The personality trait structure in Hindi replicated

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We replicated an earlier psycho-lexical study of personality traits in Hindi. The previous study gave results that deviated from the mainstream of lexical studies. This time an extended list of 357 trait descriptors was administered to 1,250 participants. Half of them provided self-ratings and the other half provided peer-ratings on these same participants. Principal Components Analyses were performed on the combined self- and peer-ratings, both with raw data and with ipsatized data. The resulting trait-structure was strongly evaluative in character, with the ancient personality system, the so-called triguna, seemingly largely determining its content. That structure, built on the three concepts rajasic, representing ambition and friendliness, tamasic, representing egoism and concealment, and sattvic, representing competence and harmony, was identified using triguna marker scales. It is unclear, however, whether it is the triguna that defines the structure, or whether it is mainly information of moral and evaluative character. Although the factors explained the variance in Big Five markers pretty well, the Big Five did not emerge as distinct factors.

Keywords: personality scales, inventories, traits, trait structure, lexical approach, replication

A first psycho-lexically based study of personality traits in Hindi (Singh, Misra, & De Raad, 2013) provided a structure that belongs to the most deviating ones in the history of the psycho-lexical approach. In that structure, with six factors, the first three and largest factors seemed to reflect the distinctions of an ancient typology that is still alive today, the so-called *triguna*. The *triguna* historically comprises *sattvic guna* (goodness, harmony, purity), *rajasic guna* (passion, mobility, energy), and *tamasic guna* (dullness, indifference, inertia). The second three smaller factors reminisced of the Big Five Extraversion, Agreeableness, and Conscientiousness. Given the history of the psycho-lexical approach most often producing five- or six-factorial structures reflecting the Big Five or the HEXACO structure, a study with such different results is clearly in need of replication. The present paper aims to do that.

The previous study did not really differ in terms of sample, procedure, and analyses from other studies in the psycho-lexical field. The most striking difference was possibly in the number of trait descriptors used to obtain ratings. That number was 295, which is on the low side compared to most other studies in the lexical field, although studies in Polish and in Italian used smaller numbers of trait terms, with 287 and 285 terms, respectively (Szarota, 1996; Caprara & Perugini, 1994). For the present study, a somewhat larger selection of trait-descriptive adjectives was used.

While the Big Five and related psycho-lexically based models have gained great support especially in Europe and in the US, doubt has been expressed as regards the cross-cultural replicability of the five factors, especially outside this geographical and cultural region of the world. Even comparisons of Big Five structures from American-European countries have casted doubt on the replicability of all of the Big Five factors. Using congruence coefficients as criteria of factor similarity, it was found that three, or at best four, factors of the Big Five are cross-lingually replicable (e.g., Hofstee, Kiers, De Raad, Goldberg, & Ostendorf, 1997; De Raad, Perugini, & Szirmák, 1997; De Raad, Perugini, Hřebíčková, & Szarota, 1998). A more recent study comparing 14 trait-taxonomies, including Philipino, confirmed the suggestion of replicability of a structure with three factors (De Raad, Barelds, Levert, et al., 2010). Those three factors are mainly characterized by trait-terms typical of Extraversion, Agreeableness, and Conscientiousness. The appearance of factors reflecting cultural specifics can be found in, for example, Valchev (2012) and Zeinoun (2016).

What is most striking about studies that deviate from the Big Five structure is that particularly the vast domain of Agreeableness splits into sub-clusters that sometimes can be represented into additional Agreeableness-related factors, often with evaluative or moralistic overtones, such as Honesty-Humility (Ashton et al., 2004), Concern for others (Church, Katigback, & Reyes, 1998), both presented to convey more content than evaluation, or factors with an explicit emphasis on evaluative or morality characteristics (e.g., Almagor, Tellegen, & Waller, 1995).

The six-factor structure in Hindi might also be understood as representing, on the one hand, the pan-cultural three (De Raad, Barelds, Timmerman, et al., 2014), typically identified by Extraversion, Agreeableness, and Conscientiousness terms, respectively, and, on the other hand, the structure might reflect a system for evaluating behavior that is strongly influenced by the traditional *triguna* phi-

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losophy. *Triguna* traits can well be understood as attributes of character (e.g., Chakraborty, 1985), thus emphasizing moral features and relating to ethics of virtue.

The *triguna*

The *triguna* is one of the most extensively studied indigenous personality constructs in post-colonial India (e.g., Asthana, 1950; Edgerton, 1965; Frawley, 2006; Gambhirananda, 1995; Halbfass, 1992; Krishnan, 2002; Murthy & Kumar, 2007; Rao & Paranjape, 2016; Suneetha & Srikrishna, 2009). The origin of the *triguna* is in texts of ancient India (Vedas, Upanishads, Mahabharata, Bhagavad-Gita, and the Samkhyan texts), initially documented in Sanskrit during 1500-200 BC, and translated into English during the colonial period. In the post-colonial period, spanning nearly seven decades, the *triguna* has become understood as the proper construct to describe personality in the Indian cultural context.

The Sanskrit word *triguna* combines *tri* and *guna*, referring to three mental attributes of the individual (*guna* means 'cord', 'string', or 'thread'). *Guna* has been discussed elaborately in the Samkhya School of philosophy where it was conceptualized at different levels of abstraction and different manifestations of reality. The personality relevant conceptualization, in this respect, is what is called *prakriti* (human nature), comprising physical, psychological, and ethical features, and constituted of the three *gunas*. In a broad sense, *sattvic guna* is seen as the spiritual quality, and when *sattvic guna* is dominant in a person, that person is seen as inherently desiring to be good and caring. *Rajasic guna* is seen as the active quality, and when dominant, giving rise to passion and desire. *Tamasic guna* is seen as the material quality, related to hopes and illusions (Srivastava, 2012).

The ancient text of the Bhagavad-Gita presents the most elaborate and extensive description of *triguna*, its qualifying attributes, and its reflection in the personality of individual, highlighting its meaning, its constituents, its nature, and also the characteristic behavioural patterns seen in a person who is dominated by any of the three *gunas*. According to Varahamihira (505-587 AD), philosopher and scientist of his time, the three *gunas* deal with three different kinds of temperament (Iyer, 1884). *Sattva guna* denotes good temper. A predominantly *sattvic* person is merciful, firm-minded, strong and sincere. *Rajas guna* refers to passionate temper. A *rajasic* person is a poet, learned in various arts, performs sacrificial rites, and is bold and courageous. *Tamas guna* characterizes dark temper. A person with predominance of *tamas guna* is deceitful, ignorant, idle, angry, and sleepy.

Only a few studies are known in which the *triguna* has been studied in relation to other personality measures such as the Big Five (e.g., Mohan & Sandhu, 1988; Singh, 2008; Singh, 2016; Uma, Lakshmi, & Parameshwaran, 1971), and the findings were not consistent and the correlations rather low but significant. For example, Uma et al. (1971) and Mohan and Sandhu (1988) reported *sattvic* to correlate negatively with Extraversion, while Singh (2016) and Khanna, Singh, Singla, and Verma (2013) reported a positive correlation with Extraversion. *Rajasic* has been found to correlate positively with Extraversion in Uma et al. (1971) and in Mohan and Sandhu 1988), negatively in Singh (2016), and zero in Khanna et al. (2013). *Tamasic* was found to correlate positively with Psychoticism (Uma et al., 1971; Mohan & Sandhu, 1988), and positively with Neuroticism (Singh, 2016; Khanna et al., 2013).

In this replication study we aim to arrive at a clarification of trait-psychological thinking in the Hindi context. The findings of the previous study (Singh et al., 2013) and the present results may shed light on the contours of the ancient concept of the *triguna* amidst the full vocabulary of Hindi traits.

METHOD

Participants

A total of 1,250 Hindi speaking young adults participated in the study. Half of them functioned as targets and provided self-ratings. Each target person was asked to nominate a friend who knew him or her well enough to provide a peer-rating. The target person also had to take care that the friend was prepared to give the rating. We started off with 720 targets who provided self-ratings, but because for only 625 of them peer-ratings were actually obtained, we also used only the corresponding 625 self-ratings. The mean age of the self-rating group was 24.3 years (age range 19-24; SD = 2.41). Among them 72.2% were male and 27.8% were female. The majority of them had completed a post graduate degree (50.6%). Some were Ph.D. students (29.6%), and others were enrolled in undergraduate courses (19.8%). The mean age of the peer-group was 24.3 years (range: 19-28; SD = 2.16) years. Of the peer-raters 72.5% were male and 27.5% were female. Among them 50.7% were post graduates, 31.2% were research scholars, and 18.1% were enrolled in undergraduate courses. All the participants were from urban middle class socio-economic background.

Material and procedure

A list of 357 trait descriptive adjectives was used. The full procedure to arrive at this list is given in detail in Singh et al. (2013). Starting with a comprehensive selection of 2,750 trait words from the dictionary, that list was reduced in different steps, mainly by removing obscure and unfamiliar words and words that referred to roles, groups, and ideologies. In the previous study (Singh et al., 2013), this list was further reduced by removing 62 words that were considered least "appropriate" for the description of personality. Since "appropriateness" was largely captured by a combination of relevance and familiarity criteria applied in previous selection steps, these latter 62 terms was included to maximize the descriptive potential of the present list.

The list of 357 words was administered to the participants with the instruction to indicate for each adjective the extent to which the trait-word described self or peer, on a 5-point scale, running from "1" (least descriptive), to "5" (most descriptive).

Table 1. Eigenvalues expressed in terms of amounts of explained variance

		factors										
		1	2	3	4	5	6	7	8	9	10	Total (10)
Self & peer	raw	16.7	7.8	5.4	2.4	2.0	1.7	1.6	1.3	1.2	1.1	35.1
Self & peer	ipsatized	9.1	5.4	2.6	2.4	2.0	1.7	1.4	1.3	1.2	1.2	28.3

Analyses

Since the target was the same for self- and for peer-ratings, the data sets for self and peer were combined, thus providing more stable material. We analyzed both raw data and ipsatized data. We started applying Principal Components Analysis to raw (non-ipsatized) data followed by analysis of ipsatized data, to see which would deliver the clearest structure.

As a help in identifying the factors, we used markers of the *triguna*, the same set that was used in the previous study, stemming from a list developed by Frawley (2006). These markers are given in the Appendix. The correlations among the three marker-scales in the present study were 0.24, -0.26, and -0.16 for the pairs *rajasic-tamasic*, *rajasic-sattvic*, and *tamasic-sattvic*, respectively.

In the previous study we used markers reflecting the eight-factorial structure of De Raad and Barelds (2008) that included versions of the Big Five, and Hedonism, Virtue and Competence. The extraction of the eight factors in that system influenced the Big Five-related ones, which were not all typical of the Big Five. Because the Big Five is probably better understood internationally, we constructed separate markers for the Big Five. For Hedonism no markers could be identified. For Virtue and Competence marker scales were constructed to enable a optimal comparison with the previous study on the Hindi trait structure. The eight marker scales are given in the Appendix. The marker-scale for Neuroticism correlated virtually zero with the other four Big Five marker-scales, but those other four marker-scales had substantial correlations among each other, running from 0.46 to 0.71. Competence and Virtue correlated 0.62.

Finally, as a further aid in identifying the factors, especially regarding their moral and evaluative meaning, we constructed marker-scales for Honesty-Humility, Positive Valence, and Negative Valence. The three sets of markers are in the Appendix. The correlations among these three marker scales were -0.77 (HH-NV), 0.29 (HH-PV), and -0.05 (NV-PV).
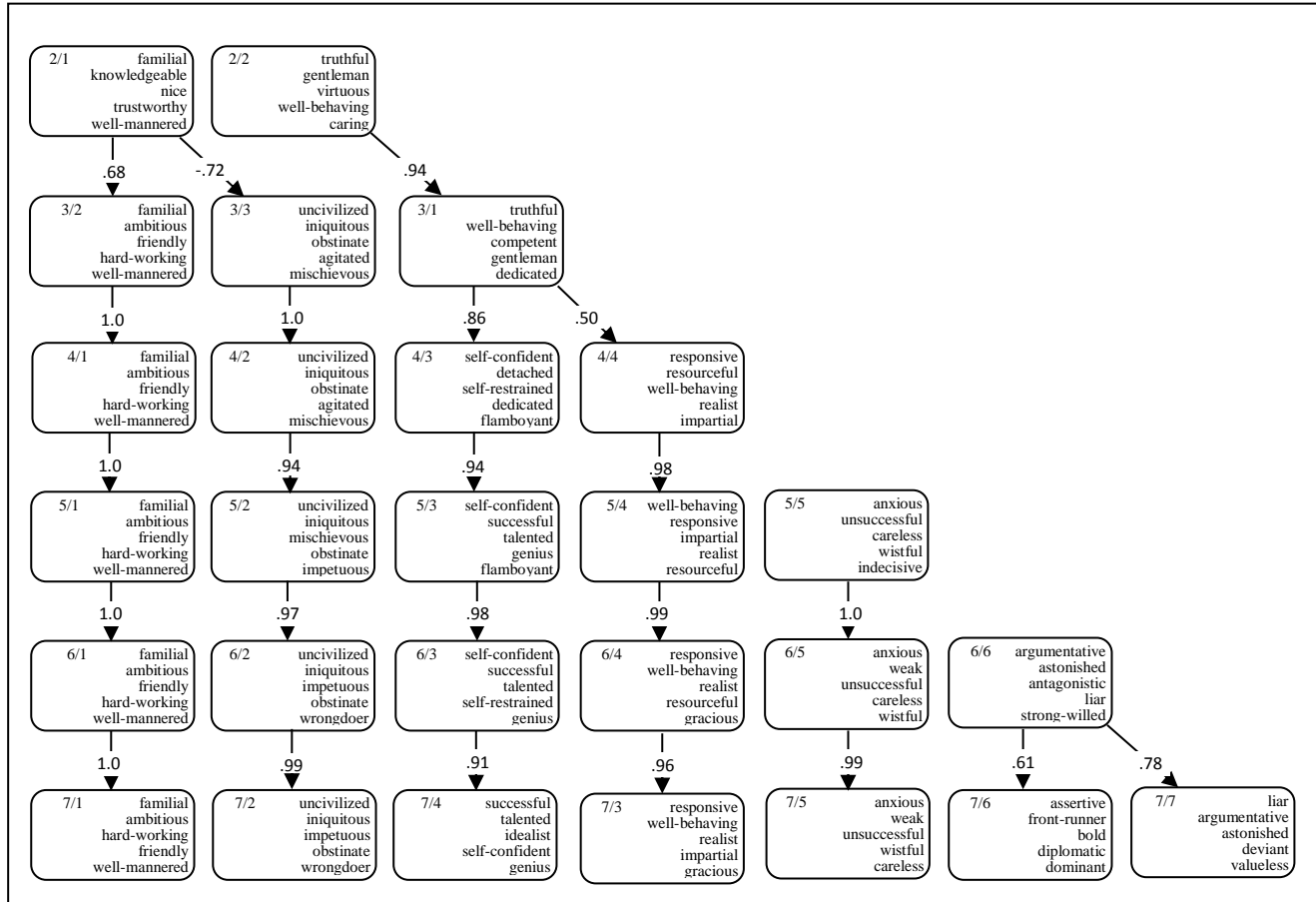

Figure 1. Hierarchy of factors (PCA; varimax rotation); combined self- and peer-ratings (raw data)

Table 2. Correlations between raw-data based factors and marker-scales for Triguna, Big Five, Honesty-Humility, Negative Valence, and Positive Valence

Scales	Triguna			Big Five					VIR	COM	HH	NV	PV
	R	T	S	E	A	C	N	I					
N of items	18	16	17	16	22	14	12	21	11	19	14	10	14
alphas	.93	.84	.88	.74	.90	.78	.74	.78	.78	.79	.83	.84	.79
Factors													
21	**-80**	**-68**	11	-20	39	16	**-60**	-01	40	-08	**74**	**-89**	01
22	-32	03	**84**	**75**	**82**	**86**	10	**84**	**79**	**87**	48	-17	**78**
31	-04	-08	**83**	**77**	**64**	**80**	03	**74**	**65**	**85**	28	01	**81**
32	**-94**	-04	23	03	**69**	34	-07	35	**61**	17	**80**	**-74**	11
33	23	**92**	-09	15	-01	-06	**77**	21	-11	10	-33	**53**	-07
41	**-94**	-04	23	03	**69**	34	-07	36	**61**	17	**80**	**-74**	11
42	23	**92**	-10	13	-02	-08	**77**	19	-12	09	-34	**53**	-08
43	-02	-04	**54**	**72**	47	**72**	-01	**73**	52	**71**	19	01	**63**
44	-02	-06	**71**	30	46	35	09	21	38	47	21	02	**52**
51	**-94**	-03	23	04	**69**	34	-07	37	**62**	18	**79**	**-73**	12
52	24	**86**	-12	14	-07	-10	**66**	18	-14	09	-38	**56**	-01
53	-01	-06	38	**67**	35	**64**	-11	**70**	43	**64**	11	04	**60**
54	-03	-07	**80**	42	**54**	47	09	33	47	**59**	25	01	**61**
55	05	33	09	06	14	10	44	12	06	05	05	04	-17
61	**-94**	-02	23	04	**69**	35	-07	37	**62**	18	**79**	**-73**	12
62	23	**86**	-15	09	-08	-08	**66**	16	-12	06	-38	**56**	-01
63	-03	-07	39	**63**	36	**67**	-10	**68**	47	**62**	13	03	**61**
64	-04	-07	**77**	37	**52**	45	09	29	46	**55**	24	01	**59**
65	05	33	10	05	14	09	45	10	06	05	05	04	-17
66	10	08	20	37	10	05	04	26	-02	28	-05	07	14
Multiple-R	.97	.93	.93	.83	.95	.89	.81	.88	.91	.89	.92	.93	.88

Note: R=Rajasic; S=Sattvic; T=Tamasic; E=Extraversion; A=Agreeableness; C=Conscientiousness; N=Neuroticism; I=Intellect; HH=Honesty-Humility; NV=Negative Valence; PV=Positive Valence; VIR=Virtue; COM=Competence

Table 3. Self and peer ratings combined, raw-data based, six factors

Factor 6/1 Rajasic
  familial (0.77), ambitious, friendly, hardworking, well-mannered, patriot, nice, trustworthy, polite, judicious, sociable, helpful, generous, smart, gentle, adult, patient, knowledgeable, devoted, humble (0.53), versus brutish (-0.81), fraud, hypocrite, deceptive, characterless, cunning, bad, unemotional, unlucky, mean-minded, insensitive, rustic, fighter, violent, cruel, busybody, indolent, selfish, quarrelsome, boastful (-0.55)

Factor 6/2 Tamasic
  uncivilized (0.64), iniquitous, impetuous, obstinate, wrongdoer, mischievous, shrewd, unreliable, disobedient, blotched, crooked, neglected, prudish, ungrateful, indecent, acrimonious, jealous, inferior, de-meritorious, unsocial, autocratic, insipid, unashamed, short-tempered (0.50)

Factor 6/4 Sattvic
  responsive (0.59), well-behaved, realist, resourceful, gracious, sweet-tongued, impartial, soft-spoken, innocent, reverential, competent, civilized, virtuous, peace-loving, gentleman, great, parsimonious, good-intentioned, forgiving, caring, scholar, truthful, understanding, sentimental, humane (0.44)

Factor 6/3
  self-confident (0.59), successful, talented, self-restrained, genius, detached, self-sacrificed, efficient, firm, experienced, energetic, dedicated, idealist, cheerful, flamboyant, sensible, progressive, self-controlled, methodical, workaholic, respectable, disciplined, self-actualized, perseverant (0.45)

Factor 6/5
  anxious (0.53), weak, unsuccessful, careless, wistful, indecisive, unresponsive, deviant, absent-minded, ambivalent, distracted, shy, thoughtful, adaptive, distressed, incompetent, foolish, dissatisfied, insistent, impatient, imitative, lethargic, unsophisticated, cantankerous, frustrated (0.36)

Factor 6/6
  argumentative (0.53), astonished, antagonistic, liar, strong-willed, unconcerned, extrovert, assertive, brave, licentious, thinker, deviant, altruistic, proficient, valueless, liberated, courageous, recalcitrant, daring, all-rounder, hilarious, frontrunner (0.30)

Note: The figures between brackets are loadings; each two per factor pole indicate the range of loadings for the traits on that factor
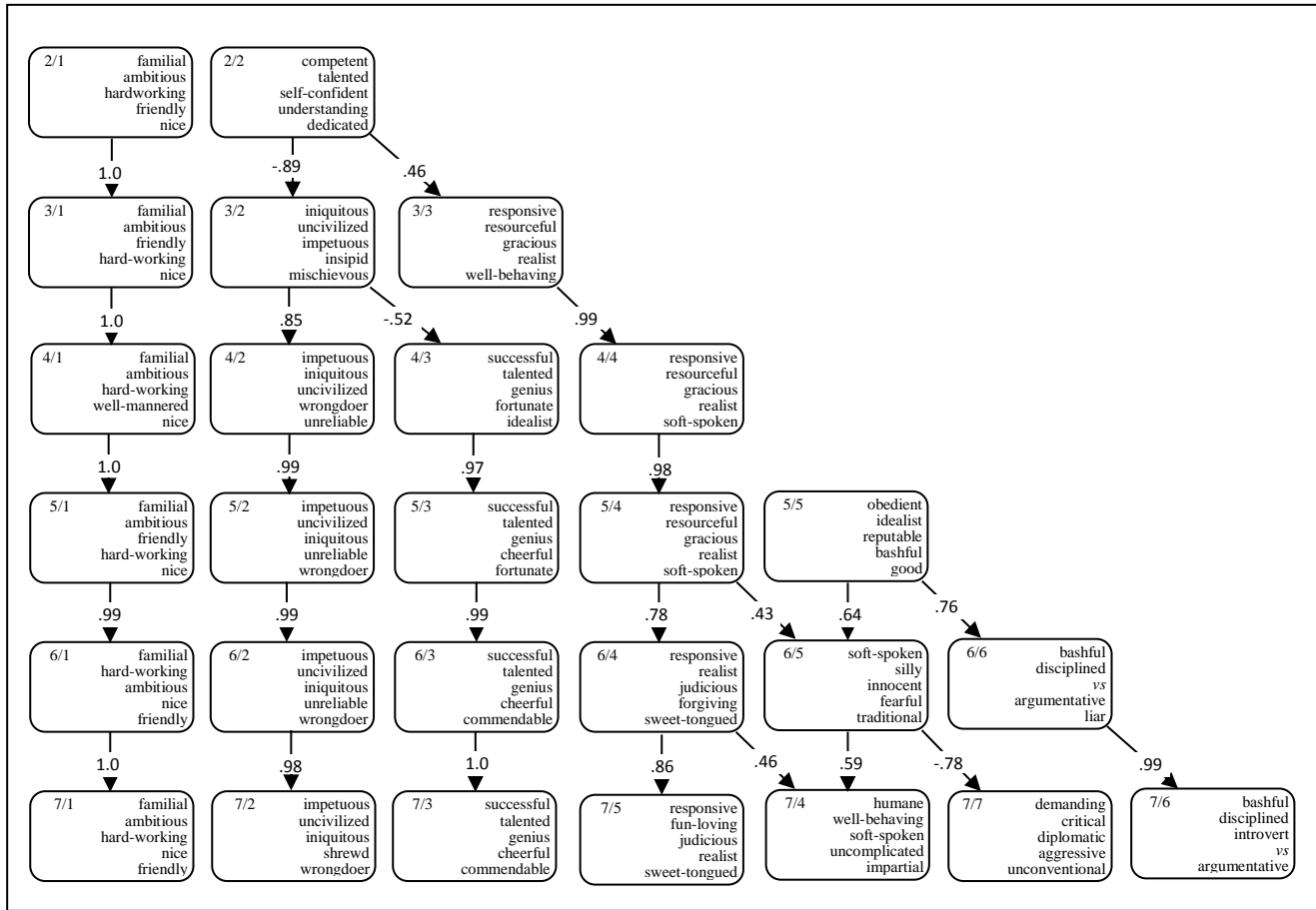
Figure 2. Hierarchy of factor solutions (PCA; varimax rotation), based on combined self- and peer-ratings (ipsatized data)

RESULTS

We applied Principal Components Analysis, first on raw data and then on ipsatized data, on the combined self- and peer-ratings. In order to make further decisions about which data to use (raw or ipsatized), and about the number of factors to retain, we used eigenvalues, interpretability of the factors, and a factor-hierarchy.

Principal Components Analyses: Raw data

The combined self- and peer-rating data were subjected to Principal Components Analysis, followed by Varimax rotation. The first ten eigenvalues are given in Table 1. Given the eigenvalue-patterns alone, it seemed that the ratings could best be summarized by three large and up to three or four smaller Components (henceforth called factors). To help making further decisions about the appropriate number of factors, we constructed a hierarchy of factors.

Factors were extracted with solutions with two factors up to a solution with seven rotated factors, in order to observe the hierarchical emergence of the factors. Figure 1 depicts the emergence of factors in those difference solutions. Between the factors from different solutions, correlations are given to indicate how factors at two adjacent levels relate to each other. For this, only correlations of 0.40 or higher are used. With two or three factors, clear splits of

factors represent the emancipation of substantial semantic clusters. This is the case from factor 2/1 to 3/2 and 3/3. From factor 3/1 to 4/3 and 4/4, the overlap in shared variance is rather moderate with a correlation of .50. With more factors, additional factors or splits as in the case of 6/6 to 7/6 and 7/7, the question is whether they are of distinctive interest and whether they explain a substantial amount of variance. For the split of factor 6/6 to 7/6 and 7/7 that is not the case, for which reason the seven-solution is not further considered. Except for the splits of 2/1 and 6/6, most of the factors are virtually the same from level to level.

For the identification of the content of the factors, we used the highest loading trait terms per factor, of which five are contained in the factor boxes of Figure 1, the correlations between the factors, and the various marker-scales. Table 2 contains the alpha reliabilities per scale and the numbers of items per scale, and the correlations between the factors and the marker-scales. Since at best six factors would make sense according to the eigenvalues, the correlations are restricted to the solutions with two to six factors.

The factor 2/1 is related to Negative Valence, in terms of its content (*brutish*, *hypocrite* at the negative pole), and in terms of its correlations, with the NV marker-scale, with H-H, and also with two of the Triguna marker scales, *rajasic* and *tamasic*. The factor 2/2 is related to four of the Big Five factors, to Competence, to Virtue, to PV, and to

Table 4. Correlations between ipsatized-data based factors and marker-scales for Triguna, Big Five, Honesty-Humility, Negative Valence, and Positive Valence

Scales	Triguna			Big Five					VIR	COM	HH	NV	PV
	R	T	S	E	A	C	N	I					
Factors													
21	**-95**	-12	24	01	**68**	34	-14	34	**62**	16	**82**	**-79**	11
22	-10	**-69**	**60**	40	38	**55**	**-52**	33	45	49	36	-31	**58**
31	**-94**	-10	21	00	**66**	33	-13	33	**60**	14	**81**	**-78**	08
32	09	**62**	-36	-38	-25	**-50**	**50**	-35	-36	-39	-28	29	-43
33	-11	-32	**62**	14	38	24	-16	05	32	31	28	-15	43
41	**-94**	-10	20	-02	**66**	31	-12	32	**59**	13	**80**	**-77**	08
42	10	45	**-50**	-40	-38	**-50**	26	-38	-39	-45	-37	31	-35
43	-09	**-52**	00	08	-03	22	**-57**	09	15	08	04	-14	34
44	-07	-27	**56**	10	31	17	-13	00	26	26	22	-09	39
51	**-95**	-10	19	-02	**65**	31	-13	31	**59**	12	**80**	**-78**	08
52	09	41	**-53**	-48	-40	**-51**	25	-43	-39	**-51**	-35	28	-39
53	-07	-48	08	20	01	24	**-55**	15	15	18	03	-09	41
54	-10	-26	**53**	01	32	15	-10	-05	26	19	24	-12	33
55	-09	-31	-17	-40	-10	-02	-21	-26	04	-34	08	-17	-14
61	**-94**	-13	19	-04	**63**	31	-14	30	**58**	09	**78**	**-79**	08
62	09	41	**-52**	-49	-40	**-52**	26	-44	-40	**-53**	-36	28	-39
63	-06	**-51**	11	17	01	23	**-55**	12	15	16	02	-10	43
64	-15	-11	49	08	35	16	-04	04	28	29	30	-10	28
65	00	-36	10	-31	-01	-01	-14	-28	04	-26	04	-14	01
66	-11	-09	-26	-27	-09	-03	-14	-12	03	-20	09	-10	-19
Multiple-R	.96	.77	.80	.67	.83	.67	.66	.63	.78	.71	.92	.86	.68

Note: R=Rajasic; S=Sattvic; T=Tamasic; E=Extraversion; A=Agreeableness; C=Conscientiousness; N=Neuroticism; I=Intellect; HH=Honesty-Humility; NV=Negative Valence; PV=Positive Valence; VIR=Virtue; COM=Competence

sattvic. With three factors, the *triguna* emerged, and that remains the case in all further solutions, with factor 4/4 representing *sattvic*, all the way to factor 7/3. Factor 4/3 is characterized by traits of E, C, I, and Competence, quite similar to the Competence factor in De Raad and Barelds (2008). Factor 5/5 represents elements of Neuroticism. Factor 6/6 is not clearly identified by any of the marker-scales.

For purposes of comparison with the previous study by Singh et al. (2013), we presented the six-factor solution in more detail in Table 3. Considering both the contents and the correlations with the marker scales in Table 2, the factors 6/1, 6/2, and 6/4 seem to represent *rajasic*, *tamasic*, and *sattvic*, respectively, thus confirming the presence of the *triguna*. The factors 6/3, 6/5, and 6/6, reflect blends of Big Five features, with 6/3 representing Competence (combining traits of Extraversion, Conscientiousness, and Intellect). This is confirmed by the correlations with the pertaining Big Five scales, and also by the correlations with the marker-scale for Competence and that for Positive Valence (which has frequently been observed to relate to Intellect in the psycho-lexical literature). Factor 6/4 seems to combine aspects of the negative pole of Conscientiousness and traits of Neuroticism. Only the latter is reflected in the moderate correlation of 0.45 with N. Factor 6/6

seems to combine traits of Extraversion, (-)Agreeableness, and of Intellect. The rather meager correlations of .37 with Extraversion, of .26 with Intellect, and .28 with Competence, at least do not contradict this interpretation.

The multiple-r's in the last row of Table 2, based the factors of the six-factor solution, tell that not only the information contained in the *triguna* marker scales is well covered, but also the Big Five and the other four scales are well covered.

Principal Components Analyses: Ipsatized data

The combined self-and peer-rating data were ipsatized and again subjected to Principal Components Analysis, followed by Varimax rotation. The first ten eigenvalues are given in Table 1. On the basis of the eigenvalue-patterns alone, it seemed that the ratings could best be summarized by two large and up to three or four smaller factors. To help making further decisions about the appropriate number of factors, we constructed again a hierarchy of factors.

Figure 2 depicts the emergence of factors in the different solutions. To aid the interpretations of the factors, the correlations between the factors and the marker-scales are given in Table 4. The first factor in all solutions in Figure 2

Table 5. self and peer, ipsatized, six factors

Factor 6/1 Rajasic

  familial (0.77), hardworking, ambitious, nice, friendly, well-mannered, patriot, trustworthy, sociable, generous, smart, helpful, devoted, patient, polite, judicious, gentle, knowledgeable, adult, beautiful (0.53) *versus* brutish (-0.82), hypocrite, fraud, characterless, cunning, bad, deceptive, unemotional, unlucky, fighter, cruel, rustic, violent, mean-minded, busybody, quarrelsome, insensitive, indolent, selfish, showy (-0.53)

Factor 6/2 Tamasic

  impetuous (0.56), uncivilized, iniquitous, unreliable, wrongdoer, indecent, shrewd, disobedient, unsocial, inferior, mischievous, blotched, unashamed, neglected, insipid, coward, wicked, crooked, crafty, egoist (0.41), *versus* detached (-0.43), ethical, responsible, self-controlled, inexorable, dedicated, self-confident, self-restrained, self-sacrificed, well-behaved, truthful, liberal, progressive, committed, lively, impartial, self-obsessed, flamboyant, altruistic, talented (-0.31)

Factor 6/4 Sattvic

  responsive (0.62), realist, judicious, forgiving, sweet-tongued, gracious, fun-loving, peace-loving, polite, resourceful, humble, well-behaved, parsimonious, empathetic, dreamer, civilized, cooperative, loyal, reverential, sentimental (0.31), *versus* bully (-0.48), value-less, suspicious, absent-minded, resource-less, stubborn, mean-minded, recalcitrant, insensitive, violent, careless, unlucky (-0.30)

Factor 6/5

  soft-spoken (0.39), silly, innocent, fearful, traditional, obedient, good-intentioned (0.30), versus aggressive (-0.44), diplomatic, assertive, demanding, sharp, orthodox, sharp-tongued, clever, bold, rigid, frontrunner, strong, obstinate, explorer (-0.30)

Factor 6/3

  successful (0.43), talented, genius, godly, cheerful, commendable, fortunate, splendid, intelligent, competent, sensible, idealist (0.30), *versus*, unsuccessful (-0.54), careless, unresponsive, anxious, dissatisfied, distracted, wistful, agitated, weak, incompetent, frustrated, distressed, impatient, cantankerous, indecisive, unsophisticated, ambivalent, impulsive, foolish, intolerant (-0.31)

Factor 6/6

  bashful (0.41), disciplined, perplexed (0.30) *versus* argumentative (-0.54), liar, astonished, antagonistic, licentious, deviant, strong-willed, lethargic, liberated, altruistic, proficient, daring, extrovert (-0.30)

Note: The figures between brackets are loadings; each two per factor pole indicate the range of loadings for the trait variables on that factor

is the same, consistently related to marker scales of *rajasic* (negatively), Agreeableness, Honesty, Negative Valence, and Virtue; so this factor is definitely strongly evaluative in character. The factor 2/2, characterized by competence, being talented, and self-confident (see Figure 2), and related to *sattvic*, Conscientiousness, Emotional Stability, and Positive Valence, seems to (weakly) reflect characteristics of Agency (Bakan, 1966). With three factors, the *triguna* emerged. With four factors, the structure does not get much clearer. *Tamasic* and *sattvic* seem to redistribute their contents over the three factors 4/2, 4/3, and 4/4. The first four factors remain virtually the same in the five- and the six-solution. The additional factors do not relate substantially to any of the marker scales. The six ipsatized-data based factors do a clearly lesser job, in comparison to the raw data, in covering the information contained in the marker scales, in particular the Big Five scales of Extraversion, Conscientiousness, Neuroticism, and Intellect. The six-factor solution is presented more fully in Table 5.

By their contents, there is clearly similarity between the factors presented in Table 5 and those based on the raw data (Table 3). For more direct figures, the correlations between the two sets of factors are given in Table 6. The factors 6/1, 6/2, and 6/4 in the two sets confirm the presence of the *triguna*, Also, the raw data based factors 6/5, and 6/6 have much in common with the ipsatized data based factors 6/3 and 6/6, respectively.

Comparison with previous study

In order to check on the consistency of the factor structure across samples, the six-factor structures for self-ratings and peer-ratings and for raw data and ipsatized data from the previous study separately (Tables 1, 2, 3, & 4 in Singh et al., 2013) are taken and the congruencies were calculated

after rotating those structures to the present six-factor structure in which self- and peer-rating were combined. This was done using only the common traits in the two studies. The congruencies are given in Table 7.

Regarding the raw data based results, the present factor 6/6 is clearly not replicated, with a congruence coefficient of .56. The previously published peer ratings based factors are all well replicated.

With respect to ipsatized ratings, peer-ratings based factors replicated better than those based on self-ratings. The last three factors are clearly not having their equivalent in the previously published factors based on self-ratings.

DISCUSSION

In the psycho-lexical personality trait study by Singh et al. (2013) it was concluded that the Hindi trait structure is largely determined by the *triguna*, a traditional three-dimensional system, with *sattvic* (harmony, competence), *rajasic* (friendliness, ambition), and *tamasic* (concealment, egoism). Those three factors explained most of the variance; yet, for reasons of connectivity to the mainstream findings in the psycho-lexical literature, six factors were reported, of which indeed the *triguna* were the larger factors, and an additional three smaller factors showed signs of Big Five Extraversion, Agreeableness, and Conscientiousness. That structure was most articulate in raw (non-ipsatized) data. Because that Hindi trait structure clearly deviated from the mainstream results that are most typically represented in the Big Five, or in structures with an additional sixth factor (Honesty Humility) or with two additional factors (Negative Valence & Positive Valence), there was good reason to try to replicate the study.

Table 6. Correlations between factors based on raw data and ipsatized data.

		Ipsatized data					
		6/1	6/2	6/4	6/5	6/3	6/6
	6/1	**97**	03	09	-12	-04	02
	6/2	-13	**58**	00	**-43**	-22	-06
Raw data	6/4	-06	-18	**79**	26	02	-31
	6/3	-03	**-55**	-24	-25	39	26
	6/5	00	-37	-21	20	**-85**	05
	6/6	01	-23	-23	-33	01	**-84**

Note: decimal points are omitted; to increase readability, correlations of |0.40| or higher are given in bold.

Table 7. Congruencies

	Present study					
	Combined self- & peer-ratings: Raw data					
Previous study	6/1	6/2	6/3	6/4	6/5	6/6
self	.88	.82	.92	.90	.85	.56
peer	.87	.91	.90	.95	.82	.87
	Combined self- and peer-ratings: Ipsatized data					
self	.88	.83	.89	.56	.69	.72
peer	.85	.85	.75	.86	.80	.81

This was done with an enlarged set of trait descriptors, and with a much larger sample of participants, and with self-ratings and peer-ratings of the same target. Largely the same routine was followed concerning analyses, ultimately resulting in a six-factor structure that showcased the *triguna* again, and three other factors reflecting blends of Big Five characteristics. These finding were based on the raw data. The ipsatized data, although reflecting the *triguna*, generally gave a less clear structure. Congruence coefficients between the previously published structure and the present one, for the raw data, indicated clear replication for at least five of the six factors.

The main issue in the present study, and in the previous one as well, is how to understand especially the first three factors, suggesting the significance of the *triguna*. The method used to identify the three *gunas* was through interpretation and the use of marker-scales. The use of marker scales is intended to facilitate interpretation, but the technique is far from perfect (for a discussion, see De Raad & Peabody, 2005). The selection of *triguna* markers is restricted to their availability in the set of trait variables of the study with which they are also ultimately related. Moreover, their definition in the *triguna* literature varies, not so much in their recurrent abstract qualifications (Illumination, Passion, Dullness), but rather in the many attributes considered typical of each of these *triguna* constructs. *Sattva* (or Illumination), for example, is not only characterized by generosity, purity, harmony, and truthfulness, but also by freeing oneself from propensities of passions, desires, and lust (e.g., Bhal & Debnath, 2006). As such it is easily understood as the opposite of *rajas* (Passion) in which one is guided by desire for things not yet acquired, or as the opposite of *tamas* (Dullness) in which one is characterized by lack of motivation and inertia. In fact, correlations between pairs of *triguna* dimensions vary with low to substantial negative correlations between *sattvic* and *tamasic*, low to substantial positive correlations between

rajasic and *tamasic*, and low to moderate negative correlations between *sattvic* and *rajasic* (e.g., Stempel, Cheston, Greer, & Gillispie, 2006; Wolf, 1999; Singh et al., 2013).

The present raw-data based three factor solution seems clearly related to the *triguna* markers. The first factor (3/1), related to *sattvic* (Illumination), also related positively to four of the Big Five, and to Virtue, Competence, and Positive Valence, and can well be understood as the Competence dimension as distinguished in De Raad and Barelds (2008), or as the Positive Valence factor as described in Almagor et al. (1995). From their contributing traits, one might well conclude the *sattvic* dimension to combine different traits of virtue (with the explicit meaning of "excellence"; cf. Cawley, Martin, & Johnson, 2000). It is about the moral appreciation of personality, about conveying a standard of moral perfection.

The second factor (3/2), related to *rajasic* (Passion), is described by *hardworking* and *devotion* on the positive pole, which agrees well with drive and energy connotation of *rajasic*, but it is also described by typical Agreeableness traits, such as *nice*, *trustworthy*, *helpful*, and *gentle*, which is untypical of *rajasic*. The negative pole of the dimension equally conveys drive and energy through such aggressive traits as *fighter*, *violent*, and *quarrelsome*. All in all, the factor seems to represent a blend of Negative Valence and Honesty-Humility; it is thus a strong evaluative dimension and less the dimension that should convey desire, dissatisfaction, and lack of control over emotions, so typical of *rajasic*.

The third factor (3/3), related to *tamasic* (Dullness), is also characterized by Neuroticism, which agrees well with traits frequently attributed to *tamasic*, namely fear, instability, and depression (e.g., Mathew, 1995; Uma et al., 1969; Wolf, 1998), but it is also described by rather aggressive traits such as *impetuous*, *mischievous*, and *short-tempered*, which are so untypical of a dimension that should convey indifference, inertia, lethargy, or low initia-

tive (Mathew, 1995; Uma, 1969; Wolf, 1998). So, notwithstanding the high correlation with the *tamasic* scale, this third factor (3/3) does not seem to be typical of *tamasic*.

In conclusion, this study leaves us with a Hindi personality structure that is deviant from the mainstream psycholexical findings, and of which the first two factors seem to convey primarily moral and evaluative information, possibly of the type expressed in Positive Valence and Negative Valence, if not *sattvic* and *rajasic*. The factors beyond the first three, in solutions with four up to six factors, are far from clearly identified in terms of either the Big Five or the Big Six (HEXACO).

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APPENDIX

Markers of Triguna

Sattvic (guided by TRUTH & ILLUMINATION): well-behaved, impartial, competent, gentleman, organized, understanding, virtuous, capable, caring, adored, scholar, calm, humane, committed, gentle, civilized, sober, realist, harmonious, simple, resourceful, level-headed

Tamasic (guided by DARKNESS & CONCEALMENT): crooked, restless, arrogant, neglected, egoist, frustrated, a-social, intolerant, disorganized, mean-minded, orthodox, snobbish, mischievous, dissatisfied (2 x), self-destructive, obstinate, prudish, unsuccessful, irritable, indecent

Rajasec (guided by PASSION & MOTION): ambitious, friendly, hardworking, well-mannered, smart, sociable, knowledgeable versus hypocrite, flatterer, cunning, deceptive, busy-body, insensitive, violent, bully, cruel, showy, boastful, quarrelsome, foul-mouthed

Markers of Big Five

Extraversion: active, cheerful, assertive, energetic, extravert, flamboyant, fun-loving, lively, optimistic, outgoing, outspoken, spontaneous, sympathetic, talkative, witty

Agreeableness: benevolent, caring, cooperative, empathetic, friendly, generous, gentle, helpful, honest, humble, humane, kind, kind-hearted, nice, peace-loving, polite, social, tolerant, trustworthy, truthful, understanding, virtuous

Conscientiousness: ambitious, busy, conscientious, disciplined, efficient, hard-working, methodical, organized, perseverant, scholarly, dedicated, practical, skillful, workaholic

Neuroticism: angry, anxious, cantankerous, cowardly, dissatisfied, distracted, fearful, hurried, seasonous, wavering, short-tempered

Intellect: artistic, bookish, clever, competent, complicated, connoisseur, curious, explorative, genious, gifted, imaginative, ingenious, intelligent, knowledgeable, open-minded, progressive, self-reflective, sharp, talented, thinker, worldly-wise

Markers of Honesty-Humility: honest, humane, humble, trustworthy, truthful, loyal, versus boastful, deceptive, egoistic, fraudulent, hypocrite, selfish, unjust, unreliable

Markers of Negative Valence: bad, brutish, cruel, fraud, inferior, mean-minded, mischievous, sinful, uncivilized, wicked

Markers of Positive Valence: capable, commendable, competent, genius, gifted, godly, gracious, great, proficient, respectable, scholar, splendid, successful, talented

Markers of Virtue: friendly, loyal, good, good character, civilized, polite, kind, benevolent, gentle, respectable, virtuous

Markers of Competence: capable, competent, energetic, flamboyant, gifted, helpful, imaginative, impartial, open-minded, optimist, realist, resourceful, scholar, splendid, straightforward, connoisseur, determined, frontrunner, karma-yogi