LOG)		SLOPES(ARITH)		ASYMPTOTES	
ITEM	MU	SIGMA	MU	SIGMA	MU	SIGMA	ALPHA	BETA
0001	0.000	2.000	0.000	0.500	1.000	0.500	5.400	16.600
0002	0.000	2.000	0.000	0.500	1.000	0.500	5.400	16.600
0003	0.000	2.000	0.000	0.500	1.000	0.500	5.400	16.600
0004	0.000	2.000	0.000	0.500	1.000	0.500	5.400	16.600
0005	0.000	2.000	0.000	0.500	1.000	0.500	5.000	17.000
0006	0.000	2.000	0.000	0.500	1.000	0.500	5.400	16.600

```
+-----------------------------------------------------------------------+
|0007 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0008 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0009 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0010 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0011 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0012 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0013 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0014 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0015 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0016 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0017 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0018 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0019 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0020 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0021 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0022 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0023 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0024 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0025 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0026 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0027 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0028 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0029 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
```

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+-----------------------------------------------------------------------+
|0030 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0031 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0032 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0033 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0034 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0035 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0036 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0037 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
+-----------------------------------------------------------------------+
|0038 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0039 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0040 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0041 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0042 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0043 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0044 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0045 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0046 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0047 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0048 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0049 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0050 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0051 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0052 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
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+-----------------------------------------------------------------------+
|0053 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0054 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0055 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0056 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0057 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0058 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0059 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0060 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0061 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0062 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0063 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0064 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0065 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0066 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0067 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0068 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0069 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0070 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0071 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0072 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.400| 16.600|
+-----------------------------------------------------------------------+
|0073 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
+-----------------------------------------------------------------------+
|0074 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
+-----------------------------------------------------------------------+
|0075 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
```

```
+-----------------------------------------------------------------+
|0076 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
+-----------------------------------------------------------------+
|0077 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
+-----------------------------------------------------------------+
|0078 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
+-----------------------------------------------------------------+
|0079 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
+-----------------------------------------------------------------+
|0080 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
+-----------------------------------------------------------------+
|0081 |  0.000|  2.000|  0.000|  0.500|  1.000|  0.500|  5.000| 17.000|
+-----------------------------------------------------------------+


 >SCORE NOSCORE;


 SUBJECT SCORING IS NOT EXECUTED.


 FILE ASSIGNMENTS AND DISPOSITIONS
 =================================


 [INPUT FILES]

 SUBJECT DATA INPUT FILE
C:\DATA\KENTUCKY\KCCT2009\STUDENTDATA\MAT03MATRIX.TXT
                                SINGLE-SUBJECT DATA
                                NO CASE WEIGHTS
                                NOT-PRESENTED RESPONSES


 NOT PRESENTED ITEM KEY FILE
C:\DATA\KENTUCKY\KCCT2009\PARSCALE\OMIT_DOT.KEY


 [OUTPUT FILES]

 ITEM PARAMETERS FILE
C:\DATA\KENTUCKY\KCCT2009\PARSCALE\OUTPUT\MAT0903.PAR
 FIT STATISTICS FILE
C:\DATA\KENTUCKY\KCCT2009\PARSCALE\OUTPUT\MAT0903.FIT
```

[SCRATCH FILES]

PARSCALE SYSTEM BINARY DATA FILE 0903MAT.MFL
TEMPORARY FILE 0903MAT.T99
TEMPORARY FILE 0903MAT.T98
TEMPORARY FILE 0903MAT.T97
TEMPORARY FILE 0903MAT.T96

[MAIN TEST: MAT03]

NOT-PRESENTED KEY: .....
.....

INPUT AND RECODED RESPONSE OF FIRST AND SECOND OBSERVATIONS

OBSERVATION # 1
GROUP: 1
ID: 1301004412
INPUT RESPONSES: 0 1 0 1 1 1 0 1 1 1 1 1 1 0 0 1 1 1 1 1
0 1 1 1 0 1 1 1 1 0 0 1 . . . . . .
. . . . . .
. . . . . 0 0 4 3 . . . .
.
RECODED RESPONSES: 1 2 1 2 2 2 1 2 2 2 2 2 2 1 1 2 2 2 2 2
1 2 2 2 1 2 2 2 2 1 1 2 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 5 4 -1 -1 -1 -1
-1

OBSERVATION # 2
GROUP: 1
ID: 1301004123
INPUT RESPONSES: 1 1 1 1 0 1 1 0 1 1 1 1 1 1 1 1 0 1 1 1
1 1 1 1 1 1 1 1 1 1 0 1 . . . . . .
. . . . . .
. . . . . 0 1 0 2 . . . .
.
RECODED RESPONSES: 2 2 2 2 1 2 2 1 2 2 2 2 2 2 2 2 1 2 2 2
2 2 2 2 2 2 2 2 2 2 1 2 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 2 1 3 -1 -1 -1 -1
-1

```
 [MAIN TEST: MAT03   ]


    50166 OBSERVATIONS READ FROM FILE:
C:\DATA\KENTUCKY\KCCT2009\STUDENTDATA\MAT03MATRIX.TXT
    50166 OBSERVATIONS WRITTEN TO FILE:  0903MAT.MFL


    43176 BYTES OF NUMERICAL WORKSPACE USED OF   8192000 AVAILABLE IN
PHASE 0
    20268 BYTES OF CHARACTER WORKSPACE USED OF   2048000 AVAILABLE IN
PHASE 0
  NORMAL END
```

Appendix F – PARSCALE Output File Phase 1 Excerpt

```
                    PARSCALE V4.1

     MAXIMUM LIKELIHOOD ITEM ANALYSIS AND TEST SCORING: POLYTOMOUS
MODEL




    [ PHASE 1 ]



    CURRENT DATE:  8- 7-2009
    CURRENT TIME: 14:45:56


              ***  POLYTOMOUS MODEL ITEM ANALYSER  ***


                      *** PHASE 1  ***

 Title 0903MAT HumRRO;
 >Comment ;

 MAINTEST: MAT03



 50166 OBS.(WEIGHTS: 50166.000) WERE READ FROM 0903MAT.MFL


 50166 OBS.(WEIGHTS: 50166.000) WERE READ FROM 0903MAT.MFL

 SUMMARY ITEM STATISTICS
 ========================


 BLOCK NO.:   1     NAME: MC047191
 ------------------------------------------------
 ITEM   | TOTAL    NOT     OMIT |  CATEGORIES
       |       PRESENT       |
       |                    |   1      2
 ------------------------------------------------
```

```
0001   |                    |
  FREQ.|  50166       0       0|  11219   38947
  PERC.|            0.0     0.0|   22.4    77.6
       |                    |
-----------------------------------------------

BLOCK NO.:   2     NAME: MC093164
-----------------------------------------------
ITEM   | TOTAL    NOT     OMIT |  CATEGORIES
       |       PRESENT        |
       |                    |   1       2
-----------------------------------------------
0002   |                    |
  FREQ.|  50166       0       0|   3701   46465
  PERC.|            0.0     0.0|    7.4    92.6
       |                    |
-----------------------------------------------

BLOCK NO.:   3     NAME: MC014062
-----------------------------------------------
ITEM   | TOTAL    NOT     OMIT |  CATEGORIES
       |       PRESENT        |
       |                    |   1       2
-----------------------------------------------
0003   |                    |
  FREQ.|  50166       0       0|   3997   46169
  PERC.|            0.0     0.0|    8.0    92.0
       |                    |
-----------------------------------------------

BLOCK NO.:   4     NAME: MC076632
-----------------------------------------------
ITEM   | TOTAL    NOT     OMIT |  CATEGORIES
       |       PRESENT        |
       |                    |   1       2
-----------------------------------------------
0004   |                    |
  FREQ.|  50166       0       0|  11414   38752
  PERC.|            0.0     0.0|   22.8    77.2
       |                    |
-----------------------------------------------

BLOCK NO.:   5     NAME: MC047194
-----------------------------------------------
ITEM   | TOTAL    NOT     OMIT |  CATEGORIES
       |       PRESENT        |
```

```
     |                    |   1       2
-----------------------------------------------
0005   |                    |
  FREQ.|  50166       0       0|  19206   30960
  PERC.|            0.0     0.0|   38.3    61.7
     |                    |
-----------------------------------------------

BLOCK NO.:   6     NAME: MC052128
-----------------------------------------------
ITEM   | TOTAL    NOT     OMIT |  CATEGORIES
     |       PRESENT        |
     |                    |   1       2
-----------------------------------------------
0006   |                    |
  FREQ.|  50166       0       0|   7769   42397
  PERC.|            0.0     0.0|   15.5    84.5
     |                    |
-----------------------------------------------

BLOCK NO.:   7     NAME: MC014063
-----------------------------------------------
ITEM   | TOTAL    NOT     OMIT |  CATEGORIES
     |       PRESENT        |
     |                    |   1       2
-----------------------------------------------
0007   |                    |
  FREQ.|  50166       0       0|  16123   34043
  PERC.|            0.0     0.0|   32.1    67.9
     |                    |
-----------------------------------------------

BLOCK NO.:   8     NAME: MC076637
-----------------------------------------------
ITEM   | TOTAL    NOT     OMIT |  CATEGORIES
     |       PRESENT        |
     |                    |   1       2
-----------------------------------------------
0008   |                    |
  FREQ.|  50166       0       0|  11404   38762
  PERC.|            0.0     0.0|   22.7    77.3
     |                    |
-----------------------------------------------

BLOCK NO.:   9     NAME: MC014063
-----------------------------------------------
```

```
ITEM   | TOTAL    NOT     OMIT |  CATEGORIES
       |       PRESENT        |
       |                  |   1       2
-----------------------------------------------
0009   |                  |
  FREQ.|  50166       0       0|   3308   46858
  PERC.|           0.0     0.0|    6.6    93.4
       |                  |
-----------------------------------------------
```

Appendix G – PARSCALE Output File Phase 2

```
                                   PARSCALE V4.1

    MAXIMUM LIKELIHOOD ITEM ANALYSIS AND TEST SCORING: POLYTOMOUS MODEL



   [ PHASE 2 ]



   CURRENT DATE:  8- 7-2009
   CURRENT TIME: 14:45:58


            ***  POLYTOMOUS MODEL ITEM ANALYSER  ***

                     *** PHASE 2  ***
Title 0903MAT HumRRO;
>Comment ;

MAINTEST: MAT03

                  ******************************
                    CALIBRATION OF MAINTEST
                         MAT03
                  ******************************


[E-M CYCLES]   PARTIAL CREDIT MODEL

STEP AND ITEM PARAMETERS AFTER CYCLE    0

  LARGEST CHANGE=  0.000
  -2 LOG LIKELIHOOD =    1911662.795

STEP AND ITEM PARAMETERS AFTER CYCLE    1

  LARGEST CHANGE=  1.180 (  1.274->  0.094) at Slope    of Item: 75 0075
  -2 LOG LIKELIHOOD =    1904804.521

STEP AND ITEM PARAMETERS AFTER CYCLE    2

  LARGEST CHANGE=  2.504 ( -2.115-> -4.620) at Category of Block: 78 OR394329
  -2 LOG LIKELIHOOD =    1874068.233

STEP AND ITEM PARAMETERS AFTER CYCLE    3

  LARGEST CHANGE=  0.576 (  0.056->  0.633) at Category of Block: 75 OR052081
  -2 LOG LIKELIHOOD =    1869182.992

STEP AND ITEM PARAMETERS AFTER CYCLE    4

  LARGEST CHANGE=  0.193 (  1.603->  1.795) at Category of Block: 80 OR594349
  -2 LOG LIKELIHOOD =    1867577.729

STEP AND ITEM PARAMETERS AFTER CYCLE    5

  LARGEST CHANGE=  0.123 (  1.795->  1.919) at Category of Block: 80 OR594349
  -2 LOG LIKELIHOOD =    1867346.676

STEP AND ITEM PARAMETERS AFTER CYCLE    6

  LARGEST CHANGE=  0.074 (  1.919->  1.993) at Category of Block: 80 OR594349
  -2 LOG LIKELIHOOD =    1867303.042

STEP AND ITEM PARAMETERS AFTER CYCLE    7
```

```
 LARGEST CHANGE=  0.042 ( -0.883-> -0.926) at Category of Block: 80 OR594349
 -2 LOG LIKELIHOOD =    1867293.963

STEP AND ITEM PARAMETERS AFTER CYCLE    8

 LARGEST CHANGE=  0.024 ( -0.926-> -0.949) at Category of Block: 80 OR594349
 -2 LOG LIKELIHOOD =    1867291.427

STEP AND ITEM PARAMETERS AFTER CYCLE    9

 LARGEST CHANGE=  0.013 ( -0.949-> -0.962) at Category of Block: 80 OR594349
 -2 LOG LIKELIHOOD =    1867290.304

STEP AND ITEM PARAMETERS AFTER CYCLE   10

 LARGEST CHANGE=  0.007 ( -2.764-> -2.771) at Category of Block: 79 OR494308
 -2 LOG LIKELIHOOD =    1867289.758

STEP AND ITEM PARAMETERS AFTER CYCLE   11

 LARGEST CHANGE=  0.005 ( -4.825-> -4.820) at Category of Block: 78 OR394329
 -2 LOG LIKELIHOOD =    1867289.539

STEP AND ITEM PARAMETERS AFTER CYCLE   12

 LARGEST CHANGE=  0.005 ( -4.820-> -4.815) at Category of Block: 78 OR394329
 -2 LOG LIKELIHOOD =    1867289.486

STEP AND ITEM PARAMETERS AFTER CYCLE   13

 LARGEST CHANGE=  0.004 ( -4.815-> -4.811) at Category of Block: 78 OR394329
 -2 LOG LIKELIHOOD =    1867289.502

STEP AND ITEM PARAMETERS AFTER CYCLE   14

 LARGEST CHANGE=  0.003 ( -4.811-> -4.808) at Category of Block: 78 OR394329
 -2 LOG LIKELIHOOD =    1867289.538

STEP AND ITEM PARAMETERS AFTER CYCLE   15

 LARGEST CHANGE=  0.003 ( -4.808-> -4.805) at Category of Block: 78 OR394329
 -2 LOG LIKELIHOOD =    1867289.576

STEP AND ITEM PARAMETERS AFTER CYCLE   16

 LARGEST CHANGE=  0.002 ( -4.805-> -4.803) at Category of Block: 78 OR394329
 -2 LOG LIKELIHOOD =    1867289.608

STEP AND ITEM PARAMETERS AFTER CYCLE   17

 LARGEST CHANGE=  0.002 ( -4.803-> -4.802) at Category of Block: 78 OR394329
 -2 LOG LIKELIHOOD =    1867289.633

STEP AND ITEM PARAMETERS AFTER CYCLE   18

 LARGEST CHANGE=  0.001 ( -4.802-> -4.801) at Category of Block: 78 OR394329
 -2 LOG LIKELIHOOD =    1867289.652

STEP AND ITEM PARAMETERS AFTER CYCLE   19

 LARGEST CHANGE=  0.001 ( -4.801-> -4.800) at Category of Block: 78 OR394329


 ITEM BLOCK   1  MC047191

 SCORING FUNCTION    :     1.000     2.000
 STEP PARAMTER       :     0.000     0.000
 S.E.                :     0.000     0.000
   GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
```

ITEM BLOCK 2 MC093164

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 3 MC014062

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 4 MC076632

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 5 MC047194

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
ITEM BLOCK 6 MC052128

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 7 MC014063

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 8 MC076637

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 9 MC014063

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 10 MC052296

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 11 MC047133

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 12 MC047149

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 13 MC093166

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000

GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 14 MC014067

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 15 MC047257

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 16 MC076635

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 17 MC052299

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 18 MC047153

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 19 MC014068

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 20 MC047233

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 21 MC014068

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 22 MC014068

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 23 MC093160

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 24 MC094337

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 25 MC147245

SCORING FUNCTION : 1.000 2.000

STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 26 MC147260

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 27 MC193158

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 28 MC193162

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 29 MC147160

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 30 MC152300

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 31 MC194237

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 32 MC147253

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 33 MC252181

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 34 MC252261

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 35 MC247247

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 36 MC247256

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 37 MC247236

```
SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
ITEM BLOCK  38  MC252290

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  39  MC252186

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  40  MC294299

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  41  MC394217

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  42  MC352182

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  43  MC352062

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  44  MC352063

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  45  MC394322

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  46  MC394234

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  47  MC352072

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
ITEM BLOCK  48  MC352130

SCORING FUNCTION    :    1.000    2.000
STEP PARAMTER       :    0.000    0.000
S.E.                :    0.000    0.000
 GUESSING PARAMETER IS ESTIMATED FOR CATEGORY  2
```

ITEM BLOCK 49 MC494311

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 50 MC452226

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 51 MC494278

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 52 MC494334

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 53 MC494297

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 54 MC452065

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 55 MC452179

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 56 MC452263

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 57 MC552223

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 58 MC552222

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 59 MC552187

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 60 MC594339

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000

S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 61 MC594291

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 62 MC594325

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 63 MC594302

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 64 MC594345

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 65 MC652225

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 66 MC652123

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 67 MC694215

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 68 MC694319

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 69 MC652127

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 70 MC652124

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 71 MC652228

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 72 MC694238

SCORING FUNCTION : 1.000 2.000
STEP PARAMTER : 0.000 0.000
S.E. : 0.000 0.000
GUESSING PARAMETER IS ESTIMATED FOR CATEGORY 2
ITEM BLOCK 73 OR076638

SCORING FUNCTION : 1.000 2.000 3.000 4.000 5.000

STEP PARAMTER : 0.000 2.078 -0.379 -0.491 -1.208

S.E. : 0.000 0.014 0.013 0.018 0.024

ITEM BLOCK 74 OR052301

SCORING FUNCTION : 1.000 2.000 3.000 4.000 5.000

STEP PARAMTER : 0.000 1.579 0.990 -2.786 0.217

S.E. : 0.000 0.018 0.017 0.034 0.043

ITEM BLOCK 75 OR052081

SCORING FUNCTION : 1.000 2.000 3.000 4.000 5.000

STEP PARAMTER : 0.000 0.798 0.305 -0.201 -0.901

S.E. : 0.000 0.021 0.018 0.015 0.013

ITEM BLOCK 76 OR152189

SCORING FUNCTION : 1.000 2.000 3.000 4.000 5.000

STEP PARAMTER : 0.000 1.827 0.254 -0.720 -1.361

S.E. : 0.000 0.045 0.034 0.038 0.048

ITEM BLOCK 77 OR247264

SCORING FUNCTION : 1.000 2.000 3.000 4.000 5.000

STEP PARAMTER : 0.000 0.355 1.126 -0.272 -1.209

S.E. : 0.000 0.057 0.054 0.048 0.057

ITEM BLOCK 78 OR394329

SCORING FUNCTION : 1.000 2.000 3.000 4.000 5.000

STEP PARAMTER : 0.000 2.638 0.730 -4.800 1.431

S.E. : 0.000 0.116 0.062 0.093 0.097

ITEM BLOCK 79 OR494308

SCORING FUNCTION : 1.000 2.000 3.000 4.000 5.000

STEP PARAMTER : 0.000 2.790 -2.783 1.801 -1.808

S.E. : 0.000 0.043 0.074 0.082 0.084

ITEM BLOCK 80 OR594349

SCORING FUNCTION : 1.000 2.000 3.000 4.000 5.000

STEP PARAMTER : 0.000 -0.972 2.075 -1.037 -0.065

S.E. : 0.000 0.057 0.056 0.039 0.041

ITEM BLOCK 81 OR652144

SCORING FUNCTION : 1.000 2.000 3.000 4.000 5.000

STEP PARAMTER : 0.000 1.170 0.024 0.114 -1.308

S.E. : 0.000 0.042 0.035 0.031 0.029

ITEM	BLOCK	SLOPE	S.E.	LOCATION	S.E.	GUESSING	S.E.
0001	1	1.126	0.020	-0.644	0.022	0.278	0.011
0002	2	0.381	0.011	-3.970	0.163	0.113	0.052
0003	3	0.890	0.013	-2.148	0.027	0.027	0.012
0004	4	1.243	0.018	-0.827	0.015	0.109	0.009
0005	5	0.599	0.007	-0.557	0.011	0.000	0.000
0006	6	0.629	0.011	-1.835	0.049	0.055	0.022
0007	7	0.698	0.018	-0.199	0.041	0.287	0.014
0008	8	0.354	0.016	-1.523	0.247	0.240	0.057
0009	9	0.606	0.012	-2.908	0.076	0.080	0.036
0010	10	0.749	0.016	-1.346	0.056	0.212	0.025
0011	11	0.966	0.013	-1.795	0.020	0.020	0.009
0012	12	0.687	0.011	-1.724	0.036	0.041	0.017
0013	13	1.130	0.018	-0.685	0.018	0.153	0.010
0014	14	1.276	0.022	-0.692	0.019	0.277	0.010
0015	15	1.059	0.016	-0.066	0.013	0.097	0.006
0016	16	0.779	0.011	-1.545	0.028	0.035	0.014
0017	17	0.693	0.011	-1.046	0.028	0.035	0.013
0018	18	0.710	0.012	-2.383	0.047	0.054	0.024
0019	19	0.955	0.014	-0.643	0.018	0.067	0.009
0020	20	0.894	0.018	-2.378	0.059	0.124	0.039
0021	21	1.349	0.023	0.184	0.011	0.215	0.005
0022	22	1.276	0.020	-1.389	0.021	0.116	0.014
0023	23	0.462	0.014	-1.293	0.119	0.167	0.038
0024	24	1.074	0.020	-0.751	0.025	0.280	0.012
0025	25	0.811	0.037	-0.281	0.061	0.180	0.025
0026	26	0.662	0.029	-1.515	0.113	0.138	0.048
0027	27	1.103	0.035	-1.213	0.037	0.055	0.020
0028	28	0.950	0.034	-1.607	0.060	0.085	0.032
0029	29	0.859	0.045	-0.744	0.089	0.332	0.035
0030	30	0.883	0.041	-0.889	0.079	0.248	0.035
0031	31	0.722	0.050	1.331	0.048	0.164	0.014

0032	32	0.683	0.029	-1.925	0.115	0.132	0.052
0033	33	1.508	0.050	-0.513	0.025	0.112	0.015
0034	34	0.893	0.040	-1.881	0.105	0.182	0.059
0035	35	0.575	0.032	-1.035	0.147	0.180	0.053
0036	36	0.930	0.033	-0.394	0.038	0.073	0.018
0037	37	0.291	0.017	-3.146	0.176	0.000	0.000
0038	38	0.510	0.040	1.057	0.079	0.137	0.025
0039	39	0.498	0.027	-0.818	0.142	0.130	0.046
0040	40	0.834	0.042	-2.724	0.130	0.159	0.068
0041	41	0.655	0.031	-2.288	0.147	0.163	0.066
0042	42	1.115	0.042	-0.401	0.038	0.155	0.020
0043	43	0.831	0.034	-1.204	0.079	0.137	0.039
0044	44	0.998	0.036	-0.914	0.048	0.098	0.026
0045	45	0.873	0.048	0.208	0.054	0.275	0.020
0046	46	0.974	0.040	-0.435	0.049	0.174	0.024
0047	47	1.278	0.048	0.240	0.024	0.140	0.012
0048	48	0.858	0.056	0.244	0.069	0.413	0.021
0049	49	0.985	0.031	-0.781	0.036	0.052	0.017
0050	50	0.636	0.035	-2.568	0.209	0.246	0.090
0051	51	0.503	0.037	0.261	0.121	0.177	0.036
0052	52	0.776	0.032	-1.926	0.100	0.127	0.050
0053	53	0.988	0.042	0.370	0.032	0.136	0.014
0054	54	1.175	0.048	-0.124	0.035	0.210	0.017
0055	55	0.894	0.035	-0.147	0.040	0.096	0.018
0056	56	0.721	0.036	-2.113	0.159	0.222	0.075
0057	57	0.629	0.033	-0.798	0.115	0.171	0.043
0058	58	0.750	0.028	-1.334	0.074	0.089	0.034
0059	59	0.398	0.042	0.160	0.249	0.280	0.055
0060	60	1.117	0.045	0.314	0.028	0.140	0.013
0061	61	0.751	0.038	0.278	0.053	0.153	0.021
0062	62	0.870	0.036	-1.430	0.083	0.145	0.043
0063	63	0.478	0.036	0.121	0.142	0.179	0.040
0064	64	0.647	0.028	-1.740	0.116	0.126	0.050
0065	65	0.657	0.031	-0.941	0.099	0.137	0.040
0066	66	0.837	0.032	-1.795	0.079	0.101	0.040

0067	67	0.872	0.033	-1.468	0.069	0.101	0.035
0068	68	0.764	0.037	-2.506	0.141	0.179	0.071
0069	69	0.743	0.037	-0.058	0.063	0.168	0.025
0070	70	0.570	0.031	-3.033	0.197	0.177	0.076
0071	71	0.619	0.031	-0.417	0.088	0.124	0.032
0072	72	0.539	0.023	-1.862	0.114	0.091	0.040
0073	73	0.561	0.004	0.564	0.006	0.000	0.000
0074	74	0.400	0.003	0.878	0.008	0.000	0.000
0075	75	0.554	0.005	-0.628	0.005	0.000	0.000
0076	76	0.511	0.010	0.041	0.014	0.000	0.000
0077	77	0.390	0.008	0.176	0.015	0.000	0.000
0078	78	0.291	0.005	-1.034	0.021	0.000	0.000
0079	79	0.409	0.006	0.822	0.018	0.000	0.000
0080	80	0.541	0.008	-0.001	0.011	0.000	0.000
0081	81	0.653	0.012	-0.424	0.011	0.000	0.000

SUMMARY STATISTICS OF PARAMETER ESTIMATES

PARAMETER	MEAN	STN DEV	N
SLOPE	0.779	0.264	81
LOG(SLOPE)	-0.310	0.359	81
THRESHOLD	-0.940	1.063	81
GUESSING	0.151	0.077	70

	1	2	3	4	5
POINT	-0.4000E+01	-0.3724E+01	-0.3448E+01	-0.3172E+01	-0.2897E+01
WEIGHT	0.2884E-03	0.5060E-03	0.8334E-03	0.1410E-02	0.2552E-02

	6	7	8	9	10
POINT	-0.2621E+01	-0.2345E+01	-0.2069E+01	-0.1793E+01	-0.1517E+01
WEIGHT	0.4714E-02	0.8346E-02	0.1380E-01	0.2145E-01	0.3182E-01

	11	12	13	14	15
POINT	-0.1241E+01	-0.9655E+00	-0.6897E+00	-0.4138E+00	-0.1379E+00
WEIGHT	0.4535E-01	0.6228E-01	0.8135E-01	0.9902E-01	0.1116E+00

	16	17	18	19	20
POINT	0.1379E+00	0.4138E+00	0.6897E+00	0.9655E+00	0.1241E+01
WEIGHT	0.1151E+00	0.1082E+00	0.9272E-01	0.7237E-01	0.5126E-01

	21	22	23	24	25
POINT	0.1517E+01	0.1793E+01	0.2069E+01	0.2345E+01	0.2621E+01
WEIGHT	0.3315E-01	0.1984E-01	0.1110E-01	0.5832E-02	0.2876E-02

	26	27	28	29	30
POINT	0.2897E+01	0.3172E+01	0.3448E+01	0.3724E+01	0.4000E+01
WEIGHT	0.1328E-02	0.5727E-03	0.2299E-03	0.8575E-04	0.2967E-04

TOTAL WEIGHT: 1.00000
MEAN : 0.00000

S.D. : 0.99970

ITEM FIT STATISTICS

BLOCK	ITEM	CHI-SQUARE	D.F.	PROB.
MC047191	0001	97.58873	27.	0.000
MC093164	0002	61.40864	30.	0.001
MC014062	0003	124.44787	25.	0.000
MC076632	0004	67.24152	26.	0.000
MC047194	0005	122.48028	30.	0.000
MC052128	0006	39.36428	30.	0.118
MC014063	0007	82.13940	30.	0.000
MC076637	0008	64.27533	30.	0.000
MC014063	0009	59.80439	27.	0.000
MC052296	0010	75.49410	30.	0.000
MC047133	0011	125.60296	25.	0.000
MC047149	0012	54.99984	30.	0.004
MC093166	0013	56.01205	28.	0.001
MC014067	0014	106.59947	26.	0.000
MC047257	0015	149.82660	30.	0.000
MC076635	0016	77.65112	30.	0.000
MC052299	0017	76.78517	30.	0.000
MC047153	0018	65.52838	27.	0.000
MC014068	0019	69.95988	30.	0.000
MC047233	0020	42.19431	24.	0.012
MC014068	0021	320.01901	30.	0.000
MC014068	0022	60.93213	24.	0.000
MC093160	0023	81.92281	30.	0.000
MC094337	0024	74.59694	27.	0.000
MC147245	0025	31.43520	28.	0.298
MC147260	0026	49.61995	25.	0.002
MC193158	0027	38.02656	22.	0.018
MC193162	0028	24.00405	22.	0.347
MC147160	0029	35.63105	25.	0.077
MC152300	0030	23.61829	25.	0.542
MC194237	0031	62.50201	30.	0.000
MC147253	0032	32.56652	24.	0.113
MC252181	0033	38.24619	23.	0.024
MC252261	0034	22.75574	21.	0.357
MC247247	0035	25.04691	29.	0.676
MC247256	0036	32.54817	27.	0.212
MC247236	0037	83.56829	30.	0.000
MC252290	0038	42.25099	30.	0.068
MC252186	0039	21.43639	30.	0.874
MC294299	0040	22.56976	18.	0.207
MC394217	0041	11.51076	23.	0.977
MC352182	0042	33.54065	25.	0.118
MC352062	0043	28.79013	24.	0.228
MC352063	0044	19.57424	24.	0.721
MC394322	0045	35.33813	29.	0.193
MC394234	0046	29.60851	26.	0.284
MC352072	0047	54.52716	27.	0.001
MC352130	0048	55.22006	29.	0.002
MC494311	0049	25.39897	25.	0.440
MC452226	0050	25.13525	23.	0.343
MC494278	0051	33.17236	30.	0.315
MC494334	0052	19.33872	23.	0.682
MC494297	0053	69.56861	30.	0.000
MC452065	0054	52.56469	26.	0.002
MC452179	0055	51.99445	28.	0.004
MC452263	0056	18.30836	23.	0.741
MC552223	0057	28.28904	29.	0.503
MC552222	0058	29.92260	25.	0.227
MC552187	0059	36.74862	30.	0.184
MC594339	0060	48.14293	28.	0.010
MC594291	0061	55.10239	30.	0.004
MC594325	0062	24.72183	24.	0.421
MC594302	0063	33.32777	30.	0.308

```
| MC594345 | 0064 |   22.10726 |   25. | 0.630 |
| MC652225 | 0065 |   35.93604 |   27. | 0.116 |
| MC652123 | 0066 |   23.74171 |   23. | 0.418 |
| MC694215 | 0067 |   21.43980 |   24. | 0.613 |
| MC694319 | 0068 |   13.29313 |   20. | 0.865 |
| MC652127 | 0069 |   42.66280 |   29. | 0.049 |
| MC652124 | 0070 |   26.35538 |   23. | 0.284 |
| MC652228 | 0071 |   33.99609 |   30. | 0.281 |
| MC694238 | 0072 |   32.01099 |   27. | 0.231 |
| OR076638 | 0073 | 1262.84216 |  112. | 0.000 |
| OR052301 | 0074 | 1047.22180 |  115. | 0.000 |
| OR052081 | 0075 |  603.74524 |  106. | 0.000 |
| OR152189 | 0076 |  200.39824 |  102. | 0.000 |
| OR247264 | 0077 |  198.69266 |  108. | 0.000 |
| OR394329 | 0078 |  167.20042 |  102. | 0.000 |
| OR494308 | 0079 |  155.04646 |  103. | 0.001 |
| OR594349 | 0080 |  273.92880 |   99. | 0.000 |
| OR652144 | 0081 |  205.86026 |   92. | 0.000 |
-----------------------------------------------
|  TOTAL   |      | 7929.02588 | 2863. | 0.000 |
-----------------------------------------------

   763488 BYTES OF NUMERICAL WORKSPACE USED OF   8192000 AVAILABLE IN PHASE 2
     4300 BYTES OF CHARACTER WORKSPACE USED OF   2048000 AVAILABLE IN PHASE 2
 NORMAL END
```

Appendix H – PARSCALE Parameter File

```
Title 0903MAT HumRRO;
>Comment ;
MAT03     81   81    7    0    1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1

   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1

   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
GROUP 01
MC047191    20001   1.12631   0.02045  -0.64414   0.02198   0.27760   0.01082
  0.00000   0.00000
  0.00000   0.00000
MC093164    20002   0.38097   0.01076  -3.97029   0.16302   0.11337   0.05188
  0.00000   0.00000
  0.00000   0.00000
MC014062    20003   0.89021   0.01346  -2.14780   0.02683   0.02695   0.01213
  0.00000   0.00000
  0.00000   0.00000
MC076632    20004   1.24286   0.01800  -0.82694   0.01544   0.10934   0.00923
  0.00000   0.00000
  0.00000   0.00000
MC047194    20005   0.59867   0.00714  -0.55700   0.01106   0.00000   0.00000
  0.00000   0.00000
  0.00000   0.00000
MC052128    20006   0.62891   0.01085  -1.83536   0.04850   0.05511   0.02222
  0.00000   0.00000
  0.00000   0.00000
MC014063    20007   0.69828   0.01782  -0.19912   0.04057   0.28688   0.01364
  0.00000   0.00000
  0.00000   0.00000
MC076637    20008   0.35352   0.01616  -1.52330   0.24678   0.24028   0.05705
  0.00000   0.00000
  0.00000   0.00000
MC014063    20009   0.60561   0.01249  -2.90811   0.07556   0.08028   0.03599
  0.00000   0.00000
  0.00000   0.00000
MC052296    20010   0.74923   0.01630  -1.34648   0.05555   0.21201   0.02513
  0.00000   0.00000
  0.00000   0.00000
MC047133    20011   0.96598   0.01307  -1.79455   0.01970   0.01967   0.00865
  0.00000   0.00000
  0.00000   0.00000
MC047149    20012   0.68683   0.01071  -1.72420   0.03608   0.04058   0.01678
  0.00000   0.00000
  0.00000   0.00000
MC093166    20013   1.12963   0.01768  -0.68462   0.01798   0.15284   0.00986
  0.00000   0.00000
  0.00000   0.00000
MC014067    20014   1.27565   0.02226  -0.69227   0.01888   0.27700   0.01008
  0.00000   0.00000
  0.00000   0.00000
MC047257    20015   1.05904   0.01589  -0.06635   0.01280   0.09687   0.00621
  0.00000   0.00000
  0.00000   0.00000
MC076635    20016   0.77904   0.01137  -1.54498   0.02829   0.03545   0.01389
  0.00000   0.00000
  0.00000   0.00000
MC052299    20017   0.69259   0.01057  -1.04612   0.02843   0.03521   0.01253
  0.00000   0.00000
  0.00000   0.00000
MC047153    20018   0.71011   0.01235  -2.38265   0.04709   0.05399   0.02365
  0.00000   0.00000
  0.00000   0.00000
MC014068    20019   0.95497   0.01406  -0.64285   0.01824   0.06736   0.00932
  0.00000   0.00000
  0.00000   0.00000
MC047233    20020   0.89399   0.01829  -2.37752   0.05940   0.12351   0.03880
  0.00000   0.00000
```

0.00000 0.00000
MC014068 20021 1.34907 0.02255 0.18449 0.01089 0.21451 0.00525
0.00000 0.00000
0.00000 0.00000
MC014068 20022 1.27587 0.02039 -1.38935 0.02132 0.11622 0.01438
0.00000 0.00000
0.00000 0.00000
MC093160 20023 0.46226 0.01429 -1.29334 0.11936 0.16711 0.03767
0.00000 0.00000
0.00000 0.00000
MC094337 20024 1.07361 0.02000 -0.75101 0.02505 0.28003 0.01217
0.00000 0.00000
0.00000 0.00000
MC147245 20025 0.81135 0.03741 -0.28113 0.06094 0.17957 0.02531
0.00000 0.00000
0.00000 0.00000
MC147260 20026 0.66234 0.02921 -1.51519 0.11262 0.13793 0.04845
0.00000 0.00000
0.00000 0.00000
MC193158 20027 1.10293 0.03468 -1.21263 0.03732 0.05538 0.01958
0.00000 0.00000
0.00000 0.00000
MC193162 20028 0.94977 0.03400 -1.60744 0.05962 0.08511 0.03181
0.00000 0.00000
0.00000 0.00000
MC147160 20029 0.85856 0.04495 -0.74352 0.08884 0.33248 0.03463
0.00000 0.00000
0.00000 0.00000
MC152300 20030 0.88321 0.04107 -0.88872 0.07905 0.24751 0.03542
0.00000 0.00000
0.00000 0.00000
MC194237 20031 0.72189 0.05032 1.33054 0.04815 0.16428 0.01370
0.00000 0.00000
0.00000 0.00000
MC147253 20032 0.68281 0.02931 -1.92459 0.11482 0.13234 0.05204
0.00000 0.00000
0.00000 0.00000
MC252181 20033 1.50828 0.04990 -0.51333 0.02474 0.11166 0.01481
0.00000 0.00000
0.00000 0.00000
MC252261 20034 0.89252 0.03997 -1.88108 0.10500 0.18161 0.05901
0.00000 0.00000
0.00000 0.00000
MC247247 20035 0.57541 0.03150 -1.03518 0.14676 0.18039 0.05271
0.00000 0.00000
0.00000 0.00000
MC247256 20036 0.92969 0.03256 -0.39448 0.03847 0.07264 0.01813
0.00000 0.00000
0.00000 0.00000
MC247236 20037 0.29056 0.01689 -3.14608 0.17628 0.00000 0.00000
0.00000 0.00000
0.00000 0.00000
MC252290 20038 0.50993 0.04043 1.05674 0.07919 0.13683 0.02471
0.00000 0.00000
0.00000 0.00000
MC252186 20039 0.49817 0.02707 -0.81788 0.14160 0.12991 0.04608
0.00000 0.00000
0.00000 0.00000
MC294299 20040 0.83418 0.04234 -2.72359 0.13035 0.15932 0.06769
0.00000 0.00000
0.00000 0.00000
MC394217 20041 0.65481 0.03106 -2.28793 0.14740 0.16297 0.06630
0.00000 0.00000
0.00000 0.00000
MC352182 20042 1.11544 0.04248 -0.40088 0.03823 0.15526 0.01968
0.00000 0.00000
0.00000 0.00000
MC352062 20043 0.83078 0.03437 -1.20433 0.07910 0.13730 0.03907
0.00000 0.00000
0.00000 0.00000

MC352063 20044 0.99751 0.03580 -0.91406 0.04806 0.09830 0.02551
0.00000 0.00000
0.00000 0.00000
MC394322 20045 0.87303 0.04750 0.20762 0.05433 0.27526 0.02026
0.00000 0.00000
0.00000 0.00000
MC394234 20046 0.97429 0.04041 -0.43516 0.04944 0.17411 0.02357
0.00000 0.00000
0.00000 0.00000
MC352072 20047 1.27778 0.04842 0.23996 0.02416 0.14044 0.01155
0.00000 0.00000
0.00000 0.00000
MC352130 20048 0.85780 0.05645 0.24432 0.06900 0.41288 0.02105
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0.00000 0.00000
MC494311 20049 0.98453 0.03096 -0.78118 0.03577 0.05172 0.01734
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0.00000 0.00000
MC452226 20050 0.63596 0.03495 -2.56786 0.20858 0.24648 0.09020
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0.00000 0.00000
MC494278 20051 0.50303 0.03712 0.26122 0.12115 0.17724 0.03593
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MC494334 20052 0.77605 0.03235 -1.92637 0.09969 0.12686 0.05009
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0.00000 0.00000
MC494297 20053 0.98786 0.04220 0.36960 0.03208 0.13618 0.01368
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0.00000 0.00000
MC452065 20054 1.17517 0.04782 -0.12371 0.03493 0.20967 0.01695
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0.00000 0.00000
MC452179 20055 0.89415 0.03462 -0.14675 0.04018 0.09635 0.01813
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0.00000 0.00000
MC452263 20056 0.72066 0.03636 -2.11322 0.15888 0.22202 0.07521
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0.00000 0.00000
MC552223 20057 0.62899 0.03270 -0.79804 0.11462 0.17052 0.04318
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0.00000 0.00000
MC552222 20058 0.74982 0.02840 -1.33429 0.07403 0.08945 0.03403
0.00000 0.00000
0.00000 0.00000
MC552187 20059 0.39841 0.04171 0.16015 0.24928 0.28031 0.05456
0.00000 0.00000
0.00000 0.00000
MC594339 20060 1.11710 0.04474 0.31403 0.02802 0.13987 0.01266
0.00000 0.00000
0.00000 0.00000
MC594291 20061 0.75125 0.03823 0.27832 0.05331 0.15260 0.02060
0.00000 0.00000
0.00000 0.00000
MC594325 20062 0.86971 0.03602 -1.43044 0.08273 0.14497 0.04308
0.00000 0.00000
0.00000 0.00000
MC594302 20063 0.47809 0.03579 0.12108 0.14155 0.17942 0.04044
0.00000 0.00000
0.00000 0.00000
MC594345 20064 0.64692 0.02806 -1.74012 0.11569 0.12588 0.04991
0.00000 0.00000
0.00000 0.00000
MC652225 20065 0.65672 0.03065 -0.94064 0.09874 0.13686 0.03959
0.00000 0.00000
0.00000 0.00000
MC652123 20066 0.83718 0.03243 -1.79517 0.07869 0.10113 0.03954
0.00000 0.00000
0.00000 0.00000
MC694215 20067 0.87222 0.03289 -1.46784 0.06869 0.10066 0.03501

```
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  0.00000   0.00000
MC694319    20068   0.76425   0.03720  -2.50587   0.14110   0.17870   0.07053
  0.00000   0.00000
  0.00000   0.00000
MC652127    20069   0.74278   0.03715  -0.05824   0.06335   0.16763   0.02474
  0.00000   0.00000
  0.00000   0.00000
MC652124    20070   0.57026   0.03094  -3.03260   0.19696   0.17653   0.07563
  0.00000   0.00000
  0.00000   0.00000
MC652228    20071   0.61898   0.03092  -0.41685   0.08763   0.12385   0.03239
  0.00000   0.00000
  0.00000   0.00000
MC694238    20072   0.53929   0.02298  -1.86188   0.11352   0.09118   0.04028
  0.00000   0.00000
  0.00000   0.00000
OR076638    50073   0.56110   0.00401   0.56416   0.00573   0.00000   0.00000
  0.00000   2.07755  -0.37866  -0.49095  -1.20794
  0.00000   0.01403   0.01325   0.01751   0.02363
OR052301    50074   0.40040   0.00297   0.87780   0.00754   0.00000   0.00000
  0.00000   1.57940   0.98995  -2.78636   0.21701
  0.00000   0.01832   0.01669   0.03403   0.04325
OR052081    50075   0.55362   0.00458  -0.62804   0.00542   0.00000   0.00000
  0.00000   0.79772   0.30460  -0.20111  -0.90120
  0.00000   0.02138   0.01763   0.01467   0.01298
OR152189    50076   0.51082   0.00976   0.04117   0.01355   0.00000   0.00000
  0.00000   1.82735   0.25445  -0.72048  -1.36133
  0.00000   0.04543   0.03432   0.03772   0.04793
OR247264    50077   0.38980   0.00805   0.17570   0.01521   0.00000   0.00000
  0.00000   0.35511   1.12579  -0.27179  -1.20911
  0.00000   0.05658   0.05363   0.04798   0.05658
OR394329    50078   0.29064   0.00470  -1.03413   0.02116   0.00000   0.00000
  0.00000   2.63845   0.73050  -4.79966   1.43071
  0.00000   0.11560   0.06165   0.09347   0.09656
OR494308    50079   0.40874   0.00592   0.82226   0.01833   0.00000   0.00000
  0.00000   2.79018  -2.78257   1.80052  -1.80813
  0.00000   0.04338   0.07389   0.08200   0.08445
OR594349    50080   0.54101   0.00845  -0.00072   0.01125   0.00000   0.00000
  0.00000  -0.97213   2.07454  -1.03698  -0.06543
  0.00000   0.05734   0.05603   0.03912   0.04082
OR652144    50081   0.65278   0.01230  -0.42369   0.01136   0.00000   0.00000
  0.00000   1.17045   0.02399   0.11401  -1.30845
  0.00000   0.04246   0.03492   0.03058   0.02855
```

Appendix I – PARSCALE Fit File Excerpt

```
Title 0903MAT HumRRO;
>Comment ;
  1   1
  1MAT03     30
  1GROUP 01
 -2.36249  -1.83524  -1.70161  -1.56505  -1.42986  -1.29323  -1.15709  -1.01970

 -0.88518  -0.74962  -0.61330  -0.47792  -0.34030  -0.20527  -0.07128   0.06620

  0.20426   0.33873   0.47633   0.61097   0.74660   0.88212   1.01977   1.15562

  1.29123   1.42643   1.56154   1.69429   1.83304   2.16649
  1MC047191   2   10001
1934.00000 525.00000 628.00000 763.00000 923.000001074.000001189.000001414.00000

1635.000001859.000002038.000002232.000002349.000002636.000002617.000002811.00000

2750.000002791.000002496.000002518.000002206.000002119.000001937.000001684.00000

1254.000001003.00000 789.00000 609.00000 486.00000 897.00000
  1
1388.00000 320.00000 397.00000 488.00000 543.00000 622.00000 620.00000 683.00000

 710.00000 746.00000 787.00000 694.00000 611.00000 596.00000 500.00000 436.00000

 337.00000 235.00000 179.00000 119.00000  80.00000  43.00000  37.00000  25.00000

  13.00000   4.00000   3.00000   2.00000   1.00000   0.00000
1346.94319 344.08501 400.75485 470.50526 545.57440 602.10359 624.90003 686.84206

 724.46822 739.04239 714.39550 678.97653 608.38228 574.06826 473.24525 414.70913

 326.97895 266.47609 188.89877 150.84929 103.90196  78.15969  55.54999  37.57459

  21.73522  13.49344   8.22989   4.94263   3.03204   2.96748
  2
 546.00000 205.00000 231.00000 275.00000 380.00000 452.00000 569.00000 731.00000

 925.000001113.000001251.000001538.000001738.000002040.000002117.000002375.00000

2413.000002556.000002317.000002399.000002126.000002076.000001900.000001659.00000
```

Appendix J – Excerpt from "2a Check IRT parameters & Compare MP par files"

Obs	form B	IREF	A	flag A	B	flag B	SE_B	FLAGSEB	C	flag C	SE	flagSE	D1	D2	D3	D4	crossover
1	0	76305	0.65687		-2.56870	EASY	0.06135		0.06947		0.03026		.	.	.	.	
2	0	52818	0.77944		-1.88356		0.03571		0.04670		0.01859		.	.	.	.	
3	0	76309	0.74146		-2.16288	EASY	0.03565		0.03657		0.01627		.	.	.	.	
4	0	76310	0.58934		-1.45186		0.08882		0.20367		0.03432		.	.	.	.	
5	0	76312	0.85555		-1.14943		0.03087		0.08756		0.01642		.	.	.	.	
6	0	51062	0.59399		-0.85599		0.05681		0.12341		0.02200		.	.	.	.	
7	0	50201	0.94930		-0.82317		0.02123		0.07476		0.01137		.	.	.	.	
8	0	50207	0.83318		-1.03667		0.03710		0.16680		0.01817		.	.	.	.	
9	0	51064	0.45994		-2.22606	EASY	0.07850		0.06400		0.02834		.	.	.	.	
10	0	76313	0.82370		-0.92074		0.02855		0.08000		0.01433		.	.	.	.	
11	0	76314	0.78406		-0.03748		0.02517		0.16484		0.01028		.	.	.	.	
12	0	76316	0.69522		-1.09396		0.04332		0.09451		0.01985		.	.	.	.	
13	0	50197	0.76599		-0.38341		0.03460		0.22624		0.01369		.	.	.	.	
14	0	52751	0.46969		-2.20038	EASY	0.13348		0.13877		0.04931		.	.	.	.	
15	0	76380	0.79712		-1.25821		0.04031		0.12038		0.02055		.	.	.	.	
16	0	76381	0.19371		-5.40347	EASY	0.20474		0.00000	????	0.00000		.	.	.	.	
17	0	76383	0.38292		-2.40997	EASY	0.04385		0.00000	????	0.00000		.	.	.	.	
18	0	52637	0.45618		-1.52166		0.02371		0.00000	????	0.00000		.	.	.	.	
19	0	76384	0.62377		-0.54636		0.05505		0.22378		0.01927		.	.	.	.	
20	0	76385	0.79633		-0.93102		0.04408		0.25361		0.01888		.	.	.	.	
21	0	76386	0.59006		-1.46138		0.05518		0.06827		0.02361		.	.	.	.	
22	0	50223	0.50039		-1.95729		0.02821		0.00000	????	0.00000		.	.	.	.	
23	0	76388	0.61887		-1.06136		0.06820		0.20332		0.02595		.	.	.	.	
24	0	52779	0.47535		0.01228		0.13310		0.57935	HIGH	0.01995		.	.	.	.	
25	1	50221	0.67140		-0.99916		0.07223		0.07937		0.03008		.	.	.	.	
26	1	76371	0.71109		-2.05307	EASY	0.11439		0.13378		0.05369		.	.	.	.	
27	1	76372	1.32016		-1.76137		0.06535		0.18095		0.04561		.	.	.	.	
28	1	76373	0.96985		-1.46381		0.07717		0.16483		0.04354		.	.	.	.	
29	1	51063	0.87089		-0.08500		0.06438		0.29971		0.02429		.	.	.	.	
30	1	76374	1.07758		-1.42263		0.06646		0.16266		0.03988		.	.	.	.	
31	1	50218	0.56054		-1.05980		0.15549		0.18979		0.05447		.	.	.	.	
32	1	50206	0.95773		-1.49899		0.08491		0.19000		0.04716		.	.	.	.	
33	2	93618	0.78501		-0.77051		0.08803		0.21672		0.03731		.	.	.	.	
34	2	93622	0.92514		-0.79988		0.05889		0.14677		0.02946		.	.	.	.	
35	2	93627	1.44993		-1.31865		0.04865		0.20977		0.03325		.	.	.	.	
36	2	50195	0.73381		-0.44093		0.08738		0.22329		0.03356		.	.	.	.	
37	2	50222	0.97924		-0.95106		0.05787		0.14646		0.03068		.	.	.	.	
38	2	93633	1.16557		-1.46587		0.05924		0.15052		0.03731		.	.	.	.	
39	2	93637	0.67493		-2.50752	EASY	0.11261		0.09944		0.04483		.	.	.	.	
40	2	93675	0.77484		-1.64841		0.08617		0.11145		0.04208		.	.	.	.	
41	3	52745	0.80774		-1.34834		0.08461		0.13535		0.04148		.	.	.	.	
42	3	52747	1.07256		-0.90895		0.05742		0.20656		0.03078		.	.	.	.	

Appendix K – Excerpt from "2c Make logodds" SAS Output

```
The SAS System          10:19 Wednesday, July 2, 2008   1
                                        Grade 4 SCIENCE

                                      The CORR Procedure

   1 With Variables:    totalraw
  81      Variables:    io1      io2      io3      io4      io5      io6      io7      io8
                        io9      io10     io11     io12     io13     io14     io15     io16
                        io17     io18     io19     io20     io21     io22     io23     io24
                        io25     io26     io27     io28     io29     io30     io31     io32
                        io33     io34     io35     io36     io37     io38     io39     io40
                        io41     io42     io43     io44     io45     io46     io47     io48
                        io49     io50     io51     io52     io53     io54     io55     io56
                        io57     io58     io59     io60     io61     io62     io63     io64
                        io65     io66     io67     io68     io69     io70     io71     io72
                        io73     io74     io75     io76     io77     io78     io79     io80
                        io81
```

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
totalraw	48595	33.64647	7.28249	1635050	0	48.00000
io1	48595	0.92223	0.26780	44816	0	1.00000
io2	48595	0.88067	0.32418	42796	0	1.00000
io3	48595	0.90178	0.29761	43822	0	1.00000
io4	48595	0.81922	0.38484	39810	0	1.00000
io5	48595	0.79457	0.40402	38612	0	1.00000
io6	48595	0.71376	0.45201	34685	0	1.00000
io7	48595	0.73903	0.43917	35913	0	1.00000
io8	48595	0.79127	0.40640	38452	0	1.00000
io9	48595	0.83743	0.36898	40695	0	1.00000
io10	48595	0.74629	0.43514	36266	0	1.00000
io11	48595	0.59210	0.49145	28773	0	1.00000
io12	48595	0.76222	0.42573	37040	0	1.00000
io13	48595	0.68719	0.46364	33394	0	1.00000
io14	48595	0.85149	0.35561	41378	0	1.00000
io15	48595	0.81148	0.39113	39434	0	1.00000
io16	48595	0.85101	0.35608	41355	0	1.00000
io17	48595	0.80971	0.39253	39348	0	1.00000
io18	48595	0.74148	0.43783	36032	0	1.00000
io19	48595	0.70324	0.45683	34174	0	1.00000
io20	48595	0.79292	0.40522	38532	0	1.00000
io21	48595	0.78994	0.40736	38387	0	1.00000
io22	48595	0.81231	0.39047	39474	0	1.00000
io23	48595	0.77376	0.41840	37601	0	1.00000
io24	48595	0.78934	0.40778	38358	0	1.00000
io25	8275	0.73849	0.43948	6111	0	1.00000
io26	8275	0.89704	0.30393	7423	0	1.00000
io27	8275	0.93208	0.25162	7713	0	1.00000
io28	8275	0.87154	0.33462	7212	0	1.00000
io29	8275	0.66900	0.47060	5536	0	1.00000
io30	8275	0.87577	0.32986	7247	0	1.00000
io31	8275	0.75976	0.42726	6287	0	1.00000

Grade 4 SCIENCE

The CORR Procedure

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
io32	8275	0.87867	0.32653	7271	0	1.00000
io33	8106	0.75130	0.43229	6090	0	1.00000
io34	8106	0.74846	0.43393	6067	0	1.00000
io35	8106	0.88712	0.31646	7191	0	1.00000
io36	8106	0.69122	0.46202	5603	0	1.00000
io37	8106	0.78251	0.41257	6343	0	1.00000
io38	8106	0.88305	0.32138	7158	0	1.00000
io39	8106	0.92191	0.26833	7473	0	1.00000
io40	8106	0.85801	0.34907	6955	0	1.00000
io41	8076	0.83024	0.37545	6705	0	1.00000
io42	8076	0.80275	0.39795	6483	0	1.00000
io43	8076	0.89413	0.30769	7221	0	1.00000
io44	8076	0.58049	0.49351	4688	0	1.00000
io45	8076	0.83024	0.37545	6705	0	1.00000
io46	8076	0.91568	0.27789	7395	0	1.00000
io47	8076	0.86714	0.33945	7003	0	1.00000
io48	8076	0.85835	0.34872	6932	0	1.00000
io49	8068	0.83441	0.37174	6732	0	1.00000
io50	8068	0.73897	0.43922	5962	0	1.00000
io51	8068	0.82771	0.37765	6678	0	1.00000
io52	8068	0.87234	0.33374	7038	0	1.00000
io53	8068	0.78607	0.41010	6342	0	1.00000
io54	8068	0.74690	0.43481	6026	0	1.00000
io55	8068	0.79338	0.40490	6401	0	1.00000
io56	8068	0.63647	0.48105	5135	0	1.00000
io57	8033	0.78763	0.40901	6327	0	1.00000
io58	8033	0.83406	0.37205	6700	0	1.00000
io59	8033	0.88796	0.31543	7133	0	1.00000
io60	8033	0.72800	0.44502	5848	0	1.00000
io61	8033	0.49670	0.50002	3990	0	1.00000
io62	8033	0.85111	0.35600	6837	0	1.00000
io63	8033	0.77393	0.41831	6217	0	1.00000
io64	8033	0.86095	0.34602	6916	0	1.00000
io65	8037	0.52793	0.49925	4243	0	1.00000
io66	8037	0.87819	0.32709	7058	0	1.00000
io67	8037	0.83688	0.36950	6726	0	1.00000
io68	8037	0.60806	0.48821	4887	0	1.00000
io69	8037	0.72067	0.44870	5792	0	1.00000
io70	8037	0.89026	0.31259	7155	0	1.00000
io71	8037	0.86301	0.34386	6936	0	1.00000
io72	8037	0.73734	0.44011	5926	0	1.00000
io73	48595	2.23214	0.98968	108471	0	4.00000
io74	48595	2.05422	1.06872	99825	0	4.00000
io75	48595	2.01564	1.28876	97950	0	4.00000
io76	8275	2.45015	0.89584	20275	0	4.00000
io77	8106	1.68048	0.96108	13622	0	4.00000

Grade 4 SCIENCE

The CORR Procedure

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
io78	8076	2.32268	0.91463	18758	0	4.00000
io79	8068	1.88163	0.93736	15181	0	4.00000
io80	8033	2.29180	0.91944	18410	0	4.00000
io81	8037	1.69143	0.99643	13594	0	4.00000

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	io1	io2	io3	io4	io5	io6	io7	io8	io9
totalraw	0.31235	0.39664	0.36645	0.34537	0.46260	0.38826	0.50812	0.44463	0.30285
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	48595	48595	48595	48595	48595	48595	48595	48595	48595

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	io10	io11	io12	io13	io14	io15	io16	io17	io18
totalraw	0.47221	0.42847	0.42729	0.41342	0.29346	0.43774	0.16339	0.28864	0.34553
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	48595	48595	48595	48595	48595	48595	48595	48595	48595

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	io19	io20	io21	io22	io23	io24	io25	io26	io27
totalraw	0.37508	0.41187	0.38369	0.34115	0.37109	0.22103	0.43114	0.36698	0.44268
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	48595	48595	48595	48595	48595	48595	8275	8275	8275

Grade 4 SCIENCE

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	io28	io29	io30	io31	io32	io33	io34	io35	io36
totalraw	0.44882	0.40413	0.46770	0.35665	0.43493	0.42768	0.48765	0.50200	0.41373
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	8275	8275	8275	8275	8275	8106	8106	8106	8106

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	io37	io38	io39	io40	io41	io42	io43	io44	io45
totalraw	0.49344	0.48345	0.32660	0.41555	0.43345	0.48503	0.39935	0.39471	0.38587
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	8106	8106	8106	8106	8076	8076	8076	8076	8076

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	io46	io47	io48	io49	io50	io51	io52	io53	io54
totalraw	0.39226	0.39991	0.36212	0.42205	0.33699	0.50810	0.32627	0.42643	0.20737
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	8076	8076	8076	8068	8068	8068	8068	8068	8068

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

io55 io56 io57 io58 io59 io60 io61 io62 io63

```
totalraw   0.34199   0.25563   0.48202   0.42439   0.29888   0.46213   0.34071   0.47477
0.41635
           <.0001    <.0001    <.0001    <.0001    <.0001    <.0001    <.0001    <.0001
<.0001
             8068      8068      8033      8033      8033      8033      8033      8033
8033

                                        The SAS System         10:19 Wednesday, July 2, 2008
5
                                       Grade 4 SCIENCE

                                      The CORR Procedure

                                Pearson Correlation Coefficients
                                   Prob > |r| under H0: Rho=0
                                      Number of Observations

             io64      io65      io66      io67      io68      io69      io70      io71
io72

totalraw   0.31750   0.39613   0.44945   0.43344   0.23632   0.39082   0.43550   0.44607
0.42044
           <.0001    <.0001    <.0001    <.0001    <.0001    <.0001    <.0001    <.0001
<.0001
             8033      8037      8037      8037      8037      8037      8037      8037
8037

                                Pearson Correlation Coefficients
                                   Prob > |r| under H0: Rho=0
                                      Number of Observations

             io73      io74      io75      io76      io77      io78      io79      io80
io81

totalraw   0.54000   0.60021   0.57019   0.50236   0.58468   0.52180   0.60264   0.41781
0.65772
           <.0001    <.0001    <.0001    <.0001    <.0001    <.0001    <.0001    <.0001
<.0001
            48595     48595     48595      8275      8106      8076      8068      8033
8037
                                        The SAS System         10:19 Wednesday, July 2, 2008
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                                       Grade 4 SCIENCE
            total raw score means and SDs for log odds transformation for item plots

                        Obs      mean        sd        n      mergeval

                         1     33.6465    7.28249    48595        1
                                        The SAS System         10:19 Wednesday, July 2, 2008
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                                       Grade 4 SCIENCE
                  ADJUSTED LOG ODDS ON CALIBRATION STUDENTS (missing exceed |3|)

                                      The FREQ Procedure

                                                   Cumulative    Cumulative
                  adlogodds    Frequency     Percent     Frequency      Percent
```

-3	26	0.05	26	0.05
-2.5	97	0.20	123	0.25
-2	412	0.85	535	1.10
-1.5	1687	3.48	2222	4.58
-1	4333	8.93	6555	13.52
-0.5	9431	19.45	15986	32.96
0	13078	26.97	29064	59.93
0.5	8686	17.91	37750	77.84
1	6954	14.34	44704	92.18
1.5	2649	5.46	47353	97.65
2	684	1.41	48037	99.06
2.5	324	0.67	48361	99.72
3	134	0.28	48495	100.00

Frequency Missing = 100

The SAS System 10:19 Wednesday, July 2, 2008

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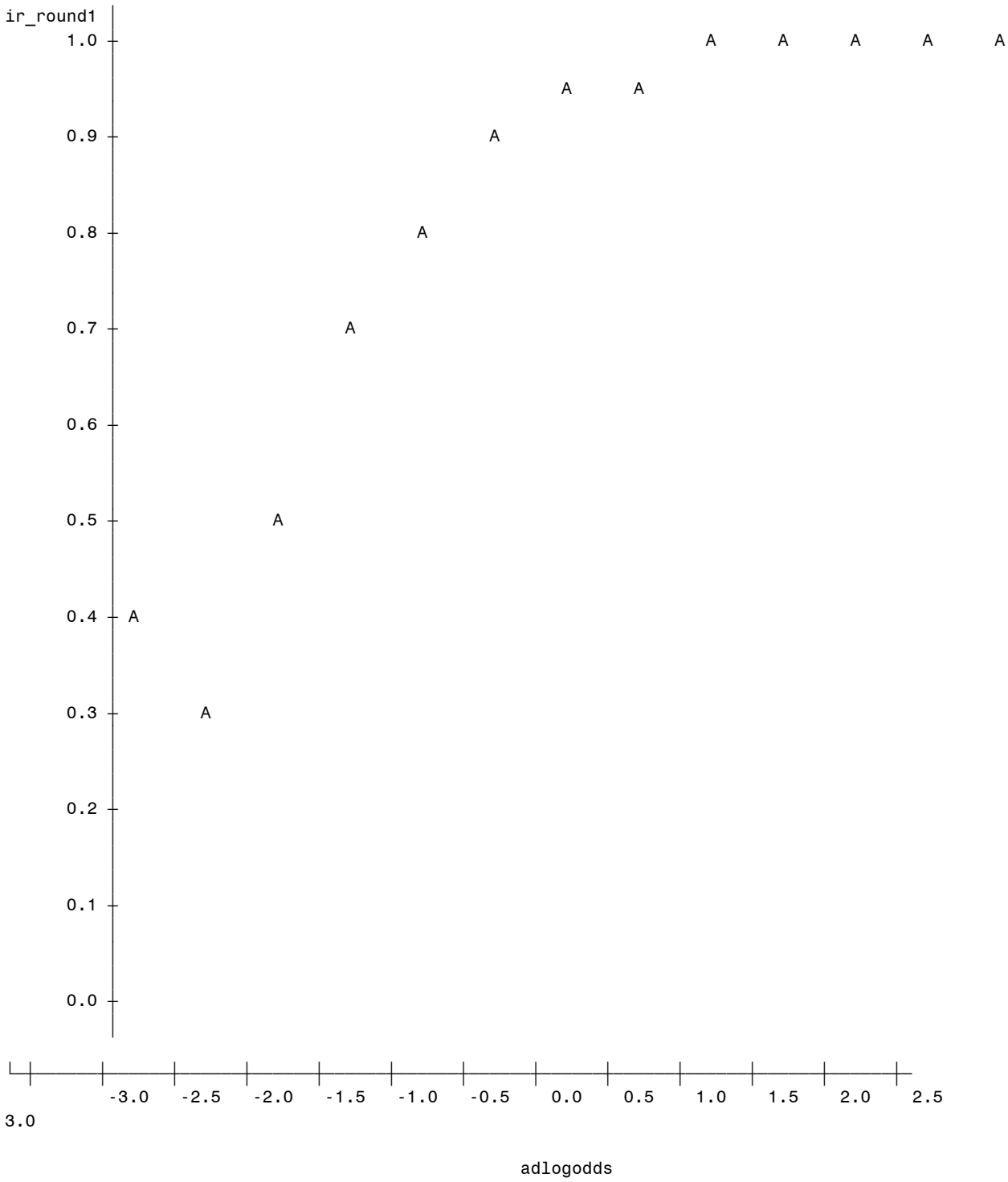
Grade 4 SCIENCE

Observed item means by adjusted logodds for MC items

Plot of ir_round1*adlogodds. Legend: A = 1 obs, B = 2 obs, etc.

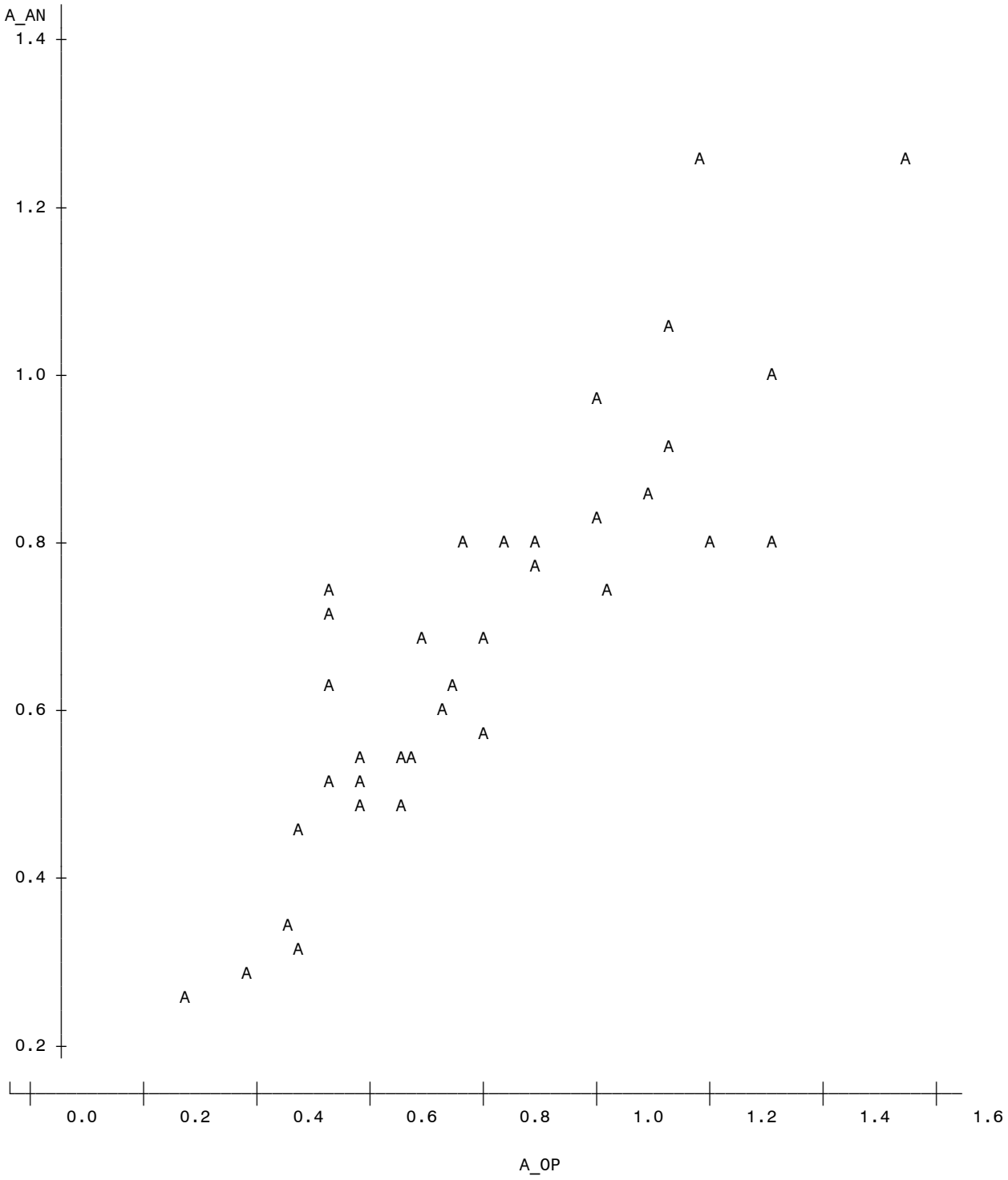


NOTE: 1 obs had missing values.

Appendix L – Excerpt from "3a Equate Across Years with STUIRT" SAS Output

```
Science grade 11 - DROP 51450                                   1
                                                                    10:55 Thursday, July 3,
2008

                    Plot of A_AN*A_OP.  Legend: A = 1 obs, B = 2 obs, etc.
```

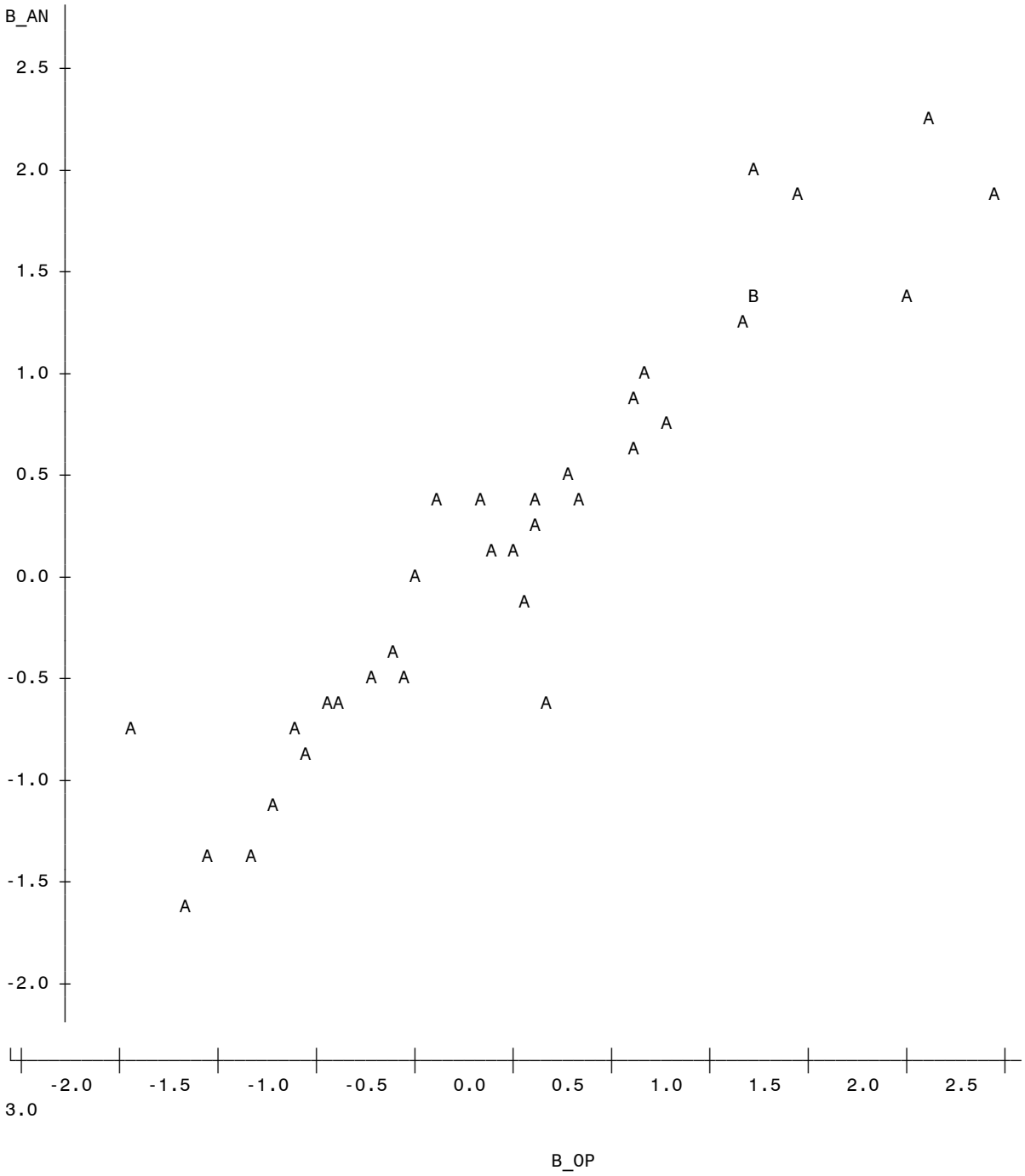


Science grade 11 - DROP 51450

2

10:55 Thursday, July 3, 2008

Plot of B_AN*B_OP. Legend: A = 1 obs, B = 2 obs, etc.



Science grade 11 - DROP 51450

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10:55 Thursday, July 3, 2008

Obs	test	m1	m2
1	SCI0811	1.00440	-0.036315

Science grade 11 - DROP 51450

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Equated Parameters 10:55 Thursday, July 3, 2008

Obs	IREF	AN_EQ	BN_EQ	CN_EQ	dn1_EQ	dn2_EQ	dn3_EQ	dn4_EQ	dn5_EQ
1	50576	0.33031	-0.04105	0.14633	.	.	.	.	.
2	50578	1.25901	1.28157	0.24573	.	.	.	.	.
3	50584	0.63274	0.30427	.	0	1.85113	0.81028	-0.76703	-1.89438
4	51164	0.79660	0.50149	0.14573	.	.	.	.	.
5	51166	0.89803	-1.39411	0.09713	.	.	.	.	.
6	51168	0.29149	-0.43965	0.09738	.	.	.	.	.
7	51169	1.02569	0.88327	0.28992	.	.	.	.	.
8	51171	1.00363	0.32074	0.13747	.	.	.	.	.
9	51172	0.43251	2.65154	0.31904	.	.	.	.	.
10	51173	0.43359	-0.87395	0.08264	.	.	.	.	.
11	51174	1.21049	1.43528	0.26416	.	.	.	.	.
12	51228	0.41415	1.07936	0.18934	.	.	.	.	.
13	51248	0.57872	0.82818	.	0	1.52277	0.98205	-0.88329	-1.62154
14	51298	0.67717	2.29416	0.35289	.	.	.	.	.
15	51299	0.79952	-1.03986	0.05838	.	.	.	.	.
16	51300	1.21015	1.62966	0.35970	.	.	.	.	.
17	51303	0.70767	0.26351	0.15226	.	.	.	.	.
18	51306	0.70579	-0.53544	0.12135	.	.	.	.	.
19	51309	1.10036	0.94038	0.32728	.	.	.	.	.
20	51311	0.49731	0.36703	0.36085	.	.	.	.	.
21	51312	0.74848	-0.91874	0.07116	.	.	.	.	.
22	51321	0.43097	-0.21719	.	0	0.71972	1.44034	-0.55172	-1.60833
23	51435	0.48248	-1.16804	0.10506	.	.	.	.	.
24	51438	0.55894	-0.33137	0.14468	.	.	.	.	.
25	51441	1.02944	0.05379	0.18223	.	.	.	.	.
26	51443	0.36115	-0.72622	0.10039	.	.	.	.	.
27	51446	0.90932	-0.35024	0.22210	.	.	.	.	.
28	51448	1.44221	1.42183	0.30235	.	.	.	.	.
29	51450	0.80665	0.77837	0.16069	.	.	.	.	.
30	51452	1.07959	0.48986	0.18910	.	.	.	.	.
31	51478	0.49289	0.80552	.	0	1.62342	0.67445	-0.87200	-1.42587
32	51574	0.38710	-1.49737	0.13932	.	.	.	.	.
33	51577	0.56899	0.16690	0.08552	.	.	.	.	.
34	51579	0.65257	1.39359	0.23147	.	.	.	.	.
35	51580	0.44274	2.17861	0.19761	.	.	.	.	.

36	51582	0.18499	-1.75192	0.00000	.	.	.	.	.
37	51583	0.38199	0.03965	0.08001	.	.	.	.	.
38	51586	0.93063	1.33866	0.12030	.	.	.	.	.
39	51587	0.59887	-0.73656	0.16237	.	.	.	.	.
40	75062	0.65321	-1.96955	0.00000	.	.	.	.	.
41	75063	0.45977	-2.37611	0.00000	.	.	.	.	.
42	75064	0.30864	-2.39739	0.00000	.	.	.	.	.
43	75065	0.61224	-1.02486	0.02797	.	.	.	.	.
44	75066	1.23169	-0.23618	0.17616	.	.	.	.	.
45	75067	0.50089	0.47681	0.20073	.	.	.	.	.
46	75068	0.67629	0.98599	0.16094	.	.	.	.	.
47	75069	0.79275	-0.49984	0.18687	.	.	.	.	.
48	75070	0.43786	-0.73626	0.00000	.	.	.	.	.
49	75072	0.10146	1.95986	0.00000	.	.	.	.	.
50	75074	0.72073	-0.03356	0.17337	.	.	.	.	.

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Science grade 11 - DROP 51450

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Equated Parameters 10:55 Thursday, July 3,

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Obs	IREF	AN_EQ	BN_EQ	CN_EQ	dn1_EQ	dn2_EQ	dn3_EQ	dn4_EQ	dn5_EQ
51	75075	0.73419	1.42801	0.24301	.	.	.	.	.
52	75076	0.54733	0.05890	.	0	2.94430	0.87703	-1.17337	-2.64796
53	75078	0.70945	0.80470	.	0	1.40399	0.69953	-0.47945	-1.62408
54	75082	0.84433	-1.24537	0.15499	.	.	.	.	.
55	75083	0.89417	-0.13263	0.29142	.	.	.	.	.
56	75085	1.33879	1.36468	0.24879	.	.	.	.	.
57	75086	0.49936	-0.35378	0.08317	.	.	.	.	.
58	75088	0.61706	-0.03310	0.18599	.	.	.	.	.
59	75089	0.40353	-0.01610	0.13416	.	.	.	.	.
60	75093	0.76181	0.57213	.	0	1.96116	0.86600	-1.02198	-1.80518
61	75097	1.17141	0.48275	0.15980	.	.	.	.	.
62	75098	0.77252	0.51887	0.26949	.	.	.	.	.
63	75099	0.87928	1.56325	0.21054	.	.	.	.	.
64	75101	0.25563	-0.21101	0.00000	.	.	.	.	.
65	75102	1.18255	1.44932	0.24806	.	.	.	.	.
66	75104	0.84544	0.80648	0.15135	.	.	.	.	.
67	75105	0.82679	-1.02304	0.07161	.	.	.	.	.
68	75107	0.24299	-0.18647	0.09756	.	.	.	.	.
69	75109	0.61014	-1.00008	0.00000	.	.	.	.	.
70	75110	0.33709	1.15503	0.20618	.	.	.	.	.
71	75111	1.08483	1.44557	0.38614	.	.	.	.	.
72	75114	0.59282	-0.07907	0.15234	.	.	.	.	.
73	75115	0.59137	-0.09702	.	0	1.32730	1.08949	-0.53985	-1.87693
74	92866	0.39867	0.28762	0.09583	.	.	.	.	.
75	92867	0.89885	1.09328	0.22146	.	.	.	.	.
76	92868	0.67554	0.41323	0.25361	.	.	.	.	.
77	92869	0.72597	-0.55158	0.09002	.	.	.	.	.
78	92915	1.26124	1.25135	0.28864	.	.	.	.	.
79	92916	0.58332	0.90146	0.18861	.	.	.	.	.
80	92918	0.72941	0.29672	0.10005	.	.	.	.	.
81	92925	0.53556	0.43767	.	0	2.56581	1.28389	-1.70065	-2.14904

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                                Science grade 11 - DROP 51450
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                                      Equated Parameters            10:55 Thursday, July 3,
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                                      The REG Procedure
                                          Model: m1
                                Dependent Variable: OldDelta

                           Number of Observations Read          36
                           Number of Observations Used          36


                                     Analysis of Variance

                                            Sum of           Mean
          Source                   DF        Squares         Square    F Value    Pr > F

          Model                     1       78.69889       78.69889     593.09    <.0001
          Error                    34        4.51157        0.13269
          Corrected Total          35       83.21045


                      Root MSE              0.36427    R-Square     0.9458
                      Dependent Mean       12.54604    Adj R-Sq     0.9442
                      Coeff Var             2.90347


                                     Parameter Estimates

                                 Parameter       Standard
              Variable      DF       Estimate          Error    t Value    Pr > |t|

              Intercept      1        0.18736        0.51109       0.37      0.7162
              MPNEWDELTA     1        0.98220        0.04033      24.35      <.0001


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                                      Equated Parameters            10:55 Thursday, July 3,
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                                                                                        Old
       Obs    _MODEL_    _TYPE_    _DEPVAR_     _RMSE_    Intercept    MPNEWDELTA    Delta

        1       m1       PARMS     OldDelta    0.36427     0.18736       0.98220       -1


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```

Obs	grade	subject	IREF	QTYPE	sqdiff	sqflag95	sqflag99	chng_Ba	chng_Bc	chng_ac	SD_lINE	SD_Flag	DISCARD
1	11	SCI	51168	MC	.000000091	N	N	-0.00291	0.00064	-0.00093	-1.0096		False
2	11	SCI	51298	MC	.000056889	N	N	0.08764	-0.11969	-0.01579	-1.1797		False
3	11	SCI	51166	MC	.000068194	N	N	-0.02368	-0.06644	-0.01151	-0.8540		False
4	11	SCI	51448	MC	.000078257	N	N	-0.00912	0.18208	0.00573	-1.1938		False
5	11	SCI	51248	OR	.000212254	N	N	-0.07063	0.04321	.	-0.5950		False
6	11	SCI	51446	MC	.000277861	N	N	0.19848	0.06693	0.09523	-1.0103		False
7	11	SCI	51299	MC	.000370713	N	N	0.10716	0.00828	0.00843	-0.9736		False
8	11	SCI	51171	MC	.000404239	N	N	-0.01752	0.14936	0.02098	-0.6904		False
9	11	SCI	51441	MC	.000444265	N	N	-0.10592	-0.03985	-0.01448	-0.1782		False
10	11	SCI	51582	MC	.000524550	N	N	-0.93920	-0.08218	-0.14255	-0.5242		False
11	11	SCI	50584	OR	.000531118	N	N	0.08040	0.03539	.	-0.8411		False
12	11	SCI	51577	MC	.000591484	N	N	0.03666	0.03929	-0.02211	-0.5281		False
13	11	SCI	51586	MC	.000624584	N	N	0.12857	0.19149	0.06583	-0.7809		False
14	11	SCI	51443	MC	.000634925	N	N	-0.14938	0.01524	0.00954	-0.1123		False
15	11	SCI	51164	MC	.000645272	N	N	0.09859	0.03341	0.06830	-0.2383		False
16	11	SCI	51173	MC	.000694772	N	N	0.03498	-0.07922	0.01160	-0.4989		False
17	11	SCI	51312	MC	.000742349	N	N	-0.11622	-0.04628	0.01208	0.0514		False
18	11	SCI	51300	MC	.000761162	N	N	-0.18248	0.40244	-0.00113	-0.4737		False
19	11	SCI	51452	MC	.000772081	N	N	-0.03775	-0.17747	0.00570	-0.2357		False
20	11	SCI	51174	MC	.000772412	N	N	0.03681	0.21598	-0.00448	0.0690		False
21	11	SCI	51309	MC	.000854475	N	N	0.17694	0.30900	0.08285	-0.6904		False
22	11	SCI	51303	MC	.000938407	N	N	0.33047	0.12584	0.08238	-0.0714		False
23	11	SCI	51587	MC	.000945579	N	N	-0.14886	-0.08478	0.01198	0.0061		False
24	11	SCI	51574	MC	.000970242	N	N	0.13399	-0.06444	0.02847	0.2198		False
25	11	SCI	51306	MC	.001023833	N	N	-0.05444	0.01915	0.04597	0.4215		False
26	11	SCI	51583	MC	.001062716	N	N	-0.38136	0.06490	-0.04561	-0.6716		False
27	11	SCI	51435	MC	.001109715	N	N	0.24418	-0.02105	0.02329	0.1542		False
28	11	SCI	51172	MC	.001287578	N	N	0.82642	-0.30430	0.00204	-0.7122		False
29	11	SCI	51438	MC	.002194142	N	N	-0.29029	0.08474	-0.01853	1.2860		False
30	11	SCI	51321	OR	.003329967	N	N	-0.52871	-0.21033	.	1.4029		False
31	11	SCI	51311	MC	.004004737	Y	N	0.97887	0.00899	0.14331	1.0006		False
32	11	SCI	51169	MC	.004052609	Y	N	-0.08856	0.12046	0.07822	1.6188		False
33	11	SCI	51580	MC	.004878425	Y	N	0.83975	-0.27118	-0.03010	1.5366		False
34	11	SCI	51579	MC	.005023480	Y	N	-0.64365	0.02641	-0.00199	1.7111		False
35	11	SCI	51478	OR	.005175444	Y	N	0.20351	-0.04223	.	1.8507		False

The CORR Procedure

6 Variables: A_OP anchor_a B_OP anchor_b C_OP anchor_c

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
A_OP	35	0.70838	0.30169	24.79333	0.18580	1.44855
anchor_a	35	0.69313	0.24542	24.25956	0.26798	1.26647
B_OP	35	0.27304	1.11433	9.55627	-1.70810	2.67609
anchor_b	35	0.25153	1.03342	8.80351	-1.58865	2.23264
C_OP	31	0.17741	0.10029	5.49985	0	0.36085
anchor_c	31	0.16152	0.09209	5.00713	0.04995	0.36868

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	A_OP	anchor_a	B_OP	anchor_b	C_OP	anchor_c
A_OP	1.00000	0.87590	0.35674	0.37656	0.47555	0.35172
		<.0001	0.0354	0.0258	0.0069	0.0523
	35	35	35	35	31	31
anchor_a	0.87590	1.00000	0.36945	0.35256	0.43738	0.37511
	<.0001		0.0289	0.0378	0.0139	0.0376
	35	35	35	35	31	31
B_OP	0.35674	0.36945	1.00000	0.94396	0.75429	0.74726
	0.0354	0.0289		<.0001	<.0001	<.0001
	35	35	35	35	31	31
anchor_b	0.37656	0.35256	0.94396	1.00000	0.66832	0.75734
	0.0258	0.0378	<.0001		<.0001	<.0001
	35	35	35	35	31	31
C_OP	0.47555	0.43738	0.75429	0.66832	1.00000	0.85952
	0.0069	0.0139	<.0001	<.0001		<.0001
	31	31	31	31	31	31
anchor_c	0.35172	0.37511	0.74726	0.75734	0.85952	1.00000
	0.0523	0.0376	<.0001	<.0001	<.0001	
	31	31	31	31	31	31

_

Science grade 11 - DROP 51450

10

*** Comparison of Item characteristic curves (ICCs): New vs. Old ***

10:55 Thursday, July 3,

2008

```
------------------------------------------ IREF=51164 ------------------------------------------
-

                        Plot of prob*theta.  Symbol is value of age.

    1.0 +                                                                                   nnnn
                                                                                       nnnnnnnna
                                                                                   nnnn
                                                                               nnn
    0.9 +                                                                    nn
                                                                           nn
                                                                          n
                                                                        nn
    0.8 +                                                                n
                                                                        n
                                                                       n
                                                                      n
    0.7 +                                                            n
                                                                    n
   prob                                                            n
                                                                  n
    0.6 +                                                        n
                                                                n
                                                                a
                                                               n
    0.5 +                                                     n
                                                             n
                                                            n
                                                           n
    0.4 +                                                 na
                                                         na
                                                        na
                                                      nna
    0.3 +                                            naa
                                                   nna
                                                 nn a
                                               nn aa
    0.2 +                                   nnnn  a
                                      nnnnnnn   aaa
      nnnnnnnnnnnnnnnnn                   aaa
                                     aaaa
    0.1 +                   aaaaaaaaaa
      aaaaaaaaaa

    0.0 +
                 -4        -3        -2        -1         0         1         2         3         4

                                                   theta

NOTE: 38 obs hidden.

_____________________________________________________________________________________________
_
```

Science grade 11 - DROP 51450

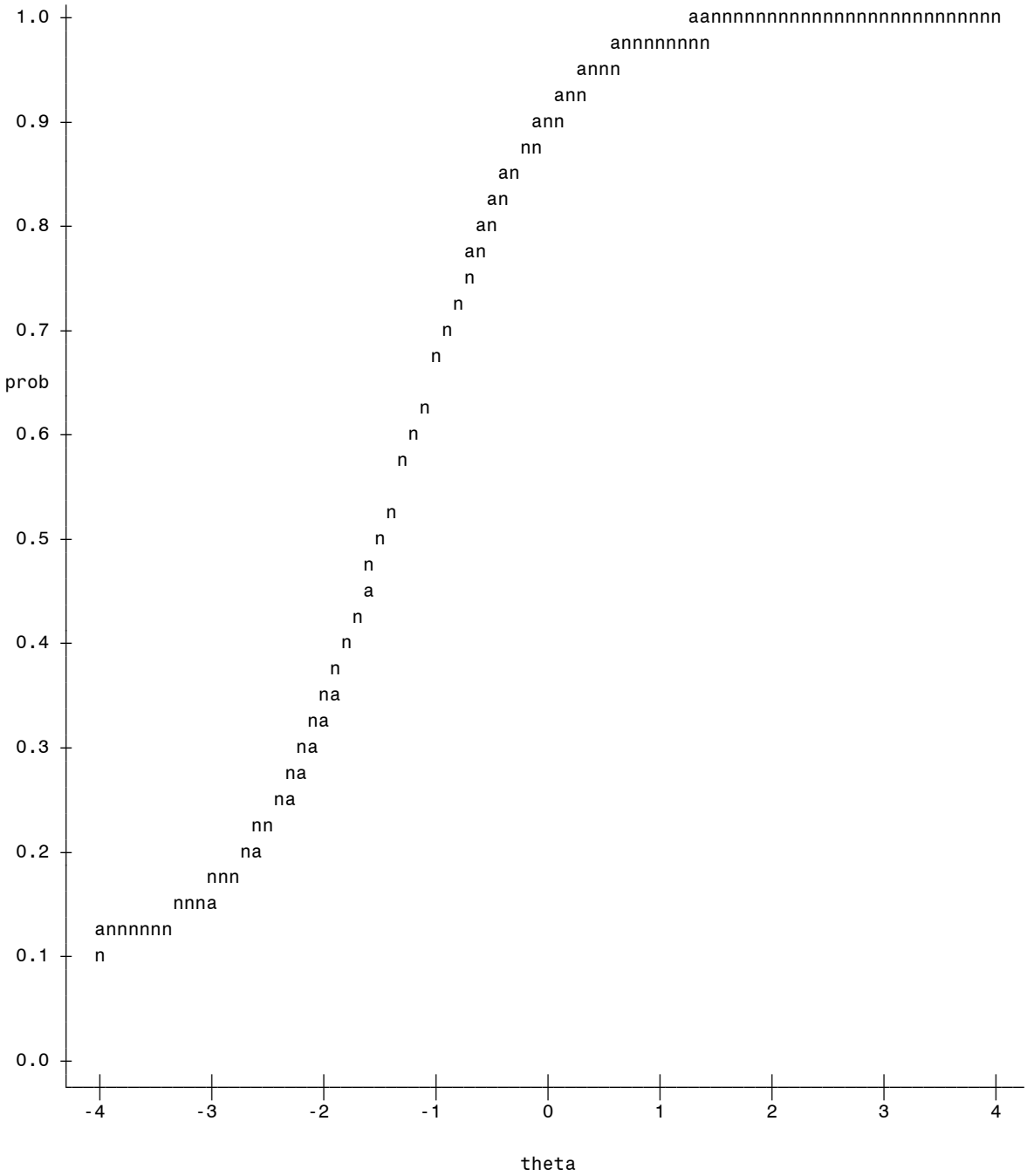
11

*** Comparison of Item characteristic curves (ICCs): New vs. Old ***

10:55 Thursday, July 3, 2008

---------- IREF=51166 ----------

Plot of prob*theta. Symbol is value of age.



Appendix M – Excerpt from "4a Compare MP & HumRRO Equating" SAS Output

```
MP and HumRRO Equated Parameter Check                                  1
                                                                 15:53 Wednesday, July 2,
2008

                          The COMPARE Procedure
                 Comparison of MPPAR.MAT03_2 with WORK.FIXEQ
                              (Method=EXACT)

                            Data Set Summary

          Dataset                 Created          Modified  NVar    NObs

          MPPAR.MAT03_2  02JUL08:15:53:39  02JUL08:15:53:39    11      72
          WORK.FIXEQ     02JUL08:15:53:39  02JUL08:15:53:39    21      72


                            Variables Summary

           Number of Variables in Common: 9.
           Number of Variables in MPPAR.MAT03_2 but not in WORK.FIXEQ: 2.
           Number of Variables in WORK.FIXEQ but not in MPPAR.MAT03_2: 12.
           Number of VAR Statement Variables: 8.


                           Observation Summary

                       Observation      Base  Compare

                       First Obs           1        1
                       Last  Obs          72       72

          Number of Observations in Common: 72.
          Total Number of Observations Read from MPPAR.MAT03_2: 72.
          Total Number of Observations Read from WORK.FIXEQ: 72.

          Number of Observations with Some Compared Variables Unequal: 0.
          Number of Observations with All Compared Variables Equal: 72.

          NOTE: No unequal values were found. All values compared are exactly equal.
```

Appendix N – Excerpt from "5a raw score to scale score 80 point version" SAS Output

```
03 MAT form = 1          12:30 Wednesday, July 9, 2008   1
                              number and weight information

        Obs    possmc    possor    countmc    countor     maxscore         orwgt

         1       32        16        32          4       47.76119403    0.9850746269
```

```
                                     03 MAT form = 2         12:30 Wednesday, July 9, 2008
                              number and weight information

        Obs    possmc    possor    countmc    countor     maxscore         orwgt

         1       32        16        32          4       47.76119403    0.9850746269
```

```
                                     03 MAT form = 3         12:30 Wednesday, July 9, 2008
                              number and weight information

        Obs    possmc    possor    countmc    countor     maxscore         orwgt

         1       32        16        32          4       47.76119403    0.9850746269
```

```
                                     03 MAT form = 4         12:30 Wednesday, July 9, 2008
                              number and weight information

        Obs    possmc    possor    countmc    countor     maxscore         orwgt

         1       32        16        32          4       47.76119403    0.9850746269
```

```
                                     03 MAT form = 5         12:30 Wednesday, July 9, 2008
                              number and weight information

        Obs    possmc    possor    countmc    countor     maxscore         orwgt

         1       32        16        32          4       47.76119403    0.9850746269
```

```
                                     03 MAT form = 6         12:30 Wednesday, July 9, 2008
                              number and weight information

        Obs    possmc    possor    countmc    countor     maxscore         orwgt

         1       32        16        32          4       47.76119403    0.9850746269
```

Appendix O – Lookup Table Example

SAS

File Edit View Tools Data Solutions Window Help

VIEWTABLE: TMP1.mat0804rsss2

	mcscore	orscore	raw	grade	subject	year	form	label	scale	lb_theta	lb_expected	lb_scale	NAPD
1	0	0	0	04	MA	08	2	2	400	.	.	.	NN
2	0	1	2	04	MA	08	2	2	400	.	.	.	NN
3	0	2	4	04	MA	08	2	2	400	.	.	.	NN
4	0	3	6	04	MA	08	2	2	400	.	.	.	NN
5	0	4	8	04	MA	08	2	2	400	.	.	.	NN
6	0	5	10	04	MA	08	2	2	400	.	.	.	NN
7	0	6	12	04	MA	08	2	2	400	.	.	.	NN
8	0	7	14	04	MA	08	2	2	400	.	.	.	NN
9	0	8	16	04	MA	08	2	2	400	.	.	.	NN
10	0	9	18	04	MA	08	2	2	402	-1.929588	17.8095148	1.5	NM
11	0	10	20	04	MA	08	2	2	408	-1.67994	19.833724665	7.5	NM
12	0	11	22	04	MA	08	2	2	413	-1.4719	21.664594825	12.5	NH
13	0	12	24	04	MA	08	2	2	418	-1.26386	23.627885476	17.5	NH
14	0	13	26	04	MA	08	2	2	423	-1.05582	25.723489675	22.5	AL
15	0	14	28	04	MA	08	2	2	428	-0.84778	27.952286564	27.5	AM
16	0	15	30	04	MA	08	2	2	432	-0.681348	29.832253629	31.5	AM
17	0	16	32	04	MA	08	2	2	436	-0.514916	31.796935381	35.5	AH
18	1	0	1	04	MA	08	2	2	400	.	.	.	NN
19	1	1	3	04	MA	08	2	2	400	.	.	.	NN
20	1	2	5	04	MA	08	2	2	400	.	.	.	NN
21	1	3	7	04	MA	08	2	2	400	.	.	.	NN
22	1	4	9	04	MA	08	2	2	400	.	.	.	NN
23	1	5	11	04	MA	08	2	2	400	.	.	.	NN
24	1	6	13	04	MA	08	2	2	400	.	.	.	NN
25	1	7	15	04	MA	08	2	2	400	.	.	.	NN
26	1	8	17	04	MA	08	2	2	400	.	.	.	NN
27	1	9	19	04	MA	08	2	2	405	-1.804764	18.798351775	4.5	NM
28	1	10	21	04	MA	08	2	2	411	-1.555116	20.916371377	10.5	NM
29	1	11	23	04	MA	08	2	2	416	-1.347076	22.826685118	15.5	NH
30	1	12	25	04	MA	08	2	2	421	-1.139036	24.869354458	20.5	AL
31	1	13	27	04	MA	08	2	2	425	-0.972604	26.598920714	24.5	AL
32	1	14	29	04	MA	08	2	2	430	-0.764564	28.88149674	29.5	AM
33	1	15	31	04	MA	08	2	2	434	-0.598132	30.804277872	33.5	AH
34	1	16	33	04	MA	08	2	2	438	-0.4317	32.809128032	37.5	AH
35	2	0	2	04	MA	08	2	2	400	.	.	.	NN
36	2		4	04	MA	08	2	2	400	.	.	.	NN
37	2	2	6	04	MA	08	2	2	400	.	.	.	NN
38	2	3	8	04	MA	08	2	2	400	.	.	.	NN
39	2	4	10	04	MA	08	2	2	400	.	.	.	NN
40	2	5	12	04	MA	08	2	2	400	.	.	.	NN
41	2	6	14	04	MA	08	2	2	400	.	.	.	NN
42	2	7	16	04	MA	08	2	2	400	.	.	.	NN
43	2	8	18	04	MA	08	2	2	402	-1.929588	17.8095148	1.5	NM
44	2	9	20	04	MA	08	2	2	408	-1.67994	19.833724665	7.5	NM
45	2	10	22	04	MA	08	2	2	413	-1.4719	21.664594825	12.5	NH
46	2	11	24	04	MA	08	2	2	418	-1.26386	23.627885476	17.5	NH

Output - (Untitled) | Log - (Untitled) | Editor - Untitled1 | VIEWTABLE: TMP1....

C:\WINDOWS\system32

Appendix P – Excerpt from "6a Compare MPresults with HumRROresults" SAS Output

```
Grade 4             12:35 Wednesday, July 9, 2008   1

                          The COMPARE Procedure
                   Comparison of WORK.READIN with WORK.HRIN
                              (Method=EXACT)

                          Data Set Summary

 Dataset                Created          Modified  NVar    NObs

 WORK.READIN  09JUL08:12:38:27  09JUL08:12:38:27    12     442
 WORK.HRIN    09JUL08:12:38:27  09JUL08:12:38:27    17     442


                          Variables Summary

  Number of Variables in Common: 9.
  Number of Variables in WORK.READIN but not in WORK.HRIN: 3.
  Number of Variables in WORK.HRIN but not in WORK.READIN: 8.
  Number of Variables with Differing Attributes: 1.
  Number of VAR Statement Variables: 4.


                         Observation Summary

                   Observation      Base  Compare

                   First Obs           1        1
                   Last  Obs         442      442

 Number of Observations in Common: 442.
 Total Number of Observations Read from WORK.READIN: 442.
 Total Number of Observations Read from WORK.HRIN: 442.

 Number of Observations with Some Compared Variables Unequal: 0.
 Number of Observations with All Compared Variables Equal: 442.

 NOTE: No unequal values were found. All values compared are exactly equal.
```

```
_

                                      Grade 4             12:35 Wednesday, July 9, 2008
2
                     Scale Score Differences Check 04 REA Form 1

                          The COMPARE Procedure
                   Comparison of WORK.READIN with WORK.HRIN
                              (Method=EXACT)

                          Data Set Summary

 Dataset                Created          Modified  NVar    NObs

 WORK.READIN  09JUL08:12:38:27  09JUL08:12:38:27    12     442
```

```
WORK.HRIN    09JUL08:12:38:27  09JUL08:12:38:27    17     442


                      Variables Summary

 Number of Variables in Common: 9.
 Number of Variables in WORK.READIN but not in WORK.HRIN: 3.
 Number of Variables in WORK.HRIN but not in WORK.READIN: 8.
 Number of Variables with Differing Attributes: 1.
 Number of VAR Statement Variables: 4.


                     Observation Summary

                Observation      Base  Compare

                First Obs           1        1
                Last  Obs         442      442

Number of Observations in Common: 442.
Total Number of Observations Read from WORK.READIN: 442.
Total Number of Observations Read from WORK.HRIN: 442.

Number of Observations with Some Compared Variables Unequal: 0.
Number of Observations with All Compared Variables Equal: 442.

NOTE: No unequal values were found. All values compared are exactly equal.
```

```
-

                                Grade 4             12:35 Wednesday, July 9, 2008
3
                Scale Score Differences Check 04 REA Form 2

                          The COMPARE Procedure
                 Comparison of WORK.READIN with WORK.HRIN
                              (Method=EXACT)

                      Data Set Summary

 Dataset               Created          Modified  NVar    NObs

 WORK.READIN  09JUL08:12:38:27  09JUL08:12:38:27    12     442
 WORK.HRIN    09JUL08:12:38:27  09JUL08:12:38:27    17     442


                      Variables Summary

 Number of Variables in Common: 9.
 Number of Variables in WORK.READIN but not in WORK.HRIN: 3.
 Number of Variables in WORK.HRIN but not in WORK.READIN: 8.
 Number of Variables with Differing Attributes: 1.
 Number of VAR Statement Variables: 4.
```

```
                        Observation Summary

                  Observation      Base  Compare

                  First Obs           1        1
                  Last  Obs         442      442

Number of Observations in Common: 442.
Total Number of Observations Read from WORK.READIN: 442.
Total Number of Observations Read from WORK.HRIN: 442.

Number of Observations with Some Compared Variables Unequal: 0.
Number of Observations with All Compared Variables Equal: 442.

NOTE: No unequal values were found. All values compared are exactly equal.
```

```
_

                                  Grade 4             12:35 Wednesday, July 9, 2008
4
                Scale Score Differences Check 04 REA Form 3

                          The COMPARE Procedure
                 Comparison of WORK.READIN with WORK.HRIN
                              (Method=EXACT)

                        Data Set Summary

 Dataset               Created          Modified  NVar    NObs

 WORK.READIN  09JUL08:12:38:28  09JUL08:12:38:28    12     442
 WORK.HRIN    09JUL08:12:38:28  09JUL08:12:38:28    17     442


                        Variables Summary

  Number of Variables in Common: 9.
  Number of Variables in WORK.READIN but not in WORK.HRIN: 3.
  Number of Variables in WORK.HRIN but not in WORK.READIN: 8.
  Number of Variables with Differing Attributes: 1.
  Number of VAR Statement Variables: 4.


                        Observation Summary

                  Observation      Base  Compare

                  First Obs           1        1
                  Last  Obs         442      442

Number of Observations in Common: 442.
Total Number of Observations Read from WORK.READIN: 442.
Total Number of Observations Read from WORK.HRIN: 442.

Number of Observations with Some Compared Variables Unequal: 0.
```

```
                Number of Observations with All Compared Variables Equal: 442.

                NOTE: No unequal values were found. All values compared are exactly equal.


_

                                        Grade 4             12:35 Wednesday, July 9, 2008
5
                           Scale Score Differences Check 04 REA Form 4

                                     The COMPARE Procedure
                            Comparison of WORK.READIN with WORK.HRIN
                                         (Method=EXACT)

                                       Data Set Summary

                 Dataset                Created          Modified  NVar    NObs

                 WORK.READIN  09JUL08:12:38:28  09JUL08:12:38:28    12     442
                 WORK.HRIN    09JUL08:12:38:28  09JUL08:12:38:28    17     442


                                       Variables Summary

                  Number of Variables in Common: 9.
                  Number of Variables in WORK.READIN but not in WORK.HRIN: 3.
                  Number of Variables in WORK.HRIN but not in WORK.READIN: 8.
                  Number of Variables with Differing Attributes: 1.
                  Number of VAR Statement Variables: 4.


                                      Observation Summary

                                Observation      Base  Compare

                                First Obs           1        1
                                Last  Obs         442      442

                Number of Observations in Common: 442.
                Total Number of Observations Read from WORK.READIN: 442.
                Total Number of Observations Read from WORK.HRIN: 442.

                Number of Observations with Some Compared Variables Unequal: 0.
                Number of Observations with All Compared Variables Equal: 442.

                NOTE: No unequal values were found. All values compared are exactly equal.


_

                                        Grade 4             12:35 Wednesday, July 9, 2008
6
                           Scale Score Differences Check 04 REA Form 5
```

```
                    The COMPARE Procedure
          Comparison of WORK.READIN with WORK.HRIN
                       (Method=EXACT)

                     Data Set Summary

 Dataset               Created          Modified  NVar    NObs

 WORK.READIN  09JUL08:12:38:28  09JUL08:12:38:28    12     442
 WORK.HRIN    09JUL08:12:38:28  09JUL08:12:38:28    17     442


                     Variables Summary

  Number of Variables in Common: 9.
  Number of Variables in WORK.READIN but not in WORK.HRIN: 3.
  Number of Variables in WORK.HRIN but not in WORK.READIN: 8.
  Number of Variables with Differing Attributes: 1.
  Number of VAR Statement Variables: 4.


                    Observation Summary

                 Observation      Base  Compare

                 First Obs           1        1
                 Last  Obs         442      442

Number of Observations in Common: 442.
Total Number of Observations Read from WORK.READIN: 442.
Total Number of Observations Read from WORK.HRIN: 442.

Number of Observations with Some Compared Variables Unequal: 0.
Number of Observations with All Compared Variables Equal: 442.

NOTE: No unequal values were found. All values compared are exactly equal.
```

```
_

                                  Grade 4             12:35 Wednesday, July 9, 2008
7
                Scale Score Differences Check 04 REA Form 6

                    The COMPARE Procedure
          Comparison of WORK.READIN with WORK.HRIN
                       (Method=EXACT)

                     Data Set Summary

 Dataset               Created          Modified  NVar    NObs

 WORK.READIN  09JUL08:12:38:29  09JUL08:12:38:29    12      17
 WORK.HRIN    09JUL08:12:38:29  09JUL08:12:38:29    17      17
```

```
                        Variables Summary

  Number of Variables in Common: 9.
  Number of Variables in WORK.READIN but not in WORK.HRIN: 3.
  Number of Variables in WORK.HRIN but not in WORK.READIN: 8.
  Number of Variables with Differing Attributes: 1.
  Number of VAR Statement Variables: 4.


                       Observation Summary

                 Observation      Base  Compare

                 First Obs           1        1
                 First Unequal      15       15
                 Last  Unequal      15       15
                 Last  Obs          17       17

Number of Observations in Common: 17.
Total Number of Observations Read from WORK.READIN: 17.
Total Number of Observations Read from WORK.HRIN: 17.

Number of Observations with Some Compared Variables Unequal: 1.
Number of Observations with All Compared Variables Equal: 16.


                    Values Comparison Summary

Number of Variables Compared with All Observations Equal: 3.
Number of Variables Compared with Some Observations Unequal: 1.
Total Number of Values which Compare Unequal: 1.
Maximum Difference: 1.
```

Appendix Q – HumRRO 2008 Writing Equating Recommendation

HumRRO Equating/Linking Recommendations for KCCT Writing

Most of KCCT's equating procedures are well explicated and fairly straightforward. Writing is the one notable exception to this rule. The nature and format of the assessment, the manner in which it was scored, and decisions regarding repeating items, create considerable challenges for making a strong link to the past in order to generate comparable scores. In order to fully understand these challenges, it is important to describe the writing assessment in some detail.

KCCT Writing for Grades 5 and 8 consist of a set of multiple-choice items and two writing prompts. Students select and respond to only one of the two writing prompts. Multiple-choice items are scored as either correct or incorrect. Writing prompts are scored three separate times on a 4 point scale. Each student's prompt is scored once for content, once for structure, and once for conventions. The multiple-choice items are all designed to measure writing process, a separate fourth dimension of the total writing score. Only multiple-choice items were repeated from 2007 to 2008.

Kentucky's attempts to tease out four dimensions of writing met with limited success in 2007. The three dimensions scored on the prompt were so highly correlated as to call into question if there was truly any difference at all among the 3 measures. The multiple-choice items exhibited considerable dimensionality compared to the prompts, making it a challenge to scale them together to create an overall writing score. Whether this was caused by a method effect (multiple-choice versus prompt), a dimension of writing effect (writing process versus the other three dimensions), or some combination, is unknown.

We do know that there were scoring procedures in 2007 that were called into question. Those questions led to dramatically different training materials for scorers, and ultimately to different scoring procedures. While these changes may represent an improvement in the scoring of writing in Kentucky, they also represent a shift from 2007 to 2008.

Options for Linking

Option #1 Equate on Multiple-Choice Items Only

In order to compare scores from 2008 to 2007, some method must be devised to link the assessments. The obvious way to perform this link would be to equate on the repeated multiple-choice items. There are no repeated writing prompts, so even if we wanted to equate on the prompts, we would not be able to use a common item method to do so.

The major benefit of using a multiple-choice only equating would be that it is easy to perform and understand. We will argue later that it is also the most viable option from a measurement standpoint. The major concern is the dimensionality we already know exists between the item types (or writing dimensions measured by them). We know that the multiple-choice, or process, items behave differently than the prompts and we know that our link between years will only capture performance shift among the multiple-choice/process items. Gains or losses on the

remaining dimensions may be obfuscated by choosing this methodology. Kentucky has some history of equating only on multiple-choice items, but it is especially concerning given the weight (numeric and conceptual) carried by the writing prompts.

Option #2 Link on the Writing Prompts and Equate on the Multiple-Choice Items

There are several ways of creating a link to the past without common items. Kentucky has considerable experience with concordance tables and with regression solutions for accomplishing this task. It would also be possible to tie the writing prompts across years using the scoring rubrics and methodology. One could devise several ways of checking for shifts in the overall scoring patterns on the writing prompts and incorporating that data into a more complex linking solution. The major, and in our view untenable, issue with performing such a procedure would be that it ignores changes to the scoring system between 2007 and 2008. Given that scoring was questionable in 2007 and that improvements in 2008 are expected to give different scoring patterns among the tested students, linking on the prompts as a means of discovering improvement or decline would be dishonest and potentially erroneous. There was simply no aspect of prompt scoring in 2007 that is expected to be similar enough in 2008 to make attributions about changing performance.

Option #3

Kentucky could build a new concordance table for writing from 2007 to 2008. Given the changes in the prompt scoring, we do not view this as a better option than simply equating on the multiple-choice items and it would almost certainly assume no growth on the writing prompts. It would also mean that KDE would need to explain one more year of concordance to the field.

Recommendation

HumRRO recommends Option #1. We recognize that this link would certainly be less than ideal and we also recommend bolstering Kentucky's capacity to equate writing in 2009 so it won't need to be repeated. We recommend repeating writing prompts from year to year (or across 2 years) and consistent and strong scoring methods for the prompts. We would also recommend that all reference to this procedure be called linking rather than equating. It should be explained to the field that our certainty for this solution is considerably less than for the other grade/subjects. Finally, we recommend that KDE and Measured Progress create a detailed plan for equating writing for 2009 and that the plan be sent out for comments, questions, and clarifications in time to make changes to the 2009 test forms.

Appendix R – 2008 Writing Dimension Correlations (provided by Measured Progress)

	prompt1	Prompt2	prompt3	prompt4	prompt5	prompt6	prompt7	prompt8	prompt9	prompt10	prompt11	prompt12
Corr(dim1,dim2)	0.861	0.827	0.839	0.880	0.845	0.869	0.881	0.833	0.881	0.888	0.887	0.849
Corr(dim2,dim3)	0.933	0.850	0.880	0.922	0.874	0.912	0.925	0.865	0.893	0.900	0.922	0.897
Corr(dim3,dim1)	0.827	0.782	0.806	0.843	0.814	0.840	0.866	0.796	0.849	0.847	0.843	0.814