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Published in:
Journal of Research in Personality

DOI:
[10.1016/j.jrp.2017.11.008](https://doi.org/10.1016/j.jrp.2017.11.008)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2018

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

De Raad, B., Smederevac, S., Colovic, P., & Mitrovic, D. (2018). Personality traits in the Serbian language: Structure and procedural effects. *Journal of Research in Personality*, 73, 93-110.
<https://doi.org/10.1016/j.jrp.2017.11.008>

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Full Length Article

Personality traits in the Serbian language: Structure and procedural effects

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ARTICLE INFO

Article history:

Received 7 October 2016

Revised 8 November 2017

Accepted 10 November 2017

Available online 11 November 2017

Keywords:

Psycho-lexical studies

Personality descriptors

Item format

Trait structure

ABSTRACT

The aims of the paper are to provide the optimal structure of personality-descriptive terms in the Serbian language, and to address crucial procedural issues in psycho-lexical studies. In Study 1, a non-restrictive methodology for the selection of personality descriptors was applied. In Study 2, we compared the structures obtained using a standard adjective item format versus a contextualized format. In Study 3, the effects of using different categories of description on the trait structure were studied. In Study 4, the descriptors used in three previous studies were analyzed jointly. The results suggest that the outcomes of psycho-lexical studies are affected by various procedural factors, pointing to two- and three-factor solutions as the most robust across methods.

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1. Introduction

The main rationale to apply the psycho-lexical approach to personality is captured by the frequently quoted idea that language provides an opportunity to identify a potentially definitive corpus of personality descriptors. That corpus of descriptors would contain the set of trait-variables to define basic personality dimensions. This idea has inspired a large number of studies, which has resulted in a growing consensus with regard to the number and the structure of psycho-lexically based trait dimensions (De Raad, 2000; De Raad & Mlačić, 2015; De Raad et al., 2010, 2014; Goldberg, 1990; John, 1990; Saucier & Goldberg, 1996).

The dispute in the psycho-lexical literature during the last decade or so has focused mainly on the correct number of trait dimensions, on coverage of the trait domain, and on cross-cultural replicability of findings. Much less attention has been given to the procedures to arrive at a content-valid vocabulary of trait-descriptive words and expressions. Saucier (1997) suggested that procedural factors do affect the number and structure of lexical personality dimensions. Notwithstanding the overwhelming similarities found across languages, differences between trait-structures from different taxonomies are quite probably also influenced by differences in procedures by which words are selected from the lexicon, and to reduce the established vocabularies. De

Raad (2000) has enumerated and discussed various procedural features that could influence the final trait-vocabulary to work with, such as the inclusion of different word-categories, the trait-conceptualization that is implied in the instructions to select trait words from a lexicon, the inclusion or exclusion of evaluative words, the choice of the dictionary, and more. Almagor, Tellegen, and Waller (1995), Angleitner, Ostendorf, and John (1990), and De Raad and Barelds (2008) form good showcases of how differences in lexical procedures relate to differences in the final resulting trait structures. The differences between taxonomies in terms of those procedural features have often been used to explain differences between the resulting structures, without making those features explicit topics of investigation.

In the present article, we aim to follow mainstream lexical procedures to find out about the trait structure in the Serbian language, but we also explicitly analyze the trait structural results in relation to different steps in the procedure, in order to find out about effects of particular choices on the final structure.

The Serbian language is an Indo-European language, belonging to the group of South Slavic languages, and it is similar to a number of languages spoken in the Western Balkan region (e.g., Croatian, Bosnian, Montenegrin). The language is especially strongly related to Croatian; these two languages are in many respects the same, but there are also differences, for example in orthography, but also culturally-historically: The Croats have been under the influence of Austro-Hungarian and Latin culture while the Serbs have been under the influence of medieval Greek and Ottoman Turkish culture. The psycho-lexical study in Serbian helps to complete

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psycho-lexical work on the most important Slavic languages to which belong, besides Croatian, also Russian, Polish, and Czech.

In recent years a growing body of literature has provided support for structures with two to seven factors, with a tendency for a smaller number of factors to be replicable across a larger number of languages. The various structures are represented by their labels in Table 1. With the development of the Serbian taxonomy it should be possible to check the availability of a two-factor solution with a factor describing Agentive or Dynamic traits and another factor describing Communal or Social Self-Regulation traits (Bakan, 1966; De Young, 2006; Digman, 1997; Hogan, 1983; Saucier et al., 2014), a three-factor solution with an additional factor describing traits of Order and of Organization (De Raad et al., 2014; Di Blas & Forzi, 1999; Peabody & Goldberg, 1989), a five-factor solution with the Big Five factors, a six-factor solution with an additional Honesty-Humility factor beyond the Big Five (Ashton et al., 2004), and a seven-factor solution with versions of the Big Five plus two factors describing Positive Valence and Negative Valence (Benet-Martínez & Waller, 1997). Four-factor solutions are hardly discussed in the psycho-lexical literature.

In previous psycho-lexical studies in the Serbian language (Smederevac, 2000; Smederevac, Mitrović, & Čolović, 2007), the followed procedures were fashioned after (Almagor et al., 1995; Benet & Waller, 1995; Waller, 1999) who, unlike most psycho-lexical investigators, explicitly included evaluative terms and state terms. Moreover, Almagor et al. (1995) sampled the dictionary by selecting the first trait-adjective they encountered on every fourth page of the dictionary. Also, Smederevac et al. (2007) experimented with two questionnaire formats, one in which the selected item was contained in a brief sentence format (e.g., "I am tolerant", "I lie frequently"), and the other with a more natural, somewhat contextualized, sentence format (e.g., "I don't mind if people act or think differently", "often, I was forced to tell lies"). This sentence format was used to facilitate endorsement of extremely evaluative items, and to remove ambiguity.

We report briefly on those earlier studies and re-analyze the data sets with procedural questions in mind. Moreover, we report on newly psycho-lexically obtained data, and ultimately combine the various data sets to enable a joint analysis.

1.1. Procedural decisions in the psycho-lexical history

After the early contributions by Galton (1884), Rümelin (1890), Klages (1926), and Baumgarten (1933), who all argued in favor of a psycho-lexical approach, Allport and Odbert (1936), were the first to provide a template of relevance through their classification into (1) personal traits, (2) temporary states, (3) social evaluations, and (4) metaphorical and doubtful terms. They suggested the first class (personal traits) to "symbolize most clearly 'real' traits of personality" (p.26), but advised to consult the other classes according to the needs and interests of the investigator. Cattell (1943a, 1943b), who was the first to carry out psycho-lexical work to arrive at a personality questionnaire that covers the trait-sphere (Cattell, Eber, & Tatsuoka, 1970), created a set of trait variables, initially based on the class of "real" traits, supplemented with relevant temporary state terms from Allport and Odbert (1936). The initial set of terms was completed with terms from the clinical practice.

The main procedural issue for Cattell was that he had to reduce his initial list of a few thousand terms via intermediate steps to some 35 variables. This was "a matter of unhappy necessity" (Cattell, 1945, p.70), understandable in the era preceding the use of computers. The use of those 35 variables or subsets of them by Fiske (1949), Tupes and Christal (1961; 1992), and Norman (1963) led to a five-factorial structure referred to as the "Big Five" by Goldberg (1981).

Tupes and Christal (1961; 1992) and Norman (1963) argued it to be unlikely that those 35 variables would catch all important traits. Therefore, Norman (1967) returned to the total pool of trait words in order to arrive at an exhaustive taxonomy of traits. Norman's effort formed an important development in the history of the psycho-lexical approach, resulting not only in a full and useful list of 2797 trait terms, but also in a revised template of classification of trait terms. This template distinguished (1) stable traits, (2) states and activities, (3) roles, relationships and effects, and (4) exclusion categories (evaluative, obscure, ambiguous, and anatomical terms).

Goldberg (1982) started with the 2797 set of terms to finally end up with a set of 1710 terms, mainly by removing unclear terms, nouns, and slangy terms. That list was further reduced according to seven exclusion criteria (Ambiguity, Difficulty, Slanginess, Sex-linkage, Over-evaluation, Peripheral, and Redundancy), which brought the number of descriptors to 505. With an additional 61 terms that met Peabody's (1970) criteria for amplification and evaluation, the final list comprised 566 descriptors. This study was the starting point in the development of the Big Five model, and in the following years compelling evidence for the robustness of five-factor solution in American-English was found (Goldberg, 1982, 1990, 1992).

It was the German psycho-lexical project (Angleitner et al., 1990) in which a third, still more detailed, template of classification was specified. This included (1) Dispositions, subdivided into (1a) temperament and character and (1b) abilities and talents, (2) Temporary conditions, subdivided into (2a) experiential states, (2b) physical and bodily states and (2c) observable activities, (3) Social and reputational aspects, subdivided into (3a) roles and relationships, (3b) social effects, (3c) pure evaluations, and (3d) attitudes and worldviews, (4) Overt characteristics and appearance, subdivided into (4a) anatomy and constitutions and (4b) appearance, looks, deportment, and (5) Terms of limited utility, subdivided into (5a) context-specific or technical and (5b) metaphorical, vague, or outmoded. This classification system was applied in various studies (e.g., Church, Katigbak, & Reyes, 1996; Di Blas & Forzi, 1998; Hřebíčková, 2007; Mlačić & Ostendorf, 2005; Quevedo-Aguado, Iraegui, Anivarro, & Ross, 1996; Ruisel, 1997; Szarota, 1996). Of particular interest in these studies is that for the collection of person-ratings to arrive at a trait structure, the dispositional category was used, with the explicit inclusion of both subcategories 1a and 1b. It is important to note, that, like in Norman (1967) and in Goldberg (1982), evaluative terms (3c) were excluded.

In the Dutch psycho-lexical project (Brokken, 1978), a simpler and efficient format was used for the selection, classification, and removal of words. All words "possibly applicable to a person" were selected from the dictionary to form the master pool of terms, from which next those terms were removed unanimously considered as purely evaluative, metaphorical, anatomical, physical or medical, or describing temporary states or moods (Hofstee, 1976). The remaining terms were rated on two criteria, the "Nature criterion" ("He/she is ... by nature.") and the "Person" criterion ("What kind of person is X?"). The combination of these two criteria was used to decide to the final list to obtain ratings (Brokken, 1978).

Still another psycho-lexical approach was favored by Almagor et al. (1995; see also Tellegen & Waller, 1987) who argued not to exclude evaluative terms and affective terms, because they are part and parcel of personality language especially in relation to esteem of self and of other (cf. Tellegen, 1993). While the English, German, and Dutch taxonomic studies, where such terms were largely removed, all supported the Big Five (see, however, Hofstee, Kiers, De Raad, Goldberg, & Ostendorf, 1997), Almagor et al. (1995) concluded to a seven-factor structure in Hebrew that included versions of the Big Five factors plus two additional factors Positive

Table 1
Recurrent trait models ordered according to family-related factor labels.

Model	Corresponding factor names in different studies							References
	1	2	3	4	5	6	7	
Big two	Agency Getting ahead β Plasticity Dynamism	Communion Getting along α Stability Social Self-Regulation						Bakan (1966) Hogan (1983) Digman (1997) De Young (2006) Saucier et al. (2014)
Big three	Surgency Extraversion Dynamism	Agreeableness Agreeableness Affiliation	Conscientiousness Conscientiousness Order					Peabody and Goldberg (1989) Di Blas and Forzi (1999) De Raad et al. (2014) Norman (1963) Goldberg (1990)
Big five	Extraversion Extraversion	Agreeableness Agreeableness	Conscientiousness Conscientiousness	Emotional stability Emotional stability	Culture Intellect			
Six-factor structure	Extraversion	Agreeableness	Conscientiousness	Emotionality	Intellect	Honesty/ Humility		Ashton et al. (2004)
Big seven	Positive emotionality	Agreeability	Dependability	Negative emotionality	Conventionality	Negative valence	Positive valence	Almagor et al. (1995)

Valence and Negative Valence (also Benet & Waller, 1995; Smederevac et al., 2007). Also Saucier (1997) found two additional factors beyond the Big Five (Attractiveness & Negative Valence), when allowing the inclusion of more evaluative and appearance terms. Saucier (2003) observed convergence between Hebrew and Filipino structures, and argued that a Big Seven can also be recovered in English, and possibly also in Italian. Saucier (2009), examining seven lexical studies with inclusive variable selection, concluded to the recurrence of six or seven factors. For factors to appear beyond the Big Five, much also depends on whether one allows for more distinction in the broad domain of Agreeableness.

A problem in this respect is that virtually no trait term escapes evaluative connotation; neutral terms are difficult to find; trait terms may run from primarily judged descriptive in nature to primarily judged evaluative in nature. Norman (1967) and Brokken (1978), for example, have provided evaluation scores for 2800 and 1203 trait adjectives, respectively, essentially showing a bimodal distribution (see also Anderson, 1968 and Hampson, Goldberg, & John, 1987). The selection of terms that are sufficiently descriptive has been a matter of arbitrary decision.

The various taxonomic studies published thus far roughly followed the Norman-Ostendorf selection procedure (including the classification), the Hofstee-Brokken procedure (simple criteria), or the Tellegen-Waller procedure (inclusion of evaluation). The most striking difference was between the first two types of procedures on the one hand and the third on the other, with the additional factors in the seven factor model being attributed to a more inclusive selection of trait words. There were, however two other distinctive characteristics in the Tellegen-Waller procedure that could be responsible for the difference in result. One was their emphasis on arriving at a representative sample of trait words rather than a complete list: they sampled pages from the dictionary and selected the first word per sampled page they encountered and that would fit their criterion of descriptiveness. The other was that virtually all taxonomic studies that rendered the Big Five had their data been ipsatized before factoring (standardized per person). In Tellegen and Waller (1987) there is no mention of ipsatized data, neither is there in Almagor et al. (1995). However, in a study in Spanish language (Benet-Martínez & Waller, 1999) ipsatized data were used, yielding seven factors that closely resembled the Big Seven.

There are many more differences between the various taxonomies; these relate to the choice of the dictionary (its compre-

hensiveness), the use of novels to find trait words, the use of free descriptions, the use of self-ratings, peer-ratings, or both, the involvement of student participants and/or others, the use of different word-categories (other than adjectives), the format of the items, etc. No systematic study has been performed to test the effects of such differences on the final structure.

1.2. Present studies

In a series of four taxonomic studies in the Serbian language, we investigate the Serbian trait structure, but also study certain of the above procedural issues: we make use of different dictionaries; we apply the Tellegen-Waller procedure; we vary item-format, and manner of sampling words, and we use both raw data and ipsatized data. Moreover, we apply part of the Hofstee-Brokken procedure and vary the inclusion of certain types of descriptors. The first two studies are based on data that have been used in previous studies. In Study 1, the emphasis is on the Tellegen-Waller procedure that we applied to the Serbian trait language. In Study 2, the specific emphasis is on different item-formats. In Study 3, a new trait taxonomy is described, involving both the trait-selection from the lexicon and the structuring of the traits based on self-ratings. This study is also about the effects of adding distinct personality relevant categories to the structure. Study 4 combines the data-sets of these previous three studies in order to arrive at the final Serbian trait-structure.

In all studies, the sets of terms underwent a drastic reduction on the basis of synonymy. The rationale for the exclusion of synonyms is based primarily on the goal to arrive at a set of descriptors of human behavior that represents the semantic differentiations of traits in the full lexical corpus. A problem with the inclusion of many synonyms is redundancy of terms, which could obscure the actual structure of personality-relevant dimensions.

2. Study 1

Tellegen and Waller (1987) argued that there has been too much focus in psycho-lexical studies on what Allport and Odbert (1936) called “real” traits, thus excluding evaluative terms and state terms. Although there were exceptions (e.g., Brokken, 1978), in general this observation was correct. Tellegen and Waller (1987) undertook a first study with more relaxed criteria for the selection of trait terms, explicitly including evaluative and

state terms. Based on self-ratings, they concluded to a factor solution with seven factors, namely (1) Positive Valence (*important, outstanding, special, first-rate*), (2) Negative Valence (*evil, vicious, wicked, worthless*), (3) Positive Emotionality (*cheerful, social, convivial, spirited*), (4) Negative Emotionality (*nervous, anxious, prone to have mood swings, cycloid*), (5) Conventionality (*conservative, mossbacked, not eccentric, not odd*), (6) Agreeableness (*agreeing, not stubborn, not bad-tempered, not sarcastic*), and (7) Dependability (*deliberate, careful, resolute, consistent*). The latter five, are interpreted as versions of the Big Five (Waller, 1999).

Almagor et al. (1995) and Benet-Martínez and Waller (1997) undertook similar psycho-lexical studies in Hebrew and Spanish, respectively. Also using self-ratings, they both concluded to seven factors. Almagor et al. (1995) claimed that two of their seven factors represented Positive Valence (*sophisticated, sharp, knowledgeable*), and Negative Valence (*fabricator, envious vs. reliable, frank*), and four of the seven were similar to Big Five factors Extraversion, Neuroticism, Agreeableness, and Conscientiousness. Tellegen and Waller's (1987) Conventionality (related to Intellect/Openness to Experience) factor was said not to be replicated. Yet, the contents of the Positive Valence factor seem to convey Intellect semantics. Benet-Martínez and Waller's (1997) Spanish structure contained Positive Valence and Negative Valence factors, very much like in the Tellegen and Waller (1987) structure, and versions of Big Five Extraversion, Agreeableness, and Openness. Negative Emotionality did not have a clear counterpart in the Spanish structure. Based on the contents of the different outcomes, the full replicability of the Big Seven structure remained undecided.

It should be noted that in these three studies a peculiar restriction was built in by accepting only each first trait-descriptive word that was encountered on every fourth page of a dictionary. This aspect of the procedure seems at odds with the psycho-lexical spirit to taxonomize all traits in the lexicon. Nevertheless, such a procedure might work well and is worth testing as long as the semantics of the full trait universe is representatively sampled. One of the problems could be that certain pages not inspected for traits might contain trait terms in relatively large densities.

Another point to be noted is that while Benet-Martínez and Waller (1997) report on a trait structure based on ipsatized data, for Tellegen and Waller (1987) and Almagor et al. (1995), there is no mention of ipsatization.

A first psycho-lexical study in the Serbian language (Smederevac, 2000) relied on the Tellegen-Waller procedure for the selection of trait-variables, including the use of non-ipsatized (raw) data. Although the study resulted in a seven-factor structure, the contents of the factors did not fully resemble the Big Seven model. The robustness of the evaluative dimensions was confirmed, Agreeableness had a strong aggressive connotation, and instead of Extraversion, a new factor emerged, named Emotional Control. Given the fact that Smederevac's (2000) study was based on raw data, for the present study we analyzed also ipsatized data and compared the results. Moreover, structures with two to six factors were also investigated.

2.1. Method

2.1.1. Participants

Of the 500 participants taking part in Study 1, there were 215 men and 285 women. Their average age was 25.5 years, ranging from 18 to 72 years. About two third of the sample (343) were students from the University of Novi Sad, who got extra credits for their participation in the research. The remainder of the sample were adult participants with various occupations and educational backgrounds, whose participation was voluntary (with oral consent). Participants from the community sample were recruited by

psychology students, who administered the questionnaires for course credits in the Personality psychology course.

2.1.2. Procedure

Since the procedure of this study has been described in detail in Smederevac (2000), only a summary description is given here. Personality descriptors had been selected from the *Dictionary of the Serbo-Croatian Literary Language (1967–1976)*, which contained a total of 5638 pages, with 143,252 entries. In correspondence with Tellegen and Waller's procedure (Waller, 1999), from every tenth page the first word (whether noun, adjective, or verb) was selected that could be meaningfully used within either of the sentences "Tends to be X"/"Is often X" (Waller, 1999), resulting in a list of 340 words. Three judges (two psychologists and one professional lector) excluded 68 synonyms from the list, resulting in a final list of 272 words (148 adjectives, 107, verbs, and 17 nouns), which served as a basis for a questionnaire. In agreement with Almagor et al. (1995), a four-point response scale format was used, running from "1" (Completely false for me), to "2" (Mostly false for me), to "3" (Mostly true for me), to "4" (Completely true for me).

2.2. Results

Principal Components Analyses (PCA) were performed on both raw and ipsatized data, followed by Varimax rotation. PCA plus Varimax (instead of EFA as an obvious alternative) was used to optimize comparison with other psycho-lexical studies that virtually all applied PCA. A convincing argumentation in favor of PCA for this type of studies is given in Hofstee (2003), who describes it as a logical consequence of performing item analysis. The best criterion for the validity of single items is in the total score on the set of equivalent items. Items are first weighted in relation to the total score. By assigning weights to items, the total score is being replaced by a weighted sum. The logical next step is to assign weights in association with the weighted sum. Through iteration to convergence of weights and weighted sums the weighted total score is the first principal component (Hofstee, 2003, p. 238). Moreover, in case of large sets of variables and large samples, there is virtually no difference in results between using CFA and EFA (see Lee & Ashton, 2007), nor with using Varimax instead of, for example, Promax. The first ten eigenvalues, expressed in percentages of variances, in the case of raw data are given in Table 2, first column, together explaining 35.2 percent of the variance. The first ten eigenvalues in the case of ipsatized data are given in the second column, together explaining 33.2 percent of the variance. In terms of amount of variance, the ipsatization apparently had little effect. Although the patterns of the eigenvalues (scree test) rather suggested four or five components (henceforth called factors throughout this paper) in both cases, in order to enable a match of the number of factors of the Tellegen-Waller model, in both cases two to a maximum of seven factors were extracted. All factors were named on the basis of the highest loading variables.

2.2.1. Factor structures

The Big Seven was only partially identified in the raw data set, but with clear Negative Valence and Positive Valence factors. In the Seven-solution based on the ipsatized data, again Negative Valence and Positive Valence were easily identified, and the remaining factors resembled the Big Five, with Intellect been represented negatively by traits of Conventionality. Although the seven factors did not all come about in their theoretically most articulate form, the structure is clearer than in the case of raw data and one might conclude that the ipsatized data has produced the Big Seven model. This clearer ipsatized solution is given in Fig. 1, together with solutions with smaller numbers of factors, in a hierarchical pattern. Using the factor-scores, the correlations were calculated between

Table 2

Eigenvalues, expressed in terms of percentages of variance for three studies.

Component	Study													
	Study 1		Study 2				Study 3							
			Lexi		PL		Stable traits		+ Talents		+ Evaluative		Full set	
	R	I	R	I	R	I	R	I	R	I	R	I	R	I
1	13.2	12.3	11.2	8.5	8.3	6.7	10.5	6.8	10.7	6.6	11.1	6.8	11.5	7.5
2	6.4	6.0	7.6	6.1	6.9	5.2	7.1	6.0	7.3	6.0	7.2	5.8	7.0	5.9
3	3.6	3.6	3.7	2.8	3.8	2.9	5.1	3.0	4.8	2.9	4.4	2.9	4.6	2.7
4	2.9	2.9	2.6	2.4	2.8	2.0	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.3
5	2.0	1.8	2.1	1.9	1.7	1.8	2.2	2.1	2.1	2.1	2.0	2.0	1.8	1.9
6	1.6	1.5	1.7	1.8	1.6	1.7	1.9	1.7	1.8	1.7	1.8	1.7	1.7	1.4
7	1.6	1.4	1.4	1.6	1.5	1.5	1.6	1.5	1.5	1.5	1.5	1.4	1.3	1.3
8	1.4	1.3	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.2	1.3	1.1	1.2
9	1.3	1.3	1.2	1.1	1.1	1.2	1.3	1.2	1.1	1.2	1.0	1.2	1.0	1.1
10	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.1	0.9	1.0	0.9	0.9
%	35.2	33.2	34.0	28.7	30.2	25.4	34.7	27.3	34.2	26.9	33.6	26.5	33.1	26.2

Note. R = Raw data; I = Ipsatized data.

factors from adjacent levels of extraction, and the results show the hierarchical emergence of the different solutions. Each factor is represented by a small number of the highest loading trait variables representing the two poles. The rectangles at the bottom of Fig. 1 do not contain our interpretations of the factors, but rather contain our best estimates of labels from the relevant trait literature agreeing with the factors. The connection may not always be immediately recognizable because of the small number of terms in the boxes. For PV, for example, other terms loading high on factor 7/1 expressing PV are *influential*, *makes impact*, and *admirable*.

Big Six Honesty-Humility did not appear as a single factor with raw data and also not after ipsatization. The five-factor solution gave E (5/1), C (5/3), and N (5/5). Agreeableness traits were included in the factors 5/2 and 5/4, with factor 5/4 having an emphasis on NV traits; Intellect is absent. The two-factor solution represents Agency and Communion traits, and the three-factor model is identifiable in the three-factor solution.

2.3. Discussion

In Study 1, the trait variables were selected according to “unrestricted” criteria suggested by Almagor et al. (1995). Using both raw data based factors and ipsatized data based factors enabled to observe some redistribution of information contained in the raw-data factors leading to a more articulate formulation of the ipsatized data factors, notwithstanding the equal naming of the two sets of factors. Although the eigenvalues did not particularly suggest a seven-factor structure for either of the two types of data, but rather four or five, especially the ipsatized seven-factor structure seemed to come close to the Big Seven.

Compared to most other psycho-lexical studies, the number of 272 terms in this study is a relatively small set. Yet, it is comparable to, for example, the Polish study with 287 terms (Szarota, 1996) and the Roman-Italian study with 285 terms (Caprara & Perugini, 1994), and those studies provided rather clear-cut results. The size of the final set of 272 terms in this study is possibly also influenced by the procedure of page-sampling. Many terms are simply not considered for their capacity to describe traits. Yet, this need not mean that the structural results inadequately represent the domain of trait semantics.

3. Study 2

Most psycho-lexically based studies make use of adjectives as personality descriptors, sometimes embedded in a brief sentence. The lexical approaches including nouns and verbs require more

complex item formulations, which are often in a more elaborate sentence format, with or without slight contextualization (see, e.g., De Raad & Barelds, 2008). There is a possibility that, besides item content, also item format is a procedural feature that can affect the results. A thorough discussion of the many issues involved with item formulation can be found in Angleitner and Wiggins (1986). Barelds and De Raad (2015) demonstrated that, for Dutch, the additional use of especially personality descriptive verbs to trait-adjectives influenced the final structure trait structure.

Also the second lexical study in the Serbian language (Smederevac et al., 2007) was also conducted according to the non-restrictive procedure described by Almagor et al. (1995). The list of descriptors, derived from a more recent dictionary and comprising all personality-relevant descriptors (including evaluative and state terms), was used to create two questionnaires with different item formats. The first one, named Lexi, consisted of the items in a more standard format, with single words or expressions, but put in brief sentences. The items of the second questionnaire (PL) were constructed in the more contextualized format in order to either eliminate potential ambiguities of some terms or to facilitate the respondent's acceptance of some negatively-evaluative descriptors.

3.1. Method

3.1.1. Participants

A total of 1806 respondents participated in this study¹. The Lexi questionnaire was filled out by 1006 participants (470 males, 439 females; for 97 gender was not indicated) aged between 18 and 84 (mean age 29.03). The PL questionnaire was filled out by 476 women and 324 men, aged 18–73 (mean age 30.16).

3.1.2. Procedure

A more recent but much less inclusive Serbian dictionary (Moskovičević, 2000) than in Study 1 with 874 pages was used. The size of a dictionary is usually mainly determined by the number of words for things (nouns); the set of ordinary words for traits, such as adjectives, for example, is usually almost the same across dictionaries of different sizes.

¹ A portion of the data used in the present study were previously used in Smederevac et al. (2007). As for the Lexi questionnaire, we used an enlarged sample of participants, originally 600, and presently 1006. For the PL questionnaire, the same sample was used as in 2007, but different analyses were performed.

Fig. 1. Study 1, ipsatized. Note. PE = Positive Emotionality; C = Conscientiousness; PV = Positive Valence; CV = Conventionality; A = Agreeableness; NV = Negative Valence; N = Neuroticism.

A variant of the [Almagor et al. \(1995\)](#) item-sampling procedure was applied, selecting the first personality descriptor encountered on each page of the dictionary, ultimately resulting in a list of 264 words. Based on that list, the two questionnaires were created, the Lexi with the brief sentence format using the original word, and the PL with a sentence format with contextualized behavior, attitudes, or reactions. Examples of the different item formulations are given in [Table 3](#). The items were rated on a five-point scale, running from “1” (Completely disagree), to “2” (Mostly disagree), to “3” (Neither agree nor disagree), to “4” (Mostly agree), to “5” (Completely agree).

3.2. Results

Principal Components Analyses were performed on both raw and ipsatized data for both the Lexi and the PL questionnaires. In case of the Lexi, raw data, the first ten eigenvalues, given in [Table 2](#),

Table 3
Examples of items in Lexi and PL.

Original word	Lexi-format	PL-format
Active	I am a very active person	I live a very active life
Rebellious	I am a rebellious person	This environment keeps giving me reasons to rebel
Exemplary	My behavior is exemplary	My behavior can often be an example to others
Tolerant	I am tolerant	I don't mind if people act or think differently
Lie	I lie frequently	Often, I was forced to tell lies
Give orders	I like to give orders	I like telling other people what to do

third column, together explained 34.0 percent of the variance. For the ipsatized data, the first ten eigenvalues (Column 4) together explained 28.7 percent of the variance. In case of the PL, raw data,

the first ten eigenvalues (Column 5), together explained 30.2 percent of the variance. For ipsatized data (Column 6), the eigenvalues together explained 25.4 percent of the variance. For both the Lexi and the PL data, ipsatization had some effect, but quite according to expectations. The reduction in the amounts of variance from Lexi to PL was not expected.

3.2.1. Lexi data, factor structures

Starting with the seven-factor structure, the one based on the raw data had the typical PV and NV, and versions of four of the Big Five plus Aggressiveness. Also in this case the solutions based on the ipsatized data were generally clearer and more articulate, for which reason also here the hierarchical emergence of the different factor solutions was presented (Fig. 2). The factors in the two-factor solution support the Big Two, with agentic traits (including Positive Emotionality) captured by 2/1 and communal (Agreeableness and to a lesser extent Conscientiousness) characteristics captured by 2/2. At the Three-factor level, a Conscientiousness factor (3/3) was added, thus supporting the Big Three. At the four-factor level Agreeableness split into a factor with Honesty (4/2) at one pole and Negative Valence at the other pole, and a revised Agreeableness factor (4/4). At the five-factor level, 5/5 is added in which a combination of sentimentality and sociability on one pole and eccentricity and carelessness on the other pole was found; after some split-offs from the five-factor solution to the six-factor solution and from the six-factor solution to the seven-factor level, the factor 7/6 conveyed at best a version of Conventionality. Besides the items given in the box 7/6 with *sociable* versus *eccentric*, other terms loading in this factor are *absorbed in thought*, *broadminded*, and *creative*. Positive Valence (6/6) was added in the six factor solution. At the seven-factor level, a Neuroticism factor was added (7/5). The Big Seven did not clearly emerge, although the seven factors might be seen as (versions of) the Big Seven factors.

3.2.2. PL-data, factor structures

Also in this case the ipsatized data generally provided somewhat clearer structures than the raw data. The Big Two was identified in 2/1 and 2/2 (Fig. 3), with an additional Conscientiousness factor at the three-factor level, thus completing the Big Three. The five-factor structure lacked a Neuroticism factor, but had instead a Positive Valence factor (5/1). Honesty did not emerge in any of the solutions. The seven-factor structure contained clear Extraversion, Agreeableness, Openness, and Conscientiousness factors, and in addition versions of Positive Valence, Positive Emotionality, and Negative Valence.

3.2.3. Congruences between Lexi and PL based factors

We calculated the congruences between the Lexi-based factors and the PL-based factors for the solutions with two up to seven factors. The congruences were calculated after rotation of the Lexi-based factors to the PL-based factors and vice versa; the averages are given in Table 4. Congruences should preferably be in the order of 0.85–0.90 (see Haven & Ten Berge, 1977; Lorenzo-Seva & Ten Berge, 2006) to indicate identity. With seven factors, no more than four would be considered the same for Lexi and PL based factors. The congruences generally indicated that two- and three-factor solutions were stable, and beyond that stability reduced. For the first five factors of the seven-factor solution, the Lexi factors accommodated the PL factors slightly (0.02) better than the PL factors did the Lexi factors.

3.3. Discussion

Is the extended PL-format to be preferred over the more standard Lexi format? It looks like this is not the case. The PL based factors explain less variance, both for raw data and for ipsatized data

(Table 2). It seems to be that the ipsatized data provide a somewhat clearer structure than the raw data, for both the Lexi-format and the PL-format. Restricting ourselves to the ipsatized-data based structures, the congruences between the Lexi based factors and the PL based factors tell that the Lexi-structures accommodate the PL-structures a little better than the other way around. More specifically, the Lexi factor 4/2 (Table 4: row Lexi-4, column F/2), an Honesty-related factor, does not find its equivalent in the PL-solution (congruence of 0.61). This repeats at the five-level, the six-level, and the seven-level with the factors with similar meanings. Also, the Lexi 6/6 (row Lexi-6, column F/6), does not have its equivalent in the PL-structure. Of the PL-based factors, 4/4, 5/5, 6/5, and 7/5, which are not substantially related, do not find equivalents in the Lexi-based structures. Similarity between factors reduces clearly after three to four factors.

Instead of selecting each first trait-relevant word on every tenth page (Study 1), in this study the first trait-relevant word on every page was selected. The resulting final set of words is of a similar size as in the case of Study 1. There is no reason to believe that eight words less has a significant effect on the final structure.

4. Study 3

Like in Studies 1 and 2, also in Study 3 the main aim was to investigate the trait structure in Serbian. This third study started from scratch, by selecting a new dictionary, culling a set of representative trait descriptors, and subsequently using a fresh sample of participants to arrive at the trait structure. The specific procedural issue in this case was the subsequent addition of distinct trait categories to the set used to arrive at the final structure. The effect of adding separate categories to arrive at lexical dimensions has not been a real focus of attention thus far. This could, for example, refer to dispositional terms, talents, states, reputations, attitudes, and evaluations.

In the introduction to this article, the distinction between the Dutch and the German psycho-lexical projects were sketched. In the Dutch project (Brokken, 1978), all personality relevant trait terms were assessed for descriptiveness by fitting them into two criterion sentences, thus resulting in the final set. In the present Study 3 we used such criterion sentences. In the German project (Angleitner et al., 1990), an explicit schedule was used involving the identification of a variety of person characterizing categories, including dispositions, talents, roles, and reputations. In Study 3, we investigated the structure based on dispositions or stable traits, then added talent terms, next evaluations, and finally we added the remaining set of terms. The inclusion of the talents category might be responsible for the explicit and strong Intellect-factor in the German Big Five structure (De Raad, 2000). The explicit inclusion of evaluative terms, has been suggested to be responsible for the Negative Valence and Positive Valence factors (Tellegen & Waller, 1987). Just as in Studies 1 and 2, also in Study 3 we analyzed both raw data and ipsatized data.

4.1. Method

This study consisted of two phases. Phase 1 comprised the selection of trait descriptors from the lexicon and the reduction of the obtained list to manageable proportions. This first phase actually consisted of three steps. Phase 2 comprised the structuring of the personality descriptors on the basis of self-ratings.

4.1.1. Phase 1: Selection and reduction of Serbian personality descriptors

4.1.1.1. Phase 1, step 1, selecting an initial list of trait-adjectives. The Dictionary of Serbian language (Rečnik srpskoga jezika; Vujančić,

Fig. 2. Study 2, Lexi., ipsatized. Note. PE = Positive Emotionality; NV = Negative Valence; A = Agreeableness; C = Conscientiousness; CV = Conventionality; N = Neuroticism; PV = Positive Valence.

2007) was used for the purpose of the selection of personality descriptors. This dictionary had approximately 85,000 entries and 1450 pages with two columns. Three judges, two psychologists and a linguist, were asked to independently select all the adjectives that refer to a person, according to criteria of relevance. These criteria implied fitting adjectives in either of two sentences: "How (adjective) am I?" or "How (adjective) X behave?". These criteria are in accordance with the procedure that was used in the studies in the Dutch language (Brokken, 1978). Just like in Brokken's study, that procedure resulted in a rather inclusive set of trait-adjectives that are largely dispositional in nature. Only full consensus among the three judges led to acceptance of a descriptor for further use. Excluded were a few words that were gender-specific or related to appearance.

The credibility of the selection of adjectives was tested by 34 independent judges. In a course on the Psychology of individual differences, psychology undergraduates were asked to apply the

same two criteria in selecting relevant personality descriptors. The result was an initial list of 1414 adjectives.

4.1.1.2. Phase 1, step 2, classification of the initial set of terms. In the next step, the 1414 terms were classified into 9 categories, much along the lines as specified in the German study. The complete list comprised 1414 descriptors. In order to facilitate the classification process, the list was divided into three sets of descriptors, the first one consisting of 471 terms, the second one of 471 terms, and the third one of 472 terms. The sets were randomly assigned to groups of students, who completed the task during a practical in personality psychology. The students who completed the rating were awarded extra course credits. A total of 94 psychology students (average age = 21.37 years, $SD = 0.49$, 89.36% females) participated. They had to assign the terms to one of the categories and had to rate the degree to which the descriptors corresponded to the 9 categories (Table 5). The degree of compatibility of each term with a

Fig. 3. Study 2, PL, ipsatized. Note. E = Extraversion; A = Agreeableness; NV = Negative Valence; O = Openness; C = Conscientiousness; PV = Positive Valence; PE = Positive Emotionality.

Table 4

Congruences between Lexi-based and PL-based factors, after rotation of Lexi to PL and vice versa, ipsatized data.

Targets	Factors						
	F/1	F/2	F/3	F/4	F/5	F/6	F/7
Lexi-2	0.94	0.85					
PL-2	0.94	0.85					
Lexi-3	0.95	0.85	0.86				
PL-3	0.94	0.85	0.86				
Lexi-4	0.95	0.61	0.87	0.89			
PL-4	0.94	0.86	0.83	0.55			
Lexi-5	0.94	0.66	0.87	0.90	0.85		
PL-5	0.94	0.82	0.89	0.81	0.63		
Lexi-6	0.94	0.66	0.86	0.91	0.86	0.69	
PL-6	0.90	0.88	0.88	0.87	0.65	0.79	
Lexi-7	0.94	0.55	0.86	0.90	0.87	0.80	0.85
PL-7	0.92	0.88	0.89	0.83	0.55	0.80	0.82

Note. The F runs from 2 to 7, depending on the factor solution, all agreeing to the factor codes as presented in Figs. 2 and 3.

Table 5

Classification of the initial descriptor list and selection of used terms.

I criterion – type of descriptors	Full list			Suitable words		
	f	%	Cronbach alpha	f	%	Cronbach alpha
1a. Temperament and character traits	572	40.5	0.93	203	53.0	0.92
1b. Abilities, talents or their absence	78	5.5	0.92	19	5.0	0.94
2a. Emotions, moods and cognitions	170	12.0	0.91	45	11.7	0.91
2b. States and activities	45	3.2	0.87	6	1.6	0.87
3a. Roles and relationships	160	11.3	0.92	44	11.5	0.93
3b. Social effects: reactions of others	85	6.0	0.91	14	3.7	0.92
3c. Pure evaluations	228	16.1	0.78	36	9.4	0.73
3d. Social status	42	3.0	0.89	5	1.3	0.84
3e. Value orientations	34	2.4	0.89	11	2.9	0.89
Totals	1414			383		

particular category was rated on a 5-point scale, running from 1 (does not correspond to a category) to 5 (corresponds fully to a category). After the students completed the ratings, average ratings of each term for each of the categories were calculated. Each term was assigned to a category for which it had the highest rating. The alphas in the “full list” panel in Table 5 tells that the classification was done reliably.

Given the fact that 1414 set of descriptors are to be seen as largely dispositional in nature, the categorization task was quite a challenge to the student-participants, as can be seen in examples of trait terms in the categories. Category 1a, for example, contained *adventurous*, *big-headed*, and *clever*, and 1b contained *creative*, *successful*, and *intelligent*, 2a contained *cheerful* and *nervous*, and 2b contained *weak* and *wild*. Further examples are *dependent* and *insistent* in 3a, *charming* and *pompous* in 3b, *beloved* and *brutal* in 3c, *respected* in 3d, and *traditional* in 3e.

4.1.1.3. Phase 1, step 3, elimination of inappropriate terms. Another aim was to eliminate inappropriate terms (synonyms, antonyms, metaphorical terms, vague terms, outmoded terms, as well as context-specific or technical terms), in order to end up with a set of terms that is suitable for the person rating task in the next Phase. This elimination step was performed by 9 judges (a lector, 4 university professors, and 4 PhD students of psychology), who discussed as a team the terms in the category lists. Each word was compared with other words from the category list, taking into account synonymy, antonymy, etc., and consensus was used as a final criterion. From the total list of 1414 terms, 481 (34%) were thus removed on the basis of synonymy, 180 (12.7%) on the basis of antonymy, 31 (2.2%) because they had figurative meaning, 144 (10.2%) because they were considered foreign (imported words: Germanisms, Anglicisms, Romanicisms), and 195 (13.8%) were removed because they were considered too metaphorical, vague, or specific. The resulting set of suitable words comprised 383 terms (27.1%); these are summarized in Table 5 (“suitable words” panel). Cronbach alpha’s were re-calculated in order to estimate whether the reliabilities of the categories had changed due to the reduction.

4.1.2. Phase 2: Factor structure of the personality relevant adjectives

4.1.2.1. Participants, material, and procedure. The sample consisted of 1575 persons (42% males), from 18 to 60 years of age ($M = 29.28$, $SD = 11.74$). Of the participants, 98.9% reported at least high school education, 43.6% were university students, and 56.4% were professionals from different disciplines. The data were gathered in the course of the project “Psychological foundations of mental health: hereditary and environmental factors”, as well as during courses in personality psychology held at the Department of Psychology in Novi Sad. All participants were given the list of 383

terms with the instruction to describe themselves on a five-point scale, running from “1” (Completely disagree), to “2” (Mostly disagree), to “3” (Neither agree nor disagree), to “4” (Mostly agree), to “5” (Completely agree). Oral consent was obtained from all participants.

4.2. Results

Principal Components Analyses (with Varimax rotation) were conducted using different sets of terms, starting with the set of 203 terms classified as most typical temperament and character traits; the analyses were done on both the raw data and on the ipsatized data. Subsequently, the ratings for the 19 “talent” terms (Category 1b) were added and PCA’s were done on the enlarged set of 222 terms. Next, the set of 36 “evaluation” terms (Category 3c) was added, followed by PCA’s on the 258 terms. Finally, the remaining set of terms was added, which were terms with partly an emphasis on emotion and state features and partly with an emphasis on role and social effect features, and PCA’s were performed again. Table 2 (Study 3 panel) gives the eigenvalues expressed as percentages of variance for the first 10 factors for both raw and ipsatized data, and for the four sets of data.

While the patterns of eigenvalues suggested three to five factors as more optimal (scree test) in all cases, the maximum numbers of 7 factors were used for further analysis. This was done for purposes of comparison (with Studies 1 and 2), and in order to allow the emergence of specific factors such as Negative Valence and Honesty-Humility.

4.2.1. Analyses of the four data sets

4.2.1.1. The raw-data based factors. The contents of the two- to seven-factor solutions based on the 203 trait-set, those based on the 222 trait-set, and those based on the 258 trait-set were almost similar in meaning, at the various levels, but with slight differences in emphases. The 383-set based factors were similar too but with stronger differences in emphases (with broader and narrower factors).

In order to check psychometrically whether the factors emerging in the different sets of traits were the same, we calculated the congruences between factors in the smaller three sets and in the full set of 383 trait terms, after rotation to the factors in the full set as target. The results are given in the “raw data” panel in Table 6. The congruences were moderate but generally agreed with the conclusion that the factors in the different sets were reasonably similar.

Of interest was the contribution of the sets of trait terms to the structures, with 19 “talent” terms to form the 222-set, 36 “evaluative” terms to form the 258-set, and the remaining set of 125 terms to form the 383-set. This latter additional set of 125 terms mainly

Table 6

Congruence coefficients after target rotation between the 383 trait-based seven factor target solution and corresponding factors in the three other solutions, for both raw and ipsatized data.

Raw data				Ipsatized data			
Stable traits (203)	Previous plus talent terms (222)	Previous plus evaluative term (258)	Target factors (383)	Stable traits (203)	Previous plus talent terms (222)	Previous plus evaluative term (258)	Target factors (383)
0.83	0.83	0.84	1. Negative valence	0.92	0.92	0.93	1. Extraversion
0.81	0.82	0.83	2. Extraversion (Eroticism)	0.90	0.90	0.91	2. Agreeableness
0.75	0.75	0.76	3. A + C	0.85	0.86	0.87	3. Intellect
0.82	0.83	0.83	4. Intellect	0.80	0.80	0.85	4. Negative valence
0.82	0.82	0.82	5. Negative vs. Emotionality vs PE	0.79	0.80	0.81	5. Conscientiousness
0.76	0.77	0.77	6. Conscientiousness	0.80	0.80	0.80	6. Sensitivity (–)
0.77	0.77	0.78	7. Aggression	0.71	0.71	0.74	7. Boring vs eroticism

consisted of terms describing temporary conditions and social and reputational characteristics. We traced the 19 “talent” terms in the structures based on the 222-set, focusing on the seven-factor structure, and found that 7 “talent” terms contributed with substantial loadings to the meanings of the factors 7/4 and 7/6, with the first representing a blend of Intellect and Conscientiousness, and the second representing a blend of Intellect and Extraversion. Those two factors were also part of the 203-set based factors. This means that the “talent” terms did not produce new factors, but only enhanced the meanings of existing factors. A similar thing happened with the inclusion of the 36 “evaluative” terms. In the seven-factor structure, some 20 of the 36 “evaluative” terms (all negative) contributed to the factor 7/2, giving the corresponding 222-set based factor 7/2 (–Honesty) Negative Valence meaning. Five (positive) evaluative terms contributed to the factor 7/3 (Agreeableness) and five evaluative terms contributed to the factor 7/6 (Intellect-facet).

4.2.1.2. The ipsatized-data based factors. Again, the ipsatized data based factor solutions were clearer than those based on raw data, for each of the four data-sets. The 203-set based factors started off with the two Communion and Agency related factors at the two-factor level, with a third factor at the three-factor level representing Conscientiousness traits mixed with traits of Intellect. At the four-factor level, Neuroticism was added and at the five-factor level the Big Five were recovered. A six-factor solution gave an additional Intellect-related factor reflecting complexity versus conventionality. With seven-factors, an Honesty factor seemed to pop up.

Also here, the contents of the two- to seven-factor solutions based on the 222 trait-set, those based on the 258 trait-set, and those based on the 383-set, were almost similar in meaning to those based on the 203-set, again with slight differences in emphases. We calculated again the congruences between factors in the smaller three sets and in the full set of 383 trait terms, after rotation to the factors in the full set as target. The results are given in the “ipsatized data” panel in Table 6. The congruences were acceptable, except for Factor 7 (Boring vs. eroticism), and most were somewhat higher in comparison to those in the “raw data” panel.

With the additional 19 “talent” terms, the 222-set based structures gave the same factors, with the “talent” terms evenly contributing to Extraversion, Intellect, and Conventionality. The variable set with 258 terms again provided virtually the same factors at the various levels, with a third of the additional 36 “evaluative” terms contributing to the meaning of factor 7/6, thus replacing 222-based factor 7/6 (Conventionality) by a factor describing lack of character and of Negative Valence. It may be worth pointing out that, in a 7-factor solution, the factor 7/7 captured a number of descriptors that refer to “attractiveness” (“sexy”, “seductive”); the factor thus resembled a similar Attractiveness

factor as discussed in Saucier (1997). In the full set of 383 trait terms, the Big Five factors were identified, the Honesty factor disappeared, to be replaced by a factor with traits running from *ordinary* to *pleasing*. Since the different sets of variables produced quite similar structures, we presented only the ipsatized-data based hierarchical structure of the solutions with two to seven factors.

4.3. Discussion

The selection of trait-descriptive terms for Study 3 was done according to the Dutch principles, followed by a classification of terms into various categories of the German schedule. The reduction of the total list of 1414 trait descriptive terms to the final list of 383 terms was partly done on the basis of more familiar criteria, such as vagueness, being metaphorical, or specificity. This led to a reduction with 370 words to a set of 1044. The further reduction was done on the basis of synonymy, a procedure used, for example by Norman (1967), and later by Engvik (1993) in Norwegian, by Livaniene and De Raad (2017) in Lithuanian, and by Farahani, De Raad, Farzad, and Fotoohie (2016) in Persian. The technique is a logical one, in which a large set of lexical terms is reduced to manageable proportions while preserving the kernel semantics of the set. Moreover, the procedure prevents that clusters of terms and factors of traits are too strongly determined by bloated specifics.

The ultimate number of 383 terms compares well with other psycho-lexical studies, in which an average of just over 400 has been used (see, e.g., De Raad et al., 2014) and the set included a separate set of 19 “talent” terms and 36 “evaluative” terms. The effects of including these two sets on the trait-structure were, however, non-significant regarding the emergence of factors. The trait-structures remained virtually the same, and the sets of additional terms apparently only strengthened the meanings of existing factors. Although the eigenvalue patterns did not give much reason to check factor-structures with more than three or four factors, we discussed structures with a maximum of seven factors to be consistent with Studies 1 and 2. The final focus was on the structure with seven factors.

Just as in the Studies 1 and 2, also in the case of Study 3, the ipsatized data based structures were generally clearer than those based on raw data. With raw data, Negative Valence emerged more easily. The ipsatized data based factors seemed to confirm the Big Five plus a Negative Valence or Honesty-Humility factor. Honesty-Humility was identified both in the structures based on the 203-set of terms and the 222-set of terms. After the inclusion of the evaluative terms, the Honesty factor turned into a Negative Valence factor. The hierarchy of factors in Fig. 4, represents the confirmation of the two factor model, and of the three-factor model.

Although it seems logical to compare the structural results based on the 383 set of terms directly to the outcomes of the language-similar Croatian trait study (Mlačić & Ostendorf, 2005),

Fig. 4. Study 3, 383, ipsatized. Note. E = Extraversion; A = Agreeableness; N = Neuroticism; PV = Positive Valence; NV = Negative Valence; I = Intellect.

differences or similarities between the structures are difficult to separate from effects due to procedural differences.

5. Study 4

The previous three studies were all performed according to psycho-lexical principles, but done independently at different periods in time, using different lexical resources, and using different samples of participants. The data-sets of the three studies varied in terms of numbers of items, with each separate set being restrictive in terms of representation of what the personality vocabulary in the language provides. In this fourth study we aim to exploit the different sets of data and combine them into a joint data-set on the basis of the trait-variables they have in common. Such a joint matrix would optimize finding the structure that would describe the Serbian trait domain best. The focus is on finding the structure that is common to the different data sets. This joint analysis of different data sets is done by using Simultaneous Component Analysis (SCA; e.g., Kiers & ten Berge, 1994). With this method it is

possible to find the structure that best captures the patterns of correlations common to the different sets of data. Moreover, we aim to provide an answer to the question to what extent the individual structures relate to the structure that is common to all.

5.1. Method

5.1.1. Materials

We repeat briefly a description of the data sets of Studies 1–3 that were used for this joint analysis. Subsequently, we describe the way we merged the data.

The Study 1 data set consisted of 272 trait descriptors on which 500 participants had provided self-ratings (215 males; 285 females). Of Study 2 only the Lexi-set of data was used, comprising self-ratings from 1006 participants on 264 trait-descriptors. Of Study 3 only the set of 383 trait descriptors was used, on which 1575 participants had provided self-ratings. The full set thus added up to a matrix of 3081 (participants) by 919 (trait descriptors). This matrix contained huge areas with missing data. Many of those 919

descriptors in the three studies were, however, the same, with 91 terms common to all three studies, 110 terms common to Study 1 and Study 2, 152 terms common to Study 1 and Study 3, and 159 terms common to Study 2 and Study 3. Taking the overlap into account, we were left with a matrix with 589 unique trait-terms, now with connectivity between the three studies but still with large areas with missing data.

5.1.2. Analyses

To identify the central structure in this joint matrix we applied SCA, with the SCA model with equal cross-products (SCA-ECP; Timmerman & Kiers, 2003). An important issue to deal with were the amounts of missing data. For a more detailed account of using SCA in this case, we refer to De Raad et al. (2014) who analyzed a joint set of data stemming from 11 psycho-lexical studies. To handle the missing data scores, we used iterative imputation (De Roover, Ceulemans, & Timmerman, 2012; Kiers, 1997), a procedure in which component scores, loadings, and missing values are

estimated jointly. In order to find out about the extent to which the individual structures of the Studies 1, 2, and 3 related to the central structure in the joint data set, we also made use of results of the separate PCA's.

5.2. Results

In applying the SCA-ECP, the components with the three individual structures are orthogonal, so that a proper comparison between the SCA-based common structure and the PCA-based individual structures is ensured. The SCA application gave the following percentages of explained variance for the first ten components: 7.7, 5.6, 2.5, 2.2, 1.8, 1.4, 1.2, 1.1, 1.0, and 0.9, suggesting no more than five components to retain. We analyzed solutions with two up to seven components after Varimax rotation, and constructed a hierarchy with correlations between components from adjacent solutions. The hierarchy, given in Fig. 5, showed a stable pattern from the higher level with two components to the lower

Fig. 5. Study 4, SCA. Note. E = Extraversion; A = Agreeableness; C = Conscientiousness; N1 = Neuroticism- aspect 1; PV = Positive Valence; N2 = Neuroticism- aspect 2; NV = Negative Valence.

level with seven components, with additional components (3/3, 4/4, and 5/5) showing little relationship with components at previous levels. The hierarchy was quite similar to the 383-based one of Study 3. The splits of 5/5 (into 6/5 and 6/6) and of 6/6 (into 7/5 and 7/7) seemed to involve splits of trait semantics into further specifications or facets.

Table 7
Marker items for the five SCA-based components.

Component	Markers
1	Enthusiastic, feels happy, in a good mood, intriguing, energetic, knows how to enjoy, successful, spirited, jaunty, smiling, interesting, sexy, cheerful, satisfied, amusing, seductive, pleasing, attractive, leader, resourceful, people readily accept him, makes strong impact, charming, optimistic, appealing, born victor, strong, dynamic, sociable, influential, good organizer, talkative, combative, witty, skillful, ambitious, powerful, quick-witted versus feels empty, sad, is bored, tense, loser, concerned, pessimistic, apathetic, withdrawn, mum, embittered, life is meaningless, blue, desperate, alienated, life is unbearable, weak, unhappy, melancholic, indecisive, morose, reluctant, captive, fearful, shy, he is ruined, oversensitive, principled, discouraged easily, remorseful, boring, frustrated, burdened, slow, self-pitying, incompetent, feels old
2	Tender-minded, peaceful, docile, tolerant, amiable, obedient, moderate, gentle, careful, family man, kind, cuddly, pleasant, modest, yielding, kind-hearted, munificent, decorous, forgiving, patient, beloved, happy to commend others, ordinary, decent, authoritarian, simple, forgivable, forbearing, conciliatory, generous, avoids conflicts, romantic, well-bred, discreet, good friend, honest, natural, chaste, asks others for advice, compromising, normal, resolves misunderstandings by conversation, accessible, cultured, loyal versus boisterous, merciless, insolent, rough, quarrelsome, commanding, aggressive, irascible, contradicts others, defiant, argumentative, forcing others to work his way, mad, vengeful, wild, tetchy, absonant, opposes people's, provocative, carper, stubborn, unscrupulous, critical, snappish, often runs amuck, frightening, lives a double life, vengeful, rugged
3	Thorough, hardworking, likes rules, responsible, does not change, dutiful, persistent, worn-out by life, neat, thrifty, categorical, engrossed, dignified, cautious, well-measured, independent, reasoned, has a good memory, moral, authoritative, decisive, operational, principled, jaunty, systematic, stable, stern, traditional, controls the situations, his thoughts are connected, does not change versus procrastinate, lazy, sappy, careless, oblivious, childish, forgetful, thoughtless, feckless, reckless, undisciplined, does jobs hastily, untidy, frequently late, unfulfilled, dreamer, chaotic, waste money, noddly, frivolous, iniquitous, often consumes alcohol, silly, amorous, often loses or misplaces items, flippant, "hits the bottle", messy, indecisive, "monkeys around", absent-minded, unsteady, often gets into troubles
4	Evil, man of letters, horrific, malicious, unsophisticated, slimy, insensitive, evil-eyed, cad, exploitative, primitive, perverted, plotting, stays away from people, treacherous, hypocrite, disdainful, shameless, equanimous, unscrupulous, disgusting, often lies, shifty, often fights, mannered, stingy, negligent, raw, has fallen under bad influence, paranoid, people despise him, backward, narrow-minded versus touching, sentimental, susceptible, vulnerable, sympathetic
5	often panics, gets the creeps, freezes out of fear, feels unjustified fear, often runs amuck, unrestrained, blames others, spirited, aflutter, rash, superstitious versus studious, sets high standards, pragmatic, reflective, shrewd, profound, analytical, godless, temerarious, operational, rational, self-conscious, systematic, cold-blooded, cynical controlled, clear-sighted

The two-component solution supported the two-factor model with Agentic and Communal traits, respectively. The three-component solution formed a confirmation of the three-factor model with an additional component (3/3) capturing Conscientiousness colored with Intellect traits. At the four-component level, an additional component (4/4), apparently represented Negative Valence terms (*evil, malicious, insensitive, exploitative, perverted*). At the opposite end of this component a handful of terms with loadings just about |.30| with traits such as *sentimental, vulnerable, susceptible*, and *oversensitive* all had significant secondary loadings, most on the Agreeableness (or Communion) related component 4/2. With five components, the Conscientiousness-Intellect Component 4/3 split into 5/3, a Conscientiousness factor (now without the Intellect-related terms), and 5/5, a component related to Neuroticism (with terms such as *panicky, fearful, sensitive* as opposed to control-related terms). This latter component (5/5) further split at the 6-level and again at the 7-level.

Only at the seven-component level, somewhat more clear signs of Intellect emerged, but mixed in with Positive Valence terms, namely in component 7/5. Examples of the Positive Valence terms were *admirable, influential, respectable, and important*, versus *ordinary, idealless, and insignificant*. Alongside these terms, Intellect terms loaded on this component such as *brilliant, talented, profound, creative, and intelligent*, versus *simple, family-man, old-fashioned, and stupid*. Such a blending of PV terms and Intellect terms is not uncommon. The study by [Almagor et al. \(1995\)](#), for example, gave a PV factor including typical Intellect traits. Other studies demonstrating this relation between PV and Intellect are [De Raad and Barends \(2008\)](#) and [Simms \(2007\)](#).

Moreover, component 7/4, a factor describing control versus panic also contains some Intellect terms at the control-pole, such as *inventive, studious and versatile*. A cluster with Honesty-related terms did not emerge; available Honesty terms were either part of Agreeableness or of Negative Valence.

Considering both the eigenvalue pattern and the easier interpretability of the five-solution above solutions with more components, we selected the five-solution as the more appropriate one for a fuller portrait. [Table 7](#) contains a more detailed listing of the items contributing to the meanings of the five factors, with the numbers 1–5 respectively representing Extraversion, Agreeableness, Conscientiousness, Negative Valence, and a Neuroticism-related factor.

5.2.1. Relations between the SCA-ECP structure and the three individual structures

[Table 8](#) contains the accumulated percentage of variance for the five-component solution after varimax rotation (19.8). In addition, in the "SCA" and "PCA" columns in [Table 8](#), the accumulated amounts of variance explained by SCA-ECP and PCA are given for the three individual structures. In order to evaluate whether the SCA-ECP did a good job, we compared these latter amounts of variance with the corresponding accumulative amounts of variance of each of the three individual PCA structures. The SCA-ECP amounts of variance are based on non-missing data and are therefore comparable to those of the PCA's. The SCA-ECP solution explained less variance in the individual sets than the separate PCA's did, with the

Table 8
Accumulative percentages of variance.

	Five components			
	SCA	PCA	Ratio	Diff.
SCA-structure	19.8			
Study 1	20.3	26.6	0.76	6.3
Study 2	19.8	21.7	0.91	1.9
Study 3	18.3	20.3	0.90	2.0

largest difference for the Study 1. For ease of interpretation of these findings, we also gave the differences and the ratios between the percentages of variance explained by the SCA-ECP and the PCA. The ratios would equal 1 if the two procedures would perform equally well and the difference would be 0. Apparently, the SCA-ECP solution fitted the data of Study 1 worst, and fitted better (almost equally) the data in Studies 2 and 3.

5.3. Discussion

In Study 4, the initial set of variables in the SCA consisted of groups of descriptors extracted using different selection criteria and using different dictionaries. This initial set of variables inevitably included evaluative terms, because they represented a legitimate set of relevant descriptions in all three studies. Descriptors are usually more or less evaluative, and as such descriptors with evaluative connotation were implied in the sets of descriptors in Studies 1 and 2. In Study 3, a different procedure was followed, and besides the inclusion of words that had obviously evaluative meaning, a separate set of terms was distinguished that had really strong evaluative meaning and this set was included in the study as one of three separate categories. Therefore, the occurrence of Negative Valence in the four-factor solution could be regarded as a consequence of the relatively large number of evaluative descriptors. Most striking was possibly the confirmation of both the two-factor model (e.g., [Bakan, 1966](#)), and the three-dimensional model, much in line with the Big-Three (e.g., [Peabody & Goldberg, 1989](#)).

A factor representing traits of Neuroticism appeared as an independent dimension only in the five factor solution (5/5). The factor included lack of emotional control. Some markers of Neuroticism also loaded on the negative pole of Extraversion (5/1), and others on the negative pole of Agreeableness (5/2). Within Extraversion, these markers included negative emotional states, but in Agreeableness they comprised vulnerability and empathy. This result implies a complex structure of Neuroticism, whose emotional, cognitive, and behavioral indicators are linked to different dimensions relevant to the emotional response. At the same time, such results points to the plausibility of differentiation between affective, behavioral, cognitive, and desire aspects of personality constructs ([Wilt & Revelle, 2015](#)).

6. Final discussion

The reported studies were aimed at an optimal description of the Serbian trait structure, and at the examination of the effects of various procedural features in psycho-lexical studies on the number and the contents of extracted dimensions. The three psycho-lexical studies in the Serbian language, conducted during a time span of 15 years, form a good frame of reference for such a topic, since in the course of this research different templates of variable selection (Tellegen-Waller in the first and second, and a combination of Hofstee-Brokken and Goldberg-Ostendorf procedures in the third study), and different methods of item formulation were applied. In the first two studies, the resulting sets of trait terms may have been challenging the representativeness of the trait-semantic. Yet, the various structures, for example with five factors, were quite similar, with good versions of E, A, and C, a weak version of N, and with NV instead of I. Only Study 3 included an Intellect-related factor.

Those three studies were designed to address some important procedural issues in psycho-lexical studies, by varying the templates of variable selection and the methods of data treatment, while keeping the linguistic and cultural factors constant by conducting all studies within a single language. The first three studies clearly shared common features, with each focusing on one proce-

dural issue. The first study involved the application of a “non-restricted” Tellegen-Waller method for the selection of variables. The second study included a variation in the Tellegen-Waller selection method and combined it with two different styles of item formulation. The third study was fashioned after mainstream lexical studies, focusing on possible effects of consecutive inclusion of categories of trait-relevant descriptors. All these three studies included analyses on the raw and ipsatized data, in order to examine the effect of this common method of data treatment. Finally, the fourth study combined the data from those three studies, with the aim to find a stable factor solution across methods.

In Studies 1, 2, and 3, the ipsatized data based results provided clearer structures than the raw data based structures. Confining to the seven-factor solutions, in general the raw data based structures showed factors that might be traced back to PV, NV, and the Big Five. Those factors differed in being articulate, were all unipolar, and sometimes rather specific. In the case of the ipsatized data the seven-factor solutions gave more articulate versions of the Big Five, plus versions of NV and PV, relatable to Tellegen and Waller’s seven dimensions. The Negative Valence factor became particularly clear in Study 3 upon the inclusion of evaluative terms. The Positive Valence factor seemed to become less clear especially with the full variable set of Study 3. The “non-restricted” Tellegen-Waller approach seems to have the potential of producing an interpretable seven-factor structure reflecting the Big Seven model.

In Study 2, the experiment with different item-formats led to the conclusion that the more contextualized (PL) format was less clear, and explained less variance than the more standard adjective format. Contextualization is a delicate process in which it is difficult to formulate a single contextualized item that captures the same semantics as the pertaining single adjective. The adjective has indeed obtained the function of communicating abstracted information in a compact format; contextualization often leads to specification, and it may sometimes take several contextualized items to communicate the semantics of a single adjective. The Tellegen and Waller model at least seems to flourish better with the use of adjectives, and by following the non-restrictive inclusion of lexical items. Ipsatization did not seem to make a major difference in the emergence of the Seven-factor model. Ipsatization did, however, affect the results when the contextualized sentence-format was used. When the raw data were analyzed, more behaviorally-charged factors appeared, leading to a result which corresponded more with psychobiological constructs.

The third study took another course, by “emulating” the procedures commonly applied in the majority of psycho-lexical studies. The results were in line with the findings of a number of studies, confirming the stability of the Big Five model and of the Honesty-Humility factor. More importantly, it demonstrated that the procedures of variable selection were of influence in obtaining the factorial solutions. Without the inclusion of the separate set of evaluative terms, Honesty emerged as a factor. The inclusion of evaluative terms turned the Honesty factor into a Negative Valence factor. The relationship between Honesty and NV is intrinsic, with Honesty traits representing the most desirable traits, and NV traits representing the most undesirable traits. However, the inclusion of evaluative terms did not substantially change the structure of the “big five” factors, opening the issue of a possibly “additive” nature of evaluative traits. In other words, evaluation appeared to be an additional domain to the big five, possibly important to personality structure, but different in nature from the more “descriptive” dimensions.

Ipsatization seems to be an important methodological issue in the emergence of NV. While Negative Valence appeared across all raw data solutions, in ipsatized data it emerged only when “purely evaluative” terms were included. Thus, controlling for response style seemingly leads to a more articulate emergence of the

“descriptive” big five dimensions. Apparently, ipsatization is not just a technical operation applied to control for response style; both the “partialed-out” and the “remaining” variance may provide information about the processes of evaluation and description, perhaps not only in the psycho-lexical domain.

These studies demonstrated that certain procedural factors – the unrestricted selection of trait descriptors, the inclusion of explicit sets of evaluative terms, the use of contextualized items, and ipsatization –, have a distinct effect on the number and structure of psycho-lexically derived trait-factors. In all cases, ipsatization helped to arrive at a clearer factor structure.

The psycho-lexical approach would fare well by an unrestricted selection of trait-descriptors, much in the spirit of the study by De Raad and Barelds (2008) in Dutch, using the selection format applied in Brokken (1978), possibly through using simple instructive sentences as used in the present Study 3. The main immediate problem is the vast amount of time needed by participants to provide ratings. In order to make the rating task a feasible one, wise decisions need to be taken for first reductions. Any reduction should possibly be done with a conservative attitude, meaning that terms or expressions should be removed only on the basis of clear and convincing arguments. Decisions about further reductions are better made at a later stage after ratings are collected, so that the contents of the removals can be studied in relation to the main data set. The use of synonymy as a basis of reduction of the item pools seems a logical one, since it does not remove kernel trait semantics, yet may reduce its density. The relatively drastic reductions in the present studies as a consequence of this procedure may strike, but the issue is primarily with the technique, less with the consequence. We believe that the use of synonymy as a basis for reduction deserves further investigation.

Although ipsatization is a generally advised technique to arrive at a clearer structure, comparisons with raw-data analyses need more attention. Ipsatization (standardization per person) is not without dispute. It is well possible that with this way of ipsatization psychological meaning is sacrificed. Subtracting only the individual's mean score from the scores of that individual is possibly a more apt procedure of ipsatization (see, e.g., Ten Berge, 1999). This, would, however, assume a reasonable number of trait words and their opposites, which in turn, puts restrictions on the use of antonymy as a basis for reduction of the trait list.

In all the first three studies, in both raw data and in ipsatized data, structures with seven factors were possible and interpretable, but also in all cases structures with fewer factors seemed to be more stable across the different studies. This is supported by congruences between Lexi-based factors and PL-based factors in Study 2 (Table 4), and by congruences between the 383 traits-based factors and the factors based on smaller sets in Study 3 (Table 6).

The advantage of Study 4 was in part in finding an ultimate solution that agrees most with the repeated observation across the three previous studies, thus also surpassing the deviating features of each separate study. Moreover, this study provided the more optimal dimensional configuration, in which justice is done to the more substantial and useful parts of each separate structure. This final SCA result gave support to the Two-factor model and to the Three-factor model. The four-, five-, six-, and seven-solution gave a clear Negative Valence factor, characterized by such terms as *evil*, *malicious*, *insensitive*, *perverted*, *shameless*, and *paranoid*. With five factors, a Neuroticism factor emerged (Fig. 5, factor 5/5). Solutions with six and seven factors, only led to a further split of this last factor into more specific factors (see Fig. 5). The Big Five model was not supported. Intellect related terms with substantial loadings were identifiable only in factor 7/5 as part of a Positive Valence factor. This relationship between Intellect and PV has been observed before (e.g., De Raad & Barelds, 2008). Honesty-Humility did not appear as a separate factor; the relevant terms were iden-

tifiable in both Agreeableness and Negative Valence of the Five-factor solution in Table 7.

At the national level, the present five-factor results seem to form the best starting-point for the development of a broadband personality trait inventory, with accents that represent best the peculiarities of the Serbian culture and understanding. Internationally, the prospects for a cross-culturally replicated psycho-lexically based five-factorial assessment instrument are less promising.

With this psycho-lexical study in the Serbian language, all of the larger languages of the Slavic branch of the Indo-European languages, except Ukrainian, have been studied for their trait-descriptive potential. Moreover, most of the larger languages in the European cultural-geographic domicile of the Indo-European family have now been studied. With a reference to the Big Five structure, though generally best replicated in European-American languages, that structure shows variation too, as exemplified in the present Serbian structure. This is important to know, especially in relation to frequently expressed claims of universality.

A one-for-all cross-culturally canonical Big Five structure is thus not to be expected, let alone findings in languages or cultures that are more remote from European-American languages, such as in Filipino, Chinese, Persian, or Hindi. Each new psycho-lexically investigated language, such as Serbian, adds its own peculiarities to the international trait-vocabulary; the documentation of such specific characteristics are important for the development of faceted specification of a trait-structure that is useful across languages.

What is of great interest in the present study is the clear replication of the two- and three-factor structures that have thus far been identified in most or all psycho-lexical studies. Moreover, these structures appear to be robust both across cultural and lexical diversities, and across procedural factors. As such, they sustain their importance as building blocks for a cross-culturally replicable kernel structure.

Acknowledgements

This research was supported by the Serbian Ministry of Education, Science and Technological Development (project number 179006).

The authors are grateful to Marieke E. Timmerman, for the help she provided with the SCA analysis.

Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.jrp.2017.11.008>.

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