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# استخدام نماذج الاستجابة للمفردة الاختبارية في تدريج مفردات بعض الاختبارات المعرفية

Thesis · July 2010

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَرَبُّكَ يَعْلَمُ مَا تُكِنُّ صُدُورُهُمْ وَمَا  
يُعْلِنُونَ ﴿٦٩﴾ وَهُوَ اللَّهُ لَا إِلَهَ إِلَّا  
هُوَ لَهُ الْعَرْشُ الْعَظِيمُ الْأُولَى وَالْآخِرَةُ  
وَلَهُ الْخُكُومُ وَإِلَيْهِ تُرْجَعُونَ ﴿٧٠﴾

سورة القصص : الآيتان ٦٩ ، ٧٠



## شكر وتقدير

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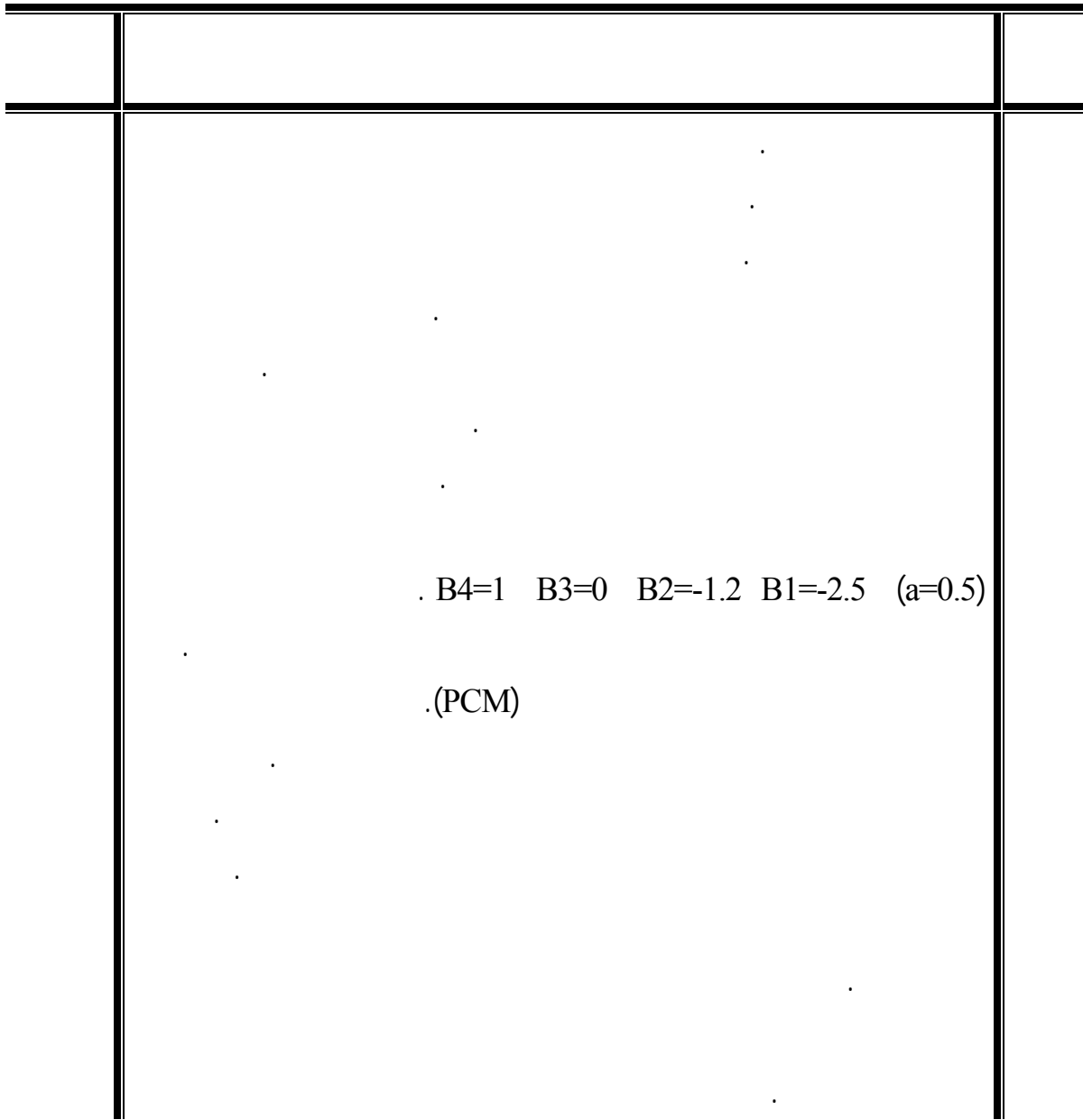
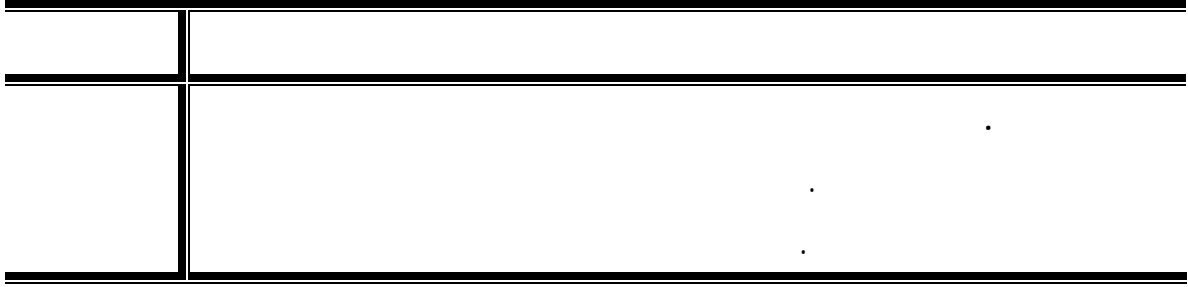
/

الباحث



	1PLM ( )
	2PLM ( )
	3PLM ( )
	(Polytomous UIRT) ( )
	.Graded-Response Model (GRM) ( )
	.Partial Credit Model (PCM) ( )
	.Rating Scale Model(RSM) ( )
	Nominal Model ( )
	. Multidimensional Models ( )





	.TCC . TIF	
	.TCC . TIF	
	.TCC . TIF	




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### Modern Test Theory

"A Method "

(Thurstone,1925)

-

"of Scaling Psychological and Educational tests

(Richardson,1936;Ferguson,1943 In: Reeve,2004,4-6)

Normal Ogive Model

(Han&Hambleton,2007,12 ) Logistic Function

(Lord&Novic,1968)

"Statistical Theories of Mental Test Scores"

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Latent Trait

Latent Trait Theory

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Multidimensional

Unidimensional

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Polychotomous ( ... :

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Dichotomous (

One-

Three-Parameter

Two-Parameter

Parameter

.(Salvia&Ysseldyke,1995,721;Harvey,2003,2-3)

(Hardouin,2007,22)

(Reeve,2004,34)

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...

(Domino&Domino,2006,34)

(Sijitsma&Junker,2006,76).

(Baker,2001,7).

(Stage,2003,2;Gleason,2008,9)

(Reeve,2004,3).

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(Waugh&Addison,1998,95-112)

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) (Wiberg,2004,2)

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(Ainol&Noor,2006,1)

( )

( ) Rasch Model

(Thompson&Weiss,2006,3)

: The Multistate Bar Examination (MBE)

Maximum

Maximum Likelihood

Expected A Posteriori \*

A Posteriori

(Fan,1998,357)

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\* طبقاً لترجمة (عماد غصاب عبابنة، ٢٠٠٨، ٦).



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Invariance (

(Stage,2003,1)

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Critical Thinking Test

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(Wagner&Harvey,2003,1)

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Flexibility of

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**: Unidimensionality**

(Fan,1998,363).

**Local Independent**

(Ueno,2002,59).

**:Item Characteristic Curve (ICC)** (Gleason,2008,9)

**: Test Characteristic Curve**

(Baker,2001,70).

**:(Item Information Curve)**

(Fraley, Waller&Brennan,2000,353).

**:(Test Information Curve)**

(Fraley, Waller&Brennan,2000,353).

**:(Item Discrimination)**

) Slope

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<b>. Unidimensional Models</b>	(
<b>(Dichotomous UIRT)</b>	(
<b>1PLM</b>	( )
<b>2PLM</b>	( )
<b>3PLM</b>	( )
<b>(Polytomous UIRT)</b>	(
<b>.Graded-Response Model (GRM)</b>	( )
<b>.Partial Credit Model (PCM)</b>	( )
<b>.Rating Scale Model(RSM)</b>	( )
<b>Nominal Model</b>	( )
<b>. Multidimensional Models</b>	(



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Embreston&Reise,2000 )

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(In: Reeve,2004,31

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(Aiken,2000,85)

.(

: Anthony,1983,3)

( $S^2_{tru}$ )

( $S^2_{obs}$ )

:

( $S^2_{err}$ )

$$S^2_{obs} = S^2_{tru} + S^2_{err} \rightarrow \text{(Rae\&Hyland,2001,373;Aiken,2000,85) eq (1)}$$

Standard Error Measurement

.(Stage,2003,2

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Normal Distribution

Adolphe Quetelet

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Normal

Probability Density Function

.( )

**Item Analysis**

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Item difficulty

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(Georgy,2007,153)

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(Aiken,2000,67)

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Item discrimination

.(Crisp&Palmer,2007,96)

(Salvia&Ysseldyke,1995,718).

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( ) ( ) )  $\frac{-}{,} =$   
(Georgy,2007,157) ( -)

Johnstone,2003;McAlpine,2002b in: )

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(Crisp&Palmer,2007,96

(Friedenberg,1995,293;Verstralen,Bechger&Maris,2001,6;Stage,2003,2)

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(Crocker&Algina,1986,339)

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**الفصل الثاني: الإطار النظري**

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Distractors

: Thornton&Oetting,1982)

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.(Aiken,2000,69)

(Georgy,2007,157)

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: Reliability

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Colton et al,1997,3)

(Kline,1993,5

( $S^2_{tru}$ )

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:

(Verstralen,Bechger&Maris,2001,4) ( $S^2_{err}$ )

$$R = \frac{S^2_{tru}}{S^2_{err}}$$

.(Aiken,2000,85) → eq (3)

(Stage,2003,2)

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(Stage,2003,2)

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.(Geogiev,2008,2)

.(Domino&Domino,2006,34)

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.(Stage,2003,2)

.(Baker,2001,36;Sick,2008,4)

(Georgy,2007,157)

.(Reeve,2004,4)

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(Hernard,1998,4)

.(Stage,2003,2)

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Item Bias

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.(Hungi,2005,143-144

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.(O.Connor,Radcliff&Gedeon,2002,530)

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(Fan,1998,357)

## Item Response Theory

(Generalization)

(IRT)

(Salzberger,1999,1)

Lawley

Item

Lord

Characteristic Curve

Georg

Wright

(Baker,2001,ii)

Rasch

Latent Trait Theory

(Cagnone&Ricci,2005,211)

:

(Crocker&Algina,1986,339;Janda,1998,134) Modern Test Theory “MTT”

(Hambleton,1982,2) Item Characteristic Curve Theory “ICCT”

(Georgy,2007,109)

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Ability

Trait

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Item Characteristic Curve (ICC)

(Item Characteristic)

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.( Baker,2001,6;Gomez,2008,866

(Invariance)

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Sample-free

Item-free

Item-free

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(In:Aiken,2000,70) (Weiss&Yoes,1991)

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(c)

$(1 + c)/2$

.(Baker,2001,36)

Sample-free

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: Wriqh,1980,2)

(Yu,2005,6).

Rasch Model

( Invariance )

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(Crocker&Algina,1986,339).

(Verstralen,Bechger&Maris,2001,29).

Computerized Adaptive )

(Testing

(Hambleton,1982,24;McGlohen,2004,36)

( )

(Item Bias)

(Hambleton,1982,21;Crane,Belle&Larson, 2004,2004,241)

(Sanz-Santamaría,Zorita&Serrano,2006,927).

(Janda,1998,139)

(Baker,2001,1)

( : Hambleton&Cock,1977)

:

(Hambleton,1982,2) ( )

Hambleton,Swaminathan&Rogers,1991,53; )

.(Fan,1998,363;Önder,2007,210

:

:

**: Unidimensional Models** (

(Cronbach,1984,116)

.(Chakravarty,Bjorner&Fries,2007,1428)

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◆

(Fan,1998,363)

(Eigen value)

(Hambleton,Swaminathan&Rogers,1991,9)

%

Reckase,1979 In: )

.(Önder,2007,213;Georgiev,2008,10

Lord) (Hambleton,Swaminathan&Rogers,1991,9)

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**Local Independent**

◆

(Hambleton,Swaminathan&Rogers,1991,9-10)

.(Ueno,2002,59)

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(Ueno,2002,59)

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(Önder,2007,215)

(Crocker&Algina,1986,339)

$P(+,+) = P_1(+) P_2(+)$  ,  $P(-,-) = P_1(-) P_2(-)$  ,  $P(-,+)$  &  $P(+,-) = P_1(+) P_2(-)$

$P_1(-)$   $P_1(+)$

$P(-,-)$   $P(+,+)$

$P(-,+)$

$P(+,-)$

$P_2(-) = 0.4$   $P_2(+)= 0.6$   $P_1(-) = 0.2$   $P_1(+)= 0.8$

$P(+,+) = 0.48$ ,  $P(-,-) = 0.08$ ,  $P(-,+)= 0.12$  &  $P(+,-) = 0.32$  :

(Hambleton,Swaminathan&Rogers,1991,9-10)

:Speededness



(Hambleton, Swaminathan, 1985, 30)

Logistic Curve

(ICC)

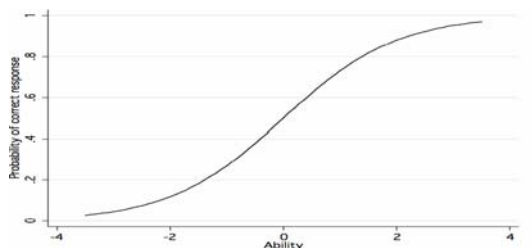
(Yen, 1992, 658)

( $\theta$ )

( )

(Spencer, 2004, 9)

Salvia & Ysseldyke, 1995, 721

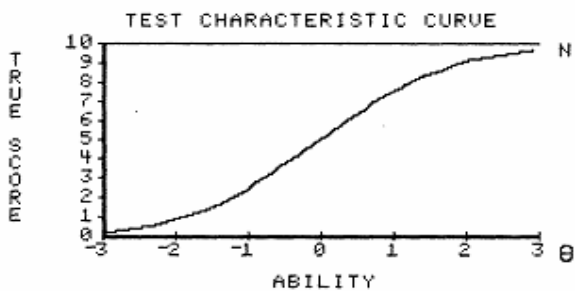


(ICC)

( )

(Gleason, 2008, 9)

(Spencer, 2004, 21-22)

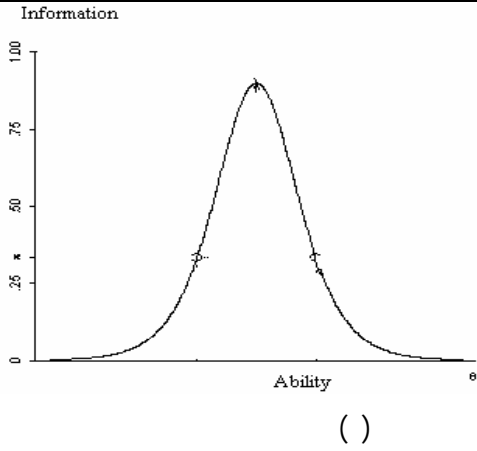


( )

(TCC) Test Characteristic Curve

( )

(Baker, 2001, 70)



Information

Function

Item Information )

(Fraley, Waller & Brennan, 2000, 353) (Curve

. ( )

: Weiss & Yoes, 1994)

.(

**:Unidimensional IRT Models (UIRT)**

(Polychotomous)

(Dichotomous)

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**:(Dichotomous UIRT Models)**

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( ) :

$$P(\theta) = \frac{1}{1 + \exp[-D(\theta - b)]} \quad (b) \quad (\text{Salvia\&Ysseldyke,1995,721}) \rightarrow \text{eq (4)}$$

$$Q(\theta) = 1 - P(\theta) = \frac{\exp[-D(\theta - b)]}{1 + \exp[-D(\theta - b)]}$$

(Bryant,2005,213)

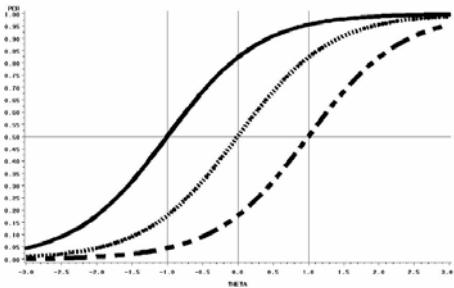
$$P(\theta) = \frac{1}{1 + \exp[-D(\theta - b)]} \quad (b) \quad ( , )$$

$$P(\theta)$$

$$( , ) \quad P(\theta)$$

$$(\theta - b) > 0 \rightarrow P(\theta) > 0.5, \quad (\theta - b) = 0 \rightarrow P(\theta) = 0.5, \quad (\theta - b) < 0 \rightarrow P(\theta) < 0.5$$

( , )  
(Georgiev,2008,4)



( ) (Slope)

(Choppin,1983,15)

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(b)

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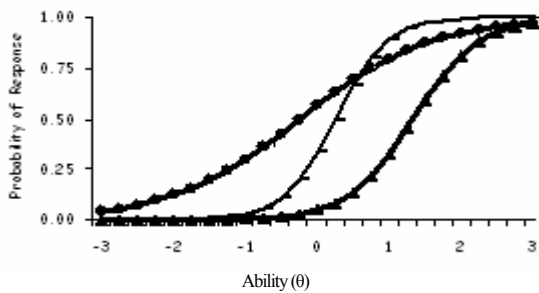
( )

(Brogden,1977,632)

(a)

(Salvia&Ysseldyke,1995,721)

.( , )



(a)

(Schrodt,2007,5)

( )

(b)

( )

(θ)

**الفصل الثاني: الإطار النظري**

( ) (a) (b)

:

$$P(\theta) = \frac{1}{1 + \exp[-D a (\theta - b)]} \quad (\text{Salvia\&Ysseldyke,1995,721}) \rightarrow \text{eq (5)}$$

(a) ( )

.( )

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: (Yen,1992,659)

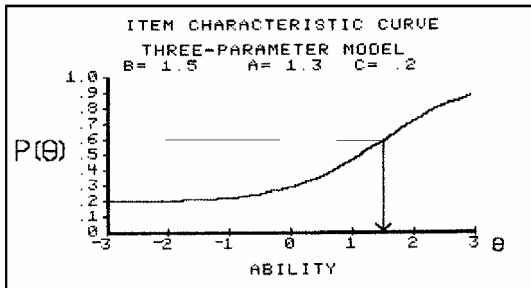
$$P(\theta) = c + \frac{1-c}{1 + \exp[-D a (\theta - b)]} \quad (\text{Salvia\&Ysseldyke,1995,721}) \rightarrow \text{eq (6)}$$

Pseudo-Chance (c)

(Yen,1992,660) Lower Asymptote

(c)

.(Baker,2001,36; Cuervo\&Andrade,2004,29) [(1+c)/2]



(θ)

(0.2)

( )

$$[(1 + 0.2)/2 = 0.6]$$

( )

(1.5)

$$\begin{matrix} ( ) & (c = 0) & ( ) \\ ( ) & ( ) & (c = 0, a = 1) \end{matrix}$$

(Stocking,1990,469;Cuervo&Andrade,2004,29)

( )

(Shigemasu&Ueno,1993,161)

**: (Polytomous UIRT Models)** ( )

(Choppin,1983,15,Cavanagh&Romanoski,2006,276)

: ( - )

**:Graded-Response Model (GRM)** ( )

(Turnstone's Method)

(Tang&Eignor,1997,11-12)

(Samejima)

(Rauch,Schweizer&Moosbrugger,2008,49)

(Thresholds)

(a)

( $B_1, B_2, \dots, B_n$ )

( ) ( )  
 (B<sub>1</sub>,B<sub>2</sub>,B<sub>3</sub>,B<sub>4</sub>) .( ) ( )

4	3	2	1
$\beta_4$	$\beta_3$	$\beta_2$	$\beta_1$

( )

( $\beta$ )

(Hays,et al.,2007,533) ( , )

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 .( ) ♦ .( ) ♦

.(Fraleay,Waller&Brennan,2000,356)

:

♦

:

$$P_{i_v}^*(\theta) = \frac{\exp[\alpha_i(\theta - \beta_{i_v})]}{[1 + \exp \alpha_i(\theta - \beta_{i_v})]}$$

(Cagnone&Ricci,2005,212) → eq (7)

♦

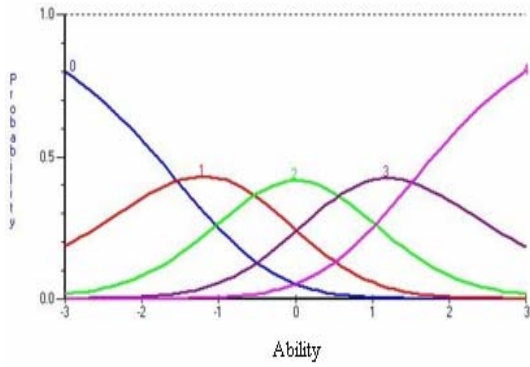
:

$$P_{i_v}(\theta) = P_{i_v}^*(\theta) - P_{i_{v+1}}^*(\theta).$$

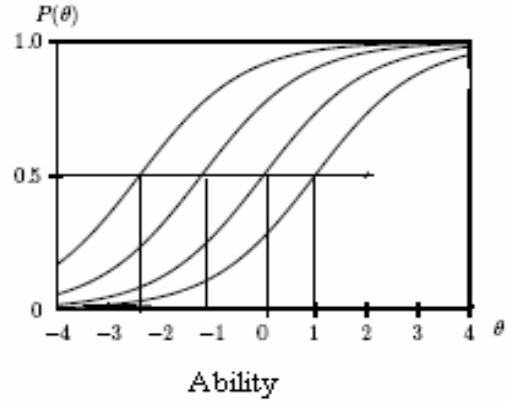
(Cagnone&Ricci,2005,212) → eq (8)

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. B = 1 B = 0 B = -1.2 B = -2.5 (a=0.5)  
 4 3 2 1

.(θ)

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**:Partial Credit Model (PCM)**

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(Masters.1982)

(In:Reeve,2004,23)

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:

$$P_k(\theta) = \frac{\exp \sum_{p=0}^k (\theta - \delta_p)}{\sum_{r=0}^M \left[ \exp \sum_{p=0}^r (\theta - \delta_p) \right]}$$

(Akkermans&Muraki,1997,569) → eq (9)

(n)

(n-1)

( $\delta_1$ )

( $\delta$ )

( $\delta_2$ )

( Masters,1982)

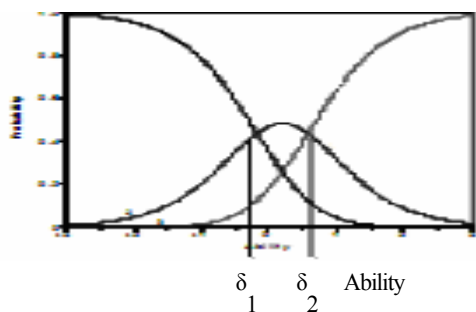
( $\delta$ )

.Category Intersection Parameters

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.(PCM)

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.(PCM)

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: ) (Koch&Dodd,1989)

.(Akkermans&Muraki,1997,569)

:Rating Scale Model

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(Andrich,1978)

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(Reeve,2004,24)

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(λ)

$$P_{ix}(\theta) = \frac{\exp \sum_{j=0}^x (\theta - (\lambda_j + \delta_j))}{\sum_{x=0}^m (\exp \sum_{j=0}^x (\theta - (\lambda_j + \delta_j)))} \quad (\text{Reeve,2004,25}) \rightarrow \text{eq (10)}$$

(λ)

(Bjorner,et al.,2004,1686)

**:Nominal Model** ( )  
(Bock,1972)

(In:Reeve,2004,22)

( : ) (De Ayala,1992b)

$$P_{ix}(\theta) = \frac{e^{z_{ix}}}{\sum_{k=1}^{m_i} e^{z_{ik}}}, \text{ where } z_{ix} = a_{ix}\theta + c_{ix}. \quad (\text{Han\&Hambleton,2007,19}) \rightarrow \text{eq (11)}$$



**:Multidimensional Models**

Kacmar,et )

(al.,2006,26

Spencer,2004,9; )

.(Thissen&Edwards,2005,4

.(Antal,2007,290)

( )

(Sijtsma&Junker,2006,93)

Compensatory Models

Non compensatory Models

(Wu&Adams,2006,104)

Confirmatory Models

Exploratory Models

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(Knol&Berger,1991 In:Spencer,2004,21)

(Spencer,2004,21-22)

(Mkinley&Reckase,1983)

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Convergent thinking

Divergent thinking

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: Flexibility of Closure -

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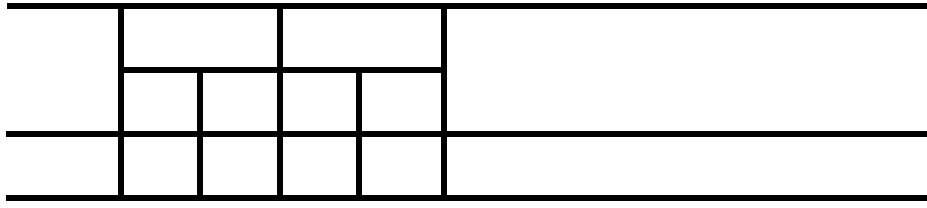
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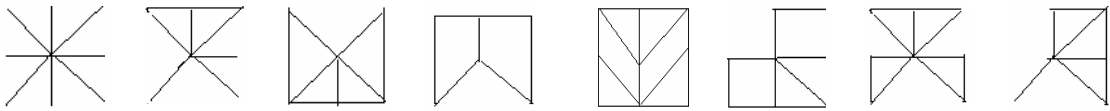
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%	%		%	%		%	%		
15.862	15.862	31.724	18.832	18.832	5.650	16.670	16.670	16.504	1
21.775	5.913	11.826	26.523	7.691	2.307	22.990	6.319	6.256	2
24.079	2.304	4.609	33.489	6.966	2.090	25.875	2.885	2.856	3
26.288	2.209	4.418	38.810	5.321	1.596	28.528	2.653	2.627	4
28.204	1.916	3.831	43.697	4.887	1.466	31.015	2.486	2.462	5
29.860	1.657	3.314	48.370	4.673	1.402	33.228	2.213	2.191	6
31.339	1.478	2.956	52.897	4.527	1.358	35.272	2.044	2.024	7
32.678	1.339	2.679	57.305	4.408	1.322	37.274	2.002	1.982	8
33.931	1.253	2.505	61.641	4.335	1.301	39.090	1.816	1.798	9
35.134	1.203	2.406	65.450	3.810	1.143	40.892	1.802	1.784	10
36.319	1.185	2.370	69.029	3.579	1.074	42.521	1.629	1.613	11
37.474	1.156	2.311				44.124	1.603	1.587	12
38.586	1.111	2.223				45.641	1.517	1.502	13
39.683	1.097	2.195				47.114	1.473	1.458	14
40.762	1.079	2.157				48.567	1.453	1.439	15
41.826	1.065	2.129				49.964	1.396	1.382	16
42.879	1.053	2.106				51.270	1.307	1.294	17
43.880	1.001	2.001				52.549	1.279	1.266	18
44.825	.945	1.891				53.813	1.264	1.251	19

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45.753	.928	1.855				55.038	1.225	1.213
46.666	.914	1.827				56.233	1.195	1.183
47.563	.896	1.793				57.383	1.151	1.139
48.450	.887	1.774				58.519	1.136	1.125
49.326	.877	1.754				59.648	1.129	1.117
50.180	.854	1.708				60.738	1.090	1.079
51.015	.834	1.669				61.812	1.074	1.064
51.819	.804	1.609						
52.603	.784	1.567						
53.379	.777	1.553						
54.149	.770	1.540						
54.903	.754	1.507						
55.643	.740	1.480						
56.370	.727	1.454						
57.089	.719	1.439						
57.791	.701	1.402						
58.472	.681	1.362						
59.145	.673	1.347						
59.804	.659	1.318						
60.445	.641	1.283						
61.084	.639	1.277						
61.703	.619	1.238						
62.313	.609	1.219						
62.913	.600	1.200						
63.507	.594	1.189						
64.087	.580	1.160						
64.663	.576	1.152						
65.228	.564	1.129						
65.786	.559	1.117						
66.334	.548	1.096						
66.875	.540	1.081						
67.413	.539	1.077						
67.940	.526	1.053						

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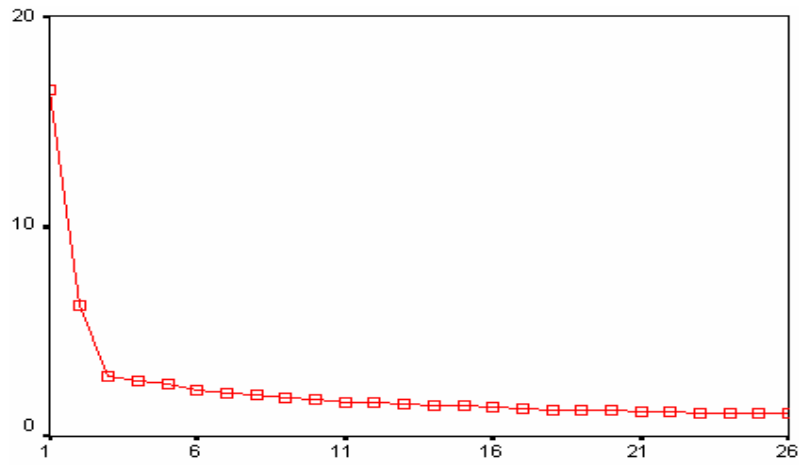
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(Reckase,1979 In: Önder,2007,213;Georgiev,2008,10)

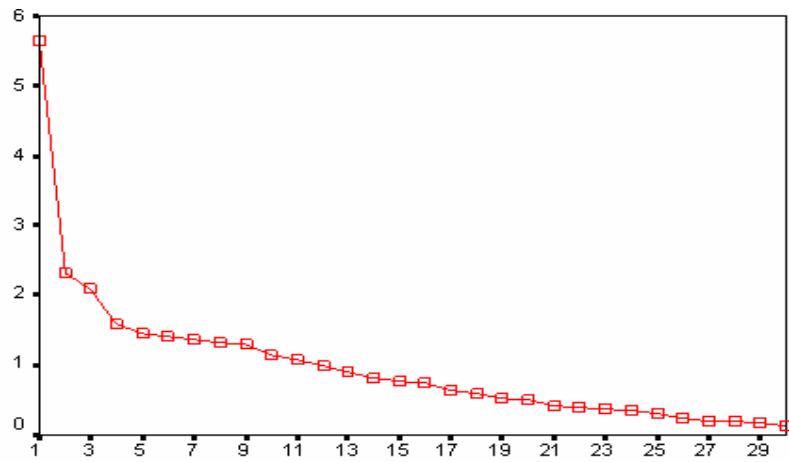
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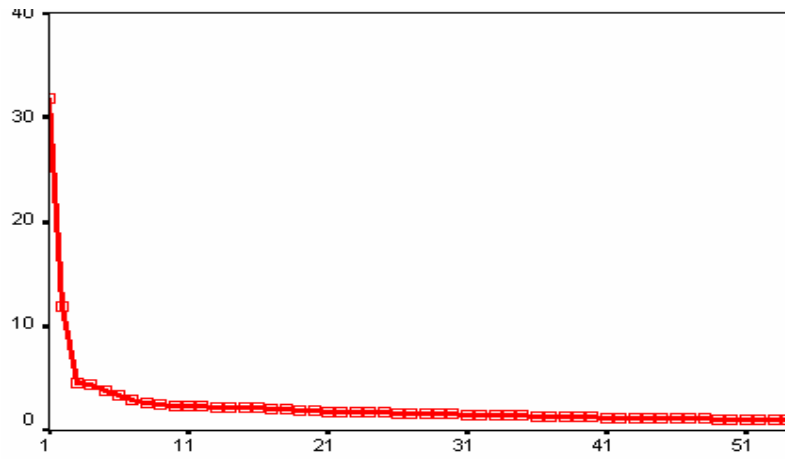
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(Hambleton,Swaminathan&Rogers,1991,9-10)

(Önder,2007,215)

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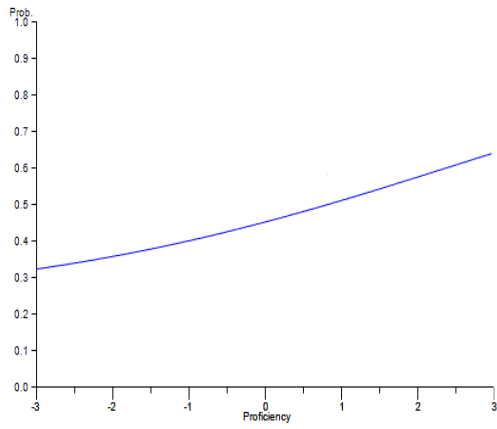
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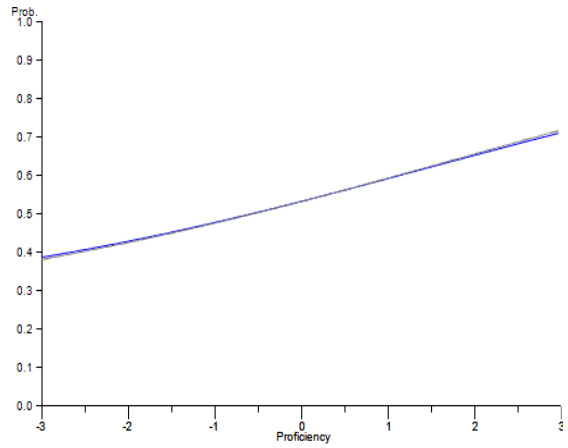
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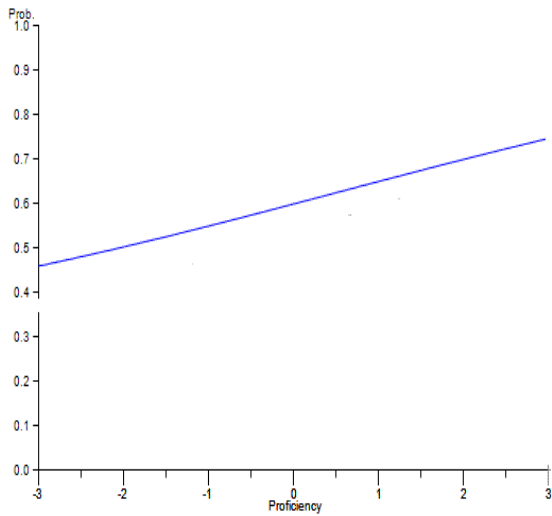
WinGen: Windows software that generates IRT )  
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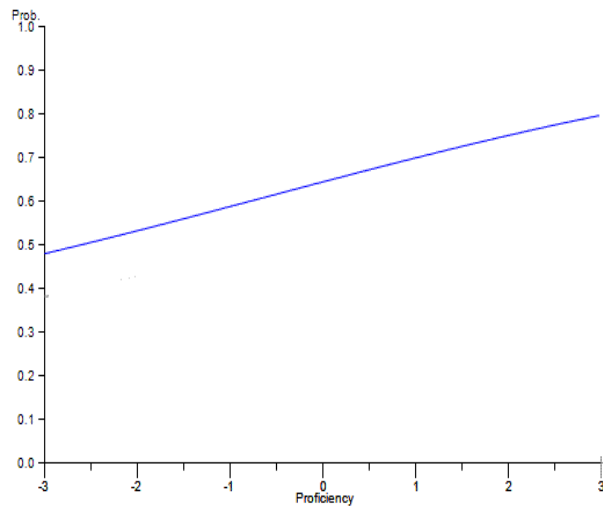
ICC for item 85



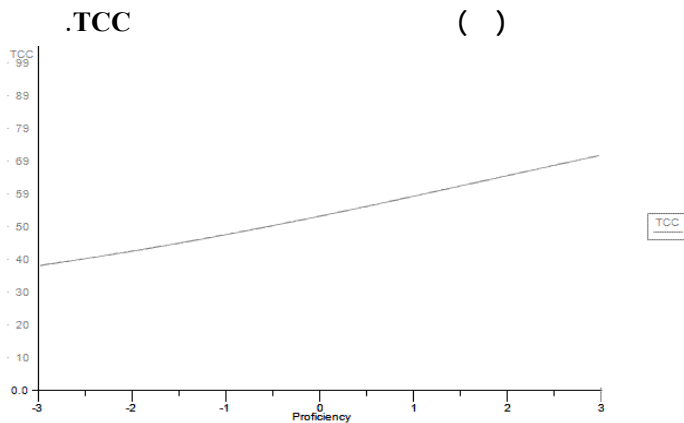
ICC for item 37



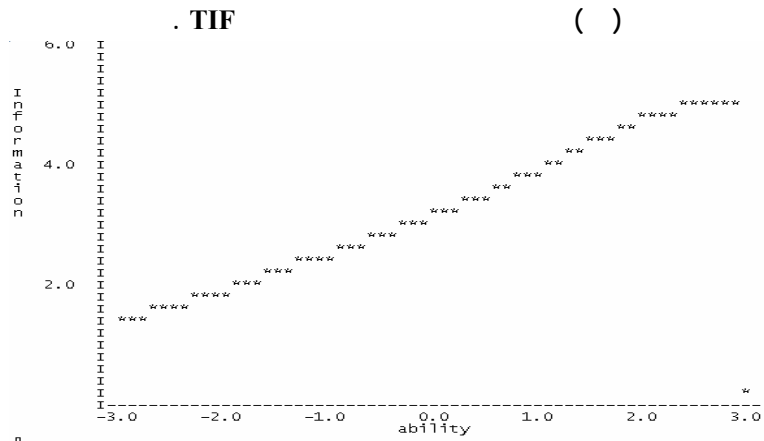
ICC for item 24



ICC for item 40



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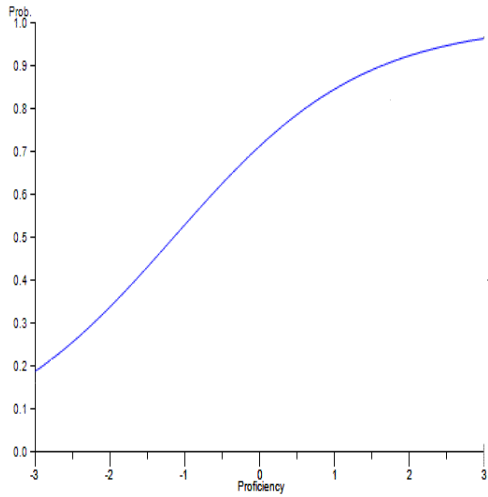
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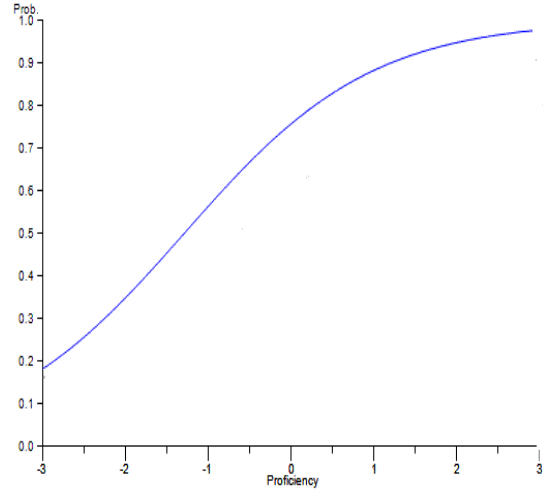
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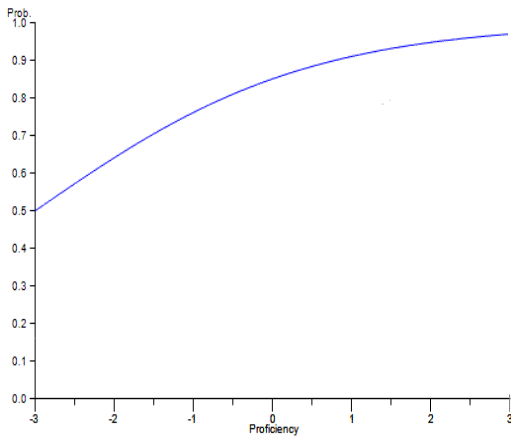


ICC for item 5

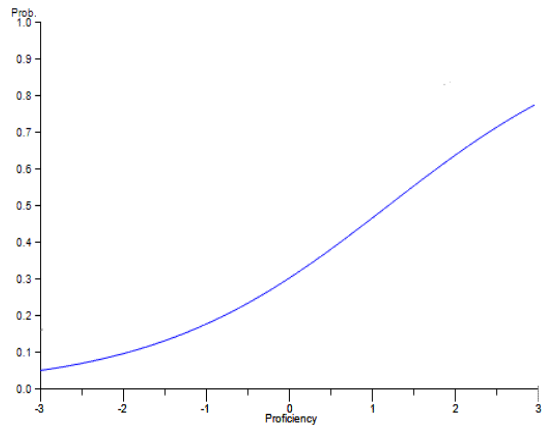


ICC for item 13

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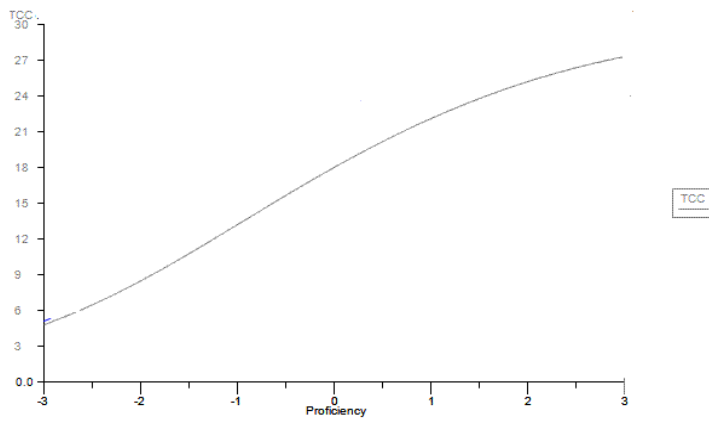
ICC for item 1



ICC for item 3

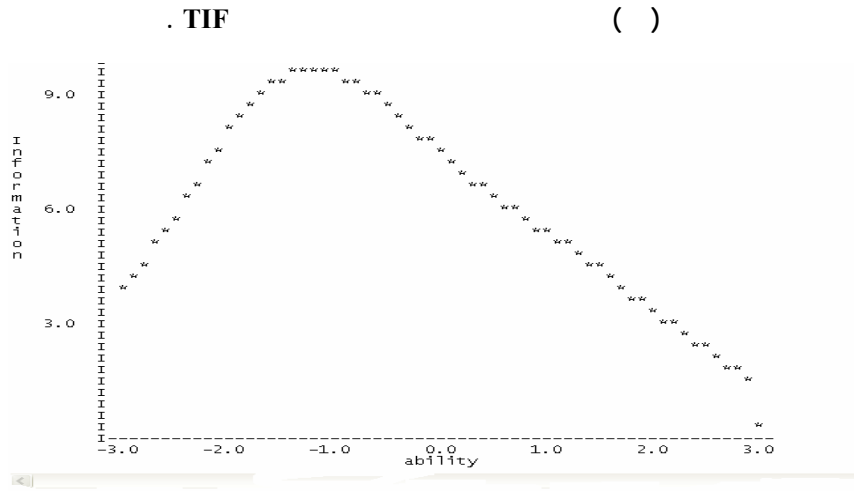
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(Georgiev,2008,15)

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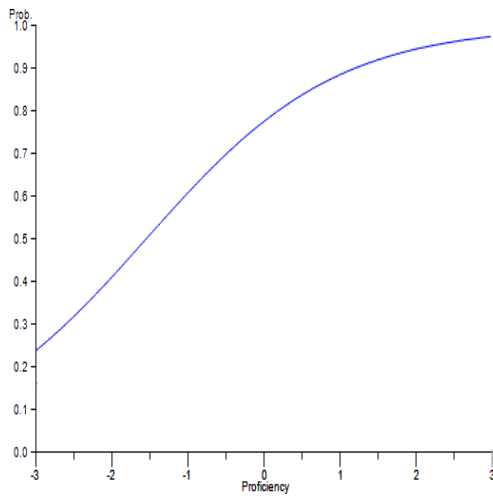
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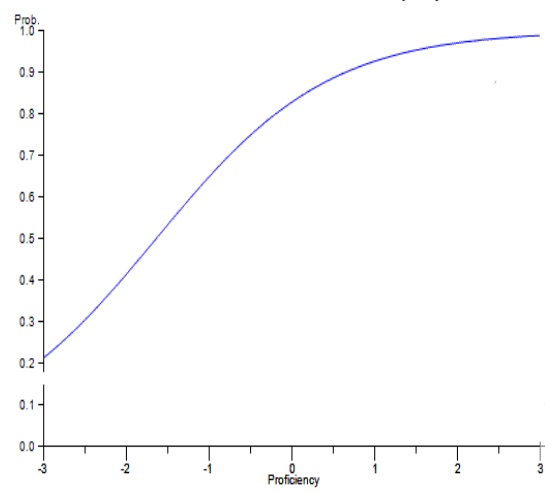
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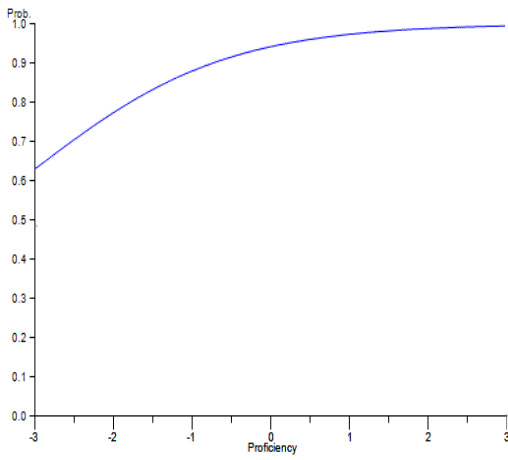


**ICC for item 8**

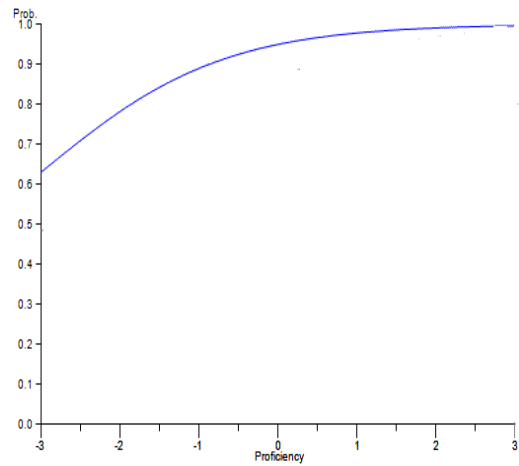


**ICC for item 30**

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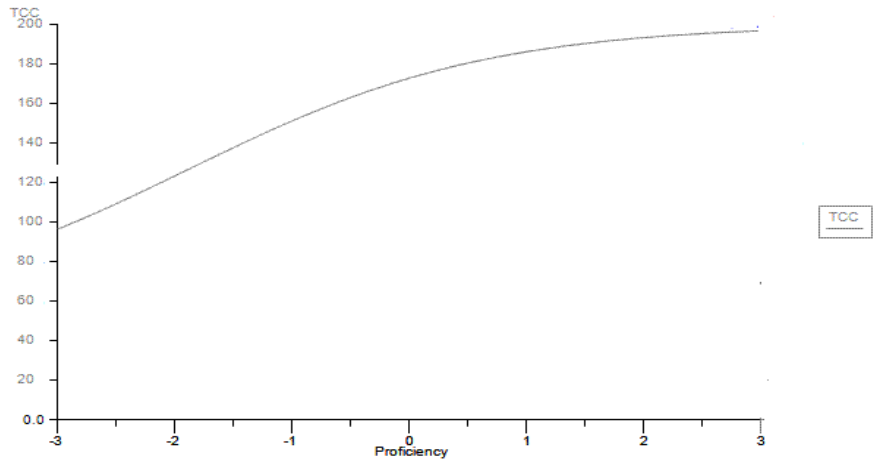
**ICC for item 10**



**ICC for item 20**

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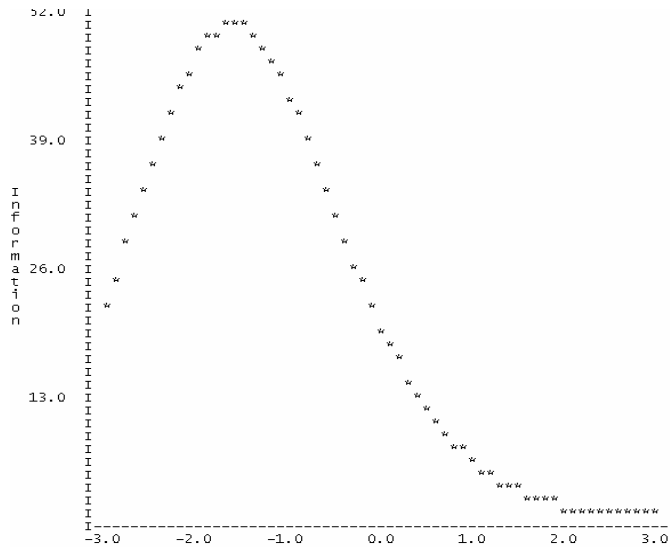
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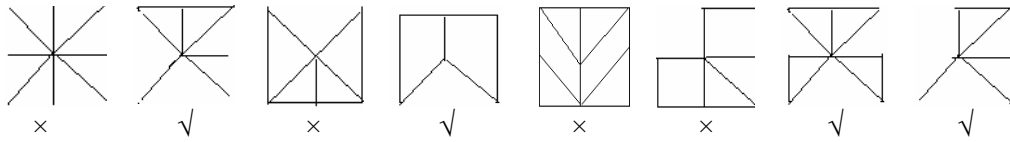
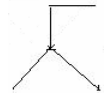
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الاسم / التخصص / النوع / السن بالشهور / التقدير التراكمي /  
 أولاً إجابة اختبار التفكير الناقد

اختبار تقويم الحجج		اختبار التفسير		اختبار الاستنباط		اختبار الافتراضات		اختبار الاستنتاج												
م	قوية	م	غير مترتبة	م	غير مترتبة	م	غير مترتبة	م	وارد	غير وارد	م	خ	م	خ	بن	م	ص	ص	م	
١		٨٦		٦٢		٣٧		٢١												
٢		٨٧		٦٣		٣٨		٢٢												
٣		٨٨		٦٤		٣٩		٢٣												
٤		٨٩		٦٥		٤٠		٢٤												
٥		٩٠		٦٦		٤١		٢٥												
٦		٩١		٦٧		٤٢		٢٦												
٧		٩٢		٦٨		٤٣		٢٧												
٨		٩٣		٦٩		٤٤		٢٨												
٩		٩٤		٧٠		٤٥		٢٩												
١٠		٩٥		٧١		٤٦		٣٠												
١١		٩٦		٧٢		٤٧		٣١												
١٢		٩٧		٧٣		٤٨		٣٢												
١٣		٩٨		٧٤		٤٩		٣٣												
١٤		٩٩		٧٥		٥٠		٣٤												
١٥				٧٦		٥١		٣٥												
١٦				٧٧		٥٢		٣٦												
١٧				٧٨		٥٣														
١٨				٧٩		٥٤														
١٩				٨٠		٥٥														
٢٠				٨١		٥٦														
				٨٢		٥٧														
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				٨٤		٥٩														
				٨٥		٦٠														
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## ثانياً اختبار التفكير الاستدلالي

رقم	الحرف	رقم	الحرف	رقم	الحرف	رقم	الحرف	رقم	الحرف	رقم	الحرف
١		٦		١١		١٦		٢١		٢٦	
٢		٧		١٢		١٧		٢٢		٢٧	
٣		٨		١٣		١٨		٢٣		٢٨	
٤		٩		١٤		١٩		٢٤		٢٩	
٥		١٠		١٥		٢٠		٢٥		٣٠	

## ثالثاً - اختبار النماذج المختلفة

الرقم	أ	ب	ج	د	هـ	و	ز	ح	ط	ي
١										
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رقم الحرف	الحرف	رقم الحرف	الحرف	رقم الحرف	الحرف	رقم الحرف	الحرف	رقم الحرف	الحرف	رقم الحرف	الحرف	رقم الحرف	الحرف	رقم الحرف	الحرف	رقم الحرف	الحرف
٢٦	ح	٢١	د	١٦	ر	١١	ذ	٦	ث	١	د	٢٧	ق	٢٢	و	١٧	د
٢٨	و	٢٣	ر	١٨	أ	١٣	أ	٨	أ	٣	خ	٢٩	د	٢٤	ض	١٩	س
٣٠	ذ	٢٥	د	٢٠	م	١٥	ذ	١٠	ز	٥	أ						


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(b) (a) :

(c)

(PBs) (pc)

(R) (Pbt) IRT

•					*c error	b error	a error	R	Pbt	PBs	PC	c	b	a	Flg	item
5	4	3	2	1												
10	1	3	9	77~	***	.163	.084	1.255	.195	.179	.766	.215	-1.72	.303		1
57~	9	4	18	11	***	.147	.195	.589	.204	.145	.572	.215	.440	.331		2
34~	27	7	28	4	0.07	.239	.091	.592	.074	.110	.340	.216	3.000	.347	P	3
46	23~	11	14	6	0.064	.223	.086	4.158	.004	.044	.232	.181	3.000	.408	RPK	4
2	2	14	33~	50	0.069	.237	.090	.958	.077	.098	.328	.213	3.000	.358	P	5
6	9	8~	45	31	0.05	.201	.079	7.311	.036	.017	.083	.107	3.000	.531	RPK	6
51~	8	28	10	2	0.095	.160	.153	.748	.149	.139	.509	.220	1.118	.327		7
7	5	9	33~	46	0.069	.231	.089	.257	.104	.096	.330	.206	2.965	.354	P	8
21	10	43~	22	4	0.085	.155	.116	.209	.214	.258	.433	.199	1.572	.361		9
1	2	6	16	74~	***	.164	.095	1.350	.167	.152	.743	.217	-1.45	.293	P	10
5	2	11	38~	44	0.073	.241	.094	1.093	.031	.124	.378	.236	2.900	.337		11
6	5	12~	46	31	0.055	.198	.077	5.389	.178	.211	.123	.120	3.000	.463	RP	12
50	25	10~	11	4	0.053	.202	.079	6.729	.023	.062	.100	.116	3.000	.500	RP	13
60	13~	16	7	4	0.056	.208	.081	6.333	-.03	-.01	.133	.135	3.000	.477	RPK	14
46	23	18~	10	3	0.06	.211	.082	4.410	.079	.092	.183	.152	3.000	.428	RP	15
52	18~	13	11	6	0.06	.211	.082	4.573	.068	.119	.180	.152	3.000	.431	RPK	16
5	3	42~	32	17	0.083	.155	.111	.511	.234	.277	.418	.194	1.650	.367		17
24	8	8	30~	30	0.068	.232	.089	1.945	.060	.130	.297	.204	3.000	.366	P	18
25	11	9	27	28~	0.067	.229	.087	2.243	.068	.053	.281	.196	3.000	.373	RPK	19
30~	12	6	16	36	0.067	.228	.087	.788	.130	.188	.302	.194	3.000	.362	P	20
			2	98~	***	.150	.058	4.639	.124	.079	.976	.196	-3.00	.486	RP	21
			57~	43	***	.143	.193	.471	.223	.222	.569	.213	.440	.339		22
			48	52~	0.09	.204	.132	3.008	-.053	.024	.518	.273	1.721	.295	RPK	23
			60~	40	***	.188	.219	3.072	-.028	.023	.601	.251	.523	.267	RPK	24
			20~	80	0.061	.225	.088	6.279	-.141	-.039	.198	.175	3.000	.453	RPK	25
			30	70~	***	.155	.118	1.199	.189	.211	.700	.218	-.877	.306		26
			79~	21	***	.158	.076	.865	.242	.231	.786	.211	-1.901	.320		27
			61	39~	0.073	.242	.096	1.380	.014	.126	.387	.244	2.881	.336		28
			55~	45	***	.161	.185	1.134	.134	.170	.552	.227	.763	.314		29
			61~	39	***	.128	.159	.442	.323	.342	.614	.201	-.063	.369		30
			57~	43	***	.138	.191	.216	.255	.300	.573	.208	.364	.348		31
			28	72~	***	.163	.106	1.462	.165	.191	.723	.219	-1.187	.293	P	32
			62~	38	***	.125	.150	.607	.346	.383	.622	.199	-.136	.376		33
			23	77~	***	.167	.084	1.600	.155	.096	.768	.216	-1.773	.294	P	34
			71~	29	***	.123	.093	.835	.411	.397	.711	.199	-.910	.392		35
			36	64~	***	.151	.165	1.150	.182	.157	.643	.219	-.235	.313		36
			50~	50	0.091	.177	.135	1.422	.083	.239	.497	.237	1.461	.316		37
			88~	12	***	.182	.062	1.593	.163	.119	.877	.210	-3.000	.312	P	38

\* تشير العلامة \*\*\* إلى أن قيمة الخطأ المعياري ضعيفة جداً بدرجة لا تذكر.

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•					*c error	b error	a error	R	PBt	PBs	PC	c	b	a	Flg	item
5	4	3	2	1												
			21~	79	0.062	.223	.087	5.446	-.074	-.043	.208	.175	3.000	.436	RPK	39
			68~	32	***	.161	.142	1.603	.142	.190	.677	.223	-.608	.293	P	40
			17	83~	***	.152	.066	.288	.336	.250	.826	.207	-2.269	.356	RPK	41
			32~	68	0.069	.246	.094	3.861	-.083	.018	.319	.235	3.000	.372	RPK	42
			35	65~	***	.141	.143	.574	.250	.240	.653	.212	-.382	.334		43
			40	60~	***	.146	.191	.738	.208	.212	.602	.217	.163	.327		44
			75~	25	***	.158	.089	1.008	.217	.266	.752	.215	-1.507	.308		45
			42~	58	0.08	.196	.103	1.184	.074	.215	.424	.233	2.190	.337		46
			78~	22	***	.158	.078	.851	.237	.229	.779	.212	-1.828	.316		47
			45	55~	***	.174	.179	1.859	.066	.062	.554	.240	.913	.298	P	48
			20~	80	0.061	.222	.087	5.907	-.103	-.064	.199	.172	3.000	.446	RPK	49
			73~	27	***	.134	.089	.382	.354	.308	.732	.205	-1.159	.363		50
			69~	31	***	.131	.107	.375	.344	.310	.692	.204	-.762	.363		51
			19	81~	***	.175	.071	1.521	.170	.160	.811	.214	-2.392	.296	P	52
			50~	50	0.085	.220	.118	3.047	-.079	.049	.495	.281	2.104	.300	R K	53
			53~	47	0.099	.149	.172	.448	.204	.343	.530	.214	.831	.339		54
			20~	80	0.061	.220	.086	5.411	-.067	.031	.200	.170	3.000	.435	RPK	55
			77~	23	***	.155	.081	.771	.248	.204	.769	.212	-1.684	.320		56
			23~	77	0.063	.228	.088	5.307	-.099	-.016	.231	.189	3.000	.423	RPK	57
			9~	91	0.051	.209	.083	8.354	-.185	-.103	.088	.117	3.000	.539	RPK	58
			25	75~	***	.162	.094	1.394	.171	.170	.746	.217	-1.451	.298	P	59
			22~	78	0.063	.220	.085	4.246	.016	.169	.218	.174	3.000	.416	RP	60
			13~	87	0.056	.206	.080	5.777	.034	.091	.135	.134	3.000	.466	RP	61
			50~	50	0.093	.158	.144	.543	.168	.278	.495	.217	1.206	.334		62
			37	63~	***	.167	.193	1.927	.094	.133	.633	.229	-.073	.287	P	63
			43~	57	0.081	.199	.106	1.073	.064	.130	.434	.234	2.153	.323		64
			32	68~	***	.178	.158	2.745	.033	.035	.676	.232	-.592	.266	RP	65
			47~	53	0.087	.180	.122	1.364	.082	.103	.471	.234	1.686	.325		66
			28~	72	0.067	.233	.089	3.383	-.006	.099	.279	.205	3.000	.383	RPK	67
			82~	18	***	.168	.069	.993	.223	.166	.817	.211	-2.368	.313		68
			14~	86	0.057	.205	.080	5.505	.063	.121	.143	.134	3.000	.463	RP	69
			56~	44	***	.132	.187	.353	.291	.292	.563	.202	.396	.363		70
			6~	94	0.049	.199	.079	7.896	.003	-.012	.062	.098	3.000	.543	RP	71
			37	63~	***	.175	.202	2.265	.050	.081	.634	.234	-.050	.275	RP	72
			41~	59	0.078	.201	.099	1.143	.072	.171	.407	.230	2.339	.341		73
			47~	53	0.085	.195	.116	2.091	.015	.034	.473	.252	1.916	.318	R	74
			24~	76	0.064	.222	.085	3.578	.042	.094	.237	.179	3.000	.398	RP	75
			15	85~	***	.180	.064	1.283	.186	.178	.846	.211	-2.844	.307		76
			48~	52	0.089	.165	.131	.840	.141	.297	.479	.222	1.434	.336		77
			26~	74	0.065	.234	.090	4.848	-.094	-.031	.260	.205	3.000	.407	RPK	78
			81~	19	***	.160	.070	.640	.261	.220	.810	.210	-2.191	.326		79
			31~	69	0.069	.242	.092	2.970	-.030	.044	.314	.225	3.000	.366	RPK	80
			32~	68	0.069	.241	.092	2.270	.008	.099	.322	.222	3.000	.359	RP	81
			26	74~	***	.164	.098	1.533	.148	.152	.737	.217	-1.375	.293	P	82
			58~	42	***	.136	.187	.194	.269	.322	.584	.207	.245	.351		83
			42~	58	0.08	.188	.104	1.012	.093	.189	.424	.227	2.091	.340		84
			39~	61	0.076	.210	.096	.679	.078	.173	.388	.223	2.521	.336		85
			9	91~	***	.180	.061	3.179	.045	.081	.909	.208	-3.000	.318	RP	86
			86~	14	***	.179	.062	.989	.218	.180	.857	.210	-2.961	.318	P	87
			50~	50	0.091	.176	.137	1.489	.080	.114	.500	.237	1.427	.315		88
			83	17~	0.059	.216	.085	6.270	-.095	-.044	.169	.156	3.000	.464	RPK	89
			28~	72	0.067	.233	.089	3.056	.007	.098	.285	.205	3.000	.376	RP	90
			44	56~	0.1	.183	.176	2.449	.018	.106	.556	.251	1.010	.289	RP	91
			46~	54	0.084	.198	.113	1.559	.032	.098	.460	.245	2.002	.315		92
			62~	38	***	.176	.217	2.466	.038	.123	.616	.239	.213	.276	RP	93
			48	52~	0.095	.178	.152	1.890	.055	.086	.523	.242	1.251	.305		94
			30	70~	***	.160	.124	1.542	.156	.199	.696	.221	-.847	.295	P	95
			49~	51	0.095	.138	.155	.346	.265	.314	.493	.198	.961	.367		96
			27	73~	***	.181	.108	2.778	.046	.035	.730	.225	-1.362	.264	RP	97
			38	62~	***	.175	.216	2.568	.039	.091	.617	.239	.203	.278	RP	98
			67~	33	***	.155	.144	1.283	.177	.296	.668	.220	-.525	.305		99

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b error	a error	R	PBt	PBs	PC	b	a	flg	رقم المفردة
.254	.105	1.072	.000	.107	.965	-3.000	.580	P	1
.195	.114	1.863	.000	.283	.900	-2.461	.794		2
.133	.125	2.212	.000	.304	.309	1.185	.696	R	3
.118	.148	1.317	.000	.430	.541	-.090	.706		4
.125	.116	1.524	.000	.454	.726	-1.148	.792		5
.199	.119	1.401	.000	.348	.911	-2.530	.857		6
.134	.113	1.415	.000	.488	.803	-1.608	.897		7
.169	.125	1.007	.000	.495	.900	-2.252	1.005		8
.139	.113	1.760	.000	.361	.761	-1.407	.739		9
.136	.141	2.280	.000	.241	.622	-.622	.615	R	10
.107	.143	1.353	.000	.486	.467	.338	.792		11
.139	.111	1.689	.000	.413	.788	-1.552	.795		12
.122	.114	1.276	.000	.506	.757	-1.295	.884		13
.132	.145	2.302	.000	.269	.402	.735	.641	R	14
.127	.125	1.901	.000	.349	.309	1.151	.734		15
.110	.125	.674	.000	.500	.641	-.619	.826		16
.127	.116	1.385	.000	.534	.819	-1.628	1.018		17
.121	.113	1.304	.000	.512	.765	-1.326	.909		18
.113	.133	.810	.000	.467	.610	-.472	.765		19
.106	.117	1.427	.000	.630	.784	-1.264	1.134		20
.132	.114	1.654	.000	.508	.815	-1.643	.956		21
.111	.143	1.094	.000	.466	.541	-.074	.758		22
.117	.123	2.131	.000	.438	.301	1.142	.829	R	23
.089	.122	.483	.000	.622	.622	-.418	1.064		24
.114	.139	1.005	.000	.454	.579	-.302	.743		25
.137	.113	1.713	.000	.371	.209	1.613	.808		26
.141	.117	2.319	.000	.294	.255	1.463	.710	R	27
.119	.114	1.400	.000	.515	.745	-1.216	.888		28
.166	.108	2.301	.000	.199	.174	1.972	.705	R	29
.127	.129	1.870	.000	.353	.328	1.057	.714		30

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•		c error	b error	a error	R	PBt	PBs	PC	c	b	a	flag	رقم الشكل
٢	١												
10	90~	***	.102	.065	1.462	.274	.290	.900	.270	-1.897	.708		1(أ)
4	96~	***	.125	.069	.834	.257	.338	.956	.263	-2.584	.800		2(أ)
6	94~	***	.098	.071	1.110	.371	.462	.942	.263	-2.116	.967		3(أ)
97~	3	***	.145	.074	.713	.226	.264	.973	.264	-2.913	.830		4(أ)
95~	5	***	.123	.068	1.070	.248	.256	.954	.266	-2.532	.795		5(أ)
5	95~	***	.113	.070	.730	.309	.384	.953	.263	-2.399	.879		6(أ)
7	93~	***	.088	.071	.925	.426	.539	.928	.255	-1.907	1.016		7(أ)
7	93~	***	.093	.070	1.013	.390	.499	.931	.259	-1.991	.953		8(أ)
95~	5	***	.116	.067	.821	.269	.310	.947	.266	-2.402	.800		9(أ)
98~	2	***	.152	.074	1.043	.203	.249	.977	.264	-3.000	.823	P	10(أ)
97~	3	***	.133	.078	1.040	.298	.392	.973	.262	-2.739	.942		11(أ)
6	94~	***	.102	.068	1.184	.353	.467	.935	.258	-2.150	.875		12(أ)
97~	3	***	.128	.075	.747	.294	.370	.967	.261	-2.661	.907		13(أ)
97~	3	***	.131	.073	1.160	.265	.305	.966	.264	-2.702	.859		14(أ)
27	73~	***	.077	.085	1.012	.383	.384	.730	.267	-.550	.738		15(أ)
11	89~	***	.084	.067	.618	.402	.461	.886	.261	-1.583	.875		16(أ)
97~	3	***	.140	.076	.514	.255	.299	.973	.263	-2.843	.876		17(أ)
11	89~	***	.079	.068	1.077	.433	.475	.888	.262	-1.519	.948		18(أ)
95~	5	***	.122	.068	.527	.258	.275	.954	.265	-2.520	.802		19(أ)
98~	2	***	.153	.078	1.109	.226	.262	.980	.264	-3.000	.873	P	20(أ)
97~	3	***	.140	.071	1.235	.222	.269	.968	.264	-2.831	.803		1(ب)
22	78~	***	.070	.075	1.233	.444	.443	.780	.261	-.809	.866		2(ب)
8	92~	***	.087	.070	.995	.412	.506	.923	.262	-1.839	.994		3(ب)
10	90~	***	.083	.068	.964	.403	.441	.898	.267	-1.619	.934		4(ب)
96~	4	***	.134	.070	1.059	.229	.243	.965	.265	-2.744	.806		5(ب)
92~	8	***	.110	.065	1.668	.240	.230	.925	.272	-2.173	.717		6(ب)
10	90~	***	.082	.068	.884	.440	.538	.900	.255	-1.652	.973		7(ب)
92~	8	***	.105	.065	1.092	.275	.289	.919	.268	-2.070	.740		8(ب)
97~	3	***	.149	.074	.896	.218	.277	.974	.263	-2.959	.825	P	9(ب)
11	89~	***	.083	.067	.884	.426	.518	.894	.255	-1.633	.923		10(ب)
98~	2	***	.151	.075	1.201	.213	.242	.976	.264	-2.983	.833	P	11(ب)
98~	2	***	.153	.078	.779	.231	.292	.979	.263	-3.000	.877	P	12(ب)
10	90~	***	.082	.069	.801	.427	.507	.901	.261	-1.639	.969		13(ب)
96~	4	***	.115	.071	.515	.301	.346	.955	.263	-2.427	.877		14(ب)
95~	5	***	.121	.067	.977	.245	.256	.951	.267	-2.496	.783		15(ب)
92~	8	***	.103	.066	.760	.299	.329	.925	.268	-2.069	.787		16(ب)
36	64~	***	.078	.107	.651	.320	.271	.641	.294	.096	.751		17(ب)
7	93~	***	.089	.071	1.057	.424	.518	.929	.256	-1.920	1.006		18(ب)
13	87~	***	.071	.069	1.057	.506	.580	.871	.249	-1.352	1.067		19(ب)
95~	5	***	.110	.069	1.228	.309	.336	.948	.265	-2.316	.860		20(ب)
6	94~	***	.107	.067	.613	.305	.362	.938	.265	-2.219	.828		1(ج)
97~	3	***	.133	.071	.781	.246	.287	.966	.263	-2.734	.828		2(ج)
97~	3	***	.146	.069	1.352	.176	.175	.967	.265	-2.922	.745		3(ج)
95~	5	***	.125	.065	1.175	.204	.212	.946	.268	-2.535	.717		4(ج)
91~	9	***	.103	.065	.722	.266	.251	.908	.272	-1.950	.717		5(ج)
11	89~	***	.084	.067	.917	.405	.469	.893	.261	-1.621	.899		6(ج)
95~	5	***	.119	.069	1.005	.270	.291	.954	.266	-2.473	.826		7(ج)
10	90~	***	.079	.069	1.150	.453	.547	.897	.255	-1.592	1.004		8(ج)
9	91~	***	.090	.067	.874	.384	.472	.911	.259	-1.825	.882		9(ج)
11	89~	***	.077	.069	.739	.460	.537	.890	.257	-1.516	1.014		10(ج)
96~	4	***	.120	.073	1.152	.306	.362	.962	.263	-2.526	.906		11(ج)
6	94~	***	.093	.072	1.231	.417	.551	.939	.254	-2.052	1.029		12(ج)
95~	5	***	.116	.068	.441	.279	.319	.950	.264	-2.422	.818		13(ج)
97~	3	***	.140	.075	.876	.249	.307	.972	.264	-2.843	.864		14(ج)
11	89~	***	.076	.069	.671	.472	.549	.885	.253	-1.492	1.016		15(ج)
9	91~	***	.085	.069	1.076	.423	.517	.913	.260	-1.750	.976		16(ج)
95~	5	***	.107	.069	.892	.326	.360	.945	.264	-2.251	.879		17(ج)
94~	6	***	.107	.068	.752	.311	.344	.941	.264	-2.243	.837		18(ج)

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•		c error	b error	a error	R	PBt	PBs	PC	c	b	a	fig	رقم الشكل
γ	λ												
11	89~	***	.087	.067	.622	.375	.422	.886	.263	-1.620	.823	P	19 (ج)
94~	6	***	.105	.068	.938	.325	.353	.938	.264	-2.192	.850		20 (ج)
98~	2	***	.153	.081	.830	.228	.306	.984	.263	-3.000	.912		1 (د)
15	85~	***	.081	.069	1.292	.376	.391	.849	.270	-1.289	.805		2 (د)
12	88~	***	.077	.068	1.105	.448	.507	.875	.257	-1.442	.946		3 (د)
95~	5	***	.127	.065	1.504	.190	.162	.946	.269	-2.560	.702		4 (د)
19	81~	***	.071	.072	.945	.454	.473	.807	.259	-.976	.895		5 (د)
96~	4	***	.126	.069	.599	.247	.270	.959	.265	-2.606	.810		6 (د)
15	85~	***	.079	.068	.900	.419	.471	.853	.256	-1.339	.849		7 (د)
92~	8	***	.109	.065	1.000	.243	.226	.918	.271	-2.115	.701		8 (د)
93~	7	***	.105	.066	.743	.303	.336	.931	.265	-2.143	.802		9 (د)
14	86~	***	.085	.068	.975	.375	.425	.855	.261	-1.412	.775		10 (د)
10	90~	***	.085	.067	.955	.417	.499	.900	.254	-1.709	.910		11 (د)
31	69~	***	.075	.089	.985	.401	.397	.695	.260	-.371	.750		12 (د)
18	82~	***	.074	.069	.881	.464	.517	.824	.247	-1.140	.874		13 (د)
95~	5	***	.119	.068	.503	.262	.290	.950	.265	-2.462	.798		14 (د)
11	89~	***	.077	.068	.835	.471	.575	.887	.250	-1.530	.995		15 (د)
15	85~	***	.073	.069	.881	.479	.551	.849	.248	-1.264	.949		16 (د)
91~	9	***	.098	.066	1.163	.307	.302	.913	.271	-1.917	.785		17 (د)
92~	8	***	.103	.066	.515	.294	.310	.923	.268	-2.060	.775	18 (د)	
15	85~	***	.075	.069	.644	.443	.482	.851	.260	-1.255	.911	19 (د)	
13	87~	***	.080	.068	1.026	.425	.474	.866	.257	-1.425	.866	20 (د)	
82~	18	***	.108	.076	1.703	.152	.132	.822	.287	-1.350	.533	1 (هـ)	
9	91~	***	.086	.068	.613	.404	.467	.910	.262	-1.748	.938	2 (هـ)	
12	88~	***	.080	.068	.474	.418	.477	.876	.260	-1.479	.891	3 (هـ)	
98~	2	***	.152	.077	.606	.225	.274	.978	.263	-3.000	.861	4 (هـ)	
8	92~	***	.102	.066	.519	.311	.361	.922	.263	-2.061	.786	5 (هـ)	
26	74~	***	.094	.092	1.840	.250	.265	.737	.284	-.618	.584	6 (هـ)	
95~	5	***	.117	.067	.924	.254	.256	.946	.267	-2.405	.781	7 (هـ)	
9	91~	***	.085	.069	.926	.417	.503	.911	.260	-1.749	.964	8 (هـ)	
93~	7	***	.114	.065	1.145	.235	.225	.931	.269	-2.269	.716	9 (هـ)	
8	92~	***	.083	.072	1.146	.456	.575	.925	.255	-1.808	1.099	10 (هـ)	
93~	7	***	.108	.065	1.118	.262	.256	.925	.269	-2.142	.739	11 (هـ)	
23	77~	***	.070	.075	1.147	.461	.489	.771	.250	-.800	.852	12 (هـ)	
96~	4	***	.122	.070	1.034	.277	.331	.957	.263	-2.542	.837	13 (هـ)	
95~	5	***	.111	.068	.638	.306	.349	.946	.263	-2.325	.843	14 (هـ)	
13	87~	***	.079	.068	1.123	.431	.500	.869	.256	-1.432	.891	15 (هـ)	
90~	10	***	.101	.065	1.224	.264	.250	.896	.273	-1.848	.697	16 (هـ)	
90~	10	***	.104	.065	1.595	.242	.210	.903	.275	-1.934	.687	17 (هـ)	
23	77~	***	.076	.077	.706	.396	.414	.775	.264	-.812	.770	18 (هـ)	
89~	11	***	.093	.067	1.147	.318	.311	.894	.274	-1.702	.775	19 (هـ)	
22	78~	***	.086	.079	.960	.311	.314	.782	.276	-.892	.665	20 (هـ)	
9	91~	***	.096	.066	.545	.324	.364	.908	.267	-1.870	.792	1 (و)	
94~	6	***	.106	.068	.554	.319	.380	.939	.263	-2.220	.844	2 (و)	
15	85~	***	.078	.069	.504	.418	.453	.851	.262	-1.290	.865	3 (و)	
93~	7	***	.121	.064	1.129	.195	.209	.931	.268	-2.385	.666	4 (و)	
97~	3	***	.151	.069	1.801	.158	.154	.967	.265	-2.997	.733	5 (و)	
20	80~	***	.075	.072	1.202	.433	.476	.796	.251	-.984	.805	6 (و)	
7	93~	***	.096	.068	.926	.372	.470	.926	.258	-1.999	.893	7 (و)	
31	69~	***	.069	.086	1.262	.444	.430	.693	.254	-.360	.825	8 (و)	
92~	8	***	.104	.065	.705	.283	.292	.916	.268	-2.029	.744	9 (و)	
8	92~	***	.096	.066	.631	.350	.403	.916	.260	-1.943	.829	10 (و)	
13	87~	***	.082	.067	.938	.413	.481	.872	.256	-1.494	.854	11 (و)	
97~	3	***	.151	.071	1.383	.178	.205	.970	.265	-3.000	.762	12 (و)	
93~	7	***	.117	.064	1.089	.207	.206	.927	.270	-2.292	.676	13 (و)	
38	62~	***	.079	.108	.815	.345	.313	.618	.276	.145	.729	14 (و)	
93~	7	***	.108	.065	.927	.262	.256	.926	.269	-2.152	.741	15 (و)	
89~	12	***	.092	.067	1.362	.319	.314	.885	.272	-1.642	.761	16 (و)	
93~	7	***	.104	.067	.926	.316	.327	.933	.265	-2.141	.822	17 (و)	
92~	8	***	.111	.065	.867	.243	.248	.925	.268	-2.192	.710	18 (و)	
17	83~	***	.075	.070	.689	.426	.451	.832	.264	-1.139	.863	19 (و)	
93~	7	***	.108	.065	.734	.274	.292	.926	.266	-2.164	.744	20 (و)	
14	86~	***	.087	.068	1.391	.344	.377	.856	.268	-1.415	.750	1 (ز)	
13	87~	***	.080	.068	.756	.421	.486	.870	.259	-1.431	.885	2 (ز)	
86~	14	***	.101	.068	1.221	.236	.222	.860	.276	-1.594	.624	3 (ز)	
11	89~	***	.087	.067	1.184	.383	.449	.887	.260	-1.628	.836	4 (ز)	
90~	10	***	.104	.065	1.340	.246	.215	.900	.274	-1.908	.686	5 (ز)	



•		c error	b error	a error	R	PBt	PBs	PC	c	b	a	fig	رقم الشكل
γ	λ												
92~	8	***	.105	.065	1.178	.279	.289	.916	.267	-2.049	.734		6(ز)
90~	10	***	.099	.066	1.543	.280	.267	.900	.274	-1.834	.731		7(ز)
11	89~	***	.082	.067	.881	.439	.530	.890	.250	-1.619	.918		8(ز)
18	82~	***	.072	.071	1.907	.447	.463	.823	.262	-1.058	.906		9(ز)
83~	17	***	.085	.073	1.217	.307	.259	.828	.289	-1.128	.726		10(ز)
10	90~	***	.086	.067	.987	.401	.477	.903	.260	-1.720	.902		11(ز)
96~	4	***	.129	.069	.867	.239	.264	.960	.265	-2.658	.803		12(ز)
10	90~	***	.091	.066	.647	.353	.401	.896	.264	-1.727	.807		13(ز)
92~	8	***	.099	.066	1.726	.300	.284	.915	.272	-1.946	.779		14(ز)
9	91~	***	.082	.069	1.091	.465	.577	.906	.248	-1.713	1.006		15(ز)
15	85~	***	.081	.068	1.224	.401	.451	.852	.258	-1.356	.813		16(ز)
20	80~	***	.068	.072	1.110	.488	.511	.800	.250	-.924	.936		17(ز)
92~	8	***	.099	.066	1.021	.319	.323	.920	.268	-1.974	.808		18(ز)
18	82~	***	.077	.071	.342	.416	.442	.821	.261	-1.100	.821		19(ز)
92~	8	***	.109	.065	.734	.245	.234	.917	.270	-2.099	.699		20(ز)
21	79~	***	.082	.076	1.341	.365	.390	.786	.263	-.939	.715		1(ح)
95~	5	***	.123	.066	.824	.230	.243	.949	.266	-2.512	.750		2(ح)
7	93~	***	.096	.068	.935	.369	.453	.927	.260	-1.999	.892		3(ح)
89~	11	***	.102	.066	1.464	.245	.216	.889	.277	-1.796	.674		4(ح)
8	92~	***	.094	.067	.709	.369	.456	.921	.260	-1.943	.877		5(ح)
28	72~	***	.065	.081	1.163	.479	.457	.718	.255	-.461	.921		6(ح)
93~	7	***	.108	.066	1.388	.272	.260	.932	.269	-2.188	.771		7(ح)
20	80~	***	.069	.073	.464	.455	.471	.804	.262	-.928	.921		8(ح)
93~	7	***	.103	.066	1.075	.302	.304	.928	.268	-2.091	.803		9(ح)
21	79~	***	.077	.074	1.263	.402	.423	.786	.258	-.919	.768		10(ح)
95~	5	***	.124	.066	1.316	.214	.217	.946	.267	-2.522	.724		11(ح)
94~	6	***	.107	.068	.918	.301	.318	.941	.268	-2.221	.838		12(ح)
95~	5	***	.121	.069	.468	.263	.286	.954	.265	-2.513	.811		13(ح)
93~	7	***	.098	.067	1.340	.327	.332	.925	.269	-2.001	.839		14(ح)
7	93~	***	.088	.070	1.116	.428	.533	.925	.256	-1.882	1.005		15(ح)
19	81~	***	.065	.072	.967	.510	.531	.812	.252	-.957	1.021		16(ح)
7	93~	***	.090	.070	.921	.410	.489	.928	.259	-1.923	.975		17(ح)
89~	11	***	.093	.066	.759	.312	.297	.887	.272	-1.677	.747		18(ح)
13	87~	***	.075	.068	1.157	.464	.538	.865	.252	-1.371	.945		19(ح)
15	85~	***	.078	.068	.507	.428	.483	.847	.256	-1.289	.847		20(ح)
91~	9	***	.109	.064	1.290	.226	.216	.911	.272	-2.075	.674		1(ط)
6	94~	***	.100	.070	.708	.376	.476	.940	.257	-2.149	.938		2(ط)
8	92~	***	.090	.069	.734	.407	.504	.925	.257	-1.914	.960		3(ط)
95~	5	***	.125	.067	.765	.232	.263	.951	.265	-2.555	.758		4(ط)
99~	1	***	.153	.079	.978	.178	.202	.987	.263	-3.000	.884		5(ط)
98~	2	***	.152	.074	.661	.164	.168	.981	.265	-3.000	.816		6(ط)
6	94~	***	.096	.072	.759	.394	.495	.940	.259	-2.082	.991		7(ط)
8	92~	***	.086	.070	.919	.434	.538	.919	.253	-1.833	.996		8(ط)
10	90~	***	.093	.066	1.347	.364	.436	.902	.257	-1.824	.811		9(ط)
91~	9	***	.106	.065	.945	.255	.268	.909	.269	-2.017	.699		10(ط)
91~	9	***	.101	.066	1.200	.276	.252	.908	.274	-1.912	.737		11(ط)
16	84~	***	.075	.068	1.250	.461	.535	.839	.247	-1.248	.881		12(ط)
12	88~	***	.080	.068	1.064	.441	.530	.883	.254	-1.527	.927		13(ط)
95~	5	***	.125	.066	1.204	.215	.207	.949	.267	-2.544	.735		14(ط)
12	88~	***	.087	.066	.909	.386	.443	.883	.257	-1.622	.814		15(ط)
91~	9	***	.096	.066	1.634	.322	.346	.912	.268	-1.893	.800		16(ط)
10	90~	***	.085	.068	1.268	.412	.477	.904	.261	-1.691	.929		17(ط)
94~	6	***	.109	.067	.391	.302	.333	.941	.264	-2.263	.823		18(ط)
95~	5	***	.119	.068	1.320	.265	.281	.952	.266	-2.465	.811		19(ط)
81~	19	***	.090	.075	.941	.277	.244	.814	.285	-1.095	.662		20(ط)
98~	2	***	.152	.076	.981	.172	.223	.983	.263	-3.000	.839		1(ي)
7	93~	***	.095	.068	.750	.380	.482	.929	.258	-2.009	.912		2(ي)
94~	6	***	.122	.066	.773	.216	.207	.945	.267	-2.488	.726		3(ي)
15	85~	***	.088	.069	1.180	.335	.355	.849	.268	-1.387	.725		4(ي)
97~	3	***	.151	.072	.726	.182	.197	.971	.265	-3.000	.776		5(ي)
13	87~	***	.084	.067	.999	.387	.449	.868	.259	-1.483	.813		6(ي)
95~	5	***	.114	.068	1.499	.281	.293	.948	.266	-2.376	.822		7(ي)
96~	4	***	.125	.070	.787	.258	.282	.960	.265	-2.591	.828		8(ي)
8	92~	***	.096	.067	1.022	.358	.433	.922	.261	-1.966	.858		9(ي)
96~	4	***	.138	.068	1.076	.189	.201	.961	.266	-2.793	.739		10(ي)
8	92~	***	.085	.071	1.181	.438	.553	.924	.256	-1.831	1.049		11(ي)
19	81~	***	.072	.072	1.412	.446	.472	.811	.259	-1.004	.878		12(ي)

•		c error	b error	a error	R	PBt	PBs	PC	c	b	a	fig	رقم الشكل
γ	λ												
89~	11	***	.104	.065	.776	.231	.214	.894	.275	-1.866	.663		13 (ي)
24	76~	***	.079	.079	1.150	.380	.391	.764	.265	-.767	.734		14 (ي)
91~	9	***	.104	.065	1.231	.259	.250	.911	.272	-1.993	.716		15 (ي)
25	75~	***	.076	.081	.840	.395	.408	.748	.262	-.665	.752		16 (ي)
20	80~	***	.081	.073	1.726	.386	.431	.800	.256	-1.034	.735		17 (ي)
15	85~	***	.075	.068	.556	.456	.511	.847	.251	-1.275	.892		18 (ي)
12	88~	***	.075	.069	.719	.479	.557	.885	.253	-1.478	1.018		19 (ي)
96~	4	***	.129	.069	.913	.236	.237	.961	.266	-2.658	.798		20 (ي)

**ملخص البحث**

**أولاً . باللغة العربية**

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(Xcalibre <sup>(tm)</sup> for Windows 95/NT -- Version 1.10 )

WinGen: Windows software that generates IRT parameters and item )

(responses

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**ثانياً . باللغة الإنجليزية**



Faculty of Education  
Educ. Psychology dept.

Using Item Response Theory In Calibrating Items In certain  
Cognitive Tests

A thesis

Submitted as a requirement for the Ph.D. in education  
(Psychological Measurement)

By

Mohammed M.M. Abd-alwahap  
Assistant lecturer in Educ. Psychology dept.

Supervised by

Dr. Anwar Riad Abd-alrahim  
Professor of Educ. Psychology  
and the dean of faculty of  
Education – Minia university

Dr. Ali H. Badary  
Professor of Educ. Psychology  
in faculty of Education – Minia  
university

2010 - 1431

## **Introduction:**

Measurement theories have been developed in order to achieve objectivity and accuracy of measurement tools. Psychological measurement experts looked for the best solutions for classical test theory (CTT) problems, For such reasons some modern theories such as item response theory (IRT) and generalizability one have appeared.

## **Problem of the research:**

There is a need for developing the scales frequently used in studies and researches such as critical thinking test, this because of the advantages of IRT and lack of studies based on IRT. So the questions of the research problem were:

- 1- Can the IRT assumptions be achieved on the sample responses on ( critical thinking test, reasoning thinking test and hidden models test)?
- 2- Are the data gathered from the sample responses fit for the IRT models used in calibrating items in each test?

## **Aims of the research:**

- 1- assuring the attainment of IRT assumptions for data gathered from the sample responses.
- 2- Selecting the IRT model which is suitable for calibrating items in each test.
- 3- Identifying the fit and unfit items for the assumptions of IRT model used in calibrating items in each test.

## **Importance of the research:**

- 1- Findings of this research may help researchers and educators to use the tests after calibrating their items with IRT models with high levels of confidence.
- 2- It may help specialists in psychological measurements to select the suitable IRT model so as to calibrate items in different scales.
- 3- It may help researchers to be aware of ensuring objectivity conditions in their scales.

## **The research limitations:**

### **1- tools:**

- A critical thinking test by Watson and Glaser translated by Gaber Abd-Alhameed and Yahia Hendam,1976.
- A reasoning thinking test by Ahmed Zaky Saleh,1987.
- A hidden models test by French et al. translated by Ali H. Badary and Anwar Riad,1985.

### **2- the sample of the research:**

- A critical thinking test: the sample consisted of 1024 students at undergraduate stage and general diploma in faculty of education.
- A reasoning thinking test: The sample was 259 students at undergraduate stage in faculty of education.
- A hidden models test: the sample consisted of 1023 students at undergraduate stage and general diploma in faculty of education.



### **3- IRT models used in calibrating items:**

**3UPLM was used in calibrating items in critical thinking test and hidden models test, while 2UPLM was used in calibrating items in the reasoning thinking test using Xcalibre <sup>(tm)</sup> for Windows 95/NT - Version 1.10 and WinGen: Windows software that generates IRT parameters and item responses .**

**The research findings:**

- 1- The assumptions of IRT (unidimensionality – local independence – speededness) extracted from (critical thinking test - hidden models test - reasoning thinking test) were proved.**
- 2- The fit and unfit items were identified in the three tests.**