Semantic Differential Measurement of the Bengali Meaning System*

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Introduction

Language provides a means for communication between individuals about the dynamic and static aspects of the environment. Primarily spoken, and secondarily written, it plays an indispensable role in economic, educational, governmental, industrial, social and other spheres of human life. Traditionally the subject of study by linguists, language has recently attracted the attention of psychologists. Among the aspects of language which are being examined from a psychological point of view are the role of learning (10), communication in small groups (9), construction of sentences (11), perception of speech (7), and the nature of meaning (13).

Using the semantic differential technique, it has been possible to operationally define and quantify certain aspects of meaning. Once meaning becomes measurable, a number of possibilities arise, including determination of the meaning system(s) of any given language and comparisons of meaning systems across languages. Individual variation in the expression of the meaning system can also be measured and used to understand and predict other forms of behaviour. Exploration of these possibilities has already been initiated in an international project on the cross-cultural generality of affective meaning systems (5, 12) Languages which have been investigated to date in this project include Arabic (Lebanon), Cantonese (Hong Kong), Dutch (Netherlands), English (U.S.A.), Farsi (Afghanistan), Farsi (Iran), Finnish (Finland), Flemish (Belgium), French (France), Greek (Greece), Hindi (India), Italian (Italy), Japanese (Japan), Kannada (India), Serbo-Croatian (Yugoslavia), Spanish (Mexico), Swedish (Sweden), Thai (Thailand) and Turkish (Turkey); the centres and responsible investigators have been reported elsewhere (5). Bengali is the twentieth language to be included in this project, and the results obtained for the Bengali language are reported herein.

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Data were collected at the Nabadwip Hindu School, Mr. Suresh C. Das, Headmaster, and at the Bakultala School, Nabadwip, Mr. Monoranjan Sarkar, Headmaster.

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The semantic differential is a technique whereby the meaning of a concept is rated on a number of adjectival or bipolar scales. Beginning with the work of Stagner and Osgood (14) on social stereotypes, it has evolved into a fairly standardized procedure, in which concepts, scales, administration, and scoring are the salient features (13). Concepts are chosen at the discretion of the investigator, and are typically single words, phrases, or nonverbal stimuli. After a decade of research it is now customary to use as scales either the fifty scales comprising the "Full-Scale Instrument" or the twelve "Pan-Cultural Factor Scales". These two sets of scales have been determined for the nineteen languages listed previously; they will be discussed in more detail below in connection with the research on the Bengali language. Administration consists of preparing graphic rating proformas with seven steps for each bipolar or adjectival pair, preparing suitable instructions, and collecting data under controlled conditions as for any psychological test. The instructions generally include orientation to the task, importance of the seven scale positions and how to mark them, and the attitude to be taken toward the task. Scoring is generally in terms of either unit or weighted factor scores or measures of profile similarity. To obtain "unit" factor score estimates, ratings on a set of the scales, which serve as indices of one factor, are added. Similarly, ratings on other sets of scales are added. Each scale is given equal or unit weight in the scoring (13). To obtain weighted factor score estimates, the ratings on all of the scales are multiplied by the appropriate regression coefficients and summed (3, 15). Measures of profile similarity include the sum of the squared differences between the ratings on two concepts, or between two subjects on the same concept (13).

For determination of the scales comprising the Full-scale Instrument and the Pan-Cultural Factor Scales, the following standard procedure has been adopted for all languages included in the international project (5, 12) :

(i) translation of one hundred initial stimuli (concepts or nouns) ;

(ii) elicitation of qualifiers (adjectives) for the one hundred stimuli by a restricted word association task ;

(iii) selection of qualifiers in terms of frequency and diversity (H-statistic of information theory) and independence (phi coefficient of correlation) ;

(iv) production of semantic differential scales by eliciting opposites to the selected qualifiers ;

(v) rating of the one hundred initial stimuli on the semantic differential scales ; and

(vi) factor analysis of the ratings to obtain the full-scale instrument and the pan-cultural factor scales.

Competent adult bilinguals at the centre conducting the research carry out steps (i) and (iv). Steps (ii) and (v) require collection of data on male high school students being educated in their mother tongue (the language under investigation). Steps (iii) and (vi) are statistical analyses done at the centre for Comparative Psycholinguistics, Institute of Communications Research, University of Illinois, U. S. A. The use of common criteria in translation, the same one hundred stimuli, identical rating methodology, comparable subjects, and centralized data processing are all designed to ensure cross-cultural comparability of the final results.

Data collection

The Bengali language is an Indo-European language spoken in West Bengal and Tripura, India, and in East Pakistan. Derived from Sanskrit, it is customarily written and printed in a script derived from Brahmi. In the state of West Bengal, where this research was conducted, it is the medium of instruction in the majority of primary and secondary schools, as well as in the humanities courses in colleges.

Data were collected in Nabadwip, District Nadia, West Bengal, about 100 km north of Calcutta. A well-known centre of Bengali literary and religious culture for several centuries, Nabadwip had the further advantage of being removed from the multilingual atmosphere (Bengali, English, Hindi) of Calcutta. Boys, aged 14 to 17, attending Classes IX, X and XI in high school, served as the subjects; one hundred boys for step (ii) and two hundred boys for step (v).

Prior to printing the booklets for steps (ii) and (v), the instructions were translated from English to Bengali, and scales for step (v) were randomly ordered, in terms of serial order as well as right and left side. The original English instructions for step (ii) were:

"We want to find out what adjectives seem to go best with certain nouns. For example, if you were given the noun BUTTERFLY, you might think of the adjective "pretty" or perhaps "quick." You would then write down this adjective next to the noun BUTTERFLY. All the words you write down should be *adjectives*: that is, some word which modifies a noun in some way. If you have difficulty thinking of adjectives, you might try putting the noun in a simple sentence such as:

"A BUTTERFLY is ————————."

or

"The ———————— BUTTERFLY."

On the pages that follow, you will find lists of nouns, each one followed by a blank, for example, BUTTERFLY ————————. Go down the list

in order, giving for each noun the first adjective that occurs to you. Please work rapidly without puzzling over particular items, and PLEASE WRITE CLEARLY.

PLEASE WRITE YOUR NAME, AGE AND SEX AT THE TOP OF THE FORM.*

The original English instructions for step (v) were as follows :

" This experiment is a part of an extensive research programme which is being carried out in a large number of countries around the world. The purpose of this research is to determine what attitudes various people have toward certain words. This is not a test of any kind ; all we want is some indication of your personal feelings about a few very ordinary words. In order to make it possible to express these feelings, we ask you to simply put some check-marks in one or another space between two adjectives. If you will open your booklets you will see that each page consists of a single word at the top of the page with a number of adjectives with spaces between them below that word. The word that you will be judging is the word at the top of the page. You will judge what the word means to you by placing a check-mark on one of the spaces for each of the lines below that word.

Let's take a particular example. Suppose that the first page of your booklet had the word " ICE " at the top of the page and had the following lines beneath it.

ICE

pleasant ——— : ——— : ——— : ——— : ——— : ——— : ✓ unpleasant

dangerous ✓ : ——— : ——— : ——— : ——— : ——— : ——— safe

everlasting ——— : ——— : ✓ : ——— : ——— : ——— : ——— momentary

etc.

You would indicate for each line how closely in your opinion the example word, ' ICE," was related to one of the sides of each of the pairs of opposites. The closer you put your check-mark to one or the other of the opposites on a line, the closer you would think that "ICE," in this example, was related to that adjective. For instance, if you felt that ICE was *very unpleasant*, then you would put your check-mark in the space right beside the word *unpleasant*. On the next line, if you thought that ICE was *very dangerous* you would place your check-mark right beside *dangerous*. And you would continue on down the page in this way judging on each line how closely the word ICE was related or made you think of the adjectives printed on either side of the spaces. It would be very unusual if you felt that every word you will judge was always very closely related to the adjectives, and this is why we give you a choice between the spaces on a line. The rule is:

the more closely you think the word at the top of the page is related to one adjective or its opposite on the line, the closer you would put your check-mark to the adjective you had chosen. If you put your check-mark in the middle space between the adjective and its opposite you would be indicating that the word at the top of the page is *equally related* to both of these adjectives on that line. To help you remember what the spaces mean, we will use the adjectives *fast-slow* and label each of the spaces.

very fast	quite fast	slightly fast	equally fast and slow	slightly slow	quite slow	very slow

fast —— : —— : ——— : ——— : ——— : ——— : ——— slow

Using this rule you could then indicate, for example, that you might feel that ICE was *slightly everlasting* by putting your check-mark on the line as follows :

ICE

everlasting —— : —— : ✓ : —— : —— : —— : —— momentary

Not all of the adjectives you will have will be this easy. For some of the words it may be hard to see how the words are related at all, but we have found that it will go quite easily if you go as rapidly as possible without being careless, using your first impression without thinking very long about any one item.

Never put more than one check-mark on any one line and don't omit any of the lines.

Remember to work quickly but, of course, not carelessly. If you have any questions, please raise your hand and we will be glad to help you. Are there any questions now?

Please put your name, age and sex at the top of the booklet, and then begin."

One class period of 50 minutes was allocated for collecting data in step (ii) and also in step (v). In both steps, booklets were administered to students in groups of 15 or less. Instructions were explained orally, after which every effort was made to ensure that the students understood the task.

The data for step (ii) consisted of 10,000 responses (100 subjects x 100 stimuli). The responses to each stimulus were alphabetically ordered and the frequency (across students) obtained after which the data were statistically analyzed at the Centre for Comparative Psycholinguistics. For step (v), the data consisted of 100,000 ratings (50 scales x 10 concepts/subject x 20 subjects/group x 10 concept

groups). After tabulation, these data were also sent to the Centre for Comparative Psycholinguistics for factor analysis.

Results

Elicitation of qualifiers by the restricted word association task yielded 937 different qualifiers. The number of qualifiers elicited in the other languages ranged from 304 (Japanese) to 2508 (Cantonese), with a mean of 1221. The number of Bengali qualifiers is similar to the number obtained for the Finnish (1072), Thai (1022), Turkish (1013) and Swedish (936) languages (8).

The full-scale instrument for the Bengali language is given in Figure 1. The fifty Bengali scales or adjectival pairs are presented in both Bengali and Roman type, along with their English translation. There are 98 different Bengali words in the fifty scales shown in Figure 1. Of these 98 words, 61 are direct Sanskrit borrowings, 18 are modified Sanskrit words, 11 are from Farsi or Arabic, 4 are from the original Bengali vernacular, and 4 combine words from two different etymological sources (1, 2).

Twelve of the fifty scales in Figure 1 comprise the pan-cultural factor scales for the Bengali language. These scales are shown in Figure 2, along with the graphic rating proforma with seven steps for each bipolar or adjectival pair. In this proforma, which was used for step (v) of this research, the steps are assigned numerical values '1' to '7' from left to right, with '4' occupying the middle position. (It is also possible to assign numbers from—3 through 0 to + 3 from left to right).

The ratings of 100 stimuli on 50 qualifiers were subjected to factor analysis by the principal factor solution, with unities in the diagonal. The resulting factors underwent an orthogonal varimax rotation (4). Table I gives the unrotated orthogonal principal factor loadings, and Table II presents the orthogonal loadings after varimax rotation. Table II describes that portion of the Bengali meaning system which is concerned with qualification of stimuli, i. e., nouns or concepts.

TABLE 1

Unrotated Orthogonal Loadings Obtained by Principal Factor Solution Part A : Scales 1 to 25

SCALE	FACTOR					
	I	II	III	IV	V	VI
1. slow-fast	—.39	.51	—.11	—.23	.38	—.33
2. high-low	—.46	—.39	—.06	—.21	—.09	—.49
3. open-shut	—.31	—.37	.33	.42	—.02	—.15
4. dull-bright	.82	.23	—.08	.02	.18	.03
5. finest-poorest	—.96	.01	—.07	—.01	.00	.04

FIGURE 1

Bengali Indigenous Scales

Sl. No.	Left Pole			Right Pole		
	English Translation	Bengali Qualifier		Bengali Qualifier		English Translation
		Roman Script	Bengali Script	Bengali Script	Roman Script	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	slow	dhiir	ধীর	দ্রুত	drut	fast
2.	high	uncu	উঁচু	নিচু	nicu	low
3.	open	kholaa	খোলা	বন্ধ	bandh	shut
4.	dull	anujjval	অনুজ্জ্বল	উজ্জ্বল	ujjval	bright
5.	finest	uttam	উত্তম	অধম	adhani	poorest
6.	unknown	akhyaat	অখ্যাত	বিখ্যাত	bikhyaat	wellknown
7.	yielding	naram	নরম	কড়া	karraa	unyielding
8.	good	bhaal	ভাল	খারাপ	khaaraap	bad
9.	red	laal	লাল	নীল	niil	blue
10.	good	bhaal	ভাল	মন্দ	mand	evil
11	many	anek	অনেক	অল্প	alp	few
12.	white	saadaa	সাদা	কাল	kaal	black
13.	old	puraan	পুরান	নোতুন	notun	new
14.	quiet	shaant	শান্ত	দুর্দান্ত	durdaant	restless
15.	raw	kaancaa	কাঁচা	পাকা	pakaa	ripe
16.	dishonest	asat	অসৎ	সৎ	sat	honest
17.	powerless	durbal	দুর্বল	প্রবল	prabal	powerful

FIGURE 1

Bengali Indigenous Scales

Sl. No.	Left Pole			Right Pole		
	English Translation	Bengali Qualifier		Bengali Qualifier		English Translation
		Roman Script	Bengali Script	Bengali Script	Roman Script	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
18.	many	anek	অনেক	এক	ek	one
19.	pliable	komal	কোমল	কঠিন	katthin	hard
20.	faded	bibarnd	বিবর্ণ	রঙ্গিন	ranggin	colored
21.	much	beshi	বেশি	একটু	ekattu	little
22.	hard	katthin	কঠিন	সহজ	sahaj	easy
23.	blunt	bhontaa	ভোঁতা	তীক্ষ	tiiksnd	sharp
24.	viscous	ghan	ঘন	পাতলা	paatalaa	nonviscous
25.	intact	aast	আস্ত	ছেঁড়া	chenrraa	torn
26.	best	seraa	সেরা	নিকৃষ্ট	nikrisstt	worst
27.	cheerful	haasikhushii	হাসিখুশী	গম্ভীর	gambhiir	cheerless
28.	short	bentte	বেঁটে	লম্বা	lamvaa	long
29.	kind	dayaalu	দয়ালু	নির্দয়	nirday	cruel
30.	light	haalakaa	হালকা	ভারী	bhaarii	heavy
31.	homely	bishrii	বিশ্রী	চমৎকার	camatkaar	lovely
32.	big	barr	বড়	ছোট	chott	small
33.	scarce	kam	কম	মেলা	melaa	numerous
34.	ugly	kutsit	কুৎসিত	সুন্দর	sundar	beautiful

FIGURE 1

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Sl. No.	Left Pole			Right Pole		
	English Translation	Bengali Qualifier		Bengali Qualifier		English Translation
		Roman Script	Bengali Script	Bengali Script	Roman Script	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
35.	weak	kamajor	কমজোর	জোর	jor	strong
36.	unpleasant	duhkhakar	দুঃখকর	সুখকর	sukhakar	pleasant
37.	foreign	bideshiiy	বিদেশীয়	দেশীয়	deshiiy	local
38.	shallow	agabhiir	অগভীর	গভীর	gabhiir	deep
39.	thin	saru	সরু	মোটা	mottaa	fat
40.	depressed	abanat	অবনত	উন্নত	unnat	elevated
41	minute	ksudr	ক্ষুদ্র	বিশাল	bishaal	huge
42.	free	mukt	মুক্ত	বদ্ধ	baddh	fettered
43.	uncertain	anishcit	অনিশ্চিত	ধ্রুব	dhrub	certain
44.	mild	mridu	মৃদু	তীব্র	tiibr	intense
45.	active	analas	অনলস	অলস	alas	lazy
46.	cold	thaandddaa	ঠাণ্ডা	গরম	garam	warm
47.	aged	prabiind	প্রবীণ	নবীন	nabiin	young
48.	dead	mrit	মৃত	জীবিত	jiibit	alive
49.	ordinary	saadhaarand	সাধারণ	অদ্ভুত	adbhut	extraordinary
50.	curled	konkarraan	কোঁকড়ান	সোজা	sojaa	uncurled

FIGURE 2

Bengali Pan-Cultural Scales

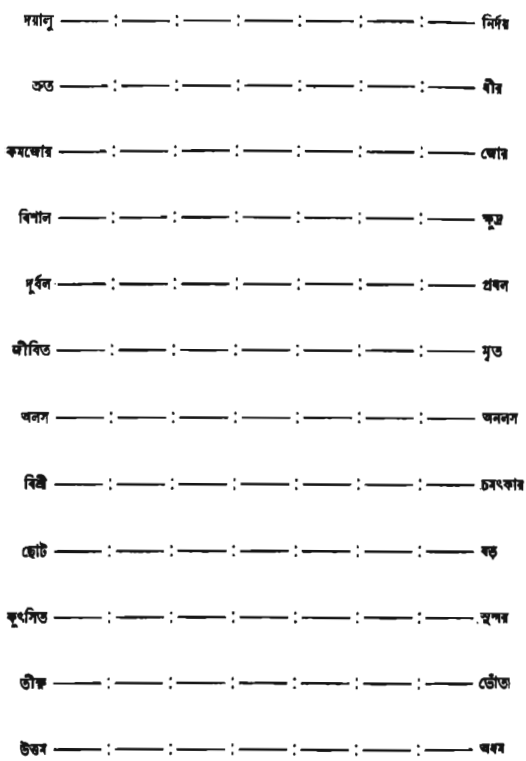

TABLE 1—(*contd*).

Unrotated Orthogonal Loadings Obtained by Principal Factor Solution Part A: Scales 1 to 25

SCALE	FACTOR					
	I	II	III	IV	V	VI
6. unknown-well known	.92	.10	.10	.09	—.02	—.07
7. yielding-unyielding	—.57	.58	.27	.23	—.10	.05
8. good-bad	—.95	.03	—.13	—.02	.01	.04
9. red-blue	—.28	—.20	—.12	—.39	—.45	.14
10. good-evil	—.95	.01	—.13	—.01	.07	.01
11. many—few	—.25	—.11	—.76	.41	—.14	.13
12. white-black	—.65	—.04	—.18	—.22	—.18	.16
13. old-new	.23	—.10	—.09	.00	.50	.50
14. quiet-restless	—.73	.47	.02	—.04	.27	—.17
15. raw-ripe	—.02	.45	.04	.19	.20	.31
16. dishonest-honest	.92	.07	—.09	.02	—.14	.01
17. powerless-powerful	.17	.84	—.10	—.12	.08	—.01
18. many-one	.15	—.00	—.69	.55	—.12	.12
19. pliable-hard	—.61	.54	.32	.28	—.10	.02
20. faded-colored	.36	.02	.42	.23	.25	.07
21. much-little	—.08	—.17	—.66	.50	—.12	.01
22. hard-easy	.39	—.56	—.34	—.30	.15	—.04
23. blunt-sharp	—.05	.62	—.38	—.06	.30	—.10
24. viscous-nonviscous	—.07	—.23	—.56	—.26	.14	—.23
25. intact-torn	—.54	.08	—.33	—.37	.12	.09

TABLE 1—(*contd*)

Unrotated Orthogonal Loadings Obtained by Principal Factor Solution Part B : Scales 26 to 50

SCALE	FACTOR					
	I	II	III	IV	V	VI
26. best-worst	—.90	—.07	—.16	—.13	.00	.03
27. cheerful-cheerless	—.86	.11	.15	.08	—.15	—.08
28. short-long	.16	.36	—.06	—.49	—.30	.02
29. kind-cruel	—.93	.11	.13	.00	.12	—.03
30. light-heavy	—.23	.29	.29	.27	—.49	—.04
31. homely-lovely	.96	—.04	.08	—.00	.01	—.04
32. big-small	—.33	—.55	.03	.17	41	—.22
33. scarce-numerous	.06	.13	.76	—.49	.08	—.11
34. ugly-beautiful	.97	—.04	.10	.01	.08	.00
35. weak-strong	.25	.76	.01	.05	—.13	—.19
36. unpleasant-pleasant	.95	—.01	.10	.01	.03	—.01
37. foreign-local	.53	—.04	.04	—.12	—.19	—.27
38. shallow-deep	.11	.44	—.36	—.28	—.23	.25
39. thin-fat	.03	.15	.40	.44	—.22	—.11
40. depressed-elevated	.92	.21	.03	.09	.05	.05
41. minute-huge	.38	.64	—.05	—.23	—.36	.23
42. free-fettered	—.44	—.45	.30	.29	.00	.05
43. uncertain-certain	.57	.04	—.03	.26	—.09	—.12
44. mild-intense	—.32	.69	—.07	.12	.07	—.09
45. active-lazy	—.31	—.52	.42	.04	.12	.40
46. cold-warm	—.42	.42	.08	.41	.40	—.03
47. aged-young	.14	—.08	.19	—.18	.59	.35
48. dead-alive	.52	.29	—.33	.06	.20	—.27
49. ordinary-extraordinary	—.26	.49	.03	.03	.04	.27
50. curled-uncurled	.55	.07	—.10	.24	.06	—.08
Characteristic Root	16.30	6.48	4.27	3.13	2.51	1.69

TABLE 2
Orthogonal Loadings Obtained by Varimax Rotation Part A : Scales 1 to 25

SCALE	FACTOR					
	I′	II′	III′	IV′	V′	Communality
1. slow-fast	—.39	.73	.19	—.03	—.07	.73
2. high-low	—.44	—.03	.09	—.30	.31	.66
3. open-shut	—.17	—.24	—.02	.26	.61	.55
4. dull-bright	.79	.21	—.00	—.10	—.21	.76
5. finest-poorest	—.94	.04	—.08	.13	.13	.93
6. unknown-well known	.93	.03	.07	.00	—.12	.88
7. yielding-unyielding	—.48	.27	.07	.69	—.08	.79
8. good-bad	—.94	.08	—.12	.10	.09	.92
9. red-blue	—.39	—.39	.02	—.18	—.33	.51
10. good-evil	—.94	.10	—.11	.07	.15	.93
11. many-few	—.25	.01	—.89	—.10	—.01	.86
12. white-black	—.71	—.13	—.09	—.05	—.17	.56
13. old-new	.16	—.04	—.05	—.23	.03	.58
14. quiet-restless	—.69	.55	.12	.24	.05	.86
15. raw-ripe	—.01	.24	—.06	.33	—.16	.38
16. dishonest-honest	.88	—.05	—.08	—.10	—.28	.88
17. powerless-powerful	.14	.61	.08	.25	—.53	.77
18. many-one	.18	.06	—.89	—.00	—.04	.84
19. pliable-hard	—.49	.24	.08	.73	—.01	.85
20. faded-colored	.43	—.01	.23	.22	.25	.42
21. much-little	—.05	.01	—.84	—.08	.12	.74
22. hard-easy	.28	—.21	—.08	—.75	.07	.69
23. blunt-sharp	—.08	.70	—.14	—.02	—.29	.63
24. viscous-nonviscous	—.15	.17	—.24	—.61	—.00	.51
25. intact-torn	—.64	.16	—.03	—.28	—.21	.57

TABLE 2—(*contd*)

Orthogonal Loadings Obtained by Varimax Rotation Part B : Scales 26 to 50

SCALE	FACTOR I′	II′	III′	IV′	V′	Communality
26. best-worst	—.91	.02	—.08	—.04	.07	.85
27. cheerful-cheerless	—.79	.03	.04	.36	.13	.80
28. short-long	.05	.07	.22	—.06	—.63	.49
29. kind-cruel	—.89	.15	.10	.24	.20	.92
30. light-heavy	—.13	—.10	—.01	.64	—.11	.53
31. homely-lovely	.94	—.07	.10	—.15	—.10	.94
32. big-small	—.26	—.03	—.02	—.27	.71	.65
33. scarce-numerous	.05	—.03	.92	.11	—.04	.86
34. ugly-beautiful	.95	—.06	.12	—.15	—.08	.95
35. weak-strong	.28	.51	.05	.40	—.42	.70
36. unpleasant-pleasant	.93	—.06	.11	—.12	—.11	.92
37. foreign-local	.52	—.03	.12	—.13	—.11	.41
38. shallow-deep	—.02	.12	—.15	—.03	—.69	.52
39. thin-fat	.17	—.05	.04	.59	.19	.44
40. depressed-elevated	.90	.09	.01	.01	—.22	.90
41. minute-huge	.29	.12	.06	.24	—.79	.78
42. free-fettered	—.35	—.36	.01	.17	.54	.57
43. uncertain-certain	.62	.03	—.16	.08	.00	.42
44. mild-intense	—.28	.57	—.05	.40	—.21	.62
45. active-lazy	—.30	—.69	.17	.11	.27	.72
46. cold-warm	—.31	.51	—.09	.43	.28	.69
47. aged-young	.07	.02	.31	—.22	.12	.56
48. dead-alive	.51	.49	—.18	—.17	—.12	.58
49. ordinary-extraordinary	—.27	.21	—.00	.35	—.28	.39
50. curled-uncurled	.59	.12	—.18	.01	.02	.39

Table 3 gives scale coefficients to obtain weighted factor score estimates for both the first three unrotated and the first three rotated orthogonal principal factors (3). Following the short method outlined by Thomson (15), an intermediary set of regression coefficients has been obtained. These coefficients have been transformed so that the resulting factor score estimates have a maximum value of + 3 and a minimum value of —3. Zero corresponds to the middle position on the seven point scale. The procedure for using the Table III values is as follows :

TABLE 3

Scale Coefficients for Estimating Factor Scores Part A : Scales 1 to 25

SCALE	COEFFICIENTS					
	PRINCIPAL FACTOR SOLUTION			VARIMAX ROTATION		
	I	II	III	I′	II′	III′
1. slow-fast	—.0037	.0336	—.0073	—.0049	.1148	.0092
2. high-low	—.0048	—.0223	—.0041	—.0059	—.0021	.0041
3. open-shut	—.0029	—.0211	.0248	—.0019	—.0186	—.0007
4. dull-bright	.0203	.0117	—.0051	.0222	.0159	—.0002
5. finest-poorest	—.1015	.0003	—.0045	—.0884	.0032	—.0037
6. unknown-well known	.0491	.0049	.0070	.0707	.0021	.0031
7. yielding-unyielding	—.0069	.0420	.0193	—.0067	.0211	.0031
8. good-bad	—.0812	.0013	—.0087	—.0875	.0056	—.0054
9. red-blue	—.0026	—.0099	—.0084	—.0049	—.0339	.0008
10. good-evil	—.0828	.0004	—.0085	—.0820	.0078	—.0049
11. many-few	—.0022	—.0053	—.1234	—.0028	.0006	—.1916
12. white-black	—.0092	—.0020	—.0126	—.0152	—.0096	—.0041
13. old-new	.0020	—.0048	—.0060	.0017	—.0031	—.0025
14. quiet-restless	—.0131	.0289	.0016	—.0143	.0580	.0057
15. raw-ripe	—.0001	.0273	.0026	—.0001	.0185	—.0028
16. dishonest-honest	.0492	.0034	—.0064	.0437	—.0035	—.0036
17. powerless-powerful	.0015	.1387	—.0066	.0016	.0721	.0037

TABLE 3—(*contd.*)

Scale Coefficients for Estimating Factor Scores Part A: Scales 1 to 25

	SCALE	COEFFICIENTS					
		PRINCIPAL FACTOR SOLUTION			VARIMAX ROTATION		
		I′	II′	III′	I′	II′	III′
18.	many-one	.0013	—.0001	—.0890	.0020	.0044	—.2033
19.	pliable-hard	—.0079	.0370	.0240	—.0070	.0190	.0037
20.	faded-colored	.0034	.0008	.0339	.0056	—.0008	.0108
21.	much-little	—.0007	—.0084	—.0799	—.0005	.0006	—.1334
22.	hard-easy	.0037	—.0395	—.0258	.0032	—.0162	—.0035
23.	blunt-sharp	—.0004	.0483	—.0294	—.0009	.1023	—.0064
24.	viscous-nonviscous	—.0006	—.0119	—.0546	—.0017	.0127	—.0114
25.	intact-torn	—.0063	.0039	—.0248	—.0117	.0121	—.0015
	Part B: Scales 26 to 50						
26.	best-worst	—.0375	—.0032	—.0109	—.0587	.0014	—.0037
27.	cheerful-cheerless	.0263	.0053	.0105	—.0221	.0024	.0017
28.	short-long	—.0014	.0199	—.0038	.0006	.0048	.0108
29.	kind-cruel	—.0612	.0056	.0091	—.0445	.0115	.0048
30.	light-heavy	.0020	.0152	.0210	—.0014	—.0072	—.0003
31.	homely-lovely	—.1078	—.0021	.0056	.0916	—.0048	.0046
32.	big-small	.0030	—.0378	.0020	—.0030	—.0022	—.0011
33.	scarce-numerous	.0005	.0062	.1213	.0005	—.0022	.2655
34.	ugly-beautiful	.1197	—.0021	.0070	.0954	—.0041	.0053
35.	weak-strong	.0022	.0884	.0009	.0033	.0512	.0021
36.	unpleasant-pleasant	.0860	—.0006	.0071	.0799	—.0040	.0051
37.	foreign-local	.0061	—.0019	.0028	.0078	—.0020	.0056
38.	shallow-deep	.0009	.0262	—.0275	—.0002	.0092	—.0070
39.	thin-fat	.0003	.0074	.0321	.0019	—.0037	.0017

TABLE 3—(*contd.*)

Scale Coefficients for Estimating Factor Scores Part B: Scales 26 to 50

SCALE	COEFFICIENTS					
	PRINCIPAL FACTOR SOLUTION			VARIMAX ROTATION		
	I′	II′	III′	I′	II′	III′
40. depressed-elevated	.0468	.0106	.0020	.0521	.0066	.0006
41. minute-huge	.0036	.0519	—.0034	.0035	.0085	.0028
42. free-fettered	—.0045	—.0272	.0222	—.0043	—.0306	.0004
43. uncertain-certain	.0069	.0022	—.0019	.0107	.0022	—.0074
44. mild-intense	—.0030	.0653	—.0045	—.0033	.0625	—.0024
45. active-lazy	—.0029	—.0341	.0339	—.0036	—.0963	.0080
46. cold-warm	—.0042	.0248	.0055	—.0037	.0506	—.0041
47. aged-young	.0012	—.0040	.0133	.0008	.0012	.0154
48. dead-alive	.0058	.0154	—.0250	.0075	.0473	—.0083
49. ordinary-extraordinary	—.0023	.0318	.0017	—.0032	.0163	—.0002
50. curled-uncurled	.0066	.0033	—.0065	.0096	.0087	—.0082

(*a*) score a subject's responses on a scale from '1' (extreme left) to '7' (extreme right) according to the graphic rating, on all scales for all stimuli. There will be one score for each bipolar or adjectival scale.

(*b*) for any one factor and stimulus, compute the weighted scores for a subject. The weighted score for a scale with a positive coefficient is obtained by multiplying the scored response [step (a)] by the corresponding scale coefficient (Table III). Since a negative coefficient indicates that the polarity of the adjectival pair is reversed on the particular factor, the deviation of the scored response from the maximum possible response is used for computing the weighted score. For a scale with a negative coefficient, subtract the scored response [step (a)] from '7' (maximum possible response) and multiply the result by the corresponding scale coefficient (Table III).

(c) add the weighted scores of scales with positive and negative coefficients, treating all weighted scores as positive. This gives

the absolute sum of weighted scores for a subject. Subtract '4' from this absolute sum to get a factor estimate ranging from '−3' to '+3'. Completion of this step yields one subject's factor score estimate for one stimulus (noun or concept).

(*d*) Repeat steps (b) and (c) for each stimulus. Treating the responses to different stimuli as replications for estimating factors, compute the mean and standard deviation.

(*e*) Carry out steps (b), (c) and (d) for each factor of interest.

Table 4 illustrates factor score estimates for one subject computed using the scale coefficients given in Table III. The estimates are given separately by concept and factor, and their means and standard deviations, over concepts, are shown for each factor.

TABLE 4

Factor Score Estimates for One Subject

CONCEPT	FACTOR					
	I	II	III	I′	II′	III′
1. House	0.40	0.15	0.34	0.39	−0.54	0.67
2. Girl	0.73	−0.54	−0.50	1.21	−0.37	−0.36
3. Picture	0.70	−0.67	−0.42	1.03	−0.92	−0.34
4. Meat	0.37	−0.80	−0.47	0.68	−0.77	−0.53
5. Trust	0.36	−0.44	−0.04	0.67	−0.72	0.21
6. Tooth	0.46	−0.21	0.06	0.72	−0.24	0.19
7. Defeat	−1.60	0.78	−1.22	−1.87	0.93	−1.20
8. Book	0.89	−0.80	0.17	1.38	−0.89	0.64
9. Lake	0.51	−0.24	0.38	1.01	−0.88	0.24
10. Star	1.11	1.60	0.42	1.63	1.15	0.74
Mean	0.39	−0.12	−0.13	0.68	−0.32	0.03
Standard Deviation	0.74	0.77	0.52	0.97	0.76	0.62

Unit factor score estimates can be obtained by adding up ratings on selected scales. For rotated orthogonal factors, the top four scales per factor are listed below, along with their Figure 1 serial numbers. It should be noted that the right-left order of some adjectival pairs has been reversed so that scale ratings can be added.

I′		II′	
34	ugly-beautiful	1	slow-fast
31	homely-lovely	23	blunt-sharp
5	poorest-finest	45	lazy-active
8	bad-good	17	powerless-powerful

III′		IV′	
33	scarce-numerous	22	easy-hard
18	one-many	19	pliable-hard
11	few-many	7	yielding-unyielding
21	little-much	30	light-heavy

V′	
41	minute-huge
32	small-big
38	shallow-deep
28	short-long

Table 5 gives the loadings of the twelve pan-cultural scales on the three pan-cultural factors. To obtain unit pan-cultural factor score estimates, add ratings on scales 1 to 4 for the first factor, on scales 5 to 8 for the second factor, and 9 to 12 for the third factor. The serial order and right-left position of the scales had been randomized to control effects of response set on the ratings. In scoring, care is to be taken that the right-left position of the qualifiers is consistent with the nature of the factor.

TABLE 5

Bengali Pan-Cultural Scales and their Evaluation (E), Potency (P) and Activity (A) Factor Loadings

SCALE	FACTOR LOADING		
	E	P	A
1. homely-lovely (31)*	.93	—.04	—.04
2. ugly-beautiful (34)	.93	—.06	.03
3. finest-poorest (5)	—.91	.01	—.12
4. kind-cruel (29)	—.91	—.02	—.03
5. minute-huge (41)	.28	.62	.20
6. powerless-powerful (17)	.09	.60	—.11
7. big-small (32)	—.28	—.55	—.23
8. weak-strong (35)	.16	.54	.00
9. blunt-sharp (23)	—.09	.51	—.49
10. dead-alive (48)	.50	.27	—.47
11. slow-fast (1)	—.40	.27	—.43
12. activo-lazy (45)	—.24	—.44	.43

* Numbers in parentheses refer to scale serial numbers in Figure 1.

Discussion

The interpretation of the indigenous factor analysis reported in Table 2 is basic to an understanding of the Bengali meaning system. Factor I′ contrasts *good, finest, lovely* and *beautiful*, with *bad, poorest, homely* and *ugly*. It provides a summary statement of the value and usefulness of a concept, noun, or stimulus to the individual. In factor II′ *slow, blunt, lazy* and *powerless* are opposed to *fast, sharp, active* and *powerful*. This factor is concerned with the dynamic aspects of the stimulus being qualified. Factors III′, IV′ and V′ deal respectively with the quantity, consistency or quality, and size of the stimulus. Among the highest loading scales are *few-many* on factor III′, *pliable-hard* on factor IV′, and *minute-huge* on Factor V′. The most parsimonious interpretation of these factors is that they reflect the dynamic and static aspects of the environment relevant for human communication. First and foremost is the usefulness and value of a stimulus, *good* as opposed to *bad*: Factor I′. Second the characterization of the stimulus in terms of its dynamic properties, as in *fast* vs. *slow, powerful* vs. *powerless*: Factor II′. Further characterization of stimuli in terms of certain static attributes is provided by Factors III′, IV and V′. These five factors operationally define and quantify the dimensions of the Bengali meaning system.

Not only the indigenous factors, but also the pan-cultural factors can assist in understanding the Bengali meaning system. The importance of the pan-cultural factors lies in their consistency across a large number of languages, and that the Bengali qualifiers appearing on these factors are covarying in a meaningful manner with qualifiers in other languages. Figure 2 and Table V give the pan-cultural factor scales. The loadings of these scales on the three pan-cultural factors show that the first deals with evaluation (E), the second with potency (P), and the third with activity (A) (5, 12). The first pan-cultural factor is similar in nature to indigenous Factor I′, hence, an evaluative statement of the value and usefulness of a stimulus. The second and third pan-cultural factors are merged in indigenous Factor II′. They represent two different aspects of the dynamism of stimuli, potency or force (both animate and inanimate) and activity or motion (both animate and inanimate). This interpretation is compatible with, but not identical to, the interpretation of Osgood and his coworkers (5, 12).

The methodology adopted for this research has yielded the most frequent, diverse, and independent qualifiers for a standard set of stimuli. According to the hypothesis that the most frequent words are those which are most needed (6), these qualifiers should have utilitarian value and usefulness. The hypothesis finds a test in the indigenous factors reported in Table II. These factors, which parsimoniously describe the variation and covariation among the qualifiers, are interpreted in terms of the meanings of the qualifiers having large factor loadings. The factors have already been interpreted as I′, usefulness and value; II′, dynamic attributes; III′, quantity; IV′, quality; and V′, size. For the purpose of communication between individuals about

environmental stimuli (objects, events, etc.), Factor I' provides an efficient statement of the value of the stimuli, and the remaining factors characterize the dynamic and static attributes of the stimuli. It may be concluded that these factors support the hypothesis that the usefulness and value of words is reflected by their frequency of occurrence. Furthermore, the attributes of the environment characterized by semantic differential measurement of the meaning system are those which are important or relevant for existence in the culture in which the language has evolved (6). The utilitarian character of size, quality, quantity, strength and activity in describing objects and events is self-evident. Thus, in addition to the construction of instruments for measuring these factors (*viz.*, "the Bengali semantic differential") this research on the Bengali meaning system has also provided evidence for a linguistic hypothesis that is relevant for psychological studies of language.

In conclusion, this research has identified a set of adjectival scales which can be used to locate stimuli (concepts, nouns) in the meaning system of the Bengali language. They can also be used to measure individual judgments of the location of stimuli in the meaning system, as well as individual differences in the expression of the dimensions of meaning (3). The Bengali meaning system has been shown to include a dimension of usefulness and value, and dimensions describing the dynamic and the static attributes of stimuli in the environment. By means of these dimensions, socially useful information about the environment can be communicated for the conduct of affairs in many spheres of human activity.

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