

DIFFERENTIAL – PSYCHOLOGICAL ASPECTS OF THE METHOD OF FIXATED SET: EMPIRICAL VERIFICATION

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Abstract

Several decades passed after development of the experimental method in the psychology of set. In spite of this, it still arises interest in the modern studies of medical psychology and psychophysiology. Many researchers from different countries use the above method, known as “Uznadze effect”. Differently from most Georgian studies dedicated to the psychology of set, foreign colleagues use modern refined technologies and statistical methods in their experiments. For this reason, we decided to conduct set experiments with the use of software program and modern methods of statistical analysis to verify the findings related to individual types of fixated set and personality traits. 171 participated in the experiment on the fixation of set. The experiment followed Uznadze’s classical method, but with the use of special software developed for visual modality. In addition, research participants’ responses were automatically recorded. Research participants also completed the validated Georgian versions of Big Five personality test (NEO-FFI) and Spielberger inventory (STAI) measuring personal anxiety. Dispersion analysis showed that static type is characterized with a higher level of neuroticism and personal anxiety than the dynamic type. Also, the plastic type scores higher on extraversion than the individuals with coarse type of set. Logistic regression analysis showed that neuroticism is a predictor of the dynamics of the extinction process (predictor of staticity – dynamism).

Key words: *Uznadze theory of set, experiments on the fixation of set, types of fixated set, Big Five personality traits*

Dimitri Uznadze, a distinguished Georgian psychologist of the past century, developed a general psychological theory of set which significantly differed from the psychological theories of that period and drew attention of the psychologists working at the international level. Despite the fact that almost 100 years passed after development of the first postulates of the theory, Uznadze’s Set Theory and his experimental method are still applied by university researchers in Italy, Great Britain, Latvia, etc. (Uccelli, 2021; Lyakhovetskii & Karpinskaia, 2017; Daneyko, Maravita, & Zavagno, 2020). In modern psychology it is known as ‘Uznadze effect’. The authors mentioned above mainly work on the cross-modal processes related to the processing of visual and sensorimotor information for the purpose of which they use the method of cross-modal irradiation. J. Piaget was the first who used the term “Uznadze effect” for Uznadze’s method of fixated set (Piaget & Lambercier, 1944 /2020), which contributed much to its popularization. Researchers often cite J. Piaget’s above work when referring to “Uznadze effect.” Although, in that period, the methods of inferential statistics were not used for hypothesis testing, French and Georgian researchers

obtained similar results, which proves their scientific value. Later, researchers in different countries replicated several well-known experiments, conducted by Uznadze and his colleagues, and applied inferential statistics to the data obtained. Their studies proved the existence of phenomena important for Set Theory (generalization, cross-modal irradiation) and other findings (Kawaguchi, 1984; Ghatani, 1984). Modern research refined the experimental methods of set fixation and introduced more precise computer technologies and software (Robakidze, 2020). Modern research focuses more often on information processing models and physiological aspects, including the factors (peripheral, central) determining “Uznadze effect” as well as the nature of generalization and cross-modality (Magos, 2002; Ucceli, Pisu, Riggio, & Bruno, 2019).

Our study aimed to test the differential-psychological aspects of the method of fixated set using modern methodology applied in empirical research. This problem has not received adequate attention in modern studies of the psychology of set differently from the issues mentioned above. It should be noted that Uznadze and other representatives of the psychology of set believed that this topic has significant practical value. It should be noted that the contribution made by modern Georgian psychologists is truly important (research into the in-depth analysis of different types of set, objectification and its role in the individual's adaptation to the environment, the role of values, norms and culture in the development of dispositional set) (Nadareishvili, 2020; 2022). Despite the importance of the above listed topics, their analysis goes beyond the scope of the given article since it deals with the content of the concept of set rather than its formal aspects, like the dynamics of the extinction of set.

Individuals differ by formal characteristics of fixated set: how fast set is fixated, how stable it is, dynamics of its extinction, etc. The Theory of Set distinguishes different types of set: static, dynamic, variable, etc. Studies conducted by Georgian psychologists confirmed the existence of relationship between the types of set and personality characteristics (Norakidze, 1975; Bzhalava, 1958). Unfortunately, these studies did not use inferential statistics. At least, the works do not contain this kind of information and the interpretation is based on frequency analysis. One of the researchers who attempted to use inferential statistics when examining relationship between the types of fixated set and personality traits identified by Eysenck personality test was the Canadian researcher J. Hritzuk (1971), whose experiments demonstrated statistically significant association between the characteristics of set and extraversion – introversion measured with the Eysenck personality test (Hritzuk, 1971). Our study aims to verify the findings established in the given studies and answer the question about relationship between the types of fixated set and personality traits. We used the Big Five model to study personality traits in relation to the types of set which had not been the focus of research in the past studies. We also decided to verify the relationship between the types of fixated set and personal anxiety established in Norakidze's experiments (1975), since it did not contain information on the use of statistical methods.

Types of extinction of set

According to Uznadze (2009), set is an integral unconscious state which is formed on the basis of the individual's need and the corresponding situation. Set is a state of readiness for behavior which determines future behavior. Since set is the projection of a specific form of future behavior, it is also the basis of purposeful behavior and ensures the individual's adaptation to environment. This is how D. Uznadze described situational ("actual") set. At the same time, Uznadze distinguished situational set from fixated set: The set which has been formed once and served a specific purpose, might not disappear. "It maintains readiness for repeated actualization and is immediately evoked in suitable conditions.", i.e., is transformed into fixated set (Uznadze, 2009, p 64). Fixated sets are sometimes so strong that they prevent the emergence of adequate set. They may or may not correspond to the situation. The subject can change one's sets in the latter case and regulate future behavior so that it better corresponds to reality. Therefore, Uznadze's set is a mechanism ensuring the individual's adaptation to environment.

Uznadze and his colleagues developed a methodology to study fixated set. In the first part of the experiment (set test), the subject is exposed to unequal objects and is instructed to evaluate their size. In the next part of the experiment (critical test), the subject is given equal objects and is instructed to evaluate their size. In the critical trials the subject perceives identical objects as unequal under the influence of the fixated set formed in the previous trials. Most subjects manifest contrast illusion, i.e., the object exposed on the same side where previously the subject was exposed to a large object is perceived smaller compared to the other object. Assimilative illusions are observed less frequently. This is when the same object is perceived as large in both fixation and critical trials. As a result of a series of exposures to equal objects fixated set gradually extinguishes, i.e., the subject's contrast illusions are replaced with the adequate perception of equal objects. Numerous experiments show that individuals differ by dynamics of the above process. In particular, individuals require different number of trials for the formation of fixated set (i.e., evoking illusions). This fact was used by Uznadze to distinguish high and low excitability types. It also turned out that individuals differ by extinction of fixated set. In particular, some participants shift to adequate perception after several contrast illusions (dynamic type)¹, whereas others never reach adequate perception and remain under the influence of fixated set during the entire experiment (static type). The third type who does not show any clear extinction pattern (sometimes manifests static and other times – dynamic pattern) is labelled variable type. In some individuals' extinction of fixated set is gradual and is characterized with interchangeable responses (plastic type), whereas in the other phase only contrast illusions are observed (coarse type). Later studies confirmed that the extinction type is the same in different modalities (visual, motor and haptic) (Avalishvili, 1940), which, according

¹ When referring to 'dynamic' and 'static' types, we mean 'the individual with dynamic set' and 'the individual with static set' in correspondence with the terms used by Uznadze in his work: 'dynamic type' or 'type of dynamic set' implies 'the individual with the dynamic type of set' (Uznadze, 2009, p.188-190).

to Uznadze, points to the differential-psychological aspects of set as integral personality state. "It can be considered an established fact that normally, every healthy subject can be characterized with a certain type of fixated set which remains unchangeable in all sensory domains" (Uznadze, 2009, p185).

The relationship between the features of the evoke/extinction of fixated set and personality characteristics were investigated in Norakidze's works (1966; 1975). Norakidze used different methods to study personality: clinical-biographical method, Eysenck personality test, projective tests (Rorschach and TAT). The results of the study confirm that plastic-dynamic set is characteristic of sanguine, phlegmatic and choleric types, coarse-static set is characteristic of melancholic types, individuals with dynamic type of set are often extraverts, and static types are introverts. It was also demonstrated that compared to dynamic type, static type scores higher on the Taylor anxiety scale. To conclude, according to Norakidze (1966), the individual with the static type of set remains under the influence of the fixated set for a long time, cannot adapt to new reality, is rigid, characterized with a high level of anxiety and internal conflicts, is predisposed to melancholy, is introspective and mostly introverted. On the other hand, the dynamic type easily adapts to environment, is flexible, harmonious, is characterized with a low level of anxiety, is balanced, realistic and mostly extraverted.

Abnormal psychology also benefited from the diagnostic potential of the method of fixated set. Uznadze viewed abnormal psychology in a broader context: "Illness does not damage a specific function; it damages the individual, as a whole, who uses this particular function." (Uznadze, 2009). The studies show that the properties of the fixated set differ from the norm in different pathological cases (Bzhalava, 1958). In patients with schizophrenia fixated set is local; it is characterized with a high level of steadiness, rigidity and staticity. However, a number of differences was confirmed for different types of schizophrenia. Patients with epilepsy are characterized with a high level of excitability; their set can be described as coarse-static and stable. The set of bipolar patients is static-plastic and variable in the manic phase. In such patients the type of extinction of set is changeable and is less consistent (Bzhalava, 1958).

Not only Georgian psychologists were interested in personality correlates of the types of extinction of fixated set. For example, the Canadian psychologist J. Hritzuk (1971) looked at the relationship between the types of set and the personality traits measured with Eysenck test (extraversion, introversion) in patients with hysteria and dysthymia. He analyzed theoretical and experimental methods applied by Eysenck and Norakidze and confirmed the existence of a certain relationship using the methods of inferential statistics, which was not used in the works of Georgian researchers. The study results showed the following: individuals scoring high on hysteria dimension scored low on excitability of set and showed a high level of cross-modal irradiation compared to the individuals scoring high on dysthymia dimension. There was no correlation between hysteria and the steadiness of set; also, there was no difference in the properties of the extinction of set by neuroticism level or extraversion – introversion (Hritzuk, 1971). These results are somewhat different from

those obtained by J. Eysenck who studied differences in individual dimensions of figural after-effect in the kinesthetic modality (a phenomenon similar to fixated set). In particular, the purpose of the study was to find out how research participants scoring high on dysthymia and hysteria differed by excitability, extinction time, and the steadiness of illusions. Statistical analysis of the study results (*t* test) demonstrated that participants scoring high on hysteria (prototype of extravert) show a higher *speed of arousal*, a bigger size of illusion, and a longer extinction period compared to the individuals scoring high on dysthymia (prototype of introvert) (Eysenck, 1955). Later, the Canadian researcher Janzen (Janzen, 1972) studied the relationship between the properties of the excitability and extinction of set and personality traits with Eysenck personality test and MMPI. Factor analysis (Varimax rotation method) extracted 8 factors which explained 73.44% of the variance. The properties of excitability and extinction were present in most factors, but their weight was quite small. According to the author's interpretation of the above results, set is involved in the characteristics described as personality traits. However, this is not enough to conclude that set plays an important part in determining behavior structure. It should be noted that both Canadian researchers only looked at the number of trials necessary for extinction, but did not use the concepts of staticity-dynamism which needs to be taken into consideration when comparing their results with those obtained by Georgian psychologists.

Controversial results of the studies on differential-psychological aspects of fixated set increased the interest in this kind of research. Our study can be regarded as an attempt to introduce more clarity in the above sphere. For this purpose, we decided to examine the relationship between the types of fixated set and personality traits using more precise methods. In the above studies, the most salient relationship was observed between the types of fixated set and affective personality characteristics as well as between extraversion-introversion and rigidity-flexibility. Therefore, our purpose was to find out whether extinction types show any difference by personality traits in the Big Five model (neuroticism, extraversion and openness to experience) and personal anxiety. It is well-known that the Big Five personality traits are basic tendencies that are stable in time and do not, basically, change in the course of life (Costa & McCrae, 1992). High level of neuroticism is associated with a high level of anxiety, aggressiveness, depression, impulsiveness, emotional instability and, therefore, with low stress resistance and weak adaptive mechanisms, which suggests that individuals with static type of set will be characterized with a high level of neuroticism. On the other hand, the high level of extraversion is associated with sociability, high level of activity, love for entertainment and joy, which, according to the above studies, is more characteristic of dynamic-plastic types. Individuals rating high on openness to experience are less traditional, more open to novelties and changes and are more flexible. All this is related to easiness with which fixated set undergoes changes and must be more characteristic of dynamic type than static type. To sum up, our hypotheses could be formulated as follows:

H1: The static type will score higher on neuroticism than the dynamic type;

H2: The dynamic type will score higher on extraversion than the static type;

H3: The dynamic type will score higher on openness to experience than the static type;

H4: The plastic type will score higher on extraversion than the coarse type;

H5: The static type will demonstrate a higher level of anxiety than the dynamic type.

Method

The Sample

187 individuals participated in the experiment. The final results were obtained for only 171 participants. The participants who did not respond to a large part of expositions or did not fill out the other instrument, were excluded from the experiment. Only those individuals participated in the experiment who were able to use computer technologies independently. The participants' age ranged from 18 to 50 years; ($M=24.56$, $SD=5.8$). Female participants made up 69% and male participants - 31% of the sample. Participation in the study was voluntary. The experimental part of the study was conducted under the experimenter's supervision. The participants filled out the questionnaires independently.

Experimental apparatus

Fixated set was studied in the optical modality using Uznadze's classical methodology (Uznadze, 2009) with only one difference: the experiments were conducted with the use of a specially developed computer software. The software enabled the experimenter to manipulate all the variables significant for the experiment: figure-ground color, shape, size, location, the point of fixation of the eye, exposition time and duration of time intervals between expositions, number of trials in the test, etc. To respond to the stimuli the participant had to press the key according to preliminary instructions. Responses were recorded in the table downloaded in MS Excel format.

Procedure

The study consisted of two parts: The set experiment was followed by completion of the Big Five questionnaire and the Spielberger State – Trait Anxiety Inventory.

In the set test a research participant was seated in front of the computer where the corresponding software was run (web-based application written in JavaScript). First, she/he was asked to read the instruction on the screen:

“Your task is to compare the sizes of the circles that will appear on the screen and respond by pressing the corresponding key. If the left circle is bigger than the right circle – press 1, if the right circle is bigger than the left circle – press 3; if the two circles are of equal size – press 2.

Even when the difference between the circles is small, you will still have to respond to the difference. You must focus on the red point in the center of the screen throughout the experiment. The objects will be exposed at a high speed, so try to press the key in time. Please, get ready in advance and find the right keys on the keyboard. If you are ready, fill in the corresponding space and start the experiment.”

After the instruction the research participants entered personal information, which included first and last names (or a symbol if the participants preferred to keep the information confidential; the same symbol was used when completing the questionnaires), the participant's gender and age.

The experiment consisted of three tests. In the control test, the participants were simultaneously exposed to the objects of equal size 5 times. This was followed by the set test in which the objects of unequal size were presented 15 times and the critical test in which the objects of equal size, to which participants were exposed in the control test, were presented 40 times. The purpose of the control test was to check the participants for natural asymmetry, i.e. natural tendency to evaluate equal objects as unequal (Uznadze, 2009). When a participant manifested similar tendency, in the case of right field dominance, in the set tests the participants were exposed to a large circle on the right side and in the case of left field dominance – on the left side.

In the experiment the research participants were presented with yellow circles on the black ground. The diameter of circles was 5 cm in control and critical tests, and 8 and 5 cm in set tests (thickness – 4 px). The red point for eye fixation (5mm in diameter) was located in the center of the screen. The duration of exposition as well as the time interval between expositions was the same in the three tests (1,000 and 1,200 ms, correspondingly). After each exposition, the participant evaluated the size of objects and pressed the key in accordance with the instruction. The experiment lasted 3 minutes.

The experiment was conducted online using the ZOOM platform¹, which enabled the experimenter to observe the participant's environment and their engagement in the experiment. The position of the computer enabled the participant to clearly perceive the figures on the screen.

In the experiment, the staticity and dynamism of set was determined by dynamics of set extinction: the dynamic set is extinguished (or the participant goes back to adequate perception) after a certain number of illusions. However, this might be preceded by the phase in which illusory perception and correct responses are interchangeable. The criterion for the extinction of set was an adequate perception of objects in 5 consecutive trials. On the other hand, the set was considered static² when the participant was not able to arrive at an adequate perception after 40 expositions of equal circles. The plastic type was identified in those cases when assimilative illusions were observed together with contrast illusions or contrast and adequate responses replaced each other. In the case of coarse set, contrast illusions were replaced with adequate perception and after that the participant did not go back to illusory perception. In the zero type not a single case of illusory perception was observed. The steadiness of set was measured by the number of contrast illusions.

¹ Large part of experiment was conducted during pandemic and, therefore, with the use of distant communication.

² The variable type was not considered in the given experiment. Only the individuals with constant set participated in the study.

After participation in the experiment, participants were instructed to complete the NEO-FFI and STAI using the Google form.

Instruments

Personality traits were studied with the Big Five model, an instrument frequently used in Georgia (Costa & McCrae, 1992). In particular, we used a short, 60-item version of the instrument (NEO-FFI). This instrument measures neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. The items were measured on a 5-point Likert scale, where 1 means 'totally disagree' and 5 – 'totally agree'. Each scale contained 12 items. Since we were interested in three personality traits (neuroticism, extraversion and openness to experience), only 36 items were used. Reliability was measured with Cronbach alpha (0.8, 0.76 and 0.5, respectively). In the Georgian version, the reliability coefficient for openness to experience is quite low, which has been also noted by other researchers (Kobuladze, 2017). The item analysis showed that two items in the scale (the first and the tenth items) had a low discrimination index – "I don't like to waste my time daydreaming" (discrimination index – 0.085) and "I like solving problems and puzzles very much" (discrimination index 0.005). According to some authors, it is not advisable to use the scales with reliability index below 0.65 (George & Mallery, 2003); however, others consider reliability index 0.5-0.7 acceptable. For this reason, we retained the given scale for data analysis (Hinton, McMurray, & Brownlow, 2014).

Anxiety was measured with the Georgian version of Spielberger's State-Trait Anxiety Inventory (STAI). The validation of the inventory for Georgian population was conducted by Javakhishvili and colleagues in 2016. This 17-item inventory uses the frequency scale ranging from 1 (very rarely) to 4 (almost always). In our study, the value of Cronbach alpha proved to be high (0.9). Also, a strong correlation was observed between the anxiety levels measured with our instrument and the level of neuroticism measured with NEO-FFI ($r(169)=.7, p<.000$), which points to a high convergent validity of the above instruments.

Results

The frequencies of extinction types showed the following distribution: 47% – static set; 42% – dynamic set; 12% – fixation did not occur; 54% – plastic set; 35% – coarse set.

Hypothesis 1 was tested by comparing scores for neuroticism in static and dynamic types. The mean score for neuroticism in the static group ($M = 38.63, SD=8.34$) exceeded its mean score in the dynamic group ($M = 32.6, SD = 6.99$), $t(149) = 4.82, p < .001$. Therefore, Hypothesis 1 has been proved.

To test Hypothesis 2, we compared the scores for extraversion in dynamic and static types. The findings did not support the given hypothesis: no statistically significant difference was obtained between the mean extraversion scores in the two groups: dynamic type ($M = 38.3, SD = 6.44$); static type ($M = 39, SD = 7.56$); $t(149) = 0.6, p = .55$.

To test Hypothesis 3, the scores for openness to experience were compared in static and dynamic types. Hypothesis 3 has not been supported: dynamic type ($M = 41.31$, $SD = 5.37$); static type ($M = 40.38$, $SD = 5.27$); $t(149) = -1.08$, $p = .28$.

To test Hypothesis 4, we compared the mean scores for extraversion in plastic and coarse types. Hypothesis 4 has been confirmed: the mean score for extraversion in plastic type ($M = 39.6$, $SD = 7.33$) exceeded the mean score for extraversion in coarse type ($M = 37.3$, $SD = 6.4$), $t(149) = 2.1$, $p < .03$.

To test Hypothesis 5 the scores on anxiety test were compared in static and dynamic types. Hypothesis 5 has been confirmed: the mean score for anxiety in static type ($M = 50.54$, $SD = 11.37$) significantly exceeded the corresponding score in the dynamic type ($M = 47.29$, $SD = 8.62$), $t(145) = 1.99$, $p < .05$.

In differential-psychological studies of set (Norakidze, 1963), steadiness of set is often considered a variable which, in combination with other variables, is associated with personality traits. We also got interested in the relationship between the steadiness of set and personality traits. The results of the correlation analysis did not show statistically significant association between the steadiness of set and personality traits. However, an interesting relationship was observed between the steadiness of set and the types of set. In particular, the mean scores for steadiness in the individuals with the static type of set ($M = 14.13$, $SD = 6.38$) significantly exceeded the scores for steadiness in individuals with the dynamic type of set ($M = 8.66$, $SD = 5.97$), $t(149) = 5.41$, $p < .001$. It has been also proved, that the scores for steadiness in the individuals with the plastic type of set ($M = 12.68$, $SD = 6$) exceeded the corresponding scores in the individuals with the coarse type of set ($M = 9.8$, $SD = 7.48$), $t(149) = 2.49$, $p < .01$.

Another thing we focused on was the relationship between two dimensions of the types of fixated set: plasticity – coarseness and dynamism – staticity. It turned out that the plasticity of set is more characteristic of the static type than the dynamic type, $\chi^2(4, N=152) = 218.15$, $p < .001$. At the moment there is not enough empirical evidence for interpreting these data in relation to personality traits but the above results indicate that it would be desirable to look at the combinations of the types of set in future empirical research (static-plastic type, dynamic-plastic type, etc.). This might enable us to uncover new, more interesting findings. It has to be noted that in his studies, Norakidze (1966) attempted to describe profiles using just this kind of combinations.

To measure the relationship between the personality traits and extinction types we used logistic (binary) regression (Pallant, 2016). In our study, neuroticism, extraversion, openness to experience, and personal anxiety were independent variables; type of set (staticity – dynamism) was a dependent variable. The model is statistically reliable $\chi^2(4, N = 151) = 26.76$, $p < 0.001$, which means that it differentiates individuals by types of set. The model explains 16.2% (Cox and Snell R square) and 21.7% (Nagelkerke R squared) of the variance of researched variable and ensures correct classification in 68.2% of cases. Table 1 shows that neuroticism is the only variable that has a predictive value, $e^B = 1.147$, $B = .137$.

Table 1. Logistic regression: Personality traits and types of set

Variables	B	S.E.	Wald	df	Sig.	Exp (B) 95%	C.I. for EXP(B)	
					Lower		Upper	
Neuroticism	.137	.035	15.570	1	.000	1.147	1.072	1.228
Openness to experience	-.004	.042	.009	1	.926	.996	.917	1.082
Extraversion	.045	.032	1.985	1	.159	1.046	.983	1.113
Personal anxiety	-.025	.029	.738	1	.390	.976	.923	1.032
Constant	-5.170	2.439	4.495	1	.034	.006		

Discussion

The study results show that the types of fixated set differ by a number of personality traits. The difference in neuroticism scores is especially significant. In particular, the static type scores higher on neuroticism than the dynamic type. Personal anxiety scores are also higher in the individuals with static set compared to those with dynamic set. These results are consistent with the findings obtained earlier by Georgian psychologist Norakidze (1966). Although Big Five personality test was not used in that period, clinical conversations and projective methods (TAT, Rorschach test) demonstrated that the individuals with the static type of set have a stronger tendency towards aggressive behavior and are highly irritable. Their phantasies that result from unsatisfied wishes and fixated sets reflect pessimistic attitudes, lack of self-confidence, anxiety and fear. This is also proved by research into formal dimensions of set in psychological abnormalities (manic depression, hysteria, psychasthenia), which demonstrates the prevalence of static set over dynamic set in like cases.

Our study confirmed the hypothesis that plastic type scores higher on extraversion than the coarse type, which supports the conclusions and interpretations of the researchers in the field of differential psychology. In particular, individuals with the plastic type of set are more sociable and are well adapted to social environment, which is more characteristic of extraverts than introverts. Coarseness, which may be also characteristic of the dynamic type, is related to sharp changes in set. After a single adequate perception, such individuals are no longer influenced by fixation, which is reflected in their character: they are loyal to their principles, are strict and can be also aggressive. It should be noted that the hypothesis about the relationship between extraversion and the dynamic type of set has not been proved. This result contradicts Norakidze's (1966) findings confirmed in a number of studies where dynamic type scored higher on extraversion compared to other types. However, Eysenck arrived at contrary results when examining this kind of relationship: in the individuals scoring high on hysteria (prototype of extraversion) extinction of fixated set takes a longer time compared to individuals who score high on dysthymia (prototype of introversion). Our results are better supported by the studies of the Canadian researcher

Hritzuk (Hritzuk, 1971), where the types of set did not show any difference on the extra-version – introversion dimension. In general, experiments on the fixation of set are very sensitive to any additional variables and even small differences in experimental procedure might entail different results. We should also keep in mind that the experiments conducted in different modalities also contribute to similar controversies.

Our study did not show any difference between the static and dynamic types by openness to experience. Although this personality trait had not been examined by Georgian school of the psychology of set, a similar construct, flexibility, turned out to be associated with the dynamic type, whereas rigidity was more characteristic of the static type (Norakidze, 1996). In our opinion, future research should be either conducted with different instruments or the scale measuring openness to experience in the Georgian version of NEO-FFI should be revised due to its low reliability (value of Cronbach alpha in our study - 0.5). As for the construct per se, it is worth examining the given construct in the context of typology of set because the inability to alter the set, fixedness on specific conditions and difficulty to perceive things adequately, imply the association with rigidity as a personality characteristic.

Conclusion

The results of our study are important for experimental psychology of set because of the statistical support of the findings obtained by the Georgian school of psychology, which augments their scientific value. In the experiment conducted with the use of special software, it is easier to control additional variables compared to the set experiments conducted in the visual modality, where exposition time, registration errors and other flaws caused by the experimenter had a serious effect on the fixation process. Modern researchers' interest in "Uznadze effect" (this is especially true for professionals working in the fields of medical psychology and psychophysiology) confirms the fact that similar studies are still important and need to be continued in the future.

Our opinion about the scientific value of the above study is substantiated by the existence of crisis in modern psychology (especially experimental psychology). It is believed that one of the reasons is difficulty with replication and the scarcity of like research. Due to this, direct and conceptual replication of studies have recently become especially important (Laws, 2016).

As for limitations, our study concerns only a small part of set typology. Numerous experiments on the excitability of set, its constancy and variability, stability and irradiation also require replication for verification of their statistical reliability. As noted by researchers who worked in this area of the psychology of set, it is important to look at the combination of variables in different modalities, since set is an integral state and cannot be studied by focusing on individual personality characteristics manifested in a separate modality (Uznadze, 2009).

Bibliography:

- Costa, P. T., & McCrae, R. (1992). *Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI)*. Odessa: Psychological Assessment Resources.
- Daneyko, O., Maravita, A., & Zavagno, D. (2020). See What You Feel: A Crossmodal Tool for Measuring Haptic Size Illusions. *I-Perception*, 11(4). doi:10.1177/2041669520944425
- Eysenck, H. (1955). Cortical inhibition, figural aftereffect, and theory of personality. *The Journal of Abnormal and Social Psychology*, 51(1), 94–106. doi:10.1037/h0043564
- George, D., & Mallery, P. (2003). *SPSS Windows step by step: A simple guide and reference 11.0 update (4th ed.)*. Boston: Allyn & Bacon.
- Ghatani, T. (1984). Generalization of Set Fixed toward a pair of Figures of Various Shapes. In I. Kawaguchi. (Ed.), *The size comparison from the standpoint of the psychology of Set* (pp. 23-26). Osaka: Osaka University.
- Hinton, P., McMurray, I., & Brownlow, C. (2014). *SPSS Explained (2nd ed.)*. London: Routledge. doi:10.4324/9781315797298
- Hritzuk, J. (1971). A comparative and experimental study of the psychology of set as related to personality. *Canadian Journal of Behavioral Science / Revue canadienne des sciences du comportement*, 3(2), 127–134. doi:10.1037/h0082254
- Janzen, H. (1972). An investigation of the integral nature of the Soviet concept of Set. *International Journal of Psychology*, 7(4), 207-218. doi:10.4324/9781315797298
- Kawaguchi, I. (1984). Problems on the figural after-effects from the standpoint of the theory of set. In I. Kawaguchi. (Ed.), *The size comparison from the standpoint of the psychology of set*. (pp. 6-8). Osaka: Osaka University.
- Lyakhovetskii, V., & Karpinskaia, V. (2017). The aftereffects of muler-lyer and ponzo illusions: differences revealed in sensorimotor domain. *Latvian academy of sciences*, 71(5), 352–358. doi:10.1515/prolas-2017-0060
- Magos, T. (2002). Correlation between platelet monoamine oxidase activity and the strength of a visual illusion. *Vision Research*, 42(16), 2031-2035.
- Pallant, J. (2016). *SPSS Survival Manual: A Step By Step Guide to Data Analysis Using SPSS Program*. London: McGraw-Hill Education.
- Ucceli, S., Pisu, V., Riggio, L., & Bruno, N. (2019). The Uznadze illusion reveals similar effects of relative size on perception and action. *Experimental Brain Research* 237, pages 953–965. doi:10.1007/s00221-019-05480-8
- Uccelli, S. (2021). *The role of temporal context in perception and action*. University of Parma: [Unpublished dissertation].
- Norakidze, V. (1963). Темперамент и последовательный оптический образ. [Temperament and successive optical image] Experimental studies in the psychology of set. *Volume 2*. A. Prangishvili & Z. Khojava (Eds.)
- Norakidze, V. (1966). *Типы характера и фиксированная установка*. [Character types and fixated set]. Tbilisi: Metsniereba.
- Norakidze, V. (1975). *Методы исследования характера личности* [Methods of studying personality character] Tbilisi: Metsniereba.

- Avalishvili, A. (1940). განწყობის ინტერმოდალური კონსტანტობის საკითხისთვის [Cross-modal constancy of set] D. Kipshidze (Ed.) Tbilisi State University Works. XVII. 1940.
- Bzhalava, I. (1958). შიზოფრენიის ფსიქოპათოლოგიისათვის [Abnormal psychology of schizophrenia] Tbilisi: Academy of Sciences of Georgia.
- Nadareishvili, V. (2020). ფიქსირებული და სიტუაციური დისპოზიციური ფსიქიკური წარმონაქმნების ურთიერთმიმართება. [Relationship between fixated and situational formations] Georgian Psychological Journal, 1, 129-144.
- Nadareishvili, V. (2022). დ. უზნაძის „ობიექტიფიკაციის“ ცნების ზოგიერთი ასპექტი. [Some aspects of D. Uznadze's concept of 'objectification'] Georgian Psychological Journal, 1, 61-73.
- Piaget, J., & Lambercier, M. (1944/2020). თანმიმდევრული ვიზუალური აღქმისას გამოვლენილი აინშტელუნგის ეფექტის ცდები (უზნაძის ეფექტი) [An effect of Einstellung arising in the course of successive visual perceptions - the Uznadze effect]. pp. 21-70. In Dimitri Uznadze's works and their interpretation. N. Javakhishvili (Ed.), Tbilisi: Ilia State University
- Robakidze, M. (2020). უზნაძის ეფექტის “კვლევა ჟ. პიაჟესა და თანამედროვე მეცნიერთა შრომებში. [Studying 'Uznadze effect' in the works of J. Piaget and modern scientists] pp. 71-8. In Dimitri Uznadze's works and their interpretation. N. Javakhishvili (Ed.), Tbilisi: Ilia State University
- Uznadze, D. (2009). განწყობის ფსიქოლოგიის ექსპერიმენტული საფუძვლები. [Experimental foundations of set psychology] Sh. Nadirashvili (Ed.) Tbilisi: Sakartvelos Matsne
- Kobuladze, T. (2017). ორგანიზაციული სამართლიანობა, სამუშაო სტრესი, მოდერაციული და მედიაციური ეფექტები. [Organizational justice, work stress, moderation and mediation effects] Doctoral thesis
- Javakhishvili, N., Skhirtladze, N., Butsashvili, N., Lortkipanidze, M., Makashvili, A., Vardanashvili, I., & Shekrladze, I. (2016). კვლევის ინსტრუმენტების ვალიდაცია. [Validation of research instruments] Works dedicated to Uznadze conference. Tbilisi: Ilia State University