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ESTIMATION OF THE OPERATING CHARACTERISTICS WHEN THE TEST INFORMATION OF THE OLD TEST IS NOT CONSTANT II: SIMPLE SUM PROCEDURE OF THE CONDITIONAL P.D.F. APPROACH/NORMAL APPROACH METHOD USING THREE SUBTESTS OF THE OLD TEST

NO. 2

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The research was conducted at the principal investigator's laboratory, 409 Austin Peay Hall, Department of Psychology, University of Tennessee. Those who worked in the laboratory and helped the author in various ways for this research include Paul S. Changas, Charles McCarter, C. I. Bonnie Chen and William J. Waldron.

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I Introduction

This is a continuation of one of the previous studies, which was published as Office of Naval Research Report 80-4, (Samejima, RR-80-4), under the same title. In the previous report, two subtests of the original Old Test, i.e., Subtest 1 and Subtest 2, were used, separately, in place of the Old Test, and the estimation of the operating characteristics of the discrete responses was experimented upon each of the two subtests. The main features of this new method are: 1) the number of test items used as the basis for the estimation is less than that of the original Old Test, i.e., twenty-five in each subtest against thirty-five of the original Old Test, and, consequently, the amount of test information is less than that of the original Old Test; 2) unlike the original Old Test, the test information function of each subtest is not constant for the interval of ability of our interest, and, therefore, we need the transformed ability in addition to the original ability dimension, so that the resultant test information for the new ability scale be constant; and 3) in so doing, the method of moments for fitting polynomials, which turned out to be the least squares solution (Samejima and Livingston, RR-79-2), is effectively adopted. Out of many combinations of a method and an approach for estimating the operating characteristics of the discrete responses (Samejima, 1977, RR-77-1, RR-78-1, RR-78-2, RR-78-3, RR-78-4, RR-78-5, RR-78-6), the combination of the Simple Sum Procedure of the Conditional P.D.F. Approach and the Normal Approach Method was selected for the experimentation. We use the same group of five hundred hypothetical examinees, whose ability levels are one hundred equally spaced positions starting from -2.475 and ending with 2.475 on the ability dimension with five examinees placed at each position; thus they represent the uniform distribution of ability for the interval, (-2.5, 2.5) .

In the present study, the third subtest, Subtest 3, is used in place of the original Old Test. The number of test items is even less than those of Subtests 1 and 2, i.e., fifteen aginst twenty-five. Another big difference is that for Subtest 3 the amount of test information is much smaller around the two endpoints of the ability interval, (-2.5, 2.5) , and, consequently, the maximum likelihood estimate of ability turned out to be either negative or positive infinity for some hypothetical examinees. For this reason, some adjustment had to be made, and we chose to use a modified maximum likelihood estimate, which was introduced in a previous study (Samejima, RR-81-1).

II Rationale behind the Modified Maximum Likelihood Estimate $\hat{\tau}^*_V$

Let θ be ability, or latent trait, which assumes any real number, such that

(2.1) $$-\infty < \theta < \infty \ .$$

Let g $(=1,2,\ldots,n)$ denote an item, and x_g $(=0,1,2,\ldots,m_g)$ be a graded item response to item g. The operating characteristic, $P_{x_g}(\theta)$, of the graded item response, or item score, x_g is defined as the conditional probability, given ability θ, with which the examinee obtains the item score x_g for item g. In the normal ogive model, this operating characteristic is defined by

(2.2) $$P_{x_g}(\theta) = (2\pi)^{-1/2} \int_{a_g(\theta - b_{x_g+1})}^{a_g(\theta - b_{x_g})} e^{-u^2/2}\, du \ ,$$

where a_g (> 0) is the item discrimination parameter and b_{x_g} is the item response difficulty parameter which satisfies

(2.3) $$-\infty = b_0 < b_1 < b_2 < \ldots\ldots < b_{m_g} < b_{(m_g+1)} = \infty \ .$$

Table 2-1 presents the item discrimination parameter, a_g, and the item response difficulty parameters, b_{x_g}, for $x_g = 1$ and $x_g = 2$, for each of the thirty-five test items of the Old Test. In the same table, also presented are crosses indicating the items included in each of the three subtests, i.e., Subtests 1, 2

TABLE 2-1

Item Discrimination Parameter, a_g , and Item Response Difficulty Parameters, b_{x_g} , for $x_g = 1$ and $x_g = 2$, for Each of the Thirty-five Test Items of the Old Test. Items Included by Subtests 1, 2, and 3 Are Marked by Crosses, Respectively.

Item g	a_g	b_1	b_2	Subtest 1	Subtest 2	Subtest 3
1	1.8	-4.75	-3.75		x	
2	1.9	-4.50	-3.50		x	
3	2.0	-4.25	-3.25		x	
4	1.5	-4.00	-3.00		x	
5	1.6	-3.75	-2.75		x	
6	1.4	-3.50	-2.50	x	x	
7	1.9	-3.00	-2.00	x	x	
8	1.8	-3.00	-2.00	x	x	
9	1.6	-2.75	-1.75	x	x	
10	2.0	-2.50	-1.50	x	x	
11	1.5	-2.25	-1.25	x	x	x
12	1.7	-2.00	-1.00	x	x	x
13	1.5	-1.75	-0.75	x		x
14	1.4	-1.50	-0.50	x		x
15	2.0	-1.25	-0.25	x		x
16	1.6	-1.00	0.00	x		x
17	1.8	-0.75	0.25	x		x
18	1.7	-0.50	0.50	x		x
19	1.9	-0.25	0.75	x		x
20	1.7	0.00	1.00	x		x
21	1.5	0.25	1.25	x		x
22	1.8	0.50	1.50	x		x
23	1.4	0.75	1.75	x	x	x
24	1.9	1.00	2.00	x	x	x
25	2.0	1.25	2.25	x	x	x
26	1.6	1.50	2.50	x	x	
27	1.7	1.75	2.75	x	x	
28	1.4	2.00	3.00	x	x	
29	1.9	2.25	3.25	x	x	
30	1.6	2.50	3.50	x	x	
31	1.5	2.75	3.75		x	
32	1.7	3.00	4.00		x	
33	1.8	3.25	4.25		x	
34	2.0	3.50	4.50		x	
35	1.4	3.75	4.75		x	

and 3 . We can see in this table that Subtest 3 is a subset of Subtest 1, as well as a subset of the original Old Test, with the exclusion of the five easiest test items and the five most difficult items.

Let $A_{x_g}(\theta)$ denote the basic function of the item score x_g, which is defined by

$$(2.4) \qquad A_{x_g}(\theta) = \frac{\partial}{\partial\theta} \log P_{x_g}(\theta) \quad .$$

The item response information function, $I_{x_g}(\theta)$, for the item score x_g is obtained from the basic function, or directly from the operating characteristic. We can write

$$(2.5) \qquad I_{x_g}(\theta) = -\frac{\partial}{\partial\theta} A_{x_g}(\theta) = -\frac{\partial^2}{\partial\theta^2} \log P_{x_g}(\theta) \quad .$$

The item information function, $I_g(\theta)$, is defined as the conditional expectation of the response pattern information function, given θ, such that

$$(2.6) \qquad I_g(\theta) = E[I_{x_g}(\theta)|\theta] = \sum_{x_g=0}^{m_g} I_{x_g}(\theta)\, P_{x_g}(\theta) \quad .$$

Let V denote the response pattern, or a vector of n item scores such that

$$(2.7) \qquad V' = (x_1, x_2, \ldots, x_g, \ldots, x_n) \quad .$$

By the assumption of local independence (Lord and Novick, 1968), the operating characteristic of the response pattern, $P_V(\theta)$, or the conditional probalility, given ability θ, with which the examinee obtains the response pattern V, is the simple product of the n operating characteristics of the graded item scores, such that

$$(2.8)\qquad P_V(\theta) = \prod_{x_g \varepsilon V} P_{x_g}(\theta) \ .$$

We can write for the response pattern information function, $I_V(\theta)$, such that

$$(2.9)\qquad I_V(\theta) = -\frac{\partial^2}{\partial\theta^2}\log P_V(\theta) = \sum_{x_g \varepsilon V} I_{x_g}(\theta) \ .$$

The test information function, $I(\theta)$, is defined as the conditional expectation of the response pattern information function, given θ, such that

$$(2.10)\qquad I(\theta) = \sum_V I_V(\theta)\, P_V(\theta) \ .$$

It can be shown that the test information function, which is defined by (2.10), is also the sum of the n item information functions, so that we can write

$$(2.11)\qquad I(\theta) = \sum_{g=1}^{n} I_g(\theta) \ .$$

The rationale behind the method of estimating the operating characteristics of discrete item responses without assuming any mathematical form, using "Old Test" with a known set of item response operating characteristics, which has a <u>non-constant test information</u>

<u>function</u>, has been described (Samejima, RR-80-2). In this method, the square root of the test information function has an important role. This fact, together with the findings about a certain constancy of the square root of the item information each test item can provide for the entire range of ability, regardless of its difficulty and discrimination power (Samejima, RR-79-1), suggests that it will be more fruitful to observe the square root of an information function, rather than the information function itself, in future studies.

Figure 2-1 presents the square root of the test information function of Subtest 3 by a solid curve, in comparison with that of Subtest 1, of which Subtest 3 is a subset, which is drawn by a dashed curve. In the same figure, also presented is a horizontal line with the height of 4.65 , which indicates the square root of the test information function of the original Old Test, whose test information function is approximately 21.63 for the range of ability θ indicated in the figure.

We can see in this figure that the amounts of information these three tests provide us with are approximately the same around $\theta = 0.0$. While the original Old Test retains a constant amount of information for the interval of ability of our interest, those of Subtests 1 and 3 decline as the level of ability diverts from this area in either the negative or positive direction, with the degree of reduction substantially higher for Subtest 3. It is recalled

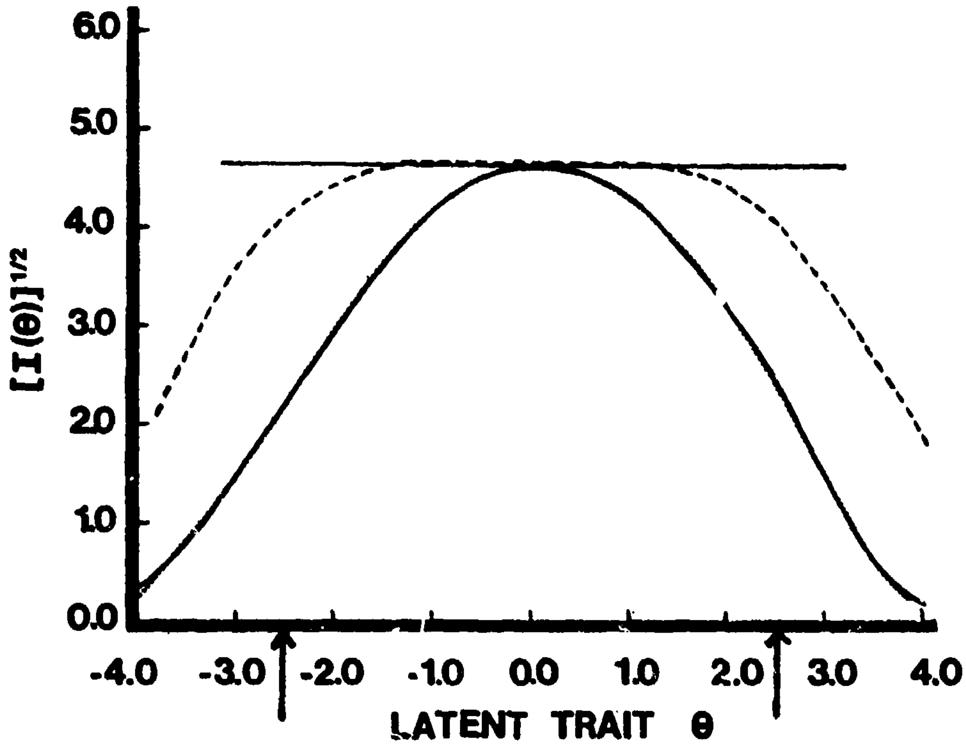

FIGURE 2-1

Square Root of the Test Information Function, $[I(\theta)]^{1/2}$, (Solid Curve) of Subtest 3 and the Polynomial of Degree 7 (Dotted Curve), Which Was Fitted by the Method of Moments with [-4.0, 4.0] as the Interval of θ, Together with the Horizontal Line (= 4.65) Which Indicates the Square Root of the Test Information Function of the Original Old Test. Square Root of the Test Information of Subtest 1 Is Also Drawn by a Dashed Curve.

(Samejima, RR-80-4) that none of the five hundred maximum likelihood estimates of ability θ , which were obtained upon Subtest 1 for the five hundred hypothetical examinees by the Monte Carlo method, assumes negative or positive infinity. This is due to the fact that at both $\theta = -2.5$ and $\theta = 2.5$, which are the two endpoints of the interval for the uniform distribution, the square root of the test information function of Subtest 1 is almost as high as 4.00 . In contrast to this, the square root of the test information function of Subtest 3 at $\theta = -2.5$ is as low as 2.20 , and the one at $\theta = 2.5$ is as low as 2.45 . For this reason, it is more likely that, upon Subtest 3, examinees whose ability levels are close to the lower endpoint of the interval, (-2.5, 2.5) , obtain V-min, or the response pattern which consists of n zeros, and those whose ability levels are close to the higher endpoint of the interval get V-max , or the response pattern which has the n highest item scores, m_g $(g=1,2,...,n)$. In practice, we observe fourteen out of the five hundred examinees whose response patterns are V-min , and twelve whose response patterns are V-max . Table 2-2 presents the identification number and the ability level of each of these twenty-six hypothetical examinees. As we can see in this table, all hypothetical examinees, except for one, who obtained negative infinity for their maximum likelihood estimates of ability, $\hat{\theta}_V$, are located lower than -2.000 in their ability levels, and also those who obtained positive infinity as their maximum likelihood

TABLE 2-2

Identification Number and Ability Level of Each of the Fourteen Hypothetical Examinees Who Obtained V-min, and of the Twelve Who Obtained V-max .

ID	θ	ID	θ
1	-2.475	491	2.025
101	-2.475	193	2.125
201	-2.475	493	2.125
401	-2.475	294	2.175
2	-2.425	296	2.275
102	-2.425	397	2.325
202	-2.425	98	2.375
302	-2.425	198	2.375
303	-2.375	199	2.425
4	-2.325	299	2.425
108	-2.125	499	2.425
109	-2.075	300	2.475
210	-2.025		
118	-1.625		

estimates have ability levels higher than 2.000 . The only exception in the former group of examinees is the hypothetical examinee No. 118, whose ability level is -1.625 , i.e., substantially higher than -2.000 , and yet whose response pattern is V-min . Eight out of the fourteen examinees of the former group have either -2.425 or -2.475 for their maximum likelihood estimates, and seven out of twelve of the latter group are located at $\theta = 2.375$ or higher ability levels.

It has been found out (Samejima and Livingston, RR-79-2) that the method of moments for fitting a polynomial of a specified degree to any given function provides us with one which is also the least squares solution in approximating the function by a polynomial of the same degree. The coefficients of such a polynomial of the given degree, m , are determined solely by the first $(m+1)$ moments, i.e., the 0-th through m-th moments, about the midpoint of the selected interval of the independent variable for which the moments were computed, and the width of that interval itself. It has also been observed that the goodness of fit of the polynomial to the given function depends, heavily, upon the selected interval, as well as the degree of the polynomial, m .

The interval of θ chosen for approximating the square root of the test information function of Subtest 3 is $(-4.0, 4.0)$, and the degree of the polynomial is seven. Table 2-3 presents the coefficients of the resultant polynomial of degree 7, or $\sum_{k=0}^{7} \alpha_k \theta^k$,

TABLE 2-3

Coefficients of the Polynomial of Degree 7 Obtained by the Method of Moments Using the Interval of θ , (-4.0, 4.0) , to Approximate the Square Root of the Test Information Function of Subtest 3.

k	α_k
0	0.46408884D+01
1	0.60789659D-01
2	-0.41482735D+00
3	0.14684659D-01
4	0.51686862D-02
5	-0.36903316D-02
6	0.21313602D-03
7	0.15726020D-03

TABLE 2-4

Coefficients of the Polynomial of Degree 8 to Transform θ to τ for Subtest 3.

k	α_k^*
0	0.00000000D+00
1	0.13259652D+01
2	0.86842420D-02
3	-0.39506409D-01
4	0.10489276D-02
5	0.29536370D-03
6	-0.17572918D-03
7	0.86989735D-05
8	0.56164139D-05

and the polynomial itself is drawn by a dotted curve in Figure 2-1. We can see that our choice of the degree of the polynomial and that of the interval of θ have resulted in an extremely good approximation to the square root of the test information function of Subtest 3.

It has been shown (Samejima, RR-80-2) that, for any given test, the transformation of latent trait θ to another latent trait, τ, which provides us with a constant test information function, $I^*(\tau) = C^2$, for the interval of τ of our interest, can be obtained from the polynomial approximating the square root of the test information function of the test. Thus we can write

$$(2.12) \qquad \tau \doteq \sum_{k=0}^{m+1} \alpha_k^* \theta^k ,$$

where

$$(2.13) \qquad \alpha_k^* \begin{cases} = d & \text{for } k = 0 \\ = (Ck)^{-1} \alpha_{k-1} & \text{for } k = 1,2,\ldots,m,m+1 \end{cases} ,$$

where d is an arbitrarily set constant and C^2 is the desired constant amount of test information of the given test for the transformed latent trait, τ. For our purpose, we have used $d = 0$ and $C = 3.5$ for Subtest 3. Table 2-4 presents the coefficients of the resultant polynomial of degree 8 for transforming ability θ to τ, which makes the square root of the test information function, $[I^*(\tau)]^{1/2}$, of Subtest 3 approximately equal to 3.5, for the interval of τ , (-3.16466, 3.27619) . Figure 2-2 presents the true values of the square root of the test information function of Subtest 3 by a dotted curve, which is obtained by

$$(2.14) \qquad [I^*(\tau)]^{1/2} = [I(\theta)]^{1/2} \frac{d\theta}{d\tau}$$

$$= [I(\theta)]^{1/2} C \, [\sum_{k=0}^{m} \alpha_k \, \theta^k]^{-1} \quad ,$$

together with the horizontal line indicating $C = 3.5$. We can see in this figure that the approximation is extremely good, as is expected from Figure 2-1 .

It has been observed (Samejima, RR-79-3) that, using equivalent, binary items following the Constant Information Model (Samejima, RR-79-1), the speed of convergence of the conditional distribution of the maximum likelihood estimate, given ability, to the normality is not constant, but is substantially different depending upon the fixed ability level, even if the amount of test information is constant across the ability levels. We should expect, therefore, that, in the present situation, the goodness of fit of the normality, with τ and C^{-1} ($\doteq$ 0.285714) as the two parameters, to the conditional distribution of the maximum likelihood estimate, given the transformed ability τ , also depends upon the fixed value of τ . This fact is confirmed from the fact that, outside of the interval of τ , (-2.30473, 2.38816) , which corresponds to the interval of θ , (-2.0, 2.0) , we have observed thirteen hypothetical

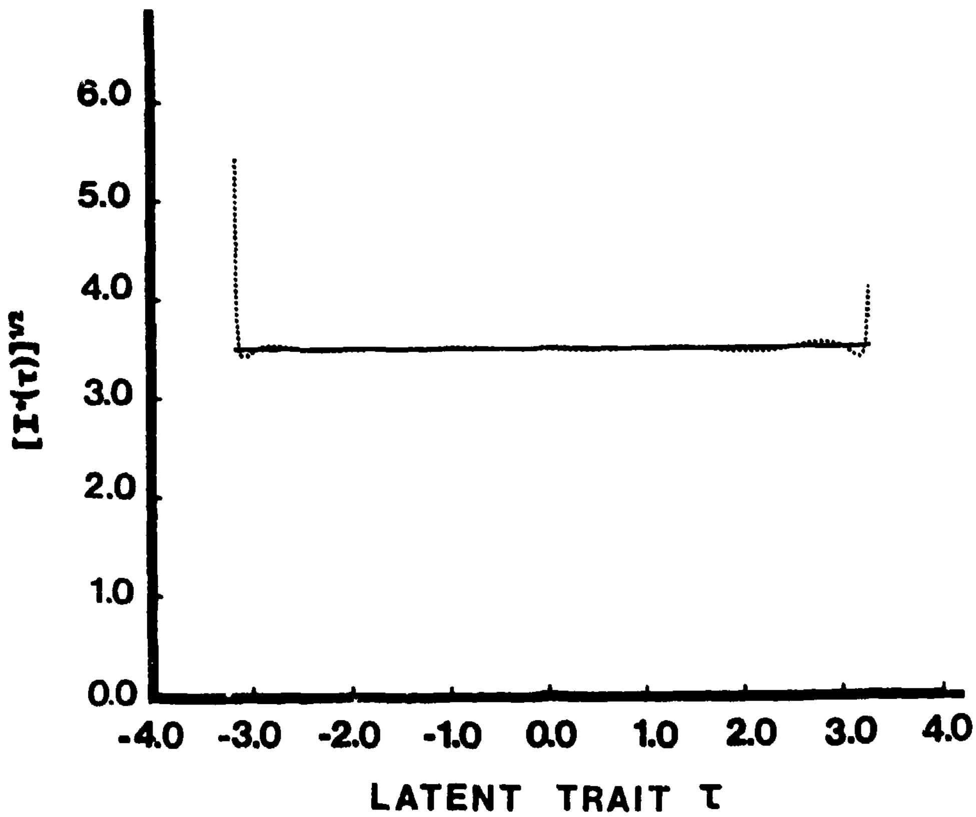

FIGURE 2-2

Square Root of Test Information Function of Subtest 3 Resultant from the Polynomial Transformation of θ to τ (Dotted Line), and the Target Constant Amount of 3.5 (Solid Line).

examinees whose response patterns are V-min , or the set of n zeros, and twelve examinees who have V-max, or the set of n m_g's , for their response patterns. Obviously, the convergence to the normality based upon Subtest 3 is slow for these deviated ability levels. For this reason, it is necessary that we use some other estimate of τ than the maximum likelihood estimate $\hat{\tau}_V$ for each of the two extreme response patterns, V-min and V-max , so that the resultant conditional distribution of the estimate, given τ , be approximately normal with τ and C^{-1} as the two parameters. One solution for this problem is to use the second modified maximum likelihood estimate, $\hat{\tau}_V^*$, which was introduced in a previous study (Samejima, RR-81-1). This estimate is defined by

$$(2.15) \qquad \hat{\tau}_V^* \begin{cases} = \hat{\tau}^*_{V\text{-min}} & \text{for } V = V\text{-min} \\ = \hat{\tau}^*_{V\text{-max}} & \text{for } V = V\text{-max} \\ = \hat{\tau}_V & \text{otherwise ,} \end{cases}$$

with $\hat{\tau}^*_{V\text{-min}}$ and $\hat{\tau}^*_{V\text{-max}}$ having such mathematical forms as

$$(2.16) \qquad \begin{cases} \hat{\tau}^*_{V\text{-min}} = [\frac{1}{2}(\tau_c + \underline{\tau})\, N_L - \sum_{\substack{V \neq V\text{-min} \\ V \neq V\text{-max}}} \hat{\tau}_V\, N_{LV}]\, N_{LV\text{-min}}^{-1} \\ \\ \hat{\tau}^*_{V\text{-max}} = [\frac{1}{2}(\overline{\tau} + \tau_c)\, N_H - \sum_{\substack{V \neq V\text{-min} \\ V \neq V\text{-max}}} \hat{\tau}_V\, N_{HV}]\, N_{HV\text{-max}}^{-1} \end{cases} ,$$

where $\underline{\tau}$ and $\bar{\tau}$ are the lower and upper endpoints of the interval of τ for which Subtest 3 is considered to be effective, τ_c is the critical value of τ below which the operating characteristic, $P^*_{V\text{-max}}(\tau)$, of the response pattern V-max assumes negligibly small values and above which so does the operating characteristic, $P^*_{V\text{-min}}(\tau)$, of the response pattern V-min , N_L and N_H are the sample sizes of the lower and the upper ability groups which were separated by the critical value, τ_c , respectively, and N_{LV} and N_{HV} are the numbers of examinees who belong to the lower ability group and have obtained a specific response pattern V , and who belong to the higher ability group and have obtained V , respectively. This modified maximum likelihood estimate is the sample statistic version of the first modified maximum likelihood estimate, τ^*_V , (Samejima, RR-80-3, RR-81-1) , and is useful when the number of all possible response patterns of a given test is too large for the computation of τ^*_V . An important characteristic of the modified maximum likelihood estimate, τ^*_V , and that of $\hat{\tau}^*_V$, is that, with a suitable choice of the interval, $(\underline{\tau},\bar{\tau})$, the estimate is, approximately, conditionally unbiased, as asymptotically is the case with the maximum likelihood estimate. In order to obtain $\hat{\tau}^*_{V\text{-min}}$ and $\hat{\tau}^*_{V\text{-max}}$, which are defined by (2.16), we must prepare a large size sample from the uniform distribution of τ for the interval, $(\underline{\tau},\bar{\tau})$, and then produce, by the Monte Carlo method, a response pattern for each hypothetical examinee upon the test in question.

With a suitable selection of the interval, $(\underline{\tau},\bar{\tau})$, we may be successful in obtaining $\hat{\tau}^*_{V-min}$ and $\hat{\tau}^*_{V-max}$ which approximate the conditional distribution of $\hat{\tau}^*_V$, given τ , to the normality with τ and C^{-1} as the two parameters.

Using the modified maximum likelihood estimate, $\hat{\tau}^*_V$, instead of the maximum likelihood estiamte, $\hat{\tau}_V$, we can proceed to the estimation of the operating characteristics of the discrete item responses of a new test item, using such approaches as Histogram Ratio Approach, Curve Fitting Approach, Conditional P.D.F. Approach, which includes Simple Sum Procedure, Weighted Sum Procedure and Proportioned Sum Procedure, and Bivariate P.D.F. Approach, each of which is combined with Two-Parameter Beta Method, Pearson System Method or Normal Approach Method, and so forth. The outlines of these procedures are described in a previous study (Samejima, RR-80-2).

III Selection of the Interval, $(\underline{\tau},\bar{\tau})$, and the Critical Value τ_c in Obtaining $\hat{\tau}^*_V$

We can write for the conditional expectation and variance of the modified maximum likelihood estimate, $\hat{\tau}^*_V$, given τ,

(3.1) $$E(\hat{\tau}^*_V|\tau) = \sum_V \hat{\tau}^*_V P^*_V(\tau)$$

and

(3.2) $$\mathrm{Var.}(\hat{\tau}^*_V|\tau) = \sum_V [\hat{\tau}^*_V - E(\hat{\tau}^*_V|\tau)]^2 P^*_V(\tau) \quad ,$$

where $P^*_V(\tau)$ is the operating characteristic of the response pattern V defined with respect to the transformed latent trait τ, and satisfies

(3.3) $$P^*_V(\tau) = P_V[\theta(\tau)] \quad .$$

It is noted from (3.1) and (3.3) that, as τ becomes less, the conditional expectation of $\hat{\tau}^*_V$ tends to $\hat{\tau}^*_{V\text{-min}}$. From this fact and (3.2), it is further noted that the conditional distribution of $\hat{\tau}^*_V$, given τ, approaches a one-point distribution at $\hat{\tau}^*_V = \hat{\tau}^*_{V\text{-min}}$, as τ becomes less. Following a similar logic, we note that the conditional distribution of $\hat{\tau}^*_V$, given τ, approaches a one-point distribution at $\hat{\tau}^*_V = \hat{\tau}^*_{V\text{-max}}$ as τ grows larger. This fact implies that, if, for the response pattern V-min, we use some substitute estimate which is higher than the lowest finite value of the maximum likehood estimate with respect to a given test, or if, for the response pattern V-max , we use some substitute which is lower than the highest finite value of the maximum likelihood estimate, the regression of the estimate on τ cannot be a strictly increasing function of τ . We may conclude, therefore, that such a substitute estimate is not desirable, unless there is a good reason for choosing one.

We can easily see that, in such models as the normal ogive model and the logistic model, etc., the lowest finite value of the maximum likelihood estimate belongs to one of the n response patterns of the type, $(0,0,\ldots,1,\ldots,0)$, and the highest finite value belongs to one of the n response patterns of the type, $(m_1,m_2,\ldots,m_g-1,\ldots,m_n)$. Table 3-1 presents, for Subtest 3, the fifteen response patterns of the former type, and the two maximum likelihood estimates, $\hat{\theta}_V$ and $\hat{\tau}_V$, the latter of which was obtained by (2.12) with the substitution of $\hat{\theta}_V$ for θ , for each of the fifteen response patterns. From this table, we can see that the lowest finite maximum likelihood estimate, $\hat{\tau}_V$, is -2.6518 , and the highest finite maximum likelihood estimate is 2.7683 . We can conclude, therefore, that it is desirable to choose an interval, $(\underline{\tau},\bar{\tau})$. which provides us with $\hat{\tau}^*_{V\text{-min}}$ and $\hat{\tau}^*_{V\text{-max}}$, the former of which is less than -2.6518 and the latter of which is greater than 2.7683 .

There is another, somewhat opposing factor that we must take into consideration, however. Although we may like to conclude that a given test is effective for a wide range of ability, for the present purpose of using Subtest 3 as the Old Test for estimating the operating

TABLE 3-1

Fifteen Response Patterns of Subtest 3, Each of Which Consists of Fourteen Zeros and One "1", and the Corresponding Two Maximum Likelihood Estimates, $\hat{\theta}_V$ and $\hat{\tau}_V$, for Each Response Pattern, and Another Set of Fifteen Response Patterns, Each of Which Has (n-1) m_g's and One (m_g-1) and the Corresponding $\hat{\theta}_V$ and $\hat{\tau}_V$ for Each.

Response Pattern	$\hat{\theta}_V$	$\hat{\tau}_V$	Response Pattern	$\hat{\theta}_V$	$\hat{\tau}_V$
000000000000001	-1.3998	-1.7296	222222222222221	2.3526	2.6855
000000000000010	-1.5206	-1.8562	222222222222212	2.3454	2.6800
000000000000100	-1.9182	-2.2347	222222222222122	2.4651	2.7683
000000000001000	-1.6990	-2.0336	222222222221222	2.2762	2.6258
000000000010000	-1.9465	-2.2592	222222222212222	2.3359	2.6727
000000000100000	-1.8783	-2.1995	222222222122222	2.1981	2.5620
000000001000000	-1.8346	-2.1603	222222221222222	2.0525	2.4359
000000010000000	-2.0033	-2.3075	222222212222222	2.0810	2.4613
000000100000000	-2.0205	-2.3218	222222122222222	1.9725	2.3627
000001000000000	-2.1792	-2.4483	222221222222222	2.0237	2.4098
000010000000000	-2.0811	-2.3714	222212222222222	1.7479	2.1437
000100000000000	-2.3846	-2.5959	222122222222222	2.0530	2.4363
001000000000000	-2.3887	-2.5987	221222222222222	1.9407	2.3329
010000000000000	-2 3585	-2.5782	212222222222222	1.7595	2.1555
100000000000000	-2.4698	-2.6518	122222222222222	1.8532	2.2488

characteristics of the discrete item responses of unknown test items, the approximate conditional unbiasedness of the estimate is not sufficient. What we need, in addition, is the approximate normality of the conditional distribution of the estimate, given ability, with C^{-1} as the second parameter. Considering the fact that the conditional variance of $\hat{\tau}^*_V$, given τ , tends to zero as τ becomes less, and also as τ grows greater, the choice of too wide an interval must be avoided, even if the approximate unbiasedness of the conditional distribution of $\hat{\tau}^*_V$ still holds for that interval.

Figure 3-1 presents the two operating characteristics, $P^*_{V\text{-min}}(\tau)$ and $P^*_{V\text{-max}}(\tau)$, by solid and dotted curves, respectively. As we can see in this figure, outside of the interval of τ , (-3.0, 3.0) , either one of these two operating characteristics becomes greater than 0.8 , the fact which indicates how speedy the convergence of the conditional distribution of $\hat{\tau}^*_V$, given τ , to each one-point distribution is. From this figure, we must say that, even outside of a smaller interval, (-2.8, 2.8) , either one of the two conditional probabilities for the response patterns, V-min and V-max , is too large.

We have observed in a previous study (Samejima, RR-81-1) eight different cases of the set of the estimates, $\hat{\tau}^*_{V\text{-min}}$ and $\hat{\tau}^*_{V\text{-max}}$, upon Subtest 3, which were obtained by using eight different intervals for $(\underline{\tau},\bar{\tau})$. The critical value, τ_c , which we used in obtaining these estimates, is -0.5455 , and the values of $P^*_{V\text{-min}}(\tau)$

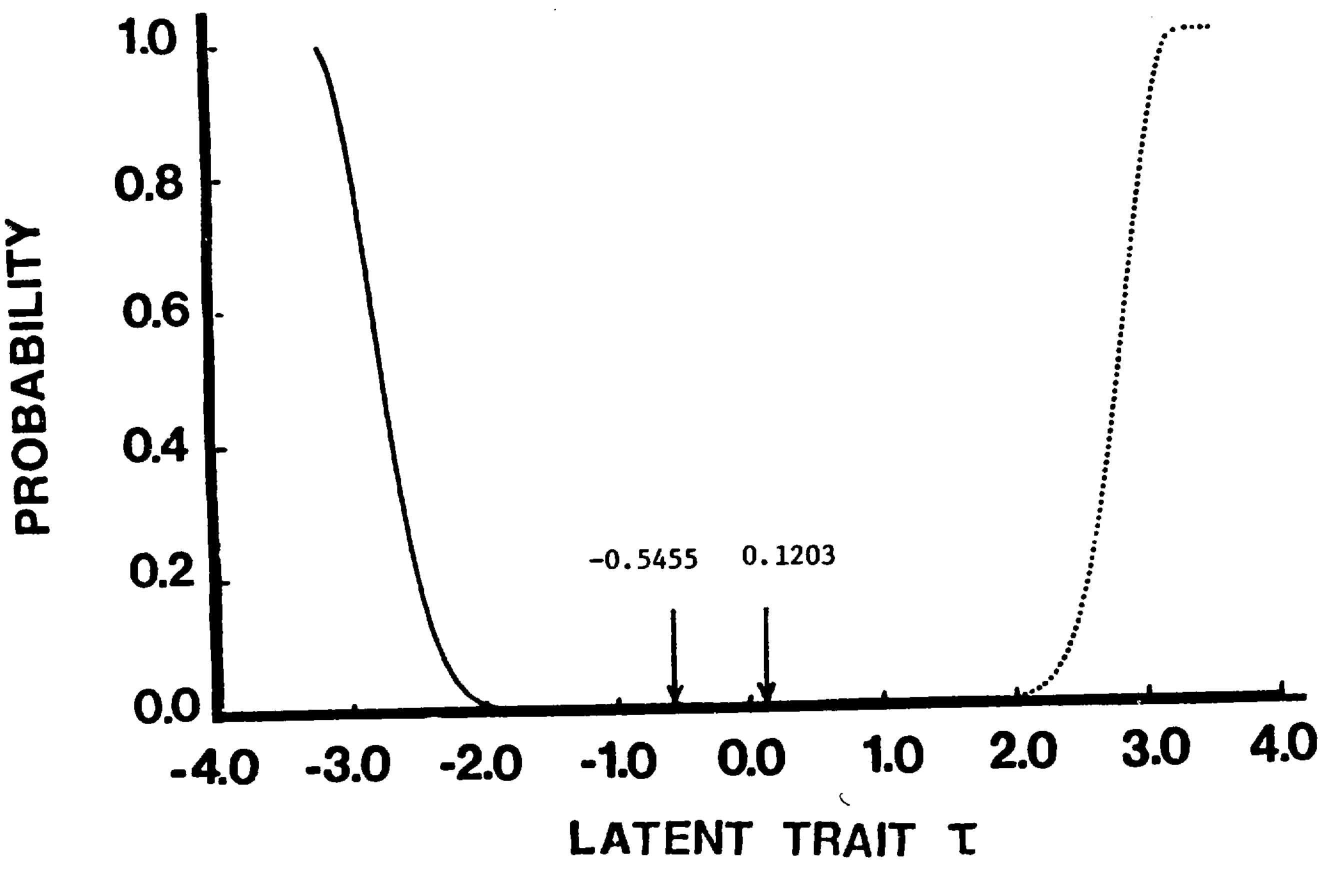

FIGURE 3-1

Operating Characteristics of V-min (Solid Line) and V-max (Dotted Line) Given As Functions of the Transformed Latent Trait τ , Together with the Critical Value, τ_c , Set at Two Different Positions.

above this point of τ are less than 0.00000001, and those of $P^*_{V\text{-}max}(\tau)$ below it are less than the same value, which satisfy the requirement (Samejima, RR-80-3) that these values be negligibly small. This value of τ_c is more or less arbitrary, i.e., only one of the infinitely many values of τ which satisfy the above requirement, however. As another, probably more meaningful, value of τ_c , here we take the value of τ_c at which the product of the two operating characteristic, $P^*_{V\text{-}min}(\tau)$ and $P^*_{V\text{-}max}(\tau)$, becomes maximal. This value of τ_c is also the polynomial function of θ_c , whose coefficients are given by Table 2-4, with $\theta = \theta_c$ being the value of the original ability θ at which the product of the two operating characteristics, $P_{V\text{-}min}(\theta)$ and $P_{V\text{-}max}(\theta)$, assumes the maximal value. It turned out that $\theta_c = 0.0907$ and $\tau_c = 0.1203$. The positions of these two values of τ_c are indicated by two arrows in Figure 3-1. The values of $P^*_{V\text{-}min}(\tau)$ for all points of τ above the critical value, 0.1203 , are, again, less than 0.00000001 , and so are those of $P^*_{V\text{-}max}(\tau)$ for $\tau < 0.1203$. In fact, this is true with any value of τ in the interval, (-0.91, 1.05) , in which both -0.5455 and 0.1203 are included.

Table 3-2 presents the resultant estimates, $\hat{\tau}^*_{V\text{-}min}$ and $\hat{\tau}^*_{V\text{-}max}$, obtained by using each of the eight intervals, together with the sample sizes, N_L , N_H and N $(= N_L + N_H)$, and the two frequencies, $N_{V\text{-}min}$ and $N_{V\text{-}max}$. For comparison, Table 3-3

TABLE 3-2

Two Estimates, $\hat{\tau}^*_{V-min}$ and $\hat{\tau}^*_{V-max}$, Obtained by Using Each of the Eight Different Intervals, $(\underline{\tau},\bar{\tau})$, and $\tau_c = 0.1203$. The Sample Sizes, N_L , N_H and N , Together with the Two Frequencies N_{V-min} and N_{V-max} , Are Also Presented for Each Case.

Case	$\underline{\tau}$	$\bar{\tau}$	$\hat{\tau}^*_{V-min}$	$\hat{\tau}^*_{V-max}$	N_{V-min}	N_{V-max}	N_L	N_H	N
1	-1.8456	2.0771	2.9707	-0.6316	1	3	1,640	1,630	3,270
2	-2.0521	2.2668	5.8168	0.6564	1	10	1,810	1,790	3,600
3	-2.2461	2.4373	-1.5891	1.7371	8	19	1,970	1,930	3,900
4	-2.4273	2.5860	-1.8162	2.2439	23	32	2,125	2,055	4,180
5	-2.5131	2.6516	-2.2006	2.4000	39	42	2,195	2,110	4,305
6	-2.6757	2.7636	-2.5467	2.6242	81	74	2,330	2,205	4,535
7	-2.8267	2.8095	-2.7265	2.7370	145	93	2,455	2,240	4,695
8	-3.0000	3.0000	-2.8432	2.8855	258	196	2,600	2,400	5,000

TABLE 3-3

Two Estimates, $\hat{\tau}^*_{V\text{-min}}$ and $\hat{\tau}^*_{V\text{-max}}$, Obtained by Using Each of the Eight Different Intervals, $(\underline{\tau},\bar{\tau})$, and $\tau_c = -0.5455$. The Sample Sizes, N_L, N_H and N, Together with the Two Frequencies $N_{V\text{-min}}$ and $N_{V\text{-max}}$, Are Also Presented for Each Case.

Case	$\underline{\tau}$	$\bar{\tau}$	$\hat{\tau}^*_{V\text{-min}}$	$\hat{\tau}^*_{V\text{-max}}$	$N_{V\text{-min}}$	$N_{V\text{-max}}$	N_L	N_H	N
1	-1.8456	2.0771	7.7998	-2.2507	1	3	1,085	2,185	3,270
2	-2.0521	2.2668	11.3745	0.1132	1	10	1,255	2,345	3,600
3	-2.2461	2.4373	-0.8183	1.4841	8	19	1,415	2,485	3,900
4	-2.4273	2.5860	-1.6061	2.0856	23	32	1,570	2,610	4,180
5	-2.5131	2.6516	-2.0651	2.2750	39	42	1,640	2,665	4,305
6	-2.6757	2.7636	-2.4788	2.5455	81	74	1,775	2,760	4,535
7	-2.8267	2.8095	-2.6867	2.6865	145	93	1,900	2,795	4,695
8	-3.0000	3.0000	-2.8214	2.8596	258	196	2,045	2,955	5,000

presents the corresponding results (Samejima, RR-81-1) obtained by using $\tau_c = -0.5455$ and each of the same eight intervals of τ. As we can see in these two tables, the two frequencies, N_{V-min} and N_{V-max}, are too small in the first three cases and the results should not be taken seriously.

Comparison of the two sets of results for each of the remaining five cases, which are shown in Tables 3-2 and 3-3, indicates that, for each interval of τ, the resultant set of $\hat{\tau}^*_{V-min}$ and $\hat{\tau}^*_{V-max}$ are very close to each other. There is a slight tendency that these values, which were obtained by using $\tau_c = 0.1203$, are greater in absolute values than those obtained by using $\tau_c = -0.5455$, but the differences are not so great, i.e., approximately between 0.022 and 0.210. There is a tendency that these discrepancies become less as the interval, $(\underline{\tau},\bar{\tau})$, becomes larger, or the frequencies, N_{V-min} and N_{V-max} become greater. In fact, for the interval, $(-3.0, 3.0)$, the discrepancy between the two $\hat{\tau}^*_{V-min}$'s is as small as -0.0218, and the one for the two $\hat{\tau}^*_{V-max}$'s is 0.0259. The sample mean and variance of $\hat{\tau}^*_V$ for each of the five cases and the sample correlation coefficient of $\hat{\tau}^*_V$ and τ are given in Table 3-4, for the two situations in which $\tau_c = 0.1203$ and $\tau_c = -0.5455$, respectively. In the same table, also presented in brackets are the theoretical mean and variance of an estimator which is conditionally unbiased, given τ, and whose conditional distribution is $N(\tau,C^{-1})$, where

TABLE 3-4

Sample Mean and Variance of the Modified Maximum Likehood Estimate, $\hat{\tau}^*_V$, Which Was Obtained upon Subtest 3, and the Sample Correlation Coefficient of τ and $\hat{\tau}^*_V$, for Each of the Five Intervals of τ in Each of the Two Situations, Where $\tau_c = -0.5455$ and $\tau_c = 0.1203$, Respectively.

Case	$\hat{\tau}^*_V$., $\tau_c = 0.1203$			$\hat{\tau}^*_V$, $\tau_c = -0.5455$			$\underline{\tau}$	$\bar{\tau}$
	Mean	Variance	Corr.$(\tau, \hat{\tau}^*_V)$	Mean	Variance	Corr.$(\tau, \hat{\tau}^*_V)$		
4	0.07884 (0.07800)	2.17079 (2.17832)	0.98130 (0,98108)	0.07879	2.16160	0.98081	-2.430	2.586
5	0.06929 (0.06900)	2.29648 (2.30560)	0.98279 (0.98214)	0.06929	2.28554	0.98254	-2.514	2.652
6	0.04465 (0.04500)	2.53448 (2.54958)	0.98478 (0.98386)	0.04458	2.52176	0.98475	-2.676	2.766
7	-0.00867 (-0.00900)	2.71573 (2.72680)	0.98586 (0.98492)	-0.00844	2.70365	0.98589	-2.826	2.808
8	0.00016 (0.00000)	3.06329 (3.08163)	0.98759 (0.98667)	0.00027	3.05110	0.98762	-3.000	3.000

$C = 3.5$. Let λ denote such an estimator. We can write

$$E(\lambda) = E(\tau) \quad , \tag{3.4}$$

and

$$\mathrm{Var.}(\lambda) = \mathrm{Var.}(\tau) + C^{-2} \quad . \tag{3.5}$$

The correlation coefficient between λ and τ is given by

$$\mathrm{Corr.}(\tau,\lambda) = [1-C^{-2}\cdot\{\mathrm{Var.}(\lambda)\}^{-1}]^{1/2} \quad . \tag{3.6}$$

This value is also presented in brackets in Table 3-4, for each of the five intervals of τ .

We can see in this table that the results obtained by using $\tau_c = 0.1203$ are very close to those obtained by using $\tau_c = -0.5455$. We notice, however, that all these values in the former situation are closer to the expected population parameters obtained with λ , although the differences are small.

Table 3-5 presents the sample linear regression coefficients of $\hat{\tau}^*_V$ on τ , which is given by $\alpha\tau + \beta$, for each of the five cases and in each of the two situations. As is expected, the two sets of results are very similar. There is a slight tendency, however, that the values of α are closer to unity, and those of β are closer to zero, in the former situation where $\tau_c = 0.1203$.

When we take all the observations we made in the preceding paragraphs, perhaps the best choice of the interval, $(\underline{\tau},\bar{\tau})$, and

TABLE 3-5

Two Coefficients of the Sample Linear Regression of $\hat{\tau}^*_V$, Which Was Obtained upon Subtest 3, on τ , for Each of the Five Intervals of τ in Each of the Two Situations, Where $\tau_c = 0.1203$ and $\tau_c = -0.5455$, Respectively.

Case	$\tau_c = 0.1203$		$\tau_c = -0.5455$	
	α	β	α	β
4	0.99849	0.00096	0.99588	0.00111
5	0.99868	0.00038	0.99605	0.00057
6	0.99797	-0.00026	0.99542	-0.00022
7	0.99892	0.00032	0.99673	0.00053
8	0.99795	0.00016	0.99599	0.00027

the critical value, τ_c, from our available data will be (-3.0, 3.0) and 0.1203. This is the only interval which provides us with $\hat{\tau}^*_{V\text{-min}}$ which is less than the least finite maximum likelihood estimate, -2.6518, of Subtest 3, and with $\hat{\tau}^*_{V\text{-max}}$ which is greater than the greatest finite maximum likelihood estimate, 2.7683, in each of the two situations where $\tau_c = 0.1203$ and $\tau_c = -0.5455$, respectively. For the purpose of illustration, the sample regression of $\hat{\tau}^*_V$ on τ, which is based upon the interval, (-2.430, 2.586), and $\tau_c = -0.5455$, is shown for the interval of τ, (-3.0, 3.0), in Appendix as Figure A-1. Although this is a sample regression based upon one thousand equally spaced points of τ with five observations at each point (Samejima, RR-81-1), a similar S-shape is also expected in the population regression. Although this example is a little extreme, a similar tendency will be seen if we use one of the results which are based upon the four intervals other than (-3.0, 3.0).

The error score, e_s, which is defined by

$$(3.7) \qquad \varepsilon_s = [\tau^*_{V_s} - \tau_s]\,[I^*(\tau_s)]^{-1/2} ,$$

where s denotes an individual hypothetical examinee and V_s and τ_s are his response pattern and ability level, respectively, was computed for each of the 5,000 hypothetical examinees using $\hat{\tau}^*_{V\text{-min}} = -2.8432$ and $\hat{\tau}^*_{V\text{-max}} = 2.8855$, which were obtained by using $\tau_c = 0.1203$. Since $[I^*(\tau)]^{1/2} \doteq 3.5$ for Subtest 3, this constant value was used in (3.7) for the above computation. For comparison, the error score is also computed for the 4,180 hypothetical examinees, using $\hat{\tau}^*_{V\text{-min}} = -1.8162$ and $\hat{\tau}^*_{V\text{-max}} = 2.2439$, which were obtained by using the same value of τ_c.

Figures 3-2 and 3-3 present the frequency distributions of these two sets of error scores, e_s, respectively, which were constructed with the category width of 0.2, together with the standard normal density function. The chi-square test for the goodness of fit of each of these two frequency distributions against the standard normal distribution was performed by categorizing all the subintervals below $e = -2.8$ into one class and all above $e = 2.8$ into another. As the results, we obtained $\chi^2_0 = 44.281$ and $\chi^2_0 = 25.573$ with 29 degrees of freedom each, which provide us with $0.025 < p < 0.050$ and $0.50 < p < 0.70$, respectively.

From all aspects, it may be feasible to adopt -2.843 and 2.885 as $\hat{\tau}^*_{V\text{-min}}$ and $\hat{\tau}^*_{V\text{-max}}$, respectively. The corresponding values of θ to these two values of τ are -2.808 and 2.641. Note, however, that these two values of θ are not the same as $\hat{\theta}^*_{V\text{-min}}$ and $\hat{\theta}^*_{V\text{-max}}$.

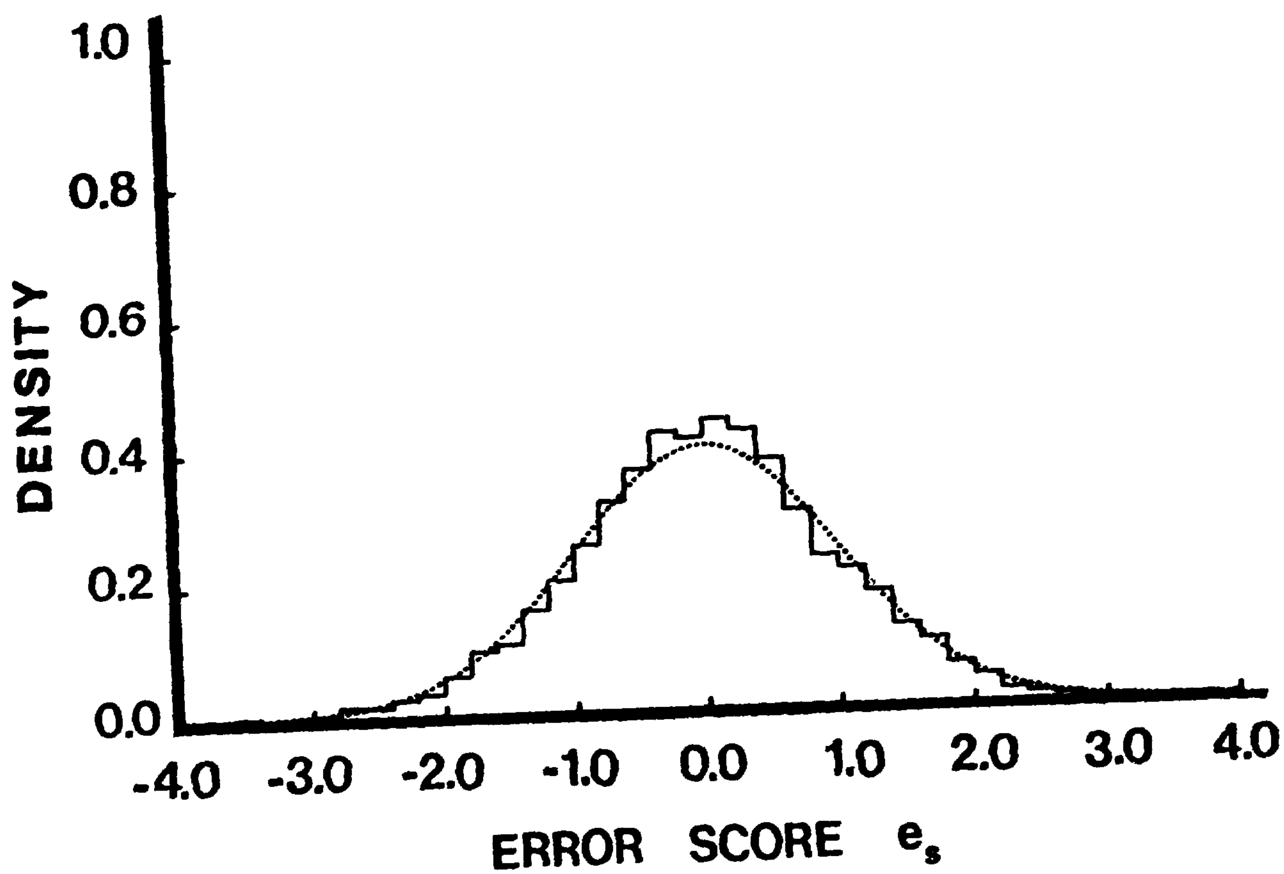

FIGURE 3-2

Frequency Distribution of the Error Score, e_s , Which Is Based upon Subtest 3 and $\tau_c = 0.1203$, $\hat{\tau}^*_{V\text{-}min} = -2.8432$ and $\hat{\tau}^*_{V\text{-}max} = 2.8855$, for the 5,000 Hypothetical Examinees (Histogram), in Comparison with the Standard Normal Density Function (Dotted Line).

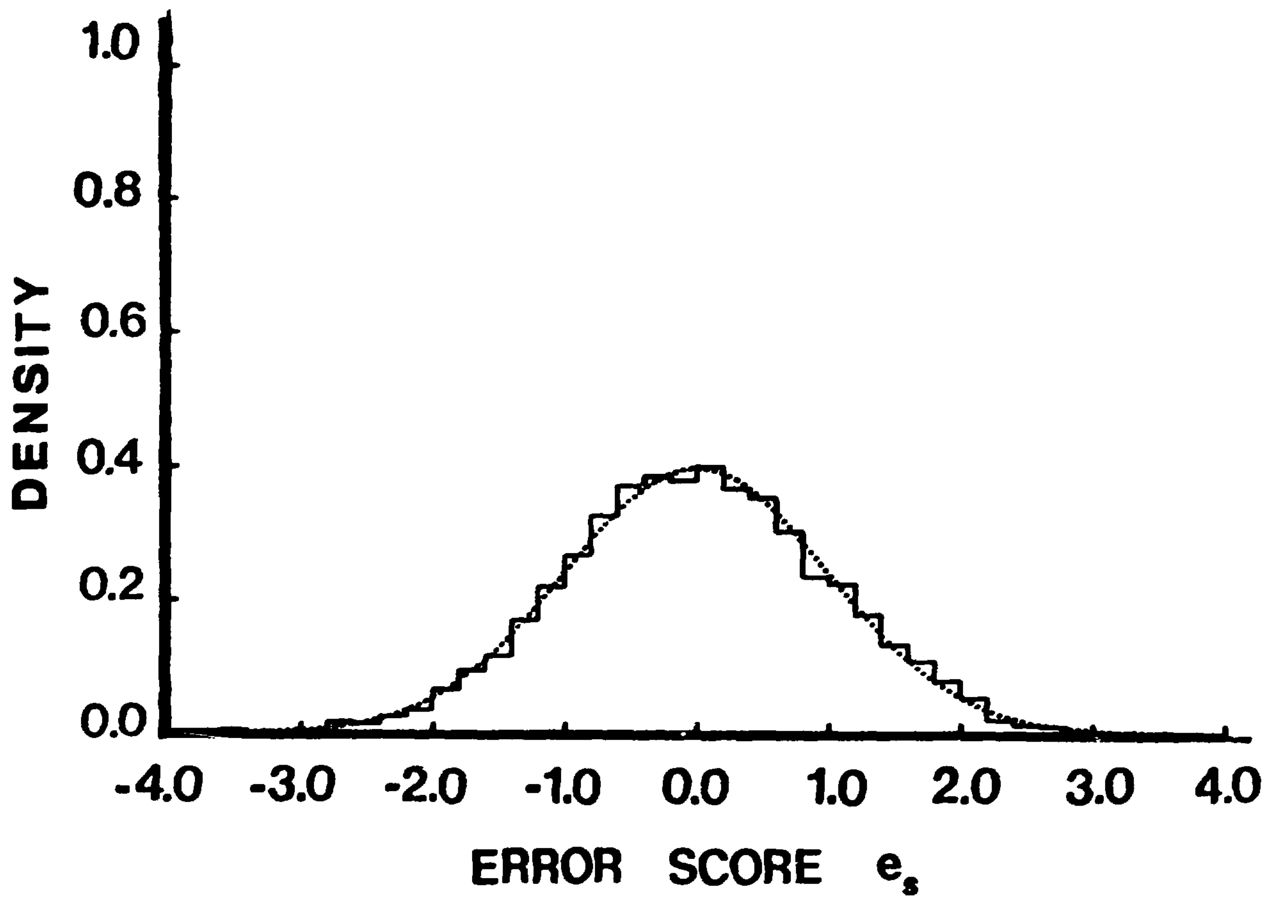

FIGURE 3-3

Frequency Distribution of the Error Score, e_s, Which Is Based upon Subtest 3 and $\tau_c = 0.1203$, $\hat{\tau}^*_{V\text{-}min} = -1.8162$ and $\hat{\tau}^*_{V\text{-}max} = 2.2439$, for the 4,180 Hypothetical Examinees (Histogram), in Comparison with the Standard Normal Density Function (Dotted Line).

IV Estimation of the Item Characteristic Functions of Ten Binary Test Items Using Subtest 3 As the Old Test

We shall proceed to use Subtest 3 as the Old Test in the process of estimating the operating characteristics of the discrete responses of unknown test items. Our simulated data are based upon five hundred hypothetical examinees whose ability levels on the original latent trait θ are distributed over one hundred equally spaced positions in the interval of θ, $(-2.5, 2.5)$, with five examinees placed at each position, as we have used them repeatedly in our previous studies (Samejima, 1977, RR-77-1, RR-78-1, RR-78-2, RR-78-3, RR-78-4, RR-78-5, RR-78-6, RR-80-2, RR-80-4). They are considered as a sample representing the uniform distribution of θ for the interval, $(-2.5, 2.5)$. This uniform density function is drawn by a dotted line in Figure 4-1. When θ is transformed to τ by (2.13) with the coefficients shown in Table 2-4, the ability distribution is no longer uniform, but its density function is of a U-shape, which is drawn by a solid line in Figure 4-1.

The difference of the present procedure of using Subtest 3 from the one in which we used either Subtest 1 or Subtest 2 (Samejima, RR-80-4) is that the modified maximum likelihood estimate, $\hat{\tau}^*_V$, is used in place of the maximum likelihood estimate, $\hat{\tau}_V$. In so doing, we define $\hat{\tau}^*_{V\text{-min}}$ and $\hat{\tau}^*_{V\text{-max}}$ such that

$$(4.1) \qquad \begin{cases} \hat{\tau}^*_{V\text{-min}} = -2.843 \\ \hat{\tau}^*_{V\text{-max}} = 2.885 \end{cases},$$

following the result obtained by using the interval of τ,

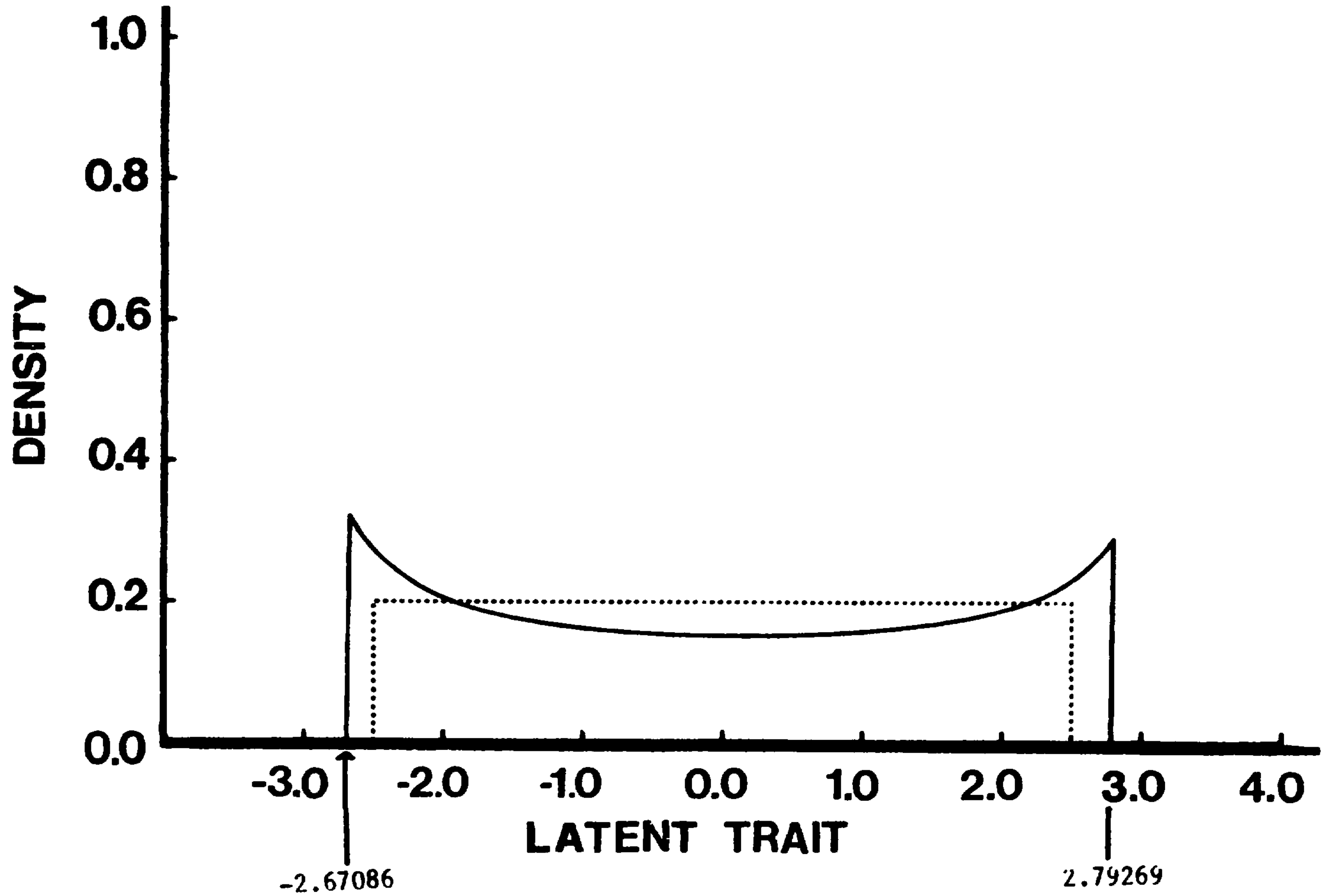

FIGURE 4-1

Theoretical Density Function of the Original Latent Trait θ (Dotted Line) and That of the Transformed Latent Trait τ (Solid Line).

(-3.0, 3.0) , which we observed in the preceding chapter. The resultant $\hat{\tau}^*_V$'s for the five hundred hypothetical examinees are plotted against τ for the five hundred hypothetical examinees in Figure 4-2. The sample linear regression of $\hat{\tau}^*_V$ on τ turned out to be $1.01213\tau - 0.00439$, which is close to the straight line with forty-five degrees from the abscissa passing the origin, (0,0) , and is shown in the same figure. The sample mean and the standard deviation of the five hundred $\hat{\tau}^*_V$'s are 0.01698 and 1.75384 , respectively, and the sample product-moment correlation coefficient between τ and $\hat{\tau}^*_V$ is 0.987 .

The bivariate density function, $\xi^*(\hat{\tau}^*_V,\tau)$, of τ and $\hat{\tau}^*_V$ is given by

$$(4.2) \qquad \xi^*(\hat{\tau}^*_V,\tau) = \psi^*(\hat{\tau}^*_V|\tau)\ f^*(\tau) \quad ,$$

where $\psi^*(\hat{\tau}^*_V|\tau)$ is the conditional density function of $\hat{\tau}^*_V$, given τ , and $f^*(\tau)$ is the marginal density function of τ . We can write for the marginal density function, $g^*(\hat{\tau}^*_V)$, of $\hat{\tau}^*_V$,

$$(4.3) \qquad g^*(\hat{\tau}^*_V) = \int_{-\infty}^{\infty} \xi^*(\hat{\tau}^*_V,\tau)\ d\tau \quad .$$

Figure 4-3 presents this theoretical density function by a thick, solid line, which was obtained by assuming that $\hat{\tau}^*_V$ is unbiased, and its conditional distribution, given τ , is normal with C^{-1} as the second parameter. Note, however, that, in reality, this assumption is only approximately satisfied. In the same figure,

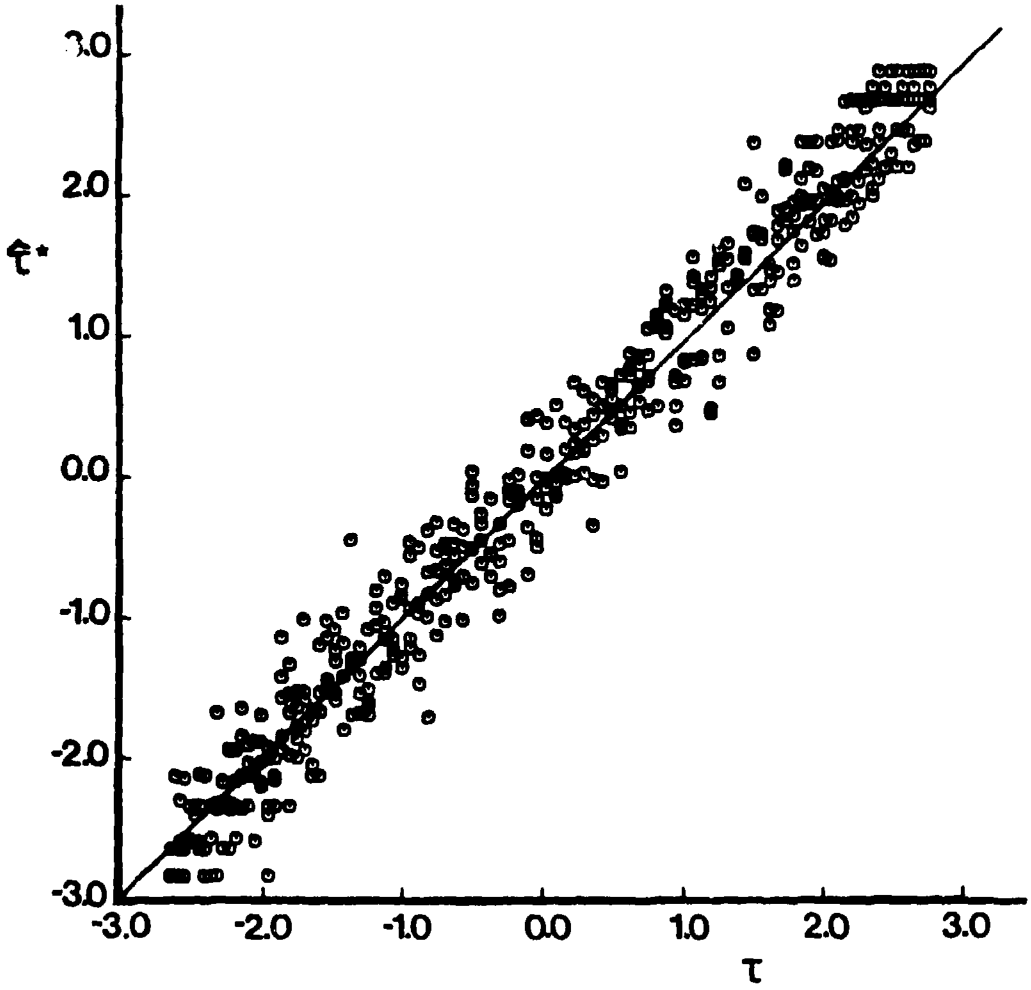

FIGURE 4-2

Modified Maximum Likelihood Estimate, $\hat{\tau}^*_s$, Plotted against the True Ability, τ_s, for the Five Hundred Hypothetical Examinees, with the Sample Linear Regression of $\hat{\tau}^*$ on τ.

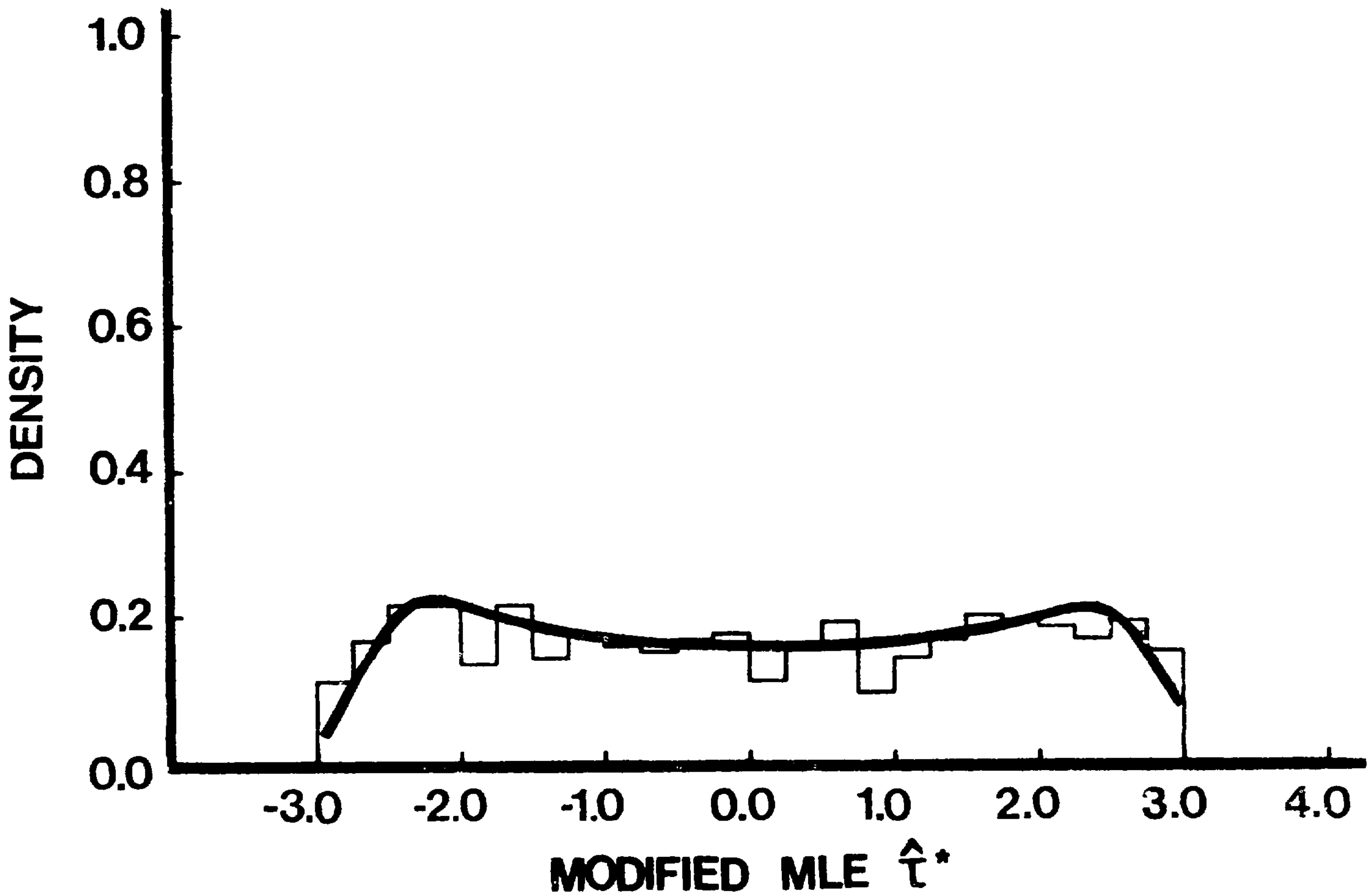

FIGURE 4-3

Theoretical Density Function of the Modified Maximum Likelihood Estimate $\hat{\tau}^*$ (Thick Solid Line), Together with the Relative Frequency Distribution of the Five Hundred Observed $\hat{\tau}^*_s$'s (Thin Solid Line), Based upon Subtest 3.

also presented is a histogram which represents the relative frequency distribution of the five hundred $\hat{\tau}_V^*$'s , using the interval width of 0.25 .

It is noted in this figure that both the lower and upper ends of the histogram are rather abrupt, with no tails. For comparison, the corresponding histogram and marginal density function, which are based upon Subtest 1, of which Subtest 3 is a subset, is shown as Figure 4-4. We can see that, for Subtest 1, the histogram has tails in both the negative and positive directions. The reason for this difference is that, for Subtest 3, there are certain numbers of examinees whose maximum likelihood estimates are negative and positive infinities, respectively, and they were uniformly replaced by two finite numbers. The error score, e_s , which is defined by (3.7), was computed for each of the five hundred hypothetical examinees, and is presented in Figure 4-5 in the form of a histogram with 0.20 as the category width, together with the standard normal density function, which is drawn by a dotted line. The chi-square test for the goodness of fit was performed, and we obtained $\chi_0 = 28.68328$, with 29 degrees of freedom, which provides us with, approximately, $p = 0.50$.

The set of unknown test items consists of ten binary items, each of which follows the normal ogive model, whose item characteristic function is given by (2.2) with $m_g = 1$ and for $x_g = 1$. Table 4-1 presents the item discrimination parameter, a_h , and the item difficulty parameter, b_h , of each of the ten new binary items, h $(=1,2,\ldots,10)$.

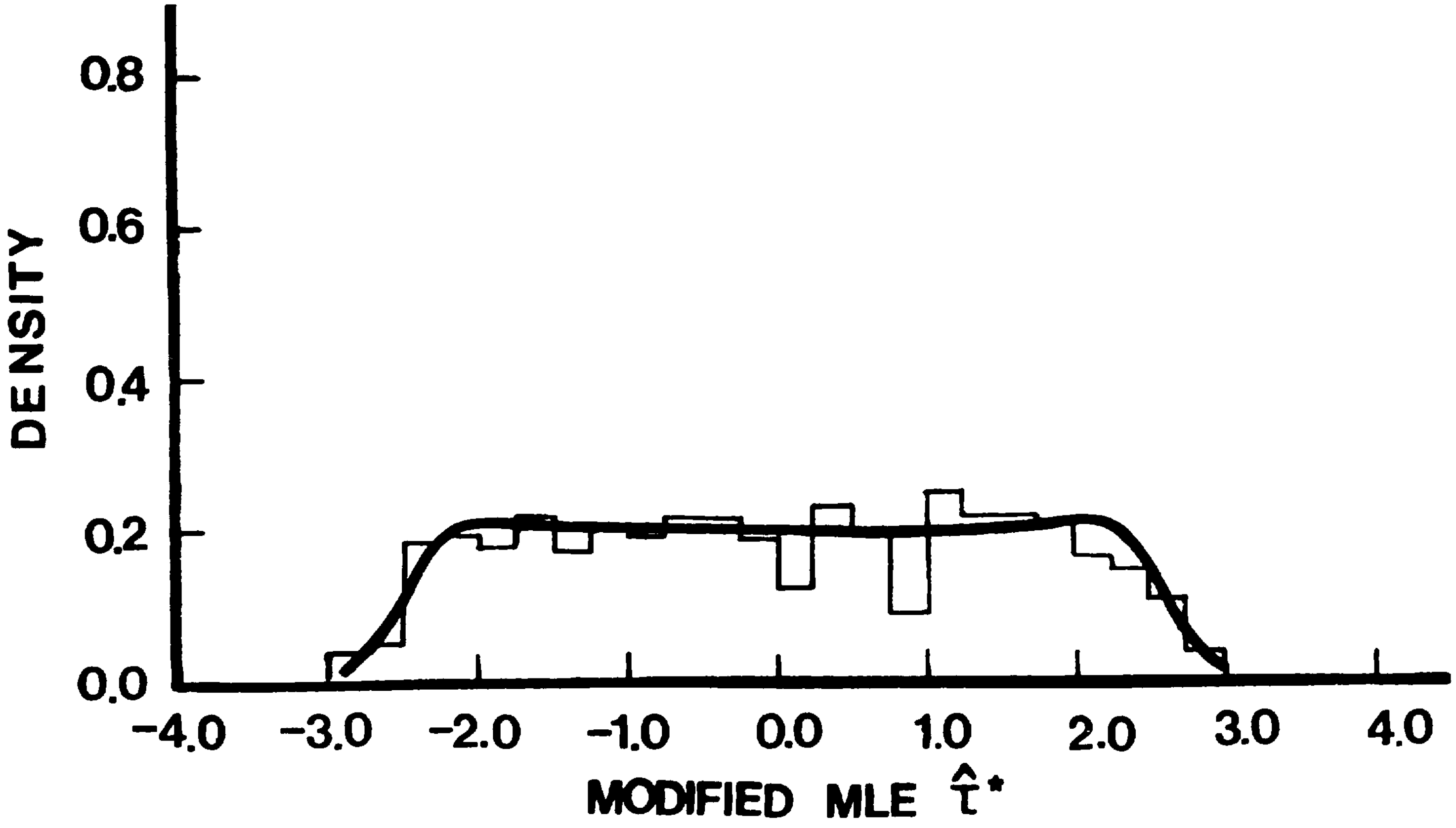

FIGURE 4-4

Theoretical Density Function of the Modified Maximum Likelihood Estimate $\hat{\tau}^*$ (Thick Solid Line), Together with the Relative Frequency Distribution of the Five Hundred Observed $\hat{\tau}^*_s$'s (Thin Solid Line), Based upon Subtest 1 .

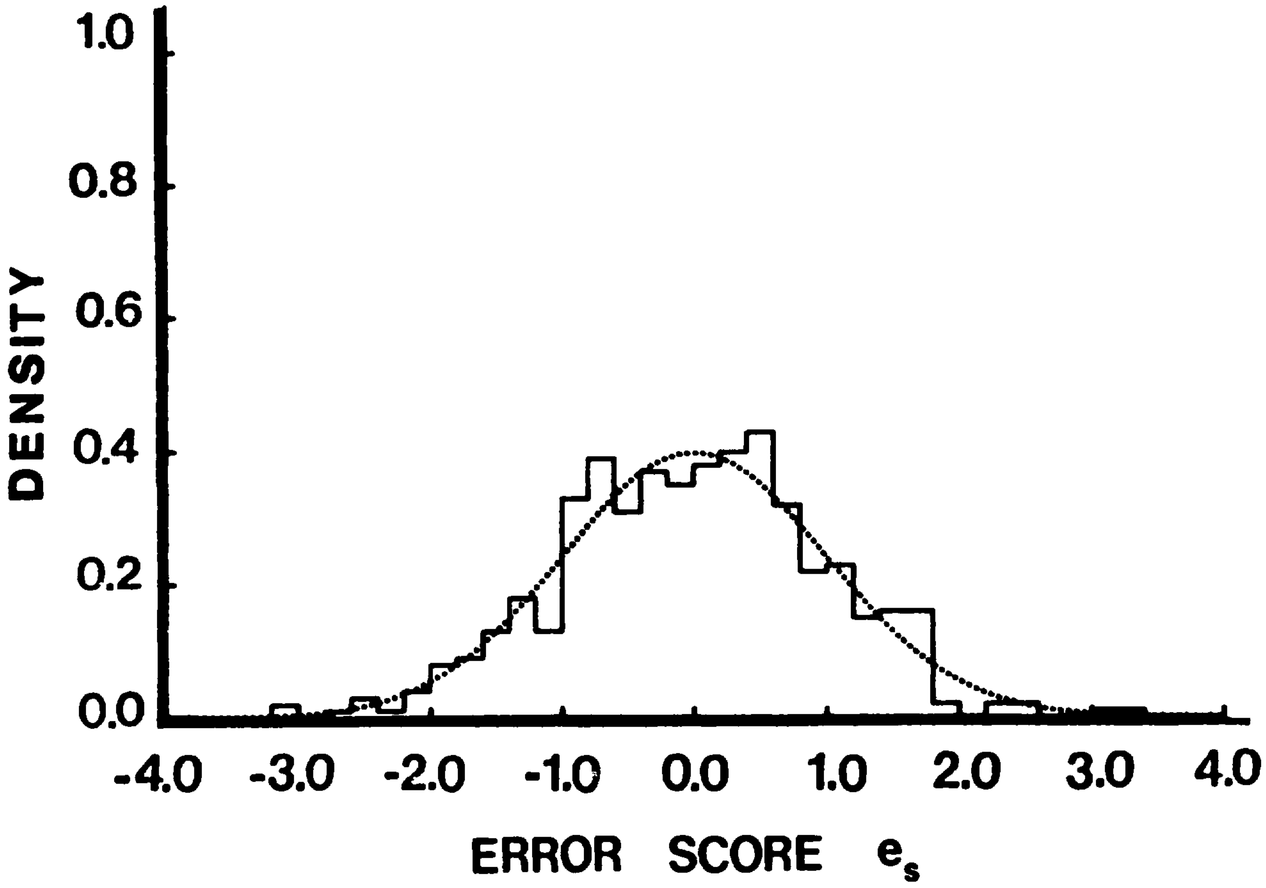

FIGURE 4-5

Frequency Distribution of the Error Score e_s (Solid Line) of the Five Hundred Hypothetical Examinees, in Comparison with the Standard Normal Density Function (Dotted Line).

TABLE 4-1

Item Discrimination Parameter, a_h , and Item Difficulty Parameter, b_h , of Each of Ten Binary Items.

Item h	a_h	b_h
1	1.5	-2.5
2	1.0	-2.0
3	2.5	-1.5
4	1.0	-1.0
5	1.5	-0.5
6	1.0	0.0
7	2.0	0.5
8	1.0	1.0
9	2.0	1.5
10	1.0	2.0

We can write for the conditional density function of τ, given $\hat{\tau}^*_V$, which is denoted by $\phi^*(\tau|\hat{\tau}^*_V)$, such that

$$(4.4) \qquad \phi^*(\tau|\hat{\tau}^*_V) = \xi^*(\hat{\tau}^*_V,\tau)\ [g^*(\hat{\tau}^*_V)]^{-1} .$$

In the Simple Sum Procedure of the Conditional P.D.F. Approach, this conditional density takes an essential role in estimating the operating characteristics of the discrete item responses of unknown test items. Let $\hat{\tau}^*_s$ be a simplified version of $\hat{\tau}^*_{V_s}$, i.e., the modified maximum likelihood estimate of the ability τ of the examinee s (=1,...,N). We can write for the criterion operating characteristic, $R_{x_h}(\theta)$, of the discrete item response x_h of the unknown item h

$$(4.5) \qquad R_{x_h}(\theta) = R^*_{x_h}[\tau(\theta)] = \sum_{s\varepsilon x_h} \phi^*(\tau|\hat{\tau}^*_V)\ [\sum_{s=1}^{N} \phi^*(\tau|\hat{\tau}^*_V)]^{-1} ,$$

where $s\varepsilon x_h$ indicates an examinee s whose response to item h is x_h. In practice, since the marginal density function $f^*(\theta)$ is not observable, $R_{x_h}(\theta)$ is not observable, either. With empirical data, we need to estimate the conditional density function, $\phi^*(\tau|\hat{\tau}^*_V)$, and this is done by using the method of moments (Elderton and Johnson, 1969) effectively. With our simulated data, however, (4.5) can be computed directly, and used as a criterion for evaluating the specific method adopted in our study. The name, criterion operating characteristic came from this fact, and its availability is one of the reasons why the Monte Carlo study is valuable.

Figure 4-6 presents the criterion operating characteristic

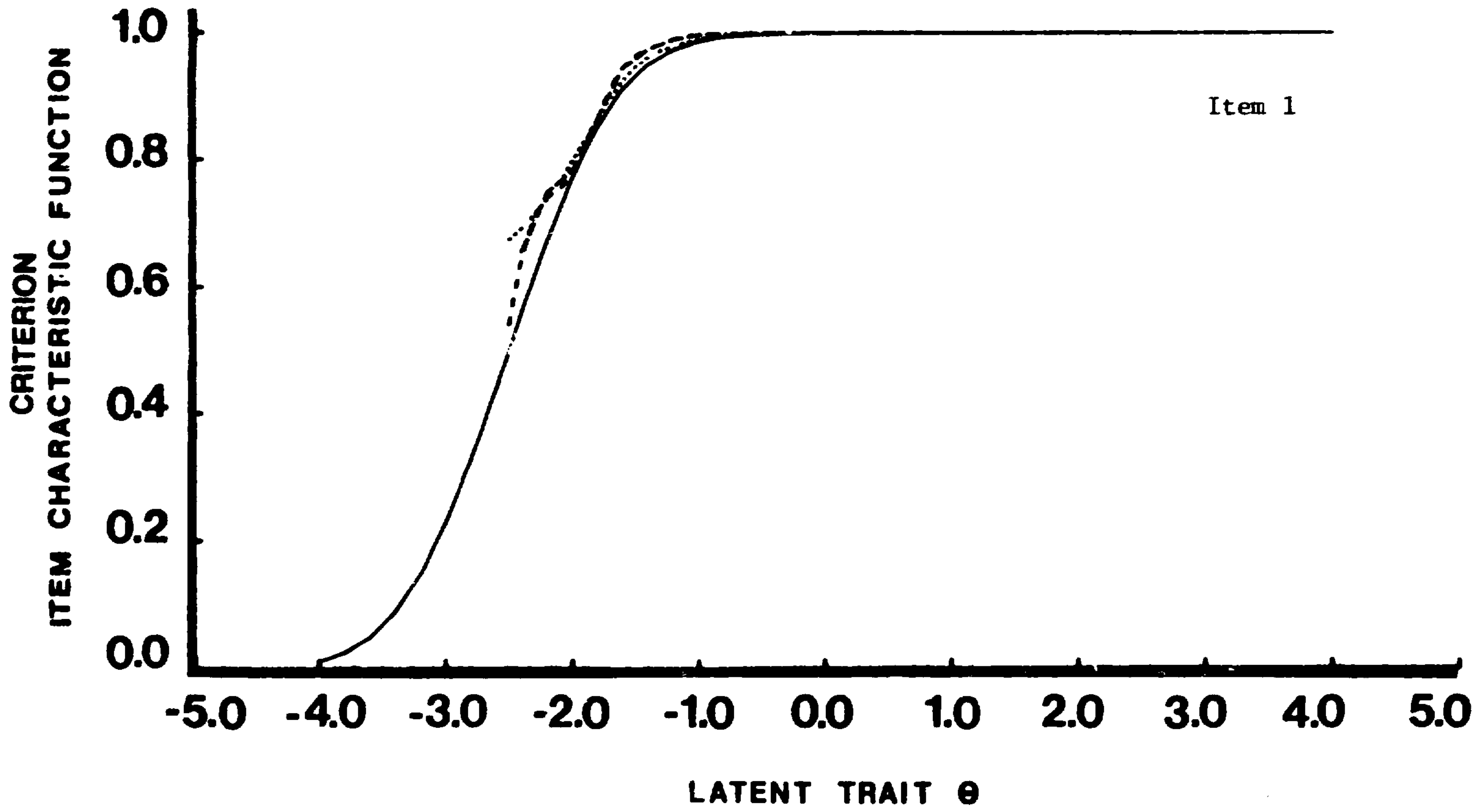

FIGURE 4-6

Criterion Item Characteristic Functions Based upon Subtest 3 (Dotted Line), upon the Original Old Test (Long Dashed Line) and upon Subtest 1 (Short Dashed Line), Together with the Theoretical Item Characteristic Function (Solid Line).

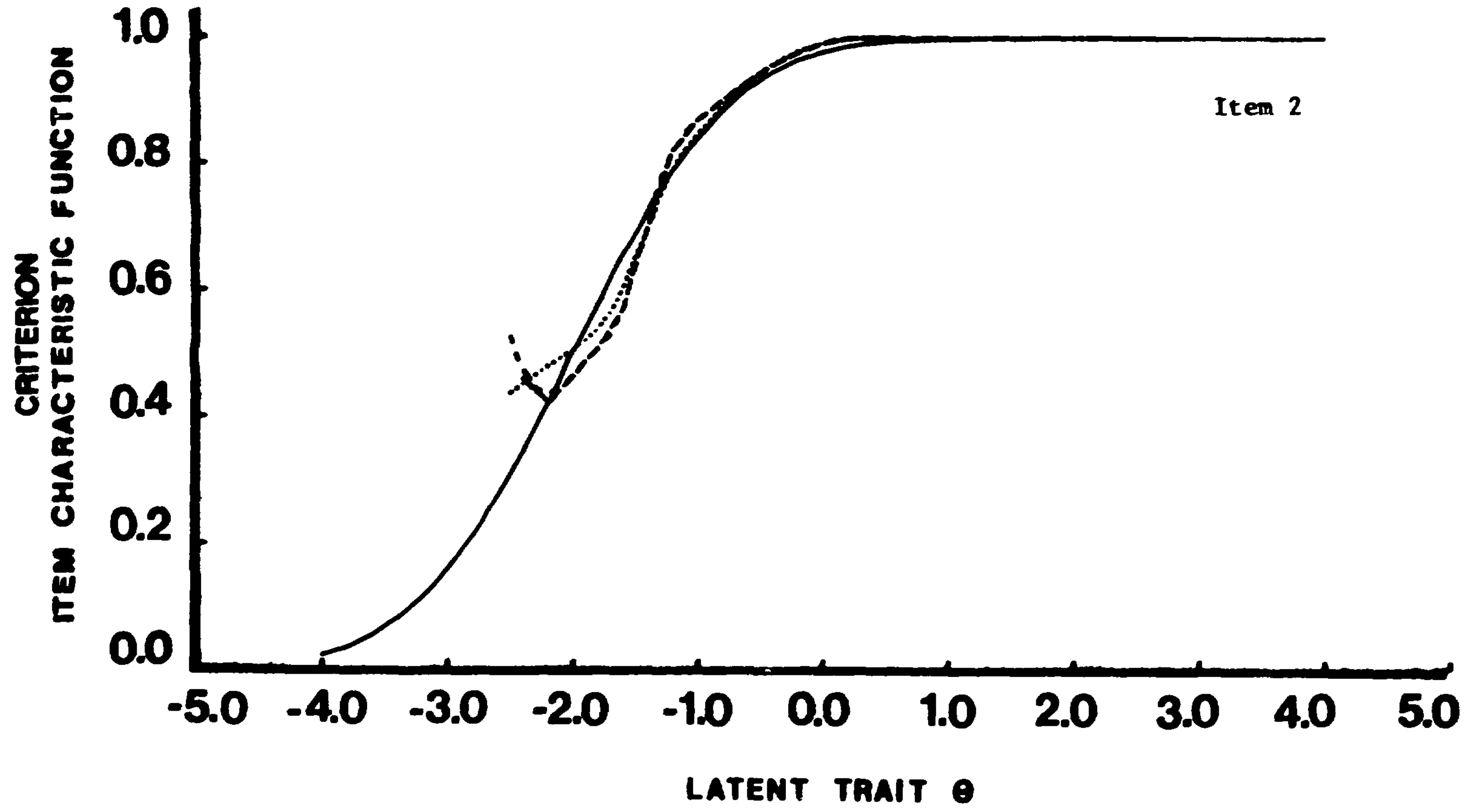

FIGURE 4-6 (Continued)

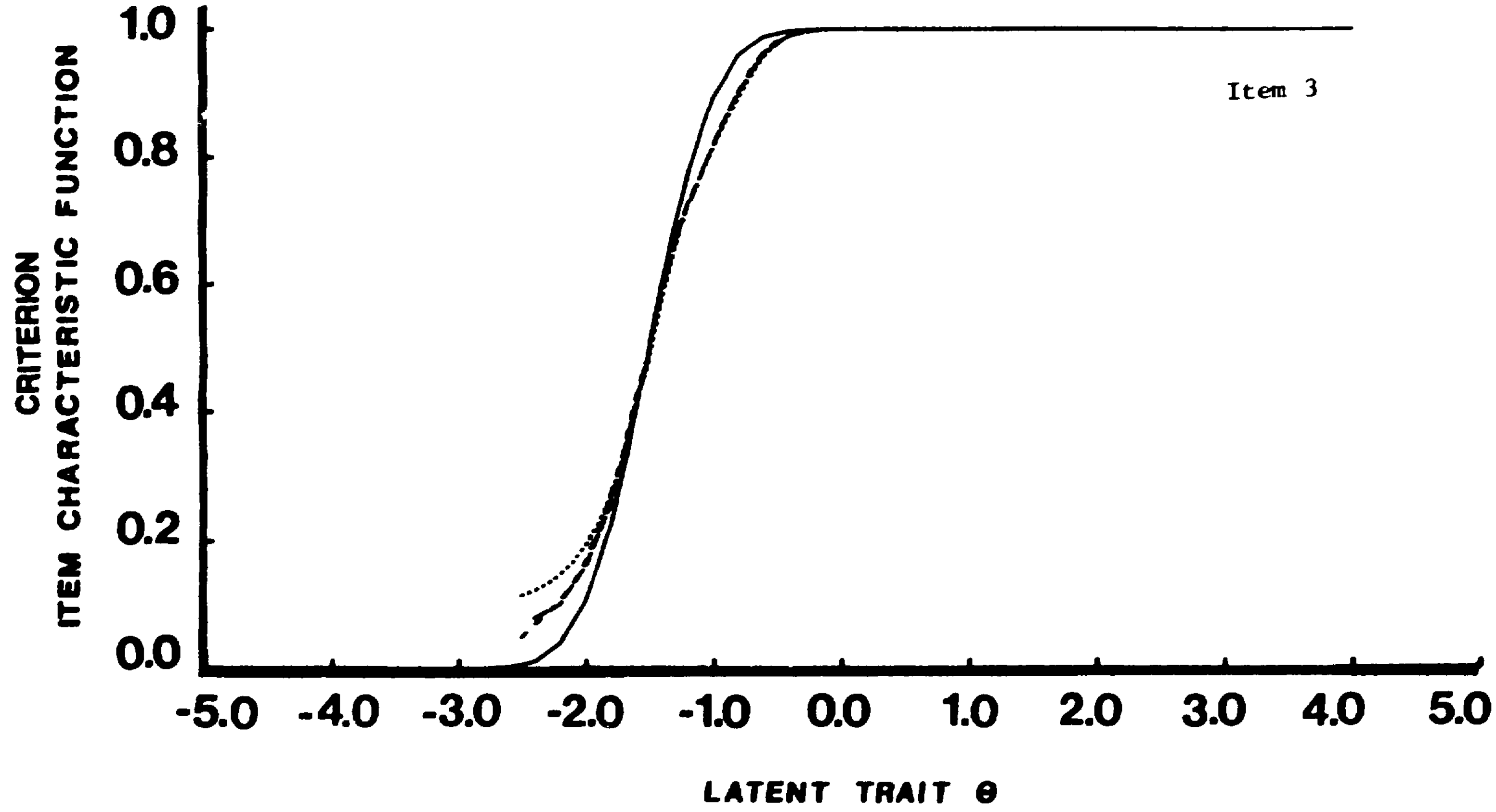

FIGURE 4-6 (Continued)

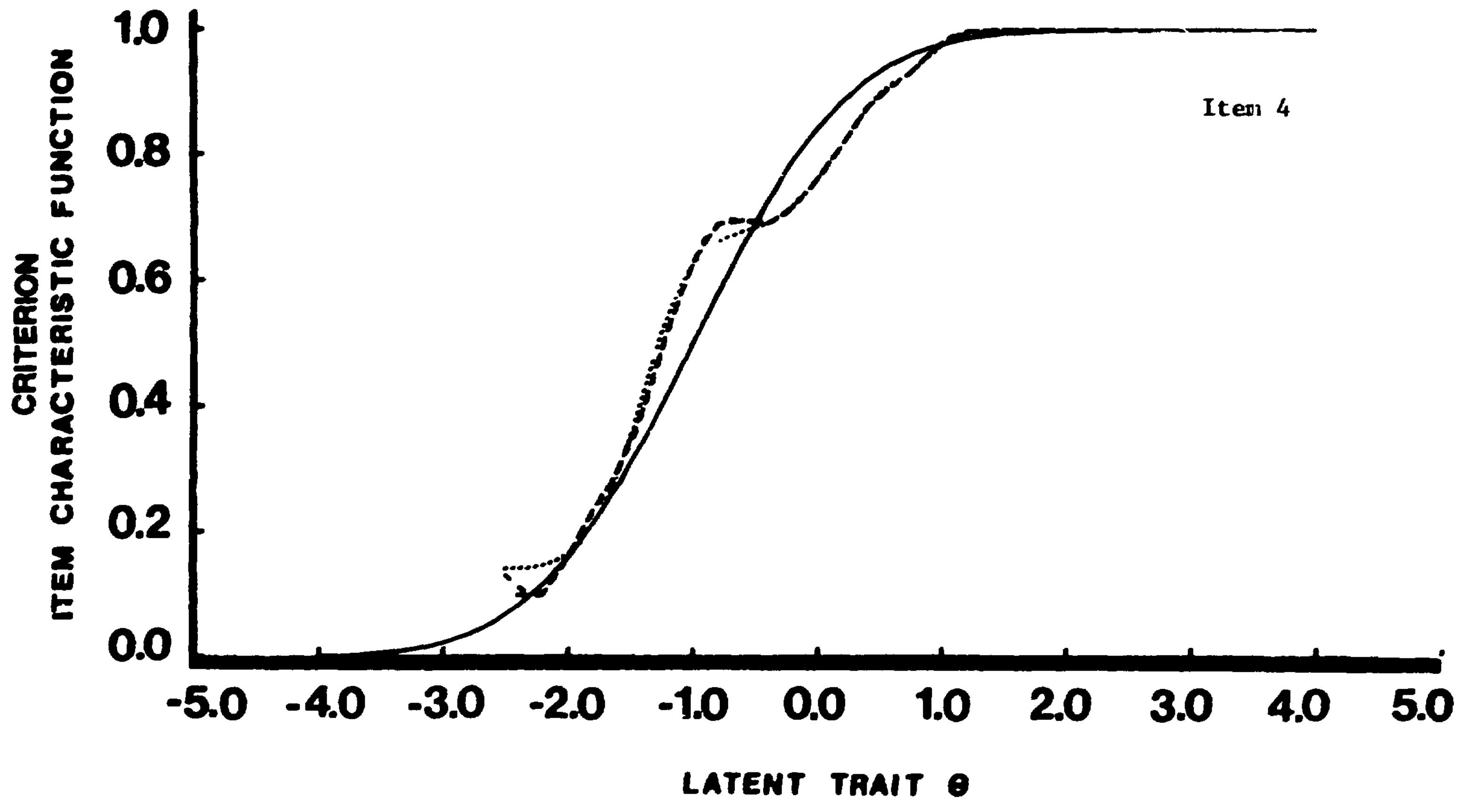

FIGURE 4-6 (Continued)

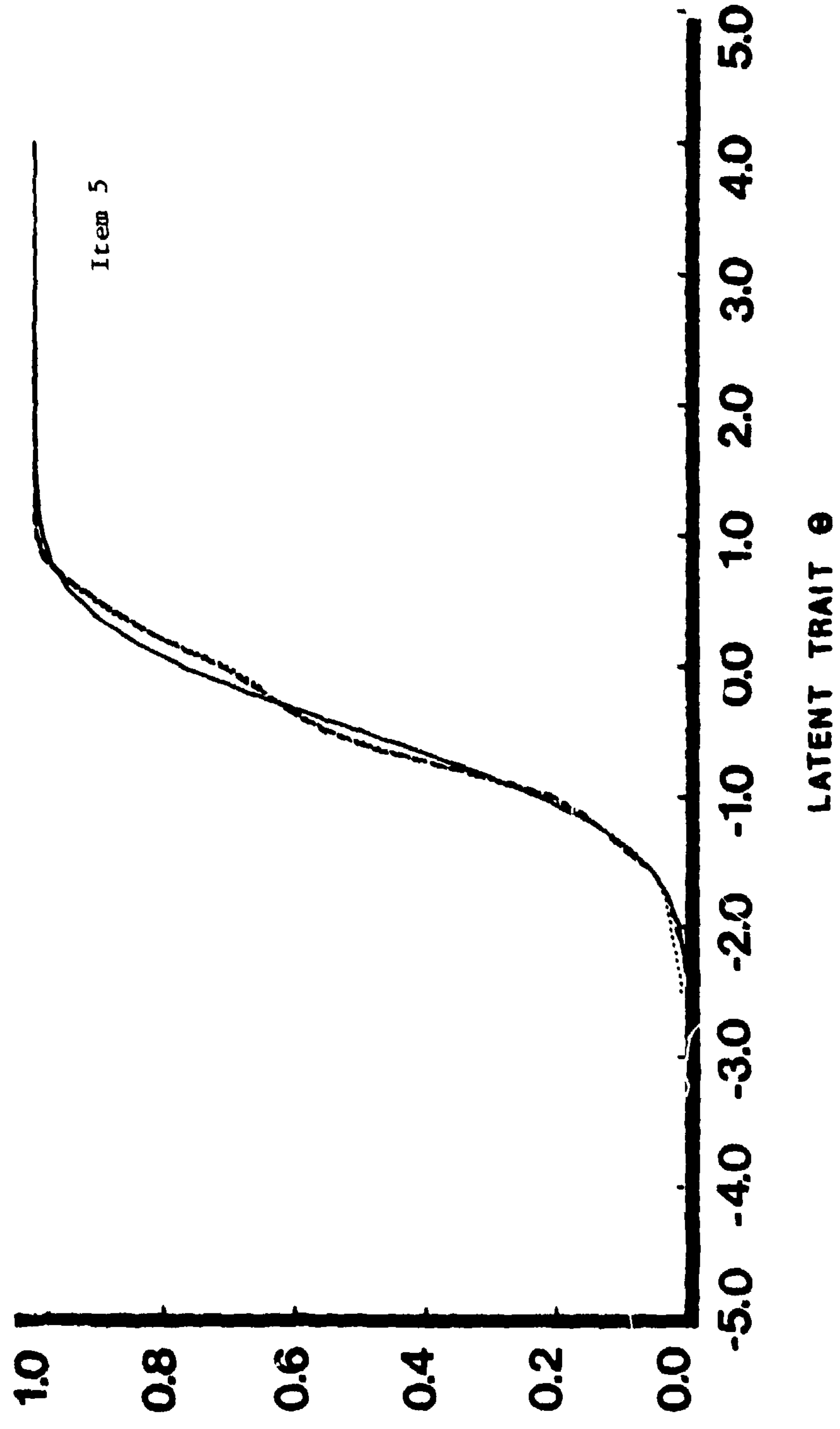

FIGURE 4-6 (Continued)

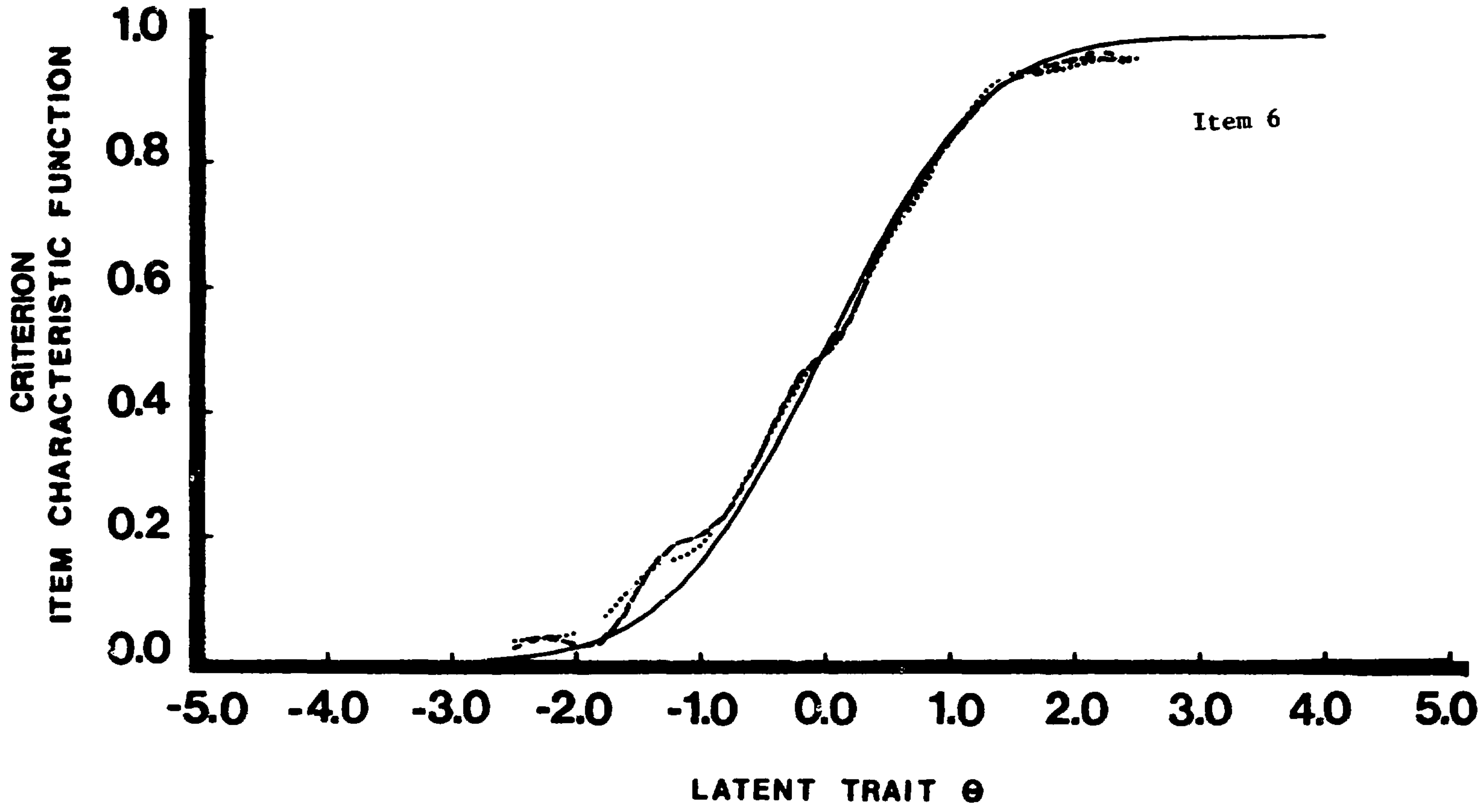

FIGURE 4-6 (Continued)

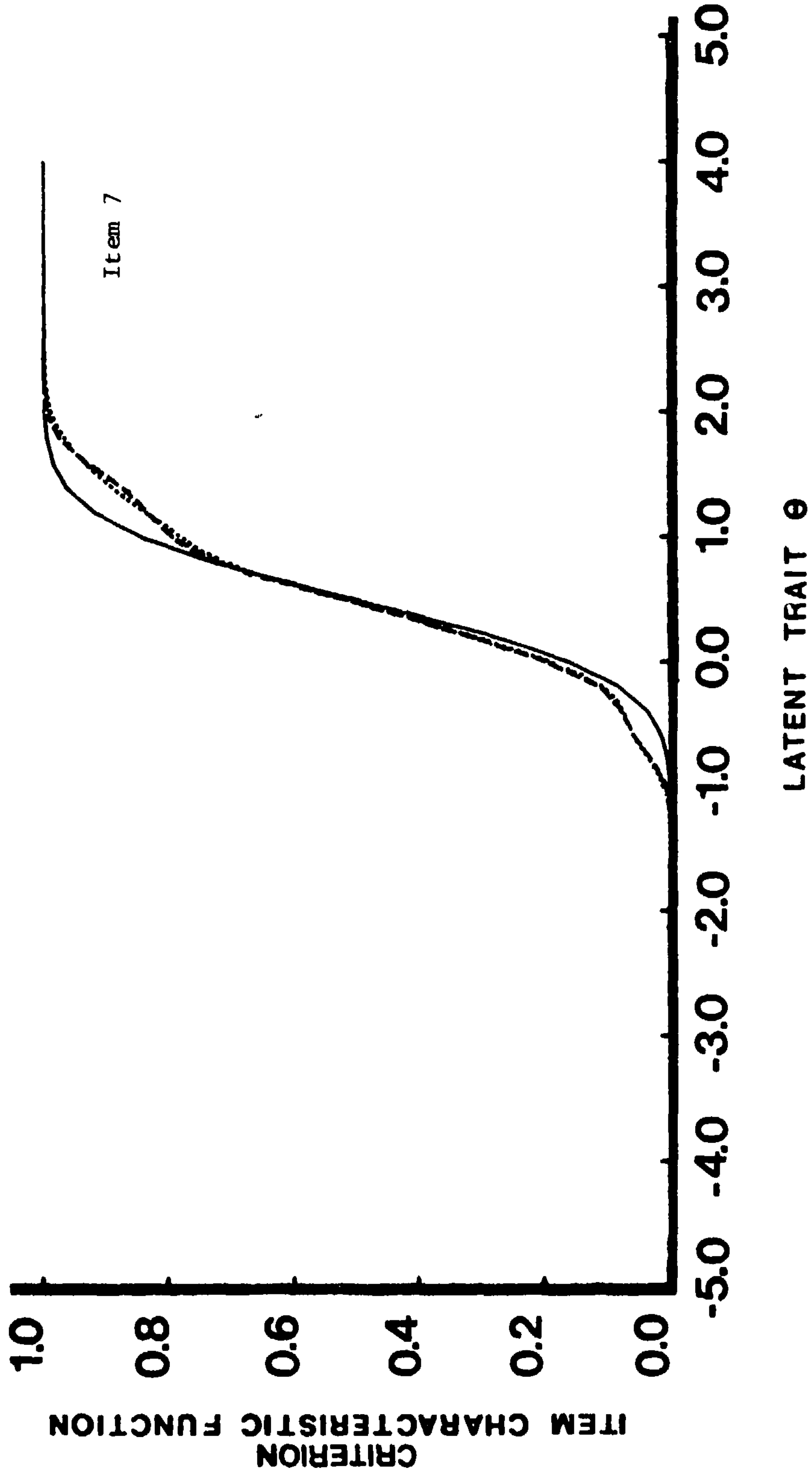

FIGURE 4-6 (Continued)

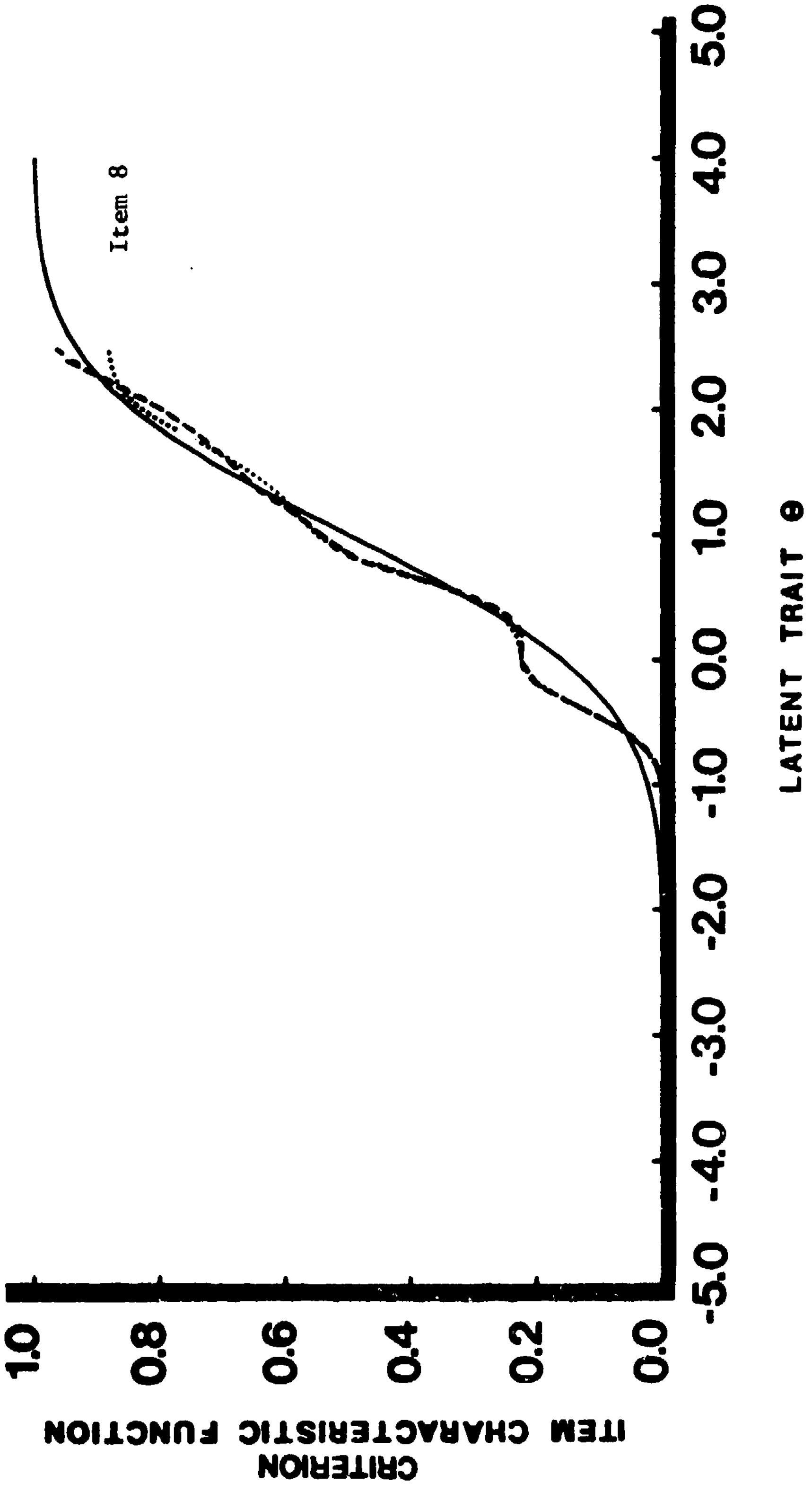

FIGURE 4-6 (Continued)

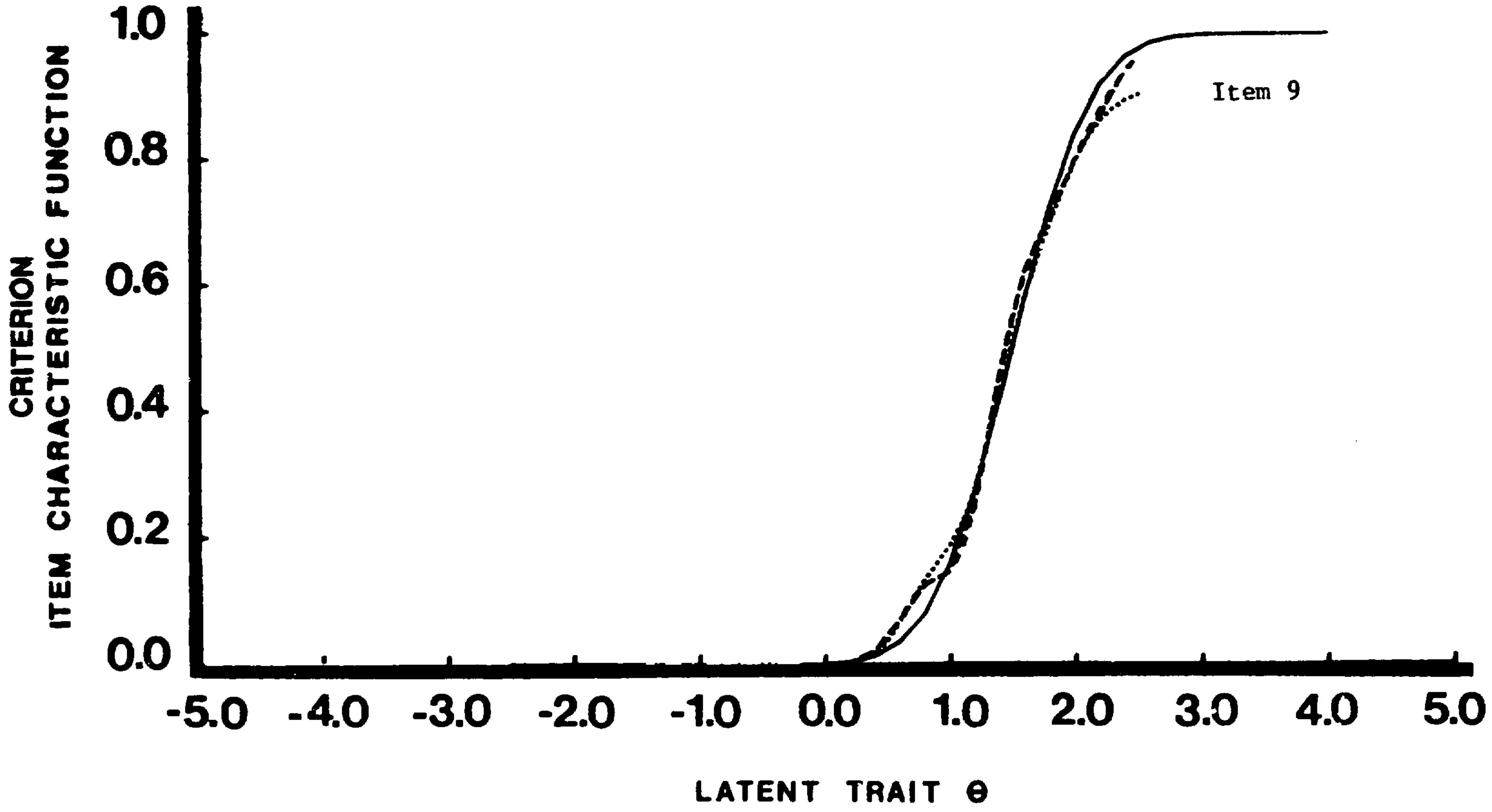

FIGURE 4-6 (Continued)

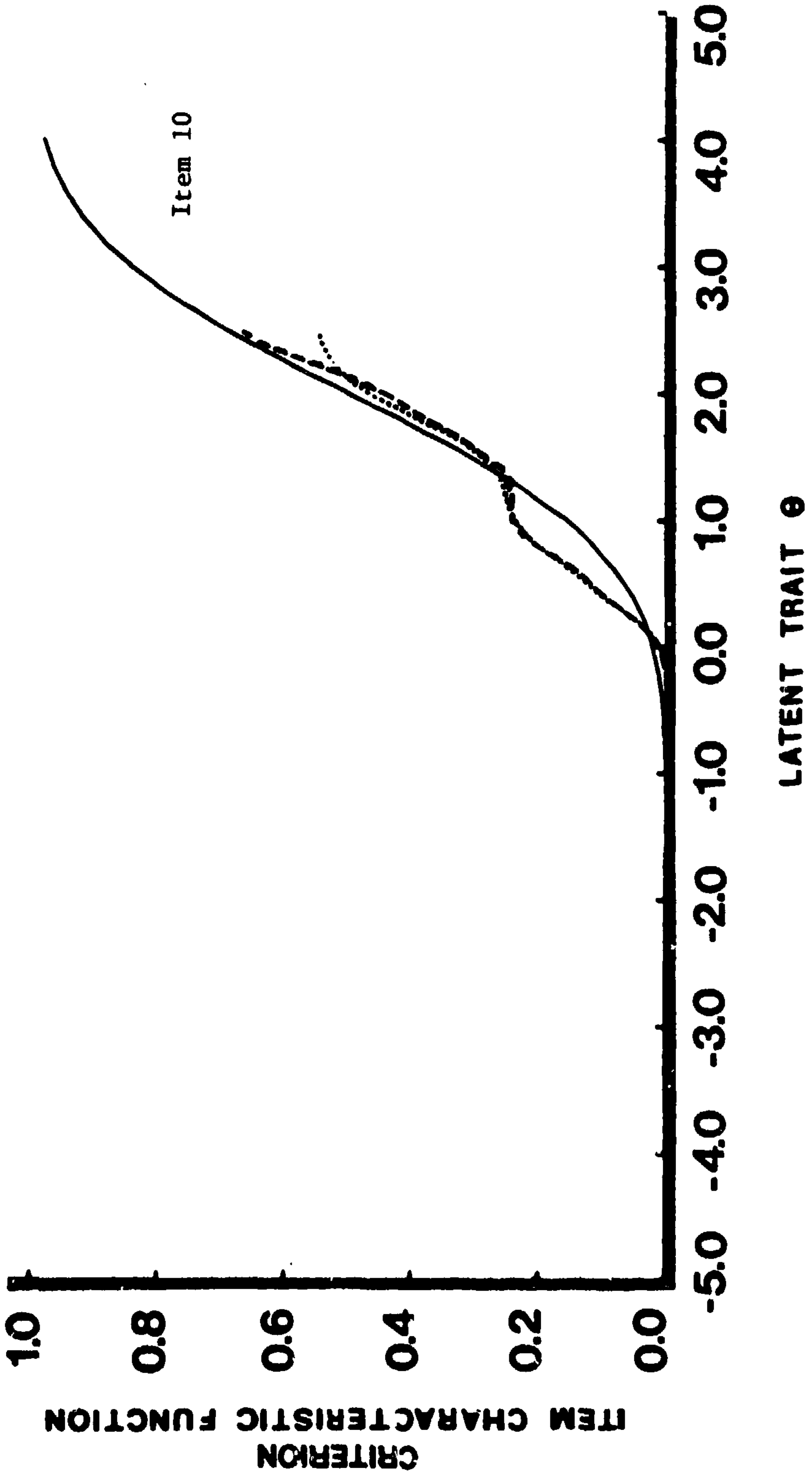

FIGURE 4-6 (Continued)

for the correct answer, or $x_h = 1$, or the criterion item characteristic function, of each of the ten unknown, binary test items, by a dotted line. In the same figure, also presented are two other criterion item characteristic functions, which were obtained upon the original Old Test and Subtest 1, by longer and shorter dashed lines, respectively, together with the theoretical item characteristic function, which is drawn by a solid line, for each binary test item. As we have observed in a previous study (Samejima, RR-80-4), for each item, the two criterion item characteristic functions based upon the Old Test and Subtest 1 are practically the same, the fact that we can confirm in Figure 4-6. We notice, further, that the criterion item characteristic function, which is based upon Subtest 3 , is very close to those two other criterion item characteristic functions, and, more importantly, it is close to the theoretical item characteristic function, for each and every binary test item. Slight discrepancies are observed, however, for farther values of θ , i.e., discrepancies for items 1, 3 and 4 for the range of θ less than -2.0 , and those for items 8, 9 and 10 for the range of θ greater than 2.0 . This is anticipated from the fact that the amount of test information is substantially less for Subtest 3 in comparison with both Subtest 1 and the original Old Test, for these ranges of θ , as we can see in Figure 2-1, although they are less important ranges of ability for the present purpose.

With any empirical data, we must use an estimate of the conditional density function, $\phi^*(\tau|\hat{\tau}_s^*)$. To obtain the estimate, the conditional moments of τ , given $\hat{\tau}_s^*$, take important roles. We can write for the first and second conditional moments of τ about the origin, given $\hat{\tau}_s^*$, such that

$$(4.6) \qquad E(\tau|\hat{\tau}_s^*) \doteq \hat{\tau}_s^* + C^{-2} \frac{d}{d\hat{\tau}_s^*} \log g^*(\hat{\tau}_s^*)$$

and

$$(4.7) \qquad E(\tau^2|\hat{\tau}_s^*) \doteq \hat{\tau}_s^* + 2\hat{\tau}_s^* C^{-2} \frac{d}{d\hat{\tau}_s^*} \log g^*(\hat{\tau}_s^*) + C^{-4}[\frac{d^2}{d\hat{\tau}_s^{*2}} \log g^*(\hat{\tau}_s^*) + \{\frac{d}{d\hat{\tau}_s^*} \log g^*(\hat{\tau}_s^*)\}^2] + C^{-2} .$$

It is obvious from (4.6) and (4.7) that we shall be able to obtain the estimates of these two conditional moments, provided that we can estimate the marginal density function, $g^*(\hat{\tau}_s^*)$. This can be done by using the method of moments for fitting a polynomial, which provides us with the least squares solution (Samejima and Livingston, RR-79-2).

Table 4-2 presents the first through tenth sample moments of $\hat{\tau}_s^*$ about the origin, which were obtained for our five hundred observations of $\hat{\tau}_s^*$. In the same table, also presented are the corresponding ten sample moments about the midpoint of the interval of $\hat{\tau}_s^*$, which turned out to be 0.021 . This second set of moments is actually used for obtaining polynomials following the method of moments, the detailed procedure of which is described in a previous study (Samejima, RR-77-1).

Table 4-3 presents the five sets of coefficients ω_j of the

TABLE 4-2

First Through Tenth Sample Moments of $\hat{\tau}^*_s$ about the Origin Obtained for the Five Hundred Observations, and the Corresponding Sample Moments about the Midpoint.

	Moments About Origin	Moments About Midpoint
1	0.16976800D-01	-0.40232000D-02
2	0.30762381D+01	0.30759661D+01
3	0.32136059D+00	0.12757078D+00
4	0.16132112D+02	0.16113257D+02
5	0.30793468D+01	0.13866074D+01
6	0.99326410D+02	0.99045076D+02
7	0.26932955D+02	0.12355264D+02
8	0.66322009D+03	0.65992046D+03
9	0.22694745D+03	0.10194924D+03
10	0.46520459D+04	0.46175227D+04

TABLE 4-3

Coefficients, ω_j, of the Polynomials of Degrees 3 Through 7, Which Approximate the Density Function, $g^*(\hat{\tau}^*)$, and Were Obtained by the Method of Moments.

j		Coefficient ω_j
0	DGR. 3	0.14752089D+00
1		-0.10711228D-01
2		0.98492052D-02
3		0.20396181D-02
0	DGR. 4	0.15724612D+00
1		-0.10213053D-01
2		-0.20091300D-02
3		0.18978863D-02
4		0.16872831D-02
0	DGR. 5	0.15707407D+00
1		-0.20242784D-02
2		-0.17154481D-02
3		-0.27622271D-02
4		0.163335685D-02
5		0.51156775D-03
0	DGR. 6	0.13966552D+00
1		-0.38977430D-02
2		0.42862067D-01
3		-0.13915383D-02
4		-0.14677720D-01
5		0.32771426D-03
6		0.14591547D-02
0	DGR. 7	0.13999730D+00
1		-0.19681749D-01
2		0.41769825D-01
3		0.15931960D-01
4		-0.14189397D-01
5		-0.43208192D-02
6		0.14075468D-02
7		0.35107420D-03

polynomials of degrees 3 through 7 , such that

$$(4.8) \qquad g^*(\hat{\tau}^*_s) = \sum_{j=0}^{p} \omega_j \hat{\tau}^{*j}_s , \qquad p = 3,4,5,6,7 ,$$

which were obtained by using up to the p-th sample moments about the midpoint. These five polynomials are shown in the five separate graphs of Figure 4-7, together with the frequency distribution of the five hundred $\hat{\tau}^*_s$'s . These estimated density functions, $\hat{g}^*(\hat{\tau}^*)$, were obtained for the interval of $\hat{\tau}^*$, [-2.843, 2.885] . When we compare these five curves with the theoretical density function of $\hat{\tau}^*$, which was obtained assuming the exact unbiasedness of the estimate and the perfect normality for the conditional distribution of the estimate, given τ , with C^{-1} ($\doteq$ 0.28571) as the second parameter, and is shown in Figure 4-3 , we notice the similarity between them. We also note a difference, however, for the two extreme ranges of τ , at which these five polynomials go up instead of coming down, as we can see in the theoretical curve. This tendency becomes more conspicuous as the degree of a polynomial grows larger.

These results are expected from the fact that the conditional distribution of the modified maximum likelihood estimate, $\hat{\tau}^*_V$, given τ , is truncated for the values of τ in these two extreme ranges, as is indicated in Figure 4-2 , and the violation from the unbiased normality for the conditional distribution is substantial for these ranges of τ . How these discrepancies of

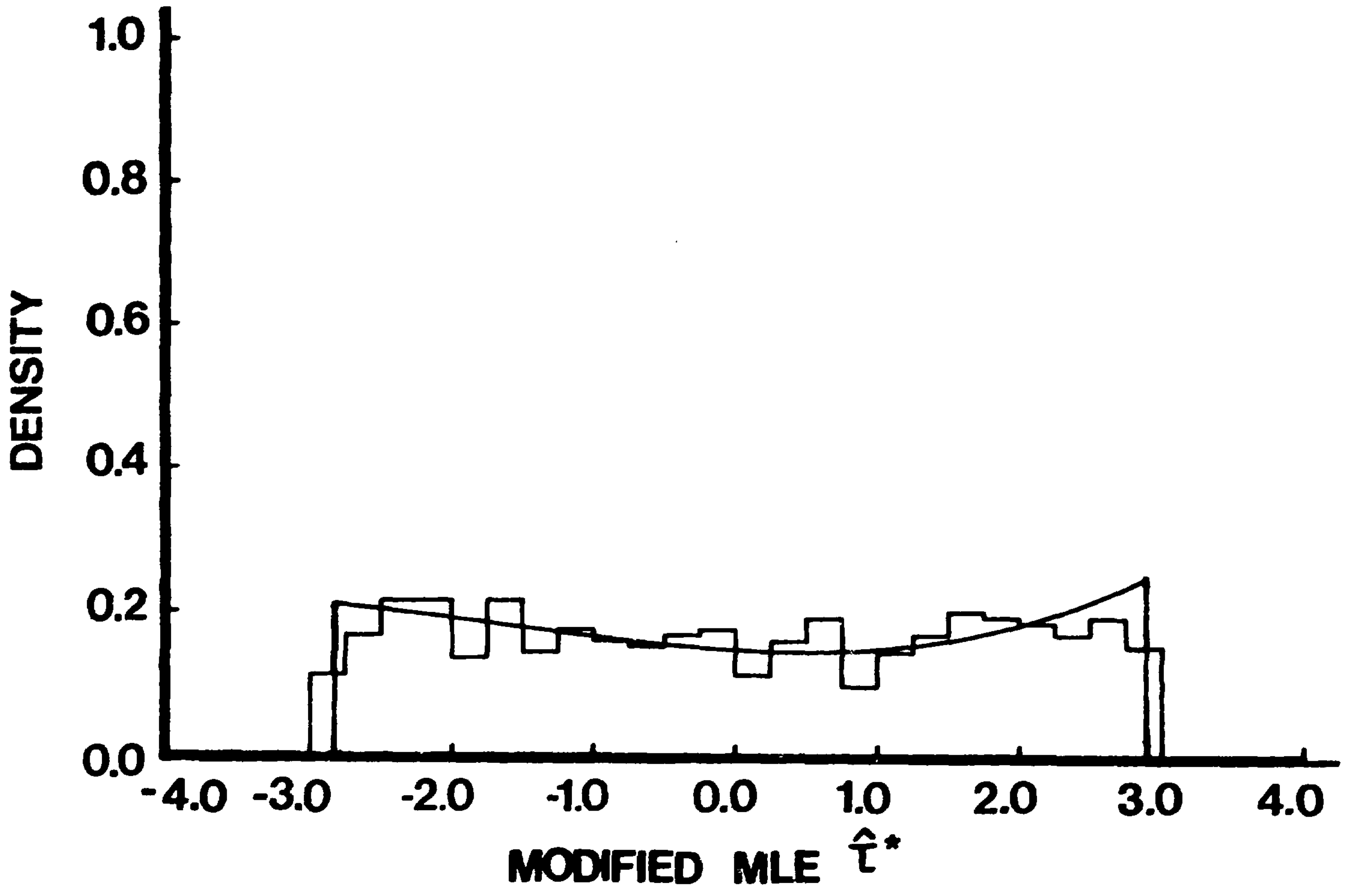

FIGURE 4-7

Estimated Density Function, $\hat{g}^*(\hat{\tau}^*)$, Obtained As a Polynomial of Degree 3, Together with the Relative Frequency Distribution of the Five Hundred Observed $\hat{\tau}^*_s$'s.

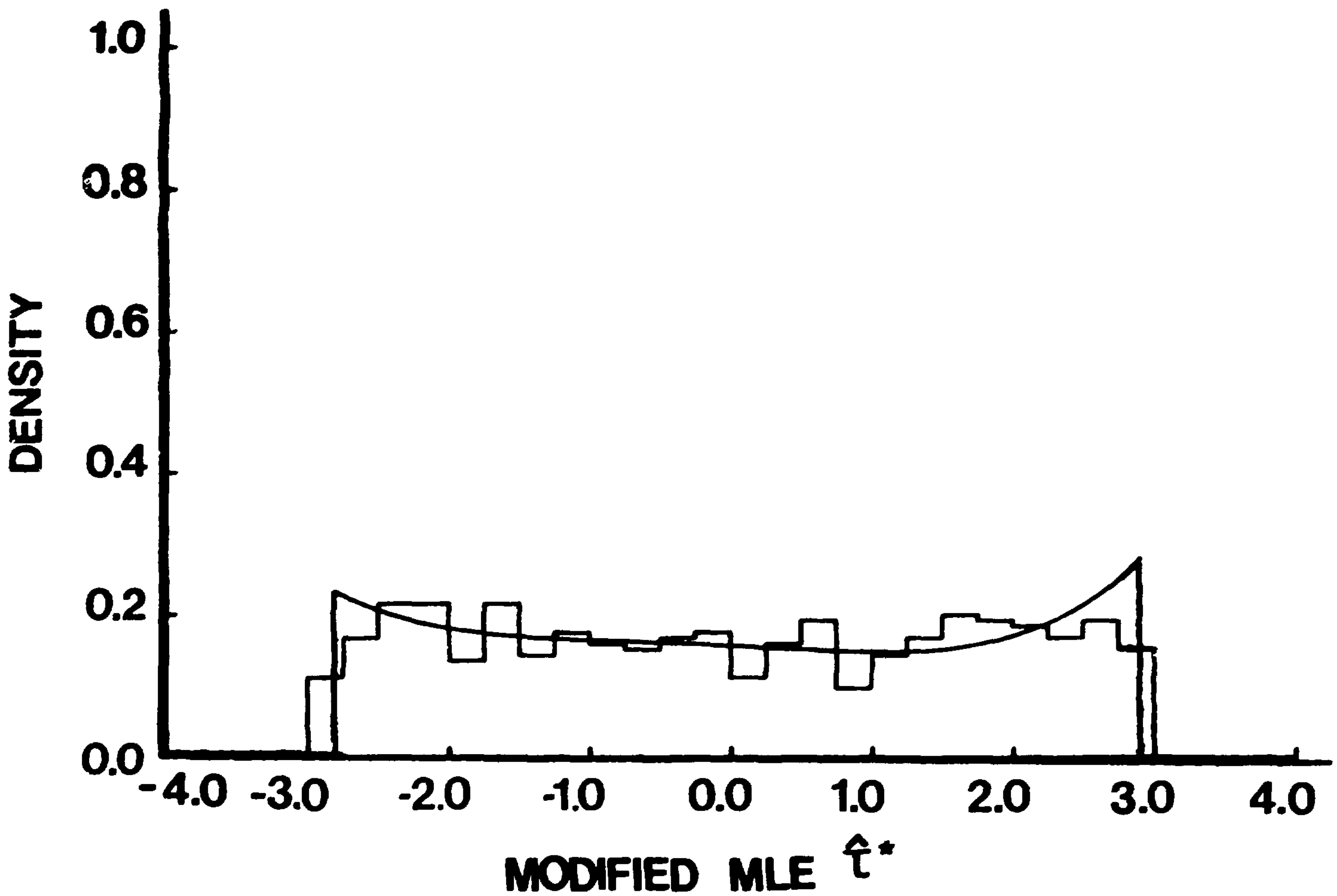

FIGURE 4-7 (Continued): Polynomial of Degree 4 .

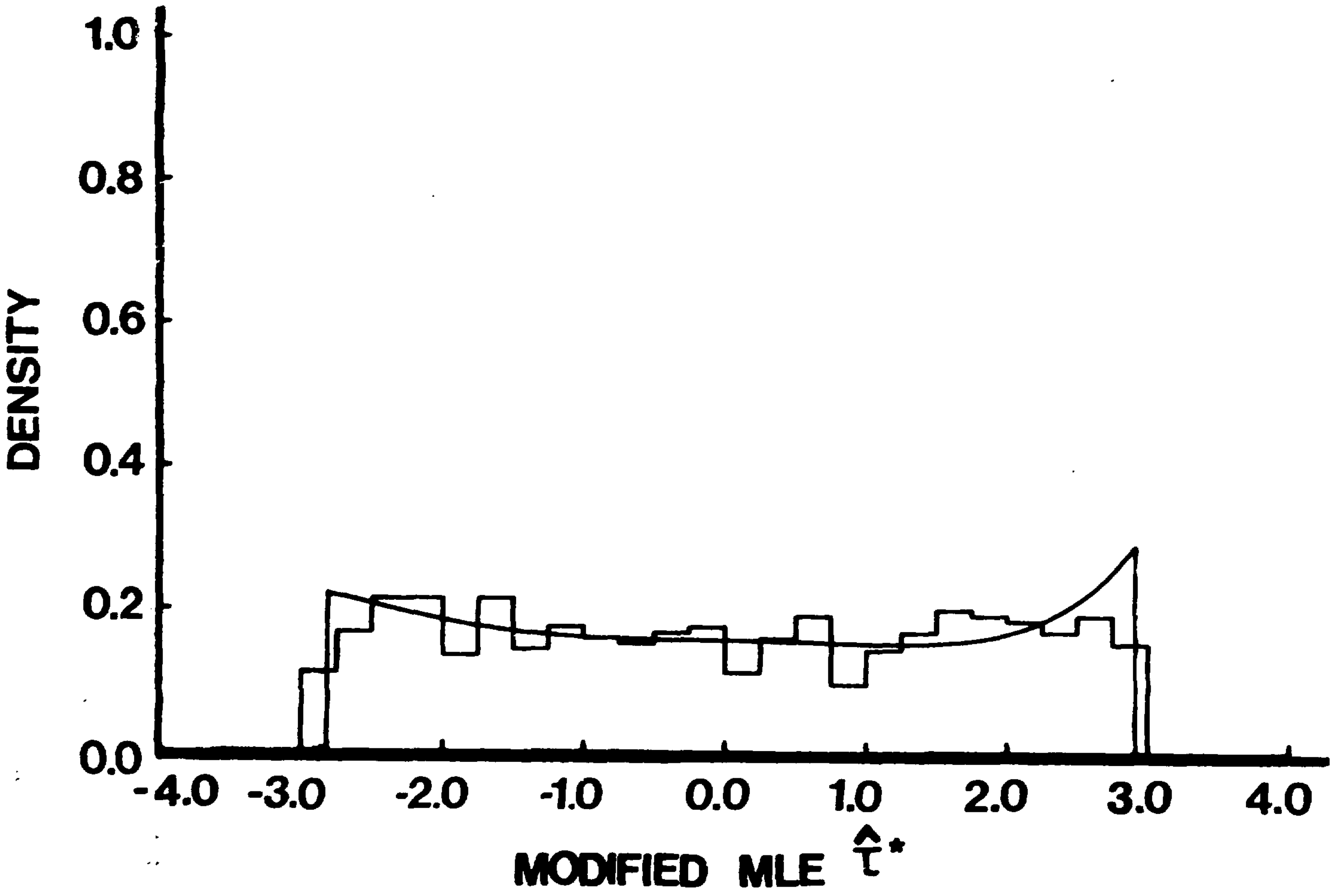

FIGURE 4-7 (Continued): Polynomial of Degree 5 .

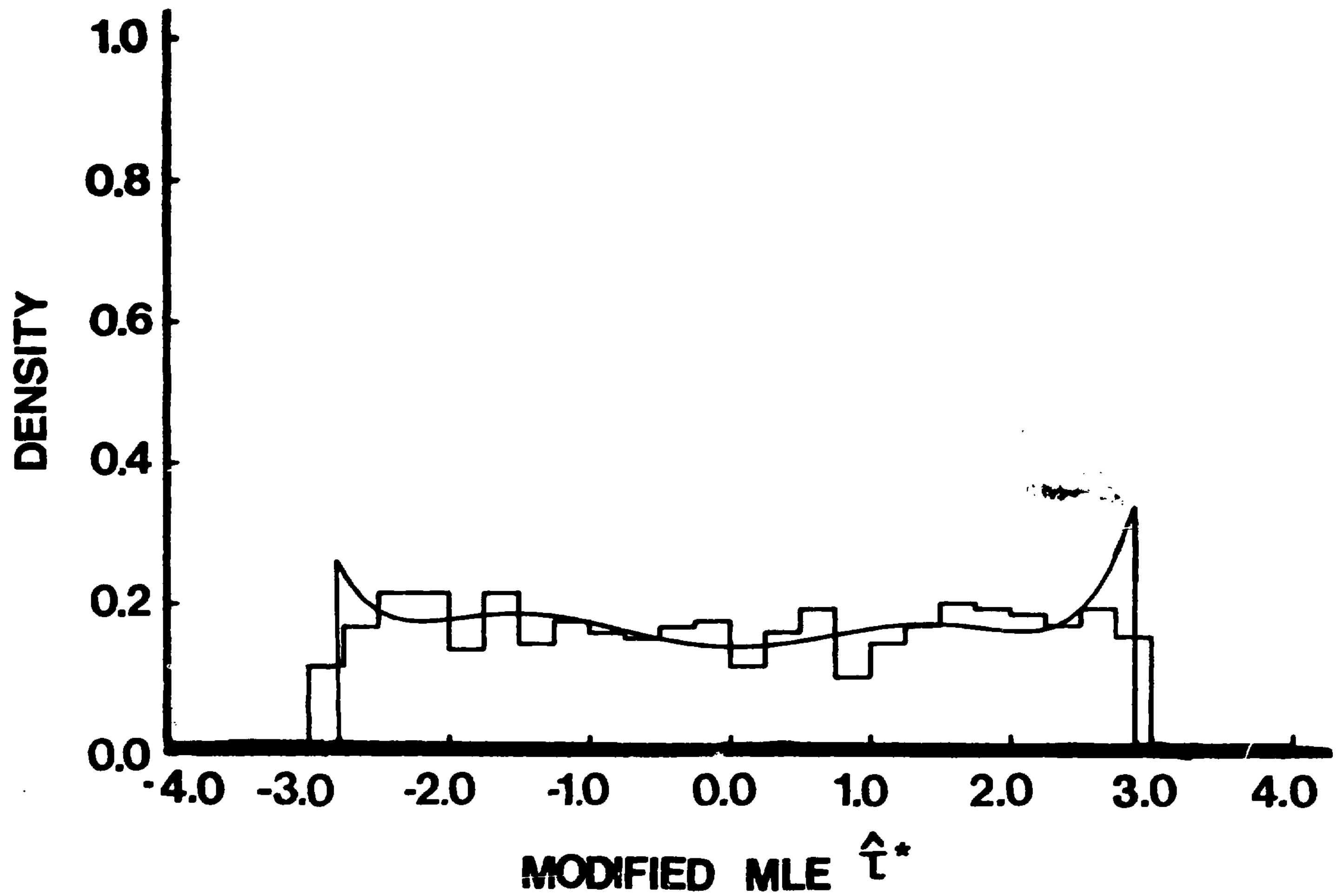

FIGURE 4-7 (Continued): Polynomial of Degree 6 .

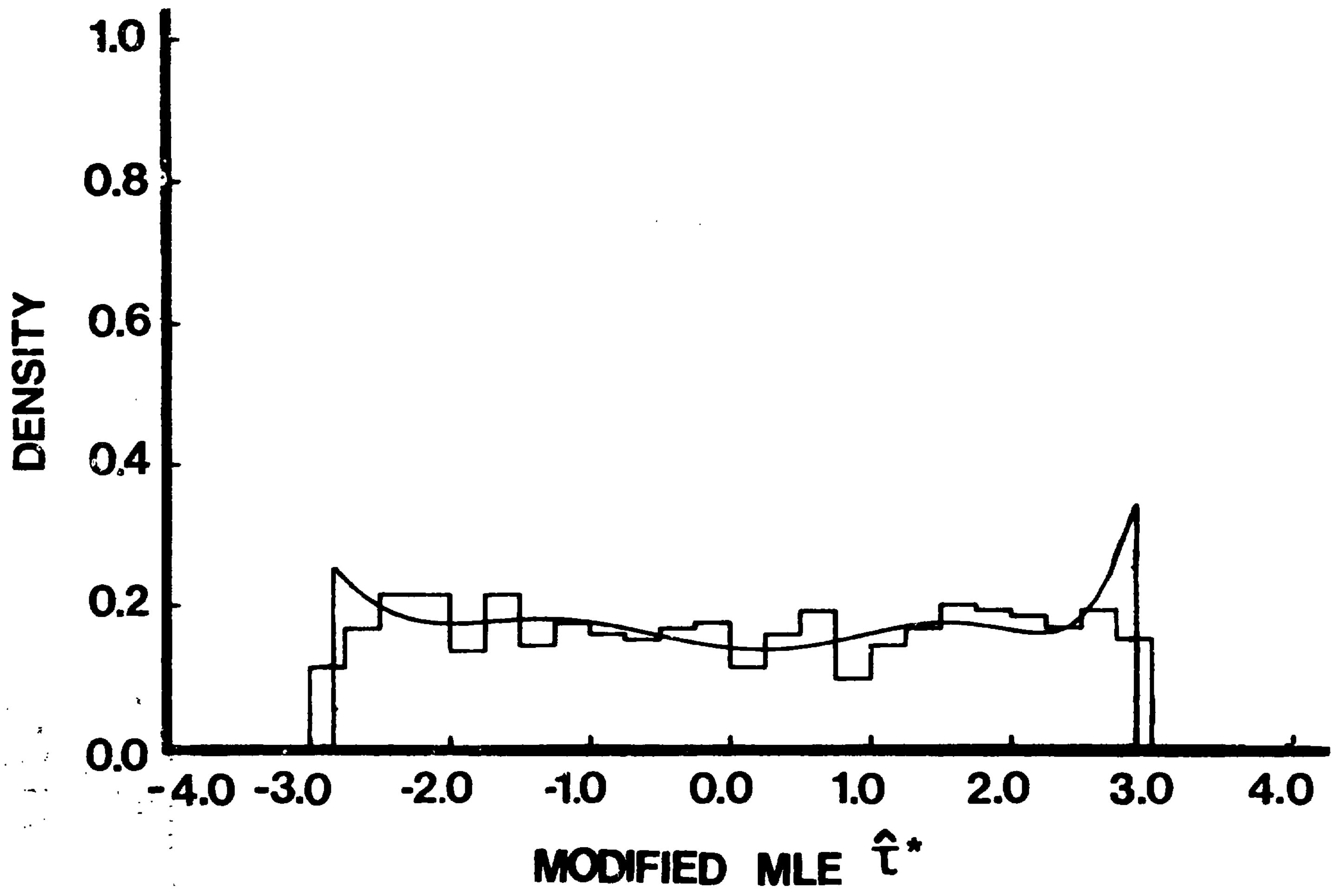

FIGURE 4-7 (Continued): Polynomial of Degree 7 .

the estimated density functions, $g^*(\tau^*_s)$, will affect the accuracy of estimation of the item characteristic functions of the ten unknown, binary test items is yet to be seen.

As we have done in a previous study for Subtests 1 and 2 (Samejima, RR-80-4), we shall use the polynomials of degrees 3 and 4 , separately, for the estimated density function, $\hat{g}^*(\hat{\tau}^*_s)$, and, hereafter, we shall call the former case as Degree 3 Case, and the latter Degree 4 Case. The estimate, $\hat{\phi}^*(\tau|\hat{\tau}^*_s)$, for the conditional density function of τ , given $\hat{\tau}^*_s$, is given by

$$(4.9) \qquad \phi^*(\tau|\hat{\tau}^*_s) = [2\pi]^{-1/2} \exp[-(\tau-\mu)^2/(2\sigma^2)] \quad ,$$

where μ is the estimate of the first conditional moment, $\hat{E}(\tau|\hat{\tau}^*_s)$, and σ^2 is the estimate of the second conditional moment, $\hat{E}(\tau^2|\hat{\tau}^*_s)$, subtracted by the square of the first estimate, which were obtained by replacing $g^*(\hat{\tau}^*_s)$ in (4.6) and (4.7) by $\hat{g}^*(\hat{\tau}^*_s)$. These estimated conditional mean and variance for each of the five hundred $\hat{\tau}^*_s$'s are presented in Appendix as Tables A-1 and A-2, for Degree 3 and 4 Cases, respectively. From the estimated conditional density functions, which are given by (4.9), we obtain the estimated operating characteristic, $\hat{P}_{x_h}(\theta)$, of the discrete item response x_h of an unknown test item h by

$$(4.10) \qquad \hat{P}_{x_h}(\theta) = \hat{P}^*_{x_g}[\tau(\theta)] = \sum_{s\in x_h} \hat{\phi}^*(\tau|\hat{\tau}^*_V) \left[\sum_{s=1}^{N} \hat{\phi}^*(\tau|\tau^*_V) \right]^{-1} .$$

Figures 4-8 and 4-9 present the resultant estimated operating characteristic for $x_h = 1$, or the estimated item characteristic

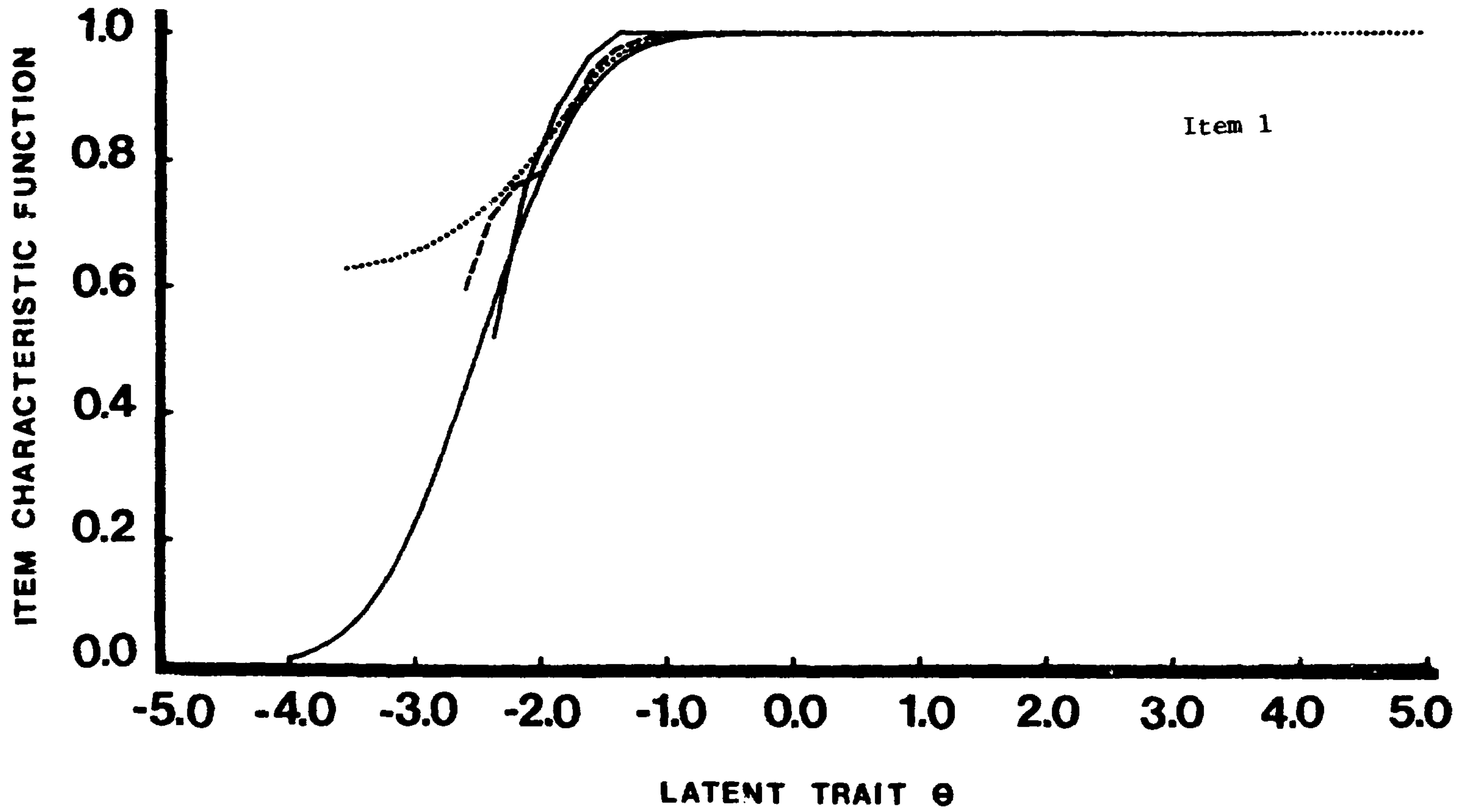

FIGURE 4-8

Estimated Item Characteristic Functions Based upon Subtest 3 (Dotted Line) and upon the Original Old Test (Dashed Line), in Comparison with the Theoretical Item Characteristic Function (Smooth Solid Line) and the Frequency Ratios of Those Who Answered Correctly (Jagged Solid Line), for Degree 3 Case.

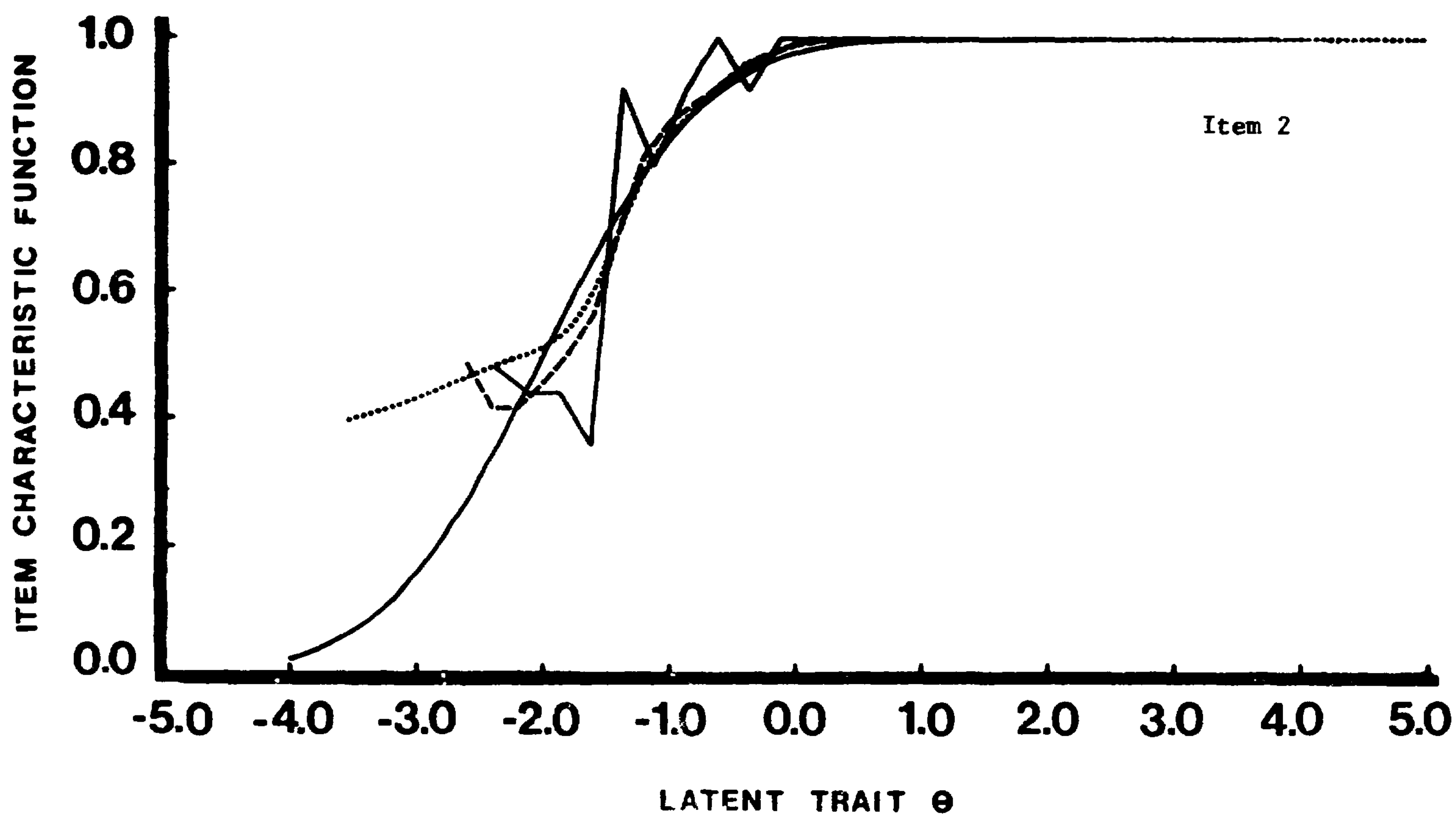

FIGURE 4-8 (Continued): Degree 3 Case.

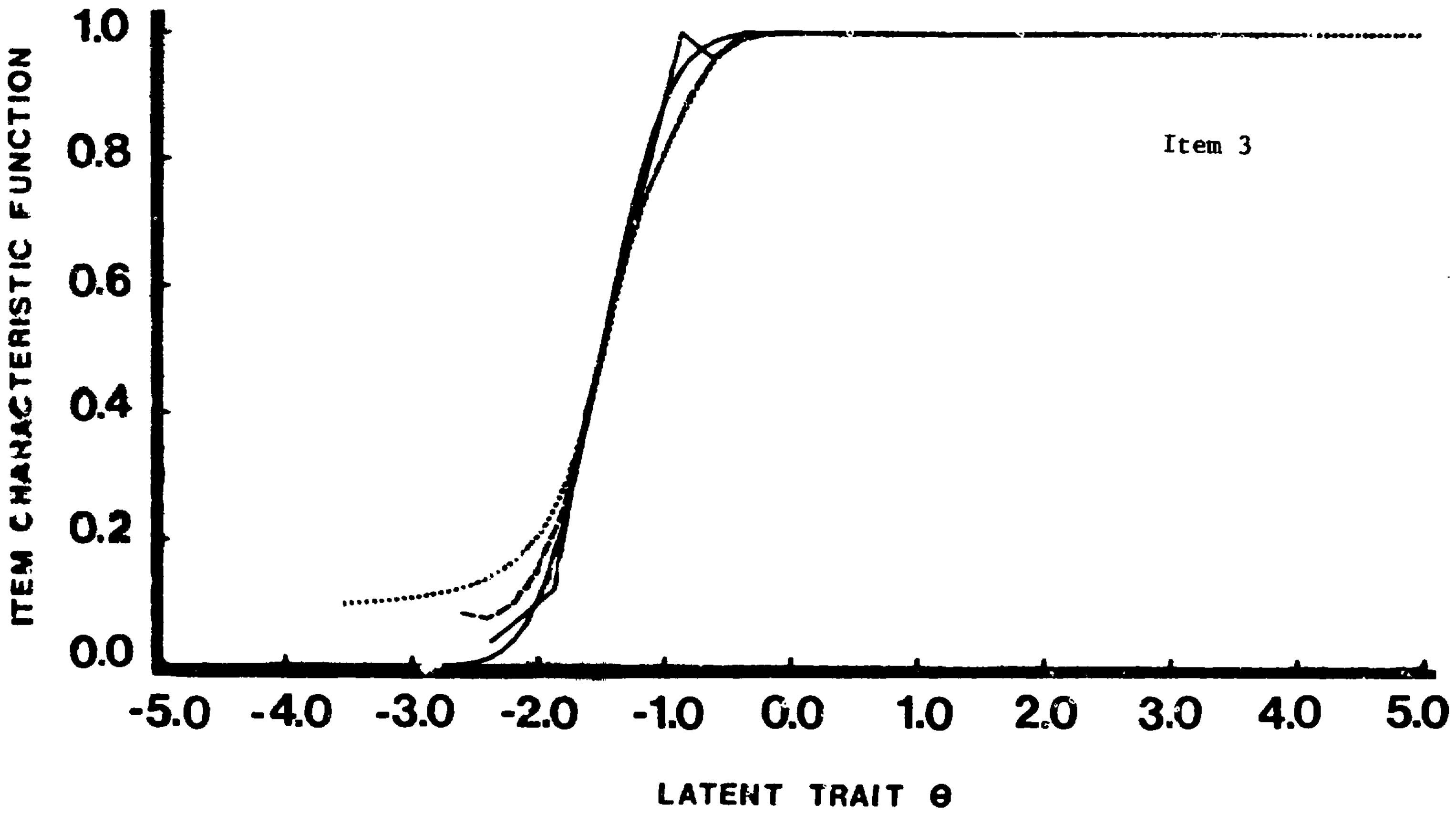

FIGURE 4-8 (Continued): Degree 3 Case.

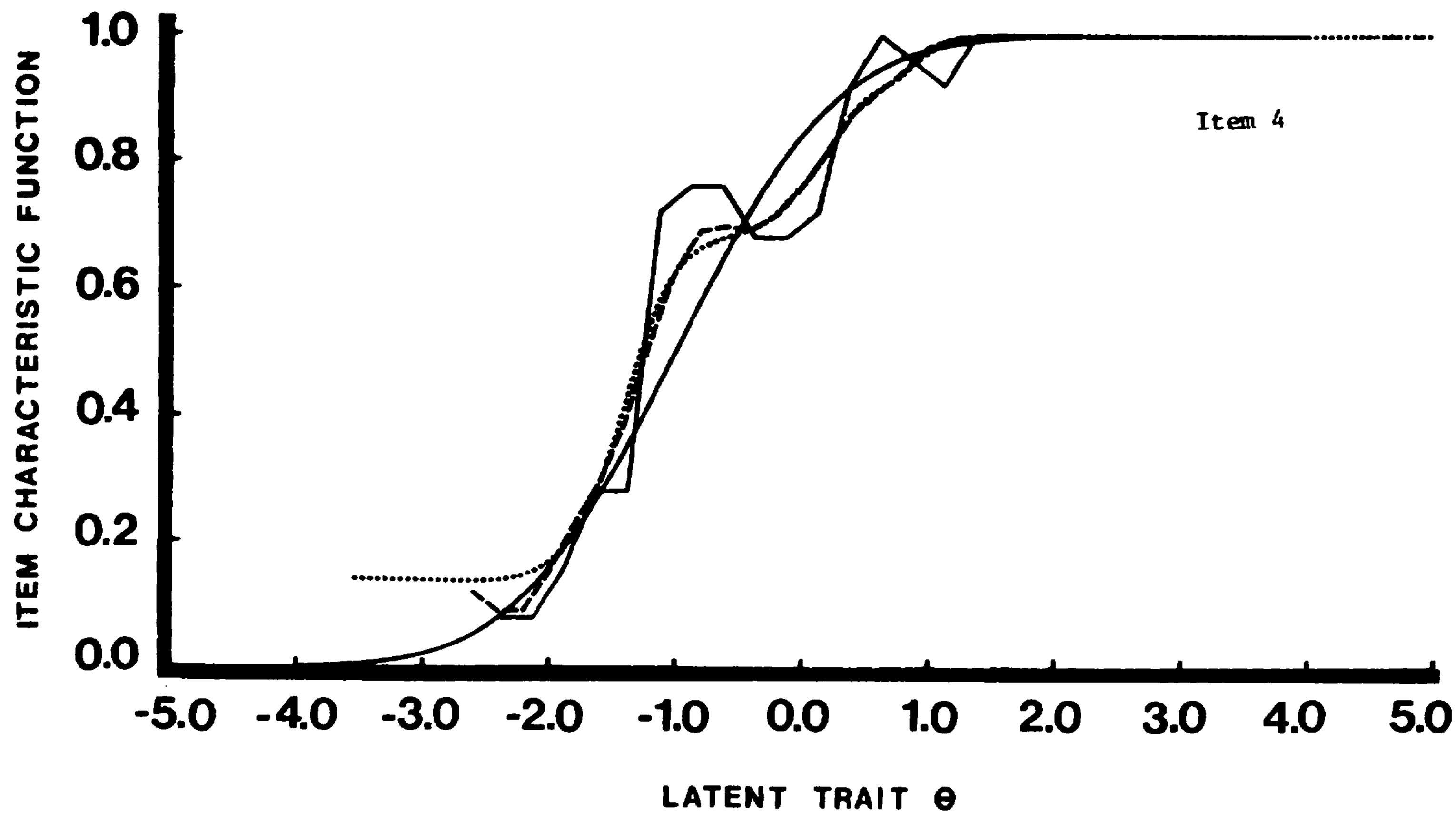

FIGURE 4-8 (Continued): Degree 3 Case.

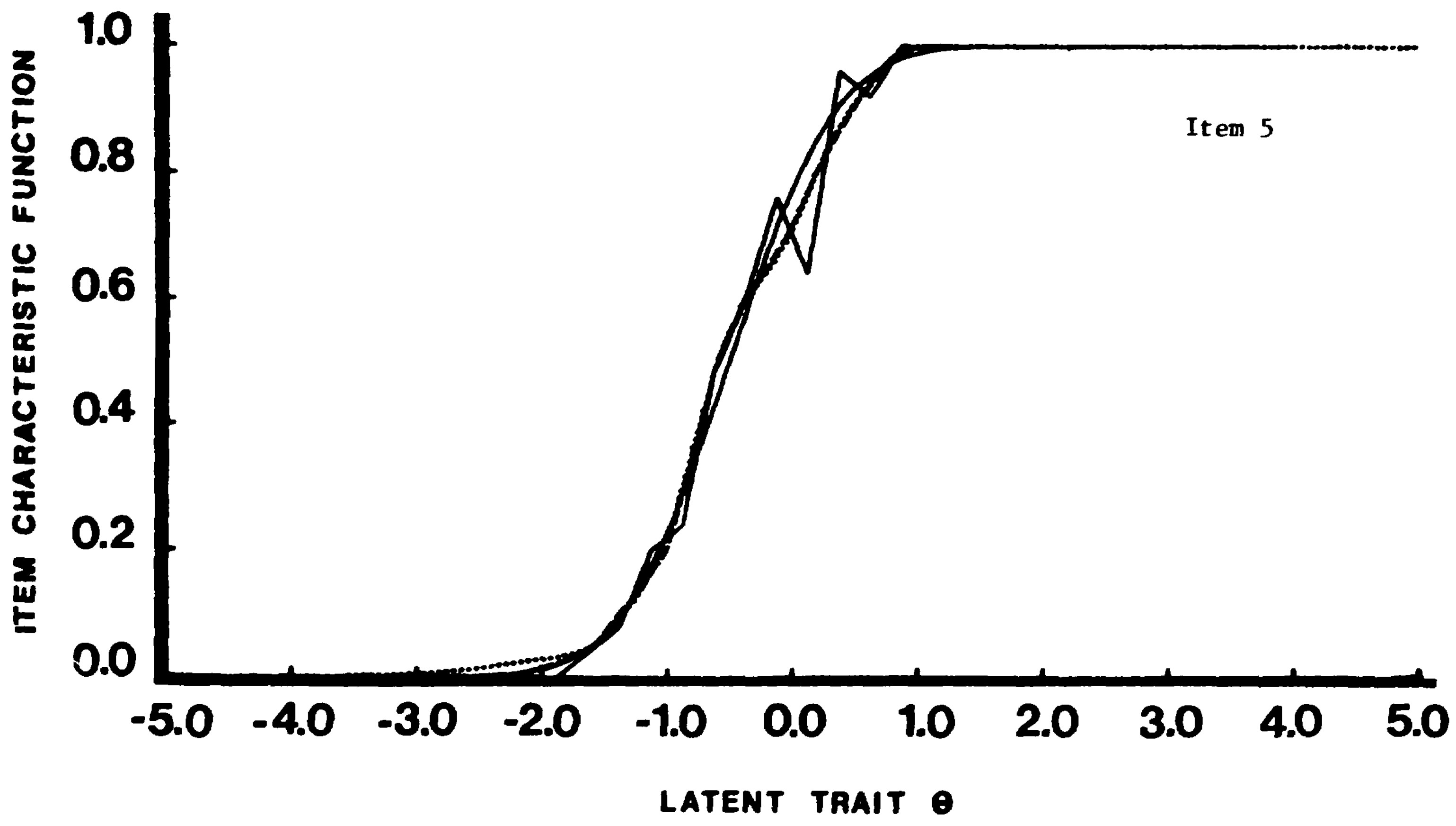

FIGURE 4-8 (Continued): Degree 3 Case.

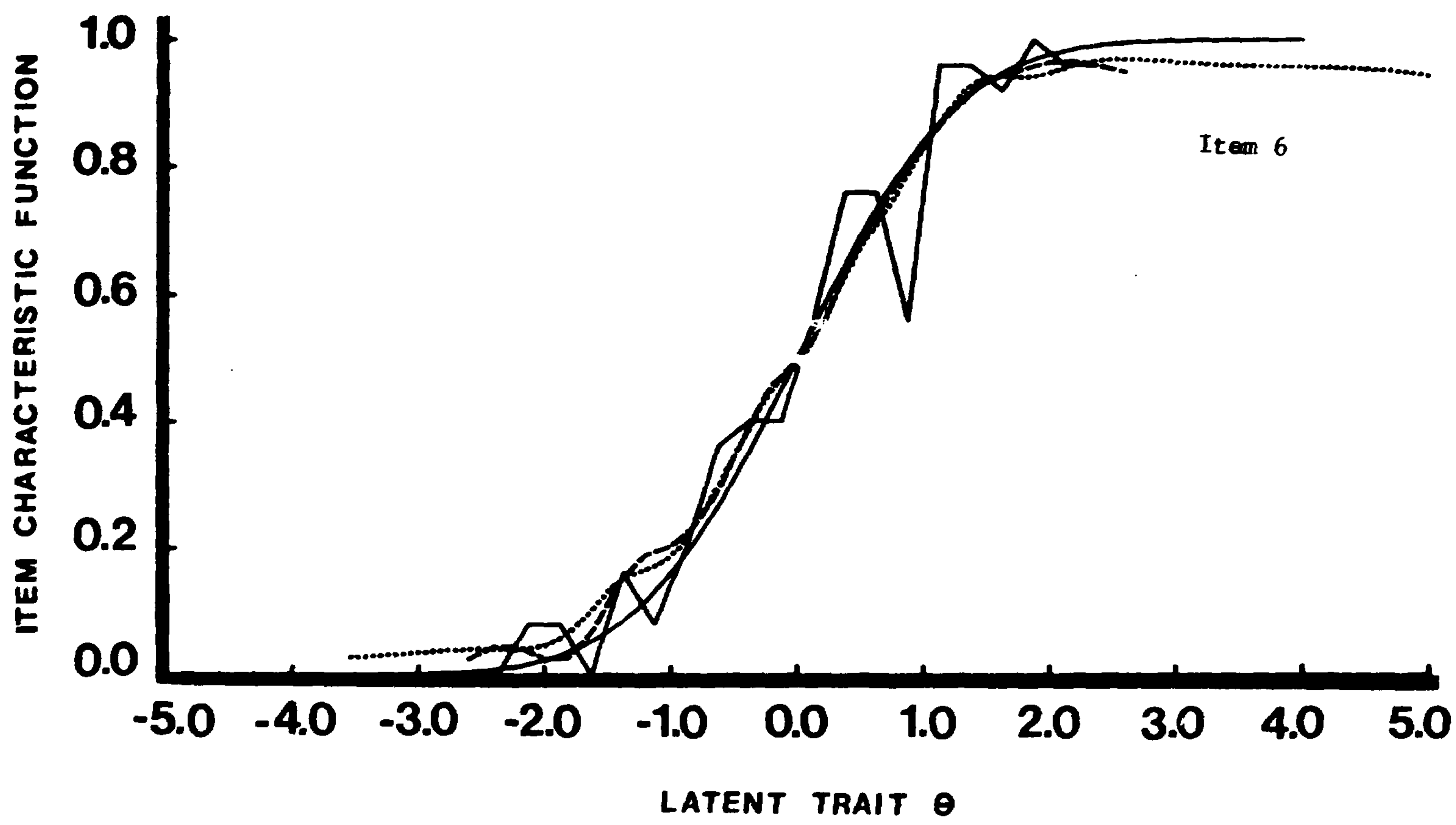

FIGURE 4-8 (Continued): Degree 3 Case.

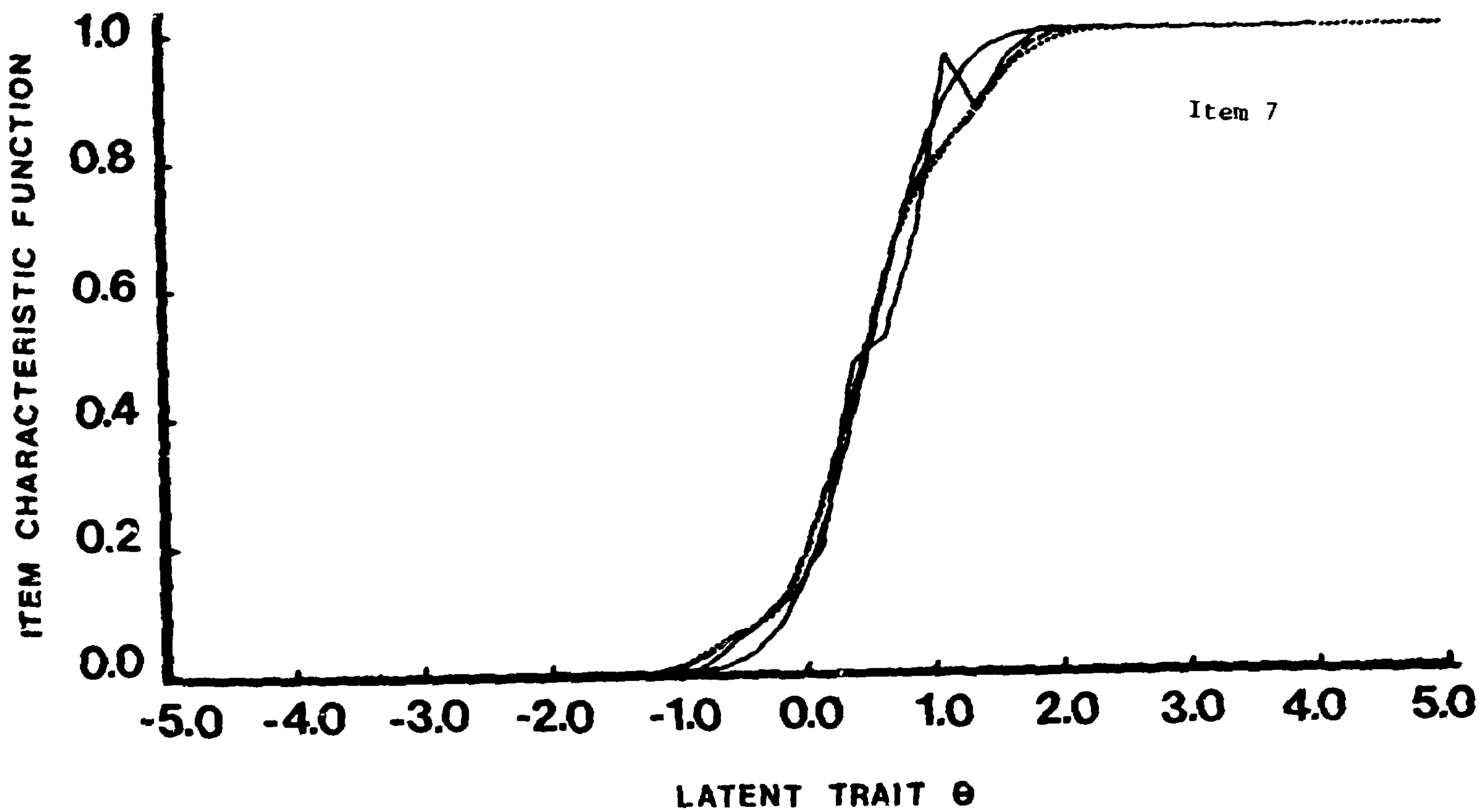

FIGURE 4-8 (Continued): Degree 3 Case.

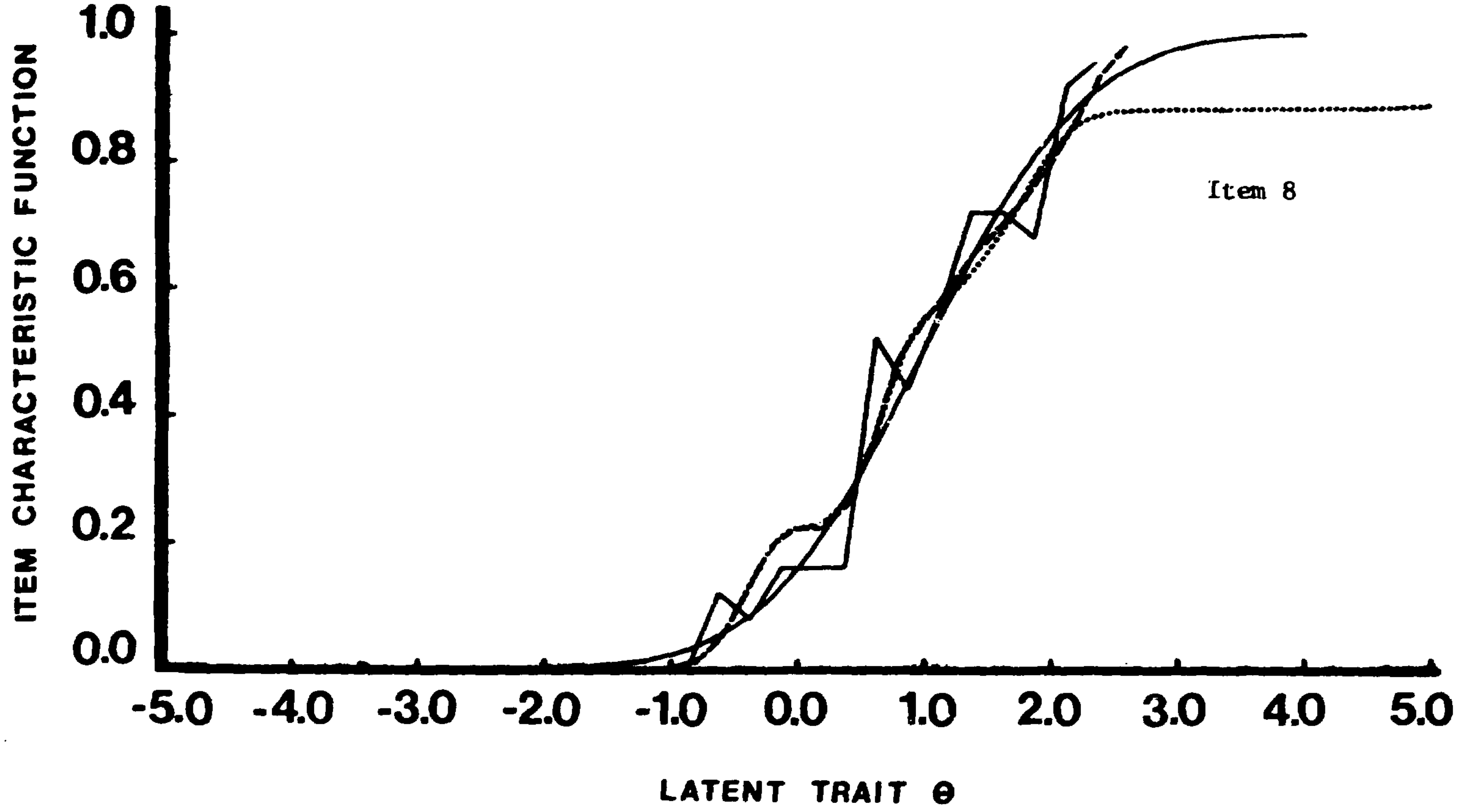

FIGURE 4-8 (Continued): Degree 3 Case.

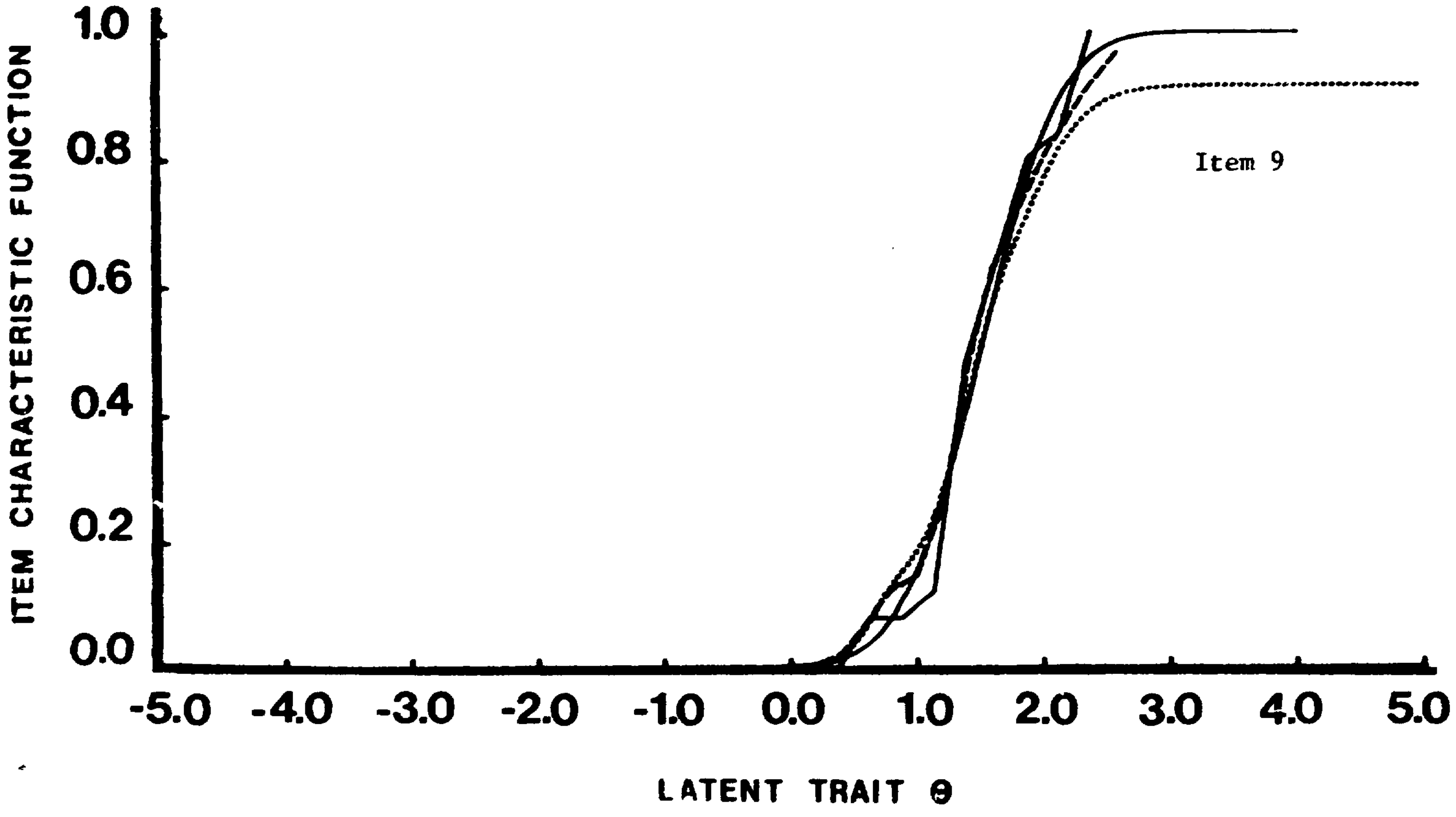

FIGURE 4-8 (Continued): Degree 3 Case.

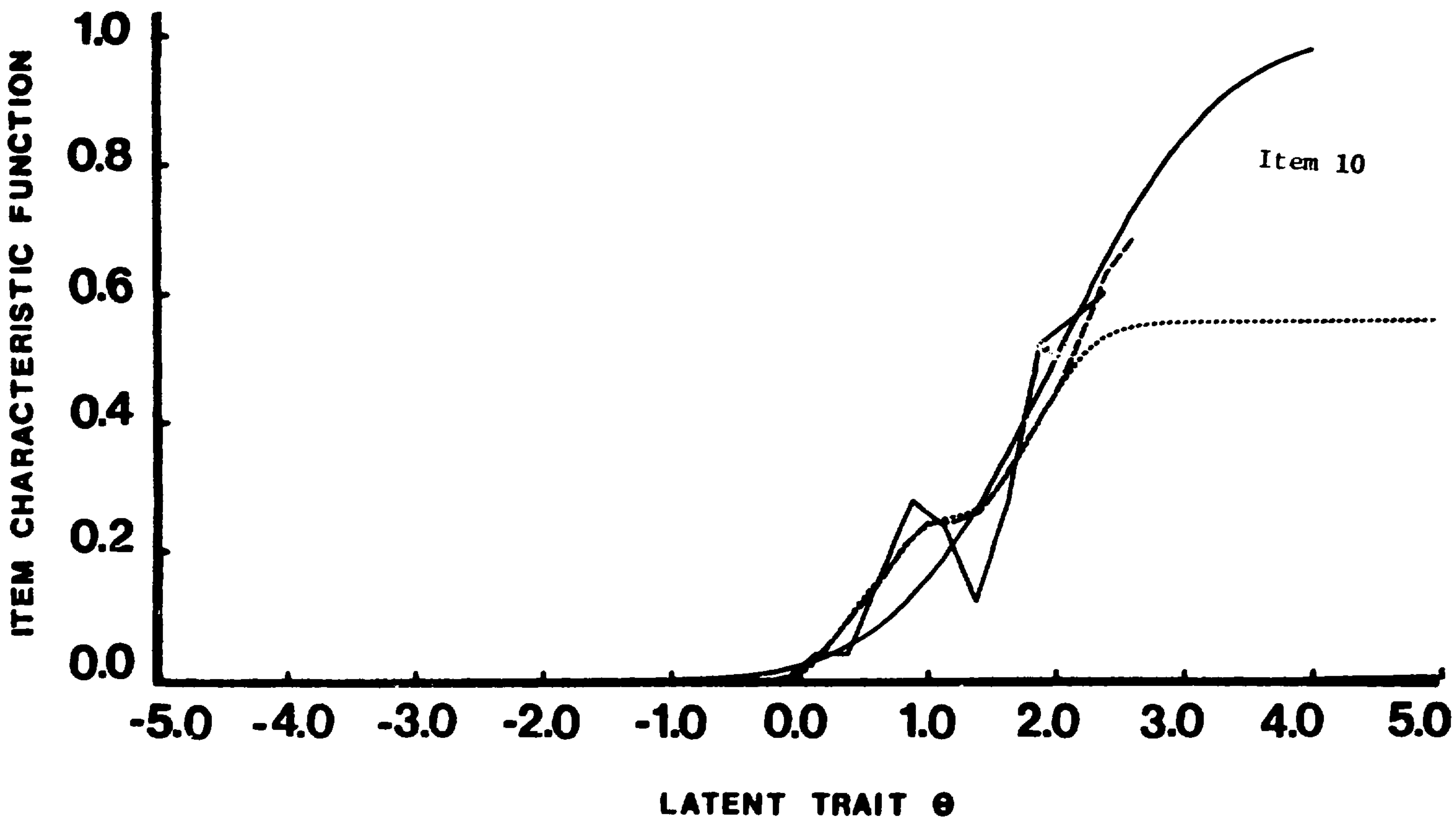

FIGURE 4-8 (Continued): Degree 3 Case.

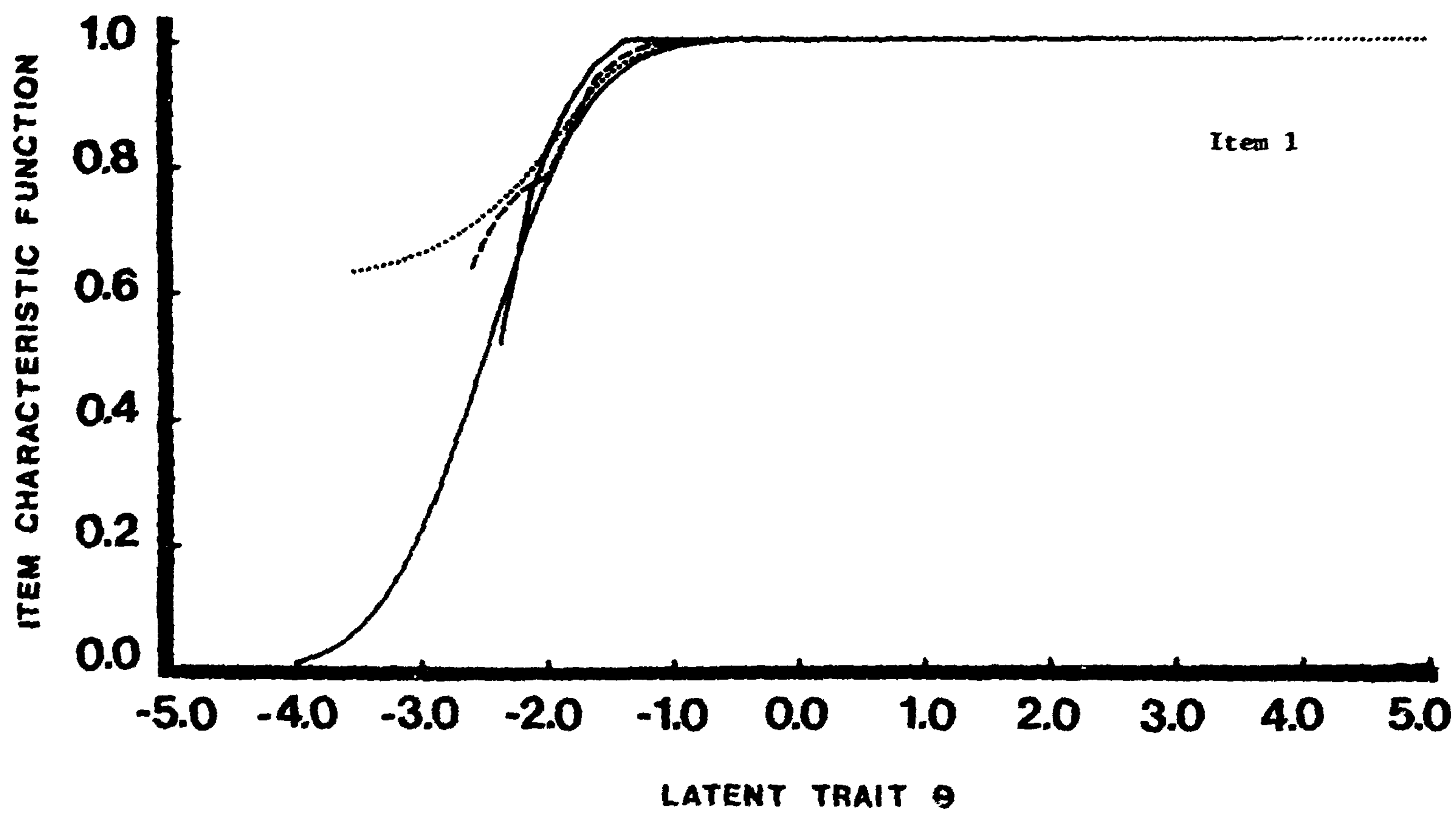

FIGURE 4-9

Estimated Item Characteristic Functions Based upon Subtest 3 (Dotted Line) and upon the Original Old Test (Dashed Line), in Comparison with the Theoretical Item Characteristic Function (Smooth Solid Line) and the Frequency Ratios of Those Who Answered Correctly (Jagged Solid Line), for Degree 4 Case.

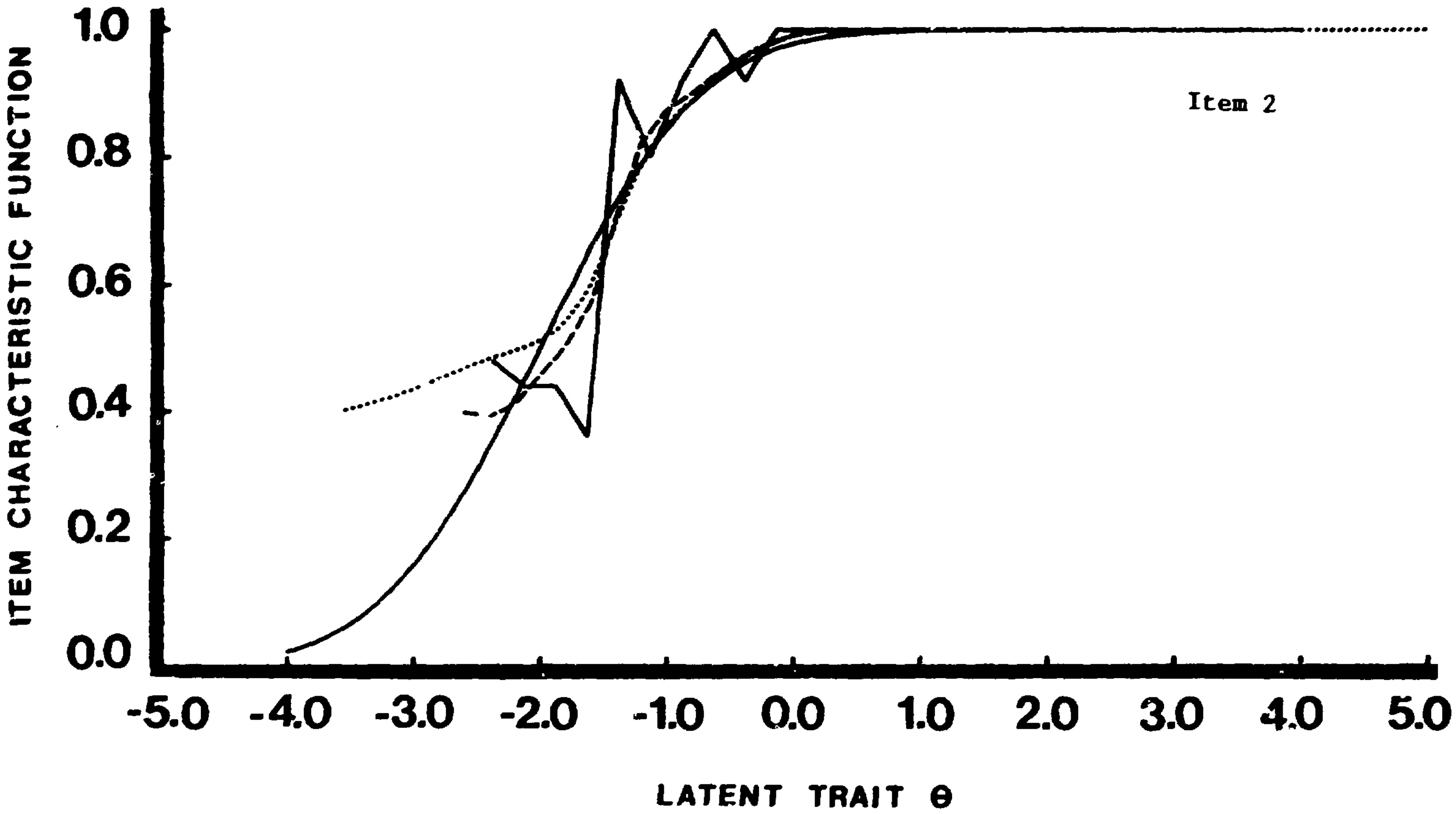

FIGURE 4-9 (Continued): Degree 4 Case.

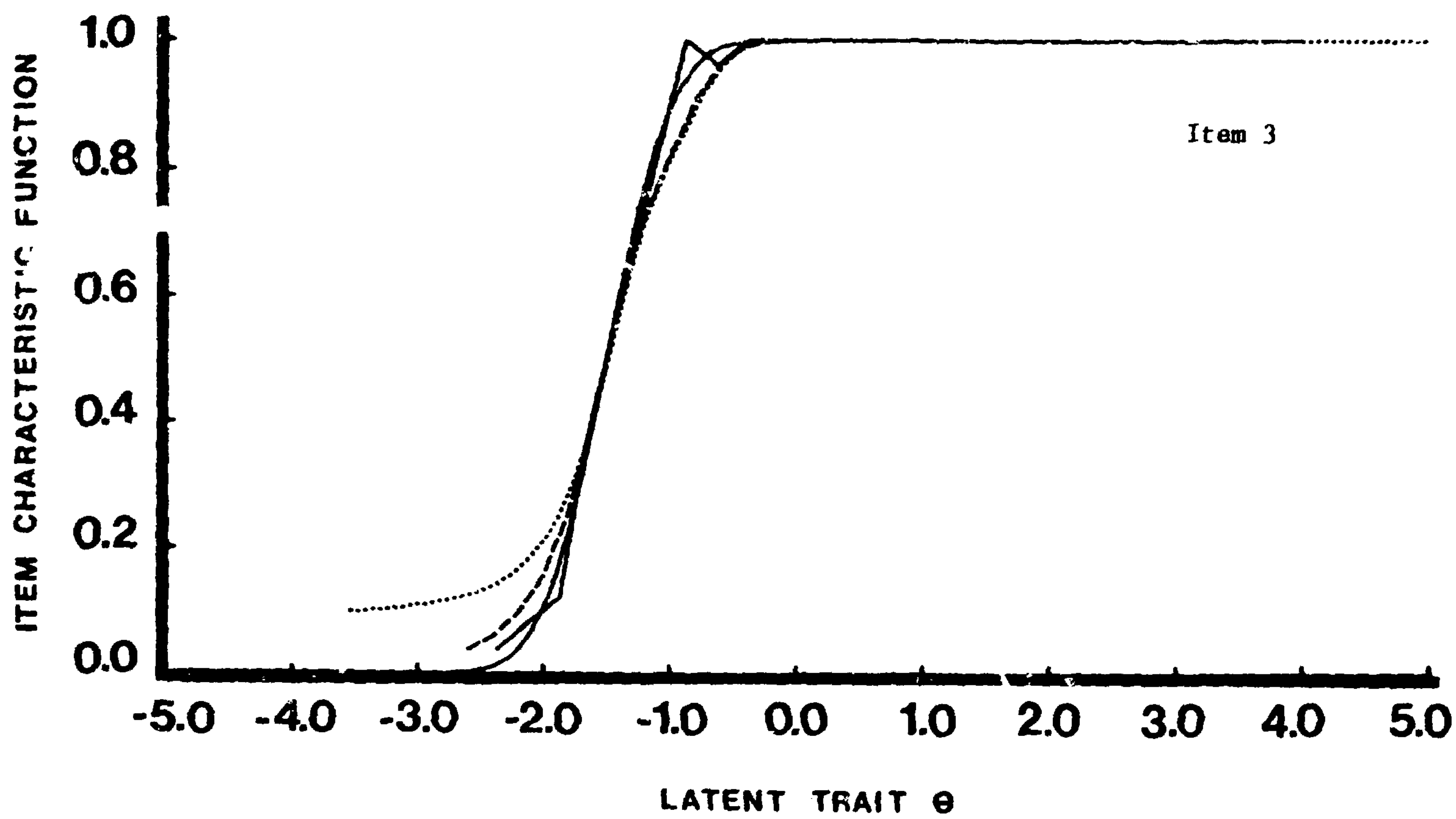

FIGURE 4-9 (Continued): Degree 4 Case.

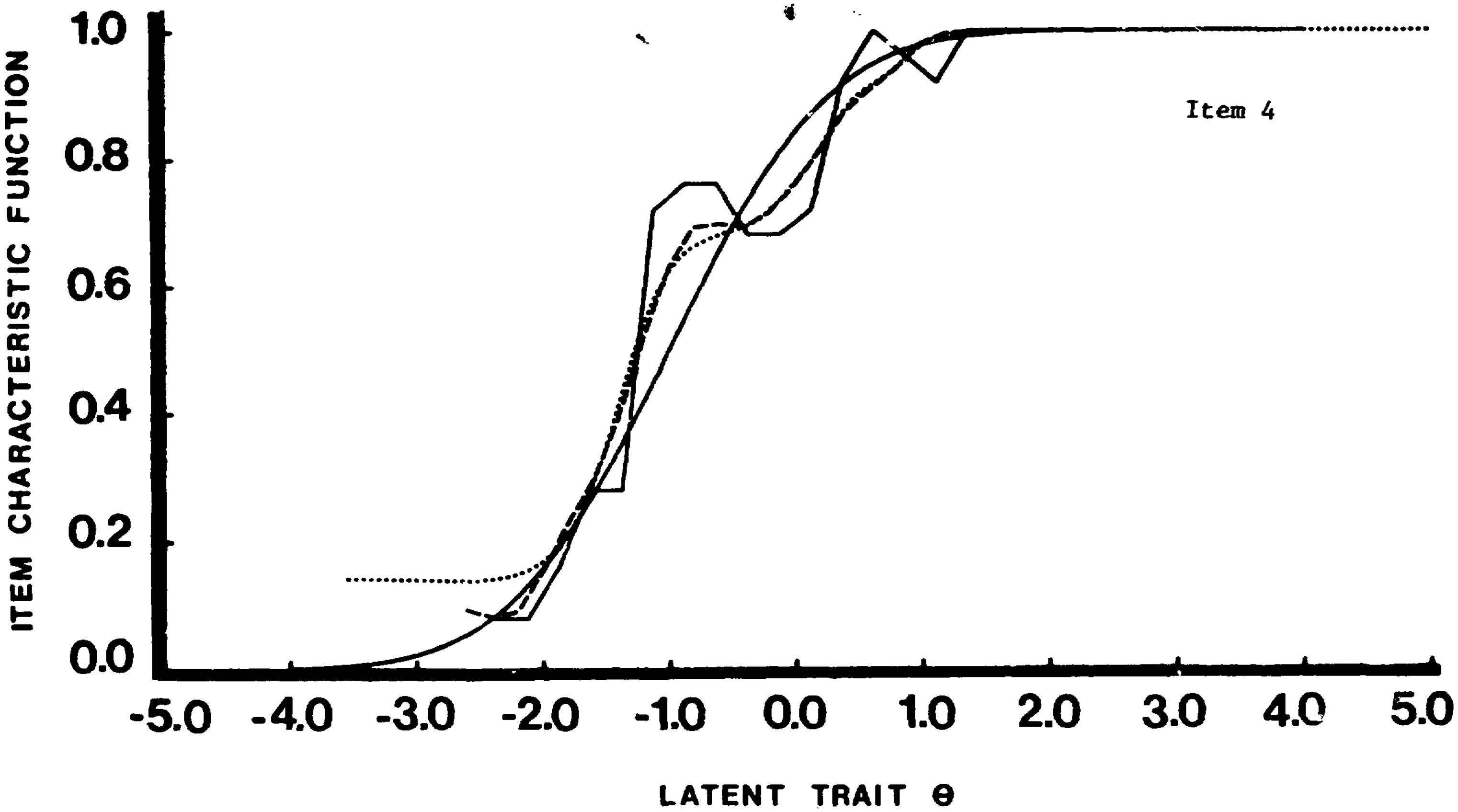

FIGURE 4-9 (Continued): Degree 4 Case.

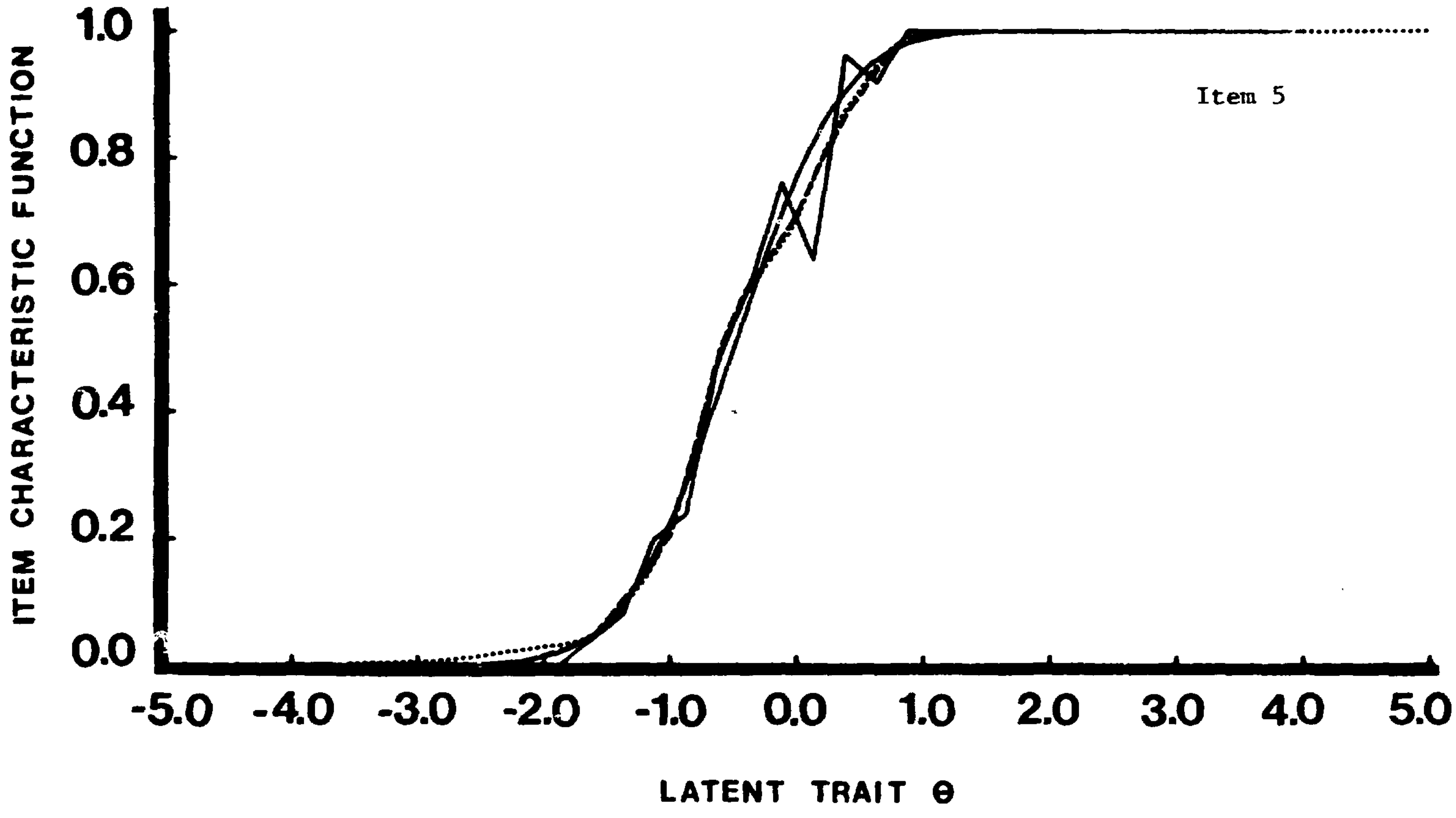

FIGURE 4-9 (Continued): Degree 4 Case.

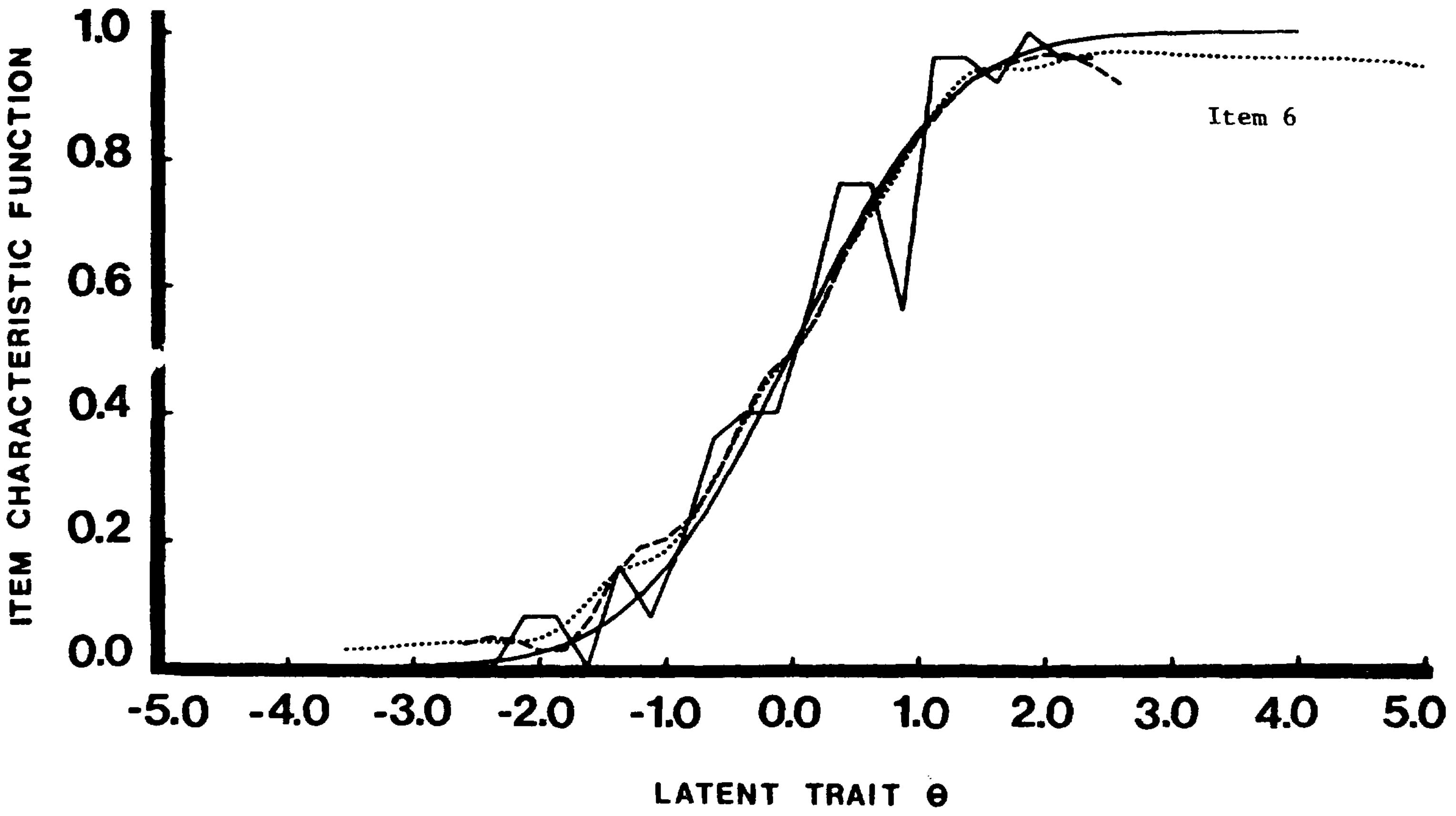

FIGURE 4-9 (Continued): Degree 4 Case.

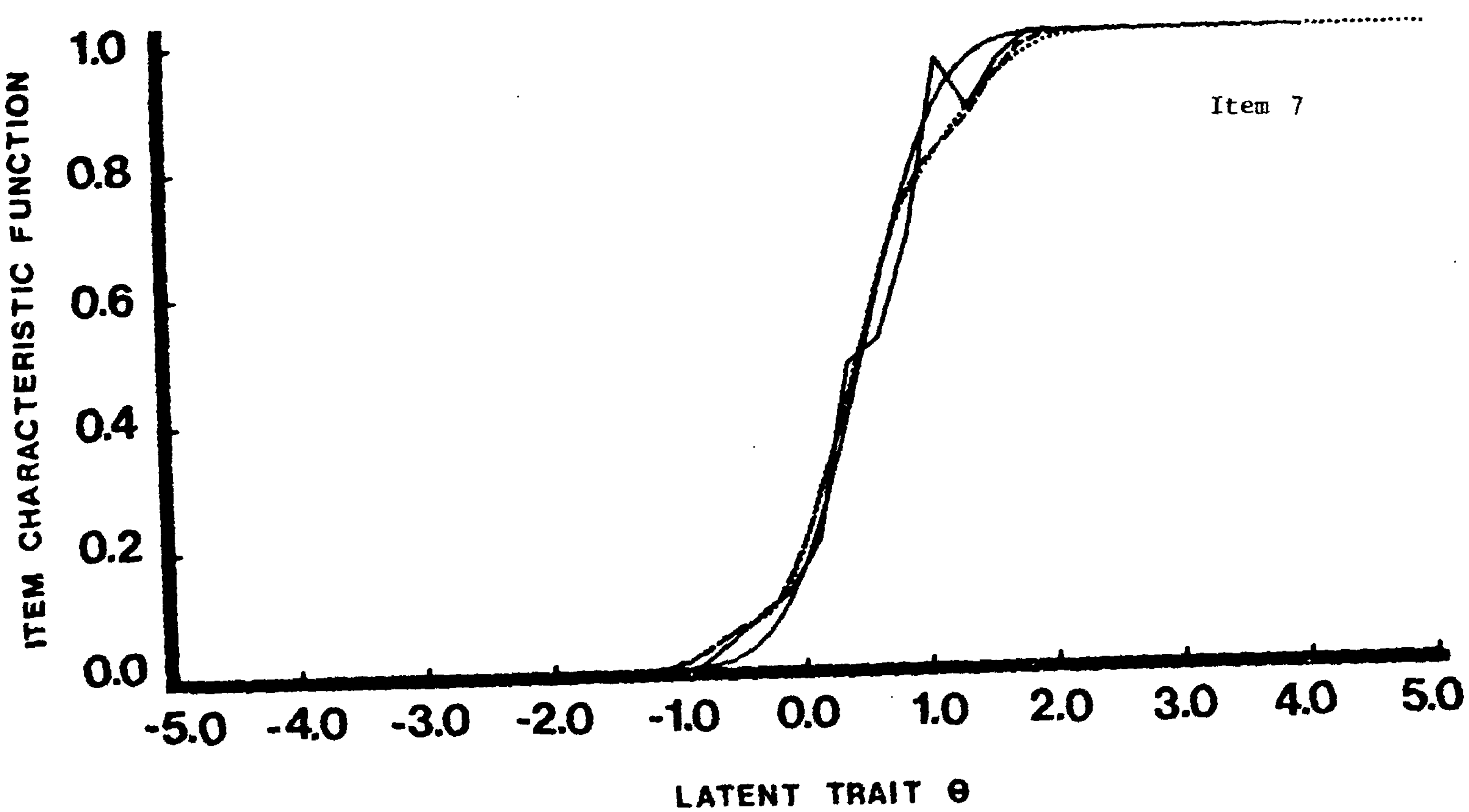

FIGURE 4-9 (Continued): Degree 4 Case.

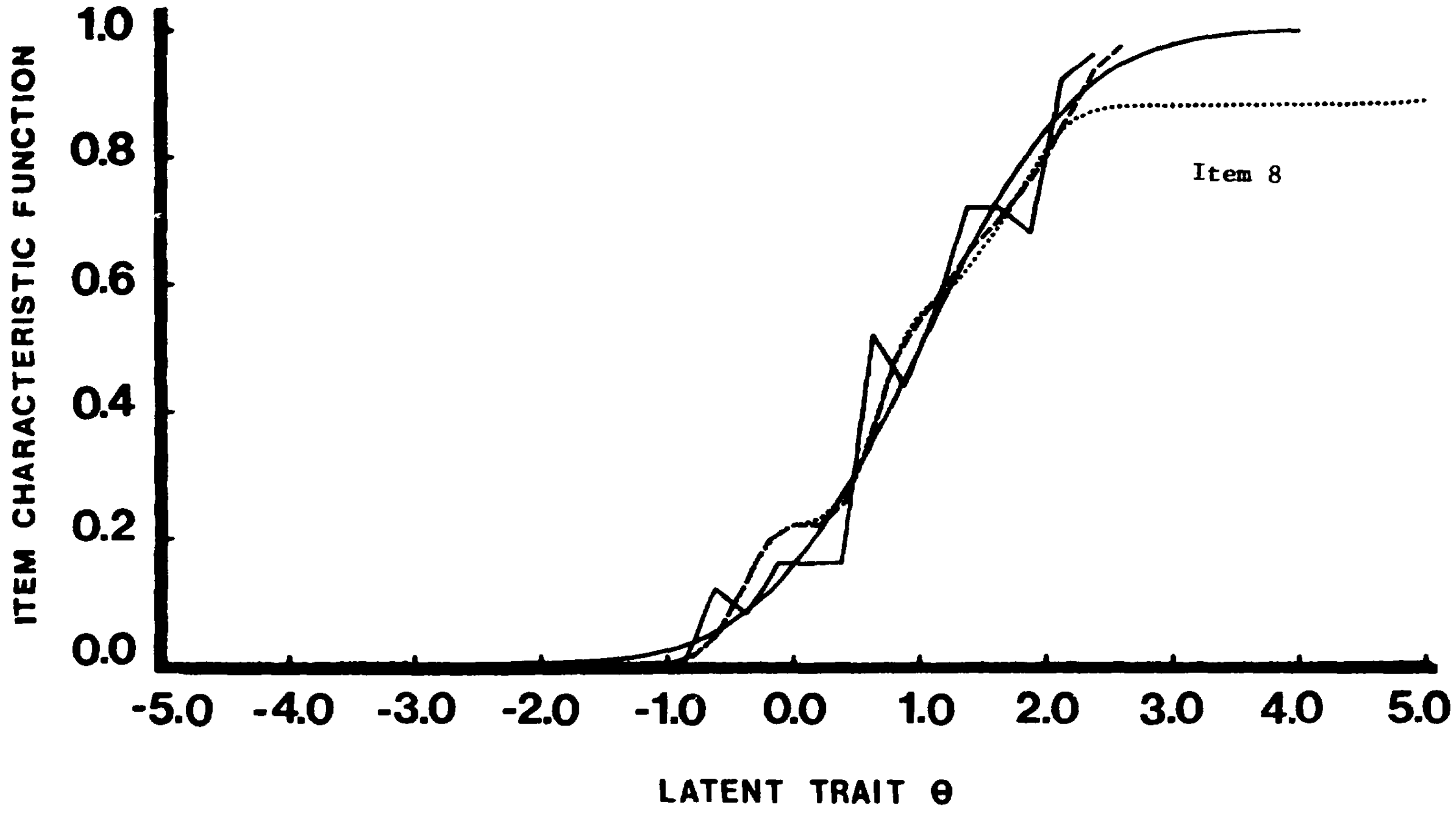

FIGURE 4-9 (Continued): Degree 4 Case.

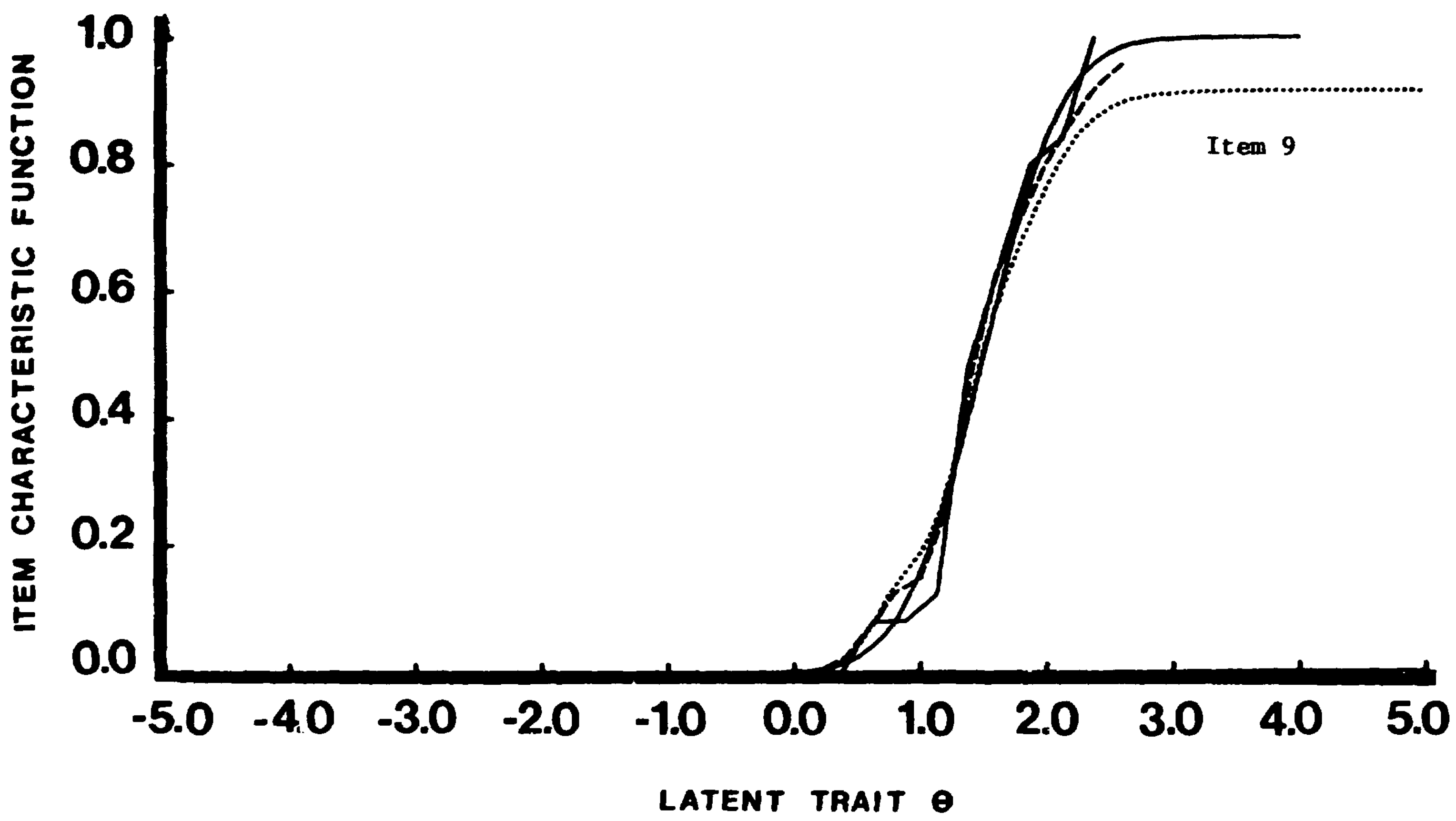

FIGURE 4-9 (Continued): Degree 4 Case.

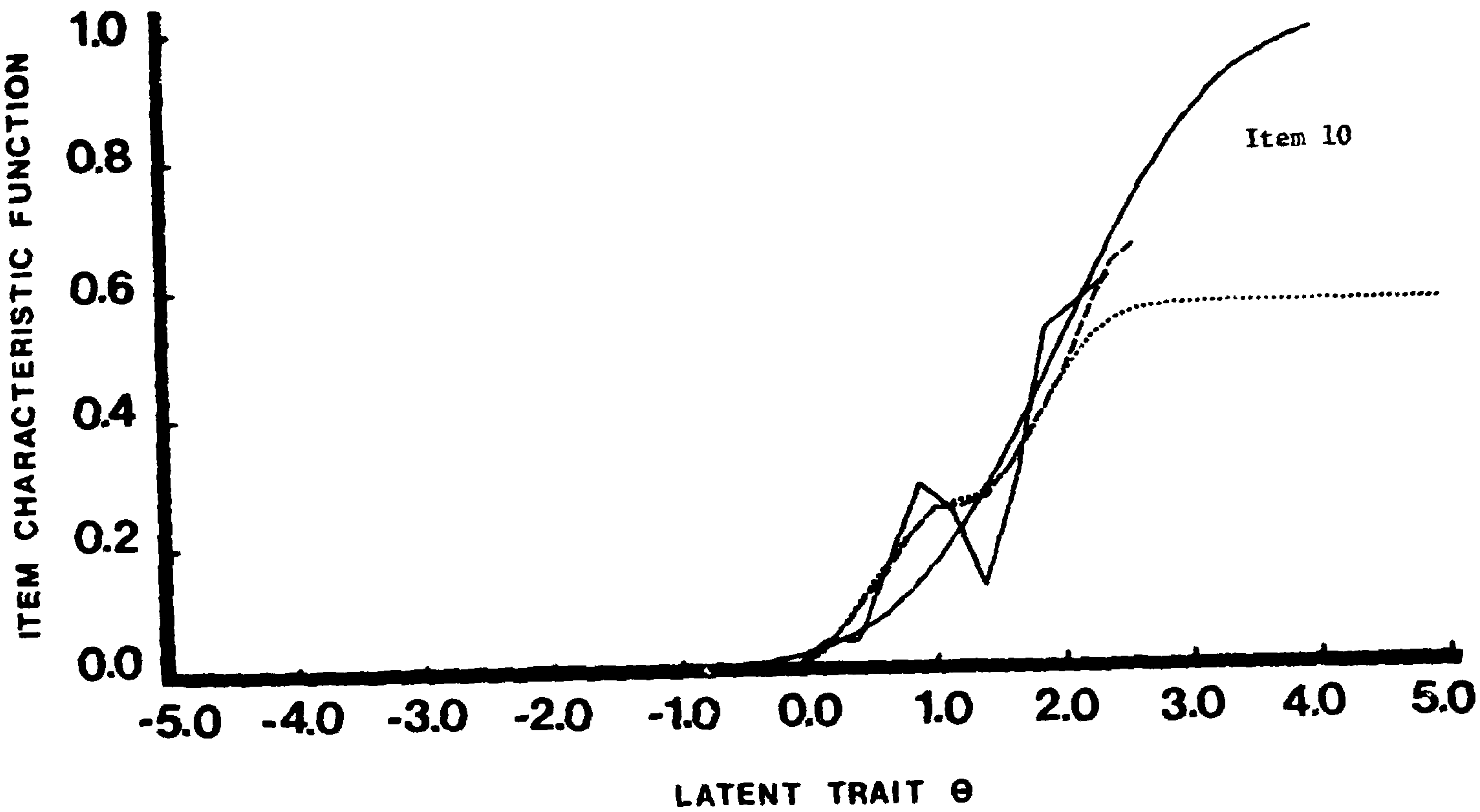

FIGURE 4-9 (Continued): Degree 4 Case.

function, by a dotted line, for each of the ten, unknown binary test items, together with the result obtained upon the original Old Test, the theoretical item characteristic function, and the frequency ratios of the correct answer for the subintervals of θ with the width 0.25 , which are drawn by a dashed line and smooth and jagged solid lines, respectively, for Degree 3 and 4 Cases. Comparison of these two figures indicates that these two sets of results, i.e., those of Degree 3 and 4 Cases, are practically identical, the fact that we observed in all the previous studies (Samejima, RR-78-1, RR-78-2, RR-78-4, RR-78-5). It is also observed that these two curves for each item are very close to the theoretical item characteristic function, at least, for the interval of θ , $(-2.0, 2.0)$. This means that the present method turned out to be successful, in spite of the fact that the amount of test information is considerably small, especially for the extreme ranges of ability θ . We also notice that these estimated item characteristic functions are very close to the corresponding results obtained upon the original Old Test. To be more precise, they are practically identical for items 3, 5, 7, 8 and 10 , while there are some visible discrepancies for items 1, 2, 4, 6 and 9 . It is important to note that, in general, these estimated item characteristic functions, which are based upon Subtest 3, are no farther apart from the theoretical item characteristic functions than those based upon the original Old Test, at least, for the interval of θ , $(-2.0, 2.0)$. This implies a remarkable accomplishment of the present method, considering the fact that

Subtest 3 contains only fifteen test items, while the original Old Test has thirty-five items, and Subtests 1 and 2 have twenty-five test items each.

We notice, in Figures 4-8 and 4-9, that there are some items whose estimated item characteristic functions have lower asymptotes greater than zero, and also some whose estimated item characteristic functions have upper asymptotes less than unity. Although the ranges of θ for which these phenomena are observed are outside of the meaningful interval, $(-2.5, 2.5)$, it may be worth investigating them. The items which belong to the first group are items 1, 2, 3 and 4, and those which belong to the second group are items 6, 8, 9 and 10 .

Table 4-4 presents the response pattern of the ten unknown, binary test items obtained by each of the fourteen hypothetical examinees whose response patterns of the fifteen test items of Subtest 3 are uniformly V-min , or the set of all zeros. We can see in this table that for items 1, 2, 3 and 4 not all the responses by the fourteen examinees are zero, i.e., eight, four, one and two examinees out of the fourteen answered these four items correctly. We note from (4.10) that the ratios of these numbers to fourteen must be the lower asymptotes for these four items, since they are the group of examinees whose modified maximum likelihood estimates are $\hat{\tau}^*_{V\text{-min}}$ $(= -2.843)$, i.e., the lowest. These ratios are 0.571 , 0.286 , 0.071 and 0.143 for items 1, 2, 3 and 4 , respectively, and both Figures 4-8 and 4-9 indicate that, indeed,

TABLE 4-4

Identification Number and the Response Pattern of the Ten Unknown, Binary Items Obtained by Each of the Fourteen Hypothetical Examinees Whose Response Patterns of Subtest 3 are V-min .

ID	Response Pattern
1	0001000000
101	0100000000
201	0100000000
401	1000000000
2	0100000000
102	0000000000
202	0000000000
302	1000000000
303	1000000000
4	1100000000
108	1000000000
109	1001000000
210	1000000000
118	1010000000

they are the lower asymptotes for these four estimated item characteristic functions in both Degree 3 and 4 Cases. Similarly, Table 4-5 presents the response pattern of the ten unknown binary test items obtained by each of the twelve hypothetical examinees whose response patterns of the fifteen test items of Subtest 3 are uniformly V-max , or the set of all 2's . This table shows that for items 6, 8, 9 and 10 some responses are zero, i.e., one out of the twelve examinees answered items 6, 8 and 9 incorrectly and five out of the twelve did the same to item 10 . The ratios of those who answered items 6, 8, 9 and 10 correctly to the total number, twelve, are 0.583 , 0.916 , 0.916 and 0.916 , respectively, and they are the upper asymptotes of the estimated item characteristic functions of the four binary test items in both Degree 3 and 4 Cases.

A close examination of Tables 4-4 and 4-5 reveals that many of the "unusual" responses come from the examinees whose true ability levels are not very low, or not very high. To be more specific, nine out of the fifteen 1's in Table 4-4 belong to the six hypothetical examinees whose true ability levels are -2.375 or higher, and seven out of the eight 0's in Table 4-5 belong to the four hypothetical examinees whose true ability levels are 2.375 or lower. This fact indicates that the small amounts of test information provided by Subtest 3 for these ranges of ability θ are responsible for these asymptotes, since they are the causes of misclassifying those examinees to V-min and V-max and

TABLE 4-5

Identification Number and the Response Pattern of the Ten Unknown, Binary Items Obtained by Each of the Twelve Hypothetical Examinees Whose Response Patterns of Subtest 3 are V-max .

ID	Response Pattern
491	1111111000
193	1111111110
493	1111111110
294	1111111111
296	1111111111
397	1111111111
98	1111111111
198	1111101110
199	1111111111
299	1111111110
499	1111111111
300	1111111111

giving them the lowest and the highest estimates, i.e., $\hat{\tau}^*_{V\text{-}min}$ and $\hat{\tau}^*_{V\text{-}max}$, respectively.

V Discussion and Conclusions

The main difference between the present study and the previous one (Samejima, RR-80-4) in which Subtests 1 and 2 were used, separately, as the Old Test lies in the fact that the amount of test information provided by Subtest 3 is so small at both the lower and higher extreme ranges of ability θ , that the maximum likelihood estimates of some of the hypothetical examinees are either negative or positive infinity, and we used the modified maximum likelihood estimate instead, while the same is not the case with either Subtest 1 or Subtest 2. In spite of this handicap, the results of the present study turned out to be quite successful.

There is an implicit warning in our results, however. As was observed in the preceding chapter, these small amounts of test information provided by Subtest 3 for extreme values of ability have caused undesirable asymptotes for some estimated item characteristic functions. Although it is relatively insignificant in the present result, encouragement in adopting a test with small amounts of information as the Old Test will lead to greater deviations of the estimated operating characteristics from the theoretical ones.

Even if the modified maximum likelihood estimate, $\hat{\tau}^*_V$, has an approximately linear regression on τ , the deviation of its conditional distribution, given τ , from the normality with C^{-1} as its second parameter is substantial, as we have observed in Chapter 3. We should not be overjoyed, therefore, by the success in the present study, and become insensitive to the shape of the square root of the test information function of a test, which we consider for the Old Test.

Throughout the two studies, in which we used three tests with non-constant test information functions, separately, as the Old Test, the introduction of the transformed latent trait τ proved to be successful. The logical step we should take next will be the investigation concerning the reduction of the number of test items in our Old Test, which may or may not have a constant amount of test information for the range of ability of our interest. This will be done in the near future, with the warning pointed out in the preceding paragraph in mind.

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APPENDIX

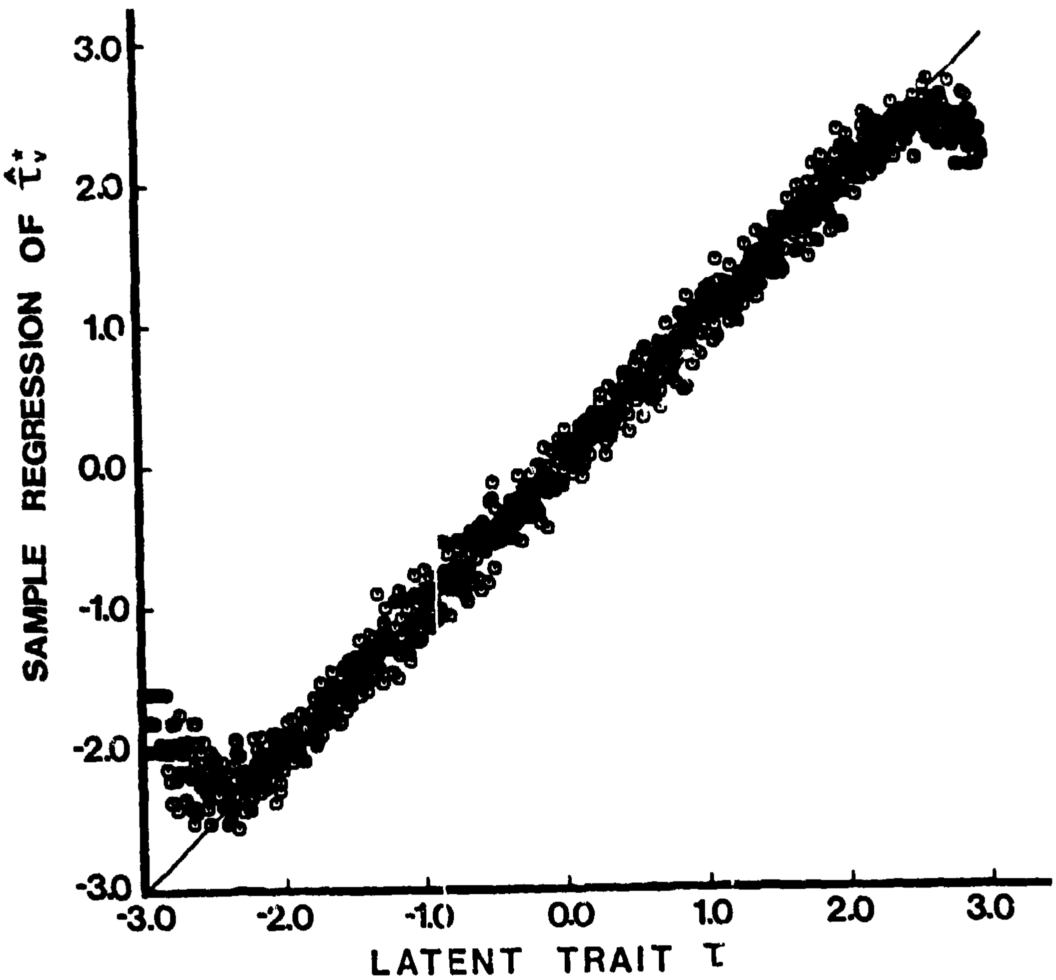

FIGURE A-1

Sample Regression of $\hat{\tau}_V^*$ on τ : Case 4, Using the Interval (-3.000, 3.000) , Instead of (-2.430, 2.586) . $\tau_c = -0.5455$, $\hat{\tau}^*_{V\text{-min}} = -1.6061$ and $\hat{\tau}^*_{V\text{-max}} = 2.0856$.

TABLE A-1

The Estimated Conditional Moments of τ , Given the Maximum Likelihood Estimate, β_1 , β_2 and the Criterion κ for the 500 Hypothetical Subjects, in Degree 3 Case, Based upon Subtest 3 .

Subject	$\hat{\tau}$*	Conditional Moments Mean	Variance	3rd	4th	β_1	β_2	κ	Type	Subject
1	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	1
2	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	2
3	-2.6518	-2.65965	0.08116	0.00002	0.01976	0.000	3.000	0.011	8	3
4	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	4
5	-2.5959	-2.60406	0.08118	0.00002	0.01977	0.000	3.000	0.009	8	5
6	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	6
7	-2.6518	-2.65965	0.08116	0.00002	0.01976	0.000	3.000	0.011	8	7
8	-2.6518	-2.65965	0.08116	0.00002	0.01976	0.000	3.000	0.011	8	8
9	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	9
10	-2.3683	-2.37766	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	10
11	-2.6518	-2.65965	0.08116	0.00002	0.01976	0.000	3.000	0.011	8	11
12	-2.3212	-2.33078	0.08125	0.00002	0.01981	0.000	3.000	0.004	8	12
13	-1.9462	-1.95728	0.08137	0.00003	0.01986	0.000	3.000	0.003	8	13
14	-2.3678	-2.37716	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	14
15	-2.0411	-2.05185	0.08134	0.00003	0.01985	0.000	3.000	0.003	8	15
16	-2.1282	-2.13862	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	16
17	-2.2013	-2.21142	0.08129	0.00002	0.01982	0.000	3.000	0.003	8	17
18	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	18
19	-2.1565	-2.16680	0.08130	0.00002	0.01983	0.000	3.000	0.003	8	19
20	-1.6494	-1.66077	0.08140	0.00003	0.01988	0.000	3.000	0.003	8	20
21	-1.3325	-1.34471	0.08161	0.00004	0.01998	0.000	3.000	0.004	8	21
22	-1.7778	-1.78937	0.08143	0.00003	0.01989	0.000	3.000	0.003	8	22
23	-1.8130	-1.82448	0.08141	0.00003	0.01989	0.000	3.000	0.003	8	23
24	-2.1282	-2.13862	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	24
25	-1.6738	-1.68561	0.08146	0.00003	0.01991	0.000	3.000	0.003	8	25
26	-1.0262	-1.03819	0.08177	0.00005	0.02006	0.000	3.000	0.005	8	26
27	-1.5894	-1.60036	0.08150	0.00003	0.01993	0.000	3.000	0.003	8	27
28	-0.9676	-0.97948	0.08181	0.00005	0.02008	0.000	3.000	0.005	8	28
29	-1.6938	-1.70555	0.08146	0.00003	0.01991	0.000	3.000	0.003	8	29
30	-1.6826	-1.69439	0.08146	0.00003	0.01991	0.000	3.000	0.003	8	30
31	-1.6168	-1.62872	0.08149	0.00003	0.01992	0.000	3.000	0.003	8	31
32	-1.0597	-1.07174	0.08176	0.00005	0.02005	0.000	3.000	0.005	8	32
33	-1.3596	-1.37180	0.08160	0.00004	0.01998	0.000	3.000	0.004	8	33
34	-1.2315	-1.24370	0.08166	0.00004	0.02001	0.000	3.000	0.004	8	34
35	-1.3596	-1.37180	0.08160	0.00004	0.01998	0.000	3.000	0.004	8	35
36	-1.1492	-1.16135	0.08171	0.00004	0.02003	0.000	3.000	0.004	8	36
37	-0.4998	-0.50982	0.08212	0.00006	0.02023	0.000	3.000	0.012	8	37
38	-1.7123	-1.72402	0.08145	0.00003	0.01990	0.000	3.000	0.003	8	38
39	-0.6697	-0.68050	0.08200	0.00006	0.02017	0.000	3.000	0.008	8	39
40	-0.6330	-0.64373	0.08202	0.00006	0.02018	0.000	3.000	0.009	8	40
41	-0.5638	-0.57418	0.08207	0.00006	0.02021	0.000	3.000	0.010	8	41
42	-0.4939	-0.50389	0.08212	0.00006	0.02023	0.000	3.000	0.012	8	42
43	0.0381	0.03258	0.08252	0.00006	0.02043	0.000	3.000	-0.013	8	43
44	-0.3326	-0.34150	0.08224	0.00006	0.02029	0.000	3.000	0.024	8	44
45	-0.5536	-0.56392	0.08208	0.00006	0.02021	0.000	3.000	0.011	8	45
46	-0.3347	-0.34362	0.08224	0.00006	0.02029	0.000	3.000	0.024	8	46
47	-0.1098	-0.11591	0.08241	0.00006	0.02037	0.000	3.000	-0.046	1	47
48	-0.1351	-0.11208	0.08241	0.00006	0.02037	0.000	3.000	-0.045	1	48
49	0.4172	0.41133	0.08277	0.00005	0.02055	0.003	2.995	-0.003	8	49
50	-0.0069	-0.01290	0.08248	0.00006	0.02041	0.000	3.000	-0.018	8	50

TABLE A-1 (Continued)

Subject	$\hat{\tau}^*$	Mean	Conditional Moments Variance	3rd	4th	β_1	β_2	κ	Type	Subject
51	0.1643	0.16021	0.08261	0.00006	0.02047	0.000	3.000	-0.007	8	51
52	0.5155	0.51610	0.08283	0.00004	0.02058	0.000	2.999	-0.002	8	52
53	0.1959	0.19220	0.08263	0.00006	0.02048	0.000	3.000	-0.006	8	53
54	0.6773	0.68035	0.08291	0.00003	0.02061	0.000	2.999	-0.001	8	54
55	0.0259	0.02025	0.08251	0.00006	0.02042	0.000	3.000	-0.014	8	55
56	-0.0198	-0.02593	0.08247	0.00006	0.02040	0.000	3.000	-0.019	8	56
57	-0.0333	-0.03957	0.08246	0.00006	0.02040	0.000	3.000	-0.021	8	57
58	0.4197	0.41893	0.08277	0.00005	0.02055	0.000	2.999	-0.003	8	58
59	0.3799	0.37858	0.08275	0.00005	0.02054	0.000	2.999	-0.003	8	59
60	0.8837	0.89007	0.08257	0.00002	0.02065	0.000	2.999	-0.000	8	60
61	0.8029	0.80795	0.08295	0.00003	0.02064	0.000	2.999	-0.000	8	61
62	0.6843	0.68746	0.08291	0.00003	0.02062	0.000	2.999	-0.001	8	62
63	0.5077	0.50819	0.08282	0.00004	0.02058	0.000	2.999	-0.002	8	63
64	1.3268	1.34056	0.08298	-0.00002	0.02065	0.000	2.999	-0.000	8	64
65	0.3675	0.36601	0.08274	0.00005	0.02054	0.000	3.000	-0.003	8	65
66	1.2304	1.24256	0.08300	-0.00001	0.02066	0.000	2.999	-0.000	8	66
67	1.5711	1.58881	0.08291	-0.00003	0.02062	0.000	2.999	-0.001	8	67
68	1.2032	1.21490	0.08300	-0.00001	0.02066	0.000	2.999	-0.000	8	68
69	0.4570	0.45676	0.08280	0.00005	0.02056	0.000	2.999	-0.002	8	69
70	1.5458	1.56718	0.08292	-0.00003	0.02062	0.000	2.999	-0.001	8	70
71	1.6671	1.68629	0.08287	-0.00004	0.02060	0.000	2.999	-0.001	8	71
72	1.4385	1.45409	0.08296	-0.00002	0.02064	0.000	2.999	-0.000	8	72
73	1.5565	1.57398	0.08292	-0.00003	0.02062	0.000	2.999	-0.001	8	73
74	1.3337	1.34758	0.08298	-0.00002	0.02065	0.000	2.999	-0.000	9	74
75	1.7324	1.75257	0.08284	-0.00004	0.02058	0.000	2.999	-0.002	8	75
76	1.1905	1.20199	0.08300	-0.00000	0.02066	0.000	2.999	-0.000	8	76
77	1.8991	1.92164	0.08274	-0.00005	0.02054	0.000	3.000	-0.004	8	77
78	1.9132	1.93593	0.08274	-0.00005	0.02053	0.000	3.000	-0.004	8	78
79	1.7496	1.77002	0.08283	-0.00004	0.02058	0.000	2.999	-0.002	9	79
80	2.3854	2.41362	0.08242	-0.00006	0.02038	0.000	3.000	0.137	4	80
81	2.2004	2.22669	0.08255	-0.00006	0.02044	0.000	3.000	-0.015	8	81
82	1.7209	1.74090	0.08284	-0.00004	0.02059	0.000	2.999	-0.002	8	82
83	1.5527	1.57012	0.08292	-0.00003	0.02062	0.000	2.999	-0.001	8	83
84	2.0288	2.05304	0.08266	-0.00005	0.02050	0.000	3.000	-0.006	8	84
85	1.9667	1.99014	0.08270	-0.00005	0.02052	0.000	3.000	-0.005	8	85
86	2.1227	2.14809	0.08260	-0.00005	0.02047	0.000	3.000	-0.009	8	86
87	1.9979	2.02174	0.08268	-0.00005	0.02051	0.000	3.000	-0.005	8	87
88	2.4679	2.49688	0.08236	-0.00006	0.02035	0.000	3.000	0.029	4	88
89	2.1774	2.20343	0.08256	-0.00006	0.02045	0.000	3.000	-0.013	8	89
90	2.6727	2.70334	0.08222	-0.00005	0.02028	0.000	3.000	0.010	9	90
91	2.1173	2.14262	0.08261	-0.00005	0.02047	0.000	3.000	-0.009	8	91
92	2.1925	2.21870	0.08255	-0.00006	0.02044	0.000	3.000	-0.014	8	92
93	2.2945	2.32181	0.08248	-0.00006	0.02041	0.000	3.000	-0.038	1	93
94	2.6800	2.71069	0.08222	-0.00005	0.02028	0.000	3.000	0.010	9	94
95	2.4594	2.48831	0.08237	-0.00006	0.02035	0.000	3.000	0.031	4	95
96	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	96
97	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	97
98	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	98
99	2.6800	2.71069	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	99
100	2.6258	2.65609	0.08226	-0.00005	0.02030	0.000	3.000	0.012	8	100

TABLE A-1 (Continued)

Subject	$\hat{\tau}^*$	Mean	Variance	Conditional Moments 3rd	4th	β_1	β_2	κ	Type	Subject
101	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	101
102	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	102
103	-2.5587	-2.60685	0.08117	0.00002	0.01977	0.000	3.000	0.008	8	103
104	-2.5782	-2.58646	0.08118	0.00002	0.01977	0.000	3.000	0.008	8	104
105	-2.5782	-2.58646	0.08118	0.00002	0.01977	0.000	3.000	0.008	8	105
106	-2.3435	-2.35297	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	106
107	-2.3435	-2.35297	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	107
108	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	108
109	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	109
110	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	110
111	-2.1740	-2.18423	0.08129	0.00002	0.01983	0.000	3.000	0.003	8	111
112	-1.9529	-1.56395	0.08136	0.00003	0.01986	0.000	3.000	0.003	8	112
113	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	113
114	-2.1323	-2.14270	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	114
115	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	115
116	-2.5959	-2.60406	0.08118	0.00002	0.01977	0.000	3.000	0.009	8	116
117	-1.6938	-1.70556	0.08146	0.00003	0.01991	0.000	3.000	0.003	8	117
118	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	118
119	-2.1282	-2.13862	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	119
120	-1.9476	-1.95867	0.08137	0.00003	0.01986	0.000	3.000	0.003	8	120
121	-1.5835	-1.59445	0.08135	0.00003	0.01986	0.000	3.000	0.003	8	121
122	-1.6393	-1.65118	0.08148	0.00003	0.01992	0.000	3.000	0.003	8	122
123	-1.9462	-1.95729	0.08137	0.00003	0.01986	0.000	3.000	0.003	8	123
124	-2.0513	-2.06201	0.08133	0.00003	0.01985	0.000	3.000	0.003	8	124
125	-1.5350	-1.54704	0.08152	0.00003	0.01994	0.000	3.000	0.003	8	125
126	-1.5350	-1.54704	0.08152	0.00003	0.01994	0.000	3.000	0.003	8	126
127	-1.5350	-1.54704	0.08152	0.00003	0.01994	0.000	3.000	0.003	8	127
128	-1.1811	-1.19328	0.08169	0.00004	0.02002	0.000	3.000	0.004	8	128
129	-1.2935	-1.30571	0.08163	0.00004	0.01999	0.000	3.000	0.004	8	129
130	-1.2990	-1.31121	0.08163	0.00004	0.01999	0.000	3.000	0.004	8	130
131	-1.6980	-1.70976	0.08146	0.00003	0.01991	0.000	3.000	0.003	8	131
132	-1.0597	-1.07174	0.08176	0.00005	0.02005	0.000	3.000	0.005	8	132
133	-1.0347	-1.04670	0.08177	0.00005	0.02006	0.000	3.000	0.005	8	133
134	-0.8984	-0.91011	0.08185	0.00005	0.02010	0.000	3.000	0.006	8	134
135	-0.7641	-0.77538	0.08194	0.00005	0.02014	0.000	3.000	0.007	8	135
136	-1.2145	-1.22670	0.08167	0.00004	0.02001	0.000	3.000	0.004	8	136
137	-0.8995	-0.91121	0.08185	0.00005	0.02010	0.000	3.000	0.006	8	137
138	-0.3813	-0.39055	0.08220	0.00006	0.02027	0.000	3.000	0.016	8	138
139	-1.1320	-1.14413	0.08172	0.00004	0.02003	0.000	3.000	0.004	8	139
140	-0.8420	-0.85355	0.08189	0.00005	0.02012	0.000	3.000	0.006	8	140
141	-0.7755	-0.78682	0.08193	0.00005	0.02014	0.000	3.000	0.007	8	141
142	-0.7086	-0.71966	0.08197	0.00005	0.02016	0.000	3.000	0.008	8	142
143	-0.0595	-0.06603	0.08244	0.00006	0.02039	0.000	3.000	-0.027	1	143
144	-0.3323	-0.34221	0.08224	0.00006	0.02029	0.000	3.000	0.024	8	144
145	-0.7086	-0.71966	0.08197	0.00005	0.02016	0.000	3.000	0.008	8	145
146	-0.4784	-0.48929	0.08213	0.00006	0.02024	0.000	3.000	0.013	8	146
147	-0.4548	-0.46454	0.08215	0.00006	0.02025	0.000	3.000	0.014	8	147
148	-0.1049	-0.11187	0.08241	0.00006	0.02037	0.000	3.000	-0.046	1	148
149	-0.3579	-0.36699	0.08222	0.00006	0.02028	0.000	3.000	0.020	8	149
150	-0.4998	-0.50982	0.08212	0.00006	0.02023	0.000	3.000	0.012	8	150

TABLE A-1 (Continued)

Subject	$\hat{\tau}^*$	Conditional Moments Mean	Variance	3rd	4th	β_1	β_2	κ	Type	Subject
151	-0.0143	-0.02038	0.08248	0.00006	0.02041	0.000	3.000	-0.019	8	151
152	0.0146	0.00883	0.08250	0.00006	0.02042	0.000	3.000	-0.016	8	152
153	0.0255	0.01984	0.08251	0.00006	0.02042	0.000	3.000	-0.014	8	153
154	0.2403	0.23715	0.08266	0.00006	0.02050	0.000	3.000	-0.005	8	154
155	0.6143	0.61638	0.08288	0.00004	0.02060	0.000	2.999	-0.001	8	155
156	0.2638	0.26094	0.08268	0.00005	0.02050	0.000	3.000	-0.005	8	156
157	0.2940	0.29153	0.08270	0.00005	0.02051	0.000	3.000	-0.004	8	157
158	0.6264	0.62867	0.08288	0.00004	0.02060	0.000	2.999	-0.001	8	158
159	0.5103	0.51083	0.08283	0.00004	0.02058	0.000	2.999	-0.002	8	159
160	0.3534	0.35172	0.08273	0.00005	0.02053	0.000	3.000	-0.004	8	160
161	0.5351	0.53599	0.08284	0.00004	0.02058	0.000	2.999	-0.002	8	161
162	0.8711	0.87726	0.08297	0.00002	0.02065	0.000	2.999	-0.000	8	162
163	1.1112	1.12136	0.08300	0.00000	0.02066	0.000	2.999	-0.000	8	163
164	1.0709	1.08038	0.08300	0.00000	0.02066	0.000	2.999	-0.000	8	164
165	0.6773	0.68035	0.08291	0.00003	0.02061	0.000	2.999	-0.001	8	165
166	0.6856	0.68878	0.08291	0.00003	0.02062	0.000	2.999	-0.001	8	166
167	1.4316	1.44708	0.08296	-0.00002	0.02064	0.000	2.999	-0.000	8	167
168	0.8593	0.86527	0.08297	0.00002	0.02065	0.000	2.999	-0.000	8	168
169	1.3500	1.36415	0.08298	-0.00002	0.02065	0.000	2.999	-0.000	8	169
170	0.6792	0.68228	0.08291	0.00003	0.02062	0.000	2.999	-0.001	8	170
171	1.3520	1.36720	0.08298	-0.00002	0.02065	0.000	2.999	-0.000	8	171
172	1.4411	1.45674	0.08296	-0.00002	0.02064	0.000	2.999	-0.000	8	172
173	2.0908	2.11581	0.08262	-0.00005	0.02048	0.000	3.000	-0.008	8	173
174	1.7513	1.77174	0.08283	-0.00004	0.02058	0.000	2.999	-0.002	8	174
175	1.6943	1.71390	0.08286	-0.00004	0.02059	0.000	2.999	-0.002	8	175
176	1.4735	1.48966	0.08295	-0.00003	0.02063	0.000	2.999	-0.001	8	176
177	1.1862	1.19762	0.08300	-0.00000	0.02066	0.000	2.999	-0.000	8	177
178	1.8264	1.84793	0.08279	-0.00005	0.02056	0.000	2.999	-0.003	8	178
179	1.9567	1.98001	0.08271	-0.00005	0.02052	0.000	3.000	-0.005	8	179
180	1.9433	1.96643	0.08272	-0.00005	0.02052	0.000	3.000	-0.004	8	180
181	1.9667	1.99014	0.08270	-0.00005	0.02052	0.000	3.000	-0.005	8	181
182	1.9667	1.99014	0.08270	-0.00005	0.02052	0.000	3.000	-0.005	8	182
183	1.5711	1.58881	0.08291	-0.00003	0.02062	0.000	2.999	-0.001	8	183
184	1.9801	2.00371	0.08269	-0.00005	0.02051	0.000	3.000	-0.005	8	184
185	2.3964	2.42472	0.08241	-0.00006	0.02038	0.000	3.000	0.052	4	185
186	2.6727	2.70334	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	186
187	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	187
188	2.1040	2.12917	0.08261	-0.00005	0.02047	0.000	3.000	-0.009	8	188
189	2.3617	2.38969	0.08244	-0.00006	0.02039	0.000	3.000	-0.647	1	189
190	1.9979	2.02174	0.08268	-0.00005	0.02051	0.000	3.000	-0.005	8	190
191	2.3854	2.41362	0.08242	-0.00006	0.02038	0.000	3.000	0.137	4	191
192	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	192
193	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	193
194	2.4679	2.49688	0.08236	-0.00006	0.02035	0.000	3.000	0.029	4	194
195	2.4594	2.48831	0.08237	-0.00006	0.02035	0.000	3.000	0.031	4	195
196	2.2004	2.22669	0.08255	-0.00006	0.02044	0.000	3.000	-0.015	8	196
197	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	197
198	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	198
199	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	199
200	2.6258	2.65609	0.08226	-0.00005	0.02030	0.000	3.000	0.012	8	200

TABLE A-1 (Continued)

Subject	$\hat{\tau}^*$	Mean	Conditional Moments Variance	3rd	4th	β_1	β_2	κ	Type	Subject
201	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	201
202	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	202
203	-2.3032	-2.31286	0.08126	0.00002	0.01981	0.000	3.000	0.004	8	203
204	-2.5987	-2.60685	0.08117	0.00002	0.01977	0.000	3.000	0.005	8	204
205	-2.5782	-2.58646	0.08118	0.00002	0.01977	0.000	3.000	0.008	8	205
206	-2.4080	-2.41716	0.08123	0.00002	0.01979	0.000	3.000	0.005	8	206
207	-2.1198	-2.12925	0.08131	0.00003	0.01984	0.000	3.000	0.003	8	207
208	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	208
209	-2.5782	-2.58646	0.08118	0.00002	0.01977	0.000	3.000	0.008	8	209
210	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	210
211	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	211
212	-1.9462	-1.95728	0.08137	0.00003	0.01986	0.000	3.000	0.003	8	212
213	-1.9462	-1.95728	0.08137	0.00003	0.01986	0.000	3.000	0.003	8	213
214	-1.6464	-1.65826	0.08148	0.00003	0.01992	0.000	3.000	0.003	8	214
215	-2.1304	-2.14081	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	215
216	-2.1188	-2.12925	0.08131	0.00003	0.01984	0.000	3.000	0.003	8	216
217	-1.8853	-1.89657	0.08139	0.00003	0.01987	0.000	3.000	0.003	8	217
218	-2.0043	-2.01518	0.08135	0.00003	0.01985	0.000	3.000	0.003	8	218
219	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	219
220	-1.1404	-1.15254	0.08171	0.00004	0.02003	0.000	3.000	0.004	8	220
221	-1.6795	-1.69129	0.08146	0.00003	0.01991	0.000	3.000	0.003	8	221
222	-1.8685	-1.87982	0.08139	0.00003	0.01988	0.000	3.000	0.003	8	222
223	-1.0170	-1.02897	0.08178	0.00005	0.02007	0.000	3.000	0.005	8	223
224	-2.1282	-2.13862	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	224
225	-1.1970	-1.20919	0.08168	0.00004	0.02002	0.000	3.000	0.004	8	225
226	-1.4432	-1.45535	0.08156	0.00004	0.01996	0.000	3.000	0.003	8	226
227	-1.2323	-1.24450	0.08166	0.00004	0.02001	0.000	3.000	0.004	8	227
228	-1.4207	-1.43287	0.08157	0.00004	0.01996	0.000	3.000	0.003	8	228
229	-1.3507	-1.36290	0.08160	0.00004	0.01998	0.000	3.000	0.004	8	229
230	-1.2163	-1.22850	0.08167	0.00004	0.02001	0.000	3.000	0.004	8	230
231	-1.5956	-1.60755	0.08150	0.00003	0.01993	0.000	3.000	0.003	8	231
232	-1.4008	-1.41298	0.08158	0.00004	0.01997	0.000	3.000	0.034	8	232
233	-1.3987	-1.41088	0.08158	0.00004	0.01997	0.000	3.000	0.004	8	233
234	-1.1457	-1.15785	0.08171	0.00004	0.02003	0.000	3.000	0.004	8	234
235	-0.8620	-0.87361	0.08187	0.00005	0.02011	0.000	3.000	0.006	8	235
236	-0.4625	-0.47229	0.08214	0.00006	0.02024	0.000	3.000	0.014	8	236
237	-1.2667	-1.27891	0.08165	0.00004	0.02000	0.000	3.000	0.004	8	237
238	-0.9977	-1.00964	0.08179	0.00005	0.02007	0.000	3.000	0.005	8	238
239	-0.3243	-0.33314	0.08224	0.00006	0.02029	0.000	3.000	0.025	4	239
240	-1.0306	-1.04260	0.08177	0.00005	0.02006	0.000	3.000	0.005	8	240
241	-0.7388	-0.74999	0.08195	0.00005	0.02015	0.000	3.000	0.007	8	241
242	-0.7035	-0.71454	0.08198	0.00005	0.02016	0.000	3.000	0.008	8	242
243	-0.5131	-0.52319	0.08211	0.00006	0.02023	0.000	3.000	0.012	8	243
244	-0.6158	-0.62644	0.08203	0.00006	0.02019	0.000	3.000	0.009	8	244
245	-0.5420	-0.55226	0.08209	0.00006	0.02022	0.000	3.000	0.011	8	245
246	-0.9902	-1.00212	0.08180	0.00005	0.02007	0.000	3.000	0.005	8	246
247	-0.7815	-0.79285	0.08192	0.00005	0.02014	0.000	3.000	0.007	8	247
248	-0.1980	-0.20582	0.08234	0.00006	0.02034	0.000	3.000	0.150	4	248
249	0.4075	0.40655	0.08277	0.00005	0.02055	0.000	2.999	-0.003	8	249
250	-0.4340	-0.44361	0.08216	0.00006	0.02025	0.003	3.000	0.015	8	250

TABLE A-1 (Continued)

Subject	$\hat{\tau}^*$	Conditional Moments Mean	Variance	3rd	4th	β_1	β_2	κ	Type	Subject
251	-0.0793	-0.08603	0.08243	0.00006	0.02038	0.000	3.000	-0.033	1	251
252	-0.0492	-0.05563	0.08245	0.00006	0.02039	0.000	3.000	-0.024	8	252
253	-0.0016	-0.00754	0.08249	0.00006	0.02041	0.000	3.000	-0.017	8	253
254	0.340[illegible]	0.33855	0.08273	0.00005	0.02053	0.000	3.000	-0.004	8	254
255	0.3723	0.37189	0.08275	0.00005	0.02054	0.000	3.000	-0.003	8	255
256	-0.3444	-0.35339	0.08223	0.00006	0.02029	0.000	3.000	0.022	8	256
257	0.5084	0.50890	0.08282	0.00004	0.02058	0.000	2.999	-0.002	8	257
258	0.4814	0.48151	0.08281	0.00005	0.02057	0.000	2.999	-0.002	8	258
259	0.3478	0.34605	0.08273	0.00005	0.02053	0.000	3.000	-0.004	8	259
260	0.7231	0.72697	0.08292	0.00003	0.02062	0.000	2.999	-0.001	8	260
261	0.6489	0.65151	0.08289	0.00004	0.02061	0.000	2.999	-0.001	8	261
262	0.4721	0.47309	0.08281	0.00005	0.02057	0.000	2.999	-0.002	8	262
263	1.1164	1.12664	0.08300	0.00000	0.02066	0.000	2.999	-0.000	8	263
264	1.0260	1.03473	0.08300	0.00001	0.02066	0.000	2.999	-0.000	8	264
265	0.7249	0.72870	0.08293	0.00003	0.02062	0.000	2.999	-0.001	8	265
266	0.8334	0.83894	0.08296	0.00002	0.02064	0.000	2.999	-0.000	8	266
267	0.8371	0.84271	0.08296	0.00002	0.02064	0.000	2.999	-0.000	8	267
268	0.8472	0.85297	0.08297	0.00002	0.02064	0.000	2.999	-0.000	8	268
269	0.4901	0.49033	0.08281	0.00005	0.02057	0.000	2.999	-0.002	8	269
270	0.8669	0.87299	0.08297	0.00002	0.02065	0.000	2.999	-0.000	8	270
271	1.5527	1.57012	0.08292	-0.00003	0.02062	0.000	2.999	-0.001	8	271
272	1.4385	1.45409	0.08296	-0.00002	0.02063	0.000	2.999	-0.000	8	272
273	1.5992	1.61735	0.08290	-0.00003	0.02061	0.000	2.999	-0.001	8	273
274	1.7324	1.75257	0.08284	-0.00004	0.02058	0.000	2.999	-0.002	8	274
275	2.0019	2.02580	0.08268	-0.00005	0.02051	0.000	3.000	-0.005	8	275
276	1.0832	1.09289	0.08300	0.00000	0.02066	0.000	2.999	-0.000	8	276
277	1.7925	1.81354	0.08281	-0.00004	0.02057	0.000	2.999	-0.002	8	277
278	2.2235	2.25004	0.08253	-0.00006	0.02043	0.000	3.000	-0.018	8	278
279	1.5167	1.53355	0.08293	-0.00003	0.02063	0.000	2.999	-0.001	8	279
280	1.9979	2.02174	0.08268	-0.00005	0.02051	0.000	3.000	-0.005	8	280
281	2.3852	2.41341	0.08242	-0.00006	0.02038	0.000	3.000	0.146	4	281
282	2.1774	2.20343	0.08256	-0.00006	0.02045	0.000	3.000	-0.013	8	282
283	2.0495	2.07400	0.08255	-0.00005	0.02049	0.000	3.000	-0.007	8	283
284	1.8259	1.84742	0.08279	-0.00005	0.02056	0.000	2.999	-0.003	8	284
285	2.1040	2.12917	0.08261	-0.00005	0.02047	0.000	3.000	-0.009	8	285
286	2.1040	2.12917	0.08261	-0.00005	0.02047	0.000	3.000	-0.009	8	286
287	1.8477	1.86953	0.08278	-0.00005	0.02055	0.000	3.000	-0.003	8	287
288	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	288
289	2.6800	2.71069	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	289
290	2.0471	2.07157	0.08265	-0.00005	0.02049	0.000	3.000	-0.007	8	290
291	2.4679	2.49688	0.08236	-0.00006	0.02035	0.000	3.000	0.029	4	291
292	2.2004	2.22669	0.08255	-0.00006	0.02044	0.000	3.000	-0.015	8	292
293	2.6800	2.71069	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	293
294	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	294
295	2.7683	2.79960	0.08216	-0.00005	0.02025	0.000	3.000	0.008	8	295
296	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	296
297	2.3566	2.38453	0.08244	-0.00006	0.02039	0.000	3.000	-0.412	1	297
298	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	298
299	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	299
300	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	300

TABLE A-1 (Continued)

Subject	$\hat{\tau}^*$	Mean	Variance	Conditional Moments 3rd	4th	β_1	β_2	κ	Type	Subject
301	-2.6518	-2.65965	0.08116	0.00002	0.01976	0.000	3.000	0.011	8	301
302	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	302
303	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	303
304	-2.1445	-2.15485	0.08130	0.00002	0.01983	0.000	3.000	0.003	8	304
305	-2.5987	-2.60685	0.08117	0.00002	0.01977	0.000	3.000	0.008	8	305
306	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	306
307	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	307
308	-2.6518	-2.65965	0.08116	0.00002	0.01976	0.000	3.000	0.011	8	308
309	-2.3435	-2.35297	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	309
310	-2.3212	-2.33078	0.08125	0.00002	0.01981	0.000	3.000	0.004	8	310
311	-2.1703	-2.18054	0.08129	0.00002	0.01983	0.000	3.000	0.003	8	311
312	-2.6518	-2.65965	0.08116	0.00002	0.01976	0.000	3.000	0.011	8	312
313	-2.5782	-2.58646	0.08118	0.00002	0.01977	0.000	3.000	0.008	8	313
314	-1.8477	-1.85908	0.08140	0.00003	0.01988	0.000	3.000	0.003	8	314
315	-1.9133	-1.92448	0.08138	0.00003	0.01987	0.000	3.000	0.003	8	315
316	-2.0795	-2.09011	0.08132	0.00003	0.01984	0.000	3.000	0.003	8	316
317	-2.1707	-2.18094	0.08129	0.00002	0.01983	0.000	3.000	0.003	8	317
318	-1.9201	-1.93126	0.08137	0.00003	0.01987	0.000	3.000	0.003	8	318
319	-2.3435	-2.35297	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	319
320	-1.4223	-1.43447	0.08157	0.00004	0.01996	0.000	3.000	0.004	8	320
321	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	321
322	-1.5287	-1.54075	0.08152	0.00003	0.01994	0.000	3.000	0.003	8	322
323	-1.5302	-1.54225	0.08152	0.00003	0.01994	0.000	3.000	0.003	8	323
324	-1.6554	-1.66724	0.08147	0.00003	0.01991	0.000	3.000	0.003	8	324
325	-1.6653	-1.67712	0.08147	0.00003	0.01991	0.000	3.000	0.003	8	325
326	-1.5018	-1.51389	0.08154	0.00004	0.01995	0.000	3.000	0.003	8	326
327	-1.3121	-1.32431	0.08162	0.00004	0.01999	0.000	3.000	0.004	8	327
328	-1.8015	-1.81301	0.08142	0.00003	0.01989	0.000	3.000	0.003	8	328
329	-0.4473	-0.45599	0.08215	0.00006	0.02025	0.000	3.000	0.014	8	329
330	-1.4146	-1.42677	0.08157	0.00004	0.01997	0.000	3.000	0.003	8	330
331	-1.5140	-1.52607	0.08153	0.00004	0.01994	0.000	3.000	0.003	8	331
332	-0.8088	-0.82024	0.08191	0.00005	0.02013	0.000	3.000	0.007	8	332
333	-1.1548	-1.16696	0.08170	0.00004	0.02003	0.000	3.000	0.004	8	333
334	-1.2703	-1.28251	0.08164	0.00004	0.02000	0.000	3.000	0.004	8	334
335	-1.2855	-1.29771	0.08164	0.00004	0.02000	0.000	3.000	0.004	8	335
336	-0.5580	-0.56835	0.08207	0.00006	0.02021	0.000	3.000	0.010	9	336
337	-0.9692	-0.98108	0.08181	0.00005	0.02008	0.000	3.000	0.005	8	337
338	-0.8348	-0.84632	0.08189	0.00005	0.02012	0.000	3.000	0.006	8	338
339	-0.8740	-0.88564	0.08187	0.00005	0.02011	0.000	3.000	0.006	8	339
340	-0.5062	-0.51625	0.08211	0.00006	0.02023	0.000	3.000	0.012	8	340
341	-0.3366	-0.34553	0.08224	0.00006	0.02029	0.000	3.000	0.023	8	341
342	-0.3701	-0.37927	0.08221	0.00006	0.02028	0.000	3.000	0.019	8	342
343	-0.7559	-0.76715	0.08194	0.00005	0.02014	0.000	3.000	0.007	8	343
344	-0.2618	-0.27015	0.08229	0.00006	0.02032	0.000	3.000	0.043	4	344
345	-0.1534	-0.16083	0.08237	0.00006	0.02036	0.000	3.000	-0.121	1	345
346	-0.8045	-0.81593	0.08191	0.00005	0.02013	0.000	3.000	0.007	8	346
347	-0.0251	-0.03129	0.08247	0.00006	0.02040	0.000	3.000	-0.020	9	347
348	0.0131	0.00731	0.08250	0.00006	0.02042	0.000	3.000	-0.016	8	348
349	0.18[illegible]	0.17934	0.08262	0.00006	0.02048	0.000	3.000	-0.007	8	349
350	0.4358	0.43526	0.08278	0.00005	0.02056	0.000	2.999	-0.003	8	350

TABLE A-1 (Continued)

Subject	$\hat{\tau}^*$	Conditional Moments Mean	Variance	3rd	4th	β_1	β_2	κ	Type	Subject
351	-0.2272	-0.23527	0.08232	0.00006	0.0203[illegible]	0.000	3.000	0.068	4	351
352	-0.1141	-0.12116	0.08240	0.00006	0.02037	0.000	3.000	-0.052	1	352
353	-0.0085	-0.01452	0.08248	0.00006	0.02041	0.000	3.000	-0.017	8	353
354	0.1697	0.16568	0.08261	0.00006	0.02047	0.000	3.000	-0.007	8	354
355	0.1832	0.17934	0.08262	0.00006	0.02048	0.000	3.000	-0.007	8	355
356	0.5575	0.55872	0.08285	0.00004	0.02059	0.000	2.999	-0.002	8	356
357	0.6773	0.68035	0.08291	0.00003	0.02061	0.000	2.999	-0.001	8	357
358	0.6607	0.66350	0.08290	0.00004	0.02061	0.000	2.999	-0.001	8	358
359	0.0375	0.03197	0.08252	0.00006	0.02043	0.000	3.000	-0.013	8	359
360	0.4618	0.46163	0.08280	0.00005	0.02056	0.000	2.999	-0.002	8	360
361	0.8644	0.87045	0.08297	0.00002	0.02065	0.000	2.999	-0.000	8	361
362	1.0592	1.06849	0.08300	0.00001	0.02066	0.000	2.999	-0.000	3	362
363	1.1494	1.16020	0.08300	-0.00000	0.02066	0.000	2.999	-0.000	8	363
364	1.2245	1.23656	0.08300	-0.00001	0.02066	0.000	2.999	-0.000	8	364
365	1.1905	1.20199	0.08300	-0.00000	0.02066	0.000	2.999	-0.000	8	365
366	1.1563	1.16721	0.08300	-0.00000	0.02066	0.000	2.999	-0.000	8	366
367	1.2229	1.23493	0.08300	-0.00001	0.02066	0.000	2.999	-0.000	8	367
368	1.3023	1.31566	0.08299	-0.00001	0.02066	0.000	2.999	-0.000	8	368
369	1.2514	1.26391	0.08300	-0.00001	0.02066	0.000	2.999	-0.000	8	369
370	1.6302	1.64883	0.08289	-0.00004	0.02061	0.000	2.999	-0.001	8	370
371	1.0642	1.07357	0.08300	0.00001	0.02066	0.000	2.999	-0.000	8	371
372	1.3989	1.41385	0.08297	-0.00002	0.02065	0.000	2.999	-0.000	8	372
373	1.5896	1.60760	0.08290	-0.00003	0.02061	0.000	2.999	-0.001	8	373
374	0.8755	0.88173	0.08297	0.00002	0.02065	0.000	2.999	-0.000	8	374
375	1.7324	1.75257	0.08284	-0.00004	0.02058	0.000	2.999	-0.002	8	375
376	1.5200	1.53690	0.08293	-0.00003	0.02063	0.000	2.999	-0.001	8	376
377	1.6896	1.70913	0.08286	-0.00004	0.02059	0.000	2.999	-0.002	8	377
378	2.1925	2.21870	0.08255	-0.00006	0.02044	0.000	3.000	-0.014	8	378
379	1.3933	1.40816	0.08297	-0.00002	0.02065	0.000	2.999	-0.000	8	379
380	2.1227	2.14809	0.08260	-0.00005	0.02047	0.000	3.000	-0.009	8	380
381	1.8191	1.84052	0.08279	-0.00005	0.02056	0.000	2.999	-0.003	8	381
382	2.3854	2.41362	0.08242	-0.00006	0.02038	0.000	3.000	0.137	4	382
383	1.7392	1.75947	0.08283	-0.00004	0.02058	0.000	2.999	-0.002	8	383
384	2.3854	2.41362	0.08242	-0.00006	0.02038	0.000	3.000	0.137	4	384
385	2.4679	2.49688	0.08236	-0.00006	0.02035	0.000	3.000	0.029	4	385
386	1.9667	1.99014	0.08270	-0.00005	0.02052	0.000	3.000	-0.005	8	386
387	2.3854	2.41362	0.08242	-0.00006	0.02038	0.000	3.000	0.137	4	387
388	1.9446	1.96775	0.08272	-0.00005	0.02052	0.000	3.000	-0.004	8	388
389	2.6258	2.65609	0.08226	-0.00005	0.02030	0.000	3.000	0.012	8	389
390	2.7683	2.79960	0.08216	-0.00005	0.02025	0.000	3.000	0.008	8	390
391	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	391
392	2.7683	2.79960	0.08216	-0.00005	0.02025	0.000	3.000	0.008	8	392
393	2.6800	2.71069	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	393
394	2.2004	2.22669	0.08255	-0.00006	0.02044	0.000	3.000	-0.015	8	394
395	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	395
396	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	396
397	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	397
398	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	398
399	2.3854	2.41362	0.08242	-0.00006	0.02038	0.000	3.000	0.137	4	399
400	2.6900	2.71069	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	400

TABLE A-1 (Continued)

Subject	$\hat{\tau}*$	Mean	Conditional Moments Variance	3rd	4th	β_1	β_2	κ	Type	Subject
401	-2.8430	-2.84968	0.08111	0.00002	0.01974	0.000	3.000	-0.022	8	401
402	-2.1323	-2.14270	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	402
403	-2.5587	-2.60685	0.08117	0.00002	0.01977	0.000	3.000	0.008	8	403
404	-2.6518	-2.65965	0.08116	0.00002	0.01976	0.000	3.000	0.011	8	404
405	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	405
406	-2.3683	-2.37766	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	406
407	-2.5587	-2.60685	0.08117	0.00002	0.01977	0.000	3.000	0.008	8	407
408	-2.1282	-2.13862	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	408
409	-2.5782	-2.58646	0.08118	0.00002	0.01977	0.000	3.000	0.008	8	409
410	-1.6793	-1.69110	0.08146	0.00003	0.01991	0.000	3.000	0.003	8	410
411	-2.3457	-2.35516	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	411
412	-2.3678	-2.37716	0.08124	0.00002	0.01980	0.000	3.000	0.004	8	412
413	-2.1707	-2.18094	0.08129	0.00002	0.01983	0.000	3.000	0.003	8	413
414	-2.1445	-2.15485	0.08130	0.00002	0.01983	0.000	3.000	0.003	8	414
415	-2.1282	-2.13862	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	415
416	-1.8853	-1.89657	0.08139	0.00003	0.01987	0.000	3.000	0.003	8	416
417	-2.0331	-2.04388	0.08134	0.00003	0.01985	0.000	3.000	0.003	8	417
418	-2.4080	-2.41716	0.08123	0.00002	0.01979	0.000	3.000	0.005	8	418
419	-2.0043	-2.01518	0.08135	0.00003	0.01985	0.000	3.000	0.003	8	419
420	-1.5731	-1.58509	0.08151	0.00003	0.01993	0.000	3.000	0.003	8	420
421	-1.5454	-1.55743	0.08152	0.00003	0.01994	0.000	3.000	0.003	8	421
422	-2.0005	-2.01139	0.08135	0.00003	0.01985	0.000	3.000	0.003	8	422
423	-1.5869	-1.59887	0.08150	0.00003	0.01993	0.000	3.000	0.003	8	423
424	-1.7349	-1.74657	0.08144	0.00003	0.01990	0.000	3.000	0.003	8	424
425	-2.1282	-2.13862	0.08131	0.00003	0.01983	0.000	3.000	0.003	8	425
426	-1.1439	-1.15605	0.08171	0.00004	0.02003	0.000	3.000	0.004	8	426
427	-1.0814	-1.09347	0.08174	0.00005	0.02005	0.000	3.000	0.005	8	427
428	-0.9658	-0.97767	0.08181	0.00005	0.02008	0.000	3.000	0.005	8	428
429	-1.3204	-1.33261	0.08162	0.00004	0.01999	0.000	3.000	0.004	8	429
430	-1.5457	-1.55773	0.08152	0.00003	0.01994	0.000	3.000	0.003	8	430
431	-1.0859	-1.09798	0.08174	0.00005	0.02005	0.000	3.000	0.005	8	431
432	-0.9320	-0.94379	0.08183	0.00005	0.02009	0.000	3.000	0.006	8	432
433	-0.7086	-0.71966	0.08197	0.00005	0.02016	0.000	3.000	0.008	8	433
434	-1.1595	-1.17166	0.08170	0.00004	0.02003	0.000	3.000	0.004	8	434
435	-0.8420	-0.85355	0.08189	0.00005	0.02012	0.000	3.000	0.006	8	435
436	-0.9320	-0.94379	0.08183	0.00005	0.02009	0.000	3.000	0.006	8	436
437	-1.4726	-1.48472	0.08155	0.00004	0.01995	0.000	3.000	0.003	8	437
438	-0.6773	-0.68823	0.08199	0.00006	0.02017	0.000	3.000	0.008	8	438
439	-0.5275	-0.53768	0.08210	0.00006	0.02022	0.000	3.000	0.011	8	439
440	-0.4758	-0.48567	0.08213	0.00006	0.02024	0.000	3.000	0.013	8	440
441	-0.4767	-0.48658	0.08213	0.00006	0.02024	0.000	3.000	0.013	8	441
442	-1.0179	-1.02988	0.08178	0.00005	0.02007	0.000	3.000	0.005	8	442
443	-0.1286	-0.13580	0.08239	0.00006	0.02036	0.000	3.000	-0.070	1	443
444	-0.4494	-0.45911	0.08215	0.00006	0.02025	0.000	3.000	0.014	8	444
445	-0.7086	-0.71966	0.08197	0.00005	0.02016	0.000	3.000	0.008	8	445
446	-0.6046	-0.61519	0.08204	0.00006	0.02019	0.000	3.000	0.009	8	446
447	-0.1687	-0.17626	0.08236	0.00006	0.02035	0.000	3.000	-0.443	1	447
448	-0.1514	-0.15881	0.08237	0.00006	0.02036	0.000	3.000	-0.127	1	448
449	-0.6964	-0.70741	0.08198	0.00005	0.02016	0.000	3.000	0.008	8	449
450	-0.1581	-0.16557	0.08237	0.00006	0.02035	0.000	3.000	-0.166	1	450

TABLE A-1 (Continued)

Subject	$\hat{\tau}$*	Mean	Conditional Moments Variance	3rd	4th	β_1	β_2	κ	Type	Subject
451	0.3871	0.38588	0.08275	0.00005	0.02054	0.000	2.999	-0.003	8	451
452	-0.1380	-0.14528	0.08238	0.00006	0.02036	0.000	3.000	-0.068	1	452
453	0.3922	0.39105	0.08276	0.00005	0.02054	0.000	2.999	-0.003	8	453
454	0.0052	-0.00067	0.08249	0.00006	0.02041	0.000	3.000	-0.016	8	454
455	0.2004	0.19675	0.08263	0.00006	0.02048	0.000	3.000	-0.006	8	455
456	0.4421	0.44165	0.08279	0.00005	0.02056	0.000	2.999	-0.003	8	456
457	0.5009	0.50129	0.08282	0.00004	0.02057	0.000	2.999	-0.002	8	457
458	0.5521	0.55324	0.08285	0.00004	0.02059	0.000	2.999	-0.002	8	458
459	0.7301	0.73398	0.08293	0.00003	0.02063	0.000	2.999	-0.001	8	459
460	0.7796	0.78427	0.08294	0.00003	0.02063	0.000	2.999	-0.001	8	460
461	0.6607	0.66350	0.08290	0.00004	0.02061	0.000	2.999	-0.001	8	461
462	0.7209	0.72464	0.08292	0.00003	0.02062	0.000	2.999	-0.001	8	462
463	1.0750	1.08455	0.08300	0.00000	0.02066	0.000	2.999	-0.000	8	463
464	1.2451	1.25750	0.08300	-0.00001	0.02066	0.000	2.999	-0.000	8	464
465	0.5047	0.50515	0.08282	0.00004	0.02057	0.000	2.999	-0.002	8	465
466	0.8198	0.82512	0.08296	0.00002	0.02044	0.000	2.999	-0.000	8	466
467	1.3894	1.40318	0.08297	-0.00002	0.02065	0.000	2.999	-0.000	8	467
468	1.3449	1.35896	0.08298	-0.00002	0.02065	0.000	2.999	-0.000	8	468
469	1.4262	1.44159	0.08296	-0.00002	0.02064	0.000	2.999	-0.000	8	469
470	1.5105	1.52725	0.08293	-0.00003	0.02063	0.000	2.999	-0.001	8	470
471	1.3546	1.36882	0.08298	-0.00002	0.02065	0.000	2.999	-0.000	8	471
472	1.4285	1.44393	0.08296	-0.00002	0.02064	0.000	2.999	-0.000	8	472
473	1.5638	1.58140	0.08291	-0.00003	0.02062	0.000	2.999	-0.001	8	473
474	2.3854	2.41362	0.08242	-0.00006	0.02038	0.000	3.000	0.137	4	474
475	1.3358	1.34971	0.08298	-0.00002	0.02065	0.000	2.999	-0.000	8	475
476	1.3933	1.40816	0.08297	-0.00002	0.02065	0.000	2.999	-0.000	8	476
477	1.4632	1.47919	0.08295	-0.00003	0.02064	0.000	2.999	-0.001	8	477
478	2.2004	2.22669	0.08255	-0.00006	0.02044	0.000	3.000	-0.015	8	478
479	1.8588	1.88078	0.08277	-0.00005	0.02055	0.000	3.000	-0.003	8	479
480	1.6479	1.66680	0.08288	-0.00004	0.02060	0.000	2.999	-0.001	8	480
481	1.9514	1.97464	0.08271	-0.00005	0.02052	0.000	3.000	-0.004	8	481
482	1.7241	1.74414	0.08284	-0.00004	0.02058	0.000	2.999	-0.002	8	482
483	1.8238	1.84529	0.08279	-0.00005	0.02056	0.000	2.999	-0.003	8	483
484	1.5436	1.56088	0.08292	-0.00003	0.02062	0.000	2.999	-0.001	8	484
485	1.9951	2.01891	0.08269	-0.00005	0.02051	0.000	3.000	-0.005	8	485
486	1.7925	1.81354	0.08281	-0.00004	0.02057	0.000	2.999	-0.002	8	486
487	2.4594	2.48831	0.08237	-0.00006	0.02035	0.000	3.000	0.031	4	487
488	2.6855	2.71623	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	488
489	2.1757	2.20171	0.08257	-0.00006	0.02045	0.000	3.000	-0.013	8	489
490	2.2235	2.25004	0.08253	-0.00006	0.02043	0.000	3.000	-0.018	8	490
491	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	491
492	2.7683	2.79960	0.08216	-0.00005	0.02025	0.000	3.000	0.008	8	492
493	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	493
494	2.6800	2.71069	0.08222	-0.00005	0.02028	0.000	3.000	0.010	8	494
495	2.7683	2.79960	0.08216	-0.00005	0.02025	0.000	3.000	0.008	8	495
496	2.4679	2.49688	0.08236	-0.00006	0.02035	0.000	3.000	0.029	4	496
497	2.7683	2.79960	0.08216	-0.00005	0.02025	0.000	3.000	0.008	8	497
498	2.3854	2.41362	0.08242	-0.00006	0.02038	0.000	3.000	0.137	4	498
499	2.8850	2.91700	0.08209	-0.00005	0.02022	0.000	3.000	0.006	8	499
500	2.7683	2.79960	0.08216	-0.00005	0.02025	0.000	3.000	0.008	8	500

TABLE A-2

The Estimated Conditional Moments of τ , Given the Maximum Likelihood Estimate, β_1 , β_2 and the Criterion κ for the 500 Hypothetical Subjects, in Degree 4 Case, Based upon Subtest 4 .

Subject	$\hat{\tau}^*$	Conditional Moments Mean	Variance	3rd	4th	β_1	β_2	κ	Type	Subject
1	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	1
2	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	2
3	-2.6518	-2.68373	0.08391	0.00001	0.02110	0.000	2.997	-0.000	8	3
4	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	4
5	-2.5959	-2.62627	0.08392	-0.00000	0.02111	0.000	2.997	-0.000	8	5
6	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	6
7	-2.6518	-2.68373	0.08391	0.00001	0.02110	0.000	2.997	-0.000	8	7
8	-2.6518	-2.68373	0.08391	0.00001	0.02110	0.000	2.997	-0.000	8	8
9	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	9
10	-2.3683	-2.39238	0.08383	-0.00006	0.02106	0.000	2.997	-0.001	8	10
11	-2.6518	-2.68373	0.08391	0.00001	0.02110	0.000	2.997	-0.000	8	11
12	-2.3217	-2.34402	0.08379	-0.00007	0.02105	0.000	2.997	-0.001	8	12
13	-1.9452	-1.96009	0.08331	-0.00013	0.02082	0.000	2.999	-0.010	8	13
14	-2.3678	-2.39187	0.08383	-0.00006	0.02105	0.000	2.997	-0.001	8	14
15	-2.0411	-2.05703	0.08346	-0.00012	0.02089	0.000	2.998	-0.006	8	15
16	-2.1282	-2.14615	0.08358	-0.00011	0.02094	0.000	2.998	-0.004	8	16
17	-2.2013	-2.22104	0.08367	-0.00009	0.02099	0.000	2.998	-0.003	8	17
18	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	18
19	-2.1565	-2.17513	0.08362	-0.00010	0.02096	0.000	2.998	-0.003	8	19
20	-1.8494	-1.86139	0.08315	-0.00014	0.02074	0.000	2.999	-0.017	8	20
21	-1.3325	-1.33771	0.08227	-0.00013	0.02031	0.000	3.001	0.012	8	21
22	-1.7778	-1.78852	0.08303	-0.00014	0.02068	0.000	3.000	-0.030	1	22
23	-1.8130	-1.82433	0.08309	-0.00014	0.02071	0.000	2.999	-0.022	8	23
24	-2.1282	-2.14615	0.08358	-0.00011	0.02094	0.000	2.998	-0.004	8	24
25	-1.6738	-1.68285	0.08285	-0.00014	0.02059	0.000	3.000	-0.528	1	25
26	-1.0262	-1.02985	0.08185	-0.00010	0.02011	0.000	3.001	0.005	8	26
27	-1.5884	-1.59626	0.08270	-0.00014	0.02052	0.000	3.000	0.050	4	27
28	-0.9676	-0.97112	0.08178	-0.00009	0.02007	0.000	3.001	0.004	8	28
29	-1.6938	-1.70315	0.08288	-0.00014	0.02061	0.000	3.000	-0.132	1	29
30	-1.6826	-1.69178	0.08286	-0.00014	0.02060	0.000	3.000	-0.222	1	30
31	-1.6168	-1.62504	0.08275	-0.00014	0.02054	0.000	3.000	0.077	4	31
32	-1.0597	-1.06344	0.08189	-0.00010	0.02013	0.000	3.001	0.005	8	32
33	-1.3596	-1.36502	0.08231	-0.00013	0.02033	0.000	3.001	0.013	8	33
34	-1.2315	-1.23601	0.08212	-0.00012	0.02024	0.000	3.001	0.006	8	34
35	-1.3596	-1.36502	0.08231	-0.00013	0.02033	0.000	3.001	0.013	8	35
36	-1.1492	-1.15328	0.08200	-0.00011	0.02018	0.000	3.001	0.007	8	36
37	-0.4998	-0.50365	0.08143	-0.00003	0.01990	0.000	3.002	0.000	8	37
38	-1.7123	-1.72194	0.08291	-0.00014	0.02062	0.000	3.000	-0.077	1	38
39	-0.6697	-0.67320	0.08152	-0.00005	0.01994	0.000	3.002	0.001	8	39
40	-0.6330	-0.63656	0.08149	-0.00005	0.01993	0.000	3.002	0.001	8	40
41	-0.5638	-0.56750	0.08145	-0.00004	0.01992	0.000	3.002	0.001	8	41
42	-0.4939	-0.49776	0.08142	-0.00003	0.01990	0.000	3.002	0.000	8	42
43	0.0381	0.03271	0.08145	0.00004	0.01992	0.000	3.002	0.001	8	43
44	-0.3326	-0.33692	0.08138	-0.00001	0.01988	0.000	3.002	0.000	8	44
45	-0.5536	-0.55732	0.08145	-0.00004	0.01991	0.000	3.002	0.001	8	45
46	-0.3347	-0.33902	0.08138	-0.00001	0.01988	0.000	3.002	0.000	8	46
47	-0.1088	-0.11381	0.08140	0.00002	0.01989	0.000	3.002	0.000	8	47
48	-0.1051	-0.11012	0.08140	0.00002	0.01989	0.000	3.002	0.000	8	48
49	0.4122	0.40663	0.08178	0.00010	0.02008	0.000	3.002	0.004	8	49
50	-0.0068	-0.01208	0.08143	0.00004	0.01991	0.000	3.002	0.000	8	50

TABLE A-2 (Continued)

Subject	$\hat{\tau}^*$	Mean	Conditional Moments Variance	3rd	4th	β_1	β_2	κ	Type	Subject
51	0.1643	0.15869	0.08153	0.00006	0.01996	0.000	3.002	0.001	8	51
52	0.5155	0.51021	0.08192	0.00012	0.02015	0.000	3.002	0.005	8	52
53	0.1959	0.19026	0.08156	0.00007	0.01997	0.000	3.002	0.002	8	53
54	0.6773	0.67283	0.08219	0.00015	0.02028	0.000	3.002	0.008	8	54
55	0.0259	0.02354	0.08145	0.00004	0.01991	0.000	3.002	0.001	8	55
56	-0.0198	-0.02505	0.08143	0.00003	0.01990	0.000	3.002	0.000	8	56
57	-0.0333	-0.03852	0.08142	0.00003	0.01990	0.000	3.002	0.000	8	57
58	0.4197	0.41415	0.08179	0.00010	0.02008	0.000	3.002	0.004	8	58
59	0.3799	0.37428	0.08174	0.00010	0.02006	0.000	3.002	0.003	8	59
60	0.8837	0.88115	0.08260	0.00018	0.02048	0.000	3.002	0.014	8	60
61	0.8029	0.79947	0.08243	0.00017	0.02040	0.000	3.002	0.011	8	61
62	0.6843	0.67988	0.08220	0.00015	0.02028	0.000	3.002	0.008	8	62
63	0.5077	0.50238	0.08191	0.00012	0.02014	0.000	3.002	0.005	8	63
64	1.3268	1.33238	0.08368	0.00020	0.02100	0.000	2.999	-0.030	1	64
65	0.3675	0.36187	0.08173	0.00009	0.02005	0.000	3.002	0.003	8	65
66	1.2304	1.23370	0.08344	0.00021	0.02089	0.000	3.000	-0.144	1	66
67	1.5711	1.58367	0.08424	0.00016	0.02127	0.000	2.997	-0.006	8	67
68	1.2032	1.20591	0.08337	0.00021	0.02085	0.000	3.000	-4.773	1	68
69	0.4570	0.45153	0.08184	0.00011	0.02011	0.000	3.002	0.004	8	69
70	1.5458	1.56169	0.08420	0.00017	0.02125	0.000	2.997	-0.007	8	70
71	1.6671	1.68294	0.08442	0.00014	0.02135	0.000	2.997	-0.003	8	71
72	1.4385	1.44706	0.08395	0.00019	0.02113	0.000	2.998	-0.013	8	72
73	1.5565	1.56860	0.08421	0.00017	0.02126	0.000	2.997	-0.007	8	73
74	1.3337	1.33945	0.08370	0.00020	0.02101	0.000	2.999	-0.028	1	74
75	1.7324	1.75341	0.08452	0.00012	0.02140	0.000	2.996	-0.002	8	75
76	1.1905	1.19294	0.08334	0.00021	0.02084	0.000	3.000	0.347	4	76
77	1.8991	1.92321	0.08470	0.00005	0.02149	0.000	2.995	-0.000	8	77
78	1.9132	1.53784	0.08471	0.00005	0.02149	0.000	2.995	-0.000	8	78
79	1.7496	1.76822	0.08455	0.00011	0.02142	0.000	2.996	-0.002	8	79
80	2.3854	2.42752	0.08442	-0.00014	0.02136	0.000	2.997	-0.003	8	80
81	2.2004	2.23590	0.08466	-0.00007	0.02147	0.000	2.996	-0.001	8	81
82	1.7209	1.73950	0.08450	0.00012	0.02140	0.000	2.996	-0.002	8	82
83	1.5527	1.56468	0.08420	0.00017	0.02125	0.000	2.997	-0.007	8	83
84	2.0288	2.05782	0.08474	-0.00000	0.02151	0.000	2.995	-0.000	8	84
85	1.9667	1.99336	0.08473	0.00003	0.02150	0.000	2.995	-0.000	8	85
86	2.1227	2.15529	0.08472	-0.00004	0.02150	0.000	2.995	-0.000	8	86
87	1.9979	2.02575	0.08474	0.00001	0.02151	0.000	2.995	-0.000	8	87
88	2.4679	2.51276	0.08428	-0.00016	0.02129	0.000	2.997	-0.006	8	88
89	2.1774	2.21204	0.08468	-0.00006	0.02148	0.000	2.995	-0.001	8	89
90	2.6727	2.72363	0.08383	-0.00019	0.02107	0.000	2.999	-0.019	8	90
91	2.1173	2.14968	0.08472	-0.00004	0.02150	0.000	2.995	-0.000	8	91
92	2.1925	2.22770	0.08467	-0.00007	0.02148	0.000	2.995	-0.001	8	92
93	2.2945	2.33343	0.08456	-0.00011	0.02142	0.000	2.996	-0.002	8	93
94	2.6800	2.73113	0.08381	-0.00019	0.02106	0.000	2.999	-0.020	8	94
95	2.4594	2.50348	0.08429	-0.00016	0.02129	0.000	2.997	-0.005	8	95
96	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	96
97	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	97
98	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	98
99	2.6800	2.73113	0.08381	-0.00019	0.02106	0.000	2.999	-0.020	8	99
100	2.6258	2.67544	0.08394	-0.00019	0.02113	0.000	2.998	-0.014	8	100

TABLE A-2 (Continued)

Subject	$\hat{\tau}^*$	Conditional Moments Mean	Variance	3rd	4th	β_1	β_2	κ	Type	Subject
101	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	101
102	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	102
103	-2.5987	-2.62915	0.08392	-0.00000	0.02111	0.000	2.997	-0.000	8	103
104	-2.5782	-2.60807	0.08392	-0.00001	0.02111	0.000	2.997	-0.000	8	104
105	-2.5782	-2.60807	0.08392	-0.00001	0.02111	0.000	2.997	-0.000	8	105
106	-2.3435	-2.36692	0.08381	-0.00007	0.02105	0.000	2.997	-0.001	8	106
107	-2.3435	-2.36692	0.08381	-0.00007	0.02105	0.000	2.997	-0.001	8	107
108	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	108
109	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	109
110	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	110
111	-2.1740	-2.19306	0.08364	-0.00010	0.02097	0.000	2.998	-0.003	8	111
112	-1.9529	-1.56693	0.08332	-0.00013	0.02082	0.000	2.999	-0.009	8	112
113	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	113
114	-2.1323	-2.15035	0.08359	-0.00011	0.02095	0.000	2.998	-0.004	8	114
115	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	115
116	-2.5959	-2.62627	0.08392	-0.00000	0.02111	0.000	2.997	-0.000	8	116
117	-1.6938	-1.70315	0.08288	-0.00014	0.02061	0.000	3.000	-0.132	1	117
118	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	118
119	-2.1282	-2.14615	0.08358	-0.00011	0.02094	0.000	2.998	-0.004	8	119
120	-1.9476	-1.96152	0.08331	-0.00013	0.02082	0.000	2.999	-0.010	8	120
121	-1.9835	-1.99817	0.08337	-0.00013	0.02084	0.000	2.999	-0.008	8	121
122	-1.6393	-1.64785	0.08279	-0.00014	0.02056	0.000	3.000	0.138	4	122
123	-1.9462	-1.56009	0.08331	-0.00013	0.02082	0.000	2.999	-0.010	8	123
124	-2.0513	-2.06746	0.08347	-0.00012	0.02089	0.000	2.998	-0.006	8	124
125	-1.5350	-1.54219	0.08260	-0.00014	0.02047	0.000	3.000	0.030	4	125
126	-1.5350	-1.54219	0.08260	-0.00014	0.02047	0.000	3.000	0.030	4	126
127	-1.5350	-1.54219	0.08260	-0.00014	0.02047	0.000	3.000	0.030	4	127
128	-1.1811	-1.18533	0.08205	-0.00011	0.02020	0.000	3.001	0.007	8	128
129	-1.2935	-1.29842	0.08221	-0.00012	0.02028	0.000	3.001	0.010	8	129
130	-1.2990	-1.30395	0.08222	-0.00012	0.02029	0.000	3.001	0.010	8	130
131	-1.6980	-1.70742	0.08289	-0.00014	0.02061	0.000	3.000	-0.113	1	131
132	-1.0597	-1.06344	0.08189	-0.00010	0.02013	0.000	3.001	0.005	8	132
133	-1.0347	-1.03837	0.08186	-0.00010	0.02011	0.000	3.001	0.005	8	133
134	-0.8984	-0.90182	0.08171	-0.00008	0.02004	0.000	3.001	0.003	8	134
135	-0.7641	-0.76751	0.08158	-0.00007	0.01998	0.000	3.002	0.002	8	135
136	-1.2145	-1.21891	0.08209	-0.00012	0.02023	0.000	3.001	0.008	8	136
137	-0.8995	-0.90292	0.08171	-0.00008	0.02004	0.000	3.001	0.003	8	137
138	-0.3813	-0.38548	0.08139	-0.00002	0.01988	0.000	3.002	0.000	8	138
139	-1.1320	-1.13601	0.08198	-0.00011	0.02017	0.000	3.001	0.006	8	139
140	-0.8420	-0.84539	0.08165	-0.00008	0.02001	0.000	3.001	0.003	8	140
141	-0.7755	-0.77890	0.08159	-0.00007	0.01998	0.000	3.002	0.002	8	141
142	-0.7086	-0.71205	0.08154	-0.00006	0.01996	0.000	3.002	0.002	8	142
143	-0.0595	-0.06465	0.08141	0.00003	0.01990	0.000	3.002	0.000	8	143
144	-0.3333	-0.33762	0.08138	-0.00001	0.01988	0.000	3.002	0.000	8	144
145	-0.7086	-0.71205	0.08154	-0.00006	0.01996	0.000	3.002	0.002	8	145
146	-0.4784	-0.48230	0.08142	-0.00003	0.01990	0.000	3.002	0.000	8	146
147	-0.4548	-0.45877	0.08141	-0.00003	0.01989	0.000	3.002	0.000	8	147
148	-0.1049	-0.10992	0.08140	0.00002	0.01989	0.000	3.002	0.000	8	148
149	-0.3579	-0.36215	0.08139	-0.00001	0.01988	0.000	3.002	0.000	8	149
150	-0.4998	-0.50365	0.08143	-0.00003	0.01990	0.000	3.002	0.000	8	150

TABLE A-2 (Continued)

Subject	$\hat{\tau}$*	Conditional Moments Mean	Variance	3rd	4th	β_1	β_2	κ	Type	Subject
151	-0.0143	-0.01956	0.08143	0.00003	0.01990	0.000	3.002	0.000	8	151
152	0.0146	0.00926	0.08144	0.00004	0.01991	0.000	3.002	0.001	8	152
153	0.0255	0.02014	0.08145	0.00004	0.01991	0.000	3.002	0.001	8	153
154	0.2403	0.23463	0.08160	0.00007	0.01999	0.000	3.002	0.002	8	154
155	0.6143	0.60945	0.08208	0.00014	0.02022	0.000	3.002	0.006	8	155
156	0.2638	0.25812	0.08162	0.00008	0.02000	0.000	3.002	0.002	8	156
157	0.2940	0.28832	0.08165	0.00008	0.02001	0.000	3.002	0.002	8	157
158	0.6264	0.62162	0.08210	0.00014	0.02023	0.000	3.002	0.007	8	158
159	0.5103	0.50499	0.08191	0.00012	0.02014	0.000	3.002	0.005	8	159
160	0.3534	0.34775	0.08171	0.00009	0.02004	0.000	3.002	0.003	8	160
161	0.5351	0.52988	0.08195	0.00012	0.02016	0.000	3.002	0.005	8	161
162	0.8711	0.86840	0.08258	0.00018	0.02047	0.000	3.002	0.013	8	162
163	1.1112	1.11208	0.08314	0.00020	0.02074	0.000	3.001	0.048	4	163
164	1.0709	1.07106	0.08304	0.00020	0.02069	0.000	3.001	0.034	4	164
165	0.6773	0.67283	0.08219	0.00015	0.02028	0.000	3.002	0.008	8	165
166	0.6856	0.68119	0.08220	0.00015	0.02029	0.000	3.002	0.008	8	166
167	1.4316	1.43997	0.08393	0.00019	0.02112	0.000	2.998	-0.014	8	167
168	0.8593	0.85646	0.08255	0.00018	0.02046	0.000	3.002	0.013	8	168
169	1.3500	1.35617	0.08374	0.00020	0.02103	0.000	2.999	-0.024	8	169
170	0.6792	0.67475	0.08219	0.00015	0.02028	0.000	3.002	0.008	8	170
171	1.3530	1.35924	0.08375	0.00020	0.02103	0.000	2.999	-0.024	8	171
172	1.4411	1.44974	0.08396	0.00019	0.02113	0.000	2.998	-0.013	8	172
173	2.0908	2.12218	0.08473	-0.00003	0.02150	0.000	2.995	-0.000	8	173
174	1.7513	1.76998	0.08455	0.00011	0.02142	0.000	2.996	-0.002	8	174
175	1.6943	1.71098	0.08446	0.00013	0.02138	0.000	2.996	-0.003	8	175
176	1.4735	1.48308	0.08403	0.00018	0.02117	0.000	2.998	-0.011	8	176
177	1.1862	1.18855	0.08333	0.00021	0.02083	0.000	3.000	0.257	4	177
178	1.8264	1.84781	0.08464	0.00008	0.02146	0.000	2.996	-0.001	8	178
179	1.9567	1.98298	0.08473	0.00003	0.02150	0.000	2.995	-0.000	8	179
180	1.9433	1.96908	0.08472	0.00004	0.02150	0.000	2.995	-0.000	8	180
181	1.9667	1.99336	0.08473	0.00003	0.02150	0.000	2.995	-0.000	8	181
182	1.9667	1.99336	0.08473	0.00003	0.02150	0.000	2.995	-0.000	8	182
183	1.5711	1.58367	0.08424	0.00016	0.02127	0.000	2.997	-0.006	8	183
184	1.9801	2.00727	0.08474	0.00002	0.02151	0.000	2.995	-0.000	8	184
185	2.3964	2.43889	0.08441	-0.00014	0.02135	0.000	2.997	-0.004	8	185
186	2.6727	2.72363	0.08383	-0.00019	0.02107	0.000	2.999	-0.019	8	186
187	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	187
188	2.1040	2.13588	0.08473	-0.00003	0.02150	0.000	2.995	-0.000	8	188
189	2.3617	2.40300	0.08446	-0.00013	0.02138	0.000	2.996	-0.003	8	189
190	1.9979	2.02575	0.08474	0.00001	0.02151	0.000	2.995	-0.000	8	190
191	2.3854	2.42752	0.08442	-0.00014	0.02136	0.000	2.997	-0.003	8	191
192	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	192
193	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	193
194	2.4679	2.51276	0.08428	-0.00016	0.02129	0.000	2.997	-0.006	8	194
195	2.4594	2.50398	0.08429	-0.00016	0.02129	0.000	2.997	-0.005	8	195
196	2.2004	2.23590	0.08466	-0.00007	0.02147	0.000	2.996	-0.001	8	196
197	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	197
198	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	198
199	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	199
200	2.6258	2.67544	0.08394	-0.00019	0.02113	0.000	2.998	-0.014	8	200

TABLE A-2 (Continued)

Subject	$\hat{\tau}^*$	Mean	Conditional Moments Variance	3rd	4th	β_1	β_2	κ	Type	Subject
201	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	201
202	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	202
203	-2.3032	-2.32555	0.08378	-0.00007	0.02104	0.000	2.997	-0.001	8	203
204	-2.5987	-2.62[illegible]15	0.08392	-0.00000	0.02111	0.000	2.997	-0.000	8	204
205	-2.5782	-2.60807	0.08392	-0.00001	0.02111	0.000	2.997	-0.000	8	205
206	-2.4080	-2.43316	0.08386	-0.00005	0.02108	0.000	2.997	-0.001	8	206
207	-2.1188	-2.13653	0.08357	-0.00011	0.02094	0.000	2.998	-0.004	8	207
208	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	208
209	-2.5782	-2.60807	0.08392	-0.00001	0.02111	0.000	2.997	-0.000	8	209
210	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001		210
211	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	211
212	-1.9462	-1.96009	0.08331	-0.00013	0.02082	0.000	2.999	-0.010	8	212
213	-1.9462	-1.9600[illegible]	0.08331	-0.00013	0.02082	0.000	2.999	-0.010	8	213
214	-1.6464	-1.6550[illegible]	0.08280	-0.00014	0.020[illegible]	0.000	3.000	0.107	4	214
215	-2.1304	-2.14840	0.08358	-0.00011	0.02095	0.000	2.998	-0.004	8	215
216	-2.1188	-2.13653	0.08357	-0.00011	0.02094	0.000	2.998	-0.004	8	216
217	-1.8853	-1.89798	0.08321	-0.00014	0.02077	0.000	2.999	-0.014	8	217
218	-2.0043	-2.01942	0.08340	-0.00013	0.02086	0.000	2.999	-0.007	8	218
219	-2.3457	-2.36918	0.08361	-0.00006	0.02106	0.000	2.997	-0.001	8	219
220	-1.1404	-1.14444	0.08199	-0.00011	0.02018	0.000	3.001	0.006	8	220
221	-1.6795	-1.68864	0.08286	-0.00014	0.02060	0.000	3.000	-0.289	1	221
222	-1.8685	-1.88085	0.08318	-0.00014	0.02075	0.000	2.999	-0.015	8	222
223	-1.0170	-1.02062	0.08183	-0.00010	0.02010	0.000	3.001	0.005	8	223
224	-2.1282	-2.14615	0.08358	-0.00011	0.02094	0.000	2.998	-0.004	8	224
225	-1.1970	-1.20[illegible]	0.08207	-0.00012	0.02021	0.000	3.001	0.009	8	225
226	-1.4432	-1.44939	0.08245	-0.00014	0.02040	0.000	3.001	0.01[illegible]	8	226
227	-1.2323	-1.23582	0.08212	-0.00012	0.02024	0.000	3.001	0.008	8	227
228	-1.4207	-1.42667	0.08241	-0.00013	0.02038	0.000	3.001	0.016	8	228
229	-1.3507	-1.35605	0.08230	-0.00013	0.02033	0.000	3.001	0.012	8	229
230	-1.2163	-1.22072	0.08210	-0.000[illegible]	0.02023	0.000	3.001	0.008	8	230
231	-1.5956	-1.60356	0.08271	-0.00014	0.02052	0.000	3.000	0.055	4	231
232	-1.4008	-1.40658	0.08238	-0.00013	0.020[illegible]6	0.000	3.001	0.015	8	232
233	-1.3987	-1.40446	0.08238	-0.00013	0.02036	0.000	3.001	0.015	8	233
234	-1.1457	-1.14977	0.08200	-0.00011	0.02018	0.000	3.001	0.007	8	234
235	-0.8620	-0.86540	0.08167	-0.00008	0.02002	0.000	3.001	0.003	8	235
236	-0.4625	-0.46644	0.08141	-0.00003	0.01989	0.000	3.002	0.000	8	236
237	-1.2667	-1.27143	0.08217	-0.00012	0.02026	0.000	3.001	0.009	8	237
238	-0.9977	-1.00128	0.08181	-0.00009	0.02009	0.000	3.001	0.004	8	238
239	-0.3243	-0.32965	0.08138	-0.00001	0.01988	0.000	3.002	0.000	8	239
240	-1.0306	-1.03426	0.08185	-0.00010	0.02011	0.000	3.001	0.005	8	240
241	-0.7388	-0.74222	0.08156	-0.00006	0.01997	0.000	3.002	0.002	8	241
242	-0.7035	-0.70696	0.08154	-0.00006	0.01996	0.000	3.002	0.002	8	242
243	-0.5131	-0.51691	0.08143	-0.00003	0.01990	0.000	3.002	0.001	8	243
244	-0.6159	-0.61939	0.08148	-0.00005	0.01993	0.000	3.002	0.001	8	244
245	-0.5420	-0.54575	0.08144	-0.00004	0.01991	0.000	3.002	0.001	8	245
246	-0.9902	-0.99376	0.08180	-0.00009	0.02009	0.000	3.001	0.004	8	246
247	-0.7815	-0.78490	0.08160	-0.00007	0.01999	0.000	3.002	0.002	8	247
248	-0.1950	-0.20274	0.08138	0.00001	0.01988	0.000	3.002	0.000	8	248
249	0.4075	0.40192	0.08178	0.00010	0.02008	0.000	3.002	0.003	6	249
250	-0.4340	-0.43802	0.08140	-0.00002	0.01989	0.000	3.002	0.000	8	250

TABLE A-2 (Continued)

Subject	$\hat{\tau}^*$	Mean	Conditional Moments Variance	3rd	4th	β_1	β_2	κ	Type	Subject
251	-0.0793	-0.08439	0.08140	0.00002	0.01989	0.000	3.002	0.000	8	251
252	-0.0492	-0.05437	0.08141	0.00003	0.01990	0.000	3.002	0.000	8	252
253	-0.0016	-0.00690	0.08143	0.00004	0.01991	0.000	3.002	0.000	8	253
254	0.3404	0.33474	0.08170	0.00009	0.02004	0.000	3.002	0.003	8	254
255	0.3733	0.36767	0.08173	0.00010	0.02006	0.000	3.002	0.003	8	255
256	-0.3444	-0.34869	0.08138	-0.00001	0.01988	0.000	3.002	0.000	8	256
257	0.5084	0.50308	0.08191	0.00012	0.02014	0.000	3.002	0.005	8	257
258	0.4814	0.47600	0.08187	0.00011	0.02012	0.000	3.002	0.004	8	258
259	0.3478	0.34215	0.08170	0.00009	0.02004	0.000	3.002	0.003	8	259
260	0.7231	0.71897	0.08227	0.00016	0.02032	0.000	3.002	0.009	8	260
261	0.6489	0.64425	0.08214	0.00014	0.02025	0.000	3.002	0.007	8	261
262	0.4721	0.46767	0.08186	0.00011	0.02012	0.000	3.002	0.004	8	262
263	1.1164	1.11738	0.08315	0.00020	0.02075	0.000	3.001	0.051	4	263
264	1.0260	1.02542	0.08293	0.00020	0.02064	0.000	3.001	0.026	4	264
265	0.7249	0.72078	0.08228	0.00016	0.02032	0.000	3.002	0.009	8	265
266	0.8334	0.83028	0.08250	0.00017	0.02043	0.000	3.002	0.012	8	266
267	0.8371	0.83432	0.08250	0.00017	0.02043	0.000	3.002	0.012	8	267
268	0.8472	0.84423	0.08252	0.00017	0.02044	0.000	3.002	0.012	8	268
269	0.4901	0.48472	0.08189	0.00012	0.02013	0.000	3.002	0.004	8	269
270	0.8669	0.86415	0.08257	0.00018	0.02046	0.000	3.002	0.013	8	270
271	1.5527	1.56468	0.08420	0.00017	0.02125	0.000	2.997	-0.007	8	271
272	1.4385	1.44706	0.08395	0.00019	0.02113	0.000	2.998	-0.013	8	272
273	1.5992	1.61267	0.08430	0.00016	0.02130	0.000	2.997	-0.005	8	273
274	1.7324	1.75041	0.08452	0.00012	0.02140	0.000	2.996	-0.002	8	274
275	2.0019	2.02990	0.08474	0.00001	0.02151	0.000	2.995	-0.060	8	275
276	1.0832	1.08358	0.08307	0.00020	0.02071	0.000	3.001	0.037	4	276
277	1.7925	1.81266	0.08460	0.00010	0.02144	0.000	2.996	-0.001	8	277
278	2.2235	2.25985	0.08464	-0.00008	0.02146	0.000	2.996	-0.001	8	278
279	1.5167	1.52757	0.08413	0.00018	0.02122	0.000	2.998	-0.008	8	279
280	1.9979	2.02575	0.08474	0.00001	0.02151	0.000	2.995	-0.000	8	280
281	2.3852	2.42731	0.08443	-0.00014	0.02136	0.000	2.997	-0.003	8	281
282	2.1774	2.21204	0.08468	-0.00006	0.02148	0.000	2.995	-0.001	8	282
283	2.0495	2.07931	0.08474	-0.00001	0.02151	0.000	2.995	-0.0[illegible]	8	283
284	1.8259	1.84729	0.08464	0.00008	0.02146	0.000	2.996	-0.0[illegible]	8	284
285	2.1040	2.13588	0.08473	-0.00003	0.02150	0.000	2.995	-0.000	8	285
286	2.1040	2.13588	0.08473	-0.00003	0.02150	0.000	2.995	-0.000	8	286
287	1.8477	1.86989	0.08456	0.00007	0.02147	0.000	2.995	-0.001	8	287
288	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	288
289	2.6800	2.73113	0.08381	-0.00019	0.02106	0.000	2.999	-0.020	8	289
290	2.0471	2.07682	0.08474	-0.00001	0.02151	0.000	2.995	-0.000	8	290
291	2.4679	2.51276	0.08428	-0.00016	0.02129	0.000	2.997	-0.006	8	291
292	2.2004	2.23590	0.08466	-0.00007	0.02147	0.000	2.996	-0.001	8	292
293	2.6800	2.73113	0.08381	-0.00019	0.02105	0.000	2.999	-0.0[illegible]	8	293
294	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	294
295	2.7683	2.82166	0.08360	-0.00020	0.02096	0.000	3.000	-0.046	[illegible]	295
296	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	296
297	2.3566	2.39777	0.08447	-0.00012	0.02128	0.000	2.996	-0.002	8	297
298	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	298
299	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	299
300	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	300

TABLE A-2 (Continued)

Subject	$\hat{\tau}$*	Mean	Conditional Moments Variance	3rd	4th	β_1	β_2	κ	Type	Subject
301	-2.6518	-2.68373	0.08391	0.00001	0.02110	0.000	2.997	-0.000	8	301
302	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	302
303	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	303
304	-2.1445	-2.16284	0.0837[illegible]	-0.00011	0.02095	0.000	2.998	-0.004	8	304
305	-2.5987	-2.62915	0.08392	-0.00000	0.02111	0.000	2.997	-0.000	8	305
306	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	306
307	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	307
308	-2.6518	-2.68373	0.08391	0.00001	0.02110	0.000	2.997	-0.000	8	308
309	-2.3435	-2.36692	0.08381	-0.00007	0.02105	0.000	2.997	-0.001	8	309
310	-2.3212	-2.34402	0.08379	-0.00007	0.02105	0.000	2.997	-0.001	8	310
311	-2.1703	-2.18927	0.08364	-0.00010	0.02097	0.000	2.9[illegible]	-0.003	8	311
312	-2.6518	-2.68373	0.08391	0.00001	0.02110	0.000	2.997	-0.000	8	312
313	-2.5782	-2.60807	0.08392	-0.00001	0.02111	0.000	2.997	-0.000	8	313
314	-1.8477	-1.85966	0.08315	-0.00014	0.02074	0.000	2.999	-0.017	8	314
315	-1.9133	-1.92653	0.08326	-0.00013	0.02079	0.000	2.999	-0.012	8	315
316	-2.0795	-2.09631	0.08351	-0.00012	0.02091	0.000	2.998	-0.005	8	316
317	-2.1707	-2.18968	0.08364	-0.00010	0.02097	0.000	2.998	-0.003	8	317
318	-1.9201	-1.93346	0.08327	-0.00013	0.02079	0.000	2.959	-0.011	8	318
319	-2.3435	-2.36692	0.08381	-0.00007	0.02105	0.000	2.997	-0.001	8	319
320	-1.4223	-1.42829	0.08241	-0.00013	0.02038	0.000	3.001	0.016	8	320
321	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	321
322	-1.5287	-1.53582	0.08259	-0.00014	0.02047	0.000	3.001	0.029	4	322
323	-1.5302	-1.53734	0.08260	-0.00014	0.02047	0.000	3.001	0.029	4	323
324	-1.6554	-1.66418	0.08281	-0.00014	0.02058	0.000	3.000	0.331	4	324
325	-1.6653	-1.67423	0.08283	-0.00014	0.02058	0.000	3.000	2.849	6	325
326	-1.5018	-1.50861	0.08255	-0.00014	0.02045	0.000	3.001	0.024	8	326
327	-1.3121	-1.31715	0.08224	-0.00013	0.02030	0.000	3.001	0.011	8	327
328	-1.8015	-1.81263	0.08307	-0.00014	0.02070	0.000	3.000	-0.024	8	328
329	-0.4473	-0.45129	0.08141	-0.00003	0.01989	0.000	3.002	0.000	8	329
330	-1.4146	-1.42051	0.08240	-0.00013	0.02038	0.000	3.001	0.016	8	330
331	-1.5140	-1.52095	0.08257	-0.00014	0.02046	0.000	3.001	0.026	4	331
332	-0.8088	-0.81219	0.08162	-0.00007	0.02000	0.000	3.002	0.002	8	332
333	-1.1548	-1.15891	0.08201	-0.00011	0.02019	0.000	3.001	0.007	8	333
334	-1.2703	-1.27506	0.08217	-0.00012	0.02027	0.000	3.001	0.009	8	334
335	-1.2855	-1.29036	0.08220	-0.00012	0.02028	0.000	3.001	0.010	8	335
336	-0.5580	-0.56171	0.08145	-0.00004	0.01991	0.000	3.002	0.001	8	336
337	-0.9692	-0.97272	0.08178	-0.00009	0.02007	0.000	3.001	0.004	8	337
338	-0.8348	-0.83819	0.08165	-0.00007	0.02001	0.000	3.001	0.003	8	338
339	-0.8740	-0.87741	0.08168	-0.00008	0.02003	0.000	3.001	0.003	8	339
340	-0.5062	-0.51003	0.08143	-0.00003	0.01990	0.000	3.002	0.000	8	340
341	-0.3366	-0.34091	0.08138	-0.00001	0.01988	0.000	3.002	0.000	8	341
342	-0.3701	-0.37431	0.08139	-0.00002	0.01988	0.000	3.002	0.000	8	342
343	-0.7559	-0.75931	0.08158	-0.00006	0.01998	0.000	3.002	0.002	8	343
344	-0.2618	-0.26634	0.08138	-0.00000	0.01988	0.000	3.002	0.000	8	344
345	-0.1534	-0.15828	0.08139	0.00001	0.01988	0.000	3.002	0.000	8	345
346	-0.8045	-0.80789	0.08162	-0.00007	0.01999	0.000	3.002	0.002	8	346
347	-0.0251	-0.03034	0.08142	0.00003	0.01990	0.000	3.002	0.000	8	347
348	0.0121	0.00777	0.08144	0.00004	0.01991	0.000	3.002	0.001	8	348
349	0.1832	0.17757	0.08155	0.00006	0.01996	0.000	3.002	0.001	8	349
350	0.4359	0.43028	0.08181	0.00011	0.02009	0.000	3.002	0.004	8	350

TABLE A-2 (Continued)

Subject	$\hat{\tau}^*$	Mean	Variance	Conditional Moments 3rd	4th	β_1	β_2	κ	Type	Subject
351	-0.2272	-0.23185	0.08138	0.00000	0.01988	0.000	3.002	0.006	8	351
352	-0.1141	-0.11909	0.08143	0.00002	0.01989	0.000	3.002	0.000	8	352
353	-0.0085	-0.01378	0.08143	0.00004	0.01990	0.000	3.002	0.000	8	353
354	0.1657	0.16408	0.08154	0.00006	0.01996	0.000	3.002	0.001	8	354
355	0.1832	0.17757	0.08155	0.00006	0.01996	0.000	3.002	0.001	8	355
356	0.5575	0.55237	0.08199	0.00013	0.02018	0.000	3.002	0.005	8	356
357	0.6773	0.67283	0.08219	0.00015	0.02028	0.000	3.002	0.008	8	357
358	0.6607	0.65612	0.08216	0.00015	0.02026	0.000	3.002	0.007	8	358
359	0.0375	0.03211	0.08145	0.00004	0.01992	0.000	3.002	0.001	8	359
360	0.4618	0.45634	0.08185	0.00011	0.02011	0.000	3.002	0.004	8	360
361	0.8644	0.66162	0.08256	0.00018	0.02046	0.000	3.002	0.013	8	361
362	1.0592	1.05917	0.08301	0.00020	0.02068	0.000	3.001	0.031	4	362
363	1.1494	1.15101	0.08324	0.00020	0.02079	0.000	3.000	0.081	4	363
364	1.2245	1.22767	0.08342	0.00021	0.02088	0.000	3.000	-0.180	1	364
365	1.1905	1.19294	0.08334	0.00021	0.02084	0.000	3.000	0.347	4	365
366	1.1563	1.15805	0.08325	0.00020	0.02080	0.000	3.000	0.093	4	366
367	1.2229	1.22604	0.08342	0.00021	0.02088	0.000	3.000	-0.202	1	367
368	1.3023	1.30727	0.08362	0.00020	0.02097	0.000	2.999	-0.038	1	368
369	1.2514	1.25517	0.08349	0.00021	0.02091	0.000	3.000	-0.081	1	369
370	1.6302	1.64470	0.08435	0.00015	0.02132	0.000	2.997	-0.004	8	370
371	1.0642	1.06425	0.08303	0.00020	0.02069	0.000	3.001	0.032	4	371
372	1.3989	1.40636	0.08386	0.00020	0.02109	0.000	2.999	-0.017	8	372
373	1.5896	1.60276	0.08428	0.00016	0.02129	0.000	2.997	-0.005	8	373
374	0.8755	0.87285	0.08259	0.00018	0.02047	0.000	3.002	0.014	8	374
375	1.7324	1.75041	0.08452	0.00012	0.02140	0.000	2.996	-0.002	8	375
376	1.5200	1.53097	0.08413	0.00018	0.02122	0.000	2.998	-0.008	8	376
377	1.6896	1.70611	0.08446	0.00013	0.02137	0.000	2.996	-0.003	8	377
378	2.1925	2.22770	0.08467	-0.00007	0.02148	0.000	2.995	-0.001	8	378
379	1.3933	1.40061	0.08384	0.00020	0.02108	0.000	2.999	-0.017	8	379
380	2.1227	2.15529	0.08472	-0.00004	0.02150	0.000	2.995	-0.000	8	380
381	1.8191	1.84024	0.08463	0.00009	0.02146	0.000	2.996	-0.001	8	381
382	2.3854	2.42752	0.08442	-0.00014	0.02136	0.000	2.997	-0.003	8	382
383	1.7392	1.75745	0.08453	0.00012	0.02141	0.000	2.996	-0.002	8	383
384	2.3854	2.42752	0.08442	-0.00014	0.02136	0.000	2.997	-0.003	8	384
385	2.4675	2.51276	0.08428	-0.00016	0.02129	0.000	2.997	-0.006	8	385
386	1.5667	1.59336	0.08473	0.00003	0.02150	0.000	2.995	-0.000	8	386
387	2.3854	2.42752	0.08442	-0.00014	0.02136	0.000	2.997	-0.003	8	387
388	1.9446	1.57042	0.08472	0.00004	0.02150	0.000	2.995	-0.000	8	388
389	2.6258	2.67544	0.08394	-0.00019	0.02113	0.000	2.998	-0.014	8	389
390	2.7683	2.82166	0.08360	-0.00020	0.02096	0.000	3.000	-0.046	1	390
391	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	391
392	2.7683	2.82166	0.08360	-0.00020	0.02096	0.000	3.000	-0.046	1	392
393	2.6800	2.73113	0.08381	-0.00019	0.02106	0.000	2.999	-0.020	8	393
394	2.2004	2.23590	0.08466	-0.00007	0.02147	0.000	2.996	-0.001	8	394
395	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	395
396	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	396
397	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	397
398	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	398
399	2.3854	2.42752	0.08442	-0.00014	0.02136	0.000	2.997	-0.003	8	399
400	2.6800	2.73113	0.08381	-0.00019	0.02106	0.000	2.999	-0.020	8	400

TABLE A-2 (Continued)

Subject	$\hat{\tau}^*$	Conditional Moments Mean	Variance	3rd	4th	β_1	β_2	κ	Type	Subject
401	-2.8430	-2.88020	0.08383	0.00006	0.02106	0.000	2.997	-0.001	8	401
402	-2.1323	-2.15035	0.08359	-0.00011	0.02095	0.000	2.998	-0.004	8	402
403	-2.5987	-2.62915	0.08392	-0.00000	0.02111	0.000	2.997	-0.000	8	403
404	-2.6518	-2.68373	0.08391	0.00001	0.02110	0.000	2.997	-0.000	8	404
405	-2.3457	-2.36918	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	405
406	-2.3683	-2.39238	0.08383	-0.00006	0.02106	0.000	2.997	[illegible]	8	406
407	-2.5587	-2.62915	0.08392	-0.00000	0.02111	0.000	2.997	-0.000	8	407
408	-2.1282	[illegible] 14615	0.08358	-0.00011	0.02094	0.000	2.998	-0.004	8	408
409	-2.5782	-2.6[illegible]907	0.08392	-0.00001	0.02111	0.000	2.997	-0.000	8	409
410	-1.6793	-1.66[illegible]	0.08286	-0.00014	0.02060	0.000	3.000	-0.251	1	410
411	-2.3457	-2.3691[illegible]	0.08381	-0.00006	0.02106	0.000	2.997	-0.001	8	411
412	-2.3678	-2.39187	0.08[illegible]83	-0.00006	0.02106	0.000	2.997	-0.001	8	412
413	-2.1707	-2.18968	0.08364	-0.00010	0.02097	0.000	2.998	-0.003	8	413
414	-2.1445	-2.16284	0.08360	-0.00011	0.02095	0.000	2.998	-0.004	8	414
415	-2.1282	-2.14615	0.08358	-0.00011	0.02094	0.000	2.998	-0.004	8	415
416	-1.8853	-1.89798	0.08321	-0.00014	0.02077	0.000	2.999	-0.014	8	416
417	-2.0331	-2.04885	0.08345	-0.00012	0.02088	0.000	2.998	-0.006	8	417
418	-2.4080	-2.43316	0.08386	-0.00005	0.02108	0.000	2.997	-0.001	8	418
419	-2.0043	-2.01942	0.08340	-0.00013	0.02086	0.000	2.999	-0.007	8	419
420	-1.5731	-1.58076	0.08267	-0.00014	0.02051	0.000	3.000	0.042	4	420
421	-1.5454	-1.55277	0.08262	-0.00014	0.02048	0.000	3.000	0.033	4	421
422	-2.0005	-2.01554	0.08340	-0.00013	0.02086	0.000	2.999	-0.007	8	422
423	-1.5869	-1.59474	0.08269	-0.00014	0.02052	0.000	3.000	0.049	4	423
424	-1.7349	-1.74490	0.08295	-0.00014	0.02064	0.000	3.000	-0.051	1	424
425	-2.1282	-2.14615	0.08358	-0.00011	0.02094	0.000	2.998	-0.004	8	425
426	-1.1439	-1.14796	0.08199	-0.00011	0.02018	0.000	3.001	0.007	8	426
427	-1.0814	-1.08521	0.08191	-0.00010	0.02014	0.000	3.001	0.066	8	427
428	-0.9658	-0.96931	0.08178	-0.00009	0.02007	0.000	3.001	0.004	8	428
429	-1.3204	-1.32551	0.08225	-0.00013	0.02030	0.000	3.001	0.011	8	429
430	-1.5457	-1.55302	0.08262	-0.00014	0.02048	0.000	3.000	0.033	4	430
431	-1.0859	-1.08973	0.08192	-0.00010	0.02014	0.000	3.001	0.006	8	431
432	-0.9320	-0.93546	0.08174	-0.00009	0.02005	0.000	3.001	0.004	8	432
433	-0.7086	-0.71205	0.08154	-0.00006	0.01996	0.000	3.002	0.002	8	433
434	-1.1595	-1.16363	0.08202	-0.00011	0.02019	0.000	3.001	0.007	8	434
435	-0.8420	-0.84539	0.08165	-0.00008	0.02001	0.000	3.001	0.003	8	435
436	-0.9320	-0.93546	0.08174	-0.00009	0.02005	0.000	3.001	0.004	8	436
437	-1.4726	-1.47909	0.08250	-0.00014	0.02042	0.000	3.001	0.020	8	437
438	-0.6773	-0.68079	0.08152	-0.00005	0.01995	0.000	3.002	0.001	8	438
439	-0.5275	-0.53128	0.08144	-0.00004	0.01991	0.000	3.002	0.001	8	439
440	-0.4758	-0.47971	0.08142	-0.00003	0.01990	0.000	3.002	0.000	8	440
441	-0.4767	-0.48061	0.08142	-0.00003	0.01990	0.000	3.002	0.000	8	441
442	-1.0179	-1.02152	0.08184	-0.00010	0.02010	0.000	3.002	0.005	8	442
443	-0.1286	-0.13355	0.08139	0.00002	0.01989	0.000	3.002	0.000	8	443
444	-0.4494	-0.45338	0.08141	-0.00003	0.01989	0.000	3.002	0.000	8	444
445	-0.7086	-0.71205	0.08154	-0.00006	0.01996	0.000	3.002	0.002	8	445
446	-0.6046	-0.60821	0.08148	-0.00005	0.01993	0.000	3.002	0.001	8	446
447	-0.1687	-0.17353	0.08138	0.00001	0.01988	0.000	3.002	0.000	8	447
448	-0.1514	-0.15628	0.08139	0.00001	0.01988	0.000	3.002	0.000	8	448
449	-0.6964	-0.69987	0.08153	-0.00006	0.01995	0.000	3.002	0.001	8	449
450	-0.1581	-0.16296	0.08139	0.00001	0.01988	0.000	3.002	0.000	8	450

TABLE A-2 (continued)

Subject	$\hat{\tau}^*$	Mean	Conditional Moments Variance	3rd	4th	β_1	β_2	κ	Type	Subject
451	0.3871	0.38149	0.08175	0.00010	0.02006	0.000	3.002	0.003	8	451
452	-0.1380	-0.14292	0.08139	0.00002	0.01988	0.000	3.002	0.000	8	452
453	0.3922	0.38660	0.08176	0.00010	0.02007	0.000	3.002	0.003	8	453
454	0.0052	-0.00311	0.08144	0.00004	0.01991	0.000	3.002	0.001	8	454
455	0.2004	0.19475	0.08156	0.00007	0.01997	0.000	3.002	0.002	8	455
456	0.4421	0.43659	0.08182	0.00011	0.02010	0.000	3.002	0.004	8	456
457	0.5009	0.49556	0.08190	0.00012	0.02014	0.000	3.002	0.005	8	457
458	0.5521	0.54695	0.08198	0.00013	0.02018	0.000	3.002	0.005	8	458
459	0.7301	0.72602	0.08229	0.00016	0.02033	0.000	3.002	0.009	8	459
460	0.7796	0.77595	0.08238	0.00016	0.02037	0.000	3.002	0.010	8	460
461	0.6607	0.65612	0.08216	0.00015	0.02026	0.000	3.002	0.007	8	461
462	0.7209	0.71675	0.08227	0.00016	0.02032	0.000	3.002	0.009	8	462
463	1.0750	1.07524	0.08305	0.00020	0.02070	0.000	3.001	0.035	4	463
464	1.2451	1.24873	0.08348	0.00021	0.02070	0.000	3.000	-0.055	1	464
465	0.5047	0.49937	0.08191	0.00012	0.02014	0.000	3.002	0.005	8	465
466	0.8198	0.81654	0.08247	0.00017	0.02041	0.000	3.002	0.011	8	466
467	1.3884	1.39558	0.08383	0.00020	0.02107	0.000	2.999	-0.018	8	467
468	1.3449	1.35094	0.08373	0.00020	0.02102	0.000	2.999	-0.025	1	468
469	1.4262	1.43442	0.08392	0.00019	0.02112	0.000	2.998	-0.014	8	469
470	1.5105	1.52118	0.08411	0.00018	0.02121	0.000	2.998	-0.007	8	470
471	1.3546	1.36089	0.08375	0.00020	0.02103	0.000	2.999	-0.023	8	471
472	1.4285	1.43678	0.08393	0.00019	0.02112	0.000	2.998	-0.014	8	472
473	1.5638	1.57613	0.08423	0.00017	0.02126	0.000	2.997	-0.006	8	473
474	2.3854	2.42752	0.08442	-0.00014	0.02136	0.000	2.997	-0.003	8	474
475	1.3358	1.34161	0.08370	0.00020	0.02101	0.000	2.999	-0.027	1	475
476	1.3933	1.40061	0.08384	0.00020	0.02108	0.000	2.999	-0.017	8	476
477	1.4632	1.47247	0.08401	0.00019	0.02116	0.000	2.998	-0.011	8	477
478	2.2064	2.23590	0.08466	-0.00007	0.02147	0.000	2.996	-0.001	8	478
479	1.8588	1.88140	0.08467	0.00007	0.02147	0.000	2.995	-0.001	8	479
480	1.6479	1.66299	0.08439	0.00014	0.02134	0.000	2.997	-0.004	8	480
481	1.9514	1.97748	0.08473	0.00003	0.02150	0.000	2.995	-0.000	8	481
482	1.7241	1.74182	0.08451	0.00012	0.02140	0.000	2.996	-0.002	8	482
483	1.8208	1.84511	0.08464	0.00008	0.02146	0.000	2.996	-0.001	8	483
484	1.5436	1.55530	0.08418	0.00017	0.02124	0.000	2.997	-0.007	8	484
485	1.9951	2.02284	0.08474	0.00001	0.02151	0.000	2.995	-0.000	8	485
486	1.7925	1.81266	0.08460	0.00010	0.02144	0.000	2.996	-0.001	8	486
487	2.4594	2.50398	0.08429	-0.00016	0.02129	0.000	2.997	-0.005	8	487
488	2.6855	2.73677	0.08380	-0.00020	0.02106	0.000	2.999	-0.021	8	488
489	2.1757	2.21028	0.08468	-0.00006	0.02148	0.000	2.995	-0.001	8	489
490	2.2235	2.25985	0.08464	-0.00008	0.02146	0.000	2.996	-0.001	8	490
491	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	491
492	2.7683	2.82166	0.08360	-0.00020	0.02096	0.000	3.000	-0.046	1	492
493	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	493
494	2.6800	2.73113	0.08381	-0.00019	0.02106	0.000	2.999	-0.020	8	494
495	2.7683	2.82166	0.08360	-0.00020	0.02096	0.000	3.000	-0.046	1	495
496	2.4679	2.51276	0.08428	-0.00016	0.02129	0.000	2.997	-0.006	8	496
497	2.7683	2.82166	0.08360	-0.00020	0.02096	0.000	3.000	-0.046	1	497
498	2.3854	2.42752	0.08442	-0.00014	0.02136	0.000	2.997	-0.003	8	498
499	2.8850	2.94095	0.08331	-0.00020	0.02082	0.000	3.000	0.143	4	499
500	2.7683	2.82166	0.08360	-0.00020	0.02096	0.000	3.000	-0.046	1	500

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