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A MULTI-AXIAL MODEL OF META-EMOTIONAL FUNCTIONS IN HEALTHY PEOPLE COMPARE TO PEOPLE WITH MENTAL ILLNESS. BRIEF SCIENTIFIC REPORT

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Abstract: *A numerous of mathematical models that outline a long tradition of attempts to objectify measurements about simple and complex human feelings is addressed in this brief scientific release. There are statistical reasons for adopting valid indexes in the study of the process of identification and association of categories for simple emotions, emotion-laden themes and scripts (Tomkins 1979, Demorest 2008, Ferdinandov 2018a). Linear and non-linear functions are used to derive indices of objective frustration, subjective ambivalence and emotional conflicts between most frequently depicted emotions. Comparing statistical power, levels of significance and size effects of two samples – high-school students and undergraduates in psychology (N = 196, from 14 to 23 age old) and adults with unipolar depression, bipolar affective disorders and schizophrenia (N = 38, from 25 to 72 age old) are considered as a key factor that could be adopted as a distinguishing clue to mental disturbance. Differences in mental pace as a function of the time invested in understanding the conditions and fulfilling the linguistic tasks are elaborated. A "Misery" index (modified Utility index, Kahneman & Kruger 2006) has been found to represent a potential and statistically significant additional criterion to the objective properties. The modified utility ("Misery") index demonstrated very high statistical significance and observed power, but with moderate to strong size effects compare to the mental pace depending on healthy status. This functional model overrun other mathematical measurements about affective ambivalence and subjective frustration (Brown & Farber 1951, Scott 1966, Kaplan 1972, Thompson et al. 1995, Priester & Petty 1996). The virtual psycholinguistic experiment is available at the Internet address https:/testrain.info*

Keywords: emotions; ambivalence; mathematical indexes; cognitive pace; mental health disturbances.

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Introduction

In the last 69 years, the psychological literature has repeatedly emphasized that real events are emotionally charged, and their actual quality serves as an example and a starting point in their description and evaluation by variety of mathematical function. Emotions on one side are perceived or understood in a qualitative, narrative way that suggests accessible and visual prototypes for descriptions or scenarios that explain them (Tomkins 1979, Tomkins 1995, Fehr & Russell 1984, Russell & Barrett 1999).

Each emotion that people communicate or recognize, in its original form, corresponds to many specific episodes, real *scenes* of an events, combined into specific *themes* that can be coded and described through basic categories of emotional cognition. They can also refer to more abstract terms such as *dimensions*, more general like frequency, duration and intensity or subjective such as good or bad determine the clarity of the context that precedes them (Shaver et al. 1987, Fredrickson & Kahneman 1993, Fredrickson 1999, Larsen & Fredrickson 1999, Tomkins 1995). From this point of view, positive emotions such as calmness, joy, love, enthusiasm are expected to foster positive illusions of well-being (Taylor & Brown 1988, Taylor & Brown 1994).

The affective component in human life is a potential route along which, directly, objectively, or indirectly, contextually and implicitly could be determine by the basic criteria for mental health or the level of development to fullfill a complete physical, mental and social well-being. The life-meaning of emotions and through basic labeling as positive, negative or contradictory (ambivalent) is a central and defining standard for an overall assessment applying measures of well-being and growth. They are expected to be an integral part of the flourishing spiral (Fredrickson 2004).

The long-term well-being impact of affective experiences is due to the frequency of variety of positive in addition to negative emotions (Diener et al. 1985). Discrete emotions and abstract dimensions can complement each other in describing individual differences. The features of the most common moods, although peculiar sometimes, can refer to two separate, global, but interrelated secondary appraisal factors in complement to primary positive and negative judgments.

The account of positive in expanse of negative experiences creates contrasts with bipolar effect due to the fact that the neural circuits of positive and negative experiences are relatively distinct but also interconnected (Davidson 1992, Davidson 1994). Under conditions of low intensity and taking a long-term perspective, the effect of opposition between positive and negative emotions decreases and their statistical correlation may be moderate and not necessarily negative (Diener & Iran-Nejad 1986).

In the current study is demonstrated how different researchers offer mathematical models in attempt to calculate positive, negative or ambivalent emotional states (Ferdinandov 2019). Other aspects of complex emotionality, indexed on the basis of positive and negative introspective self-assessment are impelemented (Berrios 2019). Many measures based on self-assessments cannot fit into the paradigm of implicit forms of accounted subjective ambivalence (Petty et al. 2012). Explicit measures, on the other hand, can be biased by numerous cultural and social factors that influence people‘s tendency to explicitly state their level of ambivalence (Cavazza & Butera 2008) or by the level of their affective differentiation (Feldman-Barrett 2004, Kang & Shaver 2004).

The subject of this study

The subject of this brief report is post hoc findings concerning differences between students and patients in a virtual experiment measurement of some aspects and functions of primary and complex emotionality.

The aim of the study is to compare the differences between mathematical indicators scrutinized in the field of emotionality (Ferdinandov 2019). The accumulated database of about 234 participants responses (students, N = 196, 14 – 23 years of age) and patients with diagnosed mental disorders - schizophrenia, bipolar disorder and depression (N = 38, between 25 and

72 years) were analyzed with several statistical tests. The patients have given their voluntary consent under the Helsinki Convention.

The hypothesis states that for some indicators significant advantages to reveal qualitative differences between the two samples in terms of their health. Thus, two types of cognitive-affective properties, *the time* spent during the virtual tests as objective indicators compared to numerous mathematical functions measuring *subjective appraisals*, would reveal independent aspects of primary states and secondary affective attributions.

Statistical results and general discussion

In case of strict limits for measuring the size and significance of the first rank regression coefficient of difference (*Partial Eta Squared,* $\eta^2 \geq .13$, Cohen 1988) should be taken into account, which means that health condition bias is not stochastic (Lykken & Tellegen 1996). All programmed mathematical functions and objective properties of response latency were found to be very salient due to the sampling effects (Table 1),

Table 1
Tests of between-subjects effects.

Mathematical functions	F	Sig.	Partial Eta Squared	Observed Power[ar]
1.1. Time spent *for recognizing facial expressions (Ekman & Friesen 1975)*	19,873	,000	*,079*	,993
2.1. Time spent for identifying of emotions families (Ferdinandov 2018)	24,874	,000	,097	,999
2.2.1. Time spent for identifying of positive emotions families (Ferdinandov 2018)	10,195	,002	,042	,889
2.3. Number of identified negative emotions families (Ferdinandov 2018)	10,484	,001	,043	,897
2.3.1. Time spent for identifying negative emotions families (Ferdinandov 2018)	22,195	,000	*,087*	,997
2.4.2. Average self-assessed duration of negative emotions families (Ferdinandov 2018)	10,581	,001	,044	,900
3. Number of associated emotion-event themes (Demorest 2008)	9,222	,003	,038	,856
3.1. Time spent for association of emotion-event themes (Demorest 2008)	**92,604**	**,000**	**,285**	**1,000**
4. Number of associated affective scripts (Tomkins 1979)	22,524	,000	*,088*	,997
4.1. Time spent for association of emotion-laden scripts (Tomkins 1979)	**41,458**	**,000**	**,152**	**1,000**
6.1. Time spent for self-evaluation of emotional regulation (Gross & John 2003)	**37,444**	**,000**	**,139**	**1,000**
7. Total response latency (Bassili 1996)	**110,842**	**,000**	**,323**	**1,000**
9. Affective frustration (Brown & Farber 1951)	13,934	,000	,057	,961
12. Ambivalence, counting number of identified emotions families (Kaplan 1972)	10,484	,001	,043	,897
12.1. Ambivalence, summing durations of identified emotions families (Kaplan 1972)	24,150	,000	*,094*	,998

14. Subjective ambivalence, counting number of emotions (Thompson et al. 1995)	10,653	,001	,044	,902
15. Subjective ambivalence, summing durations of identified emotions families (Thompson et al. 1995)	20,914	,000	*,083*	,995
15.1. Similarity between bipolar emotional families, counting number of identified emotions families (Thompson et al. 1995)	9,482	,002	,039	,866
15.2. Extremity of emotions, summing durations of identified emotions families (Thompson et al. 1995)	13,889	,000	,056	,960
16. Gradual threshold model of ambivalence, counting number of identified emotions families (Priester & Petty 1996)	10,484	,001	,043	,897
16.1. Gradual threshold model of ambivalence, summing durations of identified emotions families (Priester & Petty 1996)	23,992	,000	*,094*	,998
17. Abrupt threshold model of ambivalence, counting number of identified emotions families (Priester & Petty 1996)	10,889	,001	,045	,908
17.1. Abrupt threshold model of ambivalence summing durations of identified emotions families (Priester & Petty 1996)	23,987	,000	*,094*	,998
18.1. Emotional ambivalence, summing durations of identified emotions families (Choi & Choi 2002)	9,482	,002	,039	,866
20. Misery index (Juster et al. 1985, Kahneman & Kruger 2006)	**35,034**	**,000**	**,131**	**1,000**
22.2. Negative emodiversity (Quoidbach et al. 2014)	9,610	,002	,040	,870

It can be seen that for only 5 (with bold letters) of all 48 simulated mathematical functions a huge and very significant effects could be attributed to differences in health condition. For eight (in italics) of the remaining twenty-one indexes a significant but moderate regression were found (η^2 is ranged between .079 and .097, $p \leq .0001$, in italic). This provides an evidence in support of the hypothesis that the healthy mindset and the measured differences for each of these five variables are determined by: 1) the time spent identifying and connecting emotion-laden life *themes* to a number of chosen primary families of emotion (Demorest 2008); 2) the time spent to connect all possible *scripts* offered to the emotions selected (Tomkins 1979, Ferdinandov 2018a); 3) the time spent in *emotional regulation* self-assessment (Gross & John 2003), 4) the total *response latency* (in minutes, Bassili 1996), and 5) the magnitude of adapted *Misery index* (modified Utility index, Kahneman & Kruger 2006).

Validation and statistical norms of mathematical functions

Two orthogonal components were extracted with exploratory factor analysis which explain about 60,43% of total variance (Figure 2). This means that at least two main factors are necessary to explain the distribution of all investigated indices, first one corresponding to numerous measures of affective ambivalence and conflicts (vertical axis) and the other one related to the degree of proportionality and difference in identifications (horizontal axis).

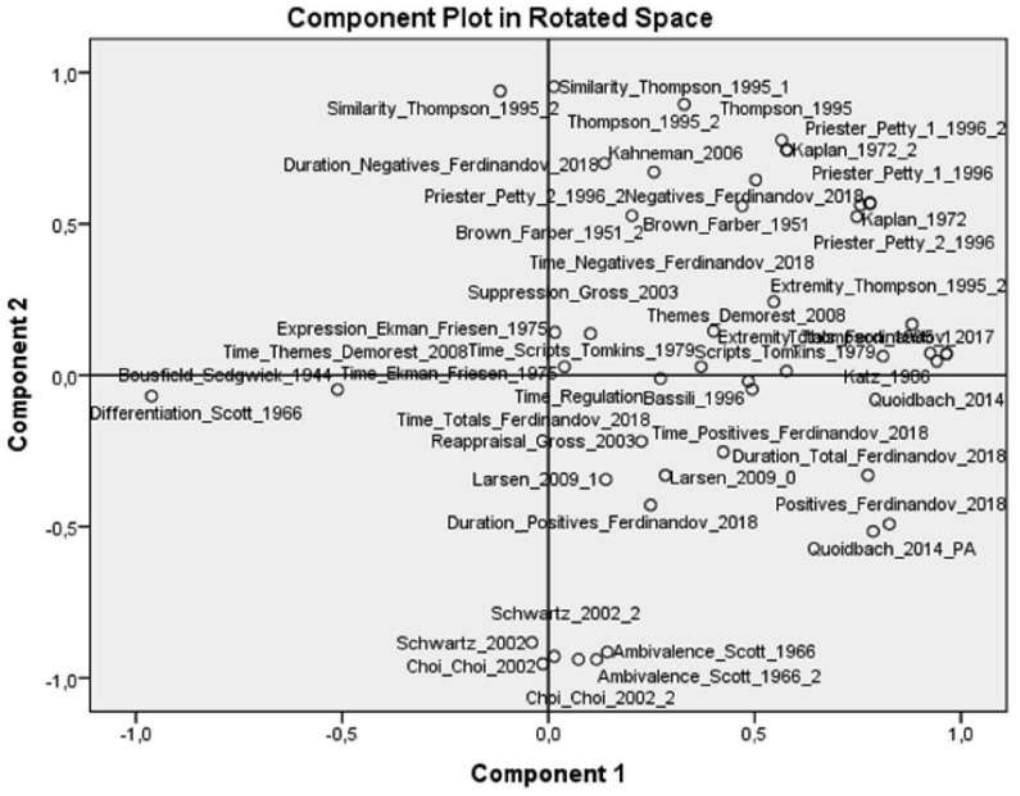


Figure . A two-factor decision

To study this evidence a further selection of the variables was performed based on their observed power and the size effect depend on health status. Out of all 48 indicators analyzed, only five of them were selected as the most significant and exceeding the adopted standard for interpretation of size effect. A common factor underlies 4 indecies that represents the time spent in selecting emotion-laden words (Table 2). The determinants of variations in responses are narrowed and the explained differences in participants‘ scores were *59.925%*, with a steep “elbow” below 1 eigenvalue after the second factor (Figure 2). This finding from the factor analysis provided can be interpreted in the direction that specifics in health condition may explain *the mental pace* of the participants in the experiment. However, the modified utility (“Misery”) index is significantly lesser according to the appropriated general condition of size effect, demonstrating a very low degree of communalities, which may mean that it is another subjective function independent from the objective property of response latency in the attributions process.

Table 2
Components loading

Communalities	Initial
7. Total response latency (Bassili 1996)	,878
6.1. Time spent for self-evaluation of emotional regulation	,596
4.1. Time spent for association of emotion-laden scripts (Tomkins 1979)	,628
3.1. Number of associated emotion-event themes (Demorest 2008)	,679
20. Misery index (Juster et al. 1985, Kahneman & Kruger 2006)	,072

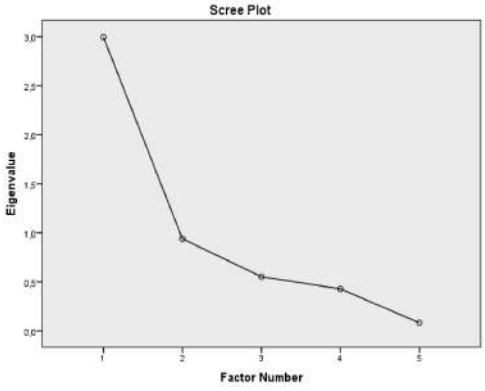


Figure 2. One factor solution of remaining indexes

The process of recognizing and associating emotion-laden images and categories for emotions, themes and scripts seems to be distorted by severe mental illness, a finding listed in another study (Ferdinandov 2018). Remarkable difference in the students' mental pace compared to patients' attribution tempo are presented in Table 3. The means of the students' response latency is depicted as several times ***faster*** than the mentally ill subjects' timing, but identifying their own affective experiences with a significantly ***poorer*** repertoire of identified common primary emotions, followed by the akin emotion-laden themes and scripts associations.

Table 3
Means and standard deviations

		N	Mean	Std. Deviation	Std. Error	95% CI for means		Minimum	Maximum
						Lower Bound	Upper Bound		
2. Number of identified emotions families (Ferdinandov 2018)	students	196	4,43	2,70	0,19	4,05	4,81	2,00	10,00
	patients	38	5,58	2,67	0,43	4,70	6,46	2,00	10,00
	total	234	4,62	2,72	0,18	4,27	4,97	2,00	10,00
3. Number of associated emotion-event themes (Demorest 2008)	students	196	5,67	5,09	0,36	4,96	6,39	1,00	24,00
	patients	38	8,47	5,76	0,93	6,58	10,37	2,00	24,00
	total	234	6,13	5,29	0,35	5,45	6,81	1,00	24,00
4. Number of associated affective scripts (Tomkins 1979)	students	196	3,34	4,35	0,31	2,73	3,96	0,00	32,00
	patients	38	7,61	7,82	1,27	5,03	10,18	0,00	33,00
	total	234	4,03	5,30	0,35	3,35	4,72	0,00	33,00
3.1. Time spent for association of emotion-event themes (Demorest 2008)	students	196	,72	,87	,06	,60	,84	0,00	9,45
	patients	38	3,63	3,77	,61	2,39	4,86	,03	17,10
	total	234	1,19	2,01	,13	,93	1,45	0,00	17,10
4.1. Time spent for association of emotion-laden scripts (Tomkins 1979)	students	196	,35	,80	,06	,24	,47	0,00	6,03
	patients	38	1,76	2,47	,40	,95	2,57	0,00	13,02
	total	234	,58	1,33	,09	,41	,75	0,00	13,02
6.1. Time spent for self-evaluation of emotional regulation (Gross & John 2003)	students	196	,86	1,22	,09	,69	1,03	0,00	12,23
	patients	38	2,44	2,35	,38	1,67	3,22	0,00	9,33
	total	234	1,12	1,57	,10	,92	1,32	0,00	12,23
7. Total response latency (Bassili 1996)	students	196	4,01	3,84	,27	3,47	4,56	,09	25,41
	patients	38	16,17	13,72	2,23	11,66	20,68	1,30	64,25
	total	234	5,99	7,90	,52	4,97	7,01	,09	64,25
20. Misery index (modified U-index, Kahneman & Kruger 2006)	students	196	,14	,33	,02	,09	,18	0,000	1,800
	patients	38	,56	,68	,11	,34	,79	0,000	2,500
	total	234	,20	,44	,03	,15	,26	0,000	2,500

First of all, it is possible that factor reduction solution is taking the sufficiently more detailed emotional experience due to age (Barret et al. 2001, Barret 2006, Hoemann et al. 2017). Secondly, the effects of longer response latency may reflect the type of psychopharmacological therapy administered in the case of paranoid schizophrenia, bipolar or mono-depressive disorder. Indirectly, the slow reading and checking pace of patients, advocates the highly invested efforts in task completion to perform well, accompanied by the need of guidance at expance of time. This interpretation is in accord with statistical finding supporting the hypothesis of having a more salient emotional *projection* during the process of identifying and associating categories (Haralanov & Haralanova 2017). Thus, the differences in the mental pace and the choice of emotions categories, themes and scripts on the one hand may be a by-product of *socially desirable bias* among the patients compared to students, despite the anonymity garanteed. A slower mental pace and the careful selection of associated categories may be a feature of a patients' common response bias to perform good. On the other hand, the short and simple self-description of students in contrast to longer and highly elaborated patients' choices can be determined by partialed correlations between time and numbers of chosen categories and statements (Table 4).

The bolded indicators represent a moderate to strong interrelatedness (Pearson's r is between .40 and .80, $p \leq .0001$). This statistical evidence may represents an obvious tendency of high overlap between objective and structural properties. The time spent by the participants in each task (the mental pace, objective measures) and the number of selected categories identifications and associations (a stuctural property according to Scott 1966) are analyzing by path analysis that best illustrates the picture of convergence between them (Figure 3). The dense lines indicate the strong relationships between the variables and the dashed ones the weaker. The Misery index is excluded from diagram because of the very weak linkage with objective measures and general structural properties ($r < .20$).

Table 4
Correlations between functions

	Functions	1	2	3	4	5	6	7	8
1	Number of identified emotions families (Ferdinandov 2018)	1	***,336****	***,750****	***,364****	,224**	***,449****	,145*	,238**
2	Number of associated emotion-event themes (Demorest 2008)	,336**	1	***,433****	,157*	***,470****	***,323****	,184**	,147*
3	Number of associated affective scripts (Tomkins 1979)	,750**	,433**	1	***,362****	***,392****	***,603****	,273**	,184**
4	Time spent for identifying of emotions (Ferdinandov 2018)	,364**	,157*	,362**	1	***,501****	***,582****	***,390****	,160*
5	Time spent for association of emotion-event themes (Demorest 2008)	,224**	,470**	,392**	,501**	1	***,569****	***,470****	,207**
6	Time spent for association of emotion-laden scripts (Tomkins 1979)	,449**	,323**	,603**	,582**	,569**	1	***,459****	,255**
7	Time spent for evaluation of emotional regulations (Gross & John 2003)	,145*	,184**	,273**	,390**	,470**	,459**	1	,121
8	Misery index (modified U-index, Kahneman & Kruger 2006)	,238**	,147*	,184**	,160*	,207**	,255**	,121	1

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

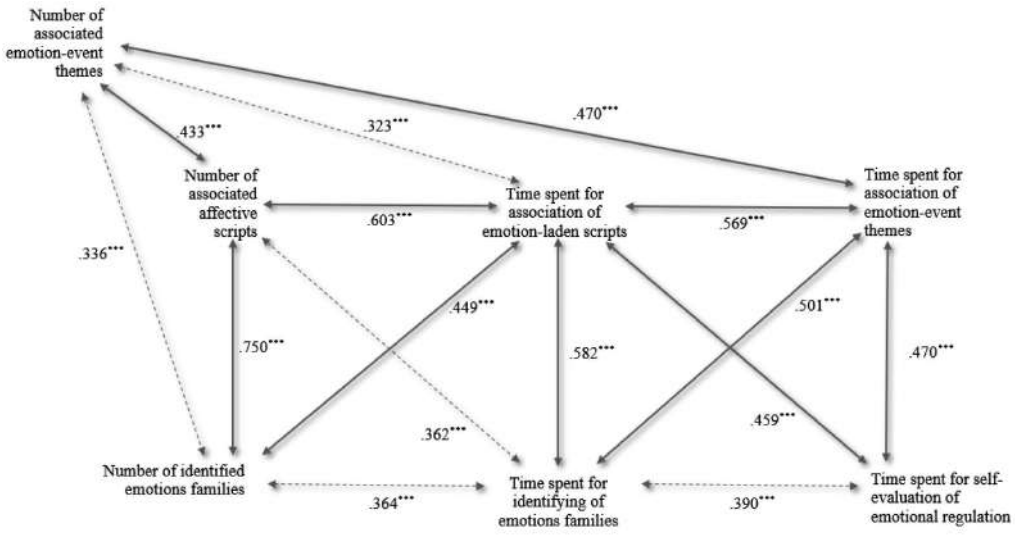


Figure 3. Path analysis of structural properties

These finding favours the significant interrelation between a slower pace during the attribution process and the cognitive-affective complexity of patients. The students demonstrate faster, more positive, but also more simple patterns of identification with in a more trivial context of meaning. The patients are at a slower pace, more negative colored and complex choices of categories loaded with very context-specific features. However, with a lower magnitude of the size effect, but with a high degree of significance and interconnection with the two objective factors (the pace and the number of identifications or associations), the prior indicators are related to the time spent for choosing families of emotions, especially the ones with negative meanig, as well as the time for associating scripts categories which are considered as an abstract concepts and loosely connected to simple emotions (Ferdinandov 2018a). It is not counterintuitive to say, that with the increase of scripts and themes category numbers the "symbolic distance" (Rogers et al. 1979) with the general valence type of emotions elicited during the experiment will abased. The correlation between the number of positive emotions identified and the time required for the selection is weaker (r = .413, p = .000) compare to the linkage between the time and the number of negative emotions selected (r = .499, p = .000). Health status seems to moderate not only the preference to negative valence at stake of positive ones, but it costs more time spent in imagery task to select from the list of emotion-event themes and the simulated Tomkins' scripts proposals biased by the same negative pattern. Furthermore, the correlation between the number of scripts and the time spent during selection (r =. 603, p = .000), compared to the themes attribution processing (r =. 470, p = .000) means that specific cognitive loop is emerging during process of associations which is consequenatly inhibited by the increase in the level of abstraction employed in the categories of themes and scripts. It seems that abstractness in meaning primes the attention of the patients and predetermines the time invested in reading.

On the other hand, according to the functionalistic paradigm in affective science (Fabr et al. 2013), the results may serves as an evidence of significant differences in the *time-spatial model* of mental representation resulting in the participants' narrowed or

widen attention during attribution (or projection) process. An alternative path of interpretation is that the simple or more complex processes of mentalization are predisposed by the mental illness during the treatment, following ideosyncratic identifications and associations of emotion-laden categories thus engaging more resources during verbal-situational conceptualization (Frederickson 1998, Frederickson 2004, Bar 2007, Barrett & Saptute 2012). Negatively conotated states is also narrow, slowing down and abruptly focusing the patients' attention on a repetitive flow and insufficient imagery which both reflect the level of distribution in the subjective semantic network. These congnitive distortions are statistically represented by objectively more simple and positive students' preferences in contrast to more complex and negative patients' connotations during the selection of words (Ferdinandov 2018). Calculated index of subjective misery may also depends on the emotional granularity which means the ability to generate detailed report of one's own experiences (Barrett 2001), in particular case the negative ones. Comparison between the "Misery" index and negative emodiversity (Quoidbach et al. 2014) demonstrated strong correlation ($r = .519$, $p \leq .000$) due to the fact that the number of negative families of emotions identified is primary taken into account in both equations. The "Misery" index highlights the role of negative experiences and exceed the alternative indicators of affective ambivalence and subjective frustration (e.g., Brown & Farber 1951, Kaplan 1972, Thompson et al. 1995, Priester & Petty 1996 and etc.). This can be interpreted as evidence that the variety of indexes measureing the affective ambivalence should be treated as a important but not salient feature of affective disturbance. This clues can serve in support of another post hoc hypothesis about the predominant implicit "rumination" thinking process, implicitly evidenced in reports about emotional experiences of mentally disturbed people (Martin & Tesser 1989, Nolen-Hoeksema & Morrow 1991, Hixon & Swann 1993, Lyubomirsky & Nolen-Hoeksema 1995, Nolen-Hoeksema et al. 1997, Just & Alloy 1997, Lyubomirsky & Tkach 2004). It also corresponds with the empirical findings that positive moods improve the ability to shift quickly between negative and positive states and the ability to widening and breadthening the cognitive attention by switching off the flow of negative experiences and so reducing negative emotional entropy (Pond et al. 2012, Gruber et al. 2013, Gühn et al. 2013, Quoidbach et al. 2018). Some scientists assumed the role of emotional regulation by positive reappraisal of negative situations which determines the subject to protect them to become succeptible to the negative connotations and vice versa (Gross & John 2003, Gross & Thompson 2007). However, this hypothesis does not meet a direct support taken the results of the current analysis. Comparing the mean scores of positive emodiversity, suppression and reappraisal in students' and patients' results did not differ significantly. Only the time spent to choose which self-regulatory strategy to identify are meaningfull in particular case of study. These results may be an indirect finding in support of the "rumination" effect – patients contemplate considerably longer what strategy they are applying and how they are regulating their emotions in imaginative fashion (Trapnell & Campbell 1999, Stanton et al. 2000).

However, the mathematical models and functions programmed to calculate relatively independent measures reflect divergent tendency in objective properties and subjective attributions. The simulated "Misery" index represents statistically the most significant subjective function that appears to be less predictive compared to the objectively measured mental pace and the number of categories chosen. According to the results, Kahneman & Kruger' modified Utility index represents both the frequency and the duration of emotions indentified in a balanced manner. It stated that if the number of negative emotions exceeds the positives then by multiplying the sum of their subjectively estimated duration times the number of negatives, the estimated wight of feel ill-being and miserable is higher in patients. This logic accounts

not only the affective disbalance or conflicts between the type of feelings experienced, but the overall condition of threated patients and the quality of their objective well-being. It seems that feeling miserable has to be more pervasive as a function of choosing common feelings but also is insensitive to the desirable style of self-presentation concerning one's own emotional experiences. Future researches and re-test procedures, in the presence of more controled data alleged could shed more light on these subtle differences between primary emotions properties, secondary functions and linkages between them.

Referances

1. **Ferdinandov, K., I. Bardov** (2017). Kompyutarna simulatsia. Virtualna proverka na teoriyata za afektite i stsenariite, sazdadena ot Silvan Tomkins. In: *Scientific proceedings from the VIIIth National Congress of Psychology, 3 November – 5 November 2017*, 337-349. ISBN 978-619-90965-1-2. (In Bulgarian)
   [**Фердинандов, К., Бардов, И.** (2017). Компютърна симулация. Виртуална проверка на теорията за афектите и сценариите, създадена от Силван Томкинс. *Сборник научни доклади от VIII национален конгрес по психология, 3.XI.-5.XI.2017 година*, pp. 337–349, https://bpspublic.files.wordpress.com/2017/11/ncp2017.pdf]
2. **Ferdinandov, K.** (2018). Nomologichen triizmeren model za emotsii. In: *Virtualna konferentsia po psihologia „Novi idei i dobri praktiki v psihologiyata kato nauka i profesia, 2018-2019*" (In Bulgarian)
   [**Фердинандов, К.** (2018). Номологичен триизмерен модел за емоции. *Виртуална конференция по психология „Нови идеи и добри практики в психологията като наука и професия*, *2018–2019"*. https://vcp2018.files.wordpress.com/ 2018/06/vcp2018-text-009-personality-ferdinandovk-1.pdf]
3. **Ferdinandov, K.** (2018a). A predictive potential exploration of emotions families and scripts model. In: *Psychological Research*, Volume 21, Number 2, 151-170, ISSN 1311-4700 (Print); ISSN 2367-9174.
4. **Ferdinandov, K.** (2019). *Vavilonska kula v choveshkoto sartse. Sporni vaprosi i protivorechia v psihologiyata na emotsiite. Virtualna konferentsia po psihologia „Novi idei i dobri praktiki v psihologiyata kato nauka i profesia, 2018-2019"* (In Bulgarian)
   [**Фердинандов, К.** (2019). Вавилонска кула в човешкото сърце. Спорни въпроси и противоречия в психологията на емоциите. *Виртуална конференция по психология „Нови идеи и добри практики в психологията като наука и професия*, *2018–2019*". https://vcp2018.files.wordpress.com/2019/02/vcp2018-text-021-personality-ferdinandovk.pdf]
5. **Haralanov, S., Haralanova, E.** (2018). *Emotsii i shizofrenia. Nov podhod kam afektivnostta pri „neafektivni" psihozi.* Iztok-Zapad, Sofia (In Bulgarian)]
   [**Хараланов, С., Хараланова, Е.** (2017). *Емоции и шизофрения. Нов подход към афективността при „неафективни" психози*, Изток-Запад, София.]
6. **Bar, M.** (2007). The proactive brain: using analogies and associations to generate predictions. In: *Trends in Cognitive Sciences, 11,* 7, 280-289.
7. **Barrett, L. F., Gross, J., Christensen, T., Benvenuto, M.** (2001). Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. In: *Cognition and Emotion*, 15, 713-724.
8. **Barrett, L. F., Tugade, M. M., Engle, R. W.** (2004). Individual differences in working memory capacity and dual-process theories of the mind. In: *Psychological Bulletin*, 130, 553-573.
9. **Barrett, L. F., Satpute, A. B.** (2013). Large-scale brain networks in affective and social neuroscience: towards an integrative functional architecture of the brain. In: *Current Opinion in Neurobiology,* 23, 3, 361-372.
10. **Bassili, J. N.** (1996). Meta-judgmental versus operative indexes of psychological attributes: The case of measures of attitude strength. In: *Journal of Personality and Social Psychology*, 71, 637-653.
11. **Berrios, R.** (2019). What Is Complex/Emotional About Emotional Complexity?. In: *Frontiers in Psychology, 10.*
12. **Brown, J., Farber, I.** (1951). Emotions conceptualized as intervening variables - with suggestions toward a theory of frustration. In: *Psychological Bulletin*, 48, 465-495.
13. **Cavazza, N., Butera, F.** (2008). Bending without breaking: Examining the role of attitudinal ambivalence in resisting persuasive communication. In: *European Journal of Social Psychology*, 38, 1-15.

14. **Choi, I., Choi, Y.** (2002). Culture and self-concept flexibility. In: *Personality and Social Psychology Bulletin*, 28, 1508-1517.
15. **Cohen, J.** (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.
16. **Davidson, R. J.** (1992). Prolegomenon to the structure of emotion: Gleanings from neuropsychology. In: *Cognition & Emotion*, 6, 245–268.
17. **Davidson, R. J.** (1994). On emotion, mood, and related affective constructs. In P. Ekman R. J. Davidson (Eds.), *The nature of emotion: Fundamental questions*, 51-55, New York: Oxford University Press.
18. **Demorest, A.** (2008). A taxonomy for scenes, In: *Journal of Research in Personality*, 42, 239-246
19. **Demorest, A.** (2008a). Script models. In W. Darity (Ed.) *International encyclopedia of the social sciences*, 2nd ed., 7, 372-373, Detroit, MI: Macmillan Reference.
20. **Diener, E., Larsen, R. J., Levine, S., Emmons, R. A.** (1985). Frequency and intensity: Dimensions underlying positive and negative affect. In: *Journal of Personality and Social Psychology*, 48, 1253-1265.
21. **Diener, E., Iran-Nejad, A.** (1986). The relationship in experience between various types of affect. In: *Journal of Personality and Social Psychology*, 50, 1031-1038.
22. **Ekman, P., Friesen, W.** (1975). *Unmasking the face: A guide to recognizing emotions from facial clues.* Englewood Cliffs, NJ: Prentice Hall.
23. **Fehr, B., Russell, J.** (1984). Concept of emotion viewed from a prototype perspective. In: *Journal of Experimental Social Psychology: General*, 113, 464-486.
24. **Fredrickson, B., Kahneman, D.** (1993). Duration neglect in retrospective evaluations of affective episodes. In: *Journal of Personality and Social Psychology*, 65(1), 45-55.
25. **Fredrickson, B.** (1999). Extracting meaning from past affective experiences: The importance of peaks, ends, and specific emotions. In: *Cognition & Emotion*, 14, 577-606.
26. **Fredrickson, B.** (2000). Cultivating positive emotions to optimize health and well-being. In: *Prevention & Treatment*, 3(1).
27. **Fredrickson, B.** (2001). The Role of Positive Emotions in Positive Psychology: The Broaden-and-Build Theory of Positive Emotions. In: *American Psychologist*, 56, 218-226.
28. **Fredrickson, B.** (1998). What Good Are Positive Emotions? In: *Review of General Psychology*, 2, 300-319.
29. **Fredrickson, B.** (2004). The broaden-and-build theory of positive emotions. In: *Philosophical Transactions of the Royal Society of London*, 359, 1367-1377.
30. **Gross, J., John, O.** (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. In: *Journal of Personality and Social Psychology*, 85, 348-362.
31. **Gross, J., Thompson, R.** (2007). Emotion regulation: Conceptual foundations. In: Gross, J. (Ed.), *Handbook of emotion regulation*, 3-24, New York, NY: Guilford.
32. **Gruber, J., Kogan, A., Quoidbach, J., Mauss, I. B.** (2013). Happiness is best kept stable: Positive emotion variability is associated with poorer psychological health. In: *Emotion*, 13, 1–6.
33. **Grühn, D., Lumley, M. A., Diehl, M., Labouvie-Vief, G.** (2013). Time-based indicators of emotional complexity: Interrelations and correlates. In: *Emotion*, 13, 226-237.
34. **Hixon, J., Swann, W.** (1993). When does introspection bear fruit? Self-reflection, self-insight, and interpersonal choices. In: *Journal of Personality and Social Psychology*, 64, 34-43.
35. **Hoemann, K., Gendron, M., Barrett, L. F.** (2017). Mixed emotions in the predictive brain. In: *Current Opinion in Behavioral Sciences*, 15, 51-57.
36. **Just, N., Alloy, L. B.** (1997). The response styles theory of depression: Tests and an extension of the theory. In: *Journal of Abnormal Psychology*, 106, 221-229.
37. **Juster, F., Courant, P., Dow, G.** (1985). A Conceptual Framework for the Analysis of Time Allocation Data, In: Juster, F., Stafford, F. (Eds) *Time, Goods, and Well-Being*, 113-131, Ann Arbor, Mich.: Institute for Social Research, University of Michigan
38. **Kang, S. M. & Shaver, P. R.** (2004). Individual Differences in Emotional Complexity: Their Psychological Implications. *Journal of Personality, 72,* 4, 687-726.
39. **Kaplan, K.** (1972). On the ambivalence-indifference problem in attitude theory and measurement: A suggested modification of the semantic differential technique. In: *Psychological Bulletin*, 77(5), 361-372.
40. **Kahneman, D., Krueger, A., Schkade, D., Schwarz, N., Stone, A.** (2004). A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method. In: *International Library of Critical Writings in Economics*, 204, 105-112.

41. **Kahneman, D., Krueger, A.** (2006). Developments in the Measurement of Subjective Well-Being. In: *Journal of Economic Perspectives,* 20(1), 3-24.
42. **Larsen, R., Fredrickson, B.** (1999). Measurement issues in Emotion research. In: Kahneman, D., Diener, E., Schwartz, N. (Eds.) *Well-being: Foundation of hedonic psychology*, pp. 40-60, New York: Russell Sage.
43. **Lykken, D., Tellegen, A.** (1996). Happiness is a stochastic phenomenon. In: *Psychological Science*, 7, 186-189.
44. **Lyubomirsky, S., Nolen-Hoeksema, S.** (1995). Effects of self-focused rumination on negative thinking and interpersonal problem solving. In: Journal *of Personality and Social Psychology*, 69, 176-190.
45. **Lyubomirsky, S., Tkach, C.** (2004). The consequences of dysphoric rumination. In: Papageorgiou, C., Wells, A. (Eds.), *Rumination: Nature, theory, and treatment of negative thinking in depression*, 21-41, Chichester, England: Wiley.
46. **Priester, J., Petty, R.** (1996). The gradual threshold model of ambivalence: Relating the positive and negative bases of attitudes to subjective ambivalence. In: *Journal of Personality and Social Psychology*, 71(3), 431-449.
47. **Martin, L. L., Tesser, A.** (1989). Toward a motivational and structural theory of ruminative thought. In J. S. Uleman J. A. Bargh (Eds.), *Unintended thought*, 306-326. NY: Guilford Press.
48. **Nolen-Hoeksema, S., Morrow, J.** (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. In: *Journal of Personality and Social Psychology*, 61, 115-121.
49. **Nolen-Hoeksema, S., McBride, A., Larson, J.** (1997). Rumination and psychological distress among bereaved partners. In: *Journal of Personality and Social Psychology*, 72, 855-862.
50. **Petty, R., Brinol, P., Johnson, I.** (2012). Implicit ambivalence. In: Gawronski B, Strack F. (Eds.) *Cognitive Consistency: A Fundamental Principle in Social Cognition*, 178-201, New York: Guilford Press.
51. **Pond, R. S., Jr., Kashdan, T. B., DeWall, C. N., Savostyanova, A., Lambert, N. M. & Fincham, F. D.** (2012). Emotion differentiation moderates aggressive tendencies in angry people: A daily diary analysis. In: *Emotion*, 12, 326-337.
52. **Quoidbach, J., Gruber, J., Mikolajczak, M., Kogan, A., Kotsou, I., Norton, M.** (2014). Emodiversity and the emotional ecosystem. In: *Journal of Experimental Psychology*: General, 143, 2057-2066.
53. **Quoidbach, J., Mikolajczak, M., Gruber, J., Kotsou, I., Kogan, A., Norton, M. I.** (2018). Robust, replicable, and theoretically-grounded: A response to Brown and Coyne's (2017) commentary on the relationship between emodiversity and health. In: *Journal of Experimental Psychology: General, 147,* 3, 451-458.
54. **Rogers, T. B., Kuiper, N. A., Rogers, P. J.** (1979). Symbolic distance and congruity effects for paired-comparisons judgements of degree of self-reference. In: *Journal of Research in Personality*, 13, 433-449.
55. **Russell, J.** (1989). Measures of emotion. In: Plutchik, R., Kellerman, H. (Eds.) *Emotion: Theory, research, and experience: 4. The measurement of emotions*, 83-111, San Diego: Ac. Press.
56. **Russell, J., Barrett, L. F.** (1999). Core Affect, Prototypical Emotional Episodes, and Other Things Called Emotion: Dissecting the Elephant. In: *Journal of Personality and Social Psychology*, 76, 805-819.
57. **Shaver, P., Schwartz, J., Kirson, D., O'Connor, C.** (1987). Emotion knowledge: Further exploration of a prototype approach. In: *Journal of Personality and Social Psychology*, 52, 1061-1086.
58. **Thompson, M. M., Zanna, M. P., Griffin, D.W.** (1995). Let's not be indifferent about (attitudinal) ambivalence. In R. E. Petty J. A. Krosnick (Eds.), *Attitude strength: Antecedents and consequences*, 361-386. Mahwah, NJ: Lawrence Erlbaum.
59. **Taylor, S. E. & Brown, J. D.** (1988). Illusion and well-being: A social psychological perspective on mental health. In: *Psychological Bulletin, 103,* 2, 193-210.
60. **Taylor, S. and Brown, J. D.** (1994). Positive Illusions and Mental Well-Being Revisited: Separating Fact from Fiction, In: *Psychological Bulletin*, 116, 1, 21-7.
61. **Tomkins, S.** (1979). Script theory: Differential magnification of affects In: Howe, H., Dienstbiener, R. (Eds.), *1978 Nebraska symposium on motivation*, 201-236. Lincoln: University of Nebraska Press.
62. **Tomkins, S.** (1987). Script theory, In: Aronoff, J., Rabin, A., Zucker, R. (Eds.), *The emergence of personality*, 147-216, New York: Springer Publishing

63. Trapnell, P., Campbell, J. (1999). Private self-consciousness and the five-factor model of personality: Distinguishing rumination from reflection. In: *Journal of Personality and Social Psychology*, 76, 284-304.

64. Stanton, A., Kirk, S., Cameron, C., Danoff-Burg, S. (2000). Coping through emotional approach: Scale construction and validation. In: *Journal of Personality and Social Psychology*, 78, 1150-1169.

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APENDIX:
Mathematical functions mentioned in Table 1:

1. Affective frustration (Brown & Farber 1951): F is the amount of frustration, a function of E_w^n denoting the weaker of the two emotional tendencies, raised to a degree of n amount of reported emotions, and E_s^{n-1} represents the stronger trend of degree n–1. The higher the value of E_w^n is, the higher will be the degree of frustration. When n is set to 1, the feeling of frustration is a function of the weaker of the two tendencies. However, the equation deviates from this model when n is set to values greater than 1.	$F = F\left(E_w^n / E_s^{n-1}\right)$
2. Subjective ambivalence (Kaplan 1972): The degree of ambivalence is a function of the difference between the value of the sum of all selected affects (positive, P, and negative ones, N) toward an object and the value of polarity in the attitude towards emotions (absolute value of positive minus negative).	$A = F\left[\left(P+N\right) - \left\|P-N\right\|\right]$
3. Potential ambivalence (Thompson et al. 1995): This equation captures the two main elements of ambivalence – it increases as a function of a) *the similarity* between positive (P) and negative evaluations (N), and b) as a function of *the extremality* of these two elements. The first component of the equation ($P + N$) / 2 presents the hypothesis that the increased intensity of emotions leads to increased ambiguity, where P and N are averaged. As the mean of these two components increases, the level of ambivalence also increases. The second component of the equation, – [P – N], hypothesizes that when *the similarity* (equivalence between number of positive and negative emotions) increases, less of the total amount of ambivalence will be subtracted compared to cases where the amount measured the similarity is less.	$A = F\left[\left(P+N\right)/2 \; -\left\|P-N\right\|\right]$
4. Gradual threshold model of ambivalence (Priester & Petty 1996): The dominant reactions (D, PA) are acounted using constant 1 divided by the conflicting emotions (C, NA), and a threshold value of p is equal to 0.4 or 0.5 modifying D. This formula produces effects that are virtually identical to the index for a abrupt accelerating function when the function exceeds the threshold. It can be reduced to a function of 5C – D when the conflicting reactions are equal to zero. The exponent of D (1/C) makes the effect of ambivalent reactions gradually to decrease with increasing conflict between the two components (PA, NA) until the effect becomes minimal. Once the conflict reaches a certain point, frustration is a function of C only.	$A = F\left(5C^p - D^{1/C}\right)$

5. Abrupt threshold model of ambivalence (Priester & Petty 1996): Compared to gradual threshold model the function is set to a) the subjective ambivalence is derived from 5 times the sum of conflicting reactions (*C*, *NA*), from which the sum of the dominant (*D*, *PA*) reactions is subtracted. The value of *p* is implemented to present the hypothesis that the conflict scores (*C*) must be below some minimum level of *p*, and that the subjective ambivalence be either a positive or negatively accelerating function. When *C* is above the minimum level ($5C^p$) A must be less than 1; The authors assume a threshold of *p* equal to 0.4 and *t* must be equal to 1.	$IF\left[C \le t\right],\ A = F\left(5C - D\right);$ $IF\left[C > t\right],\ A = F\left(5C^p\right)$
6. Emotional ambivalence (Choi & Choi 2002): The ambivalence (*A*) assumes that the ambivalence is the result of an absolute difference between positive (*PA*) and negative (*NA*) emotions.	$A = F\left\lvert PA - NA\right\rvert$
7. Misery index (Juster et al. 1985, modified ***U-index***, Kahneman & Kruger 2006): In equation a) the personal benefit U_i at a certain moment is the sum of the time h_{ij}, multiplied by μ_{ij}, which expresses the network of emotions experienced during the situation *j*. In equation b) the utility function is modified so a *Misery* (*M*) that is determined by one logical operator and mathematical one. The logical operator stipulates that if the number of negative emotions experienced ($\sum NA_i$) exceeds the number of positive ones ($\sum PA_i$), only then the sum of negative emotions ($\sum NA_i$) is multiplied by the sum of their duration ($\sum DNA_i$). If the logical condition is not satisfied, the function is equal to zero, which assumes that the absence of subjective misery is identical to objective happiness.	a) $U_i = \Sigma_j h_{ij}\mu_{ij}$ b) $IF\left[\sum NA_i > \sum PA_i\right],$ $M = \sum NA_i \times \sum D_{NAi}$
8. Emodiversity (Quoidbach et al. 2014): *S* is a total number of emotions reported, expressing the degree of emotional *richness*; p_i reflects the ratio between the total number of emotions experienced (*S*) and thenumber of emotion selected (*i*), representing the *evenness* between them. The summation is multiplied by - 1 to obtain the values for the three different kind of indices (positive, negative and general emodiversity).	$\text{Emodiversity} = \sum_{i=1}^{s}\left(p_i \times \ln p_i\right)$