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The well-known modern dimensional models of affect include two or three dimensions. They are typically based on self-reports using English emotion terms. It remains unclear to what extent these models can be applied to different cultures and languages. The present study is aimed at finding the dimensions underlying the descriptions of emotional states in Russian and suggests a structural model of affect based on these findings. At the first stage, a comprehensive list of Russian nouns denoting emotional states was compiled. It comprised 330 words and was reduced to a list of 56 words. At the second stage, participants rated their emotional states using this list. The exploratory factor analysis yielded three dimensions that underlay participant descriptions of the emotional states – negative affect with low activation, positive affect with high activation, and tension. This model is compared to other structural models of affect and its special features are discussed. This model can be used for developing Russian-based measures for the assessment of mood.

JEL Classification: Z

Key words: affect structure, core affect, dimensional models, valence, tension.

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Emotional phenomena are extremely diverse. Their description and classification are long-standing challenges for the psychology of emotion. Despite the abundance of ideas and studies, this problem has not been resolved. The aim of the present study is to develop a model of the structure of emotional states based on Russian language data. The language used for data collection is an important feature because languages differ in their emotional vocabularies and the ways of describing emotions, and this can substantially influence the results.

There are two major approaches to the classification of emotional phenomena in contemporary psychology. The categorical approach describes a certain number of emotion categories as basic emotion types interpreting all other emotions as blends or special cases of these categories. This approach is mostly represented by two groups of theories. Basic emotion theories (e.g., Izard, 1977; Plutchik, 1984) argue for the existence of a set of evolutionary determined basic emotions. In contrast, modern cognitive appraisal theories identify “modal” emotional states that are not necessarily evolutionary determined but the most frequent and salient in people’s lives (Scherer, 1994).

The dimensional approach used in this study identifies several basic dimensions that can be applied to the description of any emotional state. These dimensions define a n-dimensional space in which each emotion is represented by a point. The dimensional approach is characteristic of a number of constructivist theories (Feldman Barrett, 2013), although most often these theories combine both approaches. They claim that the dimensional approach is most suitable for the description of the core affect defined as “that neurophysiological state consciously accessible as the simplest raw (nonreflective) feelings evident in moods and emotions” (Russell, 2003, p. 148). The core affect can be observed in its purest form in mood. Most dimensional models are defined by their authors as the structural models of mood or core affect.

There are several competing structural models of affect in contemporary psychology of emotion. They differ in the number and psychological meaning of dimensions necessary for the description of affect. Most models distinguish two or three dimensions.

Russell’s circumplex model of affect is one of the most popular and empirically grounded (Russell, 1980; Feldman Barrett & Russell, 1999; Yik, Russell & Steiger, 2011). According to this model, affect can be described using the independent bipolar dimensions of valence and arousal. A similar model was suggested by Larsen and Diener (1992). In contrast, a two-dimensional model by Watson and Tellegen (1985) identifies two unipolar scales, positive affect and negative affect. Each of these scales is a mixture of valence and activation. High scores on the positive affect scale correspond to positive emotional states with high arousal whereas high scores on the negative affect scale correspond to negative emotional states with high arousal. The important feature of this model is the understanding of positive and negative affect as two

orthogonal dimensions rather than two poles of the one dimension. This allows to experience emotional states with mixed valence as positive and negative at the same time. All two-dimensional models mentioned above have their own arguments and the debate among them remains topical.

Three-dimensional models of affect are also popular in contemporary psychology. They have a long history since the first classical model by Wundt described three dimensions, “pleasure – displeasure”, “arousal – calmness”, and “tension – relaxation” (Wundt, 1896). The first dimension represents valence and the second and third dimensions correspond to the arousal in the two-dimensional models. Splitting activation into two partially independent dimensions was supported in later models. For instance, Thayer (1989) distinguished between energetic arousal and tense arousal. He showed that these arousal types are independent at both the physiological and psychological levels. For example, if a student has successfully passed important exams and anticipates a vacation ahead she can feel high energetic arousal, whereas her tense arousal would be low. The reverse combination, high tense arousal accompanied by low energetic arousal, can be present when a person is waiting for very important negative information such as a terminal diagnosis. Thayer’s two types of arousal are not only independent from each other but also are not related to valence (Schimmack & Reisenzein, 2002).

One of the most notable three-dimensional models of the recent years was suggested by Schimmack and Grob (2000). They compared different models of affect using structural modeling. The results showed that self-report ratings of emotional states were best described by three dimensions of pleasure-displeasure, awake-tiredness, and tension-relaxation. These dimensions correspond surprisingly well to Wundt’s model despite different methodologies and there being more than a century between them. A similar model was suggested earlier by Matthews et al. (1990).

These models describe the structure of core affect although not all authors use these terms. There are also dimensional models that describe the structure of mood, other emotional phenomena, and the emotional meaning of stimuli. The most influential among them in its time was the model by Mehrabian which identified the dimensions of pleasure, arousal, and dominance (Mehrabian & Russell, 1974; Mehrabian, 1996) used for the description of emotional states and the emotional tone of stimuli. The model was derived from Osgood’s theory that described affective meaning of words along three dimensions, namely evaluation, activity, and potency. One of the well-known applications of Mehrabian’s theory is the database of emotional pictures IAPS (Lang, Bradley, & Cuthbert, 2005). However, the dominance dimension is rarely used today because most studies do not find it. An important exception is the Geneva Emotion

Wheel, a two-dimensional model that is defined by the dimensions of valence and control while intensity/arousal is represented by the distance from the central neutral point (Scherer, 2005).

Most structural models with more than three dimensions were developed quite a long time ago. Nowlis and Nowlis (1956) studied the effects of psychoactive drugs such as amphetamine and barbiturates on mood in the context of social interaction. Participants reported their moods using a list of emotional adjectives. Four dimensions were obtained, namely level of activation, level of control, social orientation, and hedonic tone. The first and last dimensions correspond to Russell's circumplex model, the third dimension corresponds to the dominance dimension of Mehrabian's model. The second dimension was probably obtained due to the procedure that included social interactions among participants. McConville and Cooper (1992) developed a hierarchical model of the structure of moods. They performed factor analysis of 170 items of mood questionnaires and identified five primary factors (Depression, Hostility, Fatigue, Anxiety and Extraversion) with one general factor (hedonic tone), i.e. valence.

To sum up, the most common models of affect structure include two or three dimensions. The development of these models is typically based on self-reports using English emotion terms. It remains unclear to what extent these models can be applied to different cultures and languages. Schimmack and Grob (2000) claim that two-dimensional models are more often suggested by American authors, whereas three-dimensional models are more often obtained in the European studies. It is reasonable to assume that a description of affect structure can be influenced by cultural and/or linguistic factors.

Russian studies that attempted to identify mood dimensions are scarce (Arkhipkina, 1981; Danilova, Onishchenko & Syromyatnikov, 1990; Vartanov, 2013). Participants of these studies rated the emotional tone of stimuli instead of real emotional states; the samples were small. This does not give convincing results. The present study aimed at finding the dimensions underlying the descriptions of emotional states in Russian and suggesting a structural model of affect based on these findings.

The strategy for attaining this goal comprised of two stages. At the first stage, a comprehensive list of words denoting emotions was compiled. The list was then reduced by the exclusion of synonyms and words with indefinite meanings. The resulting list of several dozens of words described a wide range of emotional states in natural language. At the second stage, participants rated their emotional states using this list. The exploratory factor analysis yielded dimensions that underlay the participants' descriptions of the emotional states.

Stage 1. Compiling the list of emotion terms for the description of emotional states

The goal of this stage was to compile a list of emotion terms that would allow the description of a wide variety of emotional states in sufficient details. At the same time, the list should not be too large to avoid participant fatigue. The words should be comprehensible for laypersons and be easy to relate to one's own emotional state.

The initial list was made up of words taken from Russian dictionaries (Lyashevskaya & Sharov, 2009; Ozhegov & Shvedova, 2003) and obtained from informal interviews with Russian native speakers. It comprised 330 nouns suitable for the description of emotional states. After deleting stylistically marked words the list was reduced to 209 items. The further reduction of the list was implemented on the basis of the ratings given by 14 judges, 8 females and 6 men, all had university degrees, ten of them in philology. The judges were presented with the list of words in alphabetical order and were asked to rate to what extent each word was suitable for the description of emotional states using five-point Likert scales.

The internal consistency of ratings was assessed by Cronbach's alpha. It was 0.87 which shows the high reliability of the ratings. For the further reduction of the list, the following criteria were used:

- the word was assessed as not very adequate for the description of emotional states (mean rating lower than 2.9);
- the word had high variability of ratings (interquartile range larger than 2.5);
- the word is difficult for understanding by laypersons (professional terms and words with low frequency or with indefinite meaning);
- the word was a close synonym to another word in the list.

These criteria were not completely formal but they allowed us to make the list convenient for participants and at the same time diverse enough for the description of a wide variety of emotional states.

The final list comprised 56 words, they and their approximate English equivalents are presented in Appendix 1.

Stage 2. Identification of the structure of emotional states

Method

Participants

One hundred eighty-four people aged 17 to 62 years ($M = 26.9$, $SD = 9.9$) volunteered to participate in the second stage of the study; 53% were females. All participants lived in Moscow; most of them were students of different majors.

Procedure

The participants received the list of words, ordered alphabetically with scales from 1 to 5 at each word. The instruction was: “You see the words describing various emotional states. Please read each word attentively and indicate to what extent it corresponds to your emotional state at the moment using five-point scales. 1 – does not correspond at all, 2 – corresponds to a small extent, 3 – corresponds averagely, 4 – corresponds to a large extent, 5 – corresponds completely.” The participants worked individually or in small groups. The ratings were collected when participants were involved in their everyday activities, e.g., many students filled out the forms during the breaks between classes. The state of most participants can be regarded as being approximately neutral: they were in familiar environment doing familiar things; there is no reason to think that at the moment of data collection they were subject to any special emotional influence.

Results

Some words were deleted from the list before the statistical analysis because many participants faced difficulties responding to them. The word *desire* (*желание*) was considered to be unsuitable for describing emotional states although it was assessed as quite suitable by the judges in the first stage. The word *relief* (*облегчение*) was also considered to be unsuitable because in Russian it is sometimes used as a euphemism for defecation. Some words rarely corresponded to the participants' emotional states; most of them denoted very intense emotions unusual in everyday life. Most participants rated them 1, and almost no one rated them 4 or 5. The distributions of response frequencies for these words had strong positive asymmetry. These words were excluded because they were uninformative for this study and not suitable for the principal component analysis. The criterion for exclusion was the percentage of the responses “1” should have been more than 75% of all the responses to the word. The list of the excluded words is presented in Appendix 2.

After this reduction of the list, the principal component analysis was performed for the remaining 41 words to reveal basic dimensions underlying self-descriptions of emotional states. The KMO index was 0.844, the p-value of Bartlett's test of sphericity was less than 0.001. Hence the correlation matrix was suitable for factorization. The number of components for extraction was defined by a scree plot test. The scree plot (Fig.1) shows that the elbow falls on the fourth component, hence three components were extracted for rotation. The factors were rotated using the varimax method with Kaiser normalization. The resulting factor loadings are presented in Appendix 3. The interpretation of factors relied on the variables with absolute values of factor loadings larger than 0.60 for the first two factors and larger than 0.50 for the third factor.

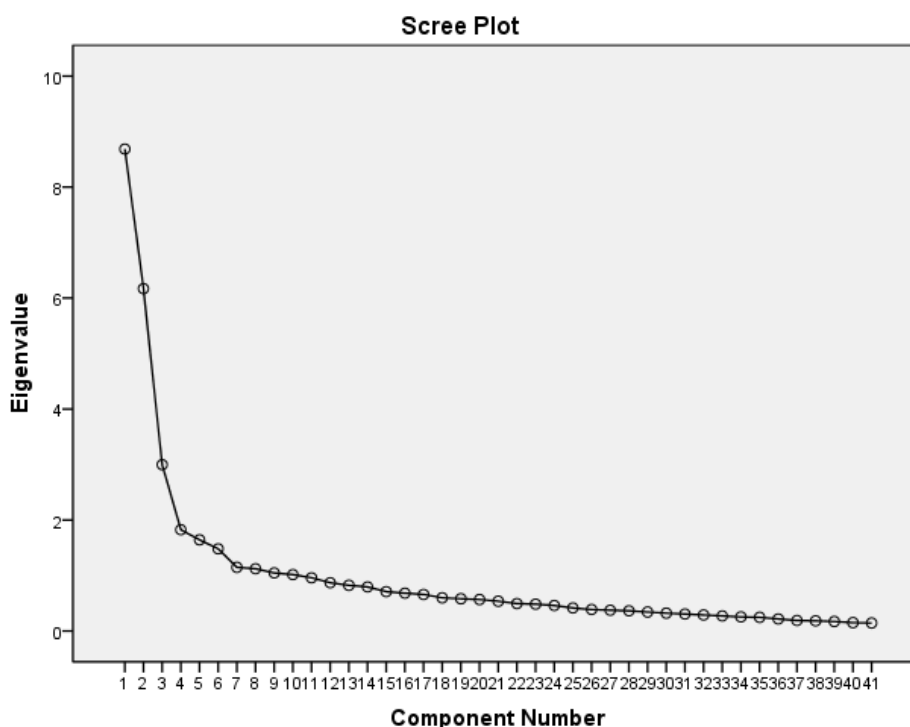


Figure 1. Principal component analysis of emotion self-reports: the scree plot.

The first component had the largest factor loadings on the variables *depression* (*подавленность*), *devastation* (*опустошённость*), *sadness* (*грусть*), *chagrin* (*огорчение*), *displeasure* (*неудовольствие*), *vexation* (*досада*), *regret* (*сожаление*), the second component on the variables *happiness* (*радость*), *enthusiasm* (*воодушевление*), *pleasure* (*удовольствие*), *exultation* (*торжество*), *admiration* (*восхищение*), *joy* (*веселье*), *anticipation* (*предвкушение*), *tenderness* (*нежность*), *interest* (*интерес*), and the third component on the variables *agitation* (*волнение*), *tension* (*напряжение*), *worry* (*беспокойство*), *anxiety* (*тревога*), *concern* (*озабоченность*), *doubt* (*сомнение*), *uncertainty* (*неуверенность*) and *calmness* (*спокойствие*), the last variable with the opposite sign. The three components together explained 44% of the total variance, after rotation 17%, 15%, and 12% respectively.

The first component can be interpreted as a factor of negative emotions and most of them are related to low arousal. The second component is a factor of positive emotions and most of them are related to high arousal. Finally, one pole of the third component unites emotions related to tension and uncertainty while *calmness* is located on the opposite pole.

The three factors were also rotated by the oblimin method; the meaning of the rotated factors was the same as after the orthogonal rotation.

Discussion

The results show that the structure of affect can be described by three dimensions. The first dimension can be named “Negative affect with low activation”, the second dimension “Positive affect with high activation”, and the third dimension “Tension”. This structure has at least three notable features.

First, valence was not a bipolar factor as in Russell’s circumplex model. Instead, it split into two orthogonal factors. This allows us to regard positive and negative emotions as relatively independent rather than opposite states. The phenomenon of mixed emotions can be better understood in this framework because it shows that positive and negative feelings can be experienced at the same time, e.g., happiness mixed with melancholy or tenderness mixed with regret. Second, valence was somewhat related to arousal, namely positive affect with high arousal and negative affect with low arousal. Third, emotional states related to tension and uncertainty formed a separate factor. Some of these states are negative, but others are quite neutral, such as *calmness*, *uncertainty*, *doubt*. This factor presumably reflects pure tension independent from any valence. In principle, tension can be mixed not only with negative and but also with positive emotions (e.g., the excitement of risk), but in everyday life a bond between tension and negative emotions is more typical.

Notably, the three extracted factors are similar to the three major groups of mood disorders; depression, mania, and anxiety.

It is interesting to compare the affect structure obtained in this study with the most influential structural models described in the introduction. The first two factors correspond to Watson and Tellegen’s model where valence and arousal are also mixed although negative emotions are related to high rather than low arousal. However, the results do not correspond to Russell’s model that identify two dimensions, valence and activation. Thanks to the third dimension “tension”, the affect structure is similar to Wundt’s and Schimmack and Grob’s models which also include a tension dimension. Notably, no factor is similar to the dominance

factor of Mehrabian and Russell's model. As mentioned above, other modern studies do not obtain this factor either.

The model suggested in this study can be used for the description of emotional phenomena of any kind because it describes the structure of core affect, which is a central part of any affective experience. However, structural models of core affect cannot be used for the subtle differentiation of emotional states. Some emotions can have the same core affect but differ from each other by some components, such as the cognitive appraisal of the situation, coping potential, ego involvement. For instance, both fear and anger can be described first of all by high scores on the third dimension "tension". The same situation, e.g., an attack, can elicit fear or anger depending on an individual's expectations of her potential to resist the attack and win the conflict. This example shows how different appraisals of a situation can result in different emotions with an identical core affect.

The suggested three-dimensional model is derived from the self-reports of people who were in everyday situations and for the most part did not experience any intense emotions. This is a limitation of the study because it remains unclear how the structure of self-reports would change under intense emotions of various types. More studies are needed to investigate this.

The structure of affect obtained in this study can be used as a basis for developing a new Russian questionnaire for the assessment of emotional states. The adequate description and assessment of core affect is important for research on emotion and emotional disorders. Recently, it has been found that the static and dynamic characteristics of core affect predict psychological well-being (Houben, Van Den Noortgate, & Kuppens, 2015), self-esteem (Kuppens et al., 2007), inter-personal behavior (Timmermans, Van Mechelen, & Kuppens, 2010), depression and other emotional disorders (Kuppens et al., 2007). A questionnaire based on the suggested model will help to develop these directions of studies.

References

- Arkhipkina, O.S. (1981). A reconstruction of the subjective semantic space of emotional states. *Vestnik Moskovskogo Universiteta. Series 14. Psychology*, 2, 40-46.
- Danilova, N.N., Onishchenko, V., & Syromyatnikov, S.N. (1990). The transformation of the semantic space of psychological state terms under the influence of information load and time deficit. *Vestnik Moskovskogo Universiteta. Series 14. Psychology*, 4, 29-40.
- Feldman Barrett, L. (2013). Psychological construction: The Darwinian approach to the science of emotion. *Emotion Review*, 5, 379-389.
- Feldman Barrett, L., & Russell, J. A. (1999). The structure of current affect: controversies and emerging consensus. *Current Directions in Psychological Science*, 8, 10-14.
- Houben, M., Van Den Noortgate, W., & Kuppens, P. (2015). The relation between short-term emotion dynamics and psychological well-being: A meta-analysis. *Psychological Bulletin*, 141, 901-930.
- Izard, C.A. (1977). *Human emotions*. N.Y.: Plenum Press.

- Kuppens, P., Van Mechelen, I., Nezlek, J. B., Dossche, D., & Timmermans, T. (2007). Individual differences in core affect variability and their relationship to personality and psychological adjustment. *Emotion, 7*, 262–274.
- Lang, P.J., Bradley, M.M., & Cuthbert, B.N. (2005). *International Affective Picture System (IAPS): Affective ratings of pictures and instruction manual*. Gainesville, FL: University of Florida.
- Larsen, R. J., & Diener, E. (1992). Promises and problems with the circumplex model of emotion. In M. S. Clark (Ed.). *Review of personality and social psychology: Emotion* (Vol. 13. pp. 25-59). Newbury Park. CA: Sage.
- Lyashevskaya, O.N., & Sharov, S.A. (2009). *The New Russian Frequency Dictionary*. Moscow: Azbukovnik.
- Matthews, G., Jones, D.M., & Chamberlain, A.G. (1990). Refining the measurement of mood: The UWIST Mood Adjective Checklist. *British Journal of Psychology, 81*, 17–42.
- McConville, C., & Cooper, C. (1992). The structure of mood. *Personality and Individual Differences, 13*, 909–919.
- Mehrabian, A. (1996). Pleasure-arousal-dominance: A general framework for describing and measuring individual differences in temperament. *Current Psychology, 14*(4), 261–292.
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. USA: The Massachusetts Institute of Technology.
- Nowlis, V., & Nowlis, H. H. (1956). The description and analysis of mood. *Annals of the New York Academy of Science, 65*, 345-355.
- Osgood, C.E., Suci, G.J., & Tannenbaum, P.H. (1957). *The measurement of meaning*. Urbana, IL: University of Illinois Press.
- Ozhegov, S.I., & Shvedova, N.Y. (2003). *The Explanatory Dictionary of the Russian Language*. 4th Edition. Moscow: ITI Tekhnologii.
- Plutchik, R. (1984). Emotion: A general psychoevolutionary synthesis. In K.R. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 197-219). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Russell, J.A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*, 1161 – 1178.
- Russell, J.A. (2003). Core affect and the psychological construction of emotion. *Psychological Review, 110*, 145-172.
- Scherer, K. (1994). Toward a concept of ‘modal emotions’. In P. Ekman & R.J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (pp. 25-31). N.Y.: Oxford University Press.
- Scherer, K. (2005). What are emotions? And how can they be measured? *Social Science Information, 44*, 693–727.
- Schimmack, U., & Grob, A. (2000). Dimensional models of core affect: A quantitative comparison by means of structural equation modeling. *European Journal of Personality, 14*, 325-345.
- Schimmack, U., & Reisenzein, R. (2002). Experiencing activation: Energetic arousal and tense arousal are not mixtures of valence and activation. *Emotion, 2*, 412–417.
- Thayer, R.E. (1989). *The Biopsychology of Mood*. Oxford University Press: New York.
- Timmermans, T., Van Mechelen, I., & Kuppens, P. (2010). The relationship between individual differences in intraindividual variability in core affect and interpersonal behavior. *European Journal of Personality, 24*, 623–638.
- Vartanov, A.V. (2013). The anthropomorphic method of emotion recognition in speech. *National Psychology Journal, 10*(2), 69-79.
- Yik, M., Russell, J.A., & Steiger, J.H. (2011). A 12-point circumplex structure of core affect. *Emotion, 11*, 705-731.
- Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin, 98*, 219 – 235.
- Wundt, W. (1896). *Grundriss der Psychologie*. Leipzig: Engelmann.

Appendix 1. Fifty-six words administered to the participants for reporting their emotional states.

Russian word	Approximate translation
безразличие	indifference
беспокойство	worry
бодрость	vigor
веселье	joy
вина	guilt
влюбленность	love
возбуждение	arousal
возмущение	outrage
волнение	agitation
воодушевление	enthusiasm
восхищение	admiration
гнев	anger
грусть	sadness
досада	vexation
желание	desire
зависть	envy
злорадство	schadenfreude
интерес	interest
напряжение	tension
недоумение	bewilderment
нежность	tenderness
неприязнь	dislike
нетерпение	impatience
неуверенность	uncertainty
неудовольствие	displeasure
обида	resentment
облегчение	relief
огорчение	chagrin
озабоченность	concern
опустошенность	devastation

отвращение	disgust
подавленность	depression
предвкушение	anticipation
презрение	contempt
радость	happiness
раздражение	irritation
раскаяние	repentance
растерянность	perplexity
ревность	jealousy
скука	boredom
смущение	embarrassment
сожаление	regret
сомнение	doubt
сочувствие	sympathy
спокойствие	calmness
страдание	suffering
страх	fear
стыд	shame
торжество	exultation
тоска	melancholy
тревога	anxiety
уверенность	confidence
удивление	surprise
удовольствие	pleasure
уныние	gloom
ярость	rage

Appendix 2. The words excluded from the list of 56 words before the factor analysis.

Russian word	Approximate translation
вина	guilt
возмущение	outrage
гнев	anger
желание	desire
зависть	envy
злорадство	schadenfreude
облегчение	relief
отвращение	disgust
презрение	contempt
ревность	jealousy
страдание	suffering
страх	fear
стыд	shame
уныние	gloom
ярость	rage

Appendix 3. Factor loadings after the varimax rotation of the factors. The factor loadings used for the interpretation of the factors are highlighted in bold.

	Components		
	1	2	3
indifference	,430	-,042	-,154
worry	,156	-,143	,695
vigor	-,359	,371	,097
joy	-,254	,712	-,065
love	,042	,533	,143
arousal	-,169	,389	,470
agitation	,055	,115	,781
enthusiasm	-,156	,772	-,001
admiration	,003	,718	-,010
sadness	,745	-,076	,110

vexation	,624	-,226	,275
interest	-,156	,629	,174
tension	,161	,021	,697
bewilderment	,477	-,027	,218
tenderness	,214	,651	,087
dislike	,479	,004	,192
impatience	,070	,203	,466
uncertainty	,452	-,048	,500
displeasure	,665	-,166	,268
resentment	,477	,028	,244
chagrin	,692	-,016	,219
concern	,249	,029	,522
devastation	,774	-,155	,188
depression	,783	-,133	,206
anticipation	-,051	,696	,086
happiness	-,237	,800	-,073
irritation	,421	-,041	,237
repentance	,338	,390	-,070
perplexity	,522	,074	,477
boredom	,469	,005	-,090
embarrassment	,225	,302	,343
regret	,600	,146	,054
doubt	,414	,135	,502
sympathy	,393	,436	-,161
calmness	,128	,190	-,585
exultation	-,052	,731	-,175
melancholy	,577	-,002	,087
anxiety	,306	,034	,658
confidence	-,219	,312	-,496
surprise	,244	,475	,056
pleasure	-,159	,737	-,090

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