AN INVESTIGATION OF HOW PEOPLE OF DIFFERENT AGE, SEX AND TEMPERAMENT
ESTIMATE THE WORLD [1]

Irina Trofimova,
McMaster University, Canada

*Summary.* - Results of a study on 167 subjects demonstrated that the basic semantic structure of consciousness is connected with a person's temperament, age and sex. Concrete particularities of estimations and structure of the semantic space were found to depend upon these biologically based characteristics. The results suggests the presence of a phenomenon of «projection through capacities»: when a person registers only those aspects of objects or situation, that he/she can properly react to and deal with in their own behavior.

**Key words:** semantic space, gender and age differences, temperament

**Introduction**

It is probably commonly felt that the content of our personal consciousness is something original, intimate, and changeable that can not be compared with other people's consciousness. However studies of psychosemantics[2] have, in various guises, suggested that there are stable characteristics of meaning area, across individuals. Psychosemantic studies became popular after G.Kelly's presentation of the theory of personal constructs (Kelly, 1955). A basic fact of such studies is that «different individuals construe events differently»; as a result, the personal constructs of such semantic perception are dichotomous (bipolar) (Kelly, 1955; p.55).

In spite of a large spectrum of meanings and categories which humans use in the process of assessing objects, Osgood and colleagues were able to extract groups of subscales which were found to be universal across different languages, cultures, and educational levels (Osgood, 1962). His Semantic Differential method asked individuals to rate objects using bipolar subscales where the poles are assigned adjectival antonyms. Estimations of concepts were found to correlate with each other and subscales were extracted using factor analysis. Three main factors extracted are interpreted as "Evaluation" (subscales, for example, "pleasant -- irritating", "clean -- dirty," "kind -- cruel"), "Activity" ("energetic -- constrained," "monotonous -- acute", "fast -- slow") and "Power" ("strong -- weak," "durable -- flimsy," "massive -- miniature") (Osgood, 1962). Bentler and La Voie, in addition to the traditional three of Osgood's factors, added the factor of Usuality (subscales banal - new, typical - exclusive, regular - rare) (Bentler & La Voie, 1972). The additional factors Improvement (organized - disorganized, constant - changeable, precise - indefinite), Reality (imaginary - real, evident - fantastic, abstract - concrete) and Density (complete - scattered, single - numerous) were added by Rosch (1978). Petrenko achieved similar results using antonym pairs within the Russian vocabulary, adding the factors: Improvement, Complexity, and Convenience to the three original factors of Osgood (Petrenko, 1993).

During the past 30 years following Osgood's work with the factor analysis of subject's estimations, the methods of multi-dimensional scaling were invented and successfully applied in psychophysics. Unfortunately they are not all suitable for application to the study of semantic spaces. The main conditions for the successful application of these methods are 1) that all axioms of a metric space (for example, the triangle inequality) hold for these data, and 2) that the data are error free. Such conditions are easy to control in psychophysics, but not in the

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[1] Address: 92 Bowman St, Hamilton, ON, Canada. L8S 2T6; e-mail: ira@ritchie.cas.mcmaster.ca
[2] Psychosemantics is that subfield of cognitive psychology which studies the content, structure, and determinants of these semantic spaces.

semantic area, where we have many examples of paradoxical estimations. That is why in the case of a small number of previously validated scales, we preferred to use factor analysis.

There are two possible observations concerning the semantic space of a person, that are useful to mention in this introduction: 1) when a person separates a prior factor (construct or criterion of estimation) into two or more criteria (factors), and 2) when the weight of some factor is getting much larger then the weights of other "axes". In the first case, it is interpreted as meaning that the "cognitive complexity" (dimensionality of a semantic space, as suggested by Schroder, Driver, and Streufert and later by McDaniel and Lawrence, 1990) is increasing. Usually this occurs with increasing experience which an individual acquires through operating with or evaluating given objects, or within a given area of estimation (Petrenko, 1997. Pp 102-103). The second case reveals the greater importance of the factor («power of a construct», in Kelly's terminology) within a person's semantic perception, in comparison to the other factors. Sometimes a factor "gains weight" through the unification of several factors - in this case there is a lowering of cognitive complexity, but the disparity in weightings still indicates the personal importance of this criteria.

Modern psychosemantics studies the semantic spaces of different domains of inquiry, and finds applications in political psychology, sociometrics, cultural studies, personality psychology, etc. Such investigations utilize specific (sometimes very long) lists of subscales, and lists of objects to be estimated by these scales.

. The well known work of Osgood and others was emphasized above because:

1) it was decided to reduce the list to include only those universal connotative scales (partially discovered by Osgood) that for certain reflect the known standard semantic space, rather than complicating the matter by including an excessive number of scales and objects for estimation. Objects were chosen which were very close to the content of the scales, so that the estimation of these objects using these scales would be more readily apparent ("beauty" should be on the positive pole by evaluation factor, "activity" - on the positive pole of activity factor, etc. This helped to reduce the possible influence of personal experiential or cultural effects. In addition, this simplification based upon documented universality in evaluations makes the method more sensitive to any differences in the use of constructs, especially in a large sample.

2) it was decided to use factor analysis (as do Osgood's followers), with modern varimax rotation;

3) it became clear that what was most important for comparing the semantic spaces of different temperamental groups was the emotional-evaluative character of the semantic factors extracted by Osgood. This has been noted by many authors (Petrenko, 1988, 1997, Bentler & La Voie, 1972; Rosch, 1978). This calls to mind Bruner's theory of categorization, according to which all cognitive processes are the applications of categories to objects and events in the process of their perception (Bruner, 1951). Bruner extracts two classes of categories, identity and equivalency, each of which separates according to affective (connotative), functional (denotative) and formal categories. Connotative meaning, as reflected in Osgood's factors, is the basic level of categorization. According to Petrenko, the creation of meaning arises as the consistent development of content realized by moving from emotional-imaginative forms of reflection through to levels of cultural meanings and levels of objective (categorical) fragmentation of the world (Petrenko, 1993).

One aspect of temperamental traits is emotional regulation. The universal Osgood factors have an emotional-evaluative character. Thus it is conceivable that the possible connections between the dynamics of a person's behavior and their internal estimation of the world could be explained, in part, by evolutionary or neurophysiological studies (Leontjev, 1975; Altman, 1978, Glezer, 1995). Thus, Glezer analyzed the functional organization of the neural structures that gradually form universal categories from "raw" sensory material. At higher levels of brain processes, these universals correspond to the basic categories of thought and language. He examined the complete process of transformation and description - the

coding of visual information and the transition from the description of visual space to the description of individual objects. It led him to the conclusion that thought and language were generated by deep seated semantic structures determined by the structure of the brain.

Of all biologically mediated human characteristics, sex and temperament form relatively stable aspects of personality, defining a person's behavioral style and strategies. As Strelau and Angleigtner pointed in their overview, "most of temperament researches agree that temperament, whatever the traits and structure to which this concept refers, has a strong biological determination... This assumption has its roots in the facts that temperament characteristics can be observed from the first weeks of life (see for example the work of Rothbart) and individual differences in temperamental traits have a strong genetic determination (Buss, Eysenck, Zuckerman, Netter, Fahrenberg)» (Strelau, Angleigtner, 1991. P.6). Several studies have explored possible biological origins of temperament (Nebylitsyn (1976), Eysenck, 1990; Rusalov (1990), Gray, 1983, 1991; Strelau, 1994, Zuckerman, 1979, 1990).

Age, of course, is a changeable characteristic, but a general relationship exists between age and personality through the appearance of the various stages of development, with rapid changes occurring in childhood and more gradual changes after the age of 16 years.

These considerations provided support for an hypothesis concerning possible interconnections between a person's temperament and their semantic space. The goal of this study was to evaluate this hypothesis through a comparison of the semantic spaces of men and women, and the semantic spaces of people across differing ages and temperament. Knowledge about the interconnections which might exist between the structure of a person's semantic space and these three biologically determined characteristics could help in the future analysis of the effect of individual differences upon peoples' estimation of their world.

## Method

*Subjects:* Ninety six adult female and seventy one adult male subjects took part in the study at the Institute of Psychology, Moscow, in 1994, and continued at the Moscow State Social University, in 1997. They were recruited from staff and students involved in the Educational courses offered under the Institute of Business, Information and Telecommunication and at the Moscow State Social University. The age range was from 18 to 36 years (M = 24,2 years, SD = 5.8). Three additional age segregated groups were formed: 117 subjects aged 19-33 years old drawn from the sample of study 1 (M = 23.9 years, SD = 4.2), and in addition, 26 subjects aged 13-18 years (M = 16,5 years, SD = 1.8), and 26 subjects aged 34-54 years (M = 43.9 years, SD = 6.5).

*Psychometric test*: Each subject completed Rusalov's Structure of Temperament Questionnaire (STQ, 105 items). The STQ is a detailed questionnaire examining the structure of temperament (Rusalov, 1989). Rusalov identified four main characteristics of temperament - - Ergonicity (the tension of activity which an individual can develop), Flexibility, Tempo and Emotionality, as applied both in operations with objects, and in verbal communication (yielding four main scales and eight temperamental subscales in all; Rusalov, 1990) [3] (corresponding labels are: ERG, ERS, FLG, FLS, TMG, TMS, EMG, EMS).

*Psycho semantic stimulus material:* The stimuli consisted of 8 concepts (objects), which were assessed on 17, 7-point, bipolar scales. The concepts were: Beauty, Activity, Strength, Reality, Status, Task, Order and I. The bipolar scales of the Semantic Differential

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[3] Internal reliability for the total scale has been found to range from .70 to .81. Reliabilities established for the subscales range from .55 to .67. Rusalov's questionnaire was compared with the EPI questionnaire (Eysenck & Eysenck, 1968) in subsequent research (Rusalov, 1990). High correlations were found between the subscales of Social Ergonicity, Social Flexibility and both Tempo-subscales, and the EPI Extroversion scale, and between both subscales of Emotionality and the EPI Neuroticism scale.

were used: pleasant - irritating (S1), clean - dirty (S2), kind - cruel (S3); energetic - constrained (S4), monotonous - acute (S5), fast - slow (S6); durable - flimsy (S7), large - small (S8), heavy - light (S9) ; dense - scattered (S10), single - numerous (S11); organized - disorganized (S12), constant - changeable (S13), precise - indefinite (S14); possible - impossible (S15), typical - exclusive (S16), regular - rare (S17). Each concept was presented on a computer monitor along with each of the scales. Subjects could select one of seven positions for the cursor on the horizontally drawn scale: strong, middle, weak (on the one pole), neutral (in the middle), weak, middle, strong (on the other pole).

     *Data processing:*

1. *Qualitative analysis of semantic space.* All ratings were placed in the group matrix having 17*1336 cells (17 columns (number of scales), 1336 rows (8 objects *167 subjects). A factor analysis on this matrix was performed. Subsequently, contrast groups for the 8 temperamental characteristics were formed. A group with a low level characteristic consisted of subjects with means lower than M - 2/3 SD, a group with a high level characteristic consisted of subjects with means higher than M + 2/3 SD. The average number of subjects in a group was 57 (SD = 14.6) (Attachment 1). A factor analysis of row estimations of the subjects for each contrast group was done, and 20 semantic spaces resulted.

2. *Quantitative analysis.* Detailed analysis of individual rating strategies was not the main goal of this study, which was directed towards a determination of the structure of the semantic spaces of the different contrast groups. Nevertheless, an analysis of variance (1-way MANOVA, fixed effects, 17 dependent variables (scales) between each pair of contrast groups) of raw ratings without the ratings of the object «I», for the gender (2), age (3) and temperamental (16) contrast groups was conducted. There did not appear to be much sense in making a cross analysis of variance for 2 x 3 x 2 (or16) of 1 groups of ratings as one could observe the psychological phenomena (semantic space configuration) only on the macro-level of specific *sets* of factors (constructs) with specifically *unified* scales for each contrast group, and analysis of the ratings along separate scales provided evidence mostly of linguistic differences.

**Results**

     Factor analysis with varimax rotation confirmed the existence of the traditional semantic factors, Evaluation, Activity, Regulation and Probability, within the semantic space of the entire group. Table 1 consists of weights ( the percentage of general dispersion) and content (scales) of these factors, with their provisional names. Scales inside the factors are placed according to the pole along which they entered into a factor (construct). The table presents the final configuration of the semantic bipolar construct, where the right poles of the listed scales constitute one pole of this construct, and the left poles of the scales constitute the other pole of a construct.

     The table demonstrates the differences between the semantic spaces of men and women. Women differ from men in having a construct based on the scales «single, rare - numerous, regular» instead of the Probability factor that men and the entire sample have (the scales «typical - exclusive», «possible-impossible» do not appear in any of women's factors). The Evaluation factor had less weight in men's semantic space than in women's, and the factor loading of the scales «pleasant-irritating, clean-dirty» were less significant. The factor loading of the scale «fast - slow» is also less in the Activity factor of the men's semantic space then in the women's semantic space. Men, however, have the scales «possible-impossible» and «large-small» in their Activity factor.

     Table 2 demonstrates the semantic spaces of the different age groups and the dynamics of the semantic space across ages. Evaluation criteria become more practical with increasing age: scales such as «clear - dirty», and even «durable - flimsy» become more important than

«pleasant - unpleasant» or «kind - severe». In  the regulation factor the scale «precise - indefinite» dominates after age 33, and the importance of the speed characteristic (the scale «fast - slow») in the Activity construct decreases with increasing age.

A summary of the main differences in the semantic spaces of the contrast temperamental groups is given in Table 3 and Attachment 2. The semantic space of people with low ergonicity in the object-oriented area construes the factor Probability on the basis of «Exclusivity» scales («single, rare - numerous, regular»). Both they and also people who are highly emotional in the social realm have a fifth factor («possible, large - impossible, small»), that is provisionally labeled «Potency as Possibility». In the semantic space of subjects who are highly energetic and flexible in the object-oriented realm, the factor Regulation was based upon the «stability» criteria - scales «constant, durable - changeable, flimsy», rather then on the scales «organized, precise - disorganized, indefinite» which was the case in the semantic space of the contrast groups and that of the entire sample.

Subjects having a high ergonicity in the social realm have three main factors - Evaluation, Activity and Regulation, and do not have the Probability or Potency constructs in their semantic spaces. Instead they have a factor «dense, single - scattered, numerous», that is termed, «Integrity».

The construct of Evaluation had a scale of exclusivity with a large loading in the semantic space of people with high social flexibility, and their Activity factor was heavily loaded with the scales «large, possible-small, impossible», while the contrast group had a more moderate content of these factors. Subjects having high tempo in the object-related area also had two indicated additional scales in their Activity factor. In addition to that they had the Exclusivity factor («single, exclusive-numerous, typical») extracted instead of the Probability factor that the contrast group had.

The analysis of variance applied to ratings by various scales showed that men differ from women in 8 of 17 scales (Table 4), attributing to them, on average, more negative ratings[4]. The greatest effects were found for the scales «pleasant-irritating», «kind-cruel», «organized-disorganized», «large-small» and «possible-impossible». The age characteristic interacted with 10 out of the 17 scales, and the largest effects appeared in the use of six scales: more old people on average estimated objects as more kind, clean, energetic, pleasant, and numerous (and most young subjects from the sample were similar to this estimation as well), but the age group between 18 and 33 years old used significantly more negative ratings on these scales.

Table 5 and Attachment 3 demonstrate the main effects between temperamental groups and ratings. The biggest effect of ergonicity in the general area was on the scale «possible-impossible» (and moderate effects on four other scales), and for social ergonicity -- on the scales «fast-slow», «acute-monotonous», «large-small». Subjects with a greater ability to do intensive work with objects on average rated objects as more impossible, and subjects with ability to carry out intensive social and verbal activity-rated objects as more fast, acute and large, than did subjects with weak ergonicity. Flexibility in the general area had the largest effects on ratings on the scales «kind-cruel», «clean-dirty», «monotonous-acute», «fast-slow», «large-small», and «precise-indefinite», where more flexible subjects, on average, provided more cruel, dirty, large, fast, acute, and indefinite attributions to the objects than did the contrast group. Similar but weaker effects were found for those with social flexibility on the scales «monotonous-acute», «fast-slow».

Tempo in the object-related activity exhibited the greatest effect in the use of the scales of the Activity factor: «energetic-constrained», «fast-slow», and «acute-monotonous». Subjects with higher tempo used on average higher ratings on these scales then subjects with low tempo. The Tempo of social activity had significant effects on the scales «single-numerous» and

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[4]  The ratings increase by the scale from the left to the right, i.e. the most pleasant = 7, the middle pleasant = 6, , weak pleasant = 5, neutral = 4, weak irritating = 3, and so on. The less mean by this scale, the more pleasant group estimated in average the objects.

«constant-changeable». People with a high rate of speech, reading and social activity had, on average, ratings biased more to the left pole of these scales (i.e. single and constant).

Emotionality factors had effects on ratings on the scales «large-small», «organized-disorganized», «clean-dirty»; less, but significant effects on the scales «kind-cruel», and the largest effect was on the scale «possible-impossible». Highly emotional people had on average more positive (left-biased) ratings on these scales.

## Discussion

### *Gender and age differences*

The comparison of the semantic spaces of the various contrast groups supported our hypothesis about the existence of interconnections between the semantic realm and the gender, age and temperament of a person. As we saw, the main gender differences were in Evaluation and Activity criteria of estimation of objects. The factor of Evaluation had, for women, a larger weight, with two additional evaluative scales participating in this construct together with the scale «kind-cruel». Analysis of variance showed that men differ greatly from women in their use of this scale, and their Evaluation factor was based mostly on the scale. This means that women more frequently associate together pleasant-clean-kind than do men. Men were also more critical, attributing on average more negative ratings to the objects. All of this shows that women tend to be more open and positively oriented in their estimations and more sensitive to the esthetic properties of objects.

Men, on the other hand, gave less significance to the Evaluation criterion, having more critical dispositions. Such dispositions could be associated with a greater ease of aggression, compared to women, that men have acquired through the course of evolution. Men included the possibility and potency scales in their Activity factor, associating to a lesser degree energetic properties with the speed scale. One can hypothesize that the evolutionary tendency of males to expand their environment created within their semantic space the scale of possibilities, and that this has aquired utility with respect to estimations within aggression activity.

These results showed that the Probability criterion in the semantic space of women was transformed to the Originality criterion, based on the scales «single, rare-numerous, regular». A possible explanation for this might be that the tendency of females to be careful, sensitive, and to mother resulted in a sensitivity to the small and individual properties of an object.

The comparison of the semantic spaces of different age groups revealed the dynamics of the meaning realm across the age range: in the youngest age groups, subjects had a tendency to evaluate objects more positively, becoming more negative in the age range of 18-33 and then after age 33 becoming more positive again (even more than the youngest ones). In addition they started to pay more attention to the more practical properties of objects - clearness and durability - in their general Evaluation criteria. Why did this group tend to attribute to neutral objects more positive estimations such as pleasant, kind, clean, and durable, while subjects in the age range 18-33 used estimations which were significantly more irritating, cruel, dirty and flimsy?

One can explain the results of age, gender and temperament related differences in the semantic realm of a person, using the concept of the *phenomenon of «projection through capacities»: when a person registers only those aspects of objects or of a situation, that he/she can properly react to and deal with according to the capacities inherent in their own behavior.* Thus the categorization of the stimulus depends upon the state of the organism: it extracts through perception those peculiarities of the stimulus, which it can use, i.e. it has proclivities for categorization before meeting with the stimuli. The connection of biologically based characteristics with reflection of an object's universal peculiarities does not have a compensatory character (when organisms mobilize energy to compensate for a deficiency of

dynamic characteristics), but rather has a more determinative character, when organisms develop a sensitivity to those aspects of the environment which resonate with their abilities.

It is conceivable that this might be true for any biologically based characteristic of a person, such as motor or perceptual skills, as they are based in certain functional systems of a living body. In this sense social influence and experience, which serve to order the set of a person's skills, will enter into a person's estimation of the world. For example, it is unlikely that all men are more oriented on self-expansion and are more aggressive than women. Nevertheless, social attitudes make boys choose more aggressive activities and girls more nurturing activities. As a result men develop more skills for aggressive activities while women develop more skills for nurturing activities. Skills in action, perception, and decision making, already based upon deeply integrated functional systems of a body, could serve to determine the attribution of properties to objects.

The phenomenon of «projection through capacities» can be observed across the age groups through the use of «energetic-constrained»: the youngest group attributed the most «energetic» properties to objects, and the scale «fast-slow» had a much greater factor loading in the Activity factor then for other groups. To my mind this occurred because they need energetic and fast stimuli to follow, while older people could not afford this (thus their factor loading in the speed scale was very small). Older people, however, may need to reassure themselves with the knowledge that there is nothing to worry about. That is why, perhaps, that they estimated objects as being much more positive, typical and regular, in comparison with the other age groups.

On the other hand, the age range 18-33 is the age of the greatest social and physical self-development, the establishment and testing of various activities and the exploration of the values of different sides of life. People in this age should be sufficiently secure in themselves to make crucial decisions and «strong turns» related to their life without much knowledge and experience. Such a high self-esteem does not originate within the culture or social environment of the young person, as we have the phenomenon of «up and coming generation» in any culture and in any family; instead it should be a biologically based characteristic of this «age of reproduction». High self-esteem might lead people to evaluate stimuli as more negative, but also as more novel - so subjects in this age estimated objects as more rare and exclusive, which meets their cognitive needs.

*Temperamental differences*

The most interesting difference in the semantic spaces between the temperamental contrast groups was, in my opinion, the difference in the Activity factor between subjects with low and high tempo in the object-related area. Here the phenomenon of «projection through capacities» showed itself very clear: subjects having a high tempo estimated neutral objects significantly more fast, energetic and acute than subjects with low tempo, and their Activity factor consisted of the scales «large-small »and «possible-impossible ». This might mean that subjects with a high tempo attribute to objects properties that correspond to their capacity to deal with or react to.

Another interesting block of results was connected with the general flexibility: more flexible people had two Stability constructs in their semantic space and estimated objects as more cruel, dirty, fast, acute, large, and indefinite than did the contrast group. One can only guess that these properties of objects are those that flexible people use for manipulation, and they attribute them to objects because they know how to deal with them. From this point of view, it is interesting that both people with high tempo and flexibility in the social area had the «possibilities» scale in their Activity factor and «exclusivity» loadings in their semantic space (as part of the Evaluation factor for flexible people, and as part of the separated factor for people with a high tempo).

The ability to maintain a  high tension of activity and emotionality showed connections with the use of the scale «possible-impossible»: subjects with low ergonicity in the object-related area showed a semantic space and ratings similar to those with high-emotional subjects, estimating objects as more  impossible and extracting a separated construct of possibilities in their semantic space. By contrast, people with high ergonicity and low emotionality estimated objects as less possible (low emotional - also as less organized). Evolutionary analysis of the development of mind (for example, Leontjev, 1975; Altman, 1978) shows that the emotional level of estimation of the world is earliest evolutionary stage of cognition (fish and chordates stage), which remains in the "background" of all later stages of informational or abstract perception and understanding. We can guess that the evaluation of objects is connected with the state of the organism, and low ergonicity and high emotionality both compel the  subject to attribute more positive, relaxing evaluations to the world, while high ergonicity and low emotionality encourage them to seek the «cruel reality», that would reveal the interconnections between the emotional and dynamic regulation of behavior (Trofimova, 1996a).

The goal of this paper was not to overload the reader by results, but to demonstrate some, though certainly not all, interconnections that exist between meaning, the semantic realm and the  biologically based characteristics of a person. Future publications will present additional results from this study as well as  studies considering the effects of fatigue, somatic illness, and cross cultural effetcs. The comparison and measurement of semantic spaces do not obey usual the statistical requirements and that is why in this study I used simplified stimuli (concepts, which were not the subject of our study itself) and a reduced degree of freedom in their evaluation.

Interconnections between gender, age and temperament, on one hand, and psycho-semantic characteristics, on the other, do not mean the exclusion of cultural and situation factors, as they influence the development of a person's body throughout their  lifetime. Nevertheless  we need to better understand know the way in which our body reflects and perhaps defines our psychological life, as we usually live and behave IN this body and BY this body. Such knowledge may be the key to providing an understanding of the relation of semantic perception to different personality characteristics and to the modeling of the meaning realm of person using a synergetic paradigm (Trofimova, 1996b). There is a need to abandon the biological-environmental dichotomy in the description of psychological phenomena and to pay more attention to functional processes.

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Attachment 1. Information about contrast temperamental groups.

|  | ERG | ERS | FLX | FLS | TMP | TMS | EMG | EMS |
|---|---|---|---|---|---|---|---|---|
| Mean by the scale | 7.03 | 8.19 | 7.01 | 5.80 | 7.80 | 6.42 | 6.08 | 7.19 |
| Standard deviation | 3.34 | 3.16 | 3.20 | 2.75 | 3.10 | 1.33 | 3.28 | 2.70 |
| N of subjects with low level | 51 | 50 | 68 | 67 | 57 | 38 | 56 | 44 |
| N of subjects with high level | 60 | 76 | 63 | 60 | 81 | 50 | 50 | 60 |

Attachment 2. The content of constructs that make a difference in semantic spaces of contrast temperamental groups.

| LOW | ERGODICITY | GENERAL | HIGH |
|---|---|---|---|
| *Factor REGULATION.* Weight 4.6% | | *Factor STABILITY* | Weight 11.1% |
| **organized -non-organized** | **72** | **constant - changeable** | **74** |
| constant - changeable | 57 | **durable - flimsy** | **66** |
| | | dense - scattered | 54 |
| | | **organized -non-organized** | **49** |
| *Factor EXCLUSIVITY* Weight 7.2% | | *Factor PROBABILITY* | Weight 8.6% |
| | | typical - exclusive | 72 |
| single - numerous | 77 | precise - indefinite | 59 |
| rare - regular | 55 | regular - rare | 46 |
| *Factor POTENCY AS POSSIBILITY* Weight 8.7% | | *Factor POTENCY AS STABILITY* Weight 8.4% | |
| **possible - impossible** | **74** | heavy - easy | 66 |
| large - small | 70 | single - numerous | 49 |
| regular - rare | 39 | dense - scattered | 48 |
| | ERGODICITY | SOCIAL | |
| *Factor PROBABILITY* Weight 10.0% | | *Factor «INTEGRITY»* | Weight 7.2 |
| typical - exclusive | 68 | | |
| possible - impossible | 62 | single - numerous | 73 |
| regular - rare | 59 | dense - scattered | 42 |
| numerous - single | 46 | | |
| | FLEXIBILITY | GENERAL | |
| *Factor REGULATION* Weight 13.8% | | *Factor STABILITY* Weight 9.7% | |
| dense - scattered | 72 | constant - changeable | 75 |
| organized - non-organized | 68 | durable - flimsy | 74 |
| precise - indefinite | 61 | dense - scattered | 42 |
| constant - changeable | 59 | | |
| | | *Factor POTENCY AS STABILITY* | Weight 7.8% |
| | | single - numerous | 71 |
| | | heavy - easy | 59 |
| | | dense - scattered | 39 |
| | FLEXIBILITY | SOCIAL | |
| *Factor EVALUATION* Weight 12.6% | | *Factor EVALUATION WITH EXCLUSIVITY* Weight 11.2% | |
| clean - dirty | 72 | kind - severe | 63 |
| kind - severe | 76 | pleasant - irritating | 62 |
| pleasant - irritating | 71 | clean - dirty | 59 |
| easy - heavy | 51 | **exclusive - typical** | **57** |
| *Factor ACTIVITY* Weight 10.2% | | *Factor ACTIVITY AS POSSIBILITIES* W.13.4% | |
| acute - monotonous | 75 | **large - small** | **69** |
| fast - slow | 72 | fast - slow | 66 |
| energetic - constrained | 68 | possible - impossible | 64 |

| | | energetic - constrained | 56 |
| | | acute - monotonous | 52 |

|  | TEMPO | GENERAL | |
|---|---|---|---|
| *Factor ACTIVITY* | Weight 10.5% | *Factor ACTIVITY WITH POSSIBILITIES* | |
| | | | Weight 12.3% |
| fast - slow | 77 | fast - slow | 67 |
| acute - monotonous | 67 | large - small | 66 |
| energetic - constrained | 66 | possible - impossible | 64 |
| | | energetic - constrained | 54 |
| | | *Factor EXCLUSIVITY* | Weight 6.8% |
| | | single - numerous | 82 |
| | | exclusive - typical | 43 |

|  | EMOTIONALITY | SOCIAL | |
|---|---|---|---|
| *Factor ACTIVITY WITH POSSIBILITIES* | | *Factor ACTIVITY* | Weight 10.1% |
| | Weight 13.3% | | |
| fast - slow | 68 | energetic - constrained | 74 |
| energetic - constrained | 67 | fast - slow | 68 |
| large - small | 62 | energetic - constrained | 54 |
| possible - impossible | 57 | | |
| | | *Factor 5. POTENCY AS POSSIBILITY* | |
| | | | Weight 9.0% |
| | | possible - impossible | 71 |
| | | large - small | 67 |

Attachment 3. Means of ratings over objects of estimation of contrast temperamental groups. Last two scales did not show significant effects.

| Temperamental group → | ERG | | ERS | | FLG | | FLS | | TMG | | TMS | | EMG | | EMS | |
| Scales | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pleasant-irritating. | 5.33 | 5.16 | 5.20 | 5.20 | 5.26 | 5.17 | 5.31 | 5.08 | 5.09 | 5.27 | 5.18 | 5.04 | 5.17 | 5.27 | 4.99 | 5.19 |
| Clean-dirty | 5.25 | 5.02 | 5.14 | 5.10 | 5.25 | 4.96 | 5.18 | 5.02 | 4.93 | 5.16 | 5.11 | 4.96 | 4.99 | 5.23 | 4.91 | 5.30 |
| Kind-cruel | 4.94 | 4.69 | 4.80 | 4.73 | 4.98 | 4.59 | 4.88 | 4.61 | 4.66 | 4.80 | 4.62 | 4.72 | 4.66 | 5.02 | 4.59 | 4.94 |
| Energetic-constrained | 5.37 | 5.30 | 5.15 | 5.32 | 5.17 | 5.27 | 5.25 | 5.30 | 4.94 | 5.42 | 5.11 | 4.99 | 5.21 | 5.26 | 5.15 | 5.34 |
| Monotonous-acute | 3.82 | 3.65 | 3.92 | 3.56 | 3.83 | 3.58 | 3.90 | 3.64 | 3.94 | 3.64 | 3.77 | 3.95 | 3.75 | 3.72 | 3.80 | 3.67 |
| Fast-slow | 4.72 | 4.90 | 4.53 | 4.95 | 4.64 | 4.94 | 4.64 | 4.92 | 4.40 | 5.00 | 4.66 | 4.80 | 4.76 | 4.95 | 4.65 | 4.90 |
| Durable -flimsy | 4.60 | 4.67 | 4.49 | 4.72 | 4.63 | 4.71 | 4.70 | 4.66 | 4.64 | 4.71 | 4.49 | 4.60 | 4.82 | 4.60 | 4.63 | 4.83 |
| Big- small | 5.32 | 5.42 | 5.16 | 5.44 | 5.17 | 5.52 | 5.29 | 5.38 | 5.22 | 5.42 | 5.34 | 5.30 | 5.22 | 5.54 | 5.11 | 5.40 |
| Heavy-light | 4.72 | 4.36 | 4.57 | 4.53 | 4.44 | 4.54 | 4.56 | 4.54 | 4.51 | 4.47 | 4.77 | 4.61 | 4.50 | 4.56 | 4.44 | 4.36 |
| Dense-scattered | 4.62 | 4.46 | 4.32 | 4.54 | 4.56 | 4.47 | 4.56 | 4.43 | 4.42 | 4.53 | 4.46 | 4.29 | 4.51 | 4.51 | 4.57 | 4.43 |
| Single-numerous | 3.67 | 3.75 | 3.58 | 3.66 | 3.66 | 3.68 | 3.61 | 3.68 | 3.64 | 3.61 | 3.30 | 3.87 | 3.62 | 3.79 | 3.58 | 3.70 |
| Organized -non-organized | 5.05 | 5.15 | 4.89 | 5.10 | 5.06 | 5.04 | 5.07 | 5.00 | 4.90 | 5.08 | 4.93 | 5.09 | 4.92 | 5.27 | 4.79 | 5.14 |
| Constant-changeable | 3.55 | 3.89 | 3.60 | 3.77 | 3.90 | 3.76 | 3.98 | 3.70 | 3.85 | 3.82 | 3.51 | 3.98 | 3.79 | 3.80 | 3.67 | 3.91 |
| Precise-indefinite | 4.38 | 4.42 | 4.43 | 4.38 | 4.56 | 4.17 | 4.59 | 4.32 | 4.45 | 4.38 | 4.16 | 4.59 | 4.45 | 4.61 | 4.46 | 4.46 |
| Possible-impossible | 5.85 | 5.64 | 5.59 | 5.76 | 5.69 | 5.67 | 5.68 | 5.66 | 5.55 | 5.69 | 5.70 | 5.46 | 5.42 | 5.95 | 5.39 | 5.76 |

Table 1. The content of varimax factors in semantic spaces of the entire sample, and of men and women separately

| All sample | | Men | | Women | |
|---|---|---|---|---|---|
| S c a l e s | Loading | S c a l e s | Loading | S c a l e s | Loading |
| ← | | Factor «*E V A L U A T I O N*» | | → | |
| Weight 11.1% | | Weight 10.1% | | Weight 11.7% | |
| kind - severe | 73 | kind - severe | 72 | kind - severe | 76 |
| clean - dirty | 67 | clean - dirty | **54** | clean - dirty | **72** |
| pleasant - irritating | 63 | pleasant - irritating | **49** | pleasant - irritating | **68** |
| easy - heavy | 51 | | | | |
| ← | | Factor «*R E G U L A T I O N*» | | → | |
| Weight 13.4% | | Weight 14.5% | | Weight 14.1% | |
| dense - scattered | 70 | dense - scattered | 70 | precise - indefinite | 67 |
| organized -disorganized | 67 | constant - changeable | 69 | constant - changeable | 64 |
| precise - indefinite | 60 | organized - disorganized | 64 | dense - scattered | 59 |
| constant - changeable | 56 | precise - indefinite | 57 | organized - disorganized | 59 |
| ← | | Factor «*A C T I V I T Y*» | | → | |
| Weight % 12.4 | | Weight 12.6% | | Weight % 12.5 | |
| acute - monotonous | 50 | energetic - constrained | 65 | **fast - slow** | **72** |
| fast - slow | 69 | **possible - impossible** | **69** | energetic - constrained | 63 |
| energetic - constrained | 65 | large - small | 62 | acute - monotonous | 58 |
| possible - impossible | 57 | **fast - slow** | **58** | large - small | 57 |
| large - small | 52 | | | | |
| ← | | Factor «*P R O B A B I L I T Y*» | | → | *AS EXCLUSIVITY* |
| Weight 8.3 % | | Weight 8.4 % | | Weight 7.4 % | |
| regular - rare | 68 | **typical - exclusive** | **68** | single - numerous | 67 |
| typical - exclusive | 61 | regular - rare | 54 | rare - regular | 52 |
| numerous - single | 48 | numerous - single | 43 | | |

Table 2. Semantic spaces of different age groups.

| Age 14-18 | | Factor | | Age 34-52 | |
|---|---|---|---|---|---|
| | ← | Factor «*E V A L U A T I O N*» | → | | |
| Weight 12.9% | | Weight 12.1% | | Weight 12.2% | |
| kind - severe | 78 | kind - severe | 73 | clean - dirty | 74 |
| pleasant - irritating | 72 | pleasant - irritating | 71 | **durable - flimsy** | **69** |
| clean - dirty | 71 | clean - dirty | 68 | kind - severe | 64 |
| | ← | Factor «*R E G U L A T I O N*» | → | | |
| Weight 11.0% | | Weight 10.7% | | Weight 12.7% | |
| organized - disorganized | 71 | organized - disorganized | 69 | organized - disorganized | 76 |
| dense - scattered | 63 | dense - scattered | 69 | **precise - indefinite** | **72** |
| single - numerous | 59 | constant - changeable | 68 | dense - scattered | 60 |
| | | precise - indefinite | 51 | constant - changeable | 57 |
| | ← | Factor «*A C T I V I T Y*» | → | | |
| Weight 11.8% | | Weight 10.5% | | Weight 10.2% | |
| **fast - slow** | **81** | acute - monotonous | 74 | acute - monotonous | 72 |
| acute - monotonous | 64 | fast - slow | 69 | energetic - constrained | 57 |
| energetic - constrained | 58 | energetic - constrained | 66 | **fast - slow** | **52** |
| heavy - easy | 52 | | | | |
| | ← | Factor «*P R O B A B I L I T Y*» | → | | |
| Weight 8.4 % | | Weight 8.6 % | | Weight 10.3 % | |
| possible-impossible | **83** | regular - rare | 66 | regular - rare | 76 |
| large - small | 68 | typical - exclusive | 66 | possible - impossible | 73 |
| | ← | Factor «*S T A B I L I T Y*» | → | | |
| Weight 10.9 % | | Weight 7.8 % | | Weight 9.1 % | |
| regular - rare | 73 | heavy - easy | 62 | heavy - easy | 66 |
| constant - changeable | 59 | single - numerous | 53 | typical - exclusive | 56 |
| durable - flimsy | 51 | large - small | 48 | irritating - pleasant | 51 |

Table 3. The differences in the structure of semantic space between contrast temperamental groups. Bold font shows the difference between a group and whole sample.

| LOW | CONSTRUCTS OF SEMANTIC SPACE | | HIGH |
|---|---|---|---|
| Ergodicity - General | Evaluation<br>Activity<br>Regulation<br>**Exclusivity**<br>**Potency as Possibility** | Evaluation<br>Activity<br>**Stability**<br>Probability<br>**Potency as Stability** | Ergodicity-General |
| Ergodicity - Social | Evaluation<br>Activity<br>Regulation<br>Probability<br>**Potency** | Evaluation<br>Activity<br>Regulation<br>**Integrity**<br>------------- | Ergodicity-Social |
| Flexibility-General | Evaluation<br>Activity<br>Regulation<br>Probability<br>------------ | Evaluation<br>Activity<br>**Stability**<br>Probability<br>**Potency as Stability** | Flexibility-General |
| Flexibility-Social | Evaluation<br>Activity<br>Regulation<br>Probability<br>**Potency** | Evaluation **/with exclusivity**<br>Activity **/with possibilities**<br>Regulation<br>Probability<br>--------------- | Flexibility-Social |
| Tempo-General | Evaluation<br>Activity<br>Regulation<br>Probability<br>Potency | Evaluation<br>Activity**/with possibilities**<br>Regulation<br>**Exclusivity**<br>Potency | Tempo - General |
| Emotionality Social | Evaluation<br>Activity**/with possibilities**<br>Regulation<br>Probability<br>------------- | Evaluation<br>Activity<br>Regulation<br>Probability<br>**Potency as Possibility** | Emotionality Social |

Table 4. Means and F value for significant main effects in ratings of different contrast age and gender groups.

| | F Sex | Means | | F Age | Means | | |
|---|---|---|---|---|---|---|---|
| | 1,1334 | Men | Women | 2,1333 | Age 1 | Age 2 | Age 3 |
| Pleasant - irritating | 10.19*** | 4.98 | 5.42 | 12.56*** | 5.46 | 5.06 | 5.67 |
| Clean - dirty | 5.19 | 4.94 | 5.18 | 17.63*** | 5.29 | 4.96 | 5.55 |
| Kind - cruel | 22.79*** | 4.44 | 4.91 | 30.64*** | 4.96 | 4.54 | 5.50 |
| Energetic-constr-d | 12.22*** | 5.00 | 5.37 | 17.10*** | 5.61 | 5.10 | 5.63 |
| Monotonous -acute | 6.52** | 3.89 | 3.61 | 3.02* | 3.31 | 3.80 | 3.68 |
| Fast - slow | 6.08** | 4.63 | 5.00 | 3.40* | 4.99 | 4.75 | 4.87 |
| Durable - flimsy | 0.10 | 4.62 | 4.76 | 4.45** | 4.61 | 4.61 | 4.82 |
| Big - small | 14.45*** | 5.10 | 5.56 | 1.43 | 5.36 | 5.31 | 5.50 |
| Single - numerous | 2.51 | 3.52 | 3.80 | 11.71*** | 3.63 | 3.78 | 2.94 |
| Organized - non-organized | 14.56*** | 4.78 | 5.29 | 3.56* | 5.17 | 4.97 | 5.31 |
| Precise - indefinite | 3.87* | 4.27 | 4.62 | 2.23 | 4.62 | 4.39 | 4.50 |
| Possible-impossible | 13.42*** | 5.47 | 5.89 | 0.69 | 5.89 | 5.63 | 5.66 |
| Typical - exclusive | 0.92 | 3.95 | 4.19 | 7.19*** | 4.07 | 3.95 | 4.48 |
| Regular - rare. | 0.00 | 4.44 | 4.45 | 4.62** | 4.26 | 4.42 | 4.78 |

\* - p < 0.05
\*\* - p < 0.01
\*\*\* - p < 0.001

Table 5. F value for significant main effects in ratings of different contrast
temperamental groups. Last two scales did not show significant effects.

| Group | ERG | ERS | FLG | FLS | TMG | TMS | EMG | EMS |
|---|---|---|---|---|---|---|---|---|
| F for scales: | 1,806 | 1,1150 | 1,1046 | 1,1086 | 1,1102 | 1,550 | 1,798 | 1,806 |
| Pleasant-irritat. | 1.88 | 0.00 | 0.69 | 5.35* | 3.07 | 0.98 | 0.62 | 2.60 |
| Clean - dirty | 4.17* | 0.18 | 8.59*** | 2.65 | 5.31* | 1.10 | 4.23* | 11.72*** |
| Kind - cruel | 4.05* | 0.51 | 13.18*** | 7.03** | 1.76 | 0.45 | 9.00*** | 8.49*** |
| Energetic-const | 0.35 | 2.36 | 1.00 | 0.24 | 21.65*** | 0.65 | 0.17 | 2.31 |
| Monoton.-acute | 1.77 | 11.01*** | 5.44* | 5.98** | 7.96*** | 1.26 | 0.08 | 1.30 |
| Fast - slow | 2.13 | 15.36*** | 8.36*** | 7.25** | 32.83*** | 0.83 | 2.52 | 4.03* |
| Durable -flimsy | 0.27 | 3.82* | 0.44 | 0.10 | 0.36 | 0.50 | 2.68 | 2.13 |
| Big - small | 0.91 | 8.72*** | 13.71*** | 0.88 | 4.65* | 0.09 | 9.01*** | 6.85** |
| Heavy - light | 8.27*** | 0.17 | 0.83 | 0.03 | 0.19 | 1.16 | 0.21 | 0.42 |
| Dense-scattered | 1.39 | 3.73* | 0.62 | 1.54 | 0.99 | 1.04 | 0.00 | 1.14 |
| Single-numerous | 0.27 | 0.38 | 0.04 | 0.29 | 0.04 | 10.12*** | 1.33 | 0.64 |
| Organized - non-organized | 0.63 | 3.40 | 0.05 | 0.47 | 2.73 | 1.04 | 7.3** | 7.11** |
| Constant-chang | 5.43* | 1.90 | 1.09 | 5.06* | 0.04 | 7.18** | 0.02 | 2.68 |
| Precise-indefin. | 0.09 | 0.17 | 10.78*** | 5.30* | 0.32 | 6.54** | 1.48 | 0.00 |
| Possible-imposs | 4.48* | 3.80* | 0.02 | 0.08 | 2.81 | 3.72* | 28.38*** | 12.59*** |

\* - $p < 0.05$
\*\* - $p < 0.01$
\*\*\* - $p < 0.001$