UNIVERSITÀ DEGLI STUDI DI TORINO

This is an author version of the contribution published on:
Questa è la versione dell'autore dell'opera:
[Social Science Information, vol. 55 no. 1, 2016, 0539018415608529]

The definitive version is available at:
La versione definitiva è disponibile alla URL:
[http://ssi.sagepub.com/content/55/1/43]

The dimensions of emotional meaning in modern Greek

Silvia Testa

Department of Psychology, University of Torino, Italy

Nikolitsa Triantafyllopoulou

Department of Psychology, University of Torino, Italy

Dario Galati

Department of Psychology, University of Torino, Italy

Corresponding author:

Silvia Testa, Department of Psychology, University of Torino, Via Verdi, 10, 10124

Torino, Italy.

Email: silvia.testa@unito.it

Abstract

The aim of this study was to investigate the meaning structure of emotion terms from the Greek lexicon, and to assess commonalities and differences with the maps of emotional words obtained in a prior study (Galati et al., 2008) of neo-Latin languages, a linguistic family sharing ancient roots with the Greek tongue. Fifteen native speakers contributed to the selection of 33 Greek terms with a clear emotional meaning and an independent sample of 30 participants evaluated the pairwise similarities among the target words. The similarity ratings were subjected to multidimensional scaling analyses, yielding a three-dimensional configuration (Valence, Physiological activation and Potency) in which the coping potential dimension (Potency) was more important than, or at least as important as, the Physiological activation dimension. The map resembled that previously identified for the core neo-Latin languages, namely Italian, French and Spanish, and was quite different from those obtained for other more peripheral neo-Latin languages, and also from those obtained in some studies involving English emotion lexicon. Reasons for these similarities and differences are discussed.

Keywords: emotion, lexicon, dimensions, similarity judgments, Greek

Résumé

Le but de cette recherche était d'étudier la structure de la signification des termes émotionnels du lexique grec moderne, et d'évaluer ses similitudes et différences par rapport à l'analogue structure des langues néo-latines (qui partagent avec le grec les anciennes racines sanskrites) mise en lumière par un étude précédent. Quinze sujets parlant grec et vivant en Grèce ont contribué à la sélection des 33 termes grecs doués d'une signification émotionnelle claire et 30 autres participants qui avaient les mêmes caractéristiques des précédents ont évalué les similitudes parmi les termes, les comparant à couples. Les scores de similarité ont été soumis à une procédure de Echelonnement multidimensionnel qui a produit une configuration tridimensionnelle (Valence hédoniste, Activation physiologique et Puissance) dans laquelle la dimension Puissance (potentiel d'adaptation) était plus important que, ou au moins aussi important que la dimension d'Activation physiologique. La projection graphique du placement des termes ressemblait à celle déjà identifiée pour les principales langues néo-latines, à savoir Italien, Français et Espagnol, et était tout à fait différente de celles obtenues pour d'autres langues néo-latines plus périphériques, et aussi de celles obtenues dans des études concernant l'Anglais. Les raisons de ces similitudes et différences ont été discutées.

Mots-clés : émotion, lexique, dimensions, jugements de similarité, grecque

Language is a key tool for understanding what emotions are and how they are experienced. One of the leading approaches to the study of emotions focuses on folk lexicon, that is, on the terms people commonly use to refer to their emotions. Pioneering work in this field was carried out by Davitz (1969). This author set out to develop a dictionary of emotional meanings, in which each emotion term was characterized by a specific combination of discrete attributes. From his analysis of the relations among the various features of emotions, Davitz identified four overarching factors that adequately accounted for similarities and differences among emotion terms: activation, relatedness, hedonic tone, and competence. In the second half of the twentieth century, a prolific line of enquiry was aimed at identifying the number and nature of the dimensions organizing the meaning of emotion words (Block, 1957; Bush, 1973; Gehm & Scherer, 1988; Herrmann & Raybeck, 1981; Neufeld, 1975; Russell, 1980; Russell & Mehrabian, 1977). This approach was strongly influenced by the seminal work of Osgood and colleagues (1957) on the three-dimensional structure of meaning in natural languages (Evaluation, Activity, and Potency). Many of these early studies were based on semantic differential technique or similarity ratings, and they tended to confirm a three-dimensional model in which the relations among emotion terms were well represented by three bipolar dimensions, typically labeled Valence (pleasant/unpleasant), Arousal (high/low activation), and Potency/Dominance (high/low power and control). More recently however, other scholars suggested that two dimensions, namely Valence and Arousal, were sufficient to characterize similarities and differences among emotion terms (Russell, 1980, 2003; Russell & Feldman Barrett, 1999). The bi-dimensional model, often represented via a circular arrangement of emotion terms (known as the circumplex model), was adopted by mainly Northern American researchers (e. g. Feldman Barrett & Fossum, 2001; Moore et al., 1999; Russell et al., 1989), but novel and contemporary empirical findings have once again provided support for models with three or more dimensions (e.g. Fontaine et al., 2002; Fontaine et al., 2007).

The differing models identified over time could be an artifact of the diverse methodological choices made by different researchers or they could reflect genuine cross-cultural differences. As observed in the critical literature, the number and kind of dimensions of emotional meaning may be influenced by the data analysis techniques adopted (Schimmack & Grob, 2000), by the specific list of terms included in a given study (Gehm & Scherer, 1988; Fontaine, 2013; Russell, 1991), or simply by cultural differences in the conceptualization of emotion. To disentangle these factors, cross-cultural studies adopting the same methods and procedures are needed. A first attempt in this direction came from studies in which the same tasks were assigned to speakers of different languages (Herrmann & Raybeck, 1981; Russell, 1983; Russell et al., 1989); however, the universalistic results obtained were not conclusive because direct translations of English terms were used. The cross-culture homogeneity observed in these studies could be due in part to this methodological choice. As pointed out by Lutz and White (1986: pp. 416, 423) 'the use of English emotions terms as a reference vocabulary could lead to ethnocentrism', and as noted by Ogarkova, Borgeaud, and Scherer (2009: p.347), 'the tandem of language and culture has frequently gone unquestioned' in research on emotions.

Recognizing that words are not pure labels for referring to emotional experiences but a reflection of social relations and cultural acquisitions raises multiple doubts as to whether emotion terms in different languages may be viewed as equivalent. An extreme solution to this problem would be to abandon ordinary language and develop a meta-language composed of semantic primes common to all cultures, as proposed by Wierzbicka (1999). Another recent and less radical approach to cross-cultural research that allows cultural specificities to emerge is the GRID method (Fontaine at al., 2013; Scherer, 2005). This approach, which is reminiscent of the pioneering work of Davitz cited above, compares emotion profiles and not simply emotion terms across cultures. Based on the Component Process Model proposed by

Scherer (2005, 2009), Fontaine and colleagues identified 142 characteristics that can describe an emotion experience. These features represent the five components of emotion posited by Scherer (i.e., appraisal, expression, feeling, bodily reactions, and action tendencies). A large sample of native speakers of 23 different languages was then asked to evaluate on a 7-point Likert scale 24 typical emotion terms (chosen by the researchers and translated into the different languages) in relation to these features. Analyses were performed both on the pooled data for the entire sample and on the data from subsamples formed by grouping most of the languages into four major groups --- Germanic, Neo-Latin, Slavic and Asian --- and treating the remainder individually. Modern Greek was among the languages in the sample, but was taken as a category in its own right. Fontaine and co-authors found that similarities among emotions in relation to the 142 features, in all the languages studied, could be summarized in terms of four principal components, labeled, in order of importance (i.e. in terms of explained variance): Valence, Power, Arousal, and Novelty.

The GRID approach facilitates the emergence of similarities and cultural specificities in emotional meaning because it induces participants to analyze their representations of emotions in detail in relation to 142 attributes. However by its nature, the task assigned to informants places some constraints on their freedom of judgment: the emotion terms and emotion features included in the analysis were chosen by the researchers rather than by the participants, and the terms were derived by translating English words into the other languages. Finally, in Fontaine and colleagues' 2013 study, the selection and grouping of the target languages was neither theoretically guided nor justified by arguments.

Another more emic approach to the study of emotion lexicons is that of inviting native speakers to select terms from a dictionary of their own language, and to freely judge the similarities among them (Church et al., 1998; D'Urso & Galati, 1990; Galati, 1986; Gius et al., 1992; Shaver et al., 2001).

The explanatory power of this kind of cross-cultural study is enhanced when the choice of cultures/languages to be compared is theoretically driven and justified. For example, one promising strategy is to select lexicons that belong to the same language family and share common roots but have undergone different courses of historical development in different countries with specific cultural characteristics, and then to compare these families among themselves to analyze how differences and commonalities have emerged over time. Following just such a perspective, Galati and colleagues (2008) compared the dimensional structure of emotional meaning in the neo-Latin languages, namely: Italian, French, Spanish, Catalan, Portuguese, and Romanian, by allowing native speakers to choose the most typical emotion terms from dictionaries of their own languages and applying scaling methods of data analysis to identify the dimensions of the meaning characterizing the various lexicons. They found that, in all six languages, three dimensions were required to satisfactorily represent the similarities and differences among the terms classified by native speakers as typical emotion terms. Two of these were the classic dimensions of Valence and Physiological Activation, while the third was connected to specific strategies adopted to cope with environmental challenges and could be seen as similar to the Potency dimension. In order to compare emotional mappings across countries, the authors performed a weighted Generalized Procrustes Analysis (GPA) on a core list of 8 terms with similar meanings in the different languages: content, happy, sad, desperate, anxious, angry, frightened, and irritated. The GPA centroid solution reproduced the three-dimensional map of Valence, Potency and Arousal. In all six languages, the highest weight (i.e. the highest relative importance) was that of Valence (weights ranging from .75 to .85). The salience of the other two dimensions was not the same across languages: Potency was the second most important axis in the Italian, French, Catalan, and Castilian samples (weights ranging from .43 to .53), whereas Activation was more important than Potency for the Romanian and Portuguese samples, with weights of .30 and .28, respectively. The

structure of emotional space was more similar in the languages spoken in geographical areas closer to Rome, the historical center from which Latin spread (i.e. Italian, French, and Spanish). In these languages, the dimension of Potency was more salient than that of Activation. As noted by Galati and co-authors (2008), the predominance of a Potency dimension implying cognitive processes of evaluation, over an Activation dimension related to physiological factors, could be the legacy of rationalist modes of thought typical of the Latin cultural tradition. A more dissimilar structure was found in the languages of more distant areas such as Portugal and Romania, which were also influenced by languages other than Latin (e.g. German and Arabic languages for Portuguese, and Dacian and Slavic languages for Romania).

Study aims and hypothesis

The aim of the present study was to investigate the structure of the emotion lexicon in modern Greek and compare it to the structure of the neo-Latin emotion lexicons mapped in Galati et al. (2008).

Modern Greek and the neo-Latin languages are based on Ancient Greek and Latin, respectively, that is to say from the linguistic containers of the two leading poles of Mediterranean culture: the Hellenistic pole in the east, and the Latin pole in the west. Despite the common origin of their languages, which both developed from ancient Sanskrit, these two cultural poles diverged greatly over time; and this despite the fact that for many centuries, they belonged to the same socio-political structure: the Roman Empire. For this reason, it is of interest to investigate whether and how this historical process of differentiation influenced the way in which emotional lexicon is organized or whether, alternatively, the structure of emotional meaning is a cultural invariant that resists historical transformation.

To make the results of this study directly comparable with those of Galati and collaborators (2008), the same method of term choice and the same tools of analysis were used. Based on the linguistic and historical considerations outlined above, we expected that the Greek emotion lexicon would display a dimensional structure that was more similar to that of the core neo-Latin languages than to other languages, but that it would also display differences due to the historical differentiation of the Hellenistic and Latin cultural poles. Specifically, we hypothesized that also in the Greek emotion lexicon: (a) three dimensions would be needed to represent commonalities and differences among terms considered by native speakers to be typically emotional; and (b) the Potency dimension would be more salient than the dimension of Physiological Activation. It was also expected that, despite major commonalities, minor differences between the two lexicons would emerge. However, we were not in a position to make any specific prediction about these.

Methods

Procedure and participants

As mentioned above, to ensure comparability with the results of Galati and co-authors in relation to the neo-Latin languages (Galati et al., 2008), the same method of term selection and data analysis were adopted. The procedure comprised the following three steps: (1) selection of emotional terms, (2) reduction of the list of terms, and (3) evaluation of similarities and differences among the terms remaining on the short list.

      Selection of emotion terms. Three independent female judges, two professors of Greek literature and a university student, all natives of and resident in Greece, were asked to compile a complete list of adjectives with an emotional meaning from a specific Greek language dictionary (Babiniotis, 2005). This particular dictionary was chosen because, according to experts in the field, it was the most modern, up-to-date,

and complete dictionary of modern Greek. The adjectival form was preferred to nominal or adverbial ones because it appears to be more directly connected with emotional experience (Conway & Bekerian, 1987; Plutchik, 1980). The nominal form was only accepted in the absence of an adjectival one. The judges were required to follow criteria adapted from Ortoni, Clore, and Foss (1987): (1) the terms must refer to internal and mental conditions; (2) they must describe a momentary state; (3) they must refer mainly to aspects of affect, even though they may also invoke emotional knowledge, emotional behavior, physiological changes, and expressive aspects of emotions. These criteria were described in very simple words to ensure that they had been clearly understood.

Shortening the list of terms. The word list thus derived was then assessed by twelve further judges, six university students attending the Faculty of Psychology (three females and three males) and six adults with a high level of education, aged between 26 and 65 (three females and three males), with the aim of obtaining a smaller number of terms. The goal was to cut the list down to approximately the same number of terms --- about 30 --- used in previous studies. To compensate for a possible order-effect, two versions of the questionnaire were administered, one with the emotion terms in ascending alphabetical order and the other with the target words in descending alphabetical order. For each term, each judge was required to rate on a scale ranging from 0 (not at all) to 3 (certainly) the extent to which the word had a clear and typical emotional meaning. The terms were ranked according to the average rating received from the twelve judges and by the number of judges who assigned the maximum score (3). Approximately 30 terms with the highest rankings on both of the defined criteria were used in the third phase.

Evaluation of similarities and differences among emotion terms. In this third phase, a sample of 30 native speakers was recruited, some of whom (10) were students attending the last year of secondary school (five females and five males), and the remainder (20) adults with a medium to high level of education (M age=39.1 years, *SD*

=5.6; ten females and ten males). For each pair of adjectives, participants were asked to assess how similar they were on a scale ranging from -3 (completely opposite in meaning) to +3 (completely identical in meaning). The pairs of terms were presented in a double-entry matrix. To compensate for a possible order-effect, two versions of the questionnaire were administered, one with the words in ascending alphabetical order and the other in descending alphabetical order.

Data analysis

The 30 individual similarities matrices were converted into dissimilarities matrices and analyzed using three different scaling procedures: classical multidimensional scaling (CMDS), individual differences scaling (Indscal) as implemented in Spss 20 under the Alscal procedure, and Generalized Procrustes Analysis (GPA) as implemented in the Pindis procedure (Lingoes & Borg, 1978) using NewMds software (Coxon et al., 2005). Measures of discrepancy (Stress) and correlation (R-square) between empirical dissimilarities and modeled distances were used to evaluate the goodness of fit of the scaling solutions (Kruskal & Wish, 1978).

Initially, CMDS was applied to each of the 30 matrices with the aim of assessing whether the individual matrices could be pooled together (an R square value of > .50 was the inclusion criterion for a three-dimensional solution (Massa et al., 1999); CMDS was subsequently applied to produce a common map of the aggregate data. Before averaging was carried out, the available data were ipsatized, that is, the raw scores of each participant were transformed by removing his or her mean and variance in order to eliminate possible idiosyncrasies in the use of the rating scale. CMDS procedures are based on un-weighted Euclidean distances, and for this reason the spatial configuration of the points representing the emotion terms is affected by rotation indeterminacy (similar to that of exploratory factor analysis), which in turn prevents univocal

interpretation of the space dimensions. In order to solve this indeterminacy, in the current study, the raw dissimilarities matrices were analyzed using Indscal, a scaling procedure based on weighted Euclidean distances, in which the weights may be interpreted as the relative importance (salience) that each individual attaches to each shared dimension. Subsequently, GPA analysis was performed to compare the Greek map to that obtained in the earlier study of neo-Latin languages. More specifically, two independent bilingual judges (who spoke both Italian and Greek perfectly) evaluated the degree to which each of the selected terms had an appropriate corresponding translation in Italian. The CMDS coordinates of the terms for which the judges fully agreed on their translatability and which were also present in the GPA analysis in the neo-Latin study were compared to the centroid of the neo-Latin GPA solution.

Results

Emotion adjectives in modern Greek

The list of words selected by at least one of the three independent judges was composed of 367 terms. The judges and the research team members analyzed controversial items and agreed on an initial shortlist of 200 emotion words, with a prevalence of terms referring to negative emotions (61%).

The average scores of the 12 judges asked to assess the extent to which (0 =not at all, 3=certainly) each of the 200 terms had a clear and typical emotional meaning ranged from a minimum of .50 to a maximum of 2.92 (M=1.76, SD=.53). The number of judges answering that a target term certainly referred to a particular emotion varied from 0 to 11 (M=3.88, SD=2.49). Only 39 terms out of 200 received the maximum score from the majority of the judges (seven out of 12). Among these, 33 were also those with the highest mean score (> 2.25) and these were selected as the reference list for the similarities task.

In this shortened list (Table) the percentage of negative emotions was 70%, and almost all the terms referred to basic (or modal in Scherer's terms, Scherer, 1994) emotions. Only one of the 33 terms was expressed in nominal form because lacking a corresponding adjectival form (Έξαψη, here translated with the noun 'upset').

TABLE ABOUT HERE

Modern Greek emotion lexicon mapped using CMDS

Almost all the individual matrices fit a CMDS three-dimensional solution (R-square > .50); only two of the secondary student participants were omitted from the subsequent data analyses because of their poor fit. The CMDS analyses performed on the aggregate dissimilarities matrix produced nearly acceptable fit measures for the bi-dimensional solution (Stress=.192; R-Square=.869)[1][1] and good fit measures for the three dimensional solution (Stress=.116; R-Square=.938)[2].[2] Figures 1, 2a and 2b show the results of these analyses; for easier reading, the English translations of the Greek terms already reported in the Table are used. The first dimension in the two-dimensional solution (Figure 1) could be labeled 'Valence', given that its markers were: Περιχαρής (overjoyed) and Πανευτυχής/ Υπερευχαριστημένος (delighted), and at the contrasting pole δυστυχισμένος-δυστυχής (unhappy), Θλιμμένος (sad) and απογοητευμένος (disappointed). The second dimension could be labeled 'Potency', given that its markers were Φοβισμένος (scared), Τρομοκρατημένος (terrified) in opposition to Εξαγριωμένος (furious) and Τσαντισμένος (angry).

FIGURE 1 ABOUT HERE

Figures 2a and 2b depict the spatial configurations of the 33 emotion terms in the three dimensional solution. Given that it is difficult to inspect a three- dimensional graph, two bi-dimensional plots are reported.

FIGURES 2 (2a and 2b) ABOUT HERE

The first dimension in the three-dimensional solution is again that of Valence, with positive and negative emotions at opposite poles. The second dimension contrasts emotions such as Μελαγχολικός (melancholic) and Λυπημένος (sad) with Εξαγριωμένος (furious) and Τσαντισμένος (angry). It seems to represent Activation, with one of its poles characterized by emotions eliciting low levels of activation and characterized by passivity and low-key behavioral activity (as in melancholy and sadness). The opposite pole is that of highly activated emotions, characterized by action, and particularly by defensive and attacking behavior (such as anger and fury). The positive emotion labels indicating various shades of joy plausibly occupy a middle ground, given that they refer to emotions characterized by a medium level of activation that is less noteworthy than the highs and lows of the emotions at either extreme. Of course the positive emotion of joy gives rise to active behaviors, but without violence or aggression. On the third dimension, the contrast is between Φοβισμένος (scared), Τρομοκρατημένος (terrified) and all the other terms related to positive and negative emotions. The contrast seems to be between negative emotions with a very low coping potential (the family of fear emotions) involving behaviors of escape and self-protection and positive and negative emotions with high coping potential (the happiness and anger families of emotion). The intermediate position here is occupied by emotions such as confusion and surprise, indicating that subjects experiencing such affective states have inadequate coping control and are cognitively disoriented because they need more

information in order to plan their behavior. In this representation, it is difficult to interpret the position of the family of sadness emotions.

Modern Greek emotional lexicon mapped using Indscal

To better clarify the meanings of the second and third dimensions an Indscal analysis was performed, yielding the maps shown in Figures 3a and 3b.

FIGURES 3 (3a and 3b) ABOUT HERE

Using a weighted Euclidean metric meant that axis orientation was no longer arbitrary and the meaning of the axes became clearer. The first dimension was, as always, that of Valence; the second and third dimensions, even more clearly than in the previous representation, could be referred to as Physiological Activation and Potency. On the Physiological Activation dimension (Figure 3a, Dimension 2), Μελαγχολικός (melancholic), Λυπημένος/Ψυχοπλακωμένος (sad) and δυστυχισμένος-δυστυχής (unhappy) were in contrast with Οργισμένος (very angry), Εξαγριωμένος (furious), Συγχυσμένος (confused) and Έξαψη (upset). On the Potency dimension (Figure 3b, Dimension 3), Τσαντισμένος/Θυμωμένος (angry), Εξαγριωμένος (furious) and αγανακτησμένος (indignant) were at the opposite end of the scale to Φοβισμένος (scared) and Τρομοκρατημένος (terrified). In this representation of the coping dimension (vertical axis in Figure 3b), the families of sadness and positive emotions of happiness were more clearly differentiated from anger, given this intermediate level of coping potential, which was less evident in the previous mapping. The average weights of the three dimensions were .31 (Valence), .12 (Physiological activation), and .09 (Potency), suggesting that Valence was the most important dimension, followed by Activation and then Potency. However, these last two dimensions were almost equally

14

salient, because the difference in their average weights was very small and could have been due to sampling errors.

The comparison between the neo-Latin and modern Greek mappings

Of the 33 selected terms, one third were rated by both bilingual judges as having an equivalent in the Italian language, and six of these had also been evaluated as translatable from the various neo-Latin languages to Italian in the study by Galati and colleagues (2008). The six terms were the following: anxious, happy, content, sad, angry, irritated, and frightened.

The three-dimensional CMDS coordinates of these six terms were analyzed using GPA. The centroid coordinates of the neo-Latin GPA analysis were used as the reference configuration, in which the most salient dimension was Valence, the second Potency and the third Physiological Activation. When the Greek space was rotated and attribution of a different relative importance to the three dimensions allowed, the overlap between the neo-Latin space and the Greek space was good (R-square=.93). Valence was the most important dimension (.74) and Potency was more important than Activation (their weights were .50 and .37 respectively).

Discussion and conclusion

The aim of the present study was to investigate the dimensional representation of the emotional lexicon in modern Greek, comparing it to the equivalent representation in the neo-Latin languages identified in a previous study by Galati and colleagues (2008). The overall hypothesis was that the mapping of emotional meaning in modern Greek would be very similar to the neo-Latin mappings, given these languages' common though very ancient roots. Specifically, it was hypothesized that, as for the core neo-Latin languages (Italian, French, Catalan and Castilian), more than two dimensions would be necessary

to satisfactorily depict the meaning structure of the Greek emotion lexicon and that the cognitive dimension of Potency would be more salient than the somatic dimension of Physiological Activation. All the MDS results corroborated the importance of the Potency dimension. When an optimally rotated solution was produced via Indscal, the three classical dimensions of Valence, Activation, and Potency clearly emerged. The ranking in importance of these dimensions could not be fully established because only Valence undoubtedly bore greater weight than the others; in contrast, the weights of Activation and Potency were almost identical. Only closer comparison with the neo-Latin mapping, effected by analyzing a core set of six terms, yielded clearer information about the hierarchy between the two dimensions. In both core neo-Latin (Italian, French, and Spanish) and modern Greek languages, Potency was clearly the second most salient dimension.

In relation to other studies of the modern Greek emotional lexicon, our findings clash with those obtained by Herrmann and Raybeck (1981) and partially support those of Fontaine and co-researchers. (2013). On analyzing similarity judgments with respect to emotion nouns across six languages (including modern Greek), Herrmann and Raybeck found that the two-dimensional configuration of Valence and Activation provided a satisfactory fit for the data from the different languages. It could be that their results, which are in contrast to ours, were influenced by their etic approach. Specifically, they used a predefined list of English emotion terms translated into the different languages, without allowing native speakers to produce a list of terms more truly representative of their emotion lexicon. This methodological approach may have prevented identification of broader differences among the different languages.

In contrast, our results displayed stronger agreement with those of Fontaine and co-authors (2013). The first three factors (and the order of importance of these three factors) obtained in their GRID research correspond exactly to those found in our own study. However, they also found a fourth factor (labeled Novelty) across all 23

16

languages and a fifth factor (Familiarity and Disappointment) that was specific to the Greek. These differences may be due to the fact that, in the present study, we asked participants to make similarity judgments between emotion terms. Maps produced by direct comparisons are typically two or three-dimensional, given that, as noted by Green (1975), it is likely difficult to perceive differences along more than two or three dimensions at one time. Alternatively, it is possible that 'finer discriminations are not required' (Green, 1975: 30). Thus, the dimensions of meaning that emerged from the particular kind of cognitive task assigned in our own study do not necessarily exhaust the universe of emotion attributes, but might be considered a selection of the most important. Following a different procedure to our own, Fontaine et al. (2013) invited their respondents to analyze the meaning of emotion terms in relation to a predefined list of analytical categories, without eliciting a holistic and personal representation of the meaning of these terms. This could also explain the presence and importance of the Power dimension among their results and its absence from the Herrmann and Raybeck analysis, even though a similar method was used to choose the emotion terms in both cases. It could be that the Power dimension in Fontaine and collaborators' study was induced by the presence of a group of categories describing appraisal (evaluation of personal resources) and action tendencies among the attributes participants were asked to rate. These categories could have aroused and directed the attention of the respondents toward a Power dimension.

Further research is needed to clarify this aspect; in any case, we suggest that the simpler, less analytical, but more emic task proposed in our own study allowed participants to implicitly express the most common and probably the most basic structure of emotional meaning.

In conclusion, the three basic dimensions which emerged in our study confirm Osgood and co-authors' (1957) theory of three basic dimensions of affective meaning in

human languages. The strong salience of Potency suggests a richer representation of emotional meaning than that provided by the two-dimensional model.

Indeed, the last-mentioned model emphasizes only two aspects of the emotional process. The first aspect (Valence) refers to the evaluation of the intrinsic pleasantness of the stimulus causing emotion, while the second aspect (Activation or Arousal) refers to the preparation of behavioral responses, via the activation of given action tendencies (Frijda, 1986). Thus, in the bi-dimensional representation of emotional meaning, the immediate assessment of the pleasantness or unpleasantness of a stimulus is directly linked to the consequences at the action level. In the three-dimensional model in contrast, the relationship between immediate evaluation of the stimulus and action tendencies is mediated by an additional cognitive check that might be termed the coping potential control (Scherer, 1984, 2010), which consists of evaluating the internal resources available to the subject for dealing with the external stimuli. The two models appear to reflect different cultural representations of emotion experience. The first views emotion as a sort of sensory motor reflex immediately elicited by certain features of the stimuli, while the second considers emotion to be a more complex cognitive process in which the evaluation of subjective resources plays a key mediating role between stimulus and response.

In our own view, it is not a coincidence that the three-dimensional model prevails in European languages with Greek and Latin roots. This representation, in fact, seems to echo the conception of emotion contained in the tripartite view of the human soul that has characterized European thought from ancient times to the present. This tripartite schema considers the soul to be a complex structure comprising rational, emotional, and vegetative aspects; it became dominant with Plato and Aristotle, spread in the Medieval and Modern periods thanks to Saint Thomas Aquinas, and is still reflected in the contemporary common-sense view of emotions. This schema attributes the emotional part of the soul with a different function to that of the purely vegetative

component, composed of mere sensory-motor reflexes. This function may be viewed as the human being's first cognitive screening of the world, which needs to be extended and guided by the rational soul, the seat of higher cognitive functions and top-down control over emotional responses.

In any case, the causal relationship between the three-dimensional representation of the meaning of emotions and the triadic representation of the soul is not yet clear. It may be that it was the ancient philosophical representation of the soul that influenced, over the centuries and across countries, common-sense understandings of the significance of emotions. However, the opposite may also be the case, namely that it was precisely the common-sense representation of emotional meaning that led to the formulation of a theory about the human soul that assigns a particular role to emotion. Nevertheless, it was not our aim here to settle the *vexata questio*: 'Which came first, the chicken or the egg?'

Acknowledgements

Notes

1. When the number of stimuli is far greater than the number of dimensions, stress values higher than the conventional benchmark of .10 might be acceptable (Borg & Groenen, 1997).

2. The increase of fit moving to four dimensions (Stress=.075; R-Square=.966) was due to over-fitting noise components: the first three dimensions were the same as in the three-dimensional solution while the fourth was not easily interpretable.

References

Babiniotis G (2005) *Dictionary of the New Modern Greek Language*. Athens: Lexical Center.

Block J (1957) Studies in the phenomenology of emotions. *Journal of Abnormal and Social Psychology* 54(3): 358--363.

Borg I, Groenen PJ (1997) *Modern Multidimensional Scaling: Theory and applications.* Springer.

Bush LE (1973) Individual differences multidimensional scaling of adjectives denoting feelings. *Journal of Personality and Social Psychology 25*(1): 50--57.

Church AT, Katigbak MS, Reyes, JAS, Jensen SM (1998) Language and organisation of Filipino emotion concepts: Comparing emotion concepts and dimensions across cultures. *Cognition and Emotion* 12: 63--92.

Conway MA, Bekerian DA (1987) Situational knowledge and emotions. *Cognition and emotion* 1(2): 145--191.

Coxon, APM, Brier AP, Hawkins PK (2005) *The NEWMDSX Program Series, Version 5*. Newmdsx Project.

Davitz JR (1969) *The Language of Emotion.* Academic Press.

D'Urso V, Galati D (1990) L'analisi dello spazio semantico di termini emozionali italiani. *Ricerche di psicologia* 14: 29--55.

Feldman Barrett L, Fossum T (2001) Mental representations of affect knowledge. *Cognition and Emotion* 15(3): 333--363.

Fontaine JRJ (2013) Dimensional, basic emotion, and componential approaches to meaning in psychological emotion research. In: Fontaine JRJ, Scherer KR, Soriano C (eds) *Components of Emotional Meaning: A sourcebook*. Oxford University Press, 31--45.

Fontaine JRJ, Poortinga YH, Setiadi B, Markam SS (2002) Cognitive structure of emotion terms in Indonesia and The Netherlands. *Cognition and Emotion* 16(1): 61--86.

Fontaine JRJ, Scherer KR, Roesch EB, Ellsworth PC (2007) The world of emotions is not two-dimensional. *Psychological Science* 18(12): 1050--1057.

Fontaine JRJ, Scherer KR, Soriano C (eds) (2013) *Components of Emotional Meaning: A sourcebook*. Oxford University Press.

Frijda NH (1986) *The Emotions*. Cambridge University Press.

Galati D (1986) Radicali semantici nel lessico italiano delle emozioni. *Ricerche di Psicologia* 3:5--34.

Galati D, Sini B, Tinti C, Testa S (2008) The lexicon of emotion in the neo-Latin languages. *Social Science Information* 47(2): 205--220.

Gehm TL, Scherer KR (1988) Factors determining the dimensions of subjective emotional space. In: Scherer KR (ed.) *Facets of Emotion: Recent research*. Lawrence Erlbaum Associates, 99--113.

Gius E, Cozzi A, Spagnotto D (1992) Il linguaggio delle emozioni. Studio sull'organizzazione delle parole che comunicano stati emotivi. *Giornale Italiano di Psicologia* 19: 563--584.

Green PE (1975) Marketing applications of MDS: Assessment and outlook. *Journal of Marketing* 39(1): 24--31.

Herrmann DJ, Raybeck D (1981) Similarities and differences in meaning in six cultures. *Journal of Cross-Cultural Psychology* 12(2): 194--206.

Kruskal JB, Wish M (1978) *Multidimensional Scaling*. Sage.

Lingoes JC, Borg I (1978) A direct approach to individual differences scaling using increasingly complex transformations. *Psychometrika* 43: 491--519.

Lutz C, White MG (1986) The anthropology of emotions. *Annual Review of Anthropology* 15: 405--436.

Massa A, Ricolfi L, Testa S (1999) Proprietà formali dell'algoritmo ALSCAL sotto SPSS. Un'analisi critica. *Testing, Psychometrics, Methodology in Applied Psychology* 6: 5--32.

Moore CC, Romney AK, Hsia TL, Rusch CD (1999) The universality of the semantic structure of emotion terms: Methods for the study of inter-and intra-cultural variability. *American Anthropologist* 101(3): 529--546.

Neufeld RW (1975) A multidimensional scaling analysis of schizophrenics' and normals' perceptions of verbal similarity. *Journal of Abnormal Psychology* 84(5): 498--507.

Ogarkova A, Borgeaud P, Scherer K (2009) Language and culture in emotion research: A multidisciplinary perspective. *Social Science Information* 48(3): 339--357.

Ortoni A, Clore GL, Foss MA (1987) The referential structure of the affective lexicon. *Cognitive Science* 11: 341--364.

Osgood CE, Suci GJ, Tannenbaum PH (1957) *The Measurement of Meaning*. University of Illinois Press.

Plutchik R (1980) *Emotion: A psychoevolutionary synthesis*. Harper & Row.

Russell JA (1980) A circumplex model of affect. *Journal of Personality and Social Psychology* 39(6): 1161--1178.

Russell JA (1983) Pancultural aspects of the human conceptual organization of emotions. *Journal of Personality and Social Psychology* 45: 1281--1288.

Russell JA (1991) Culture and the categorization of emotions. *Psychological Bulletin* 110: 426--450.

Russell JA (2003) Core affect and the psychological construction of emotion. *Psychological review* 110(1): 145--172.

Russell JA, Feldman Barrett L (1999) Core affect, prototypical emotional episodes and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology* 76: 805--819.

Russell JA, Lewicka M, Niit T (1989) A cross-cultural study of a circumplex model of affect. *Journal of Personality and Social Psychology* 57: 848--856.

Russell JA, Mehrabian A (1977) Evidence for a three-factor theory of emotions. *Journal of Research in Personality* 11(3): 273--294.

Scherer KR (1984) On the nature and function of emotion: A component process approach. In: Ekman P, Scherer KR (eds) *Approaches to Emotion*. Lawrence Erlbaum Associates, 293--317.

Scherer KR (1994) Toward a concept of 'modal emotions'. In: Ekman P, Davidson RJ (eds) *The Nature of Emotion: Fundamental questions*. Oxford University Press, 25--31.

Scherer KR (2005) What are emotions? And how can they be measured? *Social Science Information* 44(4): 695--729.

Scherer KR (2009) The dynamic architecture of emotion: Evidence for the component process model. *Cognition and Emotion* 23(7): 1307--1351.

Scherer KR (2010) The component process model: Architecture for a comprehensive computational model of emergent emotion. In: Scherer KR, Bänziger T, Roesch E (eds) *A Blueprint for Affective Computing: A sourcebook and manual*. Oxford University Press, 47--70.

Schimmack U, Grob A (2000) Dimensional models of core affect: A quantitative comparison by means of structural equation modeling. *European Journal of Personality* 14(4): 325--345.

Shaver PR, Murdaya U, Fraley RC (2001) Structure of the Indonesian emotion lexicon. *Asian Journal of Social Psychology* 4(3): 201--224.

Wierzbicka A (1999) *Emotions across Languages and Cultures*. Cambridge University Press.