Revalidation of Bhattacharya's Achievement Motivation Inventory

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Abstract: *This paper deals with the reliability and validity of revised Bhattacharya's Achievement Motivation Inventory (BAMI). Original BAMI was prepared by Vijay Kumar Rai and S.B. Bhattacharya (Rai, 1989) to measure the achievement motivation of the students. This tool is available in two forms: Form 'A' and Form 'B'. BAMI measures 11 dimensions of Achievement Motivation with 40 items in Form 'A'. Only Form A has been considered for this study. On the basis of the instructions from the test constructors (Rai & Bhattacharya) some modifications were done and eight items were added for retry-out. The try-out form was administered on 186 secondary school students and there were 48 items in the revised BAMI try-out form. After try-out, item analyses were done and the final test consisted of 44 items instead of 40 items in original version of BAMI. Four items from the old BAMI were rejected and all items (8) from newly including items resulted into 44 items in the new BAMI.*
Keywords: *Achievement Motivation, Difficulty Value, Discrimination Index.*

I. Introduction

A good research is preceded by a good research idea and careful planning, through which a study is conducted to investigate the research problem. Tool construction must precise the reliability, validity and the practicability. What is reliability? This question is always a big issue in research area. A test score is reliable when it is stable and trustworthy. Precision or accuracy of a test score is the objective of finding reliability. A well made test needs to give consistency in results. Here, consistency determines that a test is reliable when it would give same result over and over again. Reliability is not sufficient alone for a test's worthiness and truthfulness. Validity is also a vital factor for a test. Validity of a test refers to the truthfulness of inferences that are made from the results of the study. The focal issue of this study is to measure the reliability and validity of revised BAMI.

What is BAMI?

The Bhattacharya Achievement Motivation Inventory (BAMI) was introduced by Vijay Kumar Rai and Prof. S.B. Bhattacharya (Rai, 1989). This tool is available in two forms: Form 'A' and Form 'B'. BAMI form 'A' measures 11 dimensions of Achievement Motivation with 40 items. The 11 dimensions of this tool refers as Persistence (P), Personal Responsibility (PR), Aspiration Level (AL), Risk Taking (RT), Upward Mobility (UP), Time Perspective (TS), Time Perception (TP), Partner Choice (PC), Achievement Behaviour (AB), Recognition Behaviour (RB), Task Tension (TT). This study is delimited to form 'A' only.

Table 1 Distribution of Items in old BAMI

Dimensions		Total Numbers of Items	Item Number
Persistence	(P)	5	4,8,29,34,37
Personal Responsibility	(PR)	5	16, 22, 24, 25, 26
Aspiration Level	(AL)	2	23, 27
Risk Taking	(RT)	2	20, 31
Upward Mobility	(UP)	2	14, 39
Time Perspective	(TS)	5	1, 5, 6,13, 32
Time Perception	(TP)	2	12, 36
Partner Choice	(PC)	5	3, 11, 18, 30, 40
Achievement Behaviour	(AB)	4	9, 19, 21, 38
Recognition Behaviour	(RB)	4	7, 15, 33, 35
Task Tension	(TT)	4	2, 10, 17, 28

Objectives of this Study

- To find out the reliability of revised Bhattacharya achievement motivation inventory (BAMI).
- To find out the validity of revised Bhattacharya achievement motivation inventory (BAMI).

Item Analyses

On the basis of the instructions from the test constructors (Rai & Bhattacharya) some modifications and pilot testing were done. Eight items were added, and again subjected to try-out. The retry-out form was administered on 186 secondary school students and there were 48 items in the revised BAMI try-out form. Sample was selected by selecting schools randomly and then purposive sampling was carried out from 9 schools of Lucknow district. After try-out, item analyses were done and the final test consisted of 44 items. All the 8 newly introduced items were retained and 4 items from the old BAMI were rejected resulting into 44items in the revised BAMI.

Table 2 Distribution of items in the Try-out form

Characteristics		Total Numbers of Items	Item Number
Persistence	(P)	5	4, 8, 29, 34, 37
Personal Responsibility	(PR)	5	16, 22, 24, 25, 26
Aspiration Level	(AL)	4	23, 27, 41*, 42*
Risk Taking	(RT)	4	20, 31, 43*, 44*
Upward Mobility	(UP)	5	14, 39, 40* 45*, 46*
Time Perspective	(TS)	5	1, 5, 6, 13, 32
Time Perception	(TP)	3	12, 36, 47*
Partner Choice	(PC)	5	3, 11, 18, 30, 48
Achievement Behaviour	(AB)	4	9, 19, 21, 38
Recognition Behaviour	(RB)	4	7, 15, 33, 35
Task Tension	(TT)	4	2, 10, 17, 28

* Items = New Introduced items to the BAMI. Old item no. 40 is now item no. 48

Item number 40 was introduced to Upward Mobility dimension, item 41 and 42 to Aspiration Level (AL), item 43 and 44 to Risk Taking (RT), 45 and 46 to Upward Mobility (UP) and item number 47 to the Time Perception (TP).

For the selection and rejection of an item, researcher used 't' Statistic. The t Statistic was introduced by William S. Gossett. It is often pseudonym as Student 't' as appended in the following Table 3.

Table 3 Showing significance of mean differences in scores of 27% upper and lower groups in each item

Item No.	M1	SD1	M2	SD2	D	□D	t	S/R
Item 1	0.82	0.38	0.38	0.49	0.44	0.088	5.00	S
Item 2	0.92	0.27	0.40	0.49	0.52	0.080	6.50	S
Item 3	0.50	0.50	0.36	0.48	0.14	0.098	1.42	R
Item 4	0.92	0.27	0.30	0.46	0.62	0.076	8.15	S
Item 5	0.86	0.35	0.36	0.48	0.50	0.084	5.95	S
Item 6	0.70	0.46	0.48	0.5	0.22	0.096	2.29	S
Item 7	0.68	0.47	0.44	0.5	0.24	0.097	2.47	S
Item 8	0.90	0.30	0.38	0.49	0.52	0.081	6.41	S
Item 9	0.48	0.50	0.18	0.38	0.30	0.09	3.33	S
Item 10	0.78	0.41	0.34	0.47	0.44	0.089	4.94	S
Item 11	0.58	0.49	0.24	0.43	0.34	0.068	5.00	S
Item 12	0.44	0.50	0.40	0.49	0.04	0.099	0.40	R
Item 13	0.72	0.45	0.36	0.48	0.36	0.093	3.87	S
Item 14	0.76	0.43	0.40	0.49	0.36	0.092	3.91	S
Item 15	0.52	0.50	0.36	0.48	0.16	0.098	1.63	R
Item 16	0.72	0.45	0.32	0.47	0.40	0.092	4.34	S
Item 17	0.88	0.32	0.34	0.47	0.54	0.082	6.58	S
Item 18	0.76	0.43	0.36	0.48	0.40	0.091	4.39	S
Item 19	0.58	0.49	0.24	0.43	0.34	0.093	3.65	S
Item 20	0.72	0.45	0.32	0.47	0.40	0.092	4.34	S
Item 21	0.76	0.43	0.24	0.43	0.52	0.086	6.04	S
Item 22	0.70	0.46	0.30	0.46	0.40	0.092	4.34	S
Item 23	0.70	0.46	0.34	0.47	0.36	0.094	3.82	S
Item 24	0.76	0.43	0.28	0.45	0.48	0.088	5.45	S
Item 25	0.80	0.40	0.32	0.47	0.48	0.087	5.51	S
Item 26	0.92	0.27	0.34	0.47	0.58	0.077	7.53	S
Item 27	0.80	0.40	0.18	0.38	0.62	0.079	7.84	S
Item 28	0.82	0.38	0.38	0.49	0.44	0.088	5.00	S
Item 29	0.86	0.35	0.42	0.49	0.44	0.086	5.11	S
Item 30	0.70	0.46	0.34	0.47	0.36	0.094	3.82	S
Item 31	0.86	0.35	0.38	0.49	0.48	0.085	5.64	S
Item 32	0.62	0.49	0.32	0.47	0.30	0.096	3.12	S
Item 33	0.88	0.32	0.34	0.47	0.54	0.082	6.58	S
Item 34	0.44	0.50	0.34	0.47	0.10	0.098	1.02	R

Item 35	0.50	0.50	0.30	0.46	0.20	0.096	2.08	S
Item 36	0.66	0.47	0.28	0.45	0.38	0.093	4.08	S
Item 37	0.60	0.49	0.28	0.45	0.32	0.094	3.40	S
Item 38	0.80	0.40	0.36	0.48	0.44	0.089	4.94	S
Item 39	0.78	0.41	0.24	0.43	0.54	0.084	6.42	S
Item 40	0.56	0.50	0.34	0.47	0.22	0.098	2.24	S
Item 41	0.66	0.47	0.32	0.47	0.34	0.094	3.61	S
Item 42	0.74	0.44	0.44	0.50	0.30	0.094	3.19	S
Item 43	0.82	0.38	0.38	0.49	0.44	0.088	5.00	S
Item 44	0.78	0.41	0.34	0.47	0.44	0.089	4.94	S
Item 45	0.82	0.38	0.38	0.49	0.44	0.086	5.11	S
Item 46	0.62	0.49	0.32	0.47	0.30	0.096	3.12	S
Item 47	0.86	0.35	0.30	0.46	0.56	0.080	7.00	S
Item 48	0.78	0.41	0.26	0.44	0.52	0.086	6.04	S

UGM = Upper Group Mean
LGM = Lower Group Mean
SD$_1$ = Standard Deviation of Upper Group
SD$_2$ = Standard Deviation of Lower Group
D = Difference of Mean ($M_1 \sim M_2$)
$\square$D = Standard error of Mean
t = t value
S = Item Selected
R = Item Rejected

On the basis of retry-out analysis, item nos. 3, 12, 15, 34 were rejected from the old version of BAMI and all the 8 newly introduced items were accepted. So, final form of new BAMI consists of 44 items out of 48 items.

Reliability

Test reliability indicates the consistency of scores obtained by the same individuals when they are examined with the same test on different occasions, or with different sets of equivalent items. The try-out was conducted on 186 secondary school students of Lucknow city. The Spearman-Brown correlation coefficient has been found r_{1I} = 0.829 for the whole test (44 items). The split-half method is feasible when test-retest and equivalent form method is not applicable.

To calculate the reliability coefficient by Spearman-Brown, formula is given below:

$$Rr_{1I} = \frac{2r \tfrac{1}{2}_{I/II}}{1 + r \tfrac{1}{2}_{I/II}}$$

Where and r_{II} = reliability coefficient of the whole test

$r^{\tfrac{1}{2}}{}_{I/II}$ = reliability coefficient of the half-test

Validity

The validity of an acceptable validity index depends upon the length of the test, range of difficulty value and purpose for which the test is designed. The validity index of an item (i.e., discriminative power) is determined by the extent to which the given item discriminates among examinees that differs sharply in the function measured by the test as a whole. For the calculation of items validity researcher used Biserial r (Garrett, 2014, pp. 365-369). Biserial r (r_{bis}) determines the correlation of an item with total score on the test. From this Biserial r, the Discrimination indices were computed which gives the validity of the items individually and test as a whole. Discrimination index more than 0.17 considered by Garrett (2014, p.367) as satisfactory one. The following table is appended with individual values of DI calculated from Biserial r.

Table 4 Discrimination index of items through Bi-serial r (r_{bis}) for the Selected Items

Item No.	UGT scores	LGT scores	UGT%	LGT%	DV	DI
1	41	19	82	38	0.60	0.64
2	46	20	92	40	0.66	0.57
3	46	15	92	30	0.61	0.66
4	43	18	86	36	0.61	0.51
5	35	24	70	48	0.59	0.19

6	34	19	68	44	0.56	0.17
7	45	19	90	38	0.64	0.57
8	24	9	48	18	0.33	0.34
9	39	17	78	34	0.56	0.45
10	29	12	58	24	0.41	0.31
11	36	18	72	36	0.54	0.33
12	38	20	76	40	0.58	0.34
13	36	16	72	32	0.52	0.37
14	44	17	88	34	0.61	0.58
15	38	18	76	36	0.56	0.40
16	29	12	58	24	0.41	0.31
17	36	16	72	32	0.52	0.37
18	38	12	76	24	0.5	0.48
19	35	15	70	30	0.5	0.40
20	35	17	70	34	0.52	0.37
21	38	14	76	28	0.52	0.45
22	40	16	80	32	0.56	0.45
23	46	17	92	34	0.63	0.58
24	40	9	80	18	0.49	0.61
25	41	19	82	38	0.60	0.47
26	43	21	86	42	0.64	0.48
27	35	17	70	34	0.52	0.37
28	43	19	86	38	0.62	0.51
29	31	16	62	32	0.47	0.27
30	44	17	88	34	0.61	0.58
31	25	15	50	30	0.40	0.21
32	33	14	66	28	0.47	0.35
33	30	14	60	28	0.44	0.29
34	40	18	80	36	0.58	0.42
35	39	12	78	24	0.51	0.49
36	28	12	56	34	0.45	0.50
37	33	16	66	32	0.49	0.31
38	37	22	74	44	0.59	0.28
39	41	19	82	38	0.60	0.47
40	39	17	78	34	0.56	0.45
41	41	19	82	38	0.60	0.47
42	31	16	62	32	0.47	0.27
43	43	15	86	30	0.58	0.57
44	39	13	78	26	0.52	0.47

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UGT	=	Upper Group Total (n=50)
LGT	=	Lower Group Total (n=50)
UGT%	=	Upper Group Total Percentage
LGT%	=	Lower Group Total Percentage
DV	=	Difficulty Value
DI	=	Discrimination Index

Fig.1
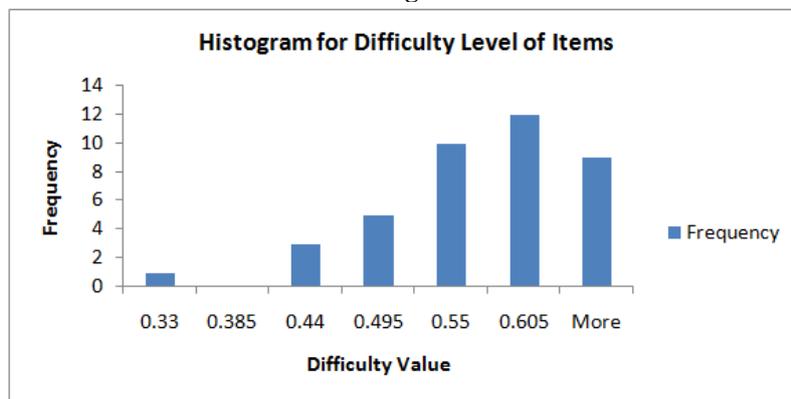
Figure 1 shows that all the items with difficulty level 0.3 and above have been selected (e.g., item no. 6 with difficulty value .33).

Fig. 2
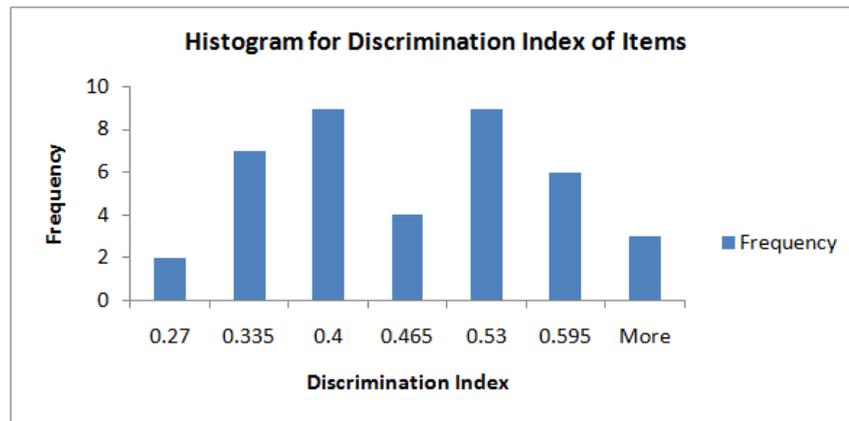
Figure 2 indicates that all items having discrimination index of 0.27 to 0.8 have been selected (e.g., item no. 11 with 0.3 discrimination index and item no.3 with 0.66 discrimination index, except item numbers 5, 6, 31. Those were also selected to keep Garret's comment in mind and the distribution of items in different dimensions).

Table 5 Distributions of Final Items in BAMI

Characteristics		Total Numbers of Items	Item Number
Persistence	(P)	4	3, 7, 26, 33
Personal Responsibility	(PR)	5	13, 19, 21, 22, 23
Aspiration Level	(AL)	4	20, 24, 37*, 38*
Risk Taking	(RT)	4	17, 28, 39*, 40*
Upward Mobility	(UP)	5	12, 35, 36* 41*, 42*
Time Perspective	(TS)	5	1, 4, 5, 11, 29
Time Perception	(TP)	2	32, 43*
Partner Choice	(PC)	4	10, 15, 27, 44
Achievement Behaviour	(AB)	4	8, 16, 18, 34
Recognition Behaviour	(RB)	3	6, 30, 31
Task Tension	(TT)	4	2, 9, 14, 25

*New included items also finally included.

After the completion of Reliability and validity testing, the researchers continued with the preparation of a norm table. A fresh administration of new BAMI was carried out on secondary students (grade IX & X). Total 348 students constituted the base for norm Table.

Sten norms were developed and details are given in the following Table 6. Some examples of Selected and rejected items are also given below. The items were prepared keeping in view the behaviour style of the student in the form of Achievement Related (AR), Task Related (TR) and Unrelated (UR). Only achievement related behaviour were given one mark and task related and unrelated behaviours were given zero marks. However, the Inventory is in Hindi Language, though English translation is available for further researches.

Rejected items

3) I would like to make friend who desires:
a) I may succeed   AR
b) I may complete my work properly   TR
12) The time span of examination:
a) it is insufficient for good answers   AR
b) it is spent in useless writings   UR

15) I like to do such work:
a) in which i feel comfort TR
b) I may get fame AR

Selected items
1) I like:
   a) to think about to make future better   UR
   b) to plan for a better future   AR

2) When I fail to achieve my goal:
a) I think about to fulfil my next goal   UR
b) I try again to achieve that goal any how   AR
6) I think mostly:
a) about my present task   TR
b) about my future   AR

Norms

       When item selection, reliability, validity all were based on try-out sample, the norms table in the form of Sten scores were developed with full strength of the sample for this study after collecting data finally. Sten (standard ten) divides a score scale into ten units. Sten indicates the status of the individuals with respect of the total scores. The sample strength was 348. The norms table is given below.

Table 6 Norm table in Sten (Standard Ten) Scores

Raw Scores Range	Percentage Cut Off	Sten Score
0-10	0 - 2.28	1
11-13	2.29 - 5.68	2
14-17	5.69 - 15.87	3
18-21	15.88 - 33.85	4
22-24	33.86 - 50.08	5
25-27	50.09 - 69.15	6
28-30	69.16 - 84.13	7
31-34	84.14 - 93.32	8
35-37	93.33 - 97.72	9
38-44	97.73 - 100.00	10

II.   Summary and conclusion

       After the item analysis through 't' test, researchers found that all items significant at .05 significance level except item nos. 3, 12, 15, 34. These items have less than the significant value of 't' So, these items were rejected from the final form of Bhattacharya Achievement Motivation Inventory (BAMI). Item no. 3 belongs to dimension Partner Choice (PC), item number 12 belongs to Time Perception, item number 15belongs to Persistence and item number 34 belongs to Recognition Behaviour (RB), and Final form of revised BAMI consists of 44 items out of 48 items.

       Reliability coefficient was calculated by Spearman-Brown's split-half correlation, and the value is 0.829. The result of reliability coefficient determines that the test is fairly reliable. For the validity of the test items, the researcher used Biserial r method suggested by Garrett (2014), Where 11 items (13, 14, 19 and so on...) are regarded as fairly satisfactory, 21 items (1, 5, 10 and so on...) have moderate validity, 12 items (2, 4, 8 and so on...) are highly valid. The final form comprised of 44 items in new version of BAMI Form 'A'.

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