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Russian Psychological Journal

Russian Psychological Journal is a peer-reviewed open access journal that publishes original research papers on all aspects of psychology.

It was founded by the Russian Psychological Society in 2004.

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The journal is intended not only for researches, scholars, students, and practitioners, but also for general readers with an interest in the state-of-the-art and most recent developments in psychology.

Russian Psychological Journal welcomes submissions from established researchers, young scholars, educators, and practitioners making significant contributions to thematic fields of the journal.

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The journal is a member of the following associations: ANRI, EASE, and CrossRef.

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GENERAL PSYCHOLOGY

Research Article

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Gender Factor in Recognizing the Emotional State of a Person by His Audio-video Images

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Annotation : **Introduction** . Gender differences in the perception of human emotional states are usually studied on the material of static images of the face, gestures or postures. The dynamics and multiplicity of manifestations of emotions remain behind the scenes. The proposed work is aimed at finding patterns of perception of the procedural characteristics of the expression of emotions. The influence of gender and age on the identification of emotional states in ecologically and socially valid situations is investigated. **Methodology** . It is based on the Russian version of the Geneva Emotion Recognition Test (Geneva emotion Recognition Test , GERT). The subjects, 48 women and 48 men, aged 20 to 62, were randomly presented with 83 audio-video clips recording fourteen key emotional states. Along with facial expressions, gestures, movements of the head and eyes, changes in the position of the body, the actors voiced pseudo-linguistic statements containing expressive intonations. An abbreviated version of the Geneva Wheel of Emotions was used as a tool for assessing emotional states. Each video clip was shown to the observer for 3–5 s. Gender differences in the responses in the accuracy of identification and the categorical structure of the tested expressions were determined. **Discussion** . Women, compared with men, more accurately recognize multimodal dynamic emotions, especially those expressed by women. Men are more sensitive to the nuances and semitones of the states they demonstrate. Sex and age differences in identification accuracy are statistically significant for five emotions: joy, amusement, irritation, anger, and surprise. On women's faces, joy, surprise, irritation and anger are more accurately recognized by women after 35 years. On male faces, surprise is less accurately recognized by men under 35; entertainment, irritation, anger - after 35 years. The dependence of the accuracy of recognition of multimodal dynamic expressions of emotions on the degree of arousal in male observers was not found, in women it is multidirectional, determined by the modality of emotion, the sex of the actor and the age of the observer.

Keywords: geneva emotion recognition test, human face, gender, age, gender differences, emotion modality, multimodal dynamic states, perception of expressions, emotion recognition, categorization

Highlights

- the gender factor does affect the recognition of multimodal dynamic expressions;
the influence of the gender factor is selective and depends on a specific combination of conditions: gender characteristics of the subject and object of perception, the age of observers, ways of expressing emotions, etc.;
- differences in the recognition of a "live" face by representatives of different sexes are manifested not only in the accuracy of observers' assessments, but also in the structure of categorical fields ; dependence of the accuracy of identification of multimodal emotional states on the degree of arousal is manifested only in the female sample and, depending on age, is multidirectional;
- gender factor in the perception of multimodal expressions of the state of people acts as a system of determinants that changes its characteristics depending on a specific communicative situation.

Funding: The study was supported by the Russian Science Foundation, project No. 18-18-00350-P "Perception in the structure of non-verbal communication."

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Introduction

Gender differences, or divergence of signs that characterize men and women in the expression and perception of the emotional state of people, are based on both biological and sociocultural reasons. The ideas of masculinity and femininity accepted in society, as well as the rules of upbringing, largely determine the form of expression of emotional states. Men more often suppress their emotions, women, on the contrary, show them more openly, actively use facial expressions, gestures, postures, and speech; women's emotions are longer and more intense than men's (Phillips, Slessor, 2011) . Women more accurately express experiences of joy, sadness, disgust, contempt and fear, and men - anger, surprise, contempt and joy. In general, women are slightly more accurate than men in both expressing and recognizing emotional states (Graham , Denson, Barnett, Calderwood, Grisham, 2018; Hall, 1978). The difference in the accuracy of expression recognition, confirmed by statistical criteria, is less common and depends on the modality, method and context of expressing emotions, individual characteristics of the participants in interpersonal interaction. Sexual dimorphism in the expression and recognition of emotions develops with age and interacts with sociocultural factors, ultimately determining emotional behavior (Brody and Hall , 2013). With increasing age, the accuracy of recognition of facial expressions decreases, with women recognizing emotions more accurately than men. The most noticeable decrease in the accuracy of identifications occurs after the age of 65 (Schlegel, Scherer, 2016), affecting the emotions of anger, sadness, and fear (Chaplin, Aldao, 2013; Fischer, Manstead, 2000).

Most of the experimental studies of the topic under discussion were carried out on the basis of assessments of photographic images of facial expressions, gestures or poses of sitters. To date, a more complete analysis of the gender characteristics of interpersonal perception is required, taking into account the multidimensionality and dynamics of the expression of a person's emotional

states in the real process of communication. The focus is on a "live" person, included in a specific communicative situation. In contrast to the factors that determine the unimodal expressions of "frozen" images, changes in facial expressions, eye movements and contact, articulation, head shaking, gestures, voice intonations, becoming a complex independent whole, become important. The expression of emotions is described in terms of action - human activity, which constitutes the interpersonal situation and regulates the flow of subject-subject interactions. This implies a significant expansion of the information base of the perceptual process, the use of appropriate strategies and mechanisms for categorizing emotional states (Drums, Korolkova, 2020; Drums, Korolkova, Lobodinskaya, 2018; Drums, Marinova, 2021; Drums, Marinova, Abramov, 2021). New ways of studying the patterns of cognition, experience and communication are opening up.

This article is devoted to the role of the gender factor in recognizing the emotional states of people in ecologically and socially valid conditions. The experimental study is based on the GERT method (Geneva emotion Recognition Test), which has proven itself well in a number of foreign studies (Dael, Mortillaro, Scherer, 2012; Schlegel, Grandjean, Scherer, 2012, 2014; Schlegel , Scherer, 2017, 2018) and tested on a Russian sample (Darabanshchikov, Suvorova, 2020a ,b). This is one of the few techniques that allows you to effectively study and diagnose the specifics of the perception of multimodal dynamic expressions that quite fully reproduce the expressions of human emotions in everyday life. The specific goal of the study is to, based on the GERT methodology , study the ways and conditions of the influence of the gender factor on the recognition of a person's emotional state by his audio and video images.

We have tried to answer a number of questions. Are there gender differences in recognition accuracy and categorical fields of multimodal dynamic expressions? If they do, how? To what extent do assessments of multimodal emotional states depend on the sex of the sitters and the age of the observers? Can gender be seen as a precondition for better performance in emotion identification tasks in ecologically and socially valid situations?

Method

GERT is based on the “Geneva Wheel of Emotions”, a conceptual construct that connects a set of 14 key categories of emotions into a circle, ordered by valence and degree of excitation (activation) (Russell, 1983; Scherer, 2005; Schlegel, Grandjean, Scherer, 2014). The visualized structure of the construct is shown in Figure 1. It includes 4 affective associations and three separate emotions.

Pride, entertainment, joy, pleasure and relief form a group of states with positive valence (group A); it includes various forms of manifestation of human achievements, which are often observed in social situations. In affective groups of states with negative valence B, C and D, the same type of emotions are divided according to the degree of excitation. Affective group B includes anxiety and fear; group C - sadness and grief; group D - irritation and anger. Disgust, as well as ambivalent interest and surprise, are considered as independent states.

The experiment used the Russian version of GERT (Barabanshchikov, Suvorova, 2020a,b), which retained the original stimulus material, the procedure for evaluating audio-video images, and the set of requirements (Bänziger, Mortillaro, Scherer, 2012). The study was conducted in a remote form on the LimeSurvey electronic platform, where a technical copy of the experiment was created using the Russian version.

83 audio-video clips of emotional states posed by 10 professional specially trained actors (5 men and 5 women) were used as stimulus material. The average age of sitters is 37 years. Along

with facial expressions, gestures, movements of the head and eyes, changes in body position, the actors voiced pseudo -linguistic statements containing expressive intonations. Examples of stimulus material made in a discrete form are shown in Fig. 2. The angular size of the video image is 18×24°, the sitter's face is 8×10°.

Figure 1. "Geneva wheel of emotions": Russian version (Barabanshchikov, Suvorova, 2020b)

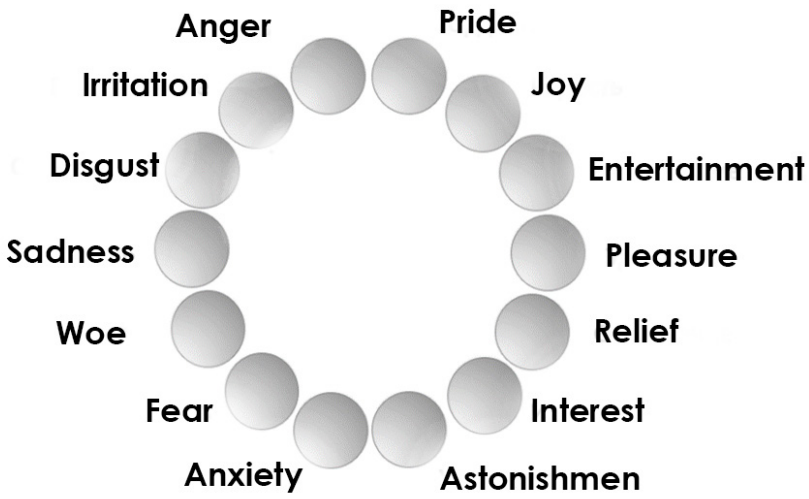
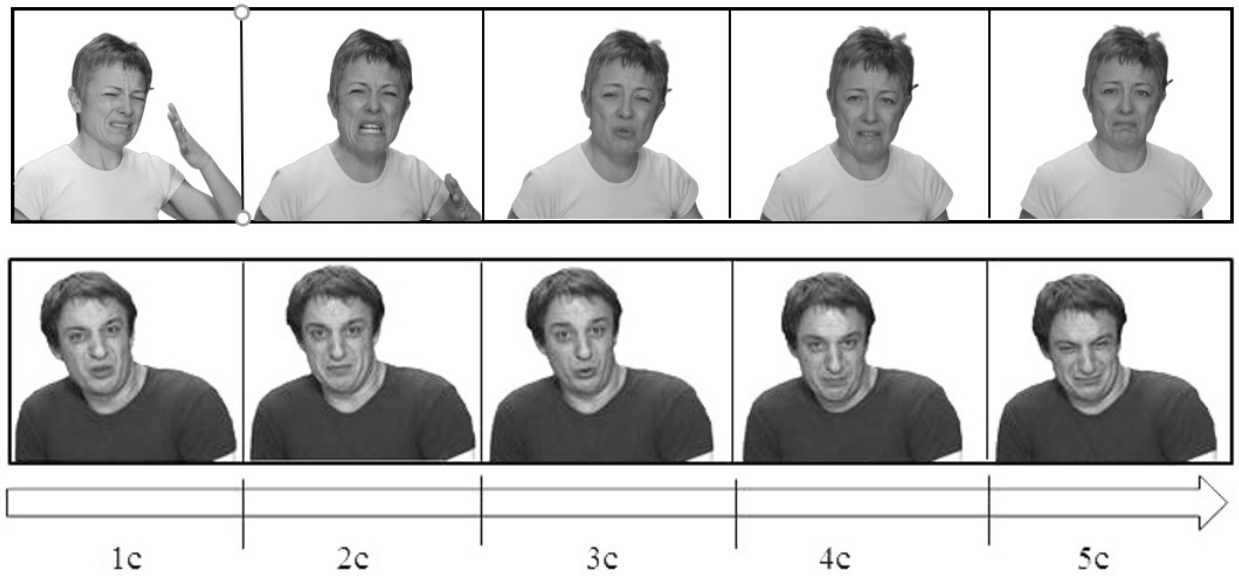


Figure 2. A video storyboard of an expression of disgust presented by an actress and an actor. The interval between frames is about 1s.



Participants were emailed instructions for completing the study, equipment requirements (earphones and a 1920x1080px display located 60 cm away from the subject's face) and URL links providing access to the experiment.

At the first stage of the study, the participants got acquainted with the instructions, which included recommendations, technical features of the experiment and the definition of the tested emotional states. After completing the training tasks (3 audio-video images), the participant had the opportunity to return to the instructions again.

At the second stage, the subjects were sequentially, in random order, presented with 83 audio-video images of emotional expressions. Each exposure was shown once for 3–5 s without the possibility of repetition. As a tool for assessing multimodal expressions, interactive conditional images of 14 emotions were used, presented on the display in a circle in the order specified by the chosen method. The "Wheel of Emotions" was presented after the exposure of each expression, with the technical possibility of choosing only one of the affective categories. After selecting a category and touching the corresponding circle on the screen, the transition to the next exposure was carried out automatically. The study program was completed by displaying on the screen the average result of recognition accuracy obtained by the participant.

The averaged indicators of recognition of multimodal expressions were analyzed for all audio-video images, the data were compared, divided into groups depending on the gender of the actor and the observer, taking into account the age of the latter. An analysis of the structure of the categorical field of dynamic expressions was based on averaged relevant and irrelevant estimates of the expressions of each category with a recognition threshold above random (> 0.05). For the purposes of statistical analysis, a statistical software package, SPSS 22.0, was used. The following statistical criteria were used : Mann-Whitney U-test and Wilcoxon Z-test with a significance level of $p < 0.05$, as well as the concordance coefficient (Kendell's rank correlation) and Spearman's correlation coefficient with a significance level of $p<0.01$.

The sample consisted of undergraduate and graduate students from Russian universities who had previously taken part in a larger study (Darabanshchikov, Suvorova, 2020b) aged 20 to 62 years (M = 34 years, SD - 9.4 years), 48 women, 48 men.

Results and discussion

To correctly address the issue of the role of the gender factor in the recognition of multimodal expressions, we formed a sample of observers balanced by gender and age (sample II) . Its representativeness was confirmed by the correspondence of the selected answers to the estimates of a wider, but not balanced sample of subjects who participated in the testing of the Russian version of GERT (sample I) . There are no statistically significant differences according to the Mann-Whitney test, concordance coefficients The Kendell (0.87) and Spearman (0.96) correlations highlight the high level of data consistency (Figure 3).

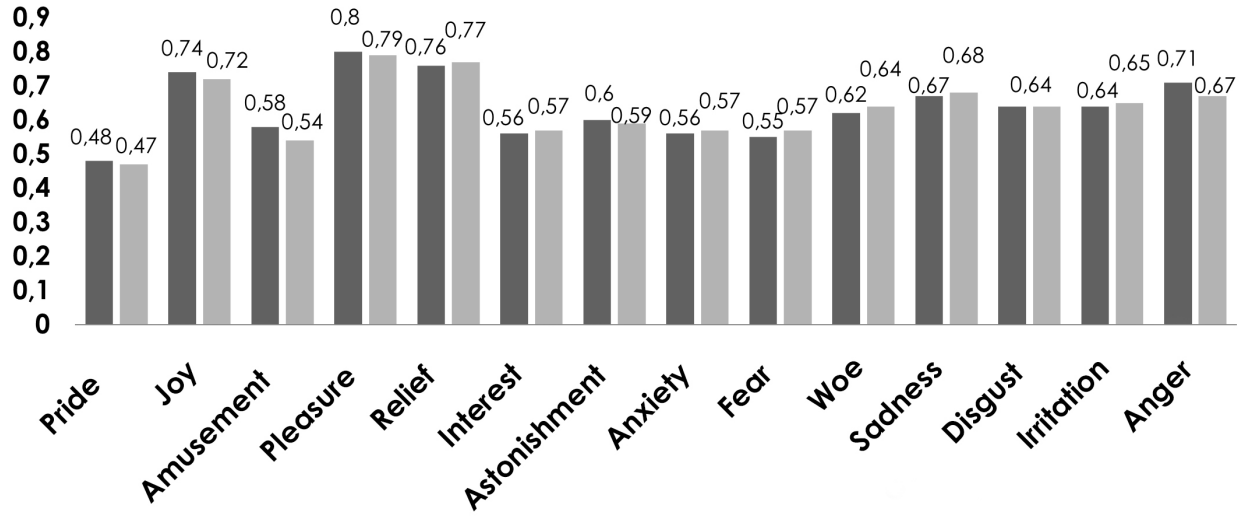


Figure 3 . Recognition Accuracy of Multimodal Dynamic Expressions Without Sex Differentiation

■- *sample I;* ■- *sample II*

It follows that the new sample reproduces the main patterns of perception described by us earlier: (a) functional autonomy of multimodal expressions, (b) differentiation of emotions of affective group A depending on semantic relations and level organization, (c) the absence of a stable linear dependence of recognition accuracy emotions of affective groups B, C, D on the degree of excitation (errausela), (d) the presence of a complex multidimensional structure of categorical fields, (e) the sources of additional components of perceived emotions are intragroup modalities or affective categories of emotions that are close to them in terms of the degree of excitation (Drummers, Suvorova, 2020a,b) .

Summary data of statistically significant gender differences in the accuracy of identification of multimodal emotional states are presented in Table 1. Its analysis allows us to make a number of general statements. First, the gender factor does influence the recognition of multimodal dynamic expressions. Secondly, this influence is selective local in nature and depends on a specific combination of conditions: gender characteristics of the subject and object of perception, the age of observers, ways of expressing emotions, etc. Thirdly, the magnitude of the detected differences varies in a wide range of values, reaching 30–40 % of the median accuracy of emotion recognition. All this suggests that it is far from always possible to ignore the role of the gender factor in experimental or diagnostic work with environmentally valid manifestations of emotions.

With a combined exposure of the states of sitters - both men and women - more accurate answers are given by female observers. The average accuracy of identifications made by women is 0.66, by men – 0.61. Statistically significant gender differences were obtained on the expressions of *entertainment* , *surprise* and *irritation* . Both groups of observers most accurately recognize the emotions of pleasure, relief and joy, the least accurately - pride.

When exposing expressions expressed by male actors, the pattern of responses is largely

preserved. Gender differences are reproduced in ratings *of amusement, surprise, and annoyance*. The average accuracy of identifications made by women is 0.65, by men – 0.59. Deeper changes occur during the exposure of expressions expressed by women. The structure of significant gender differences is radically changing: *pride* takes the place of amusement, surprise and irritation. The general drop in the accuracy of identification in men is accompanied by a trend towards an increase in adequate responses in female observers. The average frequency of accuracy of identifications expressed by women is 0.7, by men - 0.6.

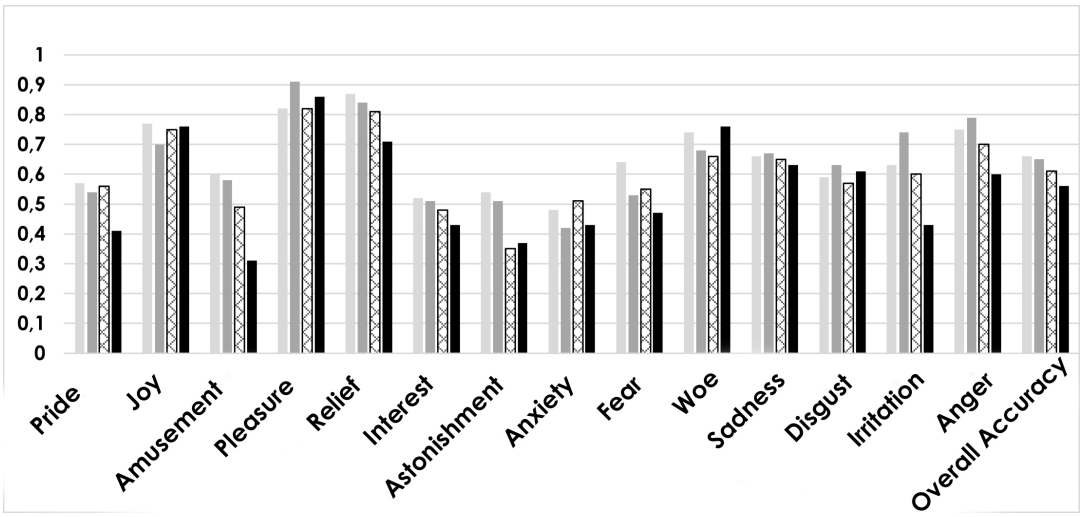
Table 1

Gender and Age Differences in the Perception of Multimodal Dynamic Expressions

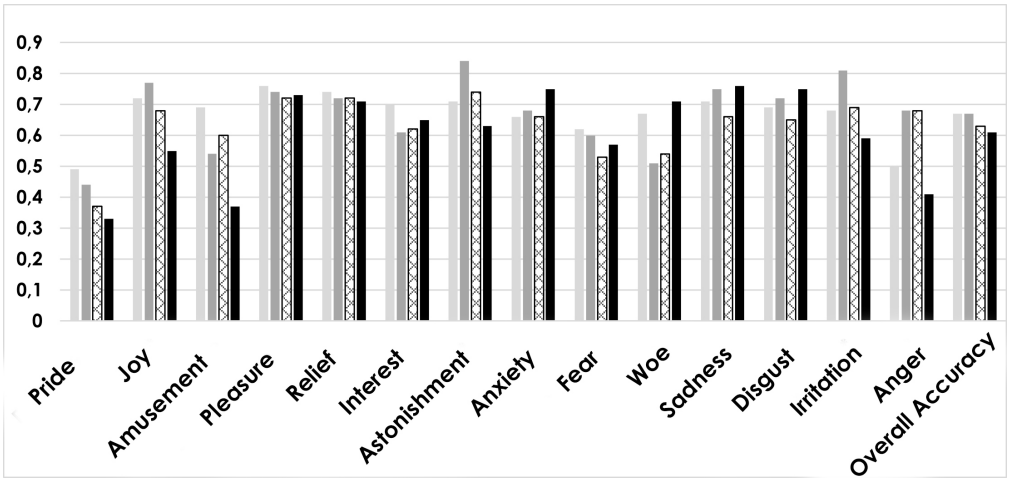
<table>
<tr><th colspan="4">Identification accuracy</th></tr>
<tr><td colspan="4">Women better recognize emotions of entertainment (m - 0.48; w - 0.61; U=870, p<0.05), surprise (m - 0.53; w - 0.65; U=781, p<0 .05) and irritation (m - 0.6; w - 0.7; U=888.5, p<0.05)</td></tr>
<tr><th colspan="2">Gender differences in the recognition of male expressions</th><th colspan="2">Gender differences in the recognition of female expressions</th></tr>
<tr><td colspan="2">obtained for the emotions of entertainment (m - 0.43; w - 0.59; U=865.5, p<0.05), surprise (m - 0.36; w - 0.53; U=784, p< 0.05) and irritation (m - 0.54; w - 0.67; U=878, p<0.05)</td><td colspan="2">obtained only for the emotion of pride (m - 0.43; w - 0.52; U=888, p<0.05)</td></tr>
<tr><th colspan="2">Gender differences in the recognition of male expressions, taking into account the age of the observers</th><th colspan="2">Gender differences in the recognition of female expressions, taking into account the age of the observers</th></tr>
<tr><td>Women Men
up to 35</td><td>Women Men
after 35</td><td>Women Men
up to 35</td><td>Women Men
after 35</td></tr>
<tr><td>men are worse at recognizing the emotion of surprise before the age of 35 (m - 0.35; w - 0.54; U=279.5, p<0.05)</td><td>men are worse at recognizing the emotions of entertainment (m - 0.31; w - 0.58; U=92, p<0.05), irritation (m - 0.43; w - 0.74; U=69.5, p <0.05) and anger (m - 0.60; w - 0.79; U=96.5, p<0.05) after 35 years</td><td>No</td><td>women over 35 better recognize emotions of joy (m - 0.55; w - 0.77; U=98, p<0.05), surprise (m - 0.63; w - 0.84; U=101, 5, p<0.05), irritation (m - 0.59; w - 0.81; U=96, p<0.05) and anger (m - 0.41; w - 0.68; U= 102.5, p<0.05).</td></tr>
</table>

Comparing significant differences in recognition accuracy in three situations: a) the exposure of emotions expressed by a combined group of actors (male + female), b) the exposure of emotions expressed only by male actors, and c) the exposure of emotions represented only by actresses, it is not difficult to come to the conclusion about the importance of gender stylistics of posing emotional multimodal dynamic states and its influence on their identification. The male manner of expressing emotions (exposure of entertainment, surprise and irritation) turns out to be more catchy, deeper, but more adequately read by women.

Figure 4 . Median assessments of the accuracy of recognition of multimodal dynamic expressions expressed by men (a) and women (b) depending on the sex and age of the observers



a



b

"*" - *statistically significant differences;* - *responses of female observers under 35;* - *responses of male observers under 35;* - *responses of female observers after 35 years;* - *responses of male observers after 35 years*

When demonstrating a specifically female manner of expressing the state (an exposition of pride), the advantage in the accuracy of identification also remains with the participants in the experiment. At the same time, in 79% of the expositions presented by the actors, and in 92% of the expositions presented by the actresses, gender stylistics does not appear. The ways of multimodal dynamic expression of the emotional state by men and women are more similar than different.

Estimates of multimodal dynamic expressions depend not only on gender, but also on the age of the observer. When exposed to male faces, male observers under 35 are significantly worse than women in recognizing emotions of surprise (m - 0.35; w - 0.54; U = 279.5, $p < 0.05$), and after 35 - entertainment (m - 0.31; w - 0.58; U = 92, $p < 0.05$), irritations (m - 0.43; w - 0.74; U = 69.5, $p < 0.05$) and anger (m - 0.60; w - 0.79; U = 96.5, $p < 0.05$). When exposed to female faces, there are no statistically significant differences in the responses of both gender groups under 35 years of age, and after 35 years of age, men recognize emotions of joy less accurately (m - 0.55; w - 0.77; U = 98, $p < 0.05$) , surprise (m - 0.63; w - 0.84; U = 101.5, $p < 0.05$), irritation (m - 0.59; w - 0.81; U = 96, $p < 0, 05$) and anger (m - 0.41; w - 0.68; U = 102.5, $p < 0.05$). Compared with male observers under 35 years old, men over 35 years old are significantly worse at identifying only the emotions of entertainment (U = 164, $p < 0.05$) and anger (U = 169.5, $p < 0.05$) expressed by women (Fig.4). Age-related decrease in the accuracy of perception of female observers is not registered. The presented results may indicate that the lag in the accuracy of male assessments begins earlier than 35 years and is selective. There is a gender asymmetry in the perception of multimodal emotional states along the line of ontogenesis.

Similar results were partially manifested when using the GERT technique on a Swiss sample in subjects from 17 to 74 years old (M = 37.1; SD = 13.9) (Schlegel , Scherer , 2016). Correlation analysis confirmed the relationship between a decrease in the overall accuracy of recognition of multimodal dynamic expressions with an increase in the age of observers ($r = -0.46$, $p < 0.01$) and a slight advantage of women in adequate assessments ($r = 0.13$, $p < 0.05$). Women compared with men had higher accuracy in identifying grief ($r = 0.2$, $p < 0.01$), pride ($r = 0.13$, $p < 0.05$) and fear ($r = 0.16$, $p < 0.01$).

A decrease in the overall indicator of recognition accuracy with increasing age was found with the exposure of three emotions of the group of positive states (entertainment, joy, pride), surprise, and all negative emotions except for grief and sadness (group C). In the Russian sample, the advantage of women in recognition accuracy is slightly higher ($r = 0.24$, $p < 0.01$). They are slightly better at recognizing the emotions of entertainment ($r = 0.21$, $p < 0.05$), surprise ($r = 0.29$, $p < 0.01$) and irritation ($r = 0.2$, $p < 0.05$). With increasing age, in contrast to the Swiss sample, only the emotion of entertainment is identified worse ($r = -0.25$, $p < 0.05$).

As expected , in the Russian sample, age differences in perception were weak; likely due to the lack of participants over 62 years of age. In contrast to the Swiss sample, for which significant differences in the drop in the accuracy of estimates were obtained for 9 emotions out of 14 (64%), in the Russian sample only 7% of tested emotions are recognized worse with increasing age. The latter is consistent with the results of a study performed using a short version of GERT on subjects under 65 years of age: no decrease in identification accuracy with an increase in the age of observers was registered at all (Schlegel , Scherer , 2016).

Gender and age differences in the assessments of the dynamic states of both men and women in affective groups B, C, D appear only in female observers. Up to 35 years of age, when exposing male sitters, there is a direct dependence of the accuracy of assessments on the intensity of

excitation: anxiety → fear, while exposing a female face - an inverse relationship: anger → irritation. After 35 years, an inverse dependence of identification accuracy was registered: grief → sadness. Differences in the assessments of paired expressions by men were not found. Another argument of the selective influence of sex and age on the perception of the functional state of a "living" person has been obtained. In this context, the gender factor is able to control the perceived relationship between modalities within affective groups with negative valence.

Emotional expressions of the face, as a rule, belong to several categories by observers; a categorical field is formed, including the core - the main most pronounced emotion and the periphery - additional emotions. The generalized structures of the categorical fields of multimodal dynamic expressions of disgust and irritation of observers of different sexes are shown in Figure 5. Histograms show the composition of categories and the values of the frequency of their perception. Values are indicated that exceed the level of random guessing - 0.05. On each of the histograms there is a core corresponding to the displayed emotion, and a periphery - one or more additions.

Comparison of the structure of categorical fields of various emotions shows that for the vast majority of expressions, high values of relative identification accuracy were obtained. The average level of correct answers of observers of both sexes exceeds the level of incorrect ones by 6 or more times. This contrasts with the high individual and gender variability in the way actors position their emotional states. Figure 2 shows a frame-by-frame scan of a multimodal expression of disgust, played differently by an actress and an actor. Despite the obvious differences in the content of each frame and in the sequence of their deployment, the accuracy of disgust identification is equally effective. The plurality of equivalent ways (methods, styles) of the realization of the same affective state is demonstrated, as well as the uncertainty of its static images in relation to multimodal dynamics as a whole.

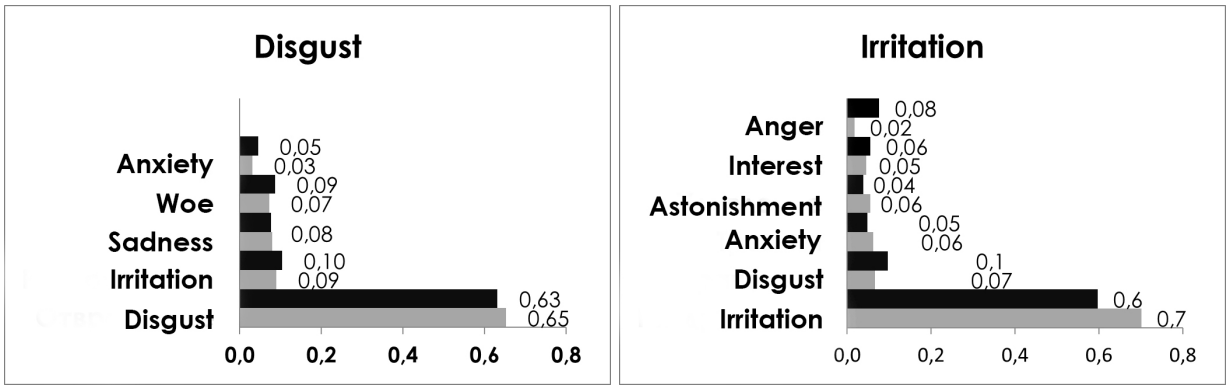


Figure 5 . The structure of categorical fields of multimodal dynamic expressions of disgust and irritation. Above are the categories of exhibited emotions, on the side are the responses of observers.

- women; - men

An analysis of the categorical fields of emotional states shows that differences in the recognition of the emotions of a "live" face by representatives of different sexes are manifested not

only in the accuracy of observers' assessments. The composition and structure of perception of additional components of expressions and their variability change. The largest total number of additional emotions was recorded in men's assessments of the affective states of male actors. The greatest difference in the number of additional emotions for male and female observers was noted in group A when evaluating a female face, as well as in the group of ambivalent emotions expressed by actors of both sexes. Men's assessments of ambivalent emotions are distinguished from women's by the presence of additional emotions of negative valence. The most variable additional components in male assessments of a male face are the dynamic states of irritation, disgust, fear, and pride; female face - pride and interest. According to experimental data, male perception, in contrast to female, has a somewhat greater expressive saturation, behind which there is a lowering of sensitivity thresholds to nuances or semitones of expressed emotion. In functional terms, such an ability can contribute not so much to the accuracy of assessments as to the speed of transition from one emotion to another, possibly accelerating the process of recognition.

The performed studies allow us to draw the following **conclusions** .

1. Gender differences in assessments of multimodal dynamic expressions are narrowly selective and depend on a combination of perceptual conditions. Women are more accurate than men in identifying emotional states and most effectively recognize emotions expressed by other women. The male manner of expressing emotions in a number of modalities is more attractive, but is more adequately read by women. Men's perception, in contrast to women's, has a greater affective saturation, sensitivity to the nuances and semitones of the expressed emotion. The described trends do not reach statistical significance in favor of one of the genders.
2. Statistically significant gender and age differences were registered during the perception of five emotions out of fourteen: joy, entertainment, irritation, anger and surprise, and the manifestations of these differences depend on a combination of controlled conditions. On female faces, female observers after 35 years of age are significantly better at recognizing joy, surprise, irritation, and anger. On male faces, men under 35 are worse at recognizing surprise, after 35 - entertainment, irritation, anger.
3. The dependence of the accuracy of recognition of dynamic emotions on the degree of their excitation in male observers was not found, in women it has a multidirectional character, determined by the modality of emotion, the sex of the actor and the age of the observer. In observers under 35 years of age, a significant decrease in the accuracy of recognition of emotions in group D (irritation-anger) was obtained on female faces with an increase in arousal; in observers over 35 years old, the same pattern is reproduced when emotions of group C (sadness-grief) are exposed. On the male faces of group B (anxiety-fear), an increase in arousal causes an increase in the accuracy of identification.
4. Gender differences cover not only the accuracy of recognition of a "live" face, but also the structure of the categorical fields of emotional states in general. The most variable additional components of male assessments of the male face are the multimodal states of irritation, disgust, fear and pride, the female face - pride and interest. Unlike women's, men's assessments of ambivalent emotions are characterized by the presence of additional emotions of negative valence.
5. The patterns revealed in the study make it possible to consider the gender factor in the

perception of multimodal dynamic expressions of the state of people as a system of determinants that changes its characteristics depending on a particular communicative situation.

6. The results obtained correspond to the most general trends in the manifestation of gender differences in studies of the perception of static images of emotional expressions, as well as people's behavior in real life situations.
7. The presented work clarifies the methodological and diagnostic capabilities of the Russian-language version of GERT, in particular, marks the areas of data correction depending on gender differences.

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Psychological Predictors of Constructive and Destructive Forms of Youth Digital Behavior

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Abstract: Introduction. In the context of the growing digitalization of society, the study of the psychological determinants of Internet activity and related to it psychological phenomena, including various forms of digital behavior, is of particular relevance. However, little research has been conducted to identify psychological predictors of constructive and destructive forms of digital behavior, in particular, we consider it interesting to study the parameters of aggressiveness, hostility and features of the cognitive sphere. **Methods**. The study involved 107 people (70% female) aged 18 to 25 years. In order to identify the level of aggressiveness and hostility, the Buss-Durkee Hostility Inventory was used; to measure individual differences in cognitive sphere in terms of the field dependence-independence parameter we used the test of embedded figures (Gottschaldt figures test); to clarify the individual characteristics of thinking we used the method of measuring the style of thinking. In order to study the features of digital behavior, the questioner "Strategies of informational behavior" (SIP) was used. Statistical analysis included: Shapiro-Wilk test, k-means clustering, Student's t-test, non-parametric Mann-Whitney test, standardized mean differences (Cohen's d) and point-biserial correlation coefficient. **Results**. Users demonstrating active constructive and destructive forms of digital behavior have significantly higher rates in all indicators of aggressiveness and hostility and demonstrate more pronounced field independence. These forms, both constructive and destructive, are united by the subject's activity. However, the focus of this activity and the intensity of individual digital behavior strategies differ. **Discussion**. The obtained results show that the higher levels of subject's online activity is connected to the field independence, aggressiveness, hostility. These results also indicate the need to continue studying the issue of cognitive mechanisms of behavioral regulation of digital behavior.

Keywords: digital behavior, cognitive style, personality, aggressiveness, field dependence, digital behavior strategies, Internet, destructive behavior

Highlights

- cognitive characteristics and levels of aggressiveness and hostility are proposed to be considered as psychological predictors of the formation of various digital behavior.
- strategies of informational behavior are manifested in the individual behavior in various combinations, which can be combined into constructive and destructive forms of digital behavior.
- dominant strategies include using the Internet to find information, to view user-generated content, to consume influencer or celebrity content.
- users with higher levels of field independence, aggressiveness and hostility prefer active forms of digital behavior.

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Introduction

The concept of "informational behavior" (digital behavior), which combines the ways of interacting with information and informational technologies in general, and Internet activity in particular, is relatively new for psychology. Informational behavior is often associated with the terms "Information culture", "Internet use", "Problematic Internet use", "cyber behavior"; "media behavior" is also encountered in more recent works (Zhizhina, 2019; Kassambara & Mundt, 2020; Alt & Boniel-Nissim, 2018; Weinstein et al., 2015). In modern literature, there is no clear term for this phenomenon, which would describe the entire range of its use. At the same time, most authors agree that this is a specific human activity, implemented with the participation of information technology tools, aimed at obtaining and assimilating, using and / or creating new information and its dissemination in society (Abakumova et al., 2020; Voiskunsky, 2017; Novikov, 2015; Dresher & Atlanova, 2005).

It has been shown that patterns and preferred strategies of human behavior online and offline can differ significantly (Ioannidis et al., 2018). The specificity of the Internet space as a social environment lies in the change in the structure of user interaction, which manifests itself in the blurring of boundaries, social norms and forms of responsibility, the plurality and accessibility of social groups, activities, and greater freedom of expression. In this regard, there is reason to believe that digital behavior reflects the personal characteristics of users to a greater extent and is more determined by them than real offline behavior (Panshina, Sungurova & Karabuschenko, 2021).

In the works of modern scientists, attempts are being made to classify Internet activity on various grounds. Thus, numerous classifications of users have been proposed based on motives, predominant types of activity, orientation towards consumption (creation) or production (creation) of content (Panshina, Sungurova & Karabuschenko, 2021; Zhizhina, 2019). Classifications of users of information systems are being developed, incl. social networks and the Internet in general (Kuznetsova & Chudova, 2011; Frindte & Köhler, 2000). Various levels of information perception (neurocognitive, psychological, and value-semantic) and the main effects of influencing them are actively studied (Ermakov, Abakumova & Steinbukh, 2018). Among the psychological phenomena associated with Internet activity, such personality traits as openness, neuroticism, rigidity, sensitivity,

the level of social skills of the subject, the value-semantic sphere, general and emotional intelligence, etc. are more often considered emotional intelligence, etc. (Molchanov & Almazova , 2018; Lysak & Belov, 2013; Belova, Valueva, Ovsyannikova, & Sysoeva, 2012; Peris, de la Barrera, Schoeps & Montoya-Castilla, 2020). When studying destructive forms of online behavior, including Internet addiction and problematic Internet use, researchers also pay attention to the characteristics of self-attitude, the level of aggressiveness, indicators of emotional-volitional regulation, emotional lability (Casale, Lecchi, & Fioravanti, 2015; Chen et al., 2015; Weinstein et al., 2015).

Given the relative novelty of the phenomenon and the methodological complexity of studying the psychological predictors of online activity, there is currently no systematic understanding of the mechanisms for the formation of certain digital behavior strategies. Psychological predictors of constructive and destructive forms of behavior remain insufficiently studied, in particular, the parameters of aggressiveness and hostility and features of the cognitive sphere are of interest. The listed characteristics have mostly been studied either in isolation from each other or exclusively in the context of problematic Internet use (Glazyrina, 2021; Hinić, 2011). However, it is the cognitive organization of the subject, as it seems to us, that largely determines his ways of interacting with information, and a personal predisposition to aggressiveness or hostility can not only largely determine the manifestation of these trends in the online space, but also have a special nature of interaction with the cognitive sphere.

Methods

The study involved 107 people (34 boys, 73 girls) aged 18 to 25 years (Southern Federal District and the Republic of Kalmykia, RF). The survey of respondents was conducted from February 13, 2020 to March 20, 2020 in person, in the format of a blank test. All respondents agreed to participate in the study, were informed about its objectives and notified of further use and publication of the results.

In order to study the psychological characteristics of the respondents, psychological testing was carried out using the following methods: to identify the level of aggression, its behavioral and emotional aspects, the Bass-Darky aggressiveness level questionnaire (Khvan, Zaitseva, & Kuznetsova, 2008); to study individual differences in cognitive activity in terms of the field dependence-field independence parameter - a test of included figures (the Gottschaldt Figures method, (Witkin, 1950); to clarify individual thinking characteristics - a method for measuring the style of thinking "(Belousova, Pishchik, & Molokhina, 2005) In order to study the features of digital behavior, the methodology “Information Behavior Strategies” was used (Abakumova et al., 2020).

Statistical processing of the obtained results was carried out using the “R” statistical data processing system (R Core Team, 2020) with the cluster cluster analysis package (Maechler et al., 2020), the factoextra data visualization package (Kassambara & Mundt, 2017) and the freely distributed JASP Computer software package (Version 0.16, 2021). Statistical methods for processing the obtained results included the Shapiro-Wilk test, k-means cluster analysis, Student's t-test, non-parametric Mann-Whitney test, standardized mean difference (Cohen's d) and point-biserial correlation coefficient.

Results

In order to group the subjects according to the most characteristic combinations of cognitive and personal characteristics and further identify differences between them in terms of constructive

and destructive forms of digital behavior, reflected in the three components (RC1 - RC3) identified by us in our previous work (Abakumova, Ermakov, Denisova & Kupriyanov, 2021), the k-means cluster analysis method was applied, the result of which is shown in the graphs (Fig. 1 and Fig. 2) and in the table (Table 1). All data used to cluster the sample were previously converted to a z-scale in order to standardize the values. The number of clusters was chosen based on the results of preliminary calculations. This number of clusters best discriminates the sample according to the indicators under study, while maintaining the uniformity of the distribution of respondents by age and gender within the clusters. The first cluster included 63 people (33 girls, 30 boys; mean age 20.8 years), the second - 44 (24 girls, 20 boys; mean age 21.1 years).

Figure 1

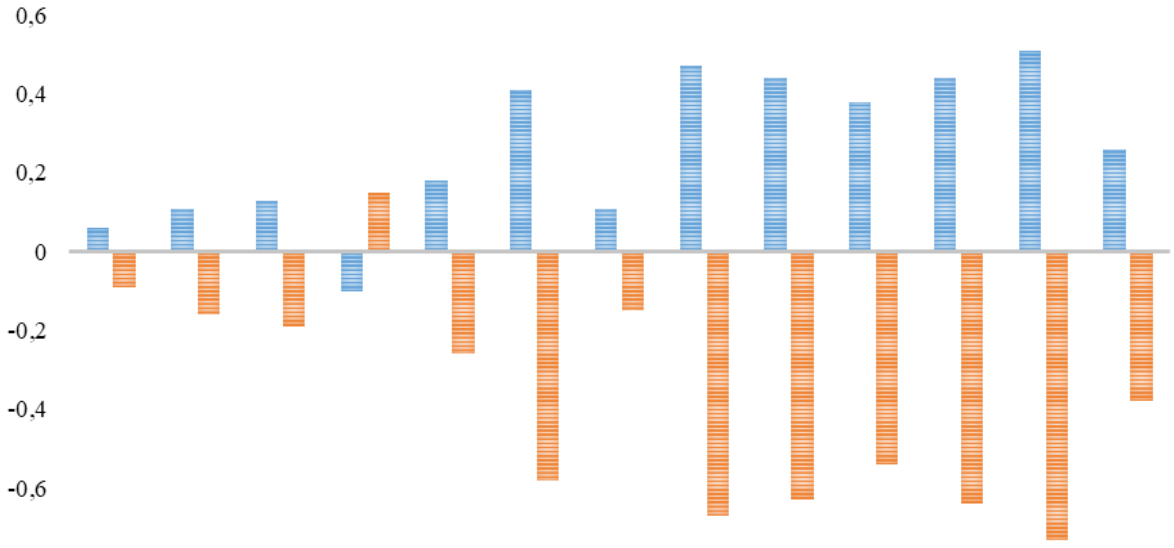
Distribution of observations across clusters

Note: 1 - respondents included in cluster 1 (indicated in red); 2 - respondents included in cluster 2 (marked in blue).

It is shown that the average values obtained for the studied indicators differ significantly in the selected clusters (Fig. 2). Thus, the respondents included in cluster 1 have higher rates in all indicators of aggressiveness and hostility, in initiative, critical and managerial thinking styles and demonstrate more pronounced field independence. Representatives of the second cluster are less prone to manifestations of aggressiveness and hostility, have higher scores in the practical style of thinking, and demonstrate more pronounced field dependence.

Figuire 2

Average values of clusters for the studied indicators



	Initiative thinking	Critical thinking	Administrative thinking	Practical thinking	Field-dependence	Physical aggression	Verbal aggression	Indirect aggression	Negativism	Irritability	Suspiciousness	Resentment	Autoaggression
cluster 1 (means)	0,06	0,11	0,13	-0,1	0,18	0,41	0,11	0,47	0,44	0,38	0,44	0,51	0,26
cluster 2 (means)	-0,09	-0,16	-0,19	0,15	-0,26	-0,58	-0,15	-0,67	-0,63	-0,54	-0,64	-0,73	-0,38

Analysis of variance (ANOVA) values indicate that not all variables contribute equally to sample clustering (Table 1). The most significant were the severity of field dependence and indicators of aggressiveness and hostility (with the exception of verbal aggression).

Table 1

Results of analysis of differences between clusters (ANOVA)

	SS	MS	F	p
Initiative thinking	0,554	0,554	0,552	0,459
Critical thinking	1,921	1,921	1,938	0,167
Administrative thinking	2,702	2,702	2,746	0,100
Practical thinking	1,658	1,658	1,669	0,199
Field-dependence	5,113	5,113	5,321	0,023
Physical aggression	25,55	25,55	33,347	0,000

Verbal aggression	1,713	1,713	1,724	0,192
Indirect aggression	34,039	34,039	49,667	0,000
Negativism	29,353	29,353	40,212	0,000
Irritability	21,823	21,823	27,221	0,000
Suspiciousness	30,274	30,274	41,978	0,000
Resentment	39,358	39,358	62,012	0,000
Autoaggression	10,549	10,549	11,605	0,001

Note: SS - parameter "sum of squares", shows the sum of squared deviations of the average values of clusters from the total average; MS - parameter "mean square", an indicator of intergroup dispersion, which is equal to the result of dividing the sum of squares by the number of degrees of freedom; since the number of degrees of freedom is equal to the number of compared clusters minus 1, in this case SS=MS; F - Fisher's F-test values - is an indicator of how well the corresponding measurement discriminates clusters; p is the significance level.

As a result of the analysis of the severity of the constructive and destructive forms of digital behavior identified by us, a comparative analysis was carried out (Table 2). Due to the fact that the distribution in the selected groups (clusters) in some cases differed from normal, the significance of differences was assessed simultaneously by the Student's t-test and the nonparametric Mann-Whitney test. In addition, effect sizes were studied using standardized group differences (Cohen's d) and r point-biserial correlation coefficient.

Table 2

The results of the analysis of the reliability of differences in the severity of constructive and destructive forms of digital behavior between clusters

Test of Normality (Shapiro-Wilk)			Components	Statistical test	Results	p-value	effect size
group	W	p					
Cluster 1	0.987	0.727	RC1	Student (T-test)	1.70	0.092	0.334
Cluster 2	0.961	0.147		Mann-Whitney	1694.00	0.052	0.222
Cluster 1	0.886	< .001	RC2	Student (T-test)	0.391	0.697	0.077
Cluster 2	0.912	0.003		Mann-Whitney	1421.00	0.827	0.025

Test of Normality (Shapiro-Wilk)			Components	Statistical test	Results	p-value	effect size
group	W	p					
Cluster 1	0.942	0.005	RC3	Student (T-test)	2.412	0.018	0.474
Cluster 2	0.975	0.444		Mann-Whitney	1738.00	0.026	0.254

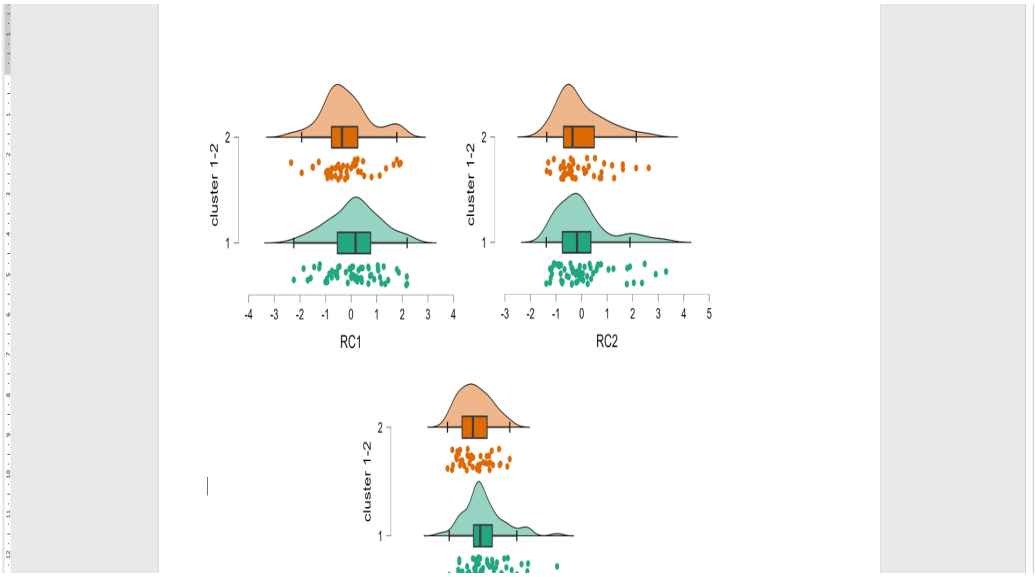
Note: A significant result according to the Shapiro-Wilk test indicates an abnormal distribution. Effect size for the t-test was calculated using standardized group differences (Cohen's d) and r point-biserial correlation coefficient (for the Mann-Whitney test).

It was found that the indices of the third component (RC3) differ significantly between the clusters. That is, in the groups identified on the basis of cluster analysis, the severity of the active destructive form of digital behavior differs. In addition, a trend towards significant differences in the first component (RC1 is the active structural form) was found. The effect size in relation to the detected differences also indicates a significant degree of their severity (average effect size).

When comparing the distribution of values by components in each of the clusters, it was found that the respondents of the first cluster have higher rates both in the active constructive form of digital behavior and in the active destructive one (Fig. 3).

Figure 3

Comparison of the severity of various forms of digital behavior in selected clusters



Note: RC1, RC2, RC3 - designations of the forms of digital behavior identified by the analysis of principal components (active constructive, passive constructive, active destructive, respectively).

The obtained results indicate that users who actively use the Internet for recreational, communicative and pragmatic purposes (RC1), or for the realization of aggressive impulses and/or sexual needs (RC3), have significantly higher scores for all indicators of aggressiveness and hostility and demonstrate more pronounced field independence (cluster 1).

Both active forms, both constructive and destructive, are united by the subject's activity parameter. However, the direction of this activity and the severity of individual strategies of digital behavior, according to the data obtained, differ. An analysis of the representation of specific digital behavior strategies is presented in the table 3.

Table 3

Frequency of occurrence of digital behavior strategies (percentage)

Name of digital behavior strategy	The frequency of occurrence of the strategy as the leading one		
	Sample	Cluster 1	Cluster 2
1.Internet for telling others about yourself	2%	2%	2%
2.Internet for shopping	2%	0%	5%
3.Internet for information	**29%**	**24%**	**36%**
4.Internet for "killing time"	7%	8%	5%
5. The Internet as a motivating force (examples from others)	**23%**	**27%**	**18%**
6.Internet as access to alternative information (opposition views)	7%	8%	5%
7.Internet for participation in communities (extremism, destructive tendencies)	3%	3%	2%
8.Internet for spying on others on social media	**21%**	**22%**	**18%**
9.Internet for the realization of sexual needs	2%	3%	0%
10.Internet for expressing ideas (manifestations of nationalism)	6%	3%	9%

The most common strategies across the sample as a whole are using the Internet to find information, to view user-generated content, and to consume influencer or celebrity content. The same strategies obviously dominate in selected clusters as well. At the same time, the search for information dominates for the representatives of the second cluster, while the content of social networks (motivational, user-generated content) is more important for the first one.

Discussion

The obtained results indicate that users who actively use the Internet for recreational, communicative and pragmatic purposes (RC1), or for the realization of aggressive impulses and/or sexual needs (RC3) have significantly higher rates for all indicators of aggressiveness and hostility and demonstrate more pronounced field independence (cluster 1). Components RC1 and RC3 combine a similar level of activity of the subject and the severity of the connection with the indicator of the strategy "Internet for information retrieval". That is, this strategy is equally expressed regardless of the nature of this information or the direction of user activity. Consequently, the predominance of these forms of behavior among representatives of cluster 1 indicates a connection between a high level of activity in the network and field independence, aggressiveness, and hostility. In general, this is consistent with the results of research on the productivity of information retrieval activities on the Internet, the material of which shows that field-independent users are more successful in performing information retrieval tasks in terms of quantitative (search speed, number of pages viewed, etc.) characteristics (Ferdowsi & Razmi, 2022 ; Ford et al., 2002; Palmquist & Kim, 2000). That is, field-independent users are generally better oriented in the information environment, and also demonstrate more active and confident behavior.

Aggressiveness and hostility of users have been studied to a greater extent in the context of their connection with Internet addictive behavior or as an independent style of behavior (cyberbullying) (Selivanova & Peshnina; 2020; Palmquist & Kim, 2000). At the same time, it has been shown that auto-aggression and other components of aggressiveness are highly likely to be expressed in destructive forms of online behavior (including addictive behavior) (Glazyrina, 2021; Hinić, 2011). In addition, users who demonstrate high aggressiveness are more active and productive in their self-expression online (Naboychenko & Okuneva, 2016; Drepa, 2009; Glicksohn, Naftuliev & Golan-Smooha, 2007).

Thus, our results generally do not contradict the empirical facts described in recent studies. At the same time, given the lack of studies that would consider the combined effect of field dependence and aggressiveness on the behavior of an individual on the Internet, the described data expand the understanding of the role of cognitive style in the choice of digital behavior strategies. However, the results of our study only direct us towards the search for cognitive mechanisms of behavioral regulation and cannot fully answer the question of the distribution of the factor load between the described characteristics.

Conclusion

1. Digital behavior as a specific human activity, implemented with the participation of information technology tools, is a complex phenomenon. The diversity of its definitions is largely due to the lack of a unified methodological approach to its study and a variety of tools that allow us to study only its individual manifestations.

2. Various combinations of digital behavior strategies that are manifested in the behavior of a

particular individual can be combined into constructive and destructive forms of digital behavior.

3. Users who actively use the Internet for recreational, communicative and pragmatic purposes (active constructive form of digital behavior), or for the implementation of aggressive impulses and/or sexual needs (active destructive form of digital behavior) have significantly higher rates for all indicators of aggressiveness and hostility and demonstrate more pronounced field independence.

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Ekaterina Gennadievna Denisova - literature review on the topic of the article, participation in the collection and processing of material, analysis of the data obtained, participation in writing the article, translation of the abstract, design of the final version of the article.
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Information about the conflict of interest

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Dynamics of Subjective Assessments of Personal Characteristics of a Person in Various Perceptual Situations

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Annotation : **Introduction** . The relevance of the study is due to the need to study the patterns of perception of a person's personal characteristics observed in ecologically valid situations of his interaction with other people. The novelty of the study lies in the disclosure of the features of interpersonal perception, taking into account the context in which the observer perceives the person being evaluated. **Methods** . As a stimulus material, three scenarios of situations of interpersonal interaction were constructed and the corresponding video clips were filmed, in each of which the same sitter participated. The study involved 20 people randomly divided into two equal groups, one of which was presented with stimulus videos with sound, and the other without it. The task of the study participants was to assess the personal characteristics of the sitter on the 21 scale of the "Personal Differential" methodology. **Results** . The study revealed a significant influence of perceptual situations related to different areas of interpersonal interaction on the observer's subjective assessment of the personal characteristics of the person included in these situations. The dynamics of subjective assessments is partially marked by the factors "Strength", "Activity" and "Evaluation" of the personality differential, as well as by their separate scales. The presentation of video clips in formats with and without sound made it possible to identify common and various significant patterns of influence of the perceived situation of interpersonal interaction on the subjective assessment of the personal characteristics of the object of perception included in it. **The discussion of the results.** The results contribute to the understanding of the processes of social perception and, in particular, the dependence of the observer's subjective assessment of the personal characteristics of another person on the situations of interpersonal interaction in which he is perceived. The regularities discovered due to the applied methodical approach demonstrate the adequacy of using the ideas of J. Gibson's ecological approach for the study of perceptual situations.

Keywords: situation, perceptual situation, personal characteristics, interpersonal perception, conditions of perception, interpersonal assessments, appearance perception, personality differential, assessment bias, ecological approach

Highlights

- ecologically valid stimulus material was developed - video images of the sitter's behavior in various situations of everyday interpersonal interaction;
- the dependence of subjective assessments of the individual psychological characteristics of the sitter on the situations of interpersonal interaction in which he is included was revealed;
- general and different regularities in the dynamics of subjective assessments of the individual psychological characteristics of the sitter, perceived in video clips presented in formats with and without sound, were revealed .

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Introduction

In recent years, psychological studies of the perception of situations (for example, Funder , 2016; Rauthmann , Horstmann , Sherman , 2020; Horstmann, Rauthmann, Sherman , 2021) and patterns of interpersonal perception in relatively real situations of life have been intensively developed (Demidov, 2022; Graham, Gosling , Travis, 2015; Meagher, 2020). Such studies, in particular, involve the choice of a principle by which it is possible to differentiate situations that contribute to the manifestation and perception of certain personal characteristics. The choice can be based on different theoretical approaches: objective and subjective.

Within the framework of the objective approach, this or that taxonomy of situations in which a person finds himself is created on the basis of their objective characteristics, considered as clues (cues). Characteristics can describe who is next to this person; Where is he located; what objects surround it; what happens and when it happens , etc. (Horstmann, Rauthmann, Sherman, 2018).

The subjective approach to differentiating situations is focused on their interpretation by the people who perceive them (Horstmann, Rauthmann, Sherman, 2021). Accordingly, a situation is defined, for example, as "a combination of individually interpreted, implicit, and unique representations, as well as culturally shared, explicit, and general environmental representations that generate and constrain behavior" (Yang , Read , Miller , 2009, p. 1020) .

Several taxonomies of situations have been created in recent years (e.g. Brown et al., 2015; Horstmann, & Ziegler, 2017; Parrigon et al ., 2017; Rauthmann et al ., 2014; Rauthmann , Horstmann , Sherman , 2020; Yang , Read , Miller , 2009 and others). Comparison of intersections between different taxonomies made it possible to identify six general groups of situation dimensions, differentiated depending on how much they require compliance with the following conditions: overcoming external dangers or obstacles (threat); coping with internal negative states (stress), performing important or urgent tasks (tasks); the implementation of serious and demanding

information processing (processing); engaging in enjoyable and fun activities and interacting with other people (fun); performing routine and automated activities (mundane) (Rauthmann, Horstmann, Sherman, 2020).

As for the actual perception of the situation, the best known model describing this process includes five main components (Rauthmann et al., 2014): 1) objectively measurable situational cues, (for example, human behavior and interaction, objects, events and characteristics of the physical space); 2) current human processing of situational cues, which is carried out in the "bottom-up" and "top-down" directions and allows them to be evaluated and given meaning; 3) aspects of personality (character traits, knowledge, habits, social roles, mood, goals, etc.) that determine the constant and current interpretation of situational clues; 4) a psychological situation that implies its perception by at least one person and affects his behavior and actions in it; 5) the behavior of the person perceiving the situation. Thus, the model takes into account both the objective characteristics of the situation and its perceptual components, that is, how it is perceived by a person with a certain personality trait.

According to modern ideas, the real assessment of situational dimensions can be carried out from three different angles, reflecting the position of the subject evaluating the situation in relation to the situation assessed by him: the subject is located and acts inside the situation (in situ); occupies, being in it, a passive position (juxta situm); is not present in the situation, evaluating it from the outside (ex situ) (Horstmann, Rauthmann, Sherman, 2021).

The last of these perspectives was implemented in our study, aimed at studying how the perception and assessment by some subject (observer) of another person (object of perception) can change depending on the change in the situation of interpersonal interaction in which the latter is located and in which he is not included. observer. We studied the "object-situation" in the terminology of V.A. Barabanshchikov (Barabanshchikov, 2009) and proceeded from the fact that "the object of perception is always unique due to the uniqueness of each of the relationships between man and the world" (Demidov, 2006, p . 59). At the same time, we were interested in such situations that were examples of interpersonal interaction, differing in their potential significance for a certain category of people.

Accordingly, *the purpose of the study* was to develop and test a variant of the methodology for studying the dependence of the observer's subjective assessment of the personal characteristics of a person (sitter) on the type of interpersonal interaction situation in which the sitter is included, and which we designate as a perceptual situation from the observer's point of view.

To achieve this goal, it was necessary to solve the following *tasks* :

1. develop stimulus material, which is a video of perceptual situations of real interpersonal interaction and has a high degree of environmental validity;
2. develop and empirically test a procedure that makes it possible to identify changes in the subjective assessment of the sitter's personal characteristics depending on the type of perceptual situation;
3. to empirically study the dynamics of subjective assessments of the sitter's personal characteristics depending on the nature of the perceptual situation.

The theoretical hypothesis of the study was that the subjective assessment of a person's personal characteristics is dynamic and may depend on the nature of the situation of interpersonal interaction in which he is included, and the format of perception of these situations (with and without sound) will contribute to focusing on partially different aspects of the perceptual situation and

thus, it will reveal the variety of significant patterns of its influence on the subjective assessment of a person's personal characteristics.

The empirical hypotheses of the study were as follows:

1. There are significant differences between the average subjective assessments of the sitter's personal characteristics by the factors "Strength", "Activity" and "Evaluation" (according to the "Personality Differential" method) and individual factor scales, when perceived in video clips with sound, characterized by potentially different significance and emotionality for the sitter.
2. There are significant differences between the average subjective assessments of the sitter's personal characteristics by the factors "Strength", "Activity" and "Evaluation" (according to the "Personality Differential" method) and individual factor scales, when perceived in video clips without sound, characterized by potentially different significance and emotionality for the sitter .

The scientific significance of the study is to identify the dynamics of subjective assessments of a person's personal characteristics, due to his perception in different situations of interpersonal interaction, containing the so-called prompts (Rauthmann et al., 2014) and peculiar "opportunities" (affordances) (Gibson, 1988) provided for understanding of a person's personality.

The practical significance of the study lies in two aspects of the developed methodology. One of them concerns the use of environmentally valid stimulus material - videos of real situations of interaction between a young girl and communicative partners. It should be noted that this is only one of the aspects of ecological validity. As is known, the widespread understanding of this concept implies its association with three general dimensions of psychological research, concerning the context of its conduct, the stimulus material used in it, and the behavior of its participants (Schmuckler , 2001). In recent decades, the concept of ecological validity has been associated with very different aspects of psychological research: incentives, objectives and conditions of research, its plans and results, theories and paradigms, methods, phenomena and data (Holleman et al ., 2020). The practical significance of our study lies precisely in the construction of a stimulus material characterized by a sufficiently high ecological validity.

The second significant aspect of the developed methodology concerns the use of stimulus video recordings of situations of interpersonal interaction in two formats - with sound and without sound - which, from our point of view, provides new opportunities for identifying the diversity of those parameters that are likely to reveal the dynamics of subjective personality assessment.

Methods

Development of stimulus material

As a stimulus material, scenarios of situations of interpersonal interaction were constructed, operationalized through three video clips, each of which involved the same sitter (a young girl - an object of perception), whose personal characteristics were to be assessed by the study participants (observers). The duration of each video story was about 1 minute. Scenarios of video clips were constructed in such a way as to represent ecologically valid situations of interpersonal interaction in different spheres of life, potentially associated with varying degrees of their significance for the sitter included in these situations, which, in turn, could manifest itself in the characteristics of his non-verbal behavior and facial expressions .

The first video ("Checkpoint") is a scenario of passing through the checkpoint to the organization; the sitter presents his passport and answers several questions of the guard related to the

purpose of the visit. The interaction of the sitter with the guard, an official unknown person, is of a formalized structured nature and, accordingly, is devoid of special significance and emotionality. *The second video* ("Consulting") is a scenario of psychotherapeutic counseling; the sitter interacts with the psychotherapist about his personal problems, which makes communication more meaningful and emotionally charged for the sitter. *The third video* ("Exam") is the script for the oral exam; the sitter answers the teacher's questions. In this case, the situation is characterized by the greatest degree of emotional stress and subjective significance for the sitter, as it is associated with obtaining an examination grade and a possible negative result. These scenarios were considered by us as environmentally valid stimulus video material, as they reflected complete fragments of everyday situations relevant for interpersonal interaction of young people, from whose age category the sample of study participants was formed.

Each of the three video clips was presented to one group of participants in a format with sound, and to another group without sound. The use of two different formats was due to our assumption that these formats will help focus the attention of the study participants on different aspects of perceptual situations, characterized both by the speech statements of the sitters participating in it, and by their non-verbal behavior (gestures, postures, facial expressions).

Study participants

The main study involved 20 women (mean age M = 28.9, SD = 6.9), divided randomly into two equal groups, one of which was presented with stimulus videos with sound, and the other without it. All participants in the study were students of universities in Moscow.

Procedure

To analyze changes in the subjective assessment of the sitter's personal characteristics depending on the type of perceptual situation, a variant of the semantic differential methodology was used, adapted by the staff of the Psychoneurological Institute named after A. V. M. Bekhtereva - "Personal differential" (hereinafter - LD) (Bazhin, Etkind, 1983); This method allows you to study the attitude towards oneself and other people. The LD was formed by a representative sample of words in the modern Russian language that describe personality traits and characterize the poles of the three classical factors of the semantic differential to the greatest extent: Evaluation, Strength and Activity.

Three videos were presented to one group of participants with sound, the other - without sound. After the presentation of each of the three videos, the participants of the study assessed the personal characteristics of the sitter using 21 scales: charming - unattractive, weak - strong, talkative - silent, irresponsible - conscientious, stubborn - compliant, withdrawn - open, kind - selfish, dependent - independent, active - passive, callous - sympathetic, resolute - indecisive, lethargic - energetic, fair - unfair, relaxed - tense, fussy - calm, hostile - friendly, confident - insecure, unsociable - sociable, honest - insincere, dependent - independent, irritable - unflappable . Each scale had a 7-point rating scale - from -3 to +3. The extreme values of the scales characterize the strong or weak severity of personality traits; central ("0") - means that the evaluated features are absent in a person at all, or making a certain assessment causes difficulty. The order of presentation of videos for all subjects was fixed, from the first ("Checkpoint") to the third ("Exam").

Results

Analysis of the dynamics of subjective assessments by the observer of the personal characteristics of the sitter, depending on the nature of the perceptual situation, was carried out separately for each of the three video clips with sound and for the same video clips presented without sound. In relation to all of these videos, a pairwise comparison was carried out (situations "Checkpoint - Exam", "Checkpoint - Consulting" and "Exam - Consulting") of the average indicators of subjective assessments obtained, firstly, by the factors "Strength", "Activity" and "Score", and secondly, on each of the scales related to these factors. A nonparametric Wilcoxon test for linked samples was used.

Subjective assessments of the personality of the sitter perceived in video clips with sound

When presenting videos *with sound* , significant differences were found (at $p < 0.05$) between the average values of subjective assessments of the sitter's personality obtained by the "Activity" factor - between the situations "Checkpoint" (M = 0.66) and "Consulting" (M = 0.13); according to the "Evaluation" factor - between the situation "Consulting" (M = 1.6), on the one hand, and the situations "Pass" (M = 1.36) and "Exam" (M = 1.44), on the other hand .

Significant differences (at $p < 0.05$) were also found between the average values of subjective assessments obtained on a number of scales related to the factors "Strength", "Activity" and "Evaluation".

According to the "Strength" factor, significant differences were found between the average values of subjective assessments (at $p < 0.05$) on four of the seven scales (Figure 1): 1) between the videos "Checkpoint" and "Consulting" on the scale "dependent - independent"; the assessment changed polarity: the sitter was assessed as rather independent in the video clip "Checking through" (M = 0.20) and rather dependent in the video clip "Consulting" (-1.10); 2) between all three video clips compared in pairs on the "indecisive-decisive" scale; the assessment changed polarity: the sitter was rated as rather indecisive in the video "Exam" (M = -0.90), as rather resolute in the video "Checkpoint" (M = 0.60), and in the video "Consulting" the sitter was rated as indecisive or decisively caused difficulty (M = 0); 3) between all three video clips compared in pairs on a tense-relaxed scale; the evaluation reversed polarity: the sitter was rated as rather tense in the video "Exam" (M = -1.30) and rather relaxed in the videos "Checkpoint" (M = =0.20) and "Consulting" (M = =0.10); 4) between the videos "Checkpoint" and "Consulting" on the scale "uncertain-confident"; the assessment changed polarity: the sitter was assessed as rather insecure when perceiving the video clip "Consulting" (M = -1.30) and as rather confident when perceiving the video clip "Checkpoint" (M = 0.20).

According to the "Activity" factor, significant differences were found between the average values of subjective assessments (at $p < 0.05$) obtained on five of the seven scales (Figure 2): »; the assessment changed from a negative pole to a neutral assessment: the sitter was assessed as rather silent in the "Checkpoint" video (M = -0.70) and did not receive a qualitatively expressed assessment in the "Consulting" video (M = 0); 2) between the videos "Checkpoint" and "Exam" on the scale "passive-active"; the assessment changed polarity: the sitter was assessed as rather active in the video clip "Checkpoint" (M = 1.30) and rather passive in the video clip "Exam" (M = -0.10); 3) between all three video clips compared in pairs according to the "sluggish-energetic" scale; the assessment reversed polarity: the sitter was rated as rather sluggish in the videos "Consulting" (M = -0.60) and "Exam" (M = -0.80), but rather energetic in the video "Checkpoint" (M = 0.40);

4) between the videos "Checkpoint" and "Consulting" on the scale "unsociable - sociable"; the sitter was rated significantly more sociable in the video clip "Checkroom" (M = 0.80) than in the video clip "Consulting" (M = 0.20); 5) between all three video clips compared in pairs on a scale of "irritable - unperturbed"; the sitter was rated significantly more unflappable in the video clip "Checkroom" (M = 1.20) than in the video clips "Exam" (M = 0.80) and "Consulting" (M = 0.50).

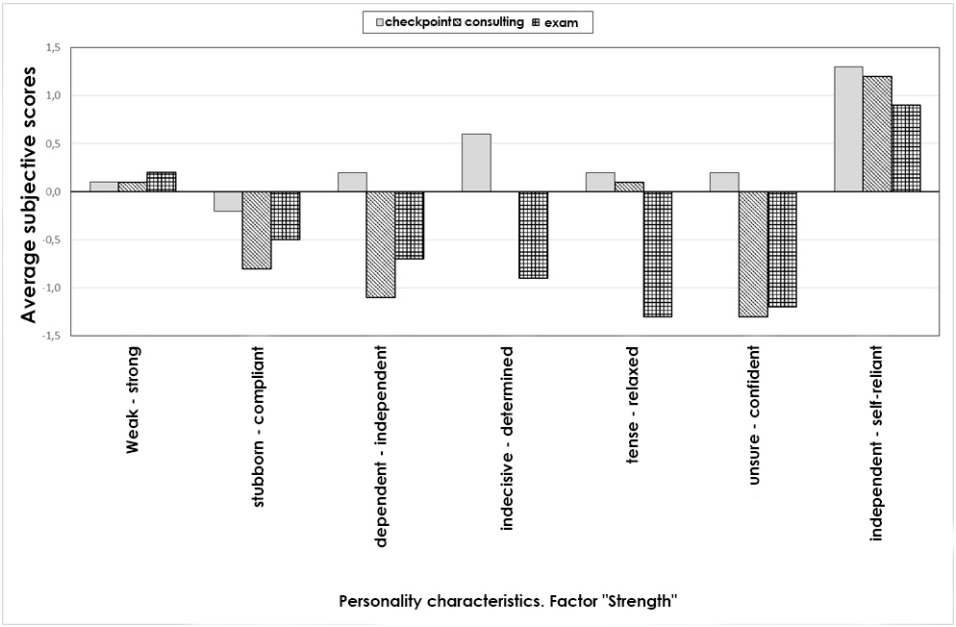

Figure 1. Average subjective assessments of the severity of the sitter's personal characteristics related to the "Strength" factor (video clips with sound)

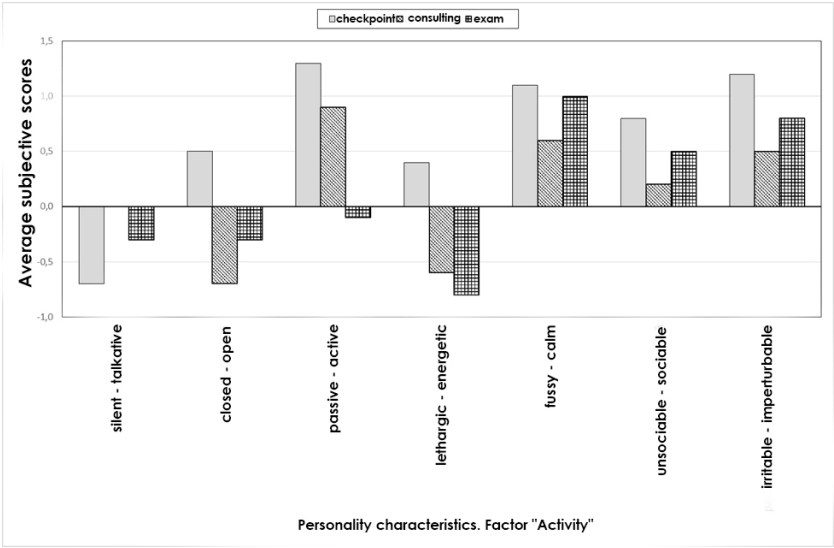

Figure 2. *Average subjective assessments of the personality characteristics of the sitter related to the "Activity" factor (video clips with sound)*

According to the "Evaluation" factor, significant differences were found between the average values of subjective assessments (at $p < 0.05$) on one of the seven scales (Figure 3) - the "insincere-honest" scale: the sitter was rated significantly more honest in the video clip "Consulting" ($M = 1.70$) than in the video clip "Checkpoint" ($M = 1.20$).

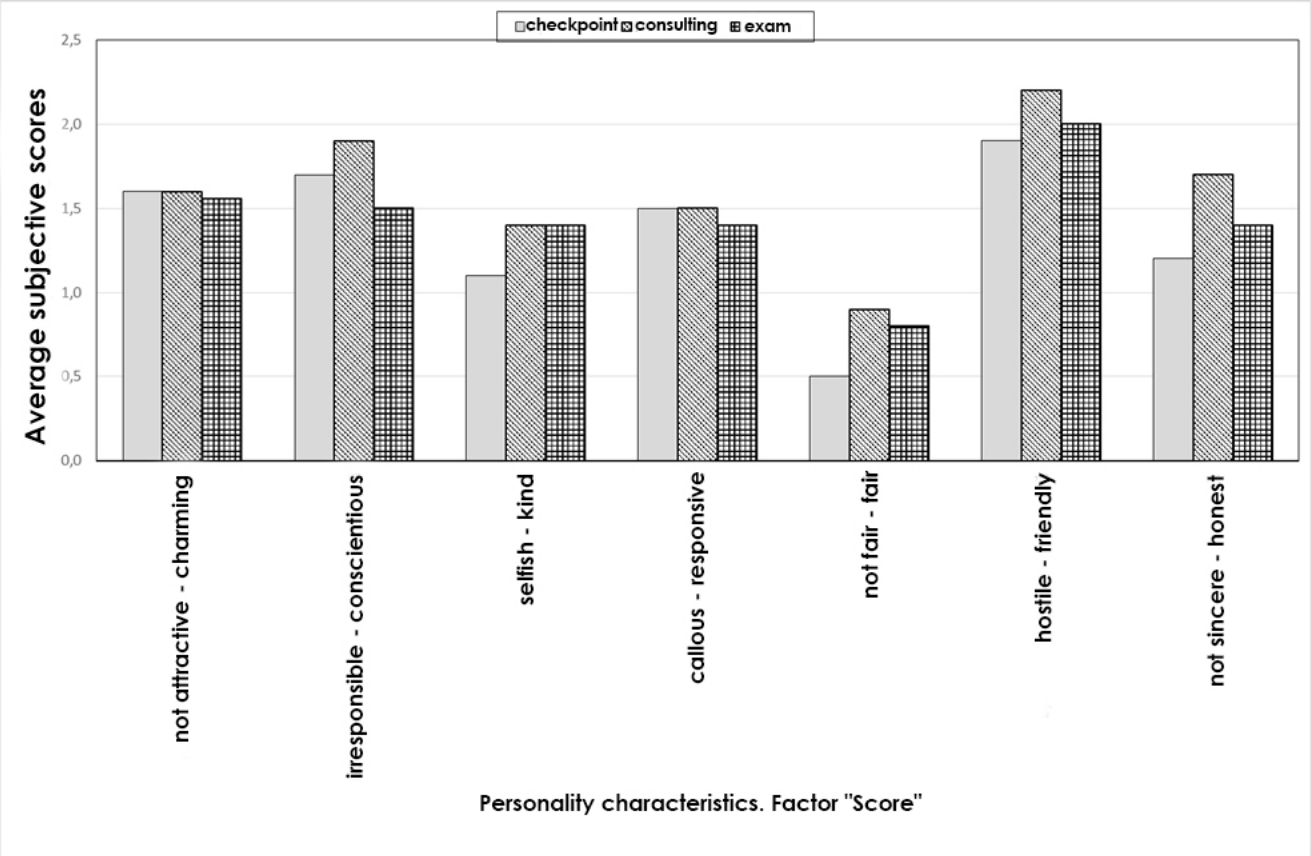

Figure 3. *Average subjective assessments of the severity of the sitter's personal characteristics related to the "Score" factor (video clips with sound)*

Subjective assessments of the personality of the sitter perceived in video clips without sound

When presenting videos *without sound* , significant differences were found (at $p < 0.05$) between the average values of the sitter's subjective assessments obtained by the factor "Strength" - between the situations "Checkpoint" ($M = 0.69$) and "Exam" ($M = -0.04$); according to the factor "Evaluation" - between the situations "Consulting" ($M = 0.46$) and "Exam" ($M = 0.86$).

Significant differences (at $p < 0.05$) were also found between the average values of subjective assessments obtained on a number of scales related to the factors "Strength", "Activity" and "Evaluation".

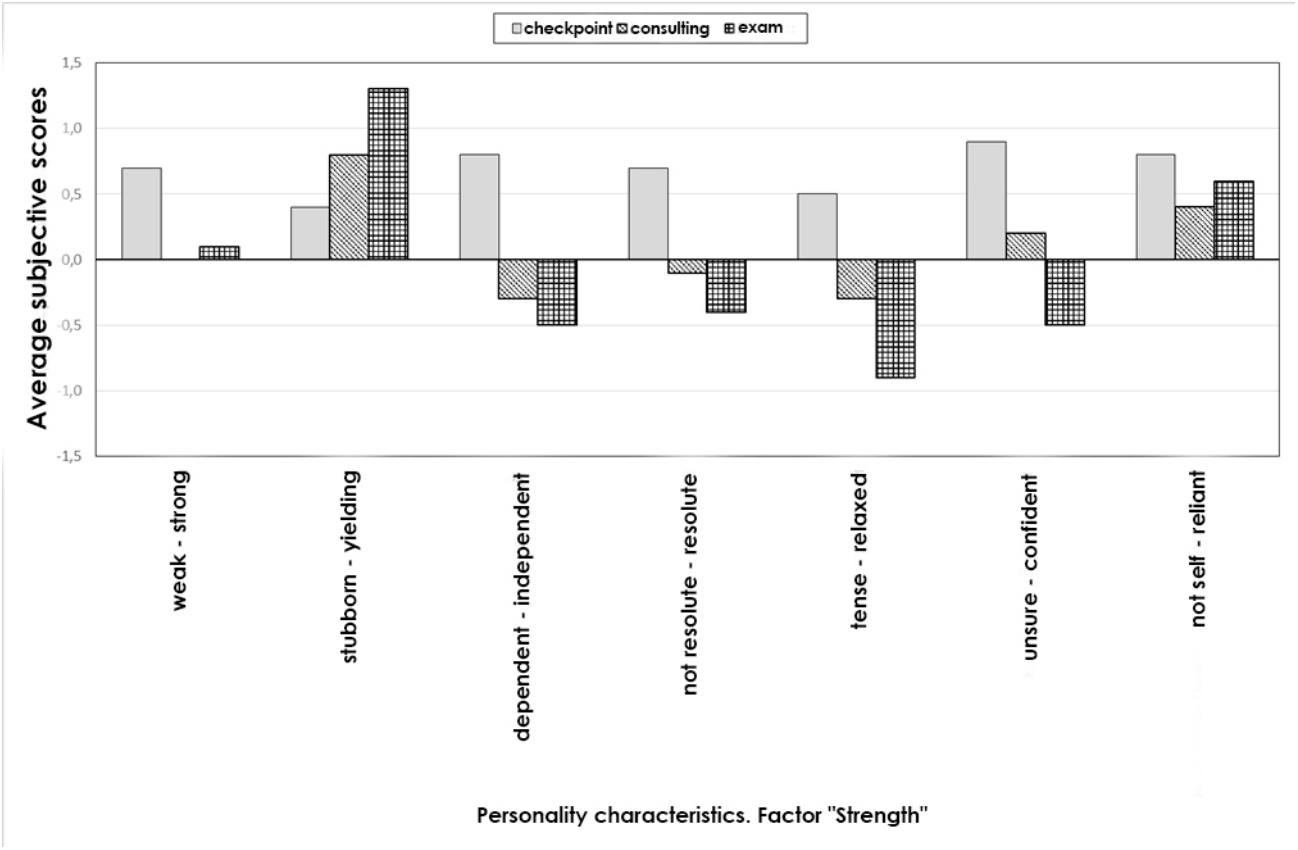

Figure 4. *Average subjective assessments of the severity of the sitter's personal characteristics related to the "Strength" factor (video clips without sound)*

According to the "Strength" factor, significant differences were found between the average values of subjective assessments (at $p < 0.05$) on five of the seven scales (Figure 4): 1) between the videos "Checkpoint" and "Exam" on the "stubborn–compliant" scale; the sitter was rated significantly more compliant in the "Exam" video (M = 1.30) than in the "Checkpoint" video (M = 0.40); 2) between all three video clips compared in pairs on the "dependent-independent" scale; the assessment changed polarity: the sitter was assessed as rather independent in the video clip "Checkpoint" (M = 0.80) and as rather dependent in the videos "Consulting" (M = -0.30) and "Exam" (M = -0.50); 3 *)* between the videos "Checkpoint" and "Exam" on the scale "indecisive - decisive"; the evaluation changed polarity: the sitter was rated as rather indecisive in the "Exam" video (M = -0.40) and as rather resolute in the "Checkpoint" video (M = 0.70); 4) between all three video clips compared in pairs on a tense-relaxed scale; the assessment changed polarity: the sitter was assessed as rather relaxed in the videos "Checkpoint" (M = 0.50), in contrast to the videos "Consulting" (M = -0.30) and "Exam" (M = -0.90), where it was rated as rather intense; 5) between the videos "Checkpoint" and "Exam" on the scale "unsure-confident"; the assessment changed polarity: the sitter was assessed as rather insecure when perceiving the video "Exam" (M = -0.50) and as rather confident when perceiving the video "Checkpoint" (M = 0.90).

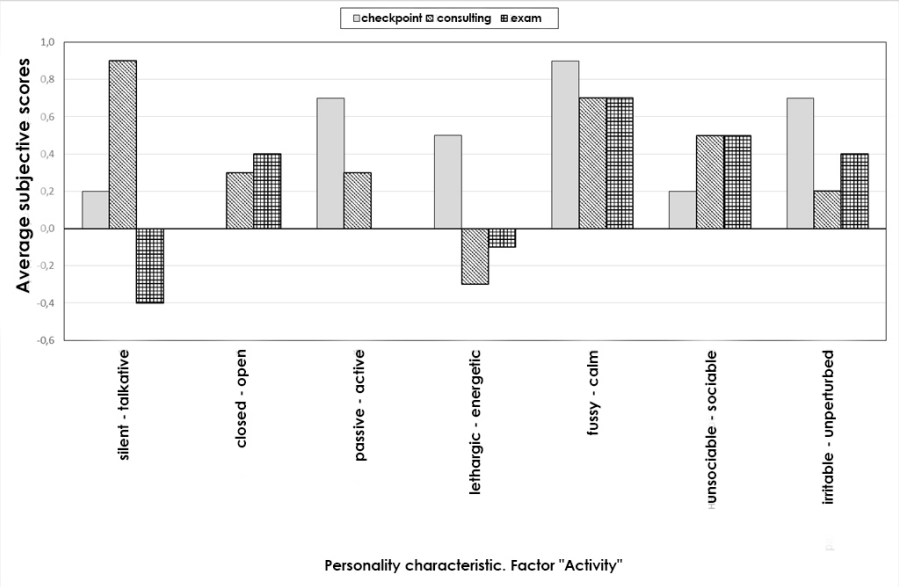

Figure 5. *Average subjective assessments of the severity of the sitter's personal characteristics related to the "Activity" factor (video clips without sound)*

According to the "Activity" factor, significant differences were found between the average values of subjective assessments (at $p < 0.05$) obtained only on one of the seven scales - the "silent-talkative" scale (Figure 5): the assessment changed polarity: the sitter was assessed as rather taciturn in the Exam video (M = -0.40) and as rather talkative in the Consulting video (M = 0.90).

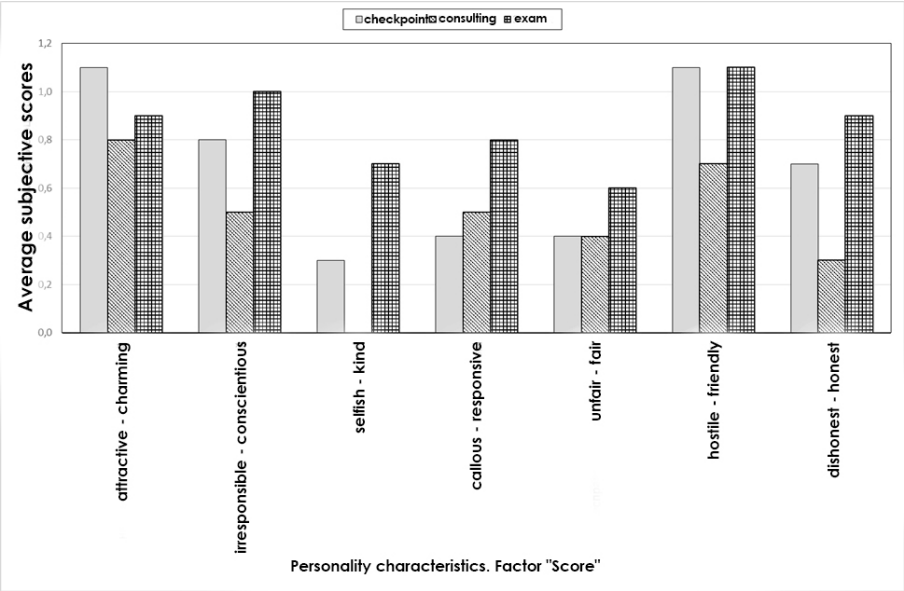

Figure 6**.** *Average subjective assessments of the severity of the personal characteristics of the object of perception, related to the "Score" factor (video clips without sound)*

As for the "Evaluation" factor, none of its scales revealed statistically significant differences between the average values of subjective assessments (Figure 6).

Discussion

In the conducted study, regularities were found in the dynamics of subjective assessments of the personal characteristics of the sitters, depending on the nature of the perceptual situation.

When presenting video clips with sound, a significant dynamics of the average indicators of subjective assessments of the sitter's personal characteristics was found: in terms of the "Activity" factor in general and in most of its scales; by the "Score" factor as a whole and by one of its scales; on separate scales of the "Strength" factor.

When presented with video clips without sound, a significant dynamics of the average indicators of subjective assessments of personal characteristics was found: in terms of the "Strength" factor in general and in most of its scales; by the "Score" factor as a whole and by one of its scales.

Comparison of regularities concerning the situations of perception of video clips with sound and without sound allows us to speak about the presence of common and different in the dynamics of subjective assessments of the sitter's personal characteristics.

Regarding the factors in general, the general pattern for perceptual situations with and without sound is a significant change in subjective assessments by the "Evaluation" factor, and the difference is that for video clips with sound, the dynamics of ratings was also noted by the "Activity" factor, and for video clips without sound - also by the "Strength" factor.

In the case of individual scales, the general patterns for perceptual situations with and without sound relate to significant dynamics on the four scales of the "Strength" factor ("stubborn-compliant", "dependent-independent", "indecisive-decisive", "tense-relaxed", " uncertain-confident") and on one scale of the factor "Activity" ("silent-talkative"). This allows us to speak about the "sensitivity" of these scales as tools that allow us to detect the dynamics of the subjective assessment of a person from one perceptual situation to another, regardless of whether the situation has a sound component.

Thus, the results of the study to a certain extent confirm the theoretical and empirical hypotheses, and also have theoretical and methodological significance.

These results support the idea that personality traits require situations that are relevant to them (Kenrick & Funder , 1988), and also correlate to some extent with the interactive model of personality (Endler , & Magnusson , 1976), according to which actual behavior is a function of continuous multidirectional interaction between a person and the situation with which he is faced. In our study, we managed to show how the actual behavior of the sitter, which changed depending on the situation in which he was, can serve as a guideline for changing the observer's subjective assessments of his personal characteristics.

As for the limitations of the study, they are primarily related to its sample, which included only students and only women. Thus, the generalization of the obtained results to the categories of people of a different age, social status and gender is impossible. However, as a positive point, we note the sufficient relevance of the stimulus material constructed by us to the sample of study participants, since the age of the girl appearing in the videos corresponded to the age of the study participants, and the types of interpersonal interaction in which she was involved were, we believe, quite natural and understandable to them.

Conclusion

1. Perceptual situations related to different spheres of interpersonal interaction and having potentially different degrees of significance and emotional involvement of a person in them significantly influenced the observer's subjective assessment of his personal characteristics. The dynamics of subjective assessments was partially marked by the general factors "Strength", "Activity" and "Evaluation", as well as by individual scales of the personality differential.
2. The dynamics of subjective assessments of personal characteristics was noted for situations of interpersonal interaction, perceived both in voiced format and without sound. The most "sensitive" to changes were the scales of the "Strength" factor.
3. Different versions of the procedure for presenting the same video clips in formats with and without sound contributed to the observer's focus on partially different aspects of the perceptual situation and thus made it possible to identify common and different significant patterns of its influence on the subjective assessment of the sitter's personal characteristics.

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Kristina Igorevna Ananyeva - participation in the development of the concept of the study, participation in the collection of empirical material, analysis of the data obtained and statistical processing of data, participation in writing the article, editing the article.

Alexander Alexandrovich Demidov - participation in the development of the research concept, literature review on the topic of the article, participation in writing the article, design of the final version of the article.

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Information about the conflict of interest

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Configurations of collective mental models in solving service and combat tasks by cadets of the National Guard

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Annotation: Introduction. A collective mental model as an important component of a military team, whose members have different knowledge, experience, needs, values, can effectively explain, predict and improve the success of a military unit in the performance of combat missions. The novelty of this work lies in the use of a metasystem approach to develop the structure and methods for measuring the collective mental model of servicemen when they solve non-standard situations in peacetime and wartime. The purpose of the study was to develop a structure and method for measuring the collective mental models of military personnel. The assumption was tested that when solving various introductory cadets, different knowledge, abilities, emotions, needs and roles will be used. **Methods.** The study involved 71 cadets of the VOOVO of the troops of the National Guard of the Russian Federation aged 21 to 27 years. To study individual mental models, 10 cases were developed containing real everyday and service-combat situations. When solving each introductory cadet, it was necessary to determine the cognitive, motivational, emotional and role parameters. To identify role aspects, the Kaleidoscope technique was used, containing 10 figures divided by gender and age. To identify collective mental models for each input, an analysis of the contingency of the parameters under study was used according to the Pearson criterion. R **results.** When solving the introductory cadets, statistically significant associations were found regarding the presence of existing similar experience, metcognitive knowledge, abilities, needs, emotions and roles ($p \leq 0.05$). About **the discussion of the results.** The results of the study confirmed the assumption that the obtained connections make it possible to build certain configurations of collective mental models when military personnel solve problematic everyday and service-combat tasks. **Conclusion.** In general, the data of the conducted study allow us to conclude that the formation of a common mental model of military personnel can improve the understanding of service and combat missions by the personnel of the unit, promote mutual understanding and support in the military team, and also increase its effectiveness in military professional activities.

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Keywords: collective mental model, metasystem, metacognitive system, metamotivational system, needs, emotions, roles, military professional activity, service and combat missions

Highlights

- the metasystem approach is an effective tool for understanding the collective mental model in the form of a system, taking into account the interaction of its constituent entities and the features of their transformation, depending on the type of combat mission.
- the collective mental model of military personnel, includes individual mental models, which in turn integrate knowledge, needs, abilities, emotions and roles.
- the development and sharing of a generalized mental model facilitates the coordination of military personnel in the process of solving a specific combat mission.

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Introduction

The relevance of the study is related to the widespread and one of the main fundamental problems of labor psychology - the solution of problem situations by subjects of military professional activity, which requires intensive cooperation between members of the military team. Such interaction may involve the establishment of a sequence of events by military personnel when making decisions or the establishment of causal relationships between constructs representing mental models of cognitive content.

Mental models are considered as the basic structure of cognition for describing and representing thought processes in problem solving (Johnson - Laird, 1980). How these cognitive constructs are developed and modified depends on the contexts and conditions in which they are created and used (Marshall, 2007). The study of mental models plays an important role in team communication, coordination and team productivity in developing a joint decision (Klimoski, & Mohammed, 1994). Mental models are units of cognitive experience that reflect simplified representations of the world (Smyth , Collins, Morris, & Levy, 1994). The mental model refers to the sum of individual cognitive schemas (Wilson , & Rutherford , 1989). At the same time, in the process of social interaction with others, the mental model of an individual can be matched with the mental model of others so that the model can be raised from the individual level to the group level (Mohammed, Klimoski, & Rentsch, 2000; Jingwei, Jinxia, & Yanli, 2019).

Cannon - Bowers et al. (2001) for the first time modernized the mental model from the individual level to the group level and proposed the concept of a general mental model, which involves operating the knowledge of team members. More recently, Mohammed & Dumville (2001) pointed out that the collaborative mental model of a team includes values, beliefs, and attitudes towards the environment and towards themselves by team members. In this context, as research on team mental models deepens, most scholars believe that the connotation of a shared mental model includes group members sharing values and beliefs (Johnson, & Lee, 2008; Mathieu , Heffner , Goodwin , Salas , & Cannon-Bowers , 2000 Van den Bossche , Gijselaers , Segers , Woltjer , &

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Kirschner, 2011). In turn, a number of studies have shown that after the formation of a common mental model, team members are capable of a similar perception of professional tasks, situations, equipment, technology, etc., which leads to successful cooperation in making effective decisions (Mohammed , Klimoski , & Rentsch , 2000; Cooke , Salas , Cannon-Bowers , & Stout , 2000), so that shared mental models positively influence team productivity and creativity. Jianwei , Hui , Haihong , & Yongkang (2018) found that the level of similarity of collective mental models can predict team performance and job satisfaction. Gurtner , Tschan , Semmerb , & N ä geleb (2007) proved that the activation of metacognitive strategies, in particular reflexivity , can increase the effectiveness of collaborative teams. In some of our studies , a feedback was found between reflection and self-regulation of cadets (Karpov, Perevozkina , Fedorishin and Zinovieva, 2021). This reflects the fact that the higher the level of self-regulation, the more the student's ability to recognize and evaluate their own resources will be suppressed (Fedorishin and Andronov, 2018).

There is no doubt that the concept of command mental models can provide effective solutions for studying the military collective. However, we argue that it is necessary to take into account the limitations of this concept, since existing research on command mental models tends to be based on the assumptions of traditional cognitive psychology. In turn, we propose to consider mental models, based on a metasystem approach (Karpov and Perevozkina , 2019), as a more effective way of learning command mental models in action (Mekebaev , Perevozkina and Fedorishin, 2021a; Mekebaev , Perevozkina and Fedorishin, 2021b). Within the framework of this approach, any psychological phenomenon can be considered as an open system that has five hierarchical levels. The first, basic level is the level of elements, which involves the activation of social skills and abilities. At the component level, metacognitive processes (memory, attention, perception, thinking, representation, etc.) are included. Edwards , Day, Arthur, & Bell (2006) proved that when team members have high cognitive abilities, the team is more likely to form a shared mental model of a higher level of performance. In addition, its formation is influenced by the level of education of team members, position and experience of cooperation (Rentsch , Richard, & Klimoski , 2001). At the subsystem level, the following subsystems are represented: metacognitive , metamotivational , metaemotional , metarole . At the system level, an individual mental model of interaction is formed, which combines all the underlying components with the perception of the current situation. Finally, the metasystem level involves the integration of individual mental models into a single collective mental model (manifestation of collective ways of implementing activities and interactions). A number of studies have shown that the leadership style of a group leader has an impact on the team's overall mental model (Boies, & Fiset, 2018).

Thus, the present study has a dual purpose: on the one hand, we are interested in developing better measuring devices for the collective mental models of military personnel. On the other hand, an important aspect is the verification of the conceptual provisions of the metasystem approach in relation to the collective mental model of servicemen in solving service and combat tasks.

Methods

Subjects

The study was conducted on the basis of the Novosibirsk military, Order of Zhukov Institute. Army General I.K. Yakovlev of the troops of the National Guard of the Russian Federation. The study involved cadets of the fifth year of study in the amount of 71 respondents, aged from 21 to 27 years.

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Equipment and stimulus material

In the process of achieving the goal, a study was conducted, which involved a number of stages. At the first stage, we were faced with the task of creating measuring methods for collective mental models in military personnel. To do this, based on the theoretical provisions of the metasystem approach regarding the structure of the collective mental model of military personnel, 10 cases were developed containing real everyday and service-combat situations, which were included in three blocks. The first block - "Interpersonal relations during the organization of the SBD": 3. Interaction with subordinates; 4. Failure to comply with an order; 8. Interpersonal conflict in the team; 9. Hostage rescue. The second block: "Injuries of personnel in military professional activity": 2. Injury of a limb during demining; 7. Plane crash of personnel; 10 Violation of safety requirements during grenade throwing. The third block "Non-standard situation in the performance of service and combat missions": 1. Loss of ammunition in combat service; 5. Critical situation; 6. Checking self-regulation.

To determine role identification, the Kaleidoscope projective technique was used (Perevozkina, Zinovieva, Andronnikova and Dmitrieva 2016). The technique contains 10 figures divided by sex and age: 2 figures relating to the period of childhood (boy and girl); 4 figures related to the period of youth and adolescence (boy and girl), of which 2 are creative figures, and 2 are destructive; 2 figures related to the period of adulthood (man and woman); 2 figures related to the period of old age (an old man and an old woman).

Procedure

The cadets had to offer a solution for each of the 10 introductory questions. In addition, according to the structure of collective mental models, the cadets had to determine what knowledge, skills and abilities they used in solving these problems. Did they have a similar experience, including civilian. They also had to note their needs and emotions, which are realized when solving a specific input. Also, out of 10 proposed figures (stimulus material of the "Kaleidoscope" methodology), the cadets chose their own role as a commander in a given situation and two roles subordinate to him.

When analyzing the contingency of the studied parameters, the ^{2} -Pearson criterion was used. Thus, the relationship between the decision of a particular introductory cadet, knowledge, experience, skills, abilities, needs, emotions and roles involved in this situation was studied.

Results

The data obtained demonstrate that when solving the input, statistically significant differences were found regarding the knowledge used, $^2 = 18.49$, $p < 0.03$ (Table 1).

Table 1

Conjugacy between the input and various structural components of the mental model

Related parameters	c	p
Introductory x Knowledge	18.49	0.030
Introductory x Experience	7.52	0.006

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Related parameters	c	p
Introductory x Skills, abilities	159.27	0.000
Input x Needs	17.82	0.023
Introductory x Emotions	111.21	0.002
Introductory x The role of the commander	13.93	0.050
Introductory x Role subordinate 1	13.04	0.042
Introductory x Role subordinate 2	17.57	0.021

There are statistically significant differences between skills and abilities when solving various introductory cadets of both faculties $\chi^2 = 159.27$, $p < 0.001$. Also, cadets realize various needs $\chi^2 = 17.82$, $p < 0.023$ and emotions $\chi^2 = 111.21$, $p < 0.002$ when solving given problem situations. Statistically significant differences were found between the selected roles for subordinates $\chi^2 = 13.04$, $p < 0.04$ and $\chi^2 = 17.57$, $p < 0.02$.

Discussion

When solving the first, fifth, sixth and tenth introductory cadets, humanitarian knowledge is predominantly used (more than 40%), military-professional knowledge is in second place (more than 30%). This indicates that when solving these problem situations, cadets, first of all, need knowledge of medicine, psychology, and other humanities. When solving the third and seventh inputs , military-professional knowledge (more than 45%) is used, including such subjects as the management of daily activities, service and combat use, intelligence and the Charter of the armed forces, and humanitarian ones - to a lesser extent (more than 30%). When solving the second, fourth, eighth and ninth introductory cadets, they need knowledge of both the humanitarian cycle and the military professional (more than 40% of both types of knowledge).

For all problem situations, for the vast majority of cadets, when solving introductory questions, self-discipline is the determining skill (from 48% to 58%), which is consistent with the results of

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other studies (Farina, & Johnson, 2021). At the same time, when solving the second and fifth introductory questions, 18% and 17% of cadets use such an ability as critical thinking. To solve the third introductory, communication skills are needed (17%). When solving the seventh introductory, the skill of oratory is important (21%).

For cadets, when solving the first input, the need for influence and establishing control over others is realized (22.54%). The second situation is characterized by the need for stable, long-term relationships in close relationships with a small team (19.72%). The third, fifth, seventh, ninth and tenth tasks are determined by the need for comfortable physical conditions (more than 22%). The fourth input is related to the need for social contacts at the level of easy communication with a large team (21.13%) and the need for power (19.72%). According to Odoard , Battistelli , Guardela , Mirko , Di Napoli , & Piccione (2021) the need for effective coordination of the military team among the personnel of the military units of the Italian Air Force is influenced by transactive memory, which is closely related to the values of innovation, perception and command skills and innovation.

The need for comfortable physical conditions (25.35%), for social contacts (19.72%) and for achieving and setting bold, challenging goals for oneself (18.31%) determine the sixth input. The dominant needs in solving the eighth task are the need for high earnings, material rewards (26.76%), as well as material goods and influence and control over others (21.13%).

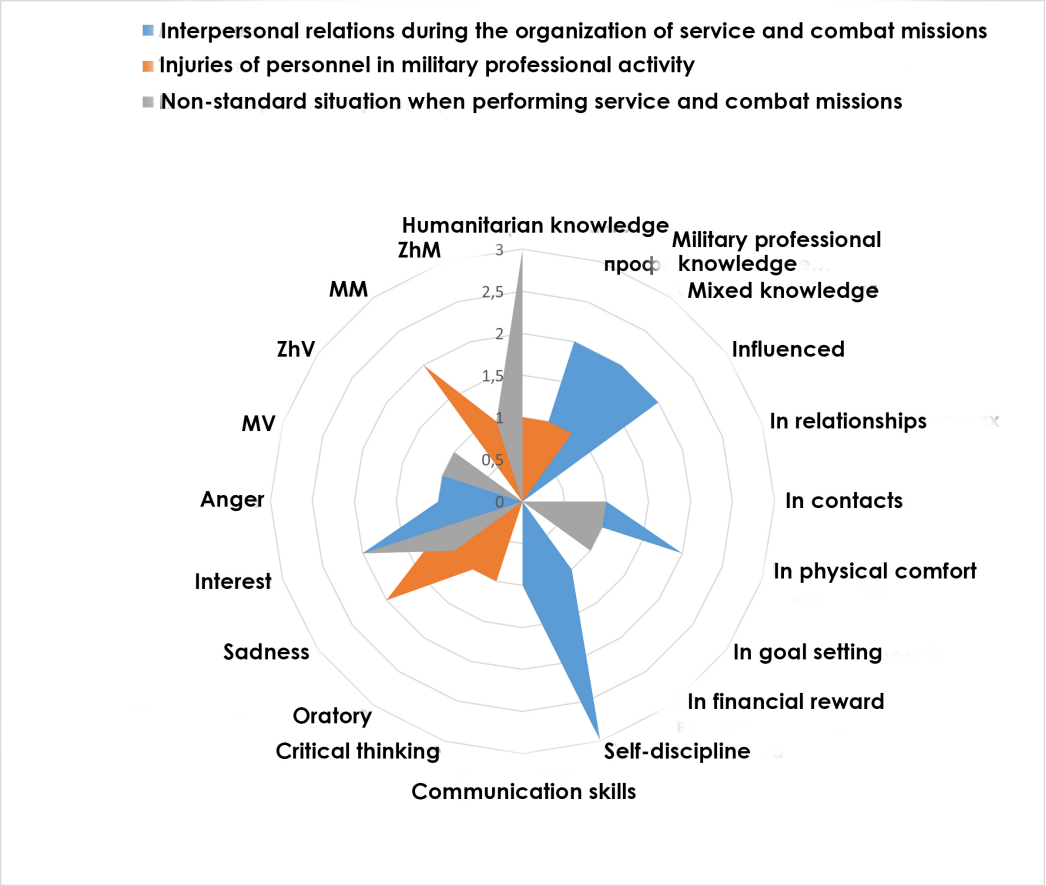
Sadness (more than 30%) is the predominant emotion among cadets when solving the second, third and seventh introductory questions. The emotion of anger dominates in solving the eighth problem situation (28.17%). Interest is activated among military personnel in solving most tasks - these are the first, fourth, fifth, sixth, ninth and tenth (more than 30%).

For the majority of cadets (more than 48%), the dominant role of the commander in solving all the introductory questions is the male role of the period of youth (Fig. 1). This role is characterized by such expectations as courage, confidence, the desire to overcome obstacles, to achieve a goal, to fight the enemy (Perevozkina , 2019). The main task of this role is to fight the enemy and protect civilians. However, for the third, fifth, ninth and tenth respondents, they also chose the male role of the period of adulthood (more than 40%). This role is distinguished by such features as control, team leadership, taking responsibility for subordinates (Perevozkina , 2019). Maden-Eyiusta (2021) notes that a leader who demonstrates acceptance of responsibility for subordinates has low values for role conflict and role ambiguity.

When choosing subordinates, there was a large differentiation of roles. So for the first and eighth problem situations, the role model of subordinates is the male role model of the period of adulthood (more than 28%). When solving the second, third and sixth tasks, a female role model related to the period of youth (more than 31%) with such characteristics as confidence, courage, vindictiveness was chosen as subordinates. For the fifth input, the female role model of the period of adulthood (25.43%) acted as a subordinate for the cadets , which is distinguished by kindness, care and mercy (Perevozkina , 2019). When solving the fourth, fifth, seventh, ninth and tenth inputs, the role of a young man is used as subordinates (more than 31%, Fig. 1). In this context, for the commander, from the point of view of most cadets, it is much easier to influence a subordinate of the same age and gender.

Thus, the obtained connections allow building certain configurations of collective mental models (Fig. 1).

Figure 1. Configurations of collective mental models when solving various inputs.



Conclusion

The conducted research allowed us to draw several conclusions. Firstly, the metasystem approach can be effective for developing the structure of the collective mental model of servicemen when solving inputs in military professional activity. The collective mental model of military personnel can be viewed as an open system that has five hierarchical levels.

Secondly, the developed structure of the collective mental model of military personnel made it possible to create methods for measuring individual mental models of cadets when they solve non-standard situations in peacetime and wartime.

Thirdly, despite certain results achieved in this work, at the same time, there are limitations in the study of the collective mental models of military personnel due to the fact that the general mental model is influenced by many additional factors that were not taken into account in this study. because the collective mental model is formed and evolves along with the dynamic changes in the military unit. Hence, topics related to the analysis of the mechanism of formation of a collective mental model, and what factors can contribute to its formation deserve further study in the future.

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Information about the conflict of interest

The authors declare no conflict of interest.

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Relationships Between Smartphone Addiction and Personal Qualities and Properties of Belarusians and Russians

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Abstract: Introduction. Smartphone addiction is the most common non-medical addiction. The purpose of the study is to find common and differences in the relationship between smartphone addiction and personal qualities and properties of Belarusian and Russian men and women (assertiveness , impulsiveness, narcissism, vulnerability to manipulation, dependence on social networks), comparing the results corresponding to these groups of respondents. **Methods.** Smartphone addiction diagnosed CAC-16 questionnaire (author V.P. Sheinov), assertiveness - assertiveness test (V.P. Sheinov), vulnerability to manipulation - questionnaire "Assessment of the degree of vulnerability of an individual from manipulative influences" (V.P. Sheinov), dependence on social networks - questionnaire ZSS-15 (V.P. Sheinov, A.S. Devitsyn) , and impulsivity - by V. BUT. Losenkov , narcissism - questionnaire E. Kot. **Results.** In the relationship between smartphone dependence and personal qualities and characteristics in the Belarusian (n = 403) and Russian (n = 361) samples of men and women, more similarities were found than differences: smartphone addiction is negatively associated with assertiveness and positively with impulsivity, loss of control over oneself, fear of refusal to use a smartphone, euphoria from its use, dependence on social networks. Regardless of gender and geographic location, the strongest link is between smartphone addiction and loss of self-control. ***A negative relationship was found between dependence on a smartphone*** and exposure to manipulation in Belarusian women, while in Russian women this relationship is positive. A negative relationship was found between smartphone dependence and narcissism among Russian women, in the absence of it among other groups of respondents. **Discussion of the results.** The data obtained on the relationship between smartphone addiction and personal qualities and properties of Belarusians and Russians are new, in general they are consistent with the results of studies in other societies, while there are some differences.

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Keywords: smartphone addiction , assertiveness , impulsiveness, exposure to manipulation, narcissism, social media addiction, Russians, Belarusians, men, women

Highlights

- connections between smartphone addiction and personal qualities and properties of Russian and Belarusian men and women are mostly similar, but there are certain differences;
smartphone addiction is most strongly associated with loss of self-control;
- Belarusian women o a negative relationship was found between dependence on a smartphone and vulnerability to manipulation; in Russian women, this relationship is positive;
among Russians, dependence on a smartphone is negatively correlated with narcissism;
- in order to prevent the formation of dependence on smartphones and release from it, it is recommended to promote the development of assertiveness of the individual.

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Introduction

In modern society, digital addictions have become widespread. In a large sociological study on a representative international sample, it was found that the structure of Internet addicted Russian youth is identical to the global one, while "the majority are average independent Internet users (95.5%), highly dependent (2.7%) and absolutely dependent (0.6%)" (Varlamova et al., 2015, p. 174).

Digital dependencies are typical for representatives of the " Generation Z". Therefore , representatives of this particular generation are of particular interest to study the impact of digital addictions, which include smartphone addiction . Generation Z Internet communication is a rather complex and multifaceted phenomenon (Kondratieva, Doveiko, 2021) . It consists of "a form of data transmission on the Web, communication interactions of the young generation in the Internet environment, communication of" generation Z "via e-mail, communication via social networks, use of video hosting, communication via instant messengers, communication in communities in social networks, as well as the use by young generation to communicate video broadcasts" (Kondratieva, Doveiko, 2021, p. 307).

Smartphone addiction is the most common among digital addictions. Smartphone users who are addicted to it have been found to have many negative conditions that negatively affect their psychological well-being. In particular, smartphone addiction increases anxiety, depression, impulsivity (Yan , Kim , 2015). For Russian, Belarusian and Ukrainian subjects, it was found that "smartphone addiction is positively correlated with anxiety, depression, stress and is negatively associated with self-control and life satisfaction. The dependence on the smartphone of women is statistically significantly higher than the dependence on the smartphone of men. A significant positive relationship was found between smoking cravings in men and smartphone addiction" (Sheynov , 2021, p. 97-98) . It is shown that dependence on a smartphone is "directly related to depression, anxiety, stress, decreased self-esteem and self-control, health problems, sleep, quality of life and satisfaction with it, family difficulties, a decrease in

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student and student performance, a decrease in labor productivity and danger become a victim of cyberbullying " (Sheinov, Devitsyn , 2021c, p. 174).

AT a number of foreign studies have revealed a positive correlation between dependence on a smartphone and *impulsiveness* (Billieux et al ., 2008 ; Gecaite-Stonciene et al., 2021; Jo et al., 2018; Kim et al., 2016; Mei et al., 2018; Peterka- Bonetta et al., 2019). At the same time , greater impulsivity leads to greater dependence on smartphones (Lee , Park , 2014) .

"Smartphones have been shown to encourage *narcissism* even in non- narcissistic users" (Pearson , Hussain , 2027, p.18) . However, *greater* narcissism was associated with problematic smartphone use by both men and women (Giordano et al ., 2019).

Smartphone Addiction Predicts *Social Media Addiction* (Tunc - Aksan , Akbay , 2019, p. 559). There is a relationship between Facebook addiction and smartphone addiction (Khoury , Neves , Roque , 2019) . "Social media use and game use were both positive predictors of smartphone addiction, but social media use appeared to be a stronger predictor of smartphone addiction than game use (Jeong et al ., 2016, p.10).

The results presented above suggest that smartphone addiction can significantly influence *assertiveness* . Assertive is a confident, direct, open behavior that does not aim to harm other people. " Assertive behavior is situational, that is, a person can demonstrate assertive behavior in one situation, but non -assertive behavior in another" (Sheynov, 2015, p. 35). Of interest is the answer to the question whether dependence on a smartphone is associated with the assertiveness of Russian-speaking users of this gadget.

"Danger of becoming a victim of cyberbullying " discovered for smartphone-addicted users (Sheinov, Devitsyn, 2021, p. 174) actualizes the question of the relationship between this addiction and *exposure to manipulation* .

Previous studies have found that the manifestations of smartphone addiction in women and men are different (Sheinov , 2021; Sheinov, Devitsyn , 2021c) . Therefore, the links between these personality traits and smartphone addiction may depend on gender and, therefore, should be studied separately for women and men.

The purpose of the study is to find common and differences in the relationship between smartphone addiction and personal qualities and properties of Belarusian and Russian men and women (assertiveness , impulsiveness, narcissism, vulnerability to manipulation, dependence on social networks), comparing the results corresponding to these groups of respondents.

Methods

Organization of the study. Data collection was carried out in the form of an online survey in September-November 2021. 764 respondents took part in the study, including 403 residents of Belarus and 361 residents of Russia. Among them are 538 women (300 Belarusians and 238 Russians) and 228 men (104 Belarusians and 124 Russians). The average age of the subjects was 20.5 years (SD = 5.4).

Research methods. Smartphone addiction was diagnosed with a short version of the CAC-16 questionnaire "Smartphone addiction scale ", the reliability and validity of which was proven (Sheynov, 2021) . Psychometric characteristics of the CAC-16 questionnaire : the standardized Cronbach's Alpha for the matrix of responses of 447 women to 16 tasks of the questionnaire is 0.749, for 243 men - 0.746, which indicates a good internal consistency of CAC-16 for women and men; deleting any task leads to a deterioration in the internal consistency of the questionnaire.

Its retest reliability was verified by retesting one month apart: the correlation between the first and second test is 0.855 ($p \leq 0.001$) (Sheinov, 2021) .

Assertiveness was measured questionnaire A26 that meets the requirements of reliability and validity; psychometric characteristics A26 : standardized Cronbach's Alpha for the matrix of responses to 26 items of the questionnaire is 0.911 ($p \leq 0.001$), p -test reliability with an interval of one month $R = 0.832$, $p \leq 0.001$ (Sheinov, 2014, pp. 109–110.).

vulnerability to manipulation was diagnosed with the NZM questionnaire "Assessment of the degree of insecurity of an individual from manipulative influences"; psychometric characteristics of the NZM questionnaire : the standardized Cronbach's Alpha for the matrix of responses to 20 items of the questionnaire is 0.772 ($p \leq 0.001$), the correlation between the first and second test when testing four groups with an interval of 4-8 weeks is within $0.771 \leq R \leq 0.923$ ($p \leq 0.001$) (Sheinov, 2012, p. 151).

Dependence on social networks was measured by the ZSS-15 questionnaire, the reliability and validity of which has been proven (Sheynov, Devitsyn , 2021a) . Psychometric characteristics of the ZSS-15 questionnaire : standardized Cronbach's Alpha for the response matrix of 514 subjects per 15 questionnaire items was equal to 0.858, which indicates a good internal consistency of the test. Retest reliability verified by retesting one month apart: correlation between first and second test $r = 0.811$, $p \leq 0.001$.

Impulsiveness were evaluated using the " Methodology for diagnosing the potential communicative impulsivity", proposed by V.A. Losenkov (Fetiskin , Kozlov, Manuilov, 2002) .

The assessment of the level of *narcissism* was carried out with a questionnaire (scale) by E. Kot (TestyOnline.ru›persona / nartsiss-li-vy /).

This study also used a statistically consistent three-factor model of smartphone addiction, including the following factors: "Loss of self-control", "Fear of refusal to use a smartphone", "Euphoria from using a smartphone". All three factors that form dependence on a smartphone increase with decreasing age (Sheinov, Devitsyn , 2021c, p. 174). The factorial model of addiction to social networks was also used in the study **,** which allows you to compare the factors that form it with addiction to a smartphone. The structure of dependence on social networks is represented by three factors: "Psychological state of the network user", "Communication of the network user" and "Obtaining information" (Sheinov, Devitsyn , 2021b).

Statistical analysis was carried out using the SPSS -22 package. The significance level $p = 0.05$ was adopted.

Results

To decide what criteria to use to investigate the alleged relationship of smartphone addiction, we checked the studied samples for their compliance with the normal distribution law.

It turned out that some of the samples representing the studied qualities are normally distributed (dependence on a smartphone - CAC-16 questionnaire, vulnerability to manipulation NZM questionnaire, impulsiveness , assertiveness), but the distribution of others is different from normal (dependence on social networks ZSS-15, narcissism, age, and all the factors of smartphone and social media addictions).

Therefore, to determine possible relationships between smartphone addiction and personality traits, we calculated correlations using the Pearson parametric test and the Kendall nonparametric rank test, choosing for output in each case the correlation for which the conditions of normality

of sample distribution are met (or not met) in each study. a couple of variables.

Tables 1-6 present the results of calculating correlations in the total, as well as in the female and male samples of Belarusians and Russians.

Table 1

Correlations of smartphone addiction with states and personality traits (Belarus, women and men, n = 403)

	Age	NZM	Pulse	PoterCon	Fear	Euphoria
Correlations Pearson	**-,151** **	**-,122** *	**.488** **	**.880** **	**.744** **	**.791** **
Value (2-sided)	.002	.014	.000	.000	.000	.000
Correlations Kendella	.010	**-,089** *	**.343** **	**.719** **	**.597** **	**.609** **
Value (2-sided)	.794	.011	.000	.000	.000	.000

	PsychComposition	Kommun	Inform	ZSS-15	Narcissus	assert
Correlations Pearson	**.698** **	**.444** **	**.532** **	**.690** **	.009	**-,389** **
Value (2-sided)	.000	.000	.000	.000	.850	.000
Correlations Kendella	**.536** **	**.331** **	**.382** **	**.518** **	.032	**-,263** **
Value (2-sided)	.000	.000	.000	.000	.355	.000

Notes: * – p < 0.05; ** – p < 0.01. *Designations in the table. 1-6:* NZM - exposure to manipulation, Impulse - impulsiveness ; PoterCon - "Loss of control over oneself", Fear - "Fear of refusal to use a smartphone", Euphoria - "Euphoria from using a smartphone" (factors of dependence on a smartphone); PsychSost - "Psychological state of a network user", Kommun - "Communication of a network user", Inform - "Receiving information" (factors of dependence on social networks), ZSS-15 - dependence on social ties; Narcissus - narcissism, Assert - assertiveness

Tabl. 1 indicates that in the total sample of Belarusian men and women, the Pearson and Kendall correlations show the same relationships (except for the age indicator), differing only quantitatively.

The presence of statistically significant relationships of dependence on a smartphone among Belarusians was revealed: *negative* with assertiveness and vulnerability to manipulation, *positive* - with impulsivity, dependence on social networks and all its factors ("psychological state", "communication", "receiving information).

The *age distribution* is not normal, so we accept the Kendall correlation, which is not statistically significant. Therefore, based on the existing sample, nothing can be said about the relationship between smartphone addiction and age.

The value of Kendall's correlations indicates that the dependence on the smartphone is most associated with the factor "Loss of control over oneself". Although Pearson's correlation leads to the same conclusion, the conclusion must be made by the non-parametric Kendall test, since the distribution of smartphone addiction factors differs from the normal one.

The positive relationship between smartphone addiction and impulsivity is consistent with the relationship found by foreign researchers (Billieux et al ., 2008 ; Gecaite - Stonciene et al ., 2021; Jo et al ., 2018; Kim et al ., 2016; Mei et al ., 2018; Peterka _ _ et al ., 2019; Lee , Park , 2014) ; and the identified positive relationship with social media addiction is also similar to previously obtained foreign results (Khoury , Neves , Roque , 2019; Tunc - Aksan , Akbay , 2019; Jeong et al ., 2016). –

The links we have established between smartphone addiction and non- assertiveness and all factors of social media addiction are new.

Identified by a number of foreign researchers (Giordano et al ., 2019; Pearson , Hussain , 2017, p. 18) the connection between smartphone addiction and narcissism was not confirmed in the general sample of Belarusian women and men.

When combining a female sample with a male sample into a single sample, it may turn out that the connections that take place in the subsamples "dissolved" in the general sample (for example, if they are in different directions in them). Therefore, we calculated correlations separately for women and men.

Table 2

Correlations of smartphone addiction with states and personality traits (Belarus, women, n = 300)

	Age	NZM	Pulse	PoterCon	Fear	Euphoria
Correlations\ Pearson	**-,164** **	**-,140** *	**.466** **	**.865** **	**.738** **	**.769** **
Value (2-sided)	.004	.015	.000	.000	.000	.000
Correlations Kendella	.029	**-,097** *	**.323** **	**.705** **	**.589** **	**.587** **
Value (2-sided)	.515	.016	.000	.000	.000	.000

	PsychComposition	Kommun	Inform	ZSS-15	Narcissus	assert
Correlations Pearson	**.692** **	**.373** **	**.498** **	**.666** **	-,042	**-,403** **
Value (2-sided)	.000	.000	.000	.000	.470	.000
Correlations Kendella	**.522** **	**.274** **	**.359** **	**.491** **	.000	**-,277** **
Value (2-sided)	.000	.000	.000	.000	.995	.000

Presented in table. The results of Table 2 show the presence of statistically significant relationships between smartphone addiction in Belarusian women: *negative* with assertiveness and vulnerability to manipulation , and *positive* with impulsivity, dependence on social networks and all its factors ("psychological state", "communication", "receiving information).

Similar to the conclusion for the general sample of Belarusian women and men, smartphone addiction among Belarusian women is most associated with the "loss of self-control" factor.

Since exposure to manipulation and dependence on a smartphone are normally distributed, therefore, the conclusion about the presence of a negative relationship between them is based on a statistically significant Pearson correlation. Thus, the hypothesis about a possible connection between smartphone addiction and vulnerability to manipulation was confirmed for Belarusian women.

Assertiveness , vulnerability to manipulation, and all factors of social media addiction found in this study are new.

The positive relationship between smartphone addiction and narcissism established by a number of foreign researchers was not confirmed in this study for Belarusian women.

Table 3

Correlations of smartphone addiction with states and personality traits (Belarus, men, n = 104)

	Age	NZM	Pulse	PoterCon	Fear	Euphoria
Correlations Pearson	-,153	.070	**.491** **	**.899** **	**.710** **	**.826** **
Value (2-sided)	,122	.477	.000	.000	.000	.000
Correlations Kendella	-,078	.046	**.368** **	**.714** **	**.583** **	**.651** **
Value (2-sided)	.303	.511	.000	.000	.000	.000

	PsychComposition	Kommun	Inform	ZSS-15	Narcissus	assert
Correlations Pearson	**.646** **	**.500** **	**.596** **	**.690** **	.083	**-,314** **
Value (2-sided)	.000	.000	.000	.000	.401	.001
Correlations Kendella	**.479** **	**.329** **	**.407** **	**.502** **	.078	**-,213** **
Value (2-sided)	.000	.000	.000	.000	.264	.002

Presented in table. 3 results show the presence of statistically significant links between Belarusian men's dependence on smartphones: *negative* - with assertiveness and *positive* - with impulsivity, dependence on social networks and all its factors ("Psychological state", "Communication", "Receiving

information"). As in previous cases, the largest correlation coefficient was found between the dependence of Belarusian men on a smartphone and the "Loss of self-control" factor.

Similarly to the Belarusian female sample and the combined sample of Belarusian men and women, the obtained associations of dependence on the smartphone of Belarusian men with impulsivity and dependence on social networks correspond to similar associations established in foreign studies.

Shown in table. The 3 links between male smartphone addiction and all factors of social media addiction are new.

For the Belarusian male sample, the hypothesis about a possible connection between dependence on a smartphone and vulnerability to manipulation was not confirmed. The connection between smartphone addiction and narcissism, revealed by a number of foreign researchers, has not been confirmed in the Belarusian society.

Let us turn next to the corresponding results in Russian samples.

Table 4

Correlations of smartphone addiction with states and personality traits (Russia, women and men, n = 361)

	Age	NZM	Pulse	PoterCon	Fear	Euphoria
Correlations Pearson	**-,170** **	.078	**.423** **	**.868** **	**.768** **	**.801** **
Value (2-sided)	.001	.138	.000	.000	.000	.000
Correlations Kendella	**-,074** *	.063	**.285** **	**.700** **	**.602** **	**.625** **
Value (2-sided)	.050	.087	.000	.000	.000	.000

	PsychComposition	Kommun	Inform	ZSS-15	Narcissus	assert
Correlations Pearson	**.634** **	**.426** **	**.498** **	**.621** **	**-,123** *	**-,377** **
Value (2 sides)	.000	.000	.000	.000	.020	.000
Correlations Kendella	**.517** **	**.325** **	**.357** **	**.483** **	-,072	**-,254** **
Value (2-sided)	.000	.000	.000	.000	.052	.000

Presented in table. 4 results show the presence of the following statistically significant relationships depending on the smartphone: *negative* - with age, assertiveness , *positive* - with dependence on social networks and its factors "Psychological state", "Communication", as well

as with the factors "Getting information", "Loss of control over oneself", "Fear of refusal to use a smartphone", "Euphoria from using a smartphone".

In contrast to the Belarusian respondents, the Russian sample did not find a link between smartphone addiction and exposure to manipulation.

The revealed correlations show that dependence on a smartphone in a sample of Russians is associated with impulsiveness, lack of assertiveness , as well as dependence on social networks, and with all factors of dependence on a smartphone and on social networks (according to Kendall), except for narcissism.

The value of Kendall's correlations indicates that the largest correlation coefficient for smartphone addiction is with the "Loss of control" factor (as in the sample of Belarusian respondents).

The found links between smartphone addiction and non- assertiveness and all factors of social media addiction are a new fact that is not reflected in the available studies.

In order to identify possible gender differences, we compare the correlations separately for the female and male samples of Russian respondents (the data are shown in Tables 5 and 6).

Table 5

Correlations of smartphone addiction with states and personality traits (Russia, women, n = 238)

	Age	NZM	Pulse	PoterCon	Fear	Euphoria
Correlations Pearson	**-,209** **	.035	**.454** **	**.872** **	**.783** **	**.791** **
Value (2-sided)	.001	238	.000	.000	.000	.000
Correlations Kendella	-,085	**.128** **	**.309** **	**.708** **	**.606** **	**.608** **
Value (2-sided)	.068	.005	.000	.000	.000	.000

	PsychComposition	Kommun	Inform	ZSS-15	Narcissus	assert
Correlations Pearson	**.748** **	**.451** **	**.531** **	**.711** **	**-,139** *	**-,403** **
Value (2-sided)	.000	.000	.000	.000	.032	.000
Correlations Kendella	**.543** **	**.309** **	**.361** **	**.496** **	**-,101** *	**-,271** **
Value (2-sided)	.000	.000	.000	.000	.026	.000

According to the results presented in table. 5, the following statistically significant relationships of smartphone dependence among Russian women were revealed: *negative* with assertiveness and narcissism , and *positive* with impulsivity, dependence on social networks and all its factors ("Psychological state of the user", "User communication", "Receiving information").

As in the previous cases, the "Loss of self-control" factor shows the greatest connection with Russian women's dependence on smartphones.

Tampering vulnerability score and smartphone addiction are normally distributed, so the conclusion that there is no statistically significant relationship between them is based on the Pearson correlation score. Thus, for the Russians, the hypothesis about a possible connection between dependence on a smartphone and vulnerability to manipulation was not confirmed.

Assertiveness and all factors of social network addiction revealed in a sample of Russian women are new.

A positive relationship between smartphone addiction and narcissism, established in a number of foreign studies, was not confirmed for this sample of women from Russia. On the contrary, this study revealed a negative significant relationship between these indicators.

In table. Figure 6 shows data on the relationship between smartphone addiction and personality traits in a male sample of Russian respondents.

Table 6

Correlations of smartphone addiction with states and personality traits (Russia, men, n = 124)

	Age	NZM	Pulse	PoterCon	Fear	Euphoria
Correlations Pearson	**-,233** **	.131	**.339** **	**.851** **	**.735** **	**.823** **
Value (2-sided)	.009	.147	.000	.000	.000	.000
Correlations Kendella	**-,137** *	.069	**.243** **	**.694** **	**.595** **	**.662** **
Value (2-sided)	.038	.274	.000	.000	.000	.000

	PsychComposition	Kommun	Inform	ZSS-15	Narcissus	assert
Correlations Pearson	**.491** **	**.380** **	**.447** **	**.497** **	-,066	**-,312** **
Value (2-sided)	.000	.000	.000	.000	.465	.000
Correlations Kendella	**.480** **	**.349** **	**.359** **	**.460** **	-,001	**-,218** **
Value (2-sided)	.000	.000	.000	.000	.988	.001

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Presented in table. 6, the results show the presence of statistically significant relationships between the dependence of Russian men on a smartphone: *negative* - with age and assertiveness, and *positive* - with impulsivity, dependence on social networks and all its factors ("psychological state", "communication", "receiving information").

"Loss of control" factor also has the greatest impact on smartphone addiction among Russian men.

As in the case of the Russian female sample, and the combined sample of Russian men and women, the obtained associations of smartphone dependence with impulsivity and dependence on social networks correspond to similar associations established in foreign studies.

Presented in table. 6 links between Russian men's smartphone addiction and all factors of social media addiction are new.

For Russian men, the hypothesis about the connection between smartphone addiction and vulnerability to manipulation and narcissism was not confirmed.

Discussion

The results obtained in the study show that Belarusians and Russians have both similarities (they prevail) and differences in the relationship between smartphone addiction and psychological qualities and personality traits.

Similarities in Russian and Belarusian men and women are manifested in the following: dependence on a smartphone is associated with such psychological qualities and personality traits as impulsiveness, lack of assertiveness , loss of self-control, fear of refusal to use a smartphone, euphoria from using a smartphone, psychological states, using a smartphone with a purpose communication, using a smartphone to obtain information. In all studied samples, regardless of gender, the highest correlation was found between dependence on a smartphone and loss of self-control.

The data obtained are consistent with the results of previous studies. So, I. M. Gorodetskaya and I. R. Islamgulov revealed the relationship between mobile phone addiction and a person's propensity for addictive behavior in general (Gorodetskaya, Islamgulov , 2014). E. I. Rasskazova, V. A. Emelin and A. Sh . Tkhostov (2015) describe changes in the need sphere of a person that occur under the influence of excessive use of technical devices. It has been shown that dependence on a smartphone among Russian students (boys and girls) is negatively associated with assertiveness (Sheinov, Devitsyn , Pomelova , Nizovskikh, 2021).

The established links between smartphone addiction and social media addiction and impulsivity are consistent with the results found in foreign studies.

The results obtained on the differences in the relationship of dependence on a smartphone among Belarusians and Russians deserve special attention. In contrast to Belarusian respondents, Russian subjects showed a significant relationship between smartphone addiction and age, which allows us to state that the older Russian men are, the less they become dependent on smartphones. This is consistent with the data that "the problematic use of a mobile phone in adolescence is rather situational, and as they grow older , the smartphone acquires its true functional purpose" (Kolesnikova, Melnik, Teplova, 2018, p. 9).

interest is also the discovery of a negative relationship between smartphone addiction and vulnerability to manipulation in Belarusian women, while in Russian women this relationship is positive. It can be assumed that Belarusian women seem to have more experience in recognizing

the risks of online communication using smartphones. At the same time, women are more likely than men to become victims of cyberbullying , since they are more suggestible than men (Pakov, 2013, p. 24).

A cross-cultural study found more similarities than differences between Russian and Belarusian men compared to female samples. Russian and Belarusian men showed similar relationships between all the studied characteristics, with the exception of the relationship between smartphone addiction and age. As already noted, in Russian men, in contrast to Belarusian men, this connection was found.

The results of the study are of *practical importance* , indicating the need for consulting and educational work in educational organizations for the development of students' personal qualities (in particular, assertiveness), which help prevent the formation of such dependence or get rid of it.

Conclusion

Studies of the relationship between smartphone addiction and personal qualities and properties of Belarusians and Russians showed that Belarusians and Russians have in common: a negative relationship between smartphone addiction and assertiveness and a positive one with impulsivity, dependence on social networks and its factors, loss of self-control (most strong connection), fear of refusal to use a smartphone, euphoria from its use.

and narcissism in Russian women (in the absence of it in other groups of respondents) and with vulnerability to manipulation in Belarusian women, while in Russian women this relationship is positive.

The results obtained contribute to the expansion of scientific discourse on the problem of digitalization of society. The prospects of the study are related to the expansion of the range of personal qualities and properties that are presumably associated with smartphone addiction, as well as to conduct similar studies in other regions.

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Devitsyn Anton Sergeevich - development of programs for processing initial data and prompt delivery of test results to respondents online.

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Psychological and Pedagogical Problems of Distance Learning in the Views of Teachers and Parents

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Annotation: **Introduction** . In recent years, the attention of scientists and practitioners is increasingly drawn to the problems of organizing distance learning. The relevance of the study lies in the fact that distance learning, which appeared as an addition to the traditional education system, after 2020 has become a necessary and sometimes the only form of continuing education for students and schoolchildren. The article presents the results of an empirical study of teachers and parents on an online platform to study their attitudes and assessments to various aspects of distance learning, shows the similarity and differences in the assessments of teachers and parents to online technologies in teaching schoolchildren. **Methods** . 2758 respondents took part in the study in the online platform, including: teachers - 571 people, students - 703 people and parents - 1484 people. For each group of respondents, separate questionnaires were compiled, consisting of closed, semi-closed and open questions. Questionnaire questions were aimed at identifying the attitude of respondents to distance learning, assessing the difficulties and problems of organizing interaction between students, teachers and parents in online learning, as well as about the desire and possibility of continuing education in this format. **Results** . Teachers, like parents, point to communication problems as the main shortcomings of distance learning. The negative attitude of parents to distance learning was reflected in their assessment of the impact of this technology on the emotional and behavioral manifestations of children. Assessing changes in the learning activities of students in the context of distance learning, the majority of teachers (81%) believe that it had a negative impact on the motivation of students to learn. Yet, unlike parents, teachers gave a positive assessment to some aspects of distance learning. More than 16% of teachers believe that the use of online learning allows them to implement a differentiated approach to students and teach them at their own pace, and about a quarter of respondents (23%) see distance learning as a good opportunity to increase the level of student independence. **Discussion of the results** . The scientific novelty of the research is determined by an integrated approach to the analysis of the psychological and pedagogical problems of distance learning in the views of teachers and parents. With regard to proposals for improving the interaction

between distance learning participants, the opinions of teachers and parents turned out to be similar. More than two-thirds of parents and the majority of teachers proposed to improve information and computer technologies, as well as to provide the child with high-quality computer equipment and uninterrupted Internet. **Conclusion.** The lack of interpersonal interaction between students and teachers is an obvious problem that somehow accompanies online learning. This psychological factor negatively affects both motivation and learning success. Under these conditions, further research into the problem of interaction between participants in the educational process and the development of optimal ways to organize their joint educational activities become extremely relevant.

Keywords : distance learning, online technologies, information and communication technologies, communication problems, learning motivation, emotional and behavioral manifestations, pedagogical interaction, psychological and pedagogical support of distance learning

Highlights

- the main problem of distance learning is the lack of high-quality communication both between the teacher and students, and the students themselves;
- in conditions of distance learning there is a significant decrease in motivation;
- most parents note the negative impact of distance learning on the emotional and behavioral manifestations of children;
- the advantage of distance learning, according to teachers, is the possibility of using modern information technologies, the ability to implement a differentiated approach to students and teach them on an individual trajectory, as well as increase the independence of students;
- in order to improve the productivity of distance learning. it is necessary to improve information and computer technology, provide students with high-quality equipment and uninterrupted Internet;
- in the process of distance learning, it is important to increase the responsibility of parents in terms of organizing the daily routine of students, as well as improving the quality of the organization of the educational process by teachers.

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Introduction

An analysis of the psychological and pedagogical literature indicates a significant attention to the problem of introducing distance technologies into the educational process of educational institutions.

Many researchers are developing concepts for remote interaction between subjects of education (Danilova et al., 2019; Karp, 2010; Minina, Vasilkova, 2019).

The study of scientific sources allows us to state that distance interaction also finds its place in the education system (Allen, 2022; Kazakova, 2020; Karp, 2010; Narykova , 2018 ; Sayapin , 2013; Furaeva , 2018; Karpov, 2015; Kushkareva , 2018; Nikulicheva , 2016; Norvig , 2013; Temerbekova et al . 2017). On the other hand, there are quite a few studies that note the negative impact of the remote format (Pronenko , Tsakhilova , Popova , Belikova , 2022; Beketova, Demina, 2018: Lukashenko, 2019, Mudrakova , 2015; Sims , Schuman , 1999). Distance interaction in the educational environment can be understood as the interaction between parents and teachers supplemented by the capabilities of modern computer and Internet technologies.

In order for this cooperation to be the most fruitful, it is advisable to create a single information and educational space (UIEP) in each educational organization (Narykova , 2018). Creating such a space for interaction with parents can be an additional source for the teacher to receive information from parents, as well as an effective way to communicate with other teachers and parents.

The undoubted advantage of this interaction will be saving the time of the parents of the students, which will help them to be "sufficiently informed" about the life of children in conditions of total employment. It is important that such communication between the teacher and the parent should not acquire a formal character, but should be directed in the interests of each child.

In the study by Petrash, Sidorova (2020), the main advantages of remote interaction between teachers and parents were analyzed, including: saving time for all subjects of the educational process; irregularity , i.e., the absence of a psychological barrier between the teacher and the parents of the children; efficiency and mobility; the opportunity to return to the correspondence, to the expressed ideas and recommendations, important messages. An expert survey and questioning of teachers showed that the vast majority of teachers daily use remote forms of interaction with students' parents. The most frequent forms of communication are groups in social networks (95%) and instant messengers WhatsApp , Viber , Telegram (66%).

Problem areas remain issues of information competence of parents and teachers and insufficient readiness of teachers to apply these forms. However, communication between parents and the pedagogical community cannot be limited only to virtual forms of interaction, but should become an additional tool that helps support parenthood in the face of modern challenges (Petrash, Sidorova, 2020).

The teacher-researcher Khutorskoy (2017) offers the following models for organizing distance learning for students: "school - Internet", "school - Internet - school", "student - Internet - teacher", "student - Internet - distance center", "student - Internet ". Models "student - Internet - remote center", "student - Internet" are used by high school students in the period of preparation for admission to a higher educational institution. The school teacher in these models of distance education may act as an adviser, rather than a leader or controller.

According to the American scientist T. Murphy, the key features of the online learning environment are its interactivity, multimedia, openness, online search, independence from time, distance and devices, global accessibility, the possibility of multiple examination, learning control, convenience, independence (Murphy , 2000).

The experience of UNESCO International Bureau specialists I. Byron and R. Gagliardi , who studied the use of information technologies in schools in different countries, showed that in school education, information technologies are used primarily for homework, creative work, consultations with teachers, joint and individual projects and distance learning can be an alternative to face-to-face education for children unable to attend school (Byron & Gagliardi, 1999).

Japan has its own view on the use of computers in school education, limiting their introduction into the higher education system. However, since 1994, primary and secondary education has been actively equipped with computers (one for each student) and the connection of all school levels to the Internet (Polat, 2020).

Vasilenko (2000) cites data obtained by Japanese experts that children who constantly communicate with a computer differ from their peers in both mental and ideological aspects. They can familiarize themselves with the contents of several books of three hundred pages in eight hours of work at a computer due to the fact that the information is there in graphical form, there are no repetitions.

One of the most advanced countries in terms of implementing information systems, UNESCO specialists consider Australia. An information network (Austalian Capital Territory Information Network), which aimed to introduce the Internet to elementary and secondary schools. It pays great attention not only to user skills, but also to methods for the effective use of Internet resources and services (Polat, 2020).

In many countries (USA, Great Britain, etc.) they offer an opportunity to obtain academic degrees, a bachelor's degree, a master's degree in various areas in a remote form. The UK Open University offers 53 courses for different levels in different specialties.

The experience of using distance learning in practice in the educational process of US secondary schools is interesting. In the United States, distance education is becoming very popular among students and their parents, which is carried out by state and non-state educational organizations.

An interesting experience of using the Internet in school and university education, distance learning is available in Canada. This country was one of the first to try not only to unite all schools into a single Internet network, but also proposed the SchoolNet program , which connected 16,500 primary and secondary schools with a single network with the ability to access all libraries and universities in the country. This is a huge resource for 302,000 teachers to use to nurture and educate 4 million Canadian students (Polat, 2020).

Own programs for connecting schools and universities to the Internet are being developed in Kazakhstan, the Czech Republic, Slovakia, and Belarus (Polat, 2020).

The prospects of distance learning are due to the experience that has already been

accumulated, which has proven its effectiveness, of course, with proper organization. Granger researchers et al . (2002) believe that with the right organization, distance learning can be even more effective than full-time education.

As Korotaeva (2013) notes, the algorithmization of educational activities, which is set in DL as a specific form of learning, just contributes to the implementation of educational activities of a reproductive nature to a greater extent. When the subjects are far from each other, some components of control are lost: eye contact, quick response to emerging questions and situations, analysis of the emotional and intellectual atmosphere in the audience, etc.

Based on a theoretical review of research by domestic and foreign scientists, we came to the conclusion that distance learning in modern realities has many advantages, but at the same time it is not without drawbacks and problems.

The purpose of our study is to study the psychological and pedagogical problems of distance learning in the views of teachers and parents, as well as to develop recommendations for the psychological and pedagogical support of participants in the educational process in the context of online learning.

Methods

The study we conducted as part of the implementation of the State task of the Ministry of Education of the Russian Federation on the topic: "Conceptual foundations and methods for organizing productive pedagogical interaction between the school, parents and persons replacing them, studying in the distance learning format" was aimed at studying the relationship of teachers, students and parents to distance learning, as well as their assessment of the difficulties and problems in organizing online learning.

The study was conducted on a representative sample in the territory of the North Caucasian Federal District of the Russian Federation. In our study, 2758 respondents took part in the online platform , including teachers - 571 people, students - 703 people and parents - 1484 people.

For each group of respondents, separate questionnaires were compiled, consisting of closed, semi-closed and open questions. Questionnaire questions were aimed at identifying the attitude of respondents to distance learning, assessing the difficulties and problems of organizing interaction between students, teachers and parents in online learning, as well as about the desire and possibility of continuing education in this format.

This article presents the results, their discussion of the study of opinions, assessments and attitudes of teachers and parents to the organization of distance learning, as well as its impact on the emotional, motivational and behavioral manifestations of students.

Results

First of all, attention is drawn to the similarity of opinions of teachers and parents in their assessment of the difficulties of distance learning, both for students and teachers. The lack of opportunity to communicate with teachers is considered by 40% of parents as the most significant difficulty in organizing distance learning. Almost a quarter of parents (23%) believe that the second most important problem with online learning is the lack of opportunities for children to communicate with their classmates (Figures 1 and 2).

Figure 1.

Assessing the difficulties of distance learning for a child according to parents

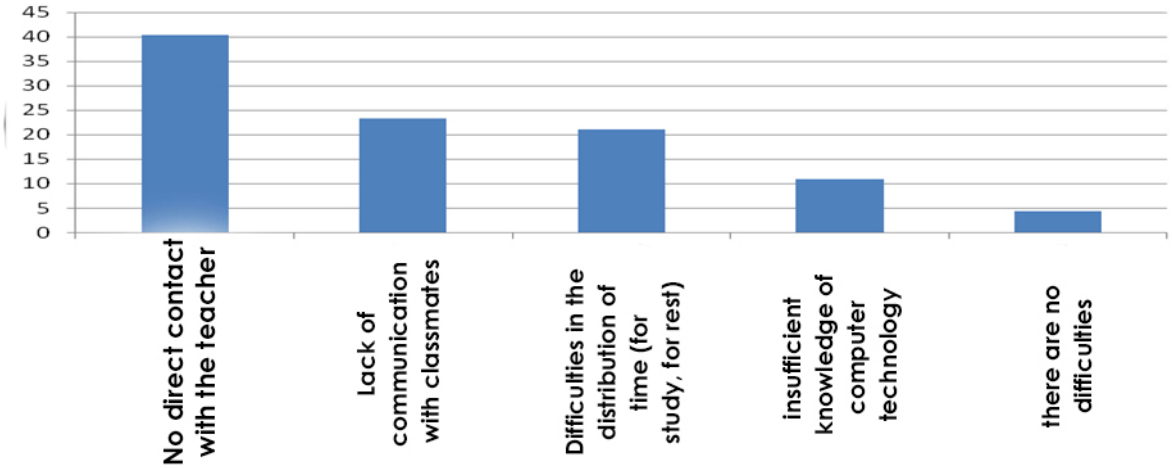
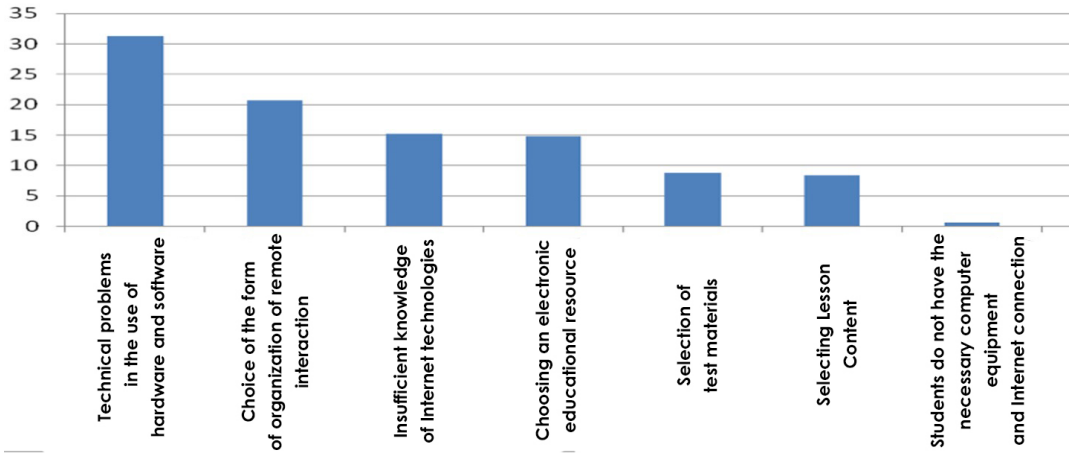


Figure 2.

Assessing the difficulties of distance learning for a child according to teachers



Teachers, like parents, point to communication problems as the main disadvantages of distance learning. Almost half of the teachers (48%) lack direct communication with students (35%), and there were also difficulties in organizing interaction with their parents (13%). It is noteworthy that almost every sixth teacher (17%) believes that distance learning is characterized by the imperfection of the system for diagnosing the quality of learning outcomes.

Meanwhile, assessing the difficulties in planning a lesson in distance learning, teachers noted that despite the fact that most of them have the technical capabilities to organize online learning, more than a third of the teachers surveyed (46%) have technical problems in using computer equipment. and related software (31%), as well as insufficient knowledge of Internet technologies (15%). In addition, many teachers had difficulties with the choice of one or another electronic resource, as well as the selection of control and measuring materials for students.

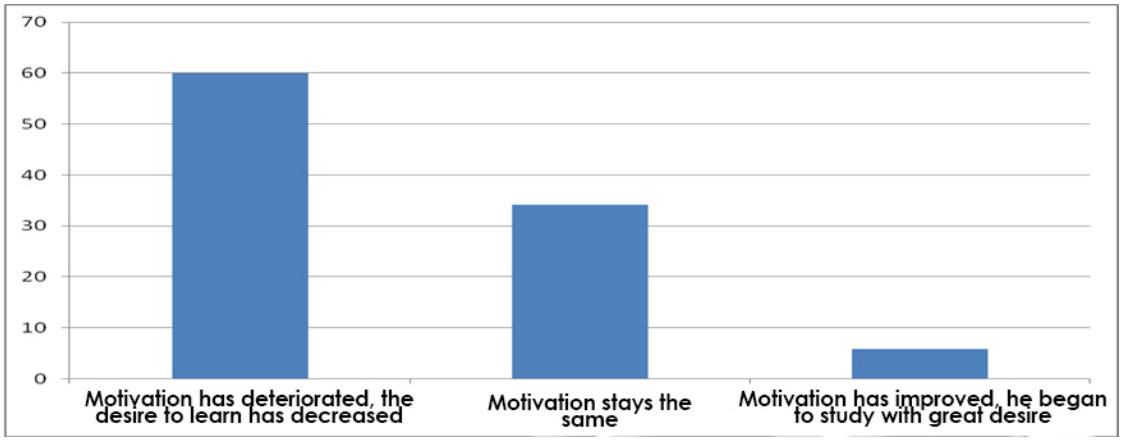
In general, we see that the vast majority of teachers and parents consider the problem of children's communication as the main difficulties of distance learning, and not the issue of the quality of education and computer skills.

For the majority of parents (81%), the process of organizing the time of life (daily routine) of the child in the context of distance learning was also a significant problem. The negative attitude of parents towards distance learning is reflected in their assessment of the quality of this form of education. An analysis of their answers regarding the quality of education in the online format just showed that for the vast majority of parents (74%) its assessment is unsatisfactory. Possibly, poor self-organization of students and the lack of the opportunity to help their children and the low quality of education could serve as a factor in the emergence of negative emotional states of parents in conditions of distance learning. Therefore, many parents (79%) rated their condition during this period as negative.

Another reason for the negative attitude of parents to distance learning is the assessment or motivation of learning in children. From the point of view of the majority of parents (60%), under the new conditions of learning, the motivation for learning has decreased, while only according to a third of parents, it has remained at the same level (Fig. 3).

Figure 3

Evaluation of changes in the child's motivation during distance learning according to parents (in %)

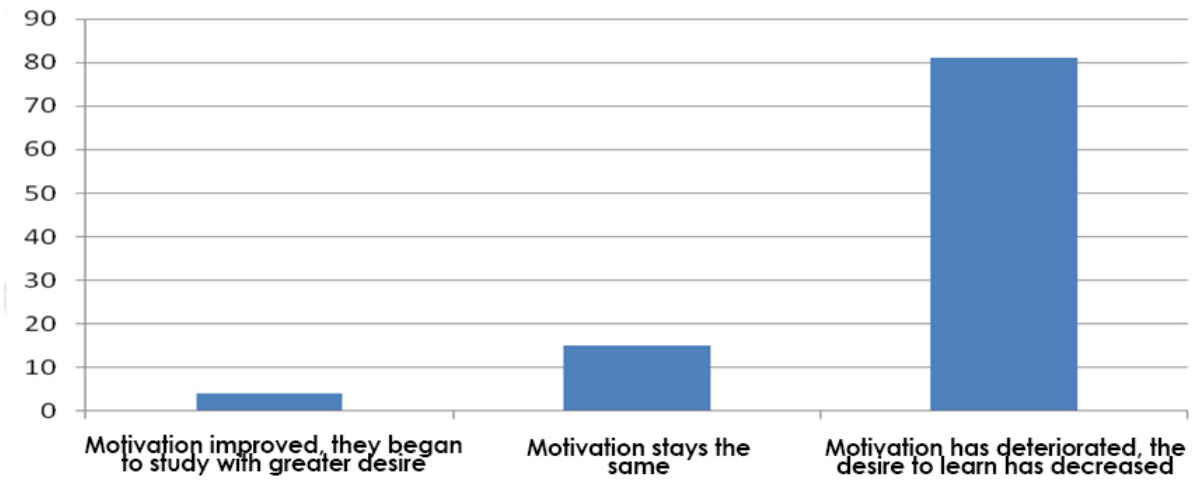


The negative attitude of parents to the distance learning format was reflected in their assessment of the impact of this technology on the emotional and behavioral manifestations of children. More than half of the parents surveyed (55%) believed that online learning had a negative impact on the emotional state of their children, while respondents indicated that they became more depressed and anxious (30%), and many experienced outbursts of irritation and anger that were not observed earlier (25%. Parents also noted that the behavior of children in the new learning environment became worse (38%). In particular, it has become harder to manage them and control the behavior of their children.

Assessing changes in the learning activities of students in the context of distance learning, the majority of teachers (81%) believe that it had a negative impact on the motivation of students to learn. It should be noted that the opinions of teachers and parents practically coincide on this issue, so we can talk about a noticeable decrease in the motivation of students to learn as a typical problem of the distance form of organizing the education process (Fig. 4).

Figure 4

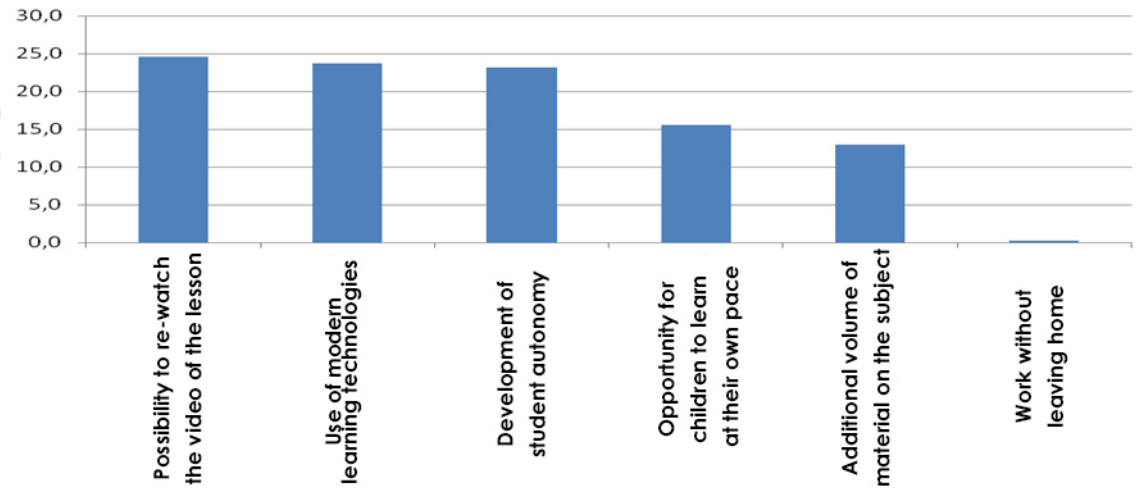
Evaluation of changes in students' motivation during distance learning according to teachers



Yet, unlike parents, teachers gave a positive assessment to some aspects of distance learning. More than 16% of teachers believe that the use of online learning allows them to implement a differentiated approach to students and teach them at an individual pace, and about a quarter of respondents (23%) see distance learning as a good opportunity to increase the level of student independence. Almost the same number of teachers (24%) consider the use of modern information technologies of education as a positive side of distance learning (Fig. 5).

Figure 5

Evaluation of the positive aspects of distance learning according to teachers



Meanwhile, despite the highlighted positive aspects, 76% of teachers do not consider the possibility of continuing education in a distance format, and only 22% would like to continue it, but only periodically (not on a permanent basis) using modern information technologies.

Discussion

In our study, respondents were asked to openly express their proposals for improving the interaction between subjects of distance learning. With regard to proposals for improving the interaction between distance learning participants, the opinions of teachers and parents turned out to be similar. More than two-thirds of parents and the majority of teachers proposed to improve information and computer technologies, as well as to provide the child with high-quality computer equipment and uninterrupted Internet.

In addition, a quarter of the teachers surveyed (23%) suggest increasing the responsibility of parents in terms of close monitoring of schoolchildren's learning and compliance with the daily routine when doing homework. As for parents, it is also relevant for them to improve the quality of the organization of the distance learning process.

Currently, online learning is becoming not just a convenient tool, but a necessity. In the context of the COVID-19 pandemic, the presence of a group of people in enclosed spaces has become a serious problem, which is why there is a need for social distancing and lockdowns around the world. For this reason, distance learning is becoming more relevant than ever and is being introduced in all educational institutions.

The development of information and communication technologies has provided ample opportunities for improving educational technologies and providing information resources to all participants in pedagogical interaction: teachers, students and their parents (Vorontsov, Chernova, 2019). At the same time, scientists and practitioners unequivocally and probably rightly express the opinion that no modern information and communication technology, no

matter how perfect, can and should not replace direct live communication between a teacher and a student (Vorontsov, Chernova , 2019 ; Kostina, Pisarenko, 2020; Orlova, 2018). Therefore, of course, there can be no talk of a complete replacement of full-time education and the transition of a modern school to distance learning - in an online format. Numerous studies in the field of psychological and pedagogical sciences (Kostina, Pisarenko, 2020; Orlova, 2018), including the results of our study confirm the correctness of this thesis. However, the situation of the COVID -19 pandemic left no alternative for a person, except to opt for a remote format for organizing student learning.

Along with the advantages, distance learning has significant problems. First of all, this is the problem of adaptation of participants in the educational process to online learning. The transition from traditional classroom to online format makes the learning process completely different. Working with a personal account and materials in various multimedia formats requires active actions from students.

Meanwhile, scientists note that the younger the student, the more clearly "there is a greater dependence of the student on the educational material. Reproducing it, he tends to always keep the structure of the original, it is very difficult for him to reconstruct and recombine it ... "(Korotaeva, 2013), which is difficult in conditions of distance learning. This issue is also highlighted in a study in Switzerland on the learning outcomes of 8 weeks of school closures related to the COVID-19 pandemic, noting that secondary school students are largely unaffected by school closures in terms of learning outcomes, for primary school students schools, learning is slowing down, and at the same time, inter-individual differences in achievement are widening (Tomasik et al ., 2021).

Algorithmization of educational activities, which is set in distance learning as a specific form of education, just contributes to the implementation of educational activities of a reproductive nature to a greater extent. When the subjects are far from each other, some components of control are lost: eye contact, quick response to emerging questions and situations, analysis of the emotional and intellectual atmosphere in the audience, etc. tasks, strict algorithmization of actions, since it is this approach that allows you to keep the attention of a large (including remote) mass of people and get a relatively adequate feedback on the information offered (Korotaeva, 2013).

The lack of computer literacy is a serious problem that has affected both students and teachers of educational organizations. Many still do not have enough knowledge of a personal computer (PC) and standard office applications such as MS Word and PowerPoint. Therefore, technological skills are mandatory for successful completion of distance learning.

Lack of motivation and poor organization of life time in distance learning is a common problem for many students. This problem is also emphasized in foreign studies: in particular, in the study by Al - Assaf (2021), it is recommended to take into account these problems when introducing distance learning as a method of teaching the language, as well as in increasing independence.

The insufficient technical equipment of the distance learning format identified in the study (internet connection failures, etc.), negatively affecting the implementation and results of students' educational activities, has a disorganizing effect on the work of the subjects of the educational process. This, in turn, gives rise to negative emotional states (anxiety, irritability, frustration), which ultimately leads to demotivation and a decrease in performance. Social

deprivation and the lack of live communication in conditions of self-isolation have a significant impact on the emergence of negative emotional states.

Conclusion

1. The analysis of our study allows us to draw the following conclusions:
2. The similarity of the opinions of teachers and parents was also revealed in the assessment of changes in the motivation of students. Both groups of respondents emphasize a significant decrease in motivation in the context of distance learning.
3. On a sample of parents, it was found that the majority of respondents assessed the negative impact of distance learning on the emotional and behavioral manifestations of students (depression, anxiety, reduced social control).
4. As positive aspects of distance learning, respondents among teachers noted the possibility of using modern information technologies, the ability to implement a differentiated approach to students and teach them according to an individual trajectory, as well as increase the independence of students .
5. In our study, educators and parents expressed their attitudes towards improving the productivity of distance learning. Respondents in both groups made suggestions for improving information and computer technology, as well as the need to provide students with high-quality equipment and uninterrupted Internet.
6. Attention should be paid to the proposals of teachers on the issue of increasing the responsibility of parents in terms of organizing the daily routine of students, as well as the opinion of parents on improving the quality of the organization of the educational process by teachers during distance learning.

Thus, the online learning format requires students to have the necessary discipline and determination to complete tasks on their own, show the necessary interest and achieve success. Distance learning mechanisms seem to be an effective means of replacing face-to-face education, at least in an emergency.

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Elmira Arsenovna Kimpaeva - selection of sources on the topic, writing the text of the article.
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The personality of the future teacher: a review of foreign studies

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Abstract: Introduction. Modern social and educational conditions of professional activity pose the challenge of developing the problems not of an already established teacher, but an emerging one, because it is at this moment that it is possible to design the conditions for the development of the personality of a future effective educator. This issue is actively discussed in the Russian literature, but there is no consideration of foreign studies on this issue. This article aims to present and analyze foreign psychological approaches to the study of the personality of a future teacher. The novelty of the study lies in the conceptualization of foreign psychological-pedagogical approaches to the study of the future teacher's personality. In addition, the personality of a future teacher is substantiated as an independent stage of specialist's professional development, as well as a comparison of approaches to this problem in Russian and foreign psychology is made. **Theoretical justification.** The paper raises theoretical questions about the place of the problem of the future teacher's personality in the structure of foreign pedagogical psychology and psychology of education, theoretical and methodological approaches underlying foreign research, the directions of studying the future teacher's personality, and the personality model of the future teacher. These aspects of the analysis of foreign publications will make it possible to substantiate the provisions on the dominance of the general psychological "Big Five" factor model in the study of the future teacher's personality in foreign psychology, as well as on the similarities and differences in the theoretical and methodological foundations of Russian and foreign pedagogical psychology and psychology of education. **Results.** The directions of foreign research on this topic are considered: individual and personal characteristics necessary for the successful professional development of the future teacher; value-motivational components of the future teacher's personality; regulators of the effective performance of the future teacher; factors of successful mastery of the profession by the future teacher. An empirical model of the future teacher's personality in foreign pedagogical psychology is derived (based on the studies reviewed): the most significant personal properties and phenomena of the future and young teacher are the personal factors "extraversion", "conscientiousness", "openness to new things", "friendliness", emotional intelligence, self-confidence; in the motivational sphere, an important role is played by internal motivation and career values, as well as focus on mastering specific skills;

value orientations are student orientation and a positive attitude to inclusive education; among the regulators of pedagogical activity of a future teacher, the most effective are career adaptability, career satisfaction, focus on professional development, and self-efficacy/self-confidence.
Discussion. The analysis of foreign works allowed us to draw the following conclusions: there are no specific conceptual models of the future teacher's personality; studies focus on empirical results, from which specific implications are drawn rather than generalizable conclusions within the issue under study, indicating the emerging state of this field of foreign educational psychology; the universal «Big Five» factor model acts as the concept used to study the personality of the future specialist; similarities in the understanding of the future teacher's personality by Russian and foreign authors are expressed in the definition of personality traits through characteristics not related to pedagogical activity, but related to professional and organizational-psychological phenomena; differences are manifested in the basic theoretical-methodological approaches: Russian psychology uses the activity approach, the concept of professionalism and the theory of social development of the personality, while foreign psychology relies on the competence approach and the «Big Five» factor concept of the personality.

Keywords: pedagogical psychology, psychology of education, foreign psychology, teacher's personality, student-teacher, Big Five, personal factors, motivation, values, competencies

Highlights

- the concept of the personality of the future teacher is a special stage of professional development of a specialist;
- there are no special theoretical developments in foreign psychology regarding the personality of the future teacher;
- in foreign psychology, the prevailing approaches to the study of the personality of a future teacher are the general psychological approach "Big Five" and the competence approach; foreign researchers identify individual-personal, value-motivational, career and professional aspects in the problem of the future teacher's personality;
- the leading personal factors of the future teacher are "extraversion", "conscientiousness", "open-mindedness", and "friendliness";
- the similarity in the analysis of the future teacher's personality by Russian and foreign researchers lies in the prevalence of professional and organizational-psychological terminology (instead of psycho-pedagogical terminology);
- the difference in the traditions of comprehension of the future teacher's personality is expressed in the reliance of Russian psychology on the activity approach, the concept of professionalism and the theory of social development of the personality, and foreign psychology – on the competence approach and the «Big Five» factor concept of the personality.

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Introduction

Significant changes are currently taking place in the education system. Society, organizations, and professional communities set new requirements for teachers and students to develop their knowledge and skills, their professional skills, and their personal characteristics. In modern social, economic, and informational conditions, Russian pedagogical psychology and educational psychology face the need to develop new approaches to solving the overarching challenges of this field of research and practice: the problems of the relationship between learning and development, method, psychodiagnostic, pedagogical activity, and professional-pedagogical education (Isaev, 2019, pp. 93-108). The latter shows that one of the leading positions in pedagogical psychology is designated for the development of issues not only of student education, but also of specialist training for the successful implementation of knowledge, skills, and abilities in pedagogical activity.

In addition, there is a reorientation of pedagogical psychology. The traditional teaching and assimilation of knowledge and norms are being replaced by the creation of conditions for the mental development and formation of the student's personality in the pedagogical space (Yakimanskaya, 2013). This research and application setup can be transferred to the professional development of a teacher. Now he is required not so much to master pedagogical technologies, but to form those views, personality traits, competencies, and patterns of behaviour which help him successfully function in changing conditions and solve pedagogical problems of a new type (teaching and development of gifted children, development of methodological support for distance education, preparation of students for the global world and new professions, etc.). Thus, for modern pedagogical psychology and education psychology, the personal development of a teacher is an urgent issue.

The problem of the personality of an already established teacher is fundamental for pedagogical psychology and the psychology of education and has already been sufficiently developed, but it consists in studying an already formed specialist and has limited prospects for change. A much more relevant area of research may be the personality of a future teacher, a professional still being formed. The issues of design conditions and environment for the formation of a future specialist, the model of an effective teacher, the necessary qualities, knowledge, skills, abilities, and finally, a person's predisposition to pedagogical activity and solving pedagogical challenges, pedagogical giftedness can be discussed here (Mazilov, 2020; Mazilov, Slepko, 2019, 2020; Shadrikov, 2019).

There are quite a lot of works devoted to this problem in the modern Russian literature. Various personal qualities of the future teacher, significant for the implementation of educational activities, are analyzed: leadership qualities (Bicheva, Filatova, 2017), professional qualities and skills (professional self-organization, reflection, competitiveness, readiness) (Filonenko, Pet'kov, 2014; Ernst, 2015; Lebedeva, Fomina, 2018; Roslyakova, 2008), subjectivity (Serezhnikova, 2015), value orientations (Dimukhametov, Stolbova, Tsilitskii, 2017), emotional stability (Savchenkov, Zabrodina, 2017; Filippova, Pazukhina, Kulikova, Stepanova, 2019), stress tolerance (Polyakova, 2008), digital culture of a teacher or skills of using a computer and digital technologies in teaching (Gnatyshina, 2018), the conditions for the formation of the future teacher's personality are also discussed (Sarsenbaeva, 2005; Kislyakov, 2013).

Modern Russian pedagogical psychology concerning the personality of a teacher relies, in many respects, on the activity approach (A.N. Leontiev), domestic concepts of labour psychology and professionalism (E.A. Klimov, A.K. Markova), personality psychology (D.I. Feldshtein), developments

in the field of psychology and pedagogy of the educational process (V.V. Davydov) etc. The specifics of the Russian psychology of education, on the one hand, preserve the identity of Russian science and continues the traditions of Russian and Soviet scientific knowledge and, on the other hand, may limit the problems of research and theoretical and methodological foundations for explaining and interpreting the results obtained. To expand the psychological and pedagogical view of the problem of the teacher's personality, we will consider modern foreign works in this field. The appeal to foreign pedagogical psychology and psychology of education in the context of the analysis of the personality of an established and future teacher will contribute to the dissemination in domestic science of ideas about the personal development of a professional since foreign psychology (including in its branches) largely relies on personological concepts and puts the personality and its properties at the centre of psychological discourse. It will be shown below in the theoretical prerequisites of foreign pedagogical psychology and the analysis of the conducted research.

Studies of the personality of a teacher as a reflection of scientific traditions and paradigms of foreign psychology

There is a great interest in the personal characteristics of a teacher at various levels of education in foreign literature, and there is a tradition of studying this problem. There are specific characteristics that are considered factors of successful pedagogical activity: factors of the Big Five (Berkovich, Eyal, 2021; Buttner et al., 2015), various competencies (personal, professional, pedagogical, transversal (self-learning, learning ability)) (Cepic et al., 2015; Wardoyo, 2015), teachers' perceptions of the student, giftedness and creativity (Baudson, Preckel, 2013; Chan, Yuen, 2014), emotional regulation (Berkovich, Eyal, 2021), self-efficacy (Klassen, Tze, 2014; Li et al., 2017), organizational commitment (Chi et al., 2013), job satisfaction (Kim, Yang, 2016), etc.

Characteristic of foreign (primarily American) psychology is the use of the Big Five factors to describe the personality and the analysis of the relationship of these qualities with other more special ones. On the one hand, these are fairly basic personal properties of an individual and his intrapersonal structure ("neuroticism", "conscientiousness", "open-mindedness"), on the other hand, they participate in interpersonal interaction ("extraversion", "friendliness") (Meshcheryakov, Zinchenko, 2009). It is a comprehensive approach to the study of a teacher as a subject and a participant in the social (educational) process. Another feature of foreign psychology is the appeal to competencies, that is, the analysis of professional activity through some complex multicomponent skills and abilities that ensure the productivity of pedagogical work. It is especially important to indicate metacompetencies (for example, transversal). The value, outlook, and orientation aspects of the pedagogical activity are revealed in the attitude of a specialist towards a student (there is a kind of image that affects relationships and acts as the desired result of activity) and ideas about his abilities, giftedness, and creativity (considered for the development of curriculum, methodological materials, making an individual learning path of a student). Finally, a required element of the analysis of pedagogical activity is its embeddedness in the organizational environment and organizational and psychological phenomena. The teacher not only works with students, but also experiences the influence of the organization, and his professional actions always correlate with a broader context.

In our opinion, the aspects highlighted in understanding the personality of a teacher in foreign psychology are theoretical and methodological prerequisites for studying other psychological

and pedagogical problems. It should be directly related to the subject of the personality of the future teacher.

Thus, this work aims to substantiate the problem of the future teacher's personality as one of the key ones for pedagogical psychology, to determine the place of this field of research in foreign psychology, to identify the specifics of foreign psychological approaches to the conceptualization of the personality of the future teacher and his preparation for professional activity, and to establish further prospects for the application of these developments in research and practical activities Russian specialists.

Theoretical justifications

The subject of the study is the problem of the future teacher's personality in the works of modern foreign psychologists. A detailed conversance with the lines of foreign research will allow us to determine the peculiarities of the foreign and Russian understanding of the future teacher's personality, to identify aspects of the analysis of the personality of the future specialist concerning the problems of the formation of educational conditions for mastering the teaching profession, the formation of professional qualities and skills of teacher education students, effective implementation of pedagogical activity. The novelty of the study lies in the presentation and analysis of foreign psychological-pedagogical approaches to the scientific problem of the personality of a future teacher, which currently not enough publications are devoted to (Vardanyan, 2014; Kalashnikova, Kostina, 2016; Kireeva, Gribanova, 2014; Kuz'kina, 2016; Sedov, 2010). This work poses the challenge of filling this gap in the modern psychological and pedagogical bibliography. In addition, this work includes the unique consideration of the future teacher's personality as an independent stage of the professional development of a specialist. Moreover, there is the structuring and conceptualization of Russian and foreign psychological approaches to this problem with the designation of theoretical and methodological foundations of research and practice. The results and conclusions of the theoretical analysis of modern foreign studies will contribute to the revision of Russian concepts regarding the personality of a developed and future teacher, the development of new applied approaches to the development of personality and professional activity of specialists.

The analysis of foreign scientific research on the problem of the future teacher's personality raises the following questions:

- what is the place of the discussed problem in the structure of foreign pedagogical psychology and psychology of education;
- what theoretical and methodological approaches underlie foreign studies of the personality of a future specialist;
- what directions of studying the personality of a future teacher exist in foreign psychology;
- which personality model of a future teacher can be reconstructed from foreign psychological publications;
- what personal characteristics in foreign science are designated as key for the future teacher.

These aspects of the analysis of foreign publications will justify the following provisions:

- the problem of the personality of the future teacher of foreign psychology is, on the one hand, new and promising, and on the other – conceptually unformulated;
- the factor approach to the personality of the "Big Five" extends to the research of the personality of an unformed specialist, and personal factors act as reference or template;

– theoretical and methodological foundations of studying the personality of a future teacher in Russian and foreign psychology have both similarities and differences.

The theoretical significance of the research lies in the conceptualization of foreign psychological approaches to the problem of future teacher's personality, the identification of key scientific concepts in foreign pedagogical psychology related to this problem, the identification of the interdisciplinary nature of psychological and pedagogical issues, which is at the intersection with personality psychology and organizational psychology. The study of the personality problem of the future teacher will allow us to revise the structure of both pedagogical psychology and psychology of education, as well as related psychological branches.

The practical significance of the study includes the description of professionally important personal traits and competencies of a teacher, the analysis of the results of the use of various pedagogical, psychological, and organizational technologies for the professional development of a specialist and the management of his behavior, the determination of prospects for changing the psychological aspects of pedagogical activity and interaction with students, on the basis of which new training programs and training of a future specialist and formation and development of his personality.

Results

The problem of future teacher's personality in foreign psychology

Having considered the key prerequisites of foreign psychology of education and labour psychology concerning the teacher and his activities, we turn to the subject of this study – the personality of the future teacher in modern foreign studies. In some approaches, the personality of a future specialist can be understood as the previous (preparatory) stage of an already established specialist. However, such a view deprives a person of professional (and pedagogical) subjectivity, mastering the knowledge, skills and abilities of a teacher, acquiring important experience in teaching and methodological work, and experiencing himself not as an 'underspecialist' (let's call it a professional dichotomy - a person is either not a professional yet or already a professional), and as a 'young specialist' (let's call it a continuum of professional becoming – the preparatory or primary stage of activity is independent and filled with important professional neoplasms). Thus, the attitude toward the personality of the future teacher as a special stage of professional development (perhaps not less important for the personal growth of the person than the stage of professionalization) is necessary for the development of psychological technologies in the field of education.

Speaking about foreign research in this field, it should be noted that there is no high interest in the personality of a future teacher issue (as there is concerning the personality of an already established teacher), but there are some trends. We will divide the discovered works in several directions: individual and personal characteristics that are necessary for successful professional development; value-motivational components; regulators of effective activity; factors of successful mastery of the profession. This classification of research areas is based on an empirical criterion: all the publications we have found relate specifically to these areas of professional development of the future teacher.

Individual and personal characteristics that are necessary for the successful professional development of a future teacher

The prerequisites for the formation of an effective teacher are sociodemographic characteristics. Thus, M. Aksu and colleagues note that in Turkey at present (2009) students come to study pedagogical majors mainly from families belonging to the lower middle class (most mothers are housewives or already retired; fathers are either already retired or civil servants, entrepreneurs (self–employed), hired workers; most parents have no higher education than primary school) (Aksu et al., 2010). The authors note that the socioeconomic status of students of other majors is on average higher than that of teaching students. According to researchers, these living conditions of teacher education students affect either their personal and professional values and motivation: the reason for admission to the pedagogical profile of 51% of students is the "desire to become a teacher"; most students have traditional views on the socio-cultural phenomena of life but declare progressive values in education and pedagogy. In our opinion, the results obtained can be interpreted ambiguously (including because these are indicators of only one Turkish sample group): teacher education students are specific contingent that has a traditional context of upbringing and development, which is a positive factor in the formation of traditional (stable, moral, socially approved and socially significant) values among students, but may limit them in using "democratic" (the term of the authors of the analyzed article) behaviour strategies (participation in socio-political events both at the level of society and at the level of an educational organization; solving problems in the classroom).

As noted above, the concept of the "Big Five" personality traits is in common currency in foreign psychology, including the field of educational psychology and pedagogical psychology. Several studies have also been conducted on the personality of the future teacher.

Thus, M.I. Arif and his colleagues studied the dominant personality traits of students of pedagogical specialities in Pakistan (Arif et al., 2012). Openness to experience, curiosity, and creativity (the "Openness" factor) are their most pronounced characteristics. Male teacher education students demonstrate pronounced extroversion, while female teacher education students are more friendly and cooperative, have increased self-discipline and flexibility, but at the same time more often show emotional instability in their behaviour.

H. Bozgeyikli designates the category of psychological capital in a teacher, the severity of whose characteristics is associated with the personality factors of the Big Five (Bozgeyikli, 2017). Psychological capital consists of qualities such as self-efficacy (self-confidence), optimism (positive perception of oneself in the present and future), hope (purposefulness, striving to achieve goals), and resistance to stress (the ability to quickly adapt to changing conditions, effectively recover from stress and stress). The author has established that extroversion, conscientiousness, and open-mindedness have the strongest relationships with the components of psychological capital. The development of the psychological (pedagogical) capital of a future specialist is an important factor in the formation of the qualities of an effective personality.

Communication with students and colleagues is the important aspect of pedagogical activity. For effective interaction and understanding of the subjects of an educational process, it is necessary to have developed empathy and emotion recognition abilities. Moreover, the activity of a teacher oneself requires emotional stability and self-regulation skills. J. L. Antoñanzas et al. found specific features of the severity of emotional intelligence in student-teachers of various specialties (a foreign language teacher, a primary school teacher, a physical education teacher, a teacher in the field of special education) (Antoñanzas et al., 2014). Specifically, students of the profiles «Special/correctional pedagogy» and «Physical culture» have a higher level of development of

emotional regulation, and students of the profiles «Foreign language» and «Special/correctional pedagogy» have extraversion (Antoñanzas et al., 2014). The authors explain this by the fact that the specialties are focused. They require certain professional qualities and skills, high self-discipline and emotional regulation.

Apart from that, it is worth noting such a direction of research on the problem of personality of a future teacher, as the study of self-discipline/conscientiousness as a leading personality trait from the Big Five. This personal characteristic is manifested through diligence, organization, motivation for activity, commitment in work, reliability in fulfilling obligations. Within the Big Five, conscientiousness includes the following subfactors - self-efficacy/self-confidence, orderliness, dutifulness, achievement seeking, self-discipline, cautiousness (Bastian et al., 2017). K. C. Bastian et al. revealed significant relationships between conscientiousness (in particular, self-confidence) and teacher assessments according to the various standards («Education Value-Added Assessment System» and «North Carolina Educator Evaluation System») (Bastian et al., 2017). The authors believe that it is the personality trait that affects students' performance and success of young teachers in mastering the profession. Conscientiousness determines decisions of a teacher and, according to the researchers, can be associated with various cognitive and emotional phenomena development in students (behavioral strategies, attitudes, involvement in learning process, etc.). These results are confirmed by another study: conscientiousness and enthusiasm are associated with level of discipline in a classroom, effective time usage in a classroom (Baier et al., 2018).

The identified personal characteristics can be used both in selection of young teachers and in process of their training in professional activities.

Value-motivational components of personality of a future teacher

Motivational and value features of pedagogical activity are important factors in a work success of a teacher. They are associated with job satisfaction, and also make it possible for young teachers to effectively adapt to the profession.

I. Jugović et al. investigated relationships and dependencies between characteristics of a personality (according to the Big Five) and motivational components of pedagogical activity among student-teachers (Jugović et al., 2012). The choice of the teaching profession by the respondents was influenced by such personal properties as extraversion, friendliness and conscientiousness. The formation of internal (intrinsic) motivation and meaningful career values were influenced by extraversion and friendliness.

From general motivation, let us proceed to focusing on the actions within a framework of pedagogical activity. Among them, the motivation to use computer and technological tools in teaching is noted, which today is certainly an integral part of any educational process. S. Perkmen and B. Cevik, using the sample of students studying to become music teachers, consider their desire and intention to use modern technologies in music education (Perkmen, Cevik, 2010). The authors analyze these motivational formations in connection with factors of a personality from the Big Five. Such personal characteristics as extraversion, openness and conscientiousness have high correlations with the motivation to learn ways of usage of computer technologies in education and implement them in one's own pedagogical activity in the future. Indeed, openness to experience, a desire to acquire new knowledge and use innovations, including the social aspect (not just for oneself), are probably important prerequisites for successful work of a modern teacher.

Motivation to use new technologies in education can be considered as a motivation to

improve one's activities and professional development. This thesis is supplemented by the work of J. Tondeur et al., who suggest that special psychodiagnostic tools are needed to identify needs of future teachers in mastering new technologies (Tondeur et al., 2016). The questionnaire developed by them allow one to study behavior models of teachers, an attitude of teachers to technologies, process of mastering technologies, cooperation of teachers with colleagues on the use of technologies in education, process of using technologies by teachers and their experience in this process, features of a feedback that teachers are given in connection with technology.

The value aspects of pedagogical activity include the ideas of future teachers about education itself and an attitude towards a child/student. P. D. Wiens discovered the bent of student teachers in the field of social sciences to change their ideas about a child, about development of pedagogical views focused on a child, with an increase in severity of their personality factor «friendliness» (Wiens, 2018).

The particular aspect of the pedagogical worldview is an attitude of teachers towards inclusion. C. Bohndick et al. showed that there is a relationship between the personal factor «friendliness» and the positive attitude towards inclusion among student teachers. That being said, it is necessary not only to declare inclusive values, but also to include in the educational process practices related to the development of inclusive attitudes (Bohndick et al., 2020).

Regulators of effective activity of a future teacher

The development of a future specialist is associated with the mastery of effective skills and competencies that support the successful implementation of pedagogical activities. Career adaptability is the one of these competencies. It is expressed in the ability of a specialist to fulfill professional duties, and to cope with career and professional challenges, including non-standard and unpredictable ones (Eryilmaz, Kara, 2017). The authors showed that career adaptability is less developed in students than already accomplished teachers (which is obvious). They also identified the personality characteristics that can contribute to the development of career adaptability competence which are extraversion, friendliness, conscientiousness.

The effectiveness of pedagogical activity includes career satisfaction, perseverance and dedication in teaching, focus on professional development, leadership position (Wiens, Ruday, 2014).

A special area of research in this section is a study of self-efficacy/self-confidence of a future teacher. Self-efficacy/self-confidence is defined as a teacher's conviction that they is able to solve a certain pedagogical problem based on their capabilities and a current situation. In the work of F. M. Jamil, J. T. Downer and R. C. Pianta, the components of pedagogical self-confidence are a teacher's belief in the ability to effectively teach and give methodological guidance, the ability to manage a class and the ability to involve a student in the educational process (Jamil, Downer, Pianta, 2012). The authors found that a high level of self-confidence in graduate student teachers is most associated with such personal characteristics as extraversion, friendliness, orientation towards student development, child/student orientation. The other studies report correlations between self-confidence and conscientiousness (Bastian et al., 2017) and a level of academic self-regulation (Senler, Sungur-Vural, 2013).

Factors of successful mastery of the profession by future teachers

Since this work is focused around a personality of a future teacher, it is necessary to turn to the process in which a future specialist is formed - their educational activity and mastery of the

profession. Studying the features of professional activity at the stage of training and mastering the necessary skills will allow one to understand how to work effectively with future specialists at an early stage.

The authors consider such the phenomenon as learning strategies and meaningful characteristics of learning activities. They include anxiety in connection with academic performance, attitudes towards education, concentration, information processing, motivation, self-discipline and self-examination, time management, tenacity, strategies for passing tests (credits and exams), etc. (Kokkinos, Kargiotidis, Markos, 2015). Taking the Big Five model as a base, the researchers found that the choice of effective learning strategies is influenced by the following personality characteristics: extraversion - a search for help in solving learning problems; conscientiousness - positive connection with academic motivation and self-examination, negative connection with the choice of test-taking strategies; emotional stability (the positive pole of "neuroticism") - on the attitude towards learning; openness to experience - negative connection with increase anxiety, attitude to learning, concentration, motivation, choice of main learning goals, time management; friendliness - positive connection with anxiety reduction, negative connection with the attitude to learning, concentration, choice of main learning goals, time management (Kokkinos, Kargiotidis, Markos, 2015). H. Karataş and M. Bademcioglu found that pronounced traits of neuroticism, conscientiousness and friendliness are characteristic of student-teachers experiencing academic procrastination (Karataş, Bademcioglu, 2015). The identified characteristics of a student-teacher can enter a personality profile of a future specialist and help in selection of the most successful applicants.

At the same time, the other researchers argue that it is not worth looking for any typological and stylistic features in educational activities, because there are no significant relationships between learning styles and personal characteristics (Yanardöner et al., 2014). Such an individualized approach to a unique learning experience and a unique professional trajectory, on the one hand, allows one to build a flexible educational process, but on the other hand, it already sets requirements for a personality of not a future teacher, but an acting teacher who trains a new generation of specialists.

The professional skills development in pedagogical activity occurs through acquisition of «field» experience in various practices. A. Biermann et al. distinguish the following characteristics of «field» experience of psychology students: organization and leadership, the relationship between theory and practice, teamwork (Biermann et al., 2015). These aspects form the following professional qualities in young professionals: successful interaction skills with students, the ability to cope with violations of discipline and behavior among students, methodological skills and planning, ways to assess progress.

Discussion

First of all, it is necessary to characterize foreign scientific studies on the problem of the future teacher's personality according to the questions posed in the «Theoretical justifications» section:

- the problem under consideration represents a particular area of foreign pedagogical psychology. Nevertheless, it is an independent field: specific issues are highlighted here, special tools are used, the solutions to specific issues are discussed;
- the study of the personality of a future teacher is based on the competence approach and the «Big Five» factor theory of the personality; in addition, it is worth noting the prevalence

of organizational-psychological terminology;
- foreign research directions include the definition of important individual-personal characteristics of a future specialist, the analysis of his value-motivational sphere, the identification of regulators of activity efficiency, the positioning of factors of successful mastering the profession;
- analyzing foreign works, it is possible to deduce a preliminary empirical model (on the basis of the results of conducted researches) of the future teacher's personality. The most significant personality properties and phenomena of a future and young teacher are the following personality factors: «extraversion», «conscientiousness», «openness to experience», «friendliness», emotional regulation, emotional intelligence and self-confidence;
- the key personality traits in the motivational sphere are intrinsic motivation and career values, as well as the focus on mastering specific skills (motivation to use computer and digital technologies, the desire for innovation). The leading value orientations are the focus on a student and a positive attitude towards inclusive education. Among the regulators of pedagogical activity for a future teacher, the most effective are career adaptability, career satisfaction, professional development orientation, and self-efficacy/self-confidence. Finally, in order to successfully approach the beginning of an implementation of independent pedagogical activity, student-teachers should use effective learning strategies (search for help in solving learning problems, learning motivation, self-examination, concentration, main learning goals choice, time management) and acquire a «field» experience.

Let us proceed to some provisions of foreign psychology in relation to a personality of a future teacher.

1. There are no conceptual developments of the issue. In the presented review, in none of the works, the authors discuss the model of a personality of a future teacher. They do not offer any aspects and measurements of this issue. This may indicate either an insufficient development of this area of research, or a conscious avoidance of such theoretical constructions. As mentioned before, in many approaches, a future teacher, an emerging specialist, is considered as a preparatory stage for a professional. Probably, it is precisely this position that is implicitly shared in foreign works.

2. The reviewed studies focus on empirical results, on the basis of which not generalizing conclusions are drawn, but specific conclusions within the framework of the issue under consider. All this indicates that this area of foreign educational psychology is still in the process of formation. Currently, various empirical data are being accumulated, based on which conceptual models will be built in the future, either with the help of theoretical analysis or within the framework of meta-analytical work. At this stage, other theoretical and methodological foundations for studying a personality of a future psychologist are used, taken from general psychology and personality psychology.

3. As a conceptual model of a personality of a future teacher, it is not even the personality of an already established/formed/professionally developeed teacher, but a set of «Big Five» personality factors. The vast majority of studies rely on such traditionally identified personality characteristics as neuroticism, conscientiousness, openness, extraversion, and friendliness, when describing a personality of a future specialist and student-teacher. On the one hand, these general characteristics fail to see the specifics of a personality of the future teacher, on the other hand, they introduce this phenomenon into a number of personality models of other professions.

4. When comparing the basic provisions in developing the problem of a personality of a future teacher in Russian and foreign educational psychology, the following can be noted. The difference

is that diverse theoretical and methodological foundations are used: in Russian psychology - an activity approach, the concept of professionalism, the theory of social development of an individual, the system for shaping teachers' focus on developing students' mental abilities and theoretical thinking; in foreign psychology - the competence-based approach, the factorial concept of personality «Big Five». Russian pedagogical psychology is characterized by greater theoretical development. However, all these theories belong to the Soviet period, so they are not always able to meet modern conditions. Moreover, one must say that there are no widely developed conceptual models of a personality of a future teacher in domestic pedagogical psychology and the psychology of education. Foreign psychology develops the problems of regulation and self-regulation of pedagogical and educational activities, discovers (correlation) relationships between various personal characteristics.

As a similarity between Russian and foreign approaches to a personality of a future specialist, one can indicate insufficient independence in the designation of this issue. The personal characteristics of a student-teacher are considered either in the context of other personal and professional phenomena (stress resistance, emotional regulation, self-control, motivation), or within the framework of solving specific professional and organizational problems (learning activities, learning strategies, psychological and organizational capital, discipline in a classroom and a student's behavior, student achievement).

In conclusion, one should note that a theoretical analysis of existing Russian and foreign studies made it possible to identify the achievements and problems of modern knowledge in the field of educational psychology. The proposed provisions regarding the foreign psychology of a personality of a future teacher will contribute to the development of modern global and national psychological and pedagogical concepts. It will contribute to the effective solution of current issues and tasks of education.

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Elementary school children's learning motivation and parental attitude to a child in blended learning conditions

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Abstract: **Introduction.** The changed living and learning conditions caused by quarantine and social restrictions in connection with the COVID-19 pandemic have radically transformed the interaction and communication between people. Genuine scientific interest is aroused by the problem of learning motivation and parental attitude toward the child in the context of a pandemic and the transition of the entire education system to a distance or blended learning format. The article presents a theoretical analysis of the motivation to learn of an elementary school child and the peculiarities of the parental attitude toward a child of elementary school age. **Methods.** The empirical research was carried out using several techniques: the method of "Learning motives questionary" by M.R. Ginzburg; the questionnaire "Parent-child interaction" by I.M. Markovskaya. The study was carried out in two stages during the 2019-2020 learning year based on the MAEI "School No. 96 Eureka - Development named after Nagibin M.V." Rostov-on-Don. The study involved 107 schoolchildren aged 8-9 years and 107 parents of elementary school children (aged 30 to 39 years). **Results.** The results revealed the presence of some changes in the severity of the learning motives of younger schoolchildren: the degree of significance of cognitive motivation of younger schoolchildren from families inclined to cooperate during blended learning became significantly lower than during contact learning; in younger schoolchildren from families inclined to control, the importance of external and game motives increased, while the severity of learning and grading motives has significantly decreased.

Keywords: elementary school children, learning motivation, study motive, parental attitude, parenting style, distant learning technology, blended learning.

Highlights

- modern parents of elementary school children are characterized by a parental attitude with a predominance of cooperation and control;
- external and positional motives are less characteristic of children whose parents tend to control their lives in all spheres, and social and playing motives are less expressed in children from families with a predominant type of parental relationship "cooperation";

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- during blended learning, changes in the severity of the learning motives of elementary school children were found in comparison with contact learning.

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Introduction

The trends of modern research in the field of psychology translate acute requests for the study of already studied phenomena in the globally changed conditions of society for the search for optimal tools for psychological research and support of personality at different stages of development. Informatization of all spheres of life, the intensity of the rhythm, and the speed of the flows of interaction with the surrounding reality contribute to the formation of a completely renewed personality of children and adolescents (Elshanskii, 2021; Ermakov, 2020; Hiong et al., 2019; Powers et al., 2020). Plunging deeper into the virtual space, most children manifest their true Self in the unreal world. Meaningful communication and interaction with peers, the educational process itself, and other various types of communication are now more realized in the digital space (Klimenskikh et al., 2020; Shipova, 2015; Roche et al., 2021). Accordingly, new requirements arise, and the functions of the professional activity of a teacher-psychologist in an educational organization are expanding to support the actively implemented processes of distance and blended learning (Petrova, 2020; Garrison, 2008), self-training of students, building a professional development trajectory, starting literally from preschool age.

Blended learning is a scientific and methodological approach in education, involving a combination of traditional forms of classroom learning with elements of e-learning, the integration of professional experience of a teacher, and online technologies (Cherdyntseva, 2018; Andreeva, 2018). Introduced by Bonka & Graham (2006), the concept of blended learning was initially positioned as a combination of various methods and forms of learning, which later led to the diversification of educational resources into the interactive field of virtual space (Powers et al., 2020). This training format consistently assumes special information technologies (Bekmanova et al., 2021), such as computer graphics, audio and video, and interactive elements (Kaur, 2013; Ellis & Brett, 2014). Currently, there is a rich experience in using a blended learning format in higher education (Clark, 2007; Alam & Agarwal, 2020; Dziuban et al., 2006; Gallard & Cartmell, 2015; Hiong et al., 2019).

In Russian education, the concepts of "e-learning" and "distance learning technologies" are enshrined in the regulatory framework. E-learning involves a logically structured learning process in an online format in the form of a full-fledged educational course or program. However, the concept of e-learning is often replaced by the concept of distance learning, which is not exactly correct. Distance educational technologies are understood as educational technologies implemented mainly with the use of information and telecommunication networks with the indirect (at a distance) interaction of students and teaching staff (Article 16 of the Federal Law of 29.12.2012 N 273-FL (ed. of 11.06.2022) "On Education in the Russian Federation").

In the context of the COVID-19 pandemic, blended learning was implemented at all levels of

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education, allowing the principle of continuity of the educational process to be fully implemented (Dziuban et al., 2006; Cherdyntseva, 2018). Taking into account the specific epidemiological situation in the world and the country, in particular, in the 2020-2021 academic year, educational organizations periodically switched the format of learning to distance, increasingly exploiting various information resources. Later, the mastered tools became an integral part of blended learning, making it possible to expand not only the professional competencies of teachers, but also the arsenal of teaching tools and methods that are appropriate and adequate for the perception of modern schoolchildren. In our research, we adhere to the opinion that distance learning is an educational process organized for the development of a discipline or course through information technologies that ensure the interaction of the teacher and the student at a distance, without direct contact. While blended learning involves the use of electronic tools in the direct contact educational process or short-term mastering of educational material independently with remote guidance and control from the teacher.

The formation and development of personal motivation as a means to determine the activity and behavior of the person has always been a complex phenomenon. Therefore, Gallard & Cartmell (2015) believe that internally motivated students, as a rule, receive more from a learning task than those who have external motivation to complete it. Slavin (2018), studying strategies to achieve learning goals or objectives among students, concludes that tasks that are complex, meaningful, and related to real life are more likely to lead to learning goals than other tasks for which students receive external remuneration. Ormrod & Brett (2018) believe that motivation increases the amount of effort and perseverance in activities directly related to the needs and goals of students. Zotova (2021) believes that learning cognitive motivation is in the first place in terms of the level of development of younger schoolchildren from grades 1 to 4. It suggests that schoolchildren understand and realize the importance and importance of educational activities from the first grade.

The Arutyunyan study (2021) indicates the need for the development of cognitive learning motivation for younger schoolchildren. It is due to the predominance of social motives in modern younger schoolchildren, accompanied by a low prevalence of cognitive motives.

In the spring of 2020, students switched to remote contactless training. It could not but affect learning motivation. Children who focus on success in educational activities have lost the opportunity to receive emotional reinforcement for their achievements, and teachers have been deprived of the usual tools to maintain the learning activity of schoolchildren. Therefore, the problem of motivating students' learning activities in the digital environment is acute and requires an operational solution to the organization of training in current conditions (Gromozdova et al., 2021).

Gromozdova and coauthors (2021) describe the specifics of motivation of educational activity in elementary school age under the conditions of distance learning. According to the authors, when using educational Internet resources, the teacher ceases to be a translator of knowledge but becomes a moderator of the learning process. Neustroeva and Kulebakina (2020) believe that when using multimedia technologies, it is significant to consider the age characteristics of elementary school children and implement the principle of continuity in the process of increasing learning motivation methodically, competently and timely use of multimedia technology in the educational process. Evdokimova and Arapova (2021) among the conditions for the successful formation of cognitive motivation of schoolchildren note the creation of situations of active mental activity and positive emotional attitude, which will become the basis for cognitive activity

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and self-education in subsequent age periods.

It has been scientifically proven and substantiated that the peculiarities of parental attitude and the style of parenting are one of the most significant factors affecting the learning motivation level (Karabanova, 2019). Today, many researchers consider parental attitude as a lasting phenomenon, including ambivalent elements of a sense-value relationship, characterized by love and acceptance, but at the same time demanding and controlled by the parent (Ovcharova, 2005). The ideas formed by the parent about the child determine the way of communicating with the child and the nature of the methods of influencing him, which is realized in the model of parental parenting style (Karabanova, 2019; Ovcharova, 2005; Smirnova and Khokhlacheva, 2008). Smirnova (2013) notes this fact in her writings, the basis of the style of family education is the parent's attitude towards the child, which represents emotional acceptance, evaluative position, and attitude and is expressed in the behaviour of the parent. The style of parental attitude is a combination of different behaviours of the parent, which will manifest themselves to a greater or lesser extent in diverse non-standard situations (Smirnova and Khokhlacheva, 2008). It was precisely such a non-standard, even stressful, situation that the transition of the educational field to the "home" space turned out to be in the conditions of the total unpreparedness of the school and family for such a format of interaction.

Consequently, the question arises as to how the learning motivation, the inner position of the elementary school student, and the parental attitude towards the child correlate with each other in conditions of blended learning. Of course, a large number of fundamental research in psychology is concerned with the study of the learning motives of elementary school children but the problem of the relationship between learning motivation and the type of parental attitude remains insufficiently studied, in particular, in the context of a pandemic and the transition of the entire education system to a blended learning format.

Thus, *the purpose of our study* was to study the changes in the elementary school children's learning motivation from families with different types of parental attitudes in conditions of blended learning.

As part of the study, we assumed that younger schoolchildren from families with different types of parental relationships have different learning motives, and they may change in conditions of contact and blended learning.

Methods

The study included two stages. In the first stage, diagnostics of parental attitudes towards elementary school children and the motives of their learning were carried out. The study was conducted in 2019 under conditions of full-time education at school. Repeated diagnostics of students' learning motives with the different modes of parental attitudes were performed during blended learning when the educational process was sometimes transferred to the online mode, and distance learning technologies were actively used in educational organizations (April 2020). At this stage, a comparative analysis of the data obtained as a result of primary and repeated diagnostics was also carried out.

The following inventory was used for diagnostics: the method " Learning motives questionary" by M.R. Ginzburg (1988); the questionnaire "Parent-child interaction" by I.M. Markovskaya (1999). Statistical data processing was carried out using the SPSS 26.0 software package, which contained descriptive statistics, the Mann-Whitney U test, and the Wilcoxon signed-rank test.

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The study was conducted based on the MAEI "School No. 96 Eureka - Development named after Nagibin M.V." Rostov-on-Don. The study involved 107 schoolchildren aged 8-9 years (M=8.36, SD=0.47), of which 53.27% were girls (M=8.16, SD=0.39) and 46.73% were boys (M=8.57, SD=0.39). The study also involved parents of elementary school children in the number of 107 people aged 30 to 39 years (M=35.81, SD=1.27), of which 79.44% were mothers (M=35.18, SD=2.03) and 20.56% were fathers (M=36.47, SD=1.99).

Results

The results have been obtained by using the «Parent-child Interaction» technique (Markovskaya, 1999). Based on this, the entire sample of respondents was divided into groups, in accordance with a dominant parameter: group 1 was younger schoolchildren whose parents demonstrate the type of parental attitude with the predominance of cooperation; group 2 was younger students whose parents demonstrate the predominance of control. Respondents with a predominance of other types of parental attitudes did not participate in the further study due to small sample size.

The results of the representation of the average group indicators of the motives for learning of younger schoolchildren with different types of parental attitude are shown in Table 1. One can see that the educational motive dominates in the «cooperation» group. While in the «control» group, the leading educational motive is the grading motive. Furthermore, the degree of intensity of other motives for learning in groups with different types of parental attitudes is different. Specifically, in the «cooperation» group the second place is occupied by the motive of getting a positive mark. The external motive, the positional motive, the playing and social motives are take other places.

Table 1

Average group indicators of the motives for learning of younger schoolchildren with different types of parental attitude

Motive	«cooperation»		«control»	
	M	SD	M	SD
External	0,57	0,08	0,36	0,03
Educational	**1,25**	0,39	0,86	0,22
Playing	0,50	0,05	0,64	0,10
Positional	0,54	0,06	0,29	0,04
Social	0,50	0,06	0,71	0,15
Grading	0,64	0,11	**1,14**	0,31

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In the «control» group, the motive for getting a high mark is most pronounced. The educational motive is slightly less pronounced, followed by social and playing motives. External and positional motives are the least pronounced.

Overall, one can say that external and positional motives are less characteristic of children whose parents tend to control their lives in all aspects of life. Social and playing motives are weakly expressed in children whose families tend to recognize the equality of children and adults.

The conducted statistical processing revealed significant differences in the expressiveness of educational motives in younger students from families with different types of parental attitude (Table 2).

Table 2

Indicators of the significance of differences in the degree of significance of the motives for learning among younger schoolchildren from families with different types of parental attitude (Mann-Whitney test)

Motive	U	p
External	300,000	0,047*
Educational	258,500	0,005**
Playing	338,500	0,058
Positional	280,000	0,009**
Social	299,000	0,047*
Grading	231,000	0,003**

Differences in the expressiveness of external, social, educational, positional motives and the motive for getting a positive mark were revealed. Consequently, for students in whose families the «control» type dominates, the grading motive predominates. It indicates their attitude towards getting a high mark. Potentially, this is due to the desire of a child. On the one hand, it is the desire to not upset their parents and meet their expectations. On the other hand, it is to avoid censure and, probably, punishment for low grades. The least pronounced motive in the group of younger students is the positional motive. The motive indicates the weak desire for self-assertion, in the absence of the desire to take leadership positions, to have influence on classmates.

In groups of children whose parents tend to cooperate, the educational motive dominates. It manifests itself in the orientation of younger students to mastering new knowledge and learning skills. Since cognitive motives, aimed at satisfying cognitive needs, dominate, the motive is determined by the depth of interest in knowledge. At the same time, they are characterized by a less pronounced social motive for learning. This indicates a lower desire to acquire knowledge in order to be useful to society, to fulfill one's duty, and an understanding of the need to learn.

That is, one can say that during contact learning, for the majority of younger students from families prone to control, the dominance of grading motives is characteristic. In addition, there

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is almost no desire to become leaders in a class, to receive approval or respect from classmates. For majority children from families whose parents are focused on cooperation, a pronounced predominance of educational motives is also characteristic. However, social motives for learning are weakly expressed.

Additional diagnostics conducted during blended learning revealed some changes in the educational motives' expressiveness among younger schoolchildren from families with different types of parental attitudes (Table 3).

Table 3

Average group indicators of learning motives of younger schoolchildren with different types of parental attitude (results of primary and additional diagnostics)

Motive	«cooperation»				«control»			
	1 measure		2 measure		1 measure		2 measure	
	M	SD	M	SD	M	SD	M	SD
External	0,57	0,08	0,60	0,09	0,36	0,03	***0,94***	0,26
Educational	**1,25**	0,39	**0,76**	0,17	0,86	0,22	0,50	0,05
Playing	0,50	0,05	***0,64***	0,11	0,64	0,10	***0,86***	0,22
Positional	0,54	0,06	0,50	0,05	0,29	0,04	0,30	0,04
Social	0,50	0,06	0,50	0,06	0,71	0,15	0,57	0,08
Grading	0,64	0,11	0,57	0,08	**1,14**	0,31	**0,89**	0,24

In the group of younger schoolchildren from families with the «cooperation» type, the educational motive retained its leading position. However, its degree of expression significantly decreased, as did the grading motive. At the same time, the degree of significance of the playing motive increased. In the group of younger schoolchildren from families prone to the «control» type, even more extensive changes are observed: a decrease in the degree of significance of grading, educational and social motives, and an increase in external and playing motives.

That is, in the «cooperation» group, the educational motive dominates, but the second and third places are occupied by playing and external motives. Grading, social and positional motives take the other places. In the group with the «control» type, the external motive dominates. The second and third positions in terms of importance are occupied by grading and playing motives, respectively. And the last three positions are social, educational and positional motives. The revealed changes indicate a change in the hierarchy of learning motives during blended learning among younger students with any type of parental attitude (Table 4).

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Table 4

Indicators of the significance of the shift in the degree of significance of the motives for learning younger schoolchildren from families with different types of parental attitude (Wilcoxon test)

Motive	«cooperation»		«control»	
	T	p	T	p
External	482,000	0,760	69,000	0,000**
Educational	158,000	0,007**	77,000	0,006**
Playing	317,000	0,503	82,000	0,009**
Positional	482,000	0,760	203,000	0,681
Social	-	-	182,000	0,447
Grading	478,000	0,756	82,000	0,009**

In the group of younger schoolchildren from families prone to cooperation, statistically significant changes were found in the degree of expression of only educational motives. Therefore, one can say that younger students of this group both during contact learning and blended learning are dominated by cognitive motivation, the desire to learn something new, the expansion of their knowledge in various fields, and mastering new skills and abilities. However, the degree of significance of cognitive motivation during blended learning became significantly lower compared to the earlier period of learning.

In the group of children from families with «control» type, statistically significant changes were found in four of the six motives. Significance of external and playing motives significantly increased. While, the expressiveness of educational and grading motives significantly decreased. Consequently, blended learning is perceived by the children of this group to a large extent as a computer game, without causing direct cognitive interest. At the same time, their learning activity is determined, first of all, by pressure and control from parents, the sense of duty and necessity, as well as the opportunity to «play school».

Discussion

The reformation of a children's subculture, the poverty of a story-role game, personal immaturity lead to the fact that younger schoolchild already come to school with a low level of motivation for learning. As soon as a process of adaptation to schooling is completed, the education format changes qualitatively to a distance form. Then it becomes blended, which was facilitated by the epidemiological events of 2020 in the world.

Modern empirical studies of internal learning motivation in the period of 2020 are associated with the need to switch to distance technologies. They demonstrate the decrease in school motivation, the change in the direction of motives (an increase in the importance of the motive

for getting a positive mark, a decrease in the focus on learning process) and a decrease in interest in a favorite academic subject. Pronina (2021) notes that this situation is observed among first-graders in the first place. This is due to the lack of cooperative activity with a teacher and external control of learning that do not allow the formation of goal-setting and self-regulation, which are important elements of educational activity. Therefore, when organizing an educational process with younger students, it is necessary to consider the features of the formation of a full-fledged educational activity. Above all, motivational component in its structure is also important.

The obtained results of our study are consonant with the results of the study by Tuboltseva (2021). The author studied learning motivation of schoolchildren during the period of contact and distance work of educational institutions. The author revealed a decrease in number of younger students who demonstrate a good and positive level of educational motivation, and an increase in students with a negative and low level. Gromozdova et al. (2021) also write about the average level of learning motivation with a tendency to low levels during distance learning. They propose to use a variety of educational Internet platforms as tools that increase the motivation for educational activities of younger students.

The conclusion about a decrease in the motivation of schoolchildren to learn is made by scientists who study schoolchildren of other age groups (Stepanova, 2020; Filippova, 2020; et al.). At the same time, the authors note that not only the motivation of educational activities is reduced, but also educational activity, interpersonal interaction with classmates and, in general, the desire to attend classes in a distance format.

In our opinion, the increase in the importance of external and playing motives of younger students is associated with the lack of direct contact with a teacher and the idea of the educational process as a sort of play activity. At the same time, in a blended learning format, difficulties arise in the development of control and grading as components of educational activity. It leads to a decrease in the presence of educational and grading motives of younger students.

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Olga Alekseevna Lebedenko - development of the idea and experimental layout, organization of empirical research, data collection;
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Features of the communicative behavior of the personality of adolescents with different levels of suicidal risks when reality changes

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Abstract: **Introduction**. The article analyzes the features of communicative behavior in the virtual space of adolescents with different levels of suicidal risk. For the first time, the study of the communicative behavior of the personality of adolescents with a high level of suicidal risks in real space when they are in social networks was carried out. Most studies prove that being in a virtual environment harms personal development. On account adolescence is a period of personality formation and is characterized by frequent mood swings, maximalism, and a desire to hold centre stage in the reference group, teenagers often find themselves in virtual space, thereby losing interest and communication skills in the real world, which leads to suicidal behavior. **Methods**. The study was conducted in real and virtual spaces. There 106 adolescents aged 14-16 took part in the ascertaining experiment. To identify groups of adolescents with increased suicidal risk in real space, the authors used the questionnaire of suicidal risk modified by T. N. Razuvaeva. To identify groups of adolescents with suicidal risk in virtual space, the authors used their own modification of the questionnaire by T. N. Razuvaeva. To study the communicative behavior of adolescents, the authors used the methods "Assessment of the level of sociability" (V. F. Ryakhovskii test) and "Diagnosis of communicative attitude" (by V. V. Boiko). **Results and discussion**. The authors identified changes in suicidal risk in adolescents when changing real space to virtual. They also analyzed the changes in the communicative characteristics of adolescents. It has been established that in the virtual space, the level of cruelty increases in most adolescents, and the vision of the environment acquires a negative connotation, which increases the level of suicidal risk among adolescents.

Keywords: adolescents, suicidal behavior, suicidal risk, communicative behavior, real space, virtual space, personality, internet communication, antisuicidal factor, communicative attitude

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Highlights:

- virtual communication is a special form of interaction between people that contributes to meeting their needs in the Internet space;
- the markers of virtual communication are communicative attitudes regarding communication in the Internet space, tolerance, communicative control, personal communication experience; virtual space catalyzes suicidal risk of adolescents;
- according to the subjective feelings of adolescents in the virtual space, the value of the anti-suicidal factor decreases, the level of open cruelty increases, and negative personal experience, grumbling, and veiled cruelty dominate among the communicative attitudes.

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Introduction

Teenage suicides in Russia over the past few years have been one of the leading causes of death at this age. Due to their lack of social experience, adolescents often find a radical solution to their problems – suicide. It should also be considered that the prevalence of adolescent depression has exceeded the 40% barrier – this can also lead to suicidal attempts.

Psychological analysis of the problem of suicidal behavior in adolescents has shown the need to study the communicative characteristics of this age group. Especially relevant is the study of communications during the transition of a teenager from the real to the virtual space, where a person has a large range of discretion and enjoys the anonymity, impunity, lack of control, and lack of boundaries inherent in the Internet space.

Uncontrolled access of adolescents to social networks, an imperfect regulatory framework for activities in the Internet space, and personal cognitive errors can lead to disruption of the virtual communication process and, as a consequence, to manifestations of suicidal behavior.

The purpose of the article is the peculiarities of the communicative behavior of the adolescents' personalities with different levels of suicidal risk when changing reality.

The objects of an article:

1. Identify groups of adolescents with increased suicidal risks in real space.
2. To analyze the dynamics of suicidal risks of adolescents during the transition from the real to the virtual space.
3. To analyze the peculiarities of changes in the communicative characteristics of adolescents when changing reality.

Review of publications on the research problem

In the scientific literature, the earliest and most common definition of the phenomenon of virtual communication is the definition from the point of a technological approach. In this case, the emphasis is on actively developing modern technologies, information transfer speed and user convenience (Nazarchuk, 2008; Baeva, 2013, 2014; Bodalev, 2011; Mironov, 2006; Rassolov, 2009; Zhilkin, 2003; Karabin, 2009; Shcherbakov, 2008; Borisov, 2012; Khabermas, 2000; Yang, 2000; Kastel's, 2004; Kheizinga, 2011; Sokolov, 2003; Sobkin & Fedotova, 2021). But, despite

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the prevalence of this approach, it cannot satisfy the needs of the individual in communication, building warm relationships, as well as in recreation and self-expression.

Russian authors such as I. V. Mikhalets, E. P. Belinskaya, Yu. D. Babaeva, A. E. Voiskunskii, A. I. Luchinkina, I. S. Luchinkina, A.V. Chistyakov, G. U. Soldatova, A. S. Tkhostov, etc. also studied virtual communication in psychology.

Thus, I. V. Mikhalets in his research considers "virtual communication" as a reality created with the help of digital technologies and creates a world of illusions and imitation of reality. The Internet space, in contrast to face-to-face interaction, according to the author, has several advantages, such as: the regularity of creating new acquaintances indefinitely; the absence of the need to take care of their appearance; concern about the impression you make on another person – which explains the growing popularity and demand for visiting the virtual space (Mikhalets, Volchkova, Filippova, 2016).

In the studies of E. I. Rasskazova, A. Sh. Tkhostov, attention is focused on predictors of delinquent behavior of a person in virtual space (Rasskazova et al., 2019).

G. U. Soldatova's works analyze the risks of digital socialization of Russian teenagers (Soldatova & Yarmina, 2019; Soldatova et al., 2020).

In her research, E. P. Belinskaya considers Internet communication as the creation of an unlimited number of variants of her own Self, which indicates the search for a network identity and the possibility of "games" with emotional states. The author notes that Internet communications have become a part of most types of person's professional activity, which form new self-organizational requirements for a person and provide an opportunity for gamification. Internet communication has a significant impact on the thinking and worldview of the individual, providing wide access to the norms and values of users and broadcasting models of social behavior (Belinskaya, 2002).

Yu. D. Babayeva and A. E. Voiskunskii consider virtual communication as an alternative to actual communication. In this case, the user of virtual communication has the opportunity not only to hide his feelings behind iconic forms of messages but also to simulate them, which gives these forms of communication great demand (Babaeva et al., 1986; Voiskunskii, 2010).

A. I. Luchinkina notes that the analysis of research on the problem of the difference between virtual communication and communication in an actual environment allows us to identify the following characteristics: polyphony, multiculturalism; hypertext and interactive Network capabilities; anonymity and distance; substitutive nature of communication (Luchinkina, 2012).

I. S. Luchinkina considers communication as a set and implementation of certain norms of an individual or a group of personalities in the process of interaction, which also contains an understanding of news content, which affects the communicative behavior of Internet users, including their perception and sharing of this information (Luchinkina, 2019).

We define virtual communication as a form of interaction between people that contributes to meeting various needs in the Internet space.

It should be noted that there are very few studies on virtual communication among adolescents with different levels of suicide risks. The works of A. I. Luchinkina are focused on the fact that the suicidal personality of a teenager in the virtual space is based on the properties and characteristics of an actual person and includes: beliefs and the level of instrumental competence of the individual; motives for being online; personal mythologems of adolescents (Luchinkina, 2017).

D. S. Isaev and K. V. Sherstnev, in their research, note that the suicidal behavior of adolescents is explained by the fact that they do not cope with the requirements and norms that society dictates

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to them, and they often do not keep up with the pace of life. In this regard, adolescents have a sense of personal inconsistency, which pushes them to suicidal behavior (Isaev, Sherstnev, 2000).

A. I. Luchinkina and I. S. Luchinkina noted that the leading cognitive distortions characteristic of suicides in virtual space at the group level are: framing, confirmation preconception, distortion in the assessment of homogeneity of members of another group, and at the personal level, the most pronounced are dichotomous thinking and catastrophization (Luchinkina, Luchinkina, 2019).

In addition, the researchers note that the conditions of unavailability of visual contact expand the possibilities of emotional response. For this reason, the choice of written forms of communication pursues the goal of separating the actual experience from the emotional response transmitted to the partner. This strategy of emotional behavior actualizes the search for various ways of expressing emotions that meet the goals and objectives of communication (Luchinkina, Luchinkina, 2019).

Virtual communication provides an opportunity to satisfy the desire to communicate, whatever the territorial remoteness of users and their physical and emotional situation. When balancing the forms of communication (actual and virtual), the communicator gets the opportunity to increase the personal circle of communication and preserve the emotional component of social interaction.

From our point of view, the model of trajectories of suicidal behavior development in adolescence by J. Bridge deserves special attention. The scientist identified factors of pre-pubertal and pubertal stages of suicidal behavior (Bridge et al., 2006).

Researchers place attention on the fact that the elements of communicative behavior of adolescents are their communicative attitudes, formed through the experience of interaction, assessments, and feelings (Agosta, 2010; Davis, 2001).

Other scientists note that the markers of communication include the following: empathy as the ability to recognize the emotional state of another person in virtual space; reflection as a factor of understanding and recognizing one's own experiences based on reflection; tolerance as the ability to respect other people's boundaries; communicative control as a form of control over behavior in various life circumstances. Adolescents with high communicative control, according to M. Shneider, control themselves well enough in words and actions, are aware of the rules and norms of behavior, and try to adhere to them (Efimova, 2012; Goncharova, 2016; Gippenreiter, Falikman, 2009; Gulevich, 2007; Shneider, 2002; Il'in, 2009).

Thus, virtual communication of teenagers includes communicative attitudes, tolerance, communicative control, and personal communication experience.

Methods

The study was conducted in real and virtual spaces. The essential method is an ascertaining experiment. In the first stage, with the help of a questionnaire on suicidal risk (modified by T. N. Razuvaeva) (Razuvaeva, 1993), groups of adolescents with increased suicidal risk in real and virtual spaces were identified. In the second stage, the peculiarities of changes in the communicative characteristics of adolescents during the change of reality were studied through the methods "Assessment of the level of sociability" (V. F. Ryakhovsky test) and "Diagnostics of the communicative attitude" (V. V. Boyko) (Ryakhovsky, 2005; Boyko, 2002).

Results and Discussion

The study revealed that the level of suicidal risk in adolescents increases with the transition from reality to virtual space. When switching to virtual communication, the level of open cruelty

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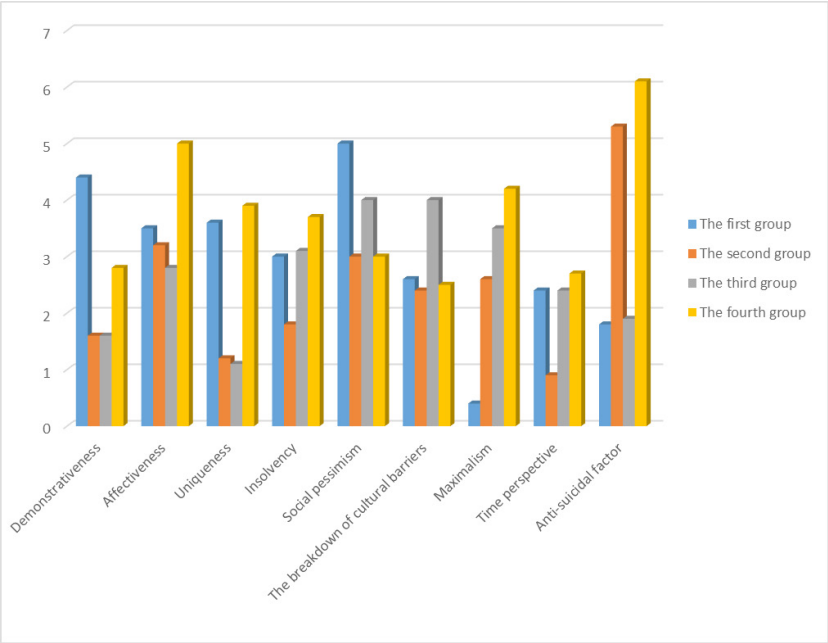
increases in most of the respondents, and the attitude toward negative personal experiences, grumbling, and veiled cruelty significantly changes.

The study identified groups of adolescents with different levels of severity of suicide risks in real and virtual spaces. In real space, by virtue of the clustering procedure, 4 groups of respondents were identified (Fig. 1): two groups with a low level of antisuicidal factor and two groups with a high level of the antisuicidal factor.

Figure 1

Distribution by groups with different levels of severity of suicidal risk in real space



The first group of respondents (9 people) is adolescents with a low value of the anti-suicidal factor (demonstrative suiciders). They tend to be suicidal. These adolescents are demonstrative (the level of demonstrativeness is above average). It is expressed through actions performed in order to attract the attention of others (from loud laughter to demonstration of deep sadness). They tend to exaggerate social problems: "they don't like me", "friends should be different" (the level of social pessimism is high). More often they perceive themselves as a unique person.

The second group (66 people) is adolescents with a value of the anti-suicidal factor above the average. These adolescents are not prone to suicidal behavior. They have average and below average values on the following scales: "demonstrativeness", "affectiveness", "uniqueness", "insolvency", "social pessimism", "the breakdown of cultural barriers", "maximalism", "time perspective", "anti-suicidal factor".

It is noteworthy that there is more than 57% of adolescents with such indicators in the sample.

The third group (12 people) is silent suiciders. They are adolescents with a low value of the anti-suicidal factor. They tend to be suicidal. Unlike adolescents of the first group, they are not prone to affects and demonstrative behavior, nor consider themselves as "unique". However,

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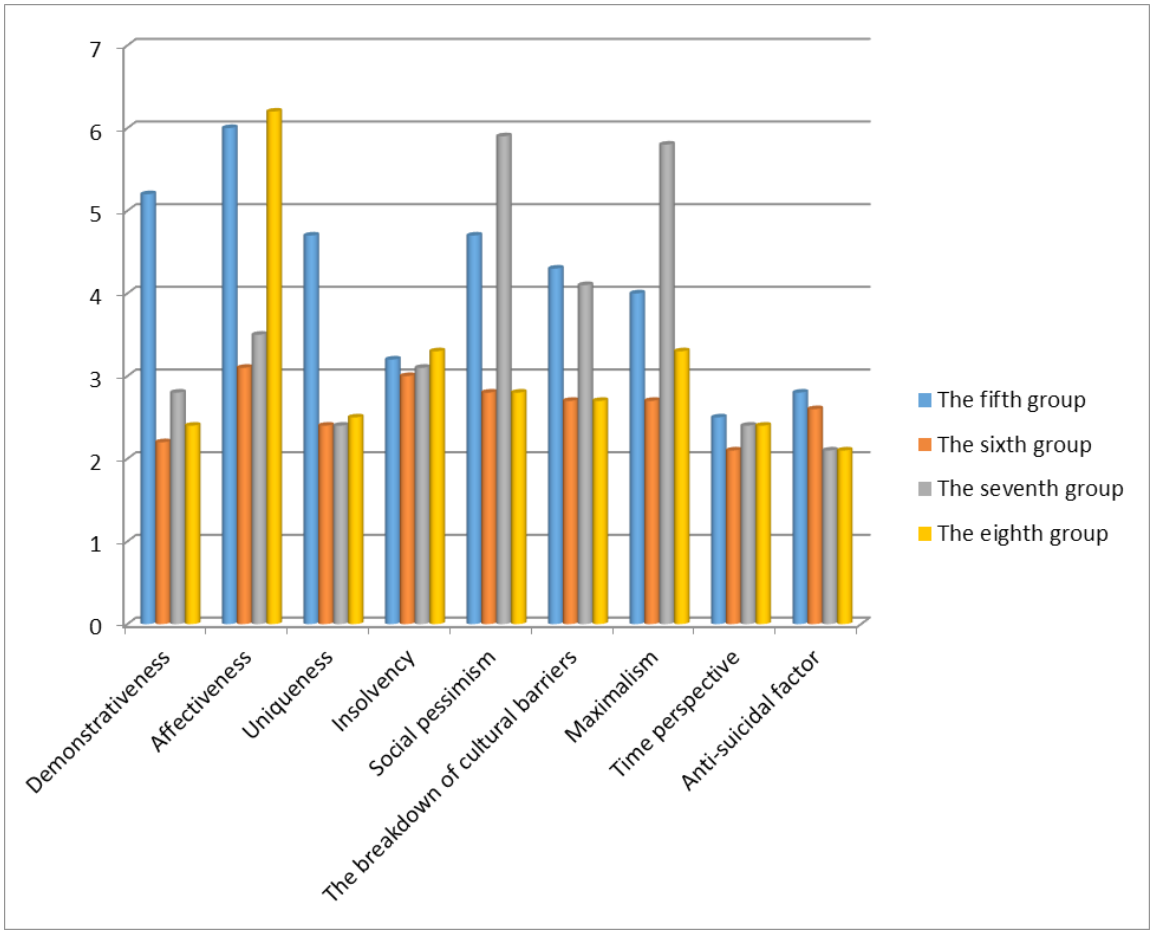
they have a negative concept of the world around them. The group is prone to the cultivation of death: they collect various stories about suicide; they participate in groups where there is a death cult. The adolescents tend to be maximalist.

The fourth group (19 people) is adolescents with a high value of the anti-suicidal factor. They are prone to affect, up to the loss of control over emotions. They have confidence in their uniqueness. Maximalism is common for them. At the same time, their attitude toward the surrounding world is favorable. They try to comply with norms and rules of public life.

To identify the tendency to suicidal behavior in the virtual space, the same questionnaire was conducted, but with the modified instruction: "All the statements proposed to you relate to your life and activities in the virtual space ...". It is important to note that the survey was conducted mainly in the virtual space through Google Forms. The results of the study are shown in Figure 2.

Figure 2

Distribution by groups with different levels of intensity of suicidal risks in the virtual space



Due to the clustering procedure, 4 groups of respondents were also identified according to their levels of suicidal risk in the virtual space (Fig. 2). It bears mentioning that all respondents have the low level of the anti-suicidal factor in the virtual space.

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The fifth group of respondents (8 people) is adolescents with a tendency to suicidal behavior in order to achieve understanding and attention from the environment. They try to achieve this through demonstrativeness and affectiveness, when emotions dominate intellectual abilities and the degree of control over the situation is significantly reduced (the level of demonstrativeness and affectiveness is above average). Adolescents of this group differ from other groups of respondents in the virtual space by perceiving themselves as an exceptionally unique and peculiar personality. This special aspect also contributes to suicidal behavior in the way that adolescents try to find a way out of a difficult situation not in a socially acceptable way, but by committing suicide (the level of uniqueness is close to the maximum value).

The sixth group (40 people) is adolescents with values below the average on all scales. This suggests that this group is not characterized by increased emotionality, faith in themselves as an exceptionally unique person. There is no inclination to maximalism and propaganda of the cult of death. There is no inclination to maximalism and propaganda of the cult of death. However, the average level of social pessimism explains this situation by the fact that such teenagers tend to be self-absorbed, to see the world around them in gloomy colors and obey their own negative concept of society. The low level of the anti-suicidal factor only emphasizes the ability of this group of adolescents in the virtual space to engage in suicidal behavior, since seeing the world in negative tones negatively affects life satisfaction and the ability to hope for the best. Generally, in moments of despair, such adolescents lose control over intellectual literacy, therefore emotions and negative internal attitudes begin to prevail (the level of affectiveness is below average, but it stands out at the level of other scales).

The seventh group (35 people) is adolescents who also have a negative concept of the world around them, however, unlike the respondents of the sixth group, there is an increased level of maximalism (above average). It indicates a tendency to extremes, which manifest themselves in any demands, beliefs and expectations. This special aspect, combined with social pessimism and a low level of the anti-suicidal factor, creates a high probability of committing suicidal behavior, since the "this way or no way" attitude is an auxiliary element in inflicting suicidal actions on oneself.

The eighth group (23 people) is adolescents who have identical indicators with the sixth group. These teenagers have a feature of losing control of their mind, when the emotional state comes to the fore, and the risk of inconsiderate actions increases. A negative view of the world, combined with affectivity, creates fertile ground for an adolescent to commit suicide. A low indicator of the anti-suicidal factor only makes it more likely that a teenager will take this action in relation to themselves.

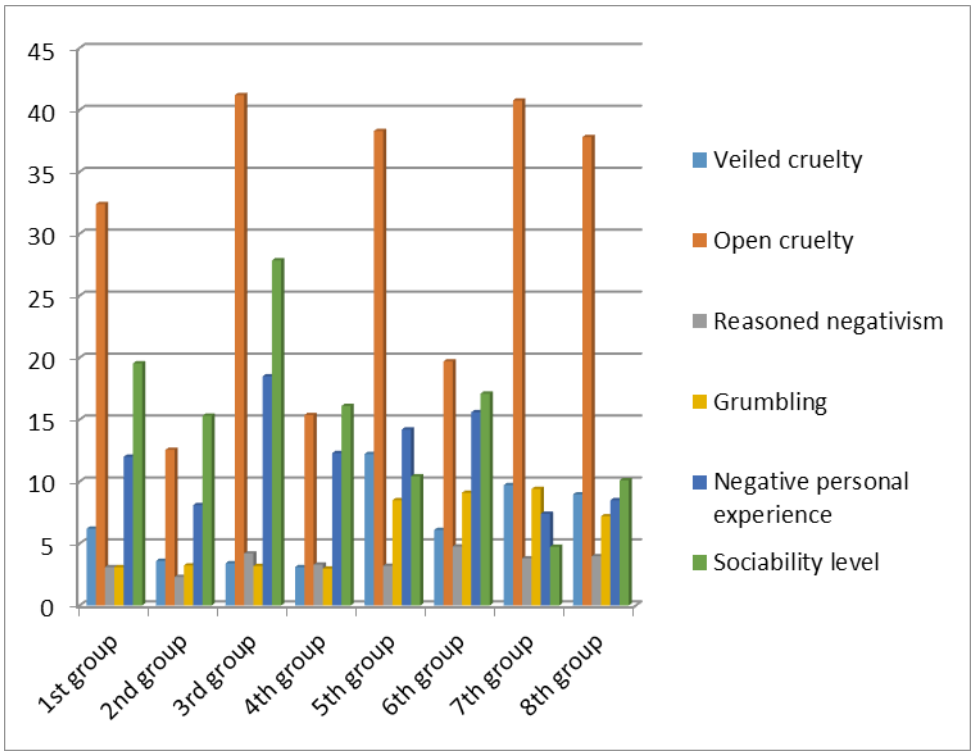
The study revealed significant differences between the groups in some parameters of virtual communication (Fig. 3).

It was revealed that there are significant differences between the level of manifestation of communicative attitudes in groups with increased suicidal risks in real and virtual space.

In real space, in groups of adolescents with high suicidal risks, the most pronounced negative communicative attitude is open cruelty (T_{emp} = 2,267 at ρ < 0,05), in the 3rd group it is negative personal experience (T_{emp} = 2,013 at ρ < 0,05). At the same time, when switching to virtual communication, the level of open cruelty increases in the majority of respondents (T_{emp} = 2,907 at ρ < 0,01), the attitude towards negative personal experience (T_{emp} = 2,117 at ρ < 0,05), grumbling (T_{emp} = 3,027 at ρ < 0,01), veiled cruelty (T_{emp} = 2,932 at ρ < 0,01) changes significantly.

Figure 3

Features of virtual communication in groups with different suicidal risks



Conclusion

1. The study made it possible to identify groups of adolescents with different suicidal risks in real and virtual space.

2. The active increasing in the tendency to suicidal risk in the virtual space has been empirically discovered.

3. In the course of virtual communication in adolescents, the value of the anti-suicidal factor decreases and the level of manifestation of individual negative communication attitudes increases: open cruelty, negative personal experience, grumbling, veiled cruelty.

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Dialectical and Formal-Logical Thinking in Senior Preschoolers

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Abstract: **Introduction**. The article presents an empirical study into the correlation problems between the development of formal-logical and that of dialectical thinking at preschool age. This has been the first ever approach towards comparing these lines of thought development. The study aims to answer the questions raised by J. Piaget, K. Riegel, and M. Bassechez in their works on the relationship between dialectical and formal-logical thinking.
Methods. To assess the development of dialectical thinking we used the following methods: *Drawing an Unusual Tree, Cycles and What Happens to be both at the Same Time?*
Development of formal intellect was determined using the Piaget tests *Scales, Probability and Cylinder*. The data on the development of dialectical and formal-logical thinking were compared using correlational and regression statistical methods. The longitudinal study involved 87 children aged 5-6 years and 6-7- year-olds at a later stage, who attended Moscow kindergartens.
Outcomes. According to the regression analysis, predictors of the success in the Probability task in the preparatory group were the scores of Piaget's *Probability* and *Cylinder* tests and dialectical thinking measured by the *Cycles* and *What Happens to be Both at the Same Time* methods, which were assessed when preschoolers attended the older group (R = 0.606 (>0.5); F = 3.957, p=0.003). Of interest is the correlation between the *Probability* test outcomes and those of the *Cycles* method (r=0.203, p=0, 021).
Discussion of outcomes. The results suggest that the formal operations of multiplication and the dialectical operations of transformation, reversal and mediation are part of a unified cognitive structure. Based on K. Riegel's assumption, it may also be argued that it is possible to solve dialectical problems in preschool childhood.

Keywords: formal-logical thinking, dialectical thinking, preschool age, seriation, multiplication, mediation, symbolization, mental operation, longitude

Highlights

- Preschool age marks the development of dialectical thinking which involves dialectical operations of transformation, integration, and mediation;

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- Six-year-olds engage in thought operations of multiplication and operations of reversal, transformation, and mediation which form part of one common cognitive structure;
- In their 7th year preschoolers undergo significant changes in the development of both formal and dialectical thinking, indicating a heterochronic nature of the development of thought operations in formal-logical and dialectical thinking.

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Introduction

The understanding of the specificity of dialectical logic has evolved within the mainstream of Russian philosophy and Western cognitive psychology. The philosopher E.V. Ilyenkov (Ilyenkov, 1979) determined that the distinctive feature of dialectical logic is related to the resolution of contradictions. Kopnin believed that formal logic reflects qualitative stability, while dialectical logic unfolds the phenomena of reality more multilaterally, in motion, a particular moment of which is rest, qualitative stability. "In studying forms of thought, formal logic abstracts from their concrete content, while dialectical logic, studying the process of development of concepts, judgments, etc., does not and cannot abstract from their content because by abstracting from content one fails to understand this process." (Kopnin 1962, p. 57)

The definition of dialectical logic as an independent form of logic gave rise to the question about the understanding of dialectical thinking. The philosopher V. I. Maltsev (Maltsev 1964) assumed the existence of corresponding thought operations. At the same time, there was a difficulty in describing formal dialectical operations that would describe processes in their development. The answer to these questions was found in the works of J. Piaget, who, in considering intelligence as the formation of formal-logical structures, also singled out dialectical structural transformations. Analyzing the issue of contradictions in children's judgments, J. Piaget saw their cause in the insufficient equilibration of logical structures. He emphasized that "dialectics is a genetic aspect of all processes of equilibrium" (Piaget 2008, p. 10). At the same time, dialectical thinking became possible not until after formal structures were formed, i.e., postformally (Over, 2015; Ferraz, Viana, Pocinho, 2018; Pronenko, Bunyaeva, 2019). This notion is also reflected in the works of K.F. Riegel (Riegel, 1973), M. Basseches (Basseches, 1984, 2005). Bassechez, analyzing the works of J. Piaget, suggested that considering dialectical thinking as a process of achieving the equilibrium of structures leads to the fact that the equilibration of logical structures makes their structure closed. Bassechez put forward a proposition that dialectical thinking is not so much a process of reaching an equilibrium as a process of working with this equilibrium. He identified 24 dialectical schemes with which an adult solves problems that he finds difficult to cope with.

Another line of studying dialectical thinking, which was also pursued in the context of human cognitive development, is related to the analysis of sensitivity to contradictions. At the same time, it was suggested that unlike their European counterparts, members of Eastern culture are less likely to feel stressed when confronting a contradiction (Peng, Nisbett 2000) and there may exist different cultural bases for dialectical thinking (Wang, 2006; Spencer-Rodgers, Anderson,

Ma-Kellams, Wang, Peng, 2018). In one paper (Zhang et al., 2015) on a comparative study of dialectical thinking of British, Chinese, and Japanese students, the outcomes obtained did not confirm the conclusions of K. Peng and R. Nisbet about a greater dialecticism of thinking in oriental cultures.

Dialectical thinking in preschoolers. Problematics of formal components in dialectical thinking has been considered by domestic psychologists (Davydov, 1972, 1986; Veraksa, Belolutskaya, 2021; Shiyan, Belolutskaya, Le-Van, Zadadaev, 2021; Zadadaev, 2012; Veraksa, Veresov, 2018). Thus, N. Veraksa's research showed that the process of operating the relations of opposites is carried out through several thought actions. Mental actions of transformation and reversal aim to transform one opposite into another as the action of transformation is associated with turning an object from into B, and that of reversal involves turning it in the reverse direction from B into A; the action of mediation is aimed at finding a situation where the opposites act as components of a whole; the action of integration, by contrast, aims to find in the situation two opposites that constitute a contradiction and so on. As researches have shown, from the age of 4 years children are capable of solving contradictory tasks (Veraksa, 1981, 1987). Thus, within the structural-dialectical approach, attempts were made to describe thought actions and it was found that children were just as capable of making transformations of opposites.

Mechanisms of dialectical thinking. Dialectical thinking allows children to solve the following tasks: 1) make a new (creative) product; 2) overcome contradictions; and 3) understand simple (cyclical) developmental processes (Veraksa, 2019). Let's consider the mechanisms involved in solving these tasks. When we talk about creating a new product, there is one major point to be taken into account. It lies in the fact that this process has to do not with a new product in general, but with a concrete new one. It is obvious that in this case the mechanism of creating a new product can be built on the fact that some property of an existing concrete object or the whole of the object will be transformed into its opposite. This means that the mechanism of creating the new presupposes the subject's ability to perform a dialectical mental action of "transformation." First, however, the subject needs to define in terms of substance the opposite in relation to which the transformation action is to be performed. Thus, the mechanism of creating the new can be as follows: first the subject determines the initial opposite in a concrete semantic field; and then he carries out the transformation of one opposite into another.

The situation of contradiction is characterized by the fact that the subject encounters the presence of mutually exclusive properties or relations. He is thus confronted with the task of finding such conditions in which the existence of such relations ceases to be mutually exclusive. In this case the subject performs an action of dialectical mediation. The action of dialectical mediation presupposes first performing an action of dialectical integration. This action of dialectical integration is performed twice. First, it is done when the subject realizes that he or she has encountered a contradictory situation, in other word he or she realizes that there exist two opposites at the same time that seek to exclude each other. Then he should find a situation or one single whole in which these opposites will not exclude each other. What it means in reality is that before proposing such a situation, the subject should first see in it the presence of "peacefully" coexisting opposites, i.e., he or she must perform an action of dialectical integration for a second time. It is not until he does it for a second time that he can start mediating the opposites. In this way the situation is not only mediated, but it is also transformed from one of contradiction to one of non-contradiction. The mechanism of such transformation is as follows:

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1) establishing a contradictory situation (performing a dialectical thought action of integration); 2) searching for a situation in which these properties coexist (performing an action of integration); 3) performing an action of transformation, which consists in turning the action of integration into that of mediation; 4) solving the problem through an action of mediation.

The understanding of cyclic processes (elementary developmental processes) presupposes that the subject presents the cyclic process as consisting of two half-cycles: the forward half-cycle, which can be described as an action of dialectical transformation, and the reverse half-cycle, described as an action of dialectical reversal. The essential point of understanding is the fact that the subject must be seeing also the opposite fragments of the cycle in addition to the two opposite half-cycles. Let us consider the daily cycle as an example (Fig. 1). It consists of two half cycles built in the direct (night - morning - day) and opposite (day - evening - night) directions.

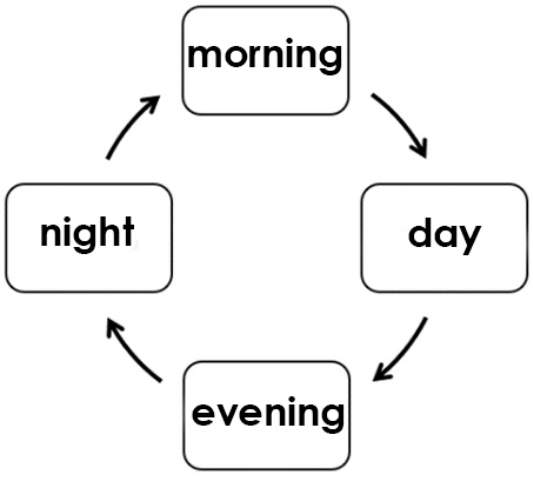

Figure 1: Daily cycle

It is clear that these two half cycles are opposite to each other. But in addition to this, the following fragments of the cycle are opposite: night - day and morning - evening. Thus, we can assume that the mechanism for understanding cyclic processes involves actions of dialectical seriation, transformation and reversal.

Dialectical thinking as a cultural phenomenon. Starting from preschool age children have access to cultural forms "that model fragments of dialectical thinking" (Vygotsky, 1982). Such forms include folk tales reflecting the schemes of transformation of relations between the opposites. Fairy tales can serve as examples of transformation actions because their main characters turn into their opposites: princesses into frogs, monsters into beautiful princes - in an oriental fairy tale called Dragon. In the tale people are oppressed by an evil and treacherous dragon. A brave young man goes to battle with the dragon, defeats him, and turns into a dragon himself. These plots help to analyze situations from the position of transformation and suggest that transformations can be varied. Of special interest are plots which pose a problematic situation only to be solved through a transformation action. For example, the well-known tale of King Solomon delivering his judgement on two women who couldn't divide a child between them. The refusal of one of the women to accept the King's decision to split the baby in two was considered to be an indication

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of her true motherhood. An example of the integration strategy are given by tales based on the idea of a copy. In them the copy appears to be both the same object and a different one at the same time. For example, the tale about an evil mandarin, who wanted to kill his opponent but, in the end, had to face an insurmountable force, as the twin brothers turned out to be five and each of them had a certain quality. This shows the idea of integration because the mandarin thought his opponent to be one person, but in fact there were many of them. An example of the mediation strategy can be found int the plot of the fairy tale "The Wise Bride" where the king says: "If your daughter is really wise, let her come to me in the morning - neither on foot nor on horseback, neither naked nor dressed, neither with a gift, nor without a present" (A.S. Afanasyev, 1986, P.247). The fairy tale emphasizes that it is 'a tricky task'. Thereby dialectical thinking is presented in culture as a special form of mental activity with which children become acquainted in their preschool years.

Methods

The study involved 87 children who were diagnosed first at age 5-6 and then one year later at age 6-7. We planned to compare the mastery of dialectical and formal-logical operations (first of all, the multiplication operation). The study had two objectives: 1) to analyze changes in the success in solving dialectical and formal tasks by children in their sixth and seventh year (on the same sample of children); and 2) to analyze the relations between the development of dialectical thought operations and formal operations in this sample of children. Data analysis was conducted in two stages: the first stage assessed changes in the development of dialectical and formal thinking in children aged six and seven over the course of a year; the second stage, using correlation analysis, examined the relationships between the success of mastering dialectical thinking actions and formal operations in children aged six and seven.

To assess the development of dialectical thinking, we developed three diagnostic techniques: *Drawing an Unusual Tree*, *Cycles*, and *What happens to be both at the same time*?

The *Drawing an unusual tree* method (Veraksa, 2006, 2021) allowed us to assess a child's solution to the creative task of creating a new graphic image. In performing the task, the child could apply both dialectical and non-dialectical transformations. To make a drawing, children used a blank (an A-4 sheet of paper) and a simple pencil. The child was instructed to "please draw an unusual tree." After completing the drawing, the child was asked to describe in detail, what was unusual about the tree he or she had drawn. The child's drawing was considered as a result of ordinary tree image transformation, which allowed for analysis of such transformation strategies to be made.

The *Cycles* technique (Veraksa, 2006, 2021) assessed the child's ability to understand elementary developmental processes. The child was offered three sets of five pictures. Each set characterized a developing situation. In total, three stories were used: *Dissolving lumps of sugar in a cup of tea, Boiling water in a teapot* (Fig. 2), and *Onset of a thunderstorm*.

The child was given the task to arrange pictures in such a way as to make a story. There was but one correct arrangement of pictures that could convey the correct sequence of story developments. Each of the stories could include up to five tasks, depending on the success of their performance. Let's look at the sequence in which the teapot story was arranged. In case of the other two stories, the order in which the tasks were to be performed was similar. In the first task the child was asked to arrange all the five pictures so that they could tell a story (Fig. 2).

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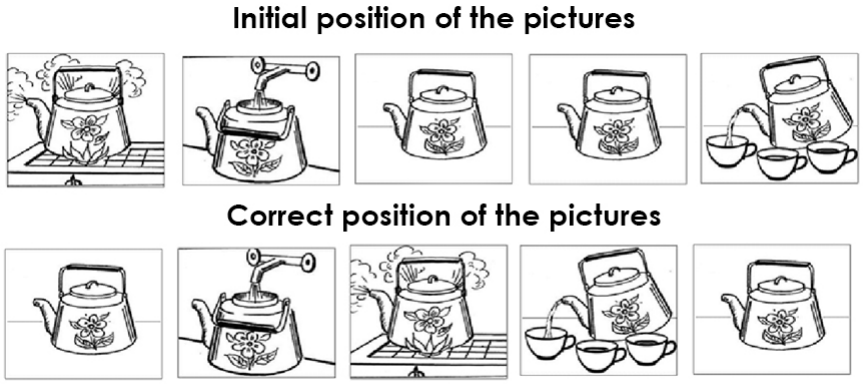

Figure 2: Performing the first task

If the child had difficulty in performing Task 1, he or she was offered to perform Tasks 2 and 3. In Tasks 2 and 3, the child was shown three pictures reflecting one of two half cycles of a cyclic process, which were also to be used to make up a story (Fig. 3).

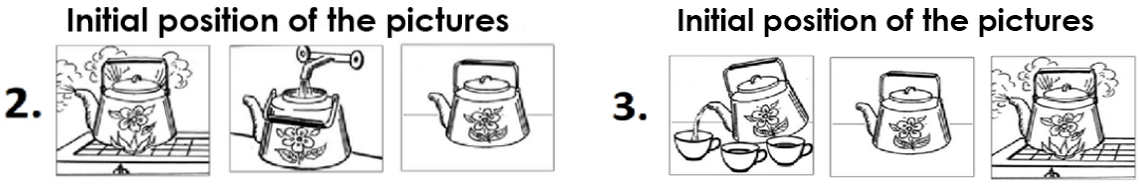

Fig. 3. Initial arrangement of cards in Tasks 2 and 3.

If the child still had difficulty in this case, he or she was given Tasks 4 and 5. In Tasks 4 and 5, the child was shown two pictures from the set with the middle picture missing, and the child had to choose from the other three pictures the one that would correspond to the intermediate state of the process depicted in this fragment of the developing situation (fig. 4).

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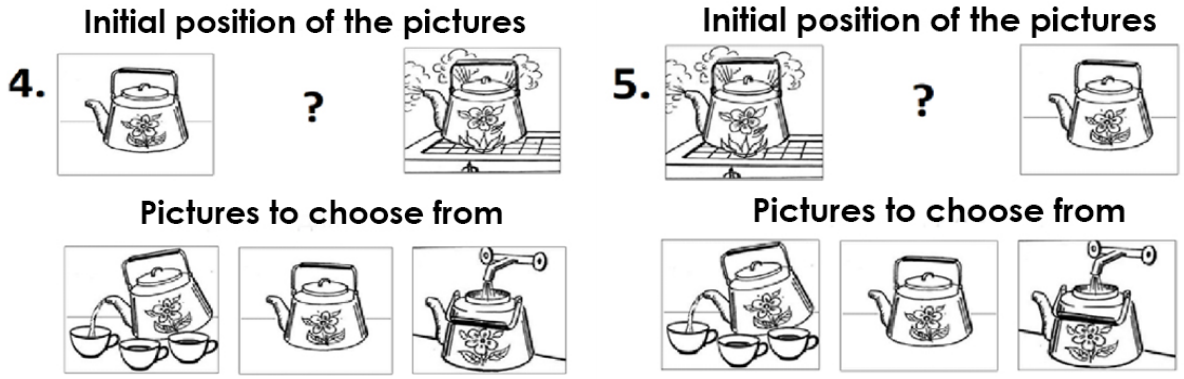

Figure 4: Arrangement of pictures in Tasks 4 and 5

The tasks were presented according to the following scheme. If the child performed Task 1, the test was stopped. Otherwise, he or she was asked to do Task 2 and Task 3. If the child did both tasks, the test was stopped. If the child did only one of two tasks, either Task 2 or Task 3, he or she was given Task 4 and Task 5. Depending on how well the child performed the task, he or she would get from 0 to 5 points for each trial. In other words, the total score could vary from 0 to 15 points.

The *What happens to be both at the same time?* technique (Veraksa, 2006, 2021) was aimed at assessing a child's ability to overcome contradictions. The technique included five questions containing a contradictory pair of attributes. The children were asked to answer the question, "What happens to be both at the same time:

- black and white?
- light and heavy?
- big and small?
- living and non-living?
- same and different?" The child's score on the technique could vary from 0 to 20 points.

The development of formal intelligence was determined using three Piaget tests, which were designed to assess the formation of the multiplication operation and the child's ability to make predictions.

In the *Scales* test (Piaget J., Inhelder B.,1955.), a child was offered a visual task using a balance scale with 12 pegs equidistant from the fulcrum on each side and 16 metal weights weighing 32 grams each (Figure 8). The device also has a mechanical bolt to fix the position of the balance scales. Before starting the procedure, the child is given information about the device and principle of scale operation and he is also given an opportunity to press on the scale arms with the bolt unlocked. During the task presentation, the weights were placed by the experimenter with the bolt locked, so the scales did not change their position regardless of the number of weights placed on each side. Each time the weights were placed, the experimenter asked the child the question, "What happens to the scale when I unlock the bolt?

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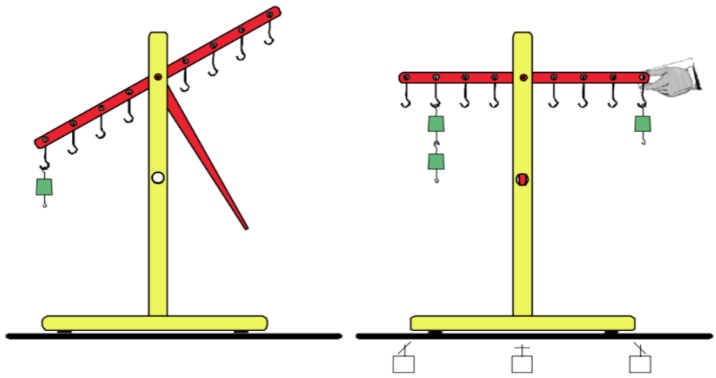

Figure 5. Device for conducting the *Scale* test

Will it stay that way or will it tip this way or that way? Which way? How did you figure it out?" There was a total of five tasks in the test, including two familiarization and three test ones.

In the *Probability* test (Piaget J., Inhelder B., 1955), two sets, each consisting of white and black chips, were placed on the table in front of the child. The child was asked to establish the probability of a white chip falling out. The instructions were as follows: "Imagine that we put the chips in bags and shook them. Now imagine that we take one chip each from here (pointing to the left pile) and one from here (pointing to the right pile). Which side has a better chance of getting a white chip? How did you figure it out?" There was a total of five tasks in the test, including two familiarization tasks and three test tasks.

In the *Cylinder* test (Piaget J., Inhelder B., 1955.), a special set-up was placed on a table in front of the child, consisting of a cylinder, which can be rotated by means of a special handle, with a white sheet of paper attached to it, and a pencil fixed on a special bar above the cylinder which can move along the cylinder and draw a line on the paper. Before starting the tasks, the child was introduced to the set-up by being given an opportunity to move the pencil back and forth and to rotate the cylinder. Then the child was asked to imagine that the pencil placed over the cylinder drew a point on the white sheet of paper attached to it and then the sheet was taken off the cylinder and placed in front of the child. At the same time, a white sheet with a dot in the upper left corner was placed in front of the child. The experimenter explained that the pencil would start moving from it. Two familiarization trials and three test trials were then conducted with the child, in which he or she had to draw on the sheet of paper what should result from the movement of the cylinder and the movement of the pencil. After completion, the drawing was put aside and the child was offered a blank sheet of paper with the point marked.

In each of Piaget's three tests, a child's answer was graded on a 4-point system: if the child did not understand the task, he or she was given 0 points; if the child took into account only one parameter in his or her answer (only the weight or the distance to the center of the balance scale; the number of either white or black chips; solely the movement of the pencil or only the revolutions of the cylinder), he or she was given 1 point; if the child mentioned both parameters in his answer, while relying on only one of them to make a prediction (for example, he counted the number of white and black chips, but chose a pile only for the number of white chips), he got 2 points; if a child tried to correlate the two parameters (guessing that they were contradictory or trying to mathematically relate them), he got 3 points. For each sample, the median was calculated.

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Outcomes

Let us first consider the outcomes of the techniques that assessed the development of dialectical thinking. The success in solving a creative task (designing a graphic image of the unusual tree) is shown in Table 1.

Table 1

Correlation of Unusual Tree Drawing test results for preschoolers in the older and prep groups

Older group	Prep group			Total
	Normative	Symbolic	Dialectic	
Normative	12	23	10	45
Symbolic	4	26	6	36
Dialectic	0	6	0	6
Total	16	55	16	87

Due to mathematical limitations, we could not use the statistical Chi-square criterion. However, the data obtained could be analyzed in the context of comparing the dynamics of the task when preschoolers attended the older group and one year later, when they started attending the preparatory group (prior to school). As shown in Table 1, at Year 6, 45 children executed the "normative" image, and at Year 7, 16 preschoolers drew a normative tree. At the same time, most of the children (12 of 16) who drew a normative tree in the preparatory group, also acted similarly in the older group, in other words, they executed a "normative" tree image.

The "dialectical" drawing of a tree in the older group was done by 6 preschool children, and by 16 in the preparatory group. Note, however, that none of the children who managed to make a "dialectical" drawing of a tree in the older group did a drawing of the same kind (i.e., a dialectical drawing of a tree) in the preparatory group.

A 'symbolic' drawing of a tree in the older group was done by 36 children, and 55 preschoolers in the preparatory group.

The outcomes of the *Cycles* technique are presented in Table 2. It shows the values of averages, medians, standard deviations, maximums and minimums of scores awarded to preschool children in the older and prep groups.

Table 2

Cycles test results for preschoolers in the older and prep groups

Group	Average	Median	Std. er.	Minimum	Maximum
Older Prep	6,30 10,38	7,00 10,00	3,485 2,516	0 4	14 15

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Application of the Kolmogorov-Smirnov criterion showed that the distribution of scores on the *Cycles* technique was normal in both the older and the prep groups, which allowed parametric criteria to be used.

Using Pearson's correlation coefficient, it was found that the scores in the senior and prep groups were unrelated (r=0.129; p=0.228).

The application of the Student's t-distribution criterion for paired samples showed that the preschoolers' scores in the senior and prep groups differ significantly (t= 9.557; p<0.001) with the scores in the prep group being higher.

Figure 6 shows the "High-Low" chart for the total score on the *Cycles* technique in the older and prep groups. For almost all preschoolers, the score in the prep group became higher than it was in the older group (Table 3).

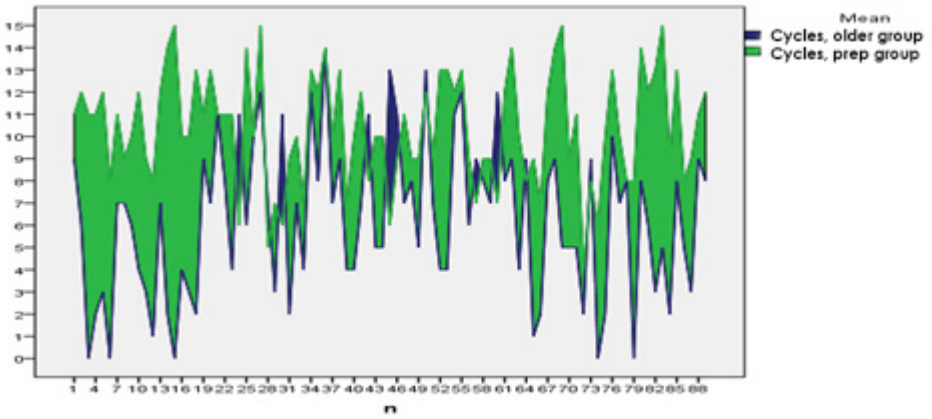

Figure 6. "High-Low" chart for the total score for the *Cycles* technique in the older and prep groups

Table 3

Results of preschoolers' performance of the tasks of the *What happens to be both at the same time?* method

Group	Average	Median	Std.er.	Minimum	Maximum
Older	4,60	4,00	3,804	0	17
Prep	9,17	9,50	4,718	0	18

The distribution of scores in the *What happens to be both at the same time?* technique for children in the older and prep groups was normal (Kolmogorov-Smirnov test), which allowed us to use parametric criteria.

Using Pearson's correlation coefficient, it was found that the scores of preschoolers in the older and preparatory groups were unrelated (r=0.148; p=0.169).

The application of the Student's t-test criterion for paired samples showed that the scores of preschoolers in the prep group were significantly higher than the those of preschoolers in the

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older group (t= 7.645; p<0.001).

Figure 7 shows the "High-Low" chart for the total score on the *What happens to be both at the same time?* technique in the older and prep groups. For almost all preschoolers, the score in the prep group proved higher than it was in the older group.

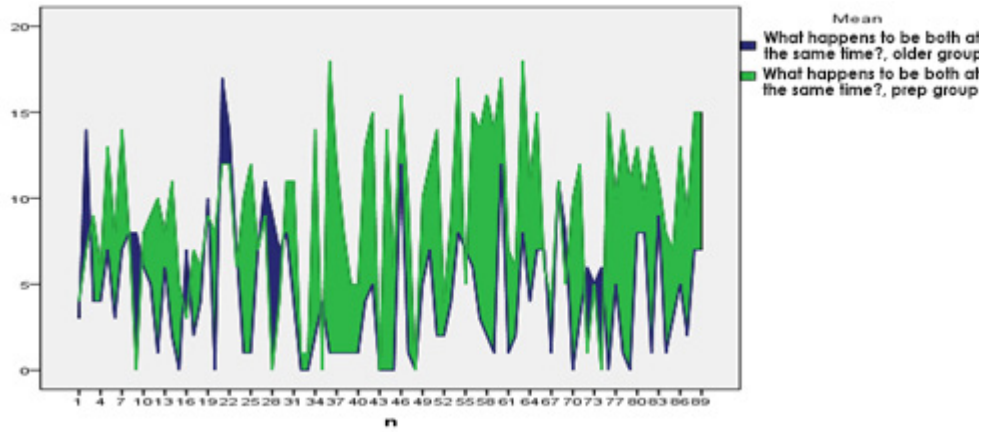

Figure 7. High-Low chart for the total score on the *What happens to be both at the same time?* technique in the older and prep groups

The outcomes of the Piaget trials for children in the older and preschool groups are shown in Table 4.

Table 4

Results of Piaget tests by preschoolers in the older and prep groups

Trial, group, parameter	Average	Median	Std. er.
Probability, older, maximum point	1,06	1,00	0,654
Probability, prep, maximum point	1,15	1,00	0,356
Probability, older, median	0,91	1,00	0,477
Probability, prep, median	1,12	1,00	0,329
Probability, older, score	2,83	3,00	1,368
Probability, prep, score	3,35	3,00	0,908

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Trial, group, parameter	Average	Median	Std. er.
Scale, older, max. point	0,97	1,00	0,519
Scale, prep, max. point	1,16	1,00	0,528
Scale, older, median	0,92	1,00	0,490
Scale, prep, median	1,08	1,00	0,412
Scale, older, score	4,53	5,00	2,335
Scale, prep, score	5,40	5,00	1,696
Cylinder, older, max. point	1,69	2,00	1,286
Cylinder, prep, max. point	1,82	2,00	0,721
Cylinder, older, median	1,42	1,00	0,855
Cylinder, prep, median	1,61	2,00	0,695
Cylinder, older, score	4,37	5,00	2,589
Cylinder, prep, score	4,82	5,00	1,813

For all trials, the mean values increase from the older to the prep group, and data scatter decreases.

The Student's t-test for pairs of the related samples was used to test the significance of differences in the scores of the older and preschool group children on the parameters in question. The outcomes are presented in Table 5.

Table 5

Differences in Piaget test scores between older and prep children

Trial, parameter	T	P
Probability, max. point	-0,779	0,439
Probability, median	-7,493	<0,001

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Trial, parameter	T	P
Probability, score	-2,756	0,007
Scale, max. point	-2,411	0,018
Scale, median	-2,435	0,017
Scale, score	-3,046	0,003
Cylinder, max. point	-2,029	0,045
Cylinder, median	-1,901	0,060
Cylinder, score	-1,913	0,058

In the *Probability*, *Scale*, and *Cylinder* tests, the outcomes of preschoolers in the older and prep groups differed significantly (they tend to become significantly higher in the prep groups). What differed in the *Probability* test were the median values and sums, rather than maxima, suggesting that the preschoolers in the prep groups often began to show their maxima in each of the 3 trials way back when they were in the older group. The outcomes of the *Cylinder* test differed significantly on the maximum score parameter, suggesting that children in the prep groups were more likely to get the correct score in one of the 3 trials. For the other two parameters of the *Cylinder* test, the differences appeared to be at trend level.

We can assume that the mechanisms behind the *Probability* test are stabilizing, while those behind the *Cylinder* test are qualitatively developing, and those behind the *Scale* test are stabilizing for some children and developing for others.

K. Riegel, describing Piaget's approach, emphasized that the decisive role in the development of formal-logical thinking is assigned to dialectical thinking. In this case, dialectical operations are to play the role of predictors of formal-logical thinking. In order to test this hypothesis, we conducted a linear regression analysis.

The following outcomes of preschoolers in their sixth year were taken as expected predictors: the total score on the *Cycles* technique, the total score on the "What happen to be both at the same time" technique, the sum of scores on each type of Piaget trials, and the total score of understanding emotions in the older group.

Table 6 shows the coefficients of the regression equation for the dependent variable "probability," the sum of scores of Year 7 children, in which the scores of Year 6 children were taken as independent variables ($R = 0.606$ (>0.5); $F = 3.957$, $p=0.003$).

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Table 6

Regression equation coefficients for the Probability test results (total) in the preparatory group

Model	Non-standard coefficients		Standard coefficients	T	p
	B	Std. Er.	Beta		
Constant	2,741	0,683		4,017	<0,001
What happens to be both at the same time, total score	0,062	,029	0,298	2,144	0,038
Cycles, total score	-0,073	0,034	-0,296	-2,157	0,037
Probability,Year 6, score	0,343	0,122	0,398	2,819	0,007
Scale,Year 6, score	-0,066	0,053	-0,166	-1,236	0,224
Cylinder, Year 6, score	-0,141	0,046	-0,407	-3,100	0,003
TEC, total score	0,044	0,041	0,141	1,067	0,292

The predictor of the success of the *Scales* task for children in Year 7 was only the "sum of points" score obtained in the *Scales* test by children in Year 6.

No regression models satisfying statistical criteria were found for the *Cylinder* test or for indicators of dialectical thinking. In addition to the analysis performed, we determined correlations between the results of measuring the indicators for children in their 6th and 7th years that were obtained using all the methods (see Tables 7 and 8).

Table 7

Correlational relationships between the results of the method tasks by children in their 6th year

	Scale	Probability	Cylinder	Cycles	Unusual Tree Drawing	What happens to be both at the same time?
Scale	1	***0,294*****	***0,222*****	0,031	0,000	-0,001
Probability		1	***0,181****	***0,203****	-0,085	-0,015
Cylinder			1	0,162	0,157	0,096

	Scale	Probability	Cylinder	Cycles	Unusual Tree Drawing	What happens to be both at the same time?
Cycles				1	***0,211****	0,165
Unusual Tree Drawing					1	0,116
What happens to be both at the same time?						1
*Note: *p < 0.05, **p < 0.01*						

Table 8

Correlations between the results of the method tasks by children in their 7th year

	Scale	Probability	Cylinder	Cycles	Unusual Tree Drawing	What happens to be both at the same time?
Scale	1	0,003	0,043	0,025	0,056	0,178
Probability		1	-0,004	0,094	-0,223	-0,063
Cylinder			1	0,123	-0,066	0,049
Cycles				1	-0,011	0,128
Unusual tree drawing					1	0,171
What happens to be both at the same time						1

Discussion

Returning to the analysis of the results of the tasks to assess the developmental level of dialectical thinking in children, we note that it is important for us to determine how these indicators changed over the year. First of all, we can say that the development of dialectical thinking is not the main line of cognitive development in preschool children. Considering the outcomes of the *Drawing an Unusual Tree* technique shows clearly structural changes in children's cognitive development. Indeed, if the older kindergarten group executed 45 normative drawings, 36 symbolic drawings, and only 6 dialectic drawings, one year later the same children presented 16 normative drawings, 16 dialectic drawings and 55 symbolic ones. Thus, we can see that children's thinking in solving creative tasks by the beginning of school age was oriented toward using the mechanism of symbolization, which is characteristic of imagination. The same circumstance confirms the importance of play for developing preschoolers' imagination.

It should be noted that those preschoolers who used dialectical operations when constructing a graphic image, when they attended the older group, did not use dialectical operations in the prep group. It is noteworthy that those preschoolers who performed normative drawings in the prep group also did normative pictures a year ago. These outcomes indicate that there is a tendency to standardize children's thinking in favor of a formal-logical perspective (Smirnova, 2019; Rzhanova, Alekseeva, and Fominykh, 2020).

Based on the fact that the creative task was predominantly carried out by creating a symbolic image, we can draw the following conclusions: in the older preschool age the development of children's ability to create a creative graphic image occurs mainly due to the development of imagination; dialectical thinking is not supported by the educational culture of kindergarten.

The performance of the *Cycles* tasks, shown in Table 2 and on the High-Low chart (Fig. 9), shows that the maximum score achieved by a portion of the preschool group children is 15 points or close to it. This outcome indicates that there are preschoolers who reflect cyclical processes quite adequately. They understand that a cycle consists of two half cycles, that there are fragments of cycles that are opposite to one another. It means that they build representations of cyclic processes on the basis of actions of seriation, reversal and transformation. Thus, we can conclude that the dialectical actions of seriation, reversal, and transformation are the first to develop with the other dialectical actions developing at a later stage.

The outcomes indicate that the older preschool age is sensitive to the development of dialectical thinking operations such as seriation, transformation and reversal. At the same time, development occurs in leaps and bounds. The latter conclusion is based on the fact that the scores in the prep and senior groups are not related to each other.

The preschoolers found it difficult to perform the tasks of the *What happens to be both at the same time?* method based on the outcomes presented in Table 3 and on the High-Low chart

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(Fig. 10). Indeed, it should be noted that although the outcomes of the preschoolers were higher than those obtained by children a year ago when they attended the older group, the tasks of the *What happens to be both at the same time?* technique still caused some difficulties for the children. This is evidenced by the fact that the children's outcomes did not reach their maximum values. For example, in the *Cycles* method the average values received by the children differed from the maximum values by only one third, while for the *What happens to be both at the same time?* method the maximum values differed from the average by more than two times.

The outcomes allow the conclusion that the senior preschool age is sensitive for the development of the thinking operation of dialectical mediation. However, the development of this operation follows that of the understanding of cyclic processes and occurs in leaps and bounds. This conclusion derives from the fact that the scores in the preparatory and older group were unrelated.

As shown by regression analysis, predictors of success in the *Probability* task in the prep group were the indicators assessed when preschoolers attended the older group. The predictors included Piaget's probabilities (*Probability, Cylinder*) trials and dialectical thinking, as measured by the *Cycles* and *What happens to be both at the same time?* methods. This outcome testifies in favor of K. Riegel's position, but requires more thorough verification.

As follows from the data of the correlation analysis, there are significant, but rather inconspicuous links between the outcomes of the Piaget trials. They show that they represent the multiplication operation, which consists in conserving two features simultaneously in the process of analysis. This operation is a part of the mechanism of double perspective, which allows preschoolers to role play and develop imagination. This appears to account for a large number of children who have performed symbolic drawings of the unusual tree. The presence of such an image indicates the children’s preference to use mechanisms of formal-logical thinking to solve creative tasks rather than those of dialectical thinking.

Of interest is the connection between the outcomes of the *Probability* test and the outcomes of the *Cycles* technique. This link testifies to the fact that the mental operations of multiplication and those of reversal, transformation and mediation are part of a uniform cognitive structure. It may be a dialectical (cyclic) structure. Also of interest is the fact that there is a connection between the outcomes of performing the *Drawing of an unusual tree* method and the *Cycles* method. Probably, this connection is explained by the presence of the common dialectical operation of Transformation.

The outcomes of the study suggest that in Year 7, significant changes occur in the development of both formal and dialectical thinking in preschoolers. In particular, there are no correlations that were established in these children a year ago, when they attended the older kindergarten group. The established structure may be disintegrating. This outcome shows the heterochronic nature of the development of thought operations in formal-logical and dialectical thinking. It also

suggests that the operation of mediation is mastered by children later than those of transformation, reversal and seriation. It should be borne in mind that the use of the mediation operation also presupposes the use of the association operation. This may be the reason preventing children from mastering the mediation operation.

Conclusion

Dialectical thinking represents a special form of thought activity consisting in the ability to operate with relations of opposites. There are different ways of operating with relations of opposites (dialectical operations).

In preschool age the development of dialectical thinking is associated with mastering dialectical operations. At first the operations of seriation, transformation and reversal are mastered. Preschool age is sensitive to the development of dialectical thinking. Dialectical thinking participates in the development of formal-logical thinking and acts as a predictor of this development. This point corresponds to the position expressed by K. Riegel and needs further study.

Dialectical thinking is a cultural phenomenon. It is represented in folk literature in the form of fairy tales of the peoples of the world and is addressed to children. However, dialectical thinking is not supported by the educational system and is not considered as an important line of cognitive development of preschool children.

Dialectical thinking together with formal thinking can create cognitive structures whose units are thought operations. These structures are part of the mechanisms for solving creative tasks and allow preschool children to create original products. They have a dynamic character and can disintegrate.

The outcomes show that disintegration of correlational relationships occurs in preschool children in the 7th year of life, that is before school. It is possible that preparation for school may influence the developmental process of dialectical thinking by making it heterochronic. This proposition needs further study.

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Information about the conflict of interest

The authors declare no conflict of interest.

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AGE-RELATED PSYCHOLOGY

Research article

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Mediation of productive activity as a condition for overcoming computer addiction in primary school age

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Abstract: Introduction. The relevance of the problem under study is associated with the specifics of the social situation of development, especially at a younger age, as a determining factor in the formation of addiction. The purpose of the study is to study the perception of parents about the peculiarities of using the Internet by younger students and to develop a project aimed at reducing computer addiction in such children. **Theoretical justification.** The theoretical substantiation of the study lies in the fact that modern digital opportunities in creating animated films become a condition for mediating and coordinating productive forms of activity for younger students. The system of productive activities within the framework of the Plasticine Cartoons project, through the systematic organization of joint activities of parents and children, made it possible to minimize computer addiction among younger students. **Results**. The practical significance of the work is determined by the designation of the problem and the consideration of one of the options for an effective form of organizing the activities of children and adults, mediated by the use of digital technologies. As a result of the project implementation, children noted changes in the following areas: cognitive, emotional and behavioral. **The discussion of the results.** During the implementation of the project, due to the variety of means of interaction between the child and peers and parents, computer addiction in children decreased in the following parameters: reduction in the time spent at the computer, gadgets; an increase in the use of gadgets by children as a means of implementing any activity; increasing the level of communication with peers; expanding the idea of options for joint activities with parents and their own pastime; an increase in situations in which children are oriented towards a dialogue with their parents; no negative reaction to the request to turn off the computer (phone). **Conclusion.** The results obtained in the course of the study can be used in work with children of preschool and primary school age. The materials of the study are relevant for the training of psychologists, teachers and educators.

Keywords: computer addiction, project activity, mediation, productive activity, younger schoolchildren

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Highlights

- computer addiction can be considered from four areas of manifestation: cognitive, emotional, behavioral, physiological;
- modern digital opportunities in creating animated films become a condition for mediating and coordinating productive forms of activity for younger students;
- The system of productive activities within the framework of the project through the systematic organization of joint activities of parents and children allowed minimizing computer addiction among younger students.

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Introduction

In the current socio-political situation, characterized by limited social contacts, an increase in technical innovations in the field of consumption, entertainment, education, the number of hours spent on the Internet by different age categories and, especially, by younger schoolchildren is increasing (Bydtaeva, 2015; Kuznetsova, 2021; Berezovskaya , 2019; Marker, Gnambs, Appel, 2019). In this regard, there is an antagonism between the variety of computer services and their impact on human mental health. The current level of development of science does not allow drawing unambiguous conclusions about whether the Internet is a risk factor or a source of development, so many researchers discuss the impact of computer addiction on the human psyche (Beznos, 2018; Bogacheva, 2019; Brenner, 1997; Griffiths, 2009; Olson and Kutner, 2015; Reisinger, 2011). There is a need to define a system of psychological and pedagogical means that allows minimizing the time spent playing computer games and reorienting people from a gaming format to a creative (productive) one (Ignatova, 2020). Therefore, it is important to focus on the specifics of the social situation of development as a determining factor in the formation of where, as a result of technological progress and the changing experience of mankind, a digital society arises, the basis of which is the digital environment (Orlov, 2019). The created conditions of the electronic environment directly affect the behavior of a person who finds himself in a new situation (Dyatlova, Mikhina, 2019). Studies show the psychological features of the change associated with: certain value orientations of the individual due to gambling addiction (Efremov, 2015); with attention problems and impulsivity (Gentile, 2012); with the neural basis of computer games (Kühn, 2011); with spatial thinking (Greenfield, 2009). The term "addiction" is characterized as a behavioral deviation, however, using the example of considering the problem of computer addiction based on the ideas of domestic psychology (Zaretskaya, 2017; Zapesotskaya, 2012; Ivanov, 2007), it suggests that the problem of enthusiasm for virtual activities, computers, gadgets can be " a consequence of both dissatisfaction with human needs and a compensatory nature" (Zaretskaya, 2017). We focus on the formulation of the concept of computer addiction by M.S. Ivanova: "Computer addiction is an addiction to activities related to the use of a computer, leading to a sharp reduction in all other activities, limiting communication with other people" (Ivanov, 2007). The concept of computer addiction includes addiction on a computer, gadgets, the Internet, computer games, etc.

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M.V. Kostrikova examines the factors in the formation of computer addiction and its impact on a person from the point of view of psychology and gives a classification of computer addiction, which is divided into gaming, communicative and cognitive (Kotrikova, 2015). I. Goldberg offers his own criteria for diagnosing this type of addiction (Goldberg, 1996).

According to I.V. Zapesotskaya and V.B. Nikishina, the key factors that cause computer addiction and are inherent in the subject-object model of relations are manipulation, excessive control and protection, a ban on expressing feelings or transforming the ways of expressing them, etc. (Zapesotskaya, 2012). An analysis of research papers showed that computer addiction can be viewed from four areas of manifestation (Skvortsova, 2018; Zapesotskaya, Nikishina, 2012; Yang, 2015): other activities); emotional (irritability when it is impossible to play computer games; neglect of one's own health, hygiene and sleep in favor of spending more time at the computer); behavioral (the impossibility of planning one's own time for gadgets, difficulties in engaging in joint games with peers, restrictions on tactile contacts); physiological (deterioration when unable to play, rapid fatigue).

O.V. Zaretskaya, analyzing works on the topic of computer addiction, systematized a number of factors that cause computer addiction: a low degree of concern for each other, a weak sense of belonging to a family; it is not customary to express one's feelings openly or it is customary to express them to a weak degree; a low degree of encouragement of family members to self-affirmation, independence and independence in thinking about problems and making decisions; low degree of family respect for ethical and moral values and rules; low degree of activity in the social, cultural and political spheres of activity; low participation in various outdoor activities and sports; low importance of order and organization in relation to structuring family activities, financial planning, clarity and certainty of family rules and responsibilities (Zaretskaya, 2017).

To date, the issue of computer addiction of younger students is one of the most pressing and can be attributed to the problems of the modern family, because it is the parents who can positively influence the child in order to prevent computer addiction (Elkina, 2017). Despite the extensive material and experience of psychological work accumulated in working with various kinds of addictions, the question of the system of means for working with this problem in childhood remains open. We believe that the use of a project-based form of education (Khoziev, 2000) will allow not only expanding the orientation in the system of parent-child relations of adults, but also providing psychological conditions for the emergence of other meanings in the use of technical means.

Methods

The purpose of this study is to study the views of parents about the peculiarities of using the Internet by younger students and to develop a project aimed at reducing computer addiction in such children. Modern digital capabilities in creating animation are becoming a condition for mediating and coordinating productive forms of activity (Rubtsova, 2019; Khoziev, 2000; Savostina, Khokhlova, 2021). The project "Plasticine cartoons" for parents and younger schoolchildren, which is based on a system of productive activities implemented in the joint activities of children and parents: verbal creativity, visual activity, design, modeling. The combination of these types of activities is aimed at constructing by the child, together with the adult, the desired image of the hero and its embodiment in reality. The implementation of the project corresponds to the traditions of the theory of planned-staged formation by P.Ya. Galperina (Khoziev, Khokhlova, Plekhanova,

2014). Tasks of the ongoing project:
– to form a system of funds to obtain their own product of activity;
– to form a system of means of interaction between children and parents (on the example of mothers) in order to organize joint activities and the possibility of correcting various aspects of computer addiction.

As a hypothesis of the second stage of the study, we assumed that due to the variety of means of interaction between the child and peers and parents within the framework of project activities, a decrease in computer addiction will be noted in the following parameters (Yang, 2015):
– reduction of time spent at the computer, gadgets;
– an increase in the use of gadgets by children as a means of implementing any activity (not for entertainment);
– increasing the level of communication with peers;
– expanding the idea of options for joint activities with parents and their own pastime;
– an increase in situations in which children will be oriented towards a dialogue with their parents;
– no negative reaction to the request to turn off the computer (phone).

Project implementation scheme: number of lessons - 11, 1.5-2.5 hours each for 2 months. The time limits of the classes changed, as the group remained either to discuss significant points or to finish the work they had begun (creating a script, modeling characters, etc.).

There are 3 substantive blocks in the project structure:

1) building interaction between younger students and their parents (solving communication problems);

2) verbal creativity (acquaintance with the structure of fairy tales; development of artistic means);

3) creation of an animated film (plot, script, drawing and modeling of characters, creation of scenery, shooting).

Prior to the implementation of the project, a questionnaire “Caught by the same network” was conducted (G. Soldatova, E. Zotova, A. Chekalina, O. Gostimskaya), aimed at studying the perception of parents about the peculiarities of using the Internet by younger students: user activity, the content of Internet activities, understanding of the Internet -security. In the system of existing questions, we added an additional question about the presence of joint activities of parents and children. The use of a parental attitude test questionnaire (A.Ya. Varga, V.V. Stolin) is due to the need to identify the characteristics of parental relationships. At the final lessons of the project, the questionnaire "Parent-Child Interaction" (I.M. Markovskaya) was used to diagnose the features of interaction between parents and children. The questionnaire allows you to analyze the features of the interaction of a parent with a child. Mathematical and statistical processing of the obtained data was carried out using the Mann-Whitney test.

Results

The sample at the first stage of the empirical study consisted of parents of younger school-children - 63 people aged 27-45 years, of which 21% were men and 79% were women. At the second stage of the study, these parents, together with their children, were invited to participate in the Plasticine Cartoons project. Of the 25 parents who came, only 10 people remained who were ready to take part in the project and work together with the child. The rest of the parents did not express a desire to study together with the child, they actively suggested that the psychologist “work only with children”, motivating them with a lack of time, etc.

Most children use gadgets only at home (60%), 66.7% of respondents feel that they need more information on how to protect their child from illegal or negative content. More than half of parents have established rules-restrictions when using the Internet from the phone - 62% (games, cartoons, etc.); computer use - 14.3%; 14.3% did not set any rules. At the same time, it should be noted that half of the parents surveyed (52.4%) establish a temporary regime for using the Internet. There are a number of examples of restrictions that parents use, and it is almost impossible to check the result of the implementation of these restrictions by children. For example, 38% of parents do not allow their child to use rude words in chats and games; 28.6% - do not allow children to meet in life with those they met on the Internet, and also prohibit visiting certain sites; 23.8% - do not allow chatting with strangers, giving personal information about themselves and downloading applications. More than a third of respondents (38.1%) say that their child spends 1.5 - 3 hours a day on the Internet (Table 1).

Table 1

The results of the diagnosis of the attitude of parents to children (%)

Testee	Questionnaire of parental attitude (A.Ya. Varga, V.V. Stolin)					Questionnaire "Parent-Child Interaction" (I.M. Markovskaya)									
	Acceptance	Cooperation	Symbiosis	Authoritative	Little loser	Demanding	Strictness	Control	Emotional	Acceptance	Cooperation	Anxiety	Sequence	Educational confrontation	Satisfaction
M (36)	100	87,5	71,4	28,6	12,5	20	30	20	30	90	80	10	80	30	50
O (40)	90,9	75	28,5	28,6	12,5	30	30	20	50	100	80	20	90	60	100
A (40)	90,9	75	28,5	28,6	0	70	60	40	70	100	80	10	70	70	100
A (46)	87,9	87,5	71,4	28,6	25	20	60	40	50	60	50	20	30	40	60
O (30)	97	87,5	43	86	25	30	70	40	50	100	40	60	20	100	60
H (37)	98,2	89	73	26,6	15,5	20	25	30	35	70	80	15	75	30	50

Testee	Questionnaire of parental attitude (A.Ya. Varga, V.V. Stolin)					Questionnaire "Parent-Child Interaction" (I.M. Markovskaya)									
	Acceptance	Cooperation	Symbiosis	Authoritative	Little loser	Demanding	Strictness	Control	Emotional	Acceptance	Cooperation	Anxiety	Sequence	Educational confrontation	Satisfaction
Λ (42)	89,9	75	29,5	27,5	14,5	25	30	20	45	90	80	20	80	60	90
A (39)	85,9	77,5	25,5	25,6	5	65	60	35	65	95	75	10	75	75	100
K (43)	88,5	89,5	69,4	29,5	20	20	50	40	45	50	55	20	35	40	60
T (34)	95	85,5	40	88	30	30	70	40	50	100	30	50	20	90	50

When the computer (phone) is turned off, the reaction is always different: 57.2%, 38% are "offended" and "irritated", 33.3% are "crazy", 28.6% are "nervous". As an alternative to gadgets, 47.6% of parents do "something together with the child" (did not indicate what exactly), also 47.6% "the child takes care of himself", 38% "communicate with the child on various topics", 28 .6% "watch TV or read books". A low level of involvement of parents in joint activities is stated. Although the question: "Does your family have traditions or customs in which you are engaged in joint activities with children?" - 57.1% answered that they do, but did not specify which ones. One third of the interviewed parents indicated that their children spend less than 3 hours at the computer, while in a face-to-face conversation everyone noted "long time". We cannot unequivocally state the presence of computer addiction in children, but if there is a negative reaction to the restriction of activity in the computer, it indicates this trend.

The results of diagnosing the attitude of parents to children are presented in Table 1. Comparison of the attitude of parents to children in pre- and post-control was carried out according to the corresponding scales of the methods of the test questionnaire of parental attitude (A.Ya. Varga, V.V. Stolin) and the test questionnaire "Interaction parent-child "(I.M. Markovskaya) - acceptance / non-acceptance, cooperation / cooperation, symbiosis / emotional closeness, authoritarianism / control, little loser / relationship satisfaction - showed statistically insignificant results (Mann-Whitney test at $p > 0.05$).

Discussion

An analysis of the survey results showed that the joint activities of children and parents are poorly represented and are declared to a greater extent than they are implemented (parents do

not indicate the specifics of the activity). The low level of joint activity causes regulated relations, the prevalence of prohibitions.

The Plasticine Cartoons project created by us is aimed at minimizing negative manifestations in the behavioral, emotional and cognitive spheres. At the first lessons, the participants were presented with a system of exercises for the joint activities of the child and the mother: "The Blind Man and the Guide", representing their family, the "Life Line" of the family, game situations for resolving conflicts of various kinds. In the process of joint performance of tasks, parents, feeling anxious, did not take actions aimed at building a dialogue with the child and minimizing their own discomfort (for example, suggesting to name the number of steps to the object; controlling moments were stated to a greater extent: "Do not rush", "Do not run" etc.). Thus, firstly, an image of the relationship "I will be patient, the main thing is to do ...", which was transferred to other types of activities in the project, both from the parents and from the children, arose; secondly, even with their eyes closed, the parents controlled the actions of the children "so describe what is around ... do not be silent", where dialogism and planning of the participants' activities were manifested to a minimum extent. In general, characterizing the joint activities of parents and children, the following was stated at the beginning of the project: the children demonstrated an egocentric position in the representation of the family, which is nominally represented, spoke more about themselves, and the mothers supported the child's initiative, but did not try to reorient him to a discussion of more general family moments. Most parents understood joint activities as "being around", and not doing something with the child, where everyone implements their part in accordance with the assigned role.

In the process of solving project tasks (mastering the structure of literary works, the specifics of the content, etc.), the participants interacted from the position of the accepted roles: screenwriters, directors, decorators, artists, critics, actors. As a result of the project, in a reflective discussion, the parents stated that the child's activity is determined by the specifics of the interaction between parents and children, and if these relations are disharmonious, then difficulties in the relationship are inevitable. Analyzing the relationship between parents and children from the position of the first, it should be noted that no statistically significant results were obtained. But let's outline a few trends that we observed after the implementation of the project. On the "Cooperation" scale, high values are stated. Cooperation is a consequence of the child's involvement in interaction, reflects equality and partnership in relations with adults. Also, 60% of the group have high scores on the "Educational confrontation" scale, which indicates parental anxiety for the child and a possible disagreement between family members on issues of education, causing confrontation within the family. In the group of 40% of parents, low scores on the Demanding and Severity scales (20-30 points) are inherent, with a high score on the Consistency scale. And the other 40% have a high score on the "Strictness" scale, a low score on the "Demanding" and "Consistency" scales. In this case, there is a danger of ascertaining the low importance of order and organization in relation to the structuring of family activity, the clarity and certainty of family rules and responsibilities. But in general, at the cognitive level, there is a decentering in the position of the parents participating in the project. Here are examples of quotations from reflective audio recordings of parents. A .: "I really liked that on the project you could look at your child from the outside ... he can say what he wants, do what he wants ... at home you won't hear or see this ... here the child speaks out. .. I was wondering ... oh, how can you do it ... the children are doing well ... everything is more difficult for parents. M: "I watched how my child reacted and how other children reacted.

I love to analyze... ...learned other forms of interaction with a child...it was very valuable for me and for my family." A: "I realized that I need to study with M ... I devote little time to him."

Analyzing the scripts of animated films (children were the main scriptwriters), it is worth noting several storylines that testify to the significant values for the children-participants. In most cases (60%), friendship saved the heroes in difficult relationships (hedgehogs, donut-bagel, minion). 20% of the participants built the film on the basis of a violation of prohibitions, but the attention and care of another (for example, the hero - a hedgehog) saved them from inevitable death. As you can see, support in difficult situations, the desire for dialogism turned out to be significant for almost all children.

As a result of the project, the following changes in the relationship between parents and children are confirmed:

- expansion of forms of cooperation - redistribution of responsibilities, agreements, compromises (for example, from the reflection of the mother-participant: "instead of threats, you can switch to another type of activity");
- the dynamics from control to cooperation (for example, from the reflection of the mother-participant: "I accepted that my daughter can already walk to the store on her own and we can negotiate with her");
- the implementation of various options for joint activities (parents began to plan joint walks with their children, discuss family traditions and the possibility of their revival; for example, a quote from a participant: "I fought so hard to develop independence in her, but in the end she appeared on the project, I completely I didn't expect it, and yes, we use gadgets less, because on weekends we try to invent joint leisure activities for the whole family... whether it's going to the cinema, a museum, or just a walk on the Saimaa").

In general, characterizing the dynamics of the involvement of children and parents in work, the following lines can be distinguished:

- from a high level of control over the process of the child's activity to a joint distribution of role positions, which was demonstrated in the process of joint co-creation when choosing a fairy tale, formulating an idea, building a script;
- expansion of forms of cooperation both with adults and with other children (dialogue in the context of the work under discussion, voicing the hero, self-presentation and presentation of the family);
- a variety of productive activities contributed to the development of a range of game forms (children were in various role-playing positions);
- reducing the manifestation of excessive involvement in the use of gadgets.

The super-task formulated for the project participants allows creating a special space in which a number of psychological difficulties, both interpersonal and subjective, are solved. It is in the joint activity in solving the problem - the creation of an animated film, that the rethinking, discovery and alignment of the hierarchy of interests, desires, and abilities of children takes place. In addressing the issue of minimizing immersion in the digital world, it is important to demonstrate a palette of other scenarios of interaction between parents and children, ways of expressing emotions and, in general, life goals.

Conclusion

As a result of the project, we can note changes in children in the following areas:

– cognitive (participants are actively involved in the dialogues of parents, children could express disagreement and justify it);
– emotional (in general, there were no significant changes, only one of the participants, according to the mother at home, began to calmly turn off the phone at her request);
– behavioral (increase in the frequency of cases of initiative, joint games with peers, increase in tactile contacts with mothers).

Thus, due to the variety of means of interaction of the child with peers and parents, the project showed a decrease in computer addiction in the following parameters: a decrease in the time spent at the computer, gadgets; an increase in the use of gadgets by children as a means of implementing any activity (not for entertainment); increasing the level of communication with peers; expanding the idea of options for joint activities with parents and their own pastime; an increase in situations in which children are oriented towards a dialogue with their parents; no negative reaction to the request to turn off the computer (phone).

One of the tasks of further work is to build a holistic system for organizing family activities, which presents a palette of creative opportunities for joint activities of the child and parents, which will contribute to the rethinking of digital technologies and reduce the involvement in the use of gadgets by both children and parents.

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Author Contribution

Natalia Ivanovna Khokhlova - organization and management of the study.
Olga Yurievna Muller - preparation of the research base.

Lyubov Vladimirovna Savostina - implementation of the study and processing of results.

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Information about the conflict of interest

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Strategies for parents' response to negative emotions and empathic reactions of preschool children

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Abstract
Introduction. The research goal involves the study of supportive and nonsupportive strategies of parents' response to negative emotions and empathic reactions of preschool children. **Methods.** The study involved parents of 5-7–year-old children in the number of 52 people (23 women and 29 male). Diagnostic tools: questionnaire "The nature of manifestations of empathic reactions and behavior in children" by Shchetinina A.M.; Scale of overcoming negative emotions in children (CCNES) by Fabes, R. A., Poulin, R., Eisenberg, N., & Madden-Derdich, D. A. Statistical data processing was carried out in the SPSS Statistics 25 program using correlation analysis according to Spearman's criterion. **Results.** The analysis of the empirical data obtained was carried out in several stages: the studied variables were identified (forms of empathic reactions of children according to their parents' assessment – humanistic, egocentric, mixed); types of parents' response to negative emotions of children (distress reactions; punitive reactions; expressive encouragement; emotion-oriented reactions; problem-oriented reactions; reactions minimization). The primary statistical characteristics of the variables are determined on the basis of which a statistical correlation analysis is carried out. The differences in parents' assessments of children's empathic manifestations and the types of parents' responses to negative emotions are shown, corresponding to two strategies of emotion socialization – supportive, optimal for preschoolers, and nonsupportive, disharmonious. Based on the model of emotion socialization, the key concept of which is the emotion-oriented socializing behavior of parents, the study examines the strategies of parents' response to negative emotions of children as a component of emotion socialization, emphasizing their unique role in the formation of basic emotional experience in preschoolers. **Discussion.** The conducted research shows the optimal types of parents' response to the emotional expressions of children and their contribution to the emotional development and formation of socio-emotional competence of preschoolers.

Keywords
socialization, emotion socialization, emotion development, supportive strategy, non-supportive strategy, coping reactions, empathic reactions, emotional competence, preschoolers, parental behavior.

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Highlights

- as a result of empirical research, the dominant place of supportive strategies of parents' response to negative emotions of children has been established;
- correlation analysis revealed the presence of direct significant links between the level of children's empathic reactions and certain types of parents' reactions to their negative emotions (*emotion-oriented reactions; problem-oriented reactions; minimization reactions*);
- supportive strategies for emotion socialization are optimal for parents of preschool children.

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Introduction

Emotion development is one of the major vectors of preschool child development (Kosheleva, 2003; Karelina, 2017). This phenomenon directly depends on the type of interaction between parents and the child (Karabanova, 2005). Currently, there is a growing interest in studying the phenomenon called "emotion socialization" in relation to childhood period of development. In a tradition dating back to the oft-quoted speech by Jastrow (1929) at the Wittenberg Symposium on Emotions, the term "emotion socialization" conceptualizes affective reactions unfolding in a social environment, simultaneously being a field for reference and reconstruction. Emotion socialization is considered as a process in which adults, as agents of socialization, with their direct reactions to children's emotions, teaching children knowledge about emotions, ensure that children acquire culturally acceptable emotions (Eisenberg et al., 1998). A wide range of verbal and nonverbal practices in the arsenal of adults, primarily families (Halberstadt & Eaton, 2002), specialists working with children (Denham et al., 2012; Denham et al., 2020), mediates ways of recognizing, labelling, and interpreting emotions, their expression, and regulation by children, contributing to emotional development mediated by social experience, intrapersonal, and interpersonal factors (Denham et al., 2014).

Studies of emotion socialization as a relatively recent achievement (Kitzmann, 2012) reveal a tendency to shift from the primacy of cognitive and biological factors to the analysis of the phenomenology of emotional development in the context of the social world, understanding emotion-laden interpersonal interactions and social group-mediated emotional processes (Parkinson & Manstead, 2015).

The emotion socialization model of Eisenberg et al. (1998) describes three vectors of specific parental behavior associated with emotion socialization (ERSBs, Emotion-Related Socialization Behaviors): 1) parents' reactions to the emotional expression by children; 2) emotional expressiveness of parents; 3) discussion of emotions by parents with children (conversations about emotions). According to the ERSBs model and the studies carried out within the framework of this model (Cole et al., 2009; Denham et al., 2014), emotion socialization is defined as a dynamic process that unfolds during the direct interaction of parents with children and includes a broader emotional context of relationships, specific socializing practices, strategies for emotion socialization and the results of emotional development of children (Eisenberg et al., 1998; Lougheed et al., 2020).

Specific socializing practices of everyday interaction between parents and children (Darling & Steinberg, 1993) include open and direct and/or more subtle and indirect ways of parents' attitude to children's emotions, modelling/correcting their own patterns of emotional expression, dyadic interaction (cooperation) of parents with children (Bao & Kato, 2020).

According to Seddon et al. (2020), there are two main types of emotion socialization strategies – supportive and non-supportive. The supportive one includes such parental practices as positive assessment and encouragement of the expression of emotions by children, teaching children emotional experiences adequate to the situation, and modelling strategies for adaptive regulation of emotions. Such practices help children develop the skills to effectively regulate their emotions and adequately express their emotional experiences outside. A supportive strategy promotes the acquisition of skills to control negative emotional reactions and, as a result, contributes to greater social competence and life satisfaction. Longitudinal studies have shown that the maternal supportive response to negative emotions of five-year-olds reveals a relationship with better regulation of emotions in these children at the age of 10 and general adaptation at 15.

At the same time, an unsupportive strategy of emotion socialization, manifested by parents ignoring the emotional expressions of children, emphasizes the inappropriateness of certain emotions by repeatedly minimizing their expression by children, expressing dissatisfaction and disappointment, including in a maladaptive manner (including aggression), use punitive measures, thereby projecting insufficient skills of emotion regulation in children. In a study by Seddon et al. (2020), it is shown that children aged 8-11 years who perceived their parents as neglecting their emotional experiences show greater difficulties in emotional regulation than children who perceived their parents as supporting their emotions. Cabecinha-Alati et al. (2021) showed the influence of a non–supportive type of emotion socialization on negative emotional manifestations of children - emotional inhibition and maladaptation. Jin et al. (2017) found a relationship between these types of emotion socialization and psychopathological internalization and externalization disorders in children.

Thus, we are talking about two strategies of emotion socialization – supportive, optimal for preschoolers, providing psychological conditions for the development and positive socialization of the child, and non-supportive, disharmonious, with an insufficient level of emotional acceptance of the child, the possibilities of emotional rejection and ambivalent attitude. The key characteristics of a supportive emotion socialization strategy include emotional awareness, acceptance and learning of children's emotions. A non-supportive one is characterized by a low level/lack of these indicators in parents. In terms of age, the supportive strategy is recognized as effective and productive in early and preschool childhood (Mirabile et al., 2018). As a child grows up and becomes involved in a variety of social connections and contexts, more complex and subtle social skills and greater autonomy are required, including from parents (Mirabile et al., 2018), although emotion socialization remains relevant until adolescence and later age stages (Denham et al., 1994).

The contribution of emotion socialization to emotion development in preschool age is described in terms of its role in the growth of children's basic emotional experience. Empirical studies have shown that emotional socialization: forms an extensive emotion repertoire of children in terms of recognition of visual and verbal signs of emotions (Thompson & Lagattuta, 2006), their expression and regulation (Breaux et al., 2016; Huguley et al., 2019); promotes the mastery of techniques for expressing emotions, cognition of the language of description

and interpretation of emotions by generally accepted definitions, comprehension of patterns of expression and understanding of one's and another's emotions, which, in turn, additionally affects the successful psychological adaptation of children and their positive relationships with peer groups (Katz et al., 2012; Jin et al., 2017). For example, helping children identify the causes of anger and learning to respond to problems that cause anger form skills to avoid aggressive verbal and nonverbal emotional reactions (Nelson & Boyer, 2018).

An important role is played by different tactics of emotional relations with children from the point of view of the gender of the father and mother, performing a reference role in mastering specifically female and male forms of emotional response (Baker et al., 2011).

A psychologically important mechanism, as a result of positive emotional socialization in preschool childhood, is presented in the form of the children's ability to control emotions.

The empirical study *aimed* to study supportive and non-supportive strategies of parents' response to negative emotions and types of empathic reactions of preschool children.

The following *goals* were solved in the study*:*

4. To empirically study the types of empathic reactions and behavior of older preschool children according to their parents' assessment using the questionnaire for parents "The nature of manifestations of empathic reactions and behavior in children" (Shchetinina, 2000).
5. To empirically study the types of parents' responses to negative emotions of children using the scale of overcoming negative emotions in children (CCNES). (Fabes et al., 1990).
6. To conduct a correlation analysis between the forms of empathic reactions of children and the types of parents' responses to negative emotions of children.

Methods

The study used a questionnaire by A. M. Shchetinina "The nature of manifestations of empathic reactions and behavior in children" (Shchetinina, 2000), which allows us to study the form of parents' empathic reaction to negative situations and how children can experience them. The humanistic type of reaction is characterized by the manifestation of interest in the state of the Other, emotionally vivid reaction and identification with him, and active involvement in the situation trying to help and calm down. The mixed form is characterized by the manifestation of both types of empathy in the child, depending on the situation. In the egocentric form, the child, trying to switch the adult's attention to himself, emotionally reacts to the experiences of the Other while striving to receive the praise and approval of an adult and only portrays sympathy and empathy for the Other.

The scale of overcoming negative emotions in children (CCNES) Fabes, R. A., Poulin, R., Eisenberg, N., & Madden-Derdich, D. A. (Fabes et al., 1990) was used to study the types of reaction (coping strategies) of parents to children's emotions manifested in stressful situations. The questionnaire presents 12 daily situations in which a child experiences negative emotions. For each situation, parents assess how likely they are to respond in one of six ways to respond to their child's negative emotions:

1. Distress reactions (DR) – a type of reaction of parents to negative emotions of children, characterized by the manifestation of distress (grief) in connection with the negative behavior of children.
2. Punitive reactions (PR) – a type of reaction characterized by punitive actions that reduce their anger or the need to cope with negative emotions of children.

3. Expressive encouragement (EE) is a type of reaction in which parents encourage children to express negative emotions, thereby confirming the negative emotional states of the child (for example, "it's okay to be sad").
4. Emotionally focused reactions (EFR) – a type of response in which parents display strategies aimed at helping the child feel better (that is, empathy-oriented in response to the bad feelings of the child).
5. Problem-focused reactions (PFR) - a type of response in which parents help the child to solve the problem that caused him an emotional disorder (focused on helping the child solve the problem or cope with a stressful situation).
6. Minimizing reactions (MR) – a type of reaction in which parents downplay the severity (minimize) situations either devalue the problem or the child's emotional reaction.

The authors describe the nature of the parents' reactions in accordance with the types of responses to the situations given in the test.

Problem-focused reactions (PFR). The problem-focused responses reflect the extent to which parents help the child solve the problem that caused his distress. In contrast, *emotion-focused responses (EFR)* reflect the extent to which parents respond with strategies that help the child feel better (that is, calm or distract the child).

These two types of coping reactions reflect the main distinction made by stress and coping theorists (Folkman & Lazarus, 1988), between coping responses aimed at eliminating a source of stress (problem-oriented coping) and those aimed at eliminating emotional distress (emotion-oriented coping). Parents who deal with children's negative emotions in supportive ways make a positive contribution to the development of children's social and emotional competence. Although both problem-focused and emotion- focused responses to children's negative emotions contribute equally to children's results, the authors of the questionnaire distinguish between the two. This is made because parents indicate that they do not use the two responses to the same extent. For example, parents are significantly more likely to use problem-focused strategies than comfort or distraction in response to their children's distress. Moreover, problem-focused and emotion-focused strategies differ in their effectiveness depending on the degree of control present in a situation. In situations where there is some degree of control, problem-focused strategies are usually more effective. Alternatively, emotion-focused coping responses are more effective when the situation involves a low degree of control.

Active encouragement of children's expression of negative emotions is reflected in the *«expressive encouragement» (EE)* subscale. The subscale reflects the degree of acceptance by parents of children's negative emotional manifestations.

The CCNES also includes two subscales focusing on non-supporting coping responses. The first of these is the *«minimizing reactions» (MR)* subscale. It reflects the degree to which parents reduce the severity of their children's emotional reactions or discount their problem reports or their emotionally distressed responses. As such, it represents one of the ways in which parents may attempt to limit or contain children's expression of negative emotions. The second non-supportive subscale is the *«punitive responses»* subscale. It reflects the extent to which parents use verbal or physical punishment to control children's negative emotional manifestations. Minimizing reactions are more subtle. They are less overtly controlled attempts to limit children's negative emotional manifestations. Although parents report relatively infrequent use of these non-supportive responses, their use in general may reduce children's social and emotional

competence (but potentially not to the same extent). The authors also present the results of a factor analysis of the CCNES structure, according to which there can be only four (instead of six) subscales (Fabes et al., 2002).

For the purpose of statistical processing of empirical material, methods of descriptive statistics, correlation analysis according to the Spearman criterion were consistently used. Calculations were made in Microsoft Excel and SPSS Statistics 25.

The empirical study involved parents of children aged 5–7 years in the amount of 52 people (of which 23 respondents were female, 29 were male). The study was conducted on the basis of the Municipal Budgetary Preschool Educational Institution of the city of Rostov-on-Don «Kindergarten No. 198».

Results

The analysis of empirical data was conducted in the several stages:

1. The studied variables were identified:

- forms of empathic reactions and behavior of elder preschool children as assessed by their parents (humanistic, egocentric, mixed);
- types of parents' reactions to children's negative emotions (DR – distress reactions; PR – punitive reactions; EE – expressive encouragement; EFR – emotion-focused reactions; PFR – problem-focused reactions; MR – minimizing reactions).

2. The primary statistical characteristics of the variables are determined: mean value, standard deviation, median, range of ranks.

3. The statistical correlation analysis was conducted according to the Spearman criterion.

The basic statistical characteristics of the studied variables are presented in Table 1.

Table 1

The basic statistical characteristics of the studied variables (N = 52)

Variables	Mean	SD	Median	Range
Humanistic form	21,19	1,12	21	20–24
Egocentric form	12,88	1,73	12,5	10–15
Mixed form	17	1	17	16–19
DR – distress reactions	3,74	0,92	3,92	1–3
PR – punitive reactions	3,77	1,31	3,7	1–4
EE – expressive encouragement	5,06	1,54	4,7	2–6
EFR – emotion-focused reactions	5,81	1,33	5,7	3–7
PFR – problem-focused reactions	5,87	1,12	5,4	2–7
MR – minimizing reactions	3,89	0,88	3,08	1–4

The analysis of the statistical characteristics of the variable form of empathic reactions and behavior of elder preschool children (based on their parents' assessments) showed the greatest manifestation of humanistic form of empathy among respondents (Mean = 21,19; SD = 1,12; Median = 21; Range = 20–24), and the least manifestation of egocentric form of empathic reactions and behavior (Mean = 12,88; SD = 1; Median = 12,5; Range = 10–15).

The analysis of the statistical characteristics of the variable of the type of parents' response to children's negative emotions showed that the most common types of responses are «expressive encouragement» (Mean = 5,06; SD = 1,54; Median = 4,7; Range = 2–6), «emotion-focused reactions» (Mean = 5,81; SD = 1,33; Median = 5,7; Range = 3–7), «problem-focused reactions» (Mean = 5,87; SD = 1,12; Median = 5,4; Range = 2–7). The least represented in the sample of respondents are such types of responses to negative emotions of children as «distress reactions» (Mean = 3,74; SD = 0,92; Median = 3,92; Range = 1–3), «punitive reactions» (Mean = 3,77; SD = 1,31; Median = 3,7; Range = 1–4), «minimizing reactions» (Mean = 3,89; SD = 0,88; Median = 3,08; Range = 1–4).

The statistical correlation analysis according to Spearman's criterion revealed the presence of the various significant relationships between the forms of empathic reactions of children and the types of reactions of their parents. Table 2 presents cross-correlations of all analyzed study variables.

Table 2

The cross-correlation matrix of the main studied variables (N = 52)

Variables	1.	2.	3.	4.	5.	6.	7.
1. Form (level) of empathic reaction	–						
2. DR – distress reactions	0,103	–					
3. PR – punitive reactions	0,043	0,176	–				
4. EE – expressive encouragement	–0,121	0,151	**0,571****	–			
5. EFR – emotion-focused reactions	**0,469****	**–0,378***	0,014	–0,211	–		
6. PFR – problem-focused reactions	**0,441***	–0,162	0,107	–0,022	**0,782****	–	
7. MR – minimizing reactions	**–0,659****	–0,142	–0,26	–0,041	–0,361	–0,399	–

*Note: * p < 0,05; ** p < 0,01.*

The following significant correlations have been identified:

– the direct significant relationship ($r = 0,469$ at $p < 0,01$) between the level of empathic reactions of children and the type of response of parents: *emotion-focused reactions*. This indicates the fact that the more often parents show reactions focused on the emotions of their children, the higher the level of formation of empathic reactions is observed in their child. Therefore, the child is more prone to the manifestation of the humanistic form of empathy;

– the direct significant relationship ($r = 0,441$ at $p < 0,05$) between the level of empathic reactions of children and the type of response of parents: *problem-focused reactions*. This indicates that the more often parents show reactions focused on the problems of their children, the higher the level of formation of empathic reactions is observed in their child. It indicates the manifestation of the humanistic form of empathy;

– the inverse significant relationship ($r = –0,659$ at $p < 0,01$) between the level of empathic reactions of children and the type of response of parents: *minimizing reactions*. This indicates that the more often parents show minimization reactions, the lower the level of formation of empathic reactions is observed in the child. Therefore, the child is more prone to the manifestation of the egocentric form of empathy.

Discussion

As a result of the empirical study, it was found that the majority of children in the study sample (based on their parents' assessments) are characterized by the humanistic form of empathy. It involves showing interest in emotional states of others, active involvement in a problem situation of the Other, and the desire to help them. The egocentric form of empathy, which involves a reaction to an emotional state of the Other in order to receive praise from an adult (for one's own benefit), is rarely observed.

By studying the types of parents' responses to children's negative emotions we revealed that the most common types of responses are «expressive encouragement», «emotion-focused reactions», «problem-focused reactions». This indicates that it is typical for the parents of the study sample to approve an external manifestation of negative emotions in their child, provide support in experiencing negative emotional states, and help in solving a problem situation.

These types of responses can be classified as supportive coping reactions, since they involve parents' orientation towards accepting the child's emotional state, providing support and assistance to their child in stressful problem situations. Parents, who deal with children's negative emotions in supportive ways, contribute positively to the development of children's social and emotional competence.

The least represented in the sample of respondents are such types of responses to negative emotions of children as «distress reactions», «punitive reactions», «minimizing reactions». That is, it is not typical for parents to frequently display punitive actions against children, show the feelings of grief and understatement, devalue the feelings and problems of their child. Punitive reactions and minimizing reactions can be attributed to non-supportive coping reactions. They do not lead to a problem solution and decrease in the negative emotional state of a child. The reactions are only aimed at protecting the feelings and emotions of a parent

oneself. Both types of non-supportive coping responses have been found to be associated with sub-optimal results in children, such as lower levels of empathy and social responsiveness, and increased anxiety.

The correlation analysis revealed the presence of direct significant relationships between a level of empathic reactions of children and certain types of parental responses to negative emotions of a child: «emotion-focused reactions», «problem-focused reactions». The inverse significant relationship was also found between a level of empathic reactions and behavior of children and the type of response of parents «minimizing reactions». That is, such supporting coping reactions of parents to their child's negative emotions as «emotion-focused reactions», «problem-focused reactions», contribute to the formation of a higher level (humanistic form) of children's empathic reactions. The «minimizing reactions», which is not a supportive coping reaction of parents, contribute to the formation of a lower level (egocentric form) of empathic reactions and behavior in children.

The results of the correlation analysis conducted in the study are consistent with the Eisenberg's model of emotional socialization (Eisenberg et al., 1998). According to this model, stable parents' reactions to children's emotions, and discussion of emotions with them, indirectly form social and emotional competence in children. It contains the approach to understanding the emotional socialization of a child through parents' reactions to emotions and their discussion, indirectly affecting the social-emotional competence of children throughout childhood further to adolescence.

That is, the current research and theory suggests that parents who use negative control strategies, when their children express negative emotions, raise children incapable for efficient emotions or behavior regulation. In addition, the use of non-supportive strategies to control children's negative emotions teaches children to suppress their negative emotions, which in turn increases their negative emotional arousal and anxiety. When parents are focused on the suppression of emotions, a child tends to «keep» a negative emotion until a moment when a similar situation arises. That way, over time, the pattern of accumulated and released negative emotions is formed. As a result, it can provoke more intense emotional manifestations that are difficult for children to cope with.

The last possible reaction of parents to expression of negative emotions by children is that parents themselves may experience distress. The degree of parents' distress is important because it affects their socializing behavior. Parents who experience distress when their children express negative emotions are more likely to focus on their own discomfort rather than their children's needs and condition. In a situation of distress, for parents it is difficult to calm down. They may feel emotionally disorganized, feel like they are «losing their temper», when faced with negative emotional manifestations of children. Such parents are unlikely to be able to support their children in their negative emotional experiences. On the contrary, they are likely to intensify own efforts to control their children's negative emotional manifestations by punishing or minimizing them. In turn, children, who are punished for expressing negative emotions, tend to suppress those emotions until they will lose control of them. Parents, who become emotionally overexcited by children's negative emotional response and rely on punishment

and minimization to achieve relief from aversive exposure, are sacrificing the socialization of children. Insufficient socialization leads to the repress of emotions until their release in a very intense and dysregulatory manner.

The supporting strategies of emotional socialization can be considered as the most optimal, corresponding to the context of emotional development of a preschooler, and increasing their emotional competence.

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Anna Viktorovna Chernaya – development of the concept and design of the study, writing a review and discussion parts, data analysis and theoretical generalization of the results, approval of the manuscript for submission for publication, editing the text of the article.

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The study of the relationship between everyday creativity and subjective well-being in old age

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Abstract: **Introduction**. The problem of subjective well-being of the elderly is becoming especially relevant in the conditions of demographic aging of modern society. The novelty of the research lies in the deepening of ideas about the relationship between subjective well-being and everyday creativity in old age. The purpose of this study is to research subjective, cognitive and hedonistic well-being in old age in relation to self-assessments of creative level and everyday creative activity. **Methods.** The voluntary study involved elderly people aged 60 to 90 years, 78 of them men (N = 202; M = 68.62; SD = 7.46). Self-report scales were used to determine self-assessments of creative activity and the subjective level of creativity. The level of subjective well-being was measured by the gerontological Life Satisfaction Index scale, LSI (authors Neugarten, Havighurst, Tobin, in N. Panina's adaptation) and the Subjective Happiness Scale, (authors Lyubomirsky, Lepper, in D. Leontiev's adaptation). For statistical analysis, the Wilcoxon, Kruskel-Wallis criteria, Welch's t-test, Pearson's consensus criterion, Spearman's rank correlation coefficient were used. **Results.** Noticeable positive correlations between the level of subjective well-being, creative activity and the subjective level of creativity were revealed: correlation coefficient r from 0.594 to 0.610; $p < 0.001$. Significant differences in the level of subjective well-being were found between creatively active and creatively inactive subjects ($p < 0.001$), as well as between subjects who rated themselves as "not creative" and as "creative": W = 1729; effect value r = 0.654; $p < 0.001$; 95% CI. **Discussion**. The results obtained expand the understanding of everyday creativity in old age, its relationship with subjective, cognitive and hedonistic well-being and can be used by socio-psychological services in working with older people to improve their psycho-emotional state and correct the level of subjective well-being.

Keywords: everyday creativity, subjective well-being, cognitive well-being, hedonistic well-being, old age, everyday creative activity, self-assessment of the creative level, subjective level of creativity

Highlights

- There are pronounced positive correlations between everyday creativity and subjective well-being in old age.
- A positive correlations were revealed between subjective, cognitive and hedonistic well-being on the one hand and daily creative activity and self-esteem of the creative level on the other hand.
- Higher indicators of well-being, subjective level of creativity and creative activity have been established in older people with higher education.

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Introduction

The well-being of the elderly is becoming increasingly important in the context of the aging population of our planet (Kitayama et al., 2020). Modern science and practice considers creativity as one of the opportunities to achieve well-being in old age. Well-being in psychology is a multifaceted construct, which is understood as mental and physical health, emotional and psychological well-being, quality of life and happiness. The conceptual field of well-being constructs is blurred due to the interchangeability of terms (Leontiev, 2020). One of the most stable constructs of well-being is subjective well-being (SWB) - the operational equivalent of happiness, a collective term for various types of analysis, evaluation, calculations (Diener, 1984). Subjective well-being exists only in the present and reflects a holistic psychological experience of one's own life (Leontiev, 2020). Subjective well-being (SWB) includes affective (hedonistic) and cognitive components. The affective component of SWB consists of a balance of positive and negative emotions (Tov, 2018). The cognitive component of SWB (also called life satisfaction) consists of a person's value judgments about his own life, including its various spheres, for example, health, income, social contacts (Pavot, 2018).

As a correlate of subjective well-being in old age, researchers consider everyday creativity (McFadden, Basting, 2010; Richards, 2007). Despite the decrease in fluid intelligence over the years (Silvia, Beaty, 2012), creativity in old age is beneficial (Zhang, Niu, 2013). It helps the elderly to slow down the aging of the brain and prevent the neuropathology of dementia (McFadden, Basting, 2010), adapt to physical, psychological and social changes (Duhamel, 2016), experience personal growth (Kudrina, 2015), to find meaning, to accept the finiteness of being (Tan et al., 2017).

More than seventy years ago, J. Guilford identified the signs of creativity: originality/novelty and relevance, adaptability or compliance with the task (Runco, Jaeger, 2012). Creativity includes such cognitive and personal characteristics as sensitivity to problems, flexibility, ability to analyze, synthesize, evaluate and reorganize information, divergent thinking, surprise (Kampylis, Valtanen, 2010; Runco, 2014a). There is no single scientific definition of creativity due to the complex contextual nature of this construct. Various researchers define creativity as going beyond the requirements of the initial problem situation (Bogoyavlenskaya, 2005); involvement in the production of new, useful products (Mumford, 2003, p.110) reflection of cognition, metacognition, attitude, motivation, affect and temperament (Runco, 2007, p. 320); the process of creating new cultural meanings (Smirnova, 2016).

Creativity is inherent in all people to varying degrees. There is both a great creativity of geniuses and a small creativity of most people (Kaufman et al., 2016). Half a century ago, creativity was studied by the example of outstanding personalities (writers, composers, Nobel laureates), in recent decades the number of studies related to everyday creativity has been growing (Amabile, 2017; Cotter et al., 2019; Ruchards, 2007). Everyday creativity is creative activities common among ordinary people in everyday life, for example, drawing, cooking recipes, poetic holiday wishes that promote and reflect psychological health (Silvia, Beaty, et al., 2014). According to M. Ranko, the nature of creativity is one, and there is no fundamental difference in the creativity of a child and an outstanding master (Runco, 2014b). With the change in approaches to the study of creativity, new definitions have appeared, for example, activities that lead to original, useful, ethical results, at least for the creator (Kampylis et al., 2009, p. 18); a process possible for everyone (Cropley & Cropley, 2013); self-perceived ability to create new and useful products (Karwowski & Brzeski, 2017).

Despite the urgency of the problem of everyday creativity of the elderly, this topic is not a priority in domestic psychological research. In Russian science, the term "creativny" (from the English "creativity") is used both in the meanings of "creative potential" (for example, Popel, 2017) and as an analogue of creativity in all its manifestations (Dorfman, 2015; Miroshnik, Shcherbakova, 2020). In this paper, we use the terms "tvorchesky" and "creativny" as synonyms.

In studies of everyday creativity, scales and self-report questionnaires are usually used, an assessment of involvement in various types of creative activity, as well as a subjective assessment of one's own creative achievements (Forgeard, Kaufman, 2016; Piffer, 2012; Silvia et al., 2011). In recent years, the concept of "creative self-belief" has appeared in the research of personal creativity, meaning the individual's conviction in his creative abilities [Karwowski et al., 2019]. Creative self-confidence is a predictor of creative activity and achievements [Beghetto, Kaufman, Baxter, 2011]. Self-perception of creativity may not coincide with real creative abilities and achievements, but it is of scientific interest. Park and colleagues conducted a comparative study of the results of objective methods for assessing individual creativity with the results of subjective assessment of creativity in a sample of 1.500 people. Subjective assessments had a smaller variance, a higher average value and a moderate correlation with objective methods of assessing creativity [Park et al., 2016].

Methods

The purpose of this study is to identify the relationship between subjective well-being and everyday creativity in old age through self-assessments of creative activity and the level of creativity of the subjects. Hypotheses: 1) there are positive correlations between everyday creative activity, self-assessments of the creative level and subjective well-being; 2) respondents who show daily creative activity and subjectively assess themselves as creative have higher indicators of cognitive, hedonistic and subjective well-being; 3) everyday creative activity and the subjective level of creativity have a strong positive correlation between them.

The voluntary study, based on the principles of anonymity and confidentiality, involved elderly people, 124 women and 78 men, the age of the subjects ranged from 60 to 90 years (N = 202; M = 68.62; SD = 7.46). Participants aged 60 to 69 years made up 62.4 % of the sample (n = 126); from 70 to 74 years made up 29.7 % of the sample (n = 58), from 75 to 91 years – 8.9 % of the sample (n = 18). Given the small proportion of respondents over the age of 75, the increase in life expectancy, we call all respondents elderly. Among the study participants, 136 (67.2 %)

continue to work, 66 people do not work (32.8 %). The subjects have secondary (40.6 %) and higher education (59.4 %), 56 (27.2 %) the subjects live alone, 146 (62.8 %) in families.

Researchers are convinced that measuring creativity is difficult. Traditionally, creativity was evaluated objectively through the products of creativity, intelligence and divergent thinking, creative behavior and personal achievements (Kaufman, Plucker & Baer, 2008). Since the 90s of the twentieth century, researchers have increasingly noted the need for a serious revision of creativity assessments in favor of their subjectivity (Sternberg, 1991; Richards, 2007; Kaufman, 2019).

Measuring the creativity of older people has a number of limitations. Divergent thinking and fluid intelligence are significantly reduced in old age. Creative abilities also decreases (Zhang, Niu, 2013) if a person is not explicitly creative. The products of everyday creativity have significance and value mainly for the creators themselves and their loved ones. When studying the everyday creativity of older people, we relied on the principles of activity, process and conviction, which J. Kaufman laid down as the basis for self-assessment of the creative level (Creativity self-assessments, CSAs), (Kaufman, 2019).

Older respondents were asked about their attitude to creativity, what types of creativity they have been engaged in over the past 12 months. Then the subjects were asked to evaluate their level of creativity in these areas on a ten-point scale. The average self-assessment of the domain level of creativity in the sample was M = 3.24; SD = 2.97. The types of everyday creativity of older people are presented in Table 1.

Table 1

Creative domains of the elderly

Creative domains	Number of responses
Needlework (embroidery, sewing, knitting, macrame, beading)	19
Dance	8
Drawing, painting	15
Literary creativity (drawing up a pedigree, writing books, memoirs, scripts for holidays; writing poems, short stories; newspaper articles)	11
Technical creativity (development of new and modernization of old nodes, blocks, devices); modeling; assembly of computers, repair of household appliances	6
Local history	9
Photo	15
Table setting	8

Creative domains	Number of responses
Music (listening, singing, playing musical instruments, composing, improvisation)	15
Gardening, floriculture	16
Fashion design	5
Chess	7
Home decoration for the holiday	3
Cooking	18
Modeling	4
Theater, acting	9
Scientific creativity	13
Blogging and pages in social networks; moderator in social networks	8

To quantify the subjective perception of their creativity in general, the study participants answered the question: "Taking into account all the circumstances, tell me how many percent conditionally do you feel like a creative person?" Answer options from 0 to 100. Average self-assessment of the overall creative level in the sample: M = 31.53; SD = 30.40 (N = 202). We will call the integral indicator of self-assessments of the domain and general level of creativity the subjective level of creativity.

Table 2.

Descriptive statistics of the subjective level of creativity of respondents

	N	mean	SD	IQR	skewness	kurtosis
Not creative	87	2,24	4,15	0	1,34	-0,16
Creative	115	51,95	23,07	40	0,40	-0,93

To determine the level of creative activity, elderly people were asked how often they are engaged in creativity. Answer options: never, rarely (1-2 times a month), often (1-2 times a week), daily. Points were awarded according to the answers: never - 0; rarely - 1, often - 2, daily - 3. Results of responses: "never" 70 (34.65 %); "rarely" 70 (34.65 %); "often" 46 (22.77 %); "daily" 16 (7.92 %). After the respondents' assessment of their creative activity (the frequency of creative activities) and the subjective level of creativity (an integral indicator of self-assessments of domain and general creativity), two groups were formed. The first group included participants who do not include creativity in their lives, who consider themselves not creative or not creative enough, who rated their creativity from 0 to 10 on a 100-point scale (n1 = 87). The second group consisted of subjects who perceive themselves as creative, for them creativity is part of a profession or everyday life (n2 = 115).

Subjective well-being (SWB), a construct consisting of cognitive judgments and affective reactions, we measured the Life Satisfaction Index (LSI) of the authors Neugarten, Havighurst, Tobin, adapted by N. Panina and Subjective Happiness Scale (SHS) of the authors Lyubomirsky, Lepper, in D. Leontiev's adaptation (Osin, Leontiev, 2020).

Results

Checking the data for the normality of the distribution according to the Shapiro-Francia criterion showed that the distribution in all scales significantly differs from normal. SWB: $W = 0.944$; $p < 0.001$; LSI: $W = 0.940$; $p < 0.001$; Self-assessment of the level of creative activity: $W = 0.876$, $p < 0.001$; Subjective Happiness Scale: $W = 0.963$, $p < 0.001$; the variable "frequency of creative activities" is presented in a rank scale. These circumstances led to the choice of nonparametric criteria for the study.

Descriptive statistics by Life Satisfaction Index (LSI) and Subjective Happiness Scale (SHS).

Table 3

Descriptive statistics by Life Satisfaction Index (LSI) and Subjective Happiness Scale (SHS)

LSI	mean	SD	IQR	asymmetry	kurtosis	0%	25%	50%	75%	100%	n
Not creative	23,24	7,67	9,5	-0,58	-0,30	5	19,5	24	29	38	87
Creative	30,73	5,49	6,0	-0,77	0,40	15	28	32	34	40	115
SHS	**mean**	**sd**	**IQR**	**asymmetry**	**kurtosis**	**0%**	**25%**	**50%**	**75%**	**100%**	**n**
Not creative	16.42	4.56	5.5	-0.053	-0.38	7	14	17	19.5	26	87
Creative	21.63	3.82	5.0	-0.86	0.18	10	20	22	25	28	115

To determine the SWB values, the results on the cognitive (LSI) and affective (SHS) scales were summarized. To maintain a uniform dimension, the scores on the Lyubomirsky, Lepper scale were recalculated using the scales package.

A statistical study of significant differences between levels of creative activity with scales of well–being and subjective level of creativity was carried out using the nonparametric criterion H Kruskel-Wallis. The results are presented in table 4

Table 4

Comparison of respondents' creative activity levels with well-being scales

Scales	Criterion Kruskel-Wallis H	Eta-squared	Pairwise comparison (Conover 's Criterion)					
			1 vs 2 p	1 vs 3 p	1 vs 4 p	2 vs 3 p	2 vs 4 p	3 vs 4 p
LSI	52,208	0,249	0,000	0,000	0,000	0,000	0,000	ns
SHS	68,108	0,329	0,000	0,000	0,000	0,000	0,000	ns
SWB	73,195	0,355	0,000	0,000	0,000	0,000	0,000	ns

With the help of Post-hoc analysis, significant differences in well-being scales were revealed between respondents who never or rarely engage in creativity, on the one hand, and often or daily show creative activity, on the other hand ($p < 0.001$). There were no significant differences in the level of well-being between those who often and daily engage in creativity (p from 0.84 to 0.94). Significant differences between the subjective level of creativity and creative activity ($p < 0.001$) of respondents were revealed.

To compare the groups of "Non–creative subjects" (n1 = 87) and "Creative subjects" (n2 = 115), the Wilcoxon rank sum criterion for unrelated samples (analogous to the Mann-Whitney criterion) was applied. The results are presented in table 5.

Table 5

Comparison of indicators on the scales of well-being between groups of non-creative and creative subjects

Scales	Mean in the in the group of uncreative and little creative (X1)	Mean in the in the group of creative respondents (X2)	Glass effect r	Wilcoxon criterion W
SWB	43,950	60,122	0,654	1729
LSI	23,241	30,730	0,583	2085
SHS	16,425	21,635	0,618	1911

Significant differences in the level of subjective well-being (SWB) between groups of creative and non-creative subjects were revealed (effect size r = 0.654; W = 1729). The average SWB value in the creative group (X2 = 60.12) more than the average value (X1 = 43.95) in a group of non-creative subjects. The levels of cognitive and hedonistic well-being in the groups of creative and non-creative respondents also differ significantly. The average value in the creative group (X1 = 23.24) of cognitive well-being in the non-creative group is less than the average (X2 = 30.73) in the creative group; W = 2085; effect size r = 0.583. Hedonistic well-being (SHS) is significantly higher in the creative group: X2 = 21.63 > X1 = 16.42; W = 1911; r = 0.618. In all cases, the significance level is p < 0.001; 95 % CI.

Using Spearman's rank correlation coefficient, the relationship between the level of SWB, hedonistic (SHS) and cognitive (LSI) scales of well-being with creative activity (how often do you do creative work?) and the subjective level of creativity was investigated. The data is given in table 6.

Table 6

Empirical values of correlation analysis between different scales

Scales	Creative activity	Subjective level of creativity	LSI	SHS
SWB	0,594	0,610	0,898	0,931
Frequency of creative activities	1	0,914	0,506	0,571
Subjective Happiness Scale (SHS)	0,914	1	0,506	0,601

As part of the research of well-being and everyday creativity of older people, a study was conducted to identify differences in indicators of well-being, subjective level of creativity and creative activity between respondents with higher and secondary education using the Welch t-test, which does not require equality of variances. As a result, respondents with higher education were found to have higher indicators on all scales:

LSI: t = 2.88; df = 159.8; p =0.004. The average value for persons with higher education (h/e) is 28.76; for persons with secondary education (s/e) are 25.65. The magnitude of the effect (Cohen's d) = 0.42; 95% CI.

SHS: t = 3.59; df = 163.46, p < .001; mean: h/e 20.40; s/e 17.91; d = 0.52; 95% CI.

SWB: t = 3.51; df = 162.01, p < .001; mean: h/e 56.10; s/e 48.84. d = 0.51; 95% CI.

Subjective level of creativity: t = 5.07, df = 186.1; p < 0.001; mean: h/e 38.83; s/e 18.41; d = 0.51; 95% CI.

To study the differences between the level of education and creative activity of older respondents, the Pearson consent criterion was used to assess the significance of differences in several indicators. The results are shown in table 7.

Table 7

How often do you do creative work

How often	never	rarely	often	everyday
Higher education	9,50	41,58	41,58	27,32
Secondary education	6,49	28,41	28,41	18,67

It has been found that older people with higher education are more likely to engage in everyday creativity.

There were no significant differences between men and women, marital status, employment with scales of well-being and everyday creativity in elderly respondents.

Discussion

We examined the daily creative activity and self-assessments of the creative level of older people in order to understand how they relate to subjective well-being and its cognitive and hedonistic components. The average positive correlations between the scales of well-being (SWB, SHS, and LSI) with the frequency of creative activities and the subjective level of creativity (r from 0.506 to 0.610; $p < 0.001$) were revealed. A high correlation was found between the frequency of creative activities and self-esteem of the creative level ($r = 0.914$; $p < 0.001$) in elderly people.

In the group of creative respondents, the indicators of cognitive, hedonistic and subjective well-being were significantly higher than in the group of non-creative. The results obtained confirm the first and second hypotheses put forward and are consistent with other data, for example, creatively active people with high creative self-esteem often have a higher level of happiness, subjective well-being and life satisfaction (Ceci, Kumar, 2016; Conner et al., 2018); in the process of everyday creative actions, students experienced feelings of happiness and activity, which they wrote about in the self-report diary (Silvia et al., 2014). The revealed strong correlation between the subjective level of creativity and creative activity ($r = 0.914$; $p < 0.001$) can be explained by the fact that creative abilities and skills develop during creative activities, which increases creative self-esteem. Creative abilities, in turn, encourage a person to creative activity. The third hypothesis was also confirmed.

This study found that older people with higher education are more likely to engage in creativity than older people with secondary education. Higher indicators on the scales of well-being and self-esteem of the creative level were revealed in older people with higher education, which turned out to be quite unexpected. The magnitude of the differences depending on the level of education in Cohen's interpretation was moderate on the scale of LSI ($d < 0.5$), significant (d from 0.5 to 0.8) on the scales of SWB, SHS and self-assessment of the creative level.

A meta-analysis of empirical studies (n=286) revealed a weak positive relationship between education and SWB in old age (Pinquart, Sørensen, 2000). A study conducted on a Russian sample

did not reveal such a correlation at all (Kolosnitsyna et al., 2014). Positive correlations ($r > 0.3$; $p < 0.01$) were found between education and creativity in older Chinese (Zhang, Niu, 2013). In this study, there were no significant correlations and differences between marital status, gender, employment with well-being scales, creative self-esteem and creative activity in older respondents. In other studies, contradictory results have been obtained (Gaymu & Springer, 2010; Kolosnitsyna et al., 2014; Hao, 2008).

In the process of creativity, older people feel more energetic, show a less negative attitude towards aging. At the same time, in old age, diverse activity is very important – emotional, social, physical, cognitive, as a predictor of subjective well-being (Gu, Dupre, 2019).

A comparison of the SWB level in the group of "non-creative" subjects, conducted using the Wilcoxon rank sum criterion, showed that active and active respondents had higher SWB indicators ($r = 0.337$; $p < 0.001$; 95% CI). The results obtained are consistent with the data of other studies. Withdrawal into oneself, restriction of social contacts entails a gradual extinction of cognitive and physical abilities (Neugarten, 1974; Alperovich, 1998). Resistance to isolation, on the contrary, contributes to the preservation of personality in old age (Ananyev, 1996). Everyday creativity, as one of the forms of activity, helps older people overcome loneliness, expands their social circle, improves physical and cognitive abilities, gives positive emotions, and increases the level of SWB and life satisfaction.

In this study, the average age of creative subjects was slightly lower ($M = 67.68$) than non-creative subjects ($M = 69.85$), $p < 0.02$. A very weak negative correlation was also found between age and the frequency of creative activities ($r = -0.13$; $p < 0.01$). Over the years, people have more health restrictions, which negatively affect creative activity. The weakly expressed negative correlations found between age and SWB ($r = -0.06$; $p < 0.05$) confirm the data of foreign studies that subjective well-being remains at a fairly high level until the age of 75, then slowly begins to decline (Hudomiet et al., 2021).

Conclusions

Summing up the results of the research, the following conclusions can be drawn.

The subjective methods of self-assessment of the frequency of creative activities and creative level are suitable for studying and measuring everyday creativity, which is confirmed by other data (Kaufman, 2019; Piffer, 2012; Silvia et al., 2012). High indicators of well-being in the group of creative subjects, an average positive relationship between SWB, the frequency of creative activities and the subjective level of creativity (r in the range from 0.594 to 0.610; $p < 0.001$), confirm the hypotheses of the research.

Old age is traditionally associated with stagnation of thinking, dogmatism, adherence to old experience. Creativity means openness to new experiences, development and creation. Despite the inevitable physical and cognitive decline, creativity in old age is possible, and everyday creativity is useful for all people regardless of their level of creativity (McFadden, Basting, 2010; Richards, 2010). In interviews, the subjects noted that they enjoyed not only the result of creativity, but also the creative process, accompanied by interest, joy, a sense of fullness of life, meaningfulness of being.

The results obtained are discussed in the context of measuring everyday creativity using self-report scales, as well as further studying the relationship between everyday creativity and subjective well-being in old age.

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Affordances as part of the process of object identification in visual search

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Annotation: **Introduction.** The study is aimed at studying the role of affordances in the representation of an object and the influence of motor programs on the process of visual search within the framework of the skipping search continuation paradigm (SPPP). A hypothesis was put forward about the occurrence of the effect of compatibility/congruence in the process of searching for real objects among distractors by running motor programs. **Methods.** The study involved 60 people from 18 to 30 years old, with normal or corrected vision, without disorders of the musculoskeletal system. The subjects had to search for target stimuli among the distractors, simultaneously performing a movement with a non-dominant hand, which could be congruent, not congruent, partially congruent to the target given by the word. **Results.** As a result of data analysis, there were no significant differences in accuracy and reaction time depending on the congruence of movement towards the search object in both groups. However, the effect of PPPP was observed in all groups, regardless of the congruence of movement towards the object. **Discussion of the results.** Since previous studies used the task of naming or categorization rather than visual search, a possible explanation for the results may be the following factors: the movement was performed by a non-dominant hand, the target stimulus was given by a word, irrelevant programs were launched, it was impossible to form an affordance situation due to the perception of objects with different from the target motor programs. **Conclusion** _ The study outlines the boundary of the position on the inclusion of functional knowledge in the representation of an object and the influence of the compatibility effect on the process of visual search. The launch of motor programs does not necessarily lead to a significant impact on the process of finding the target stimulus among distractors - there is a compatibility effect. Achieving a state of affordance is probably the key factor for the emergence of such an influence.

Keywords: affordance, motor program, functional knowledge, categorization, visual search, target stimulus, distractor, gaps in search continuation, compatibility effect, congruence

Highlights

- it is assumed that motor programs (functional knowledge) can be part of the representation of an object;

- the launch of motor programs affects the speed of object categorization;
- no significant effect of the congruence of the motor program on the accuracy and speed of visual search was found in the case of the LLPP effect;
- the proposed explanation is the inability to achieve a state of affordance in visual search tasks.

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Introduction

Looking at a familiar object, a person can easily attribute it to one category or another by analyzing the features of this object. If there is a consensus regarding the role of most basic perceptual features (shape, color, size) in categorization, then the involvement of motor programs in this process raises many questions. There are various definitions of the concept *of affordance,* but the most common understanding of affordance is as a possible way of acting with objects (Osiurak et al., 2017). An important note here is that affordance does not refer exclusively to the properties of an object, but emphasizes its "existence" in the interaction of the object and the actor of the action (Wolf et al., 2020), by which we mean an organism that perceives the environment and implements its behavior in it (Pozzi et al., 2014). Thus, affordance depends on both the properties of the object and the characteristics of the actor. In this case, an important aspect of consideration becomes such a characteristic of the actor as motor programs that implement the methods of action with the object. According to some authors, motor programs (or functional knowledge) are included in the representation of an object (see e.g. Osiurak et al., 2017, Tucker and Ellis, 1998). Assuming that motor programs, and hence affordance, can be part of the representation of an object, the next necessary step in the analysis is the concept of *categorization* - the ability to group objects for efficient storage and manipulation of information (Cohen and Lefebvre, 2005).

There is an idea that motor programs and the categorization process do not depend on each other, since motor programs are traditionally classified as low-level processes, while categorization is more complex and high-level. According to the idea of a hierarchical structure of the cognitive system, low-level processes cannot influence high-level ones (Anderson, 1996). However, within the framework of modern ideas about the system of cognitive processes, the possibility of two-way influence is emphasized (Grafton, 2009).

In the context of studying the role of motor programs in the process of categorization, the main focus of research is on the so-called "compatibility effect" - the congruence of the position of an object or its parts with the movement of a person. For example, in the experiments of Borji (2007), the subjects did not perform the movements themselves, but only received priming in the form of photographs of movements corresponding to the capture of either large objects or small objects. Next, the subjects had to attribute the presented object to the category of either artificially created or natural. In this case, priming had no effect on the speed of object categorization. However, in the second experiment, a preliminary training was added, where the subjects repeated the movements shown on the screen, after which they proceeded to perform

the experiment itself while maintaining the priming stage. This experiment demonstrated a significant effect of motion congruence on reaction time. The authors explain the results obtained by the direct launch of motor programs during the independent performance of an action, which causes an increase in "sensitivity" to priming and an improvement in the subsequent identification of objects (Borghi et al., 2007). This study outlines the condition for the occurrence of this influence: the observation of the action does not cause the launch of motor programs, however, a short-term imitation of the movement by the subjects themselves, apparently, is sufficient for the occurrence of the compatibility effect.

In a study by Tuker and Ellis (2001), where the subjects also had to assign objects to one of two categories (natural or artificially created), the so-called "object size effect" (object - size effect), which can be referred to as compatibility effects. The size effect is that the perceived size of an object triggers a motor program that is compatible with the presented object, which can be expressed in a decrease in reaction time. An important difference between Tyuker's study and Borgia's is that in the process of categorizing objects, the subjects held a specially designed instrument, with which they gave an answer about the object's belonging to the category. The subjects squeezed the cylindrical base of the instrument if the object was in the artificial category, and squeezed the small switch if the object was in the natural category. As a result, it was found that if the movement and the size of the object are compatible, the reaction time decreases, that is, the answer is given by the subjects faster. In the work of Baba and Maesson (2013), imitation of movements by the subjects was also present. However, the authors paid special attention to various parameters of movement: the use of the left and right hands, vertical and horizontal orientations, various hand positions. The task of the subjects was to familiarize themselves with a set of 96 objects with captions, after which they were sequentially presented with two photographs of hands, the position of which they had to repeat, and then name the presented object. The speed of naming, naming errors, memory errors were analyzed under conditions of congruence/ incongruence of all motion parameters and object category. As a result, significant differences were obtained in the response speed between the conditions of congruence and incongruence of the motion parameter and the object. Thus, the authors conclude that in the case of the coincidence of the motor program and the object, an increase in the speed of object identification is observed.

Of interest are studies aimed at studying the effect of compatibility in the task of visual search. One example of such work is the work of Yamani and colleagues (2016), where the authors conducted an experiment in the visual search asymmetry paradigm (the search asymmetry paradigms). The subjects had to report on the presence or absence of a cup, the handle of which could be turned left or right; depending on the direction of the handle of the target cup, the surrounding distractors (also cups with handles) had the opposite position of the handle: if the target handle is on the right, then the handles of the distractors are on the left and vice versa. The response about the presence of the target stimulus was performed with the index finger of one hand, and the response about the absence was performed with the index finger of the other hand. According to the results of the study, it was found that the reaction time was significantly higher in the case of coincidence (congruence) of the handle of the target object and the hand of the subject. The authors believe that images of objects located by the functional part towards the hand evoke an automatic motor response, which turns out to be relatively faster than in a situation where the orientation of the functional part and the hand does not match.

Thus, certain hand movements presumably trigger motor programs that are appropriate for certain objects and inappropriate for others. The present study raises the question of the influence of motor programs on the categorization process in the visual search task. As a specific study effect, we chose the phenomenon of "skipping while continuing the search" (SPPP) - a decrease in the success of finding the second target stimulus after successfully finding the first target stimulus. There are several theories explaining the mechanism of this effect. The search saturation theory assumes that after finding the first goal (object), a person is "satisfied" with the result of his search, therefore, prematurely terminates it, which is why the situation of missing the second goal arises. The resource depletion theory describes the effect of FLPP in terms of limited cognitive resources - the search for the first goal uses a lot of attention and working memory resources, as a result of which much less resources are left for the search for the second goal, which leads to skipping. Finally, perceptual set theory proposes that finding the first target (or setting the target stimulus through an image) forms a perceptual image that causes attention to be directed to similar objects, so that the probability of missing a second target (not similar to the one previously found) increases (Adamo et al., 2021). However, in addition to the ability to form a perceptual set, there is a possibility that the categorization of stimuli will affect the efficiency of visual search. Thus, in the study by Mitroff and colleagues, using the example of real objects, where target stimuli could have a perceptual similarity (the same color - two red objects) or categorical (the same function or category - a gun and bullets), it was found that categorical similarity more significantly affects the finding second target stimulus versus perceptual similarity (Mitroff et al, 2015). Similar results were obtained in a recent work by Rubtsova and Gorbunova: the role of both perceptual and categorical similarity of target stimuli was revealed, however, categorical similarity had a greater influence on the detection of the second target (Rubtsova and Gorbunova, 2021)

On the basis of the reviewed studies, we developed an experiment design aimed at clarifying the relationship between the activation of motor programs and categories in the condition of the visual search task, using the example of the PPPP effect. Based on the study of perceptual and categorical attitudes within the framework of the PPPP effect, as well as ideas about the inclusion of motor programs/functional knowledge in the representation of an object, a hypothesis can be put forward about the effect of the congruence of the triggered motor program to target stimuli on the efficiency of visual search. It is assumed that the motor program can act as an installation that ensures the direction of attention to objects that are congruent to the running program.

Methods

We have formulated a hypothesis that the congruence of movement to an object affects the accuracy and time of finding target stimuli in the visual search task within the framework of the PPP paradigm.

A mixed experimental plan was used in the experiment: the intergroup variable was the type of movement (grasping / pinching, in the further description the following abbreviations will be used: the grasping group will be designated as Grasp, the pinching group - Pinch), intragroup variables - congruence (correspondence) of the movement to the stimulus (3 block: congruent, not congruent, partially congruent) and the number of target stimuli on the screen (two, one, none). The dependent variables were the number of correct answers and reaction time. In the block of partial congruence, two words were presented; the first word in the presentation could

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be congruent or not congruent to the movement being performed. Thus, there were 4 groups of subjects in the experiment (see Table 1). In addition to this, in this experiment, a new method of conducting the experiment and analyzing the effect of SPPP was implemented (Adamo, 2019), in which the positions of single target stimuli (in the corresponding samples) corresponded to the coordinates of the samples with two stimuli and were surrounded by the same distractors.

Table 1

Designation of 4 experimental groups

Traffic	First word in partial congruence block	Symbol
capture	congruent	GraspCongru
capture	not congruent	GraspIncongru
Pinching	congruent	PincgCongru
Pinching	not congruent	Pinch Incongru

Sample

The empirical part of the study was implemented on the basis of the HSE Department of Psychology. Students of the educational program "Psychology" with normal or corrected to normal vision, without neurological disorders, were involved in the participation. Passing the experiment was rewarded with a bonus point in academic disciplines. The study involved 60 people (*M = 20.5, 27 women, 55 right-handers, 15 in each group)*. The experiment was conducted online on the Pavlovia service.

Stimulus material

Images of objects were taken from the open database of stimuli by T. Brady (2008) and were pre-selected through a survey. The final set of stimuli consisted of 50 object images.

Procedure

A pilot study was conducted in advance, in which 18 people took part. Half of the participants underwent the experiment with the presence of the experimenter; experimenter and participant communicated via Skype. As a result of comparing groups with and without the presence of the experimenter, no significant differences were found, which was the basis for conducting the main part of the experiment online. During the experiment, the subjects had to find the target stimulus given by the word, while performing a gripping or pinching hand movement in the search process. The action could be congruent to the target stimuli, not congruent, partially congruent (one target stimulus is congruent, the other is not). The word was presented for 1 second, then a search space appeared, where 18-20 distractors and there could be two, one or no target stimulus. If there were two target stimuli, then it was necessary to sequentially click on each of them. If there was one target stimulus, then it was necessary to click on the object, and

then on the word OK. If there was no target stimulus, then it was necessary to click twice on the word NO. During the search, the subject had to move not with the leading hand, but with the leading hand to control the mouse, with which he clicked on objects. In the case of a block with partial congruence, two words were presented for memorization - congruent and non-congruent. A total of 307 trials were performed, not counting 8 training trials: 86 trials per congruent and non-congruent blocks, 135 trials per block with partial congruence. In blocks with 86 trials, 25 trials were with two target stimuli, 50 with one, and 11 trials without a target stimulus. In the block with 135 trials, the number of trials with two target stimuli and their absence remained the same; there were twice as many trials with one target stimulus. The experiment was conducted online on the Pavlovia platform.

Results

Data analysis and visualization were carried out in the R v software environment. 1.2.1335. Measures of accuracy and reaction time (time of the first and second clicks) were compared for conditions with one and two target stimuli, as well as a comparison of indicators between blocks of congruence within groups. Three-way mixed analysis of variance was used as a data processing method, where the group was an intergroup variable, and the block and sample type were intragroup variables, if necessary, a correction for Greenhouse - Geisser sphericity was applied (data are corrected).

Accuracy scores and response times (first and second clicks) were analyzed using a three-way mixed ANOVA. A significant influence of the "sample type" factor on the accuracy indicator was found ($F(2,110 > 865.35, p < .000, \eta_p^2 = .856$), the reaction time indicators (first and second clicks) are significantly affected by the "sample type" factors (RT 1: $F(2,110) > 173.39, p < .000, \eta^2 = .097$, RT 2: $F(2,110) > 76.12, p < .000, \eta_p^2 = .084$) and "block" (RT 1 : $F(2,110) > 102.47, p < .000, \eta^2 = .327$, RT 2: $F(2,110) > 82.34, p < .000, \eta_p^2 = .328$), and analysis showed a significant interaction of these factors (RT 1: $F(4,220) > 23.31, p < .000, \eta_p^2 = .022$, RT 2 : $F(4,220) > 9.68, p < .000, \eta_p^2 = .011$). "group" has no significant effect ($p > 0.05$).

For further analysis, a mixed three-way analysis of variance was performed for each group, where type and block were the intragroup factor, and subgroup was the intergroup factor (congruence or incongruence of the first word in a partially congruent block). As a result of the analysis, it was revealed that for the Grasp group (GraspCongru and GraspIncong), the subgroup factor does not have a significant effect ($p > 0.05$). For the accuracy score in the Grasp group, only the type of sample is significantly affected ($F(2.54) > 656.17, p < .000, \eta_p^2 = .883$); no influence of the "block" factor was found ($p > 0.05$). For reaction time indicators (first and second clicks), the block has a significant effect (RT 1: $F(2.54) > 41.27, p < .000, \eta_p^2 = .287$, RT 2: $F(2.54) > 54.18, p < .000, \eta_p^2 = .337$) and type (RT 1: $F(2.54) > 68.91, p < .000, \eta_p^2 = .089$, RT 2 : $F(2.54) > 31.85, p < .000, \eta_p^2 = .086$), and their interaction is also observed (RT 1: $F(4.108) > 8.28, p < .000, \eta_p^2 = .016$, RT 2: $F(2,108) > 5.47, p < .004, \eta_p^2 = .015$).

For the Pinch group (PinchCongru and PinchIncong), a similar situation is observed: the subgroup factor has no significant effect ($p > 0.05$). Only the type of sample affects the accuracy index ($F(2.56) > 3.24, p < .000, \eta_p^2 = .831$). For reaction time indicators (first click) – sample type ($F(2.56) > 114.16, p < .000, \eta_p^2 = .104$), block ($F(2.56) > 63.64, p < .000, \eta_p^2 = .366$), the interaction of these factors was revealed ($F(4,112) > 16.48, p < .000, \eta_p^2 = .304$). Second click time is affected by probe type ($F(2.56) > 48.93, p < .000, \eta_p^2 = .081$), block (F $(2.56) > 55.15, p < .000, \eta_p^2 = .322$),

and the interaction of these factors was revealed (*F(4,112) > 5.16, p <.007, η_p^2 =.008)*.

A two-way analysis of variance was also performed for each of the subgroups. The intragroup factors were the type of sample and the block. For GraspCongru, a significant influence of the sample type factor on all indicators was found: accuracy (*F(2.26) > 225.99, p <.000, η_p^2 =.839)*, first click (*F(2.26) > 32.43, p <.000, η_p^2 =.127)*, second click (*F(2,26) > 14.92, p <.000, η_p^2 =.108)*. Additionally, for the reaction time indicators, a significant influence of the block was established (RT 1: *F(2.26) > 22.55, p <.000, η_p^2 =.393*, RT 2 *: F(2.26) > 13.54, p <.000, η_p^2 =.317)*, as well as a significant interaction between the factors "sample type" and "block" (RT 1: *F(4.52) > 5.96, p <.004, η_p^2 =.038*, RT 2: *F(4.52) > 4.82, p <.02, η_p^2 =.030)*. For the PinchCongru group, similar results were obtained: the effect of sample type on accuracy (*F(2,28) > 121.11, p <.000, η^2 =.814)*, the effect of sample type on reaction time - first click (*F(2, 28) > 51.23, p <.000, η_p^2 =.084)*, second click (*F(2,28) > 24.53, p <.000, η_p^2 =.086)*. Block effect on reaction time for the first click (*F(2,28) > 36.16, p <.000, η_p^2 =.385)* and for the second (*F(2,28) > 24.65, p <.000, η_p^2 =.313)*, and the interaction of the factors "sample type" and "block" influenced the reaction time - the first click (*F(4,56) > 8.71, p <.000, η_p^2 =.037)*, the second click (*F(4.56) > 3.32, p <.023, η_p^2 =.011)*. For the GraspIncong group, a significant influence of the "sample type" factor on all indicators was found: accuracy (*F(2.28) > 524.86, p <.000, η_p^2 =.925)*, first click (*F(2.28) > 37.44, p <.000, η_p^2 =.080)*, second click (*F(2,28) > 20.57, p <.000, η_p^2 =.076)*. The "block" factor has a significant impact on the reaction time indicators: the first (*F(2,28) > 22.08, p <.000, η_p^2 =.275)* the second click (*F(2,28) > 23.17, p <. 000, ηp^2 =.375)*, as well as accuracy scores (*F(2,28) > 4.77, p <.03, η_p^2 =.061)*. Interaction between factors "type" and "block" was found only for the first click (*F(4,56) > 3.39, p <.02, η_p^2 =.01)*. Similar results were obtained for the PinchIncong group. The sample type factor has a significant impact on all indicators: accuracy (*F(2.28) > 228.94, p <.000, η_p^2 =.844),* first click *(F(2.28) > 64.31, p <.000, η_p^2 =.148)*, second click (*F(2,28) > 24.82, p <.000, η_p^2 =.095)*. The "block" factor has a significant effect on the reaction time indicators: the first (*F(2.28) > 27.67, p <.000, η_p^2 =.351)*, the second click (*F(2.28) > 31.48, p <.000, η_p^2 =.331)*. No interaction was found between the factors "sample type" and "block" for the first click (*F(4.56) > 8.33, p <.000, η_p^2 =.048)*.

In order to analyze the presence of the effect of SPPP, a one-way analysis of variance was performed (factor - type of sample). Previously, the data were grouped based on the block type: congruent, not congruent, partially congruent. The analysis was carried out within each group (GraspCongru, GraspIncong, PinchCongru, PinchIncong). The type of sample has a significant effect on all indicators, regardless of the block in each group. For convenience, the results of this analysis are shown in Table 2.

Table 2

Results of one-way analysis of variance for 4 groups. Reflected indicators of accuracy, first and second clicks for each of 3 blocks: congruent, not congruent, partially congruent

GraspCongru group	Accuracy	First click	Second click
Congruent	F(2.26) > 100.6, p <.000, ηp^2 =.862	F(2.26) > 5.936, p <.007, ηp^2 =.051	F(2,2 6) > 9.24, p <.00 0, ηp^2 =.1 34
not congruent	F(2,2 6) > 160. 62, p <.000, ηp^2 =. 801	F(2,2 6) > 5. 14, p <.0 14, ηp^2 =. 078	F(2,2 6) > 9. 71, p <.0 00, ηp^2 =.123

Partially congruent	F(2,2 6) > 488. 93, p <.00 0, ηp 2 =. 951	F(2,2 6) > 40. 6, p <.000, ηp 2 =.38 8	F(2,2 6) > 10. 92, p <. 000, ηp 2 =. 144
PinchCongru Group	**Accuracy**	**First click**	**Second click**
Congruent	F(2.28) > 84.66, p <.000, ηp 2 =.833	F(2.28) > 14.18, p <.000, ηp 2 =.094	F(2.28) > 7.83, p <.001, ηp 2 =.1
not congruent	F(2.28) > 40.56, p <.000, ηp 2 =.713	F(2.28) > 10.90, p <.000, ηp 2 =.056	F(2.28) > 10.99, p <.000, ηp 2 =.065
Partially congruent	F(2.28) > 205.36, p <.000, ηp 2 =.917	F(2.28) > 32.11, p <.000, ηp 2 =.138	F(2.28) > 20.48, p <.000, ηp 2 =.094
Gras p Incong group	**Accuracy**	**First click**	**Second click**
Congruent	F(2, 28) > 84 8. 00, p <.000, ηp 2 =. 987	F(2,2 8) > 12.44, p <.000, ηp 2 =.070	F(2,2 8) > 17.88, p <.000, ηp 2 =.093
not congruent	F(2, 28) > 353. 02, p <.000, ηp 2 =. 954	F(2,2 8) > 9. 97, p <.000, ηp 2 =.0 62	F(2,2 8) > 8.04, p <.00 1, ηp 2 =.0 61
Partially congruent	F(2,2 8) > 145. 54, p <.00 0, ηp 2 =. 856	F(2,2 8) > 30. 24, p <.000, ηp 2 =. 113	F(2,2 8) > 8. 62, p <.0 01, ηp 2 =.078
Pinch Incong Group	**Accuracy**	**First click**	**Second click**
Congruent	F(2,28) > 1 39. 19, p <.000, ηp 2 =. 796	F(2,28) > 5. 764, p <.00 8, ηp 2 =.0 56	F(2.28) > 15. 491, p <.00 0, ηp 2 =.0 61
not congruent	F(2.28) > 142.61, p <.000, ηp 2 =.801	F(2.28) > 16.06, p <.000, ηp 2 =.077	F(2.28) > 7.82, p <.001, ηp 2 =.057
Partially congruent	F(2.28) > 256.87, p <.000, ηp 2 =.942	F(2.28) > 71.72, p <.000, ηp 2 =.33	F(2.28) > 20.04, p <.000, ηp 2 =.180

Pairwise comparisons (with Bonferroni -Holm correction for multiple comparisons) were used to compare accuracy and reaction time (first and second clicks separately) in trials with two and one target stimulus. Trials with two target stimuli were compared with each of the two types of trials with one stimulus, and two types of trials with one target stimulus were compared with each other. The analysis showed that in all compared triplets, the indicators of accuracy and reaction time in trials with two target stimuli differed significantly from each type of trial with one target stimulus. At the same time, comparison of two types of trials with one target stimulus showed no significant differences in any of the indicators.

Discussion

When analyzing the accuracy and reaction time, depending on the type of test, the effect of TPPP was found: in all groups and blocks, a significant decrease in reaction time was observed in the conditions of trials with two stimuli compared to trials with one stimulus; Accuracy scores in trials with two stimuli were also significantly lower than in trials with one stimulus.

As a result of data analysis, no significant differences were found in terms of accuracy and reaction time depending on the congruence of movement towards the search object in all groups. Presumably, this may be due to the way the target object is specified through the word, which does not allow the formation and retention of a specific image used as a search template, and therefore does not allow creating a situation of affordance - a certain position of the object (the functional part of the object) in combination with the ability to adjust the position hands to this object. In addition, in the process of performing the task, the subjects worked with a task space filled with other objects, which, in turn, can launch other motor programs. Together, these aspects do not allow creating an affordance situation, which leads to the impossibility of influencing the accuracy or speed of visual search, which was demonstrated in previous experiments. Based on the works mentioned in the theoretical part, it can be assumed that the indicated aspects can also act as factors that should be taken into account and corrected in further studies. For example, in the study of Baba (2013), the position of the hand was regulated not only by the method of gripping the object, but also by the orientation of the hand, and the movement was performed by the leading hand. In the conducted studies, the object was not specified by a word, but presented as an image in the absence of distractors, however, in all studies, the subject's task was to categorize the object.

The discrepancy in the occurrence of the effect with the studies mentioned in the theoretical review may also be related to the type of task or the format of the objects representation. This assumption is based on the fact that in most works in this area, the compatibility effect was studied using the example of the problem of assigning an object to one category or another (Tucker and Ellis, 2001 et al., 2007, Bub et al., 2013). The results of the studies mentioned in the theoretical review are generally consistent with studies that used the fMRI method : upon presentation of images or words, activation of motor zones was observed if the given stimulus was an object with which action was possible (for example, a hammer); significant activation occurred upon presentation of stimuli denoting movement (verbs) (Popp, et al., 2019). It can be said that the task of assigning an object to one category or another is closer to the experimental conditions of studies using fMRI than the task presented in this study.

Another important fact related to the format of the task is that in the present study, the movement was performed with a non-dominant hand, since the subjects performed actions with a

computer mouse with the help of the dominant hand. In all the studies mentioned above, the subjects performed the movement with their dominant hand. According to some studies, in the case when the object is located near the dominant hand, the identification of this object is faster (Rowe et al., 2017).

Accordingly, assumptions that viewing objects triggers motor programs or that performing a movement results in the activation of the corresponding motor patterns require clarification. For example, according to the studies of Baba and colleagues (2013), the launch of motor programs can affect the speed of naming, however, in the studies mentioned, the position of the hands and the position of the functional parts of objects were maximally adapted to each other. Thus, the launch of motor programs with subsequent influence on certain processes is possible under the condition of presenting the object (its functional part) in the position that best suits the position of the hand. The hand itself must be in a position that is adequate to the method of action with the object, and be the leading one. In this case, a situation of affordance may arise : the properties of the object and the characteristic of the actor will be in the optimal ratio to each other for the implementation of the action. Probably, it is in this case that we can talk about the influence of functional knowledge as part of the representation of an object on the performance of a task other than naming/categorization.

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Alpha and Theta Rhythms as Markers of Cognitive Effort

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Annotation: **Introduction.** This review article combines the theory of motivational intensity and the theory of mental effort with studies of oscillatory correlates of the performance of complex cognitive tasks. The phenomenon of effort has been a longstanding subject of research in fundamental psychology. Theories describing the cognitive mechanisms of mental effort have been developed in recent years. However, further research is needed to explain the mechanism of effort modulation during task performance. **Theoretical justification.** Mental effort can be defined as an active volitional process of mobilizing resources to maintain a particular behavior. The theory of motivational intensity, in conjunction with theories of mental effort, describes the cognitive and motivational factors that modulate the effort invested in the performance of a task. Interpreting the oscillatory correlates of individual cognitive processes in the context of effort theories may allow one to develop an understanding of the mechanism underlying the distribution and modulation of mental effort. The purpose of this paper is to review the existing experimental data on the modulation of task-related oscillations and compare the research results with the predictions of force theories. **Results.** The article reviews research on the power of oscillations as correlates of various controlled processes required by a cognitive task. The severity of the oscillatory effects associated with the performance of the task increases with the complication of the task and with increased motivation to perform. When performing particularly complex tasks, there are individual differences in indicators of brain activity, which, apparently, can only be explained through the motivational-emotional reaction of the subject to complexity. **Discussion of the results.** The effects found as a result of the literature review are consistent with the predictions of the theory of motivational intensity about the modulation of effort. However, to date, there is a lack of research to correlate oscillatory data with theories of effort and develop an understanding of the mechanism of force modulation under various task requirements. The article discusses possible studies on this topic and the features of the required experimental designs.

Keywords: mental effort, motivational intensity, brain oscillations, electroencephalography, magnetoencephalography, alpha rhythm, theta rhythm, complex tasks, motivation, cognitive abilities

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Highlights

- The theory of motivational effort describes the non-linear dependence of the level of effort invested on the level of task complexity.
- studies of the cognitive mechanism of mental effort suggest a connection between brain oscillations and the phenomenon of effort.
- modulations in the severity of task-related oscillations appear to be consistent with motivational intensity theory.
- research oscillatory correlates of various cognitive processes can develop theories describing the mechanism of effort modulation.

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Introduction

Effort is a common feature of everyday life. Whether it's running to the bus stop, studying, or eating an unpleasant diet (Inzlicht et al., 2018). The required effort for these activities can be defined as the intensification of mental or physical activity to achieve some goal (Eisenberger, 1992). It is thus an active volitional process (Kahneman, 1973) that mediates between how well an individual can potentially perform a task and how well he actually performs that task (Shenhav et al., 2017). Effort is expressed in the intensity of behavior with a certain motivation, goal and conditions for achieving it. The degree of effort invested depends not only on motivation, but also on many other internal and external factors (Inzlicht et al., 2018; Shenhav et al., 2017).

Appearing in the 1970s, theories about effort continue to develop in recent years, which shows the importance and relevance of research into the nature of effort and the mechanisms of its modulation in the field of fundamental psychology. This article is devoted to the study of the mechanisms of force modulation, that is, the factors that determine the intensity of the applied effort. More specifically, we are interested in the intensity of mental effort invested in the performance of cognitive tasks, that is, in mental activity (Shenhav et al., 2017).

Modern authors suggest that not all cognitive processes require effort, while some may require more effort than others. The performance of any task is associated with the choice of the optimal level of effort for a given process, that is, with the distribution of effort among the processes (Shenhav et al., 2017). However, the nature of these restrictions, as well as the mechanism for the distribution of efforts, remains unclear - the authors of theoretical articles themselves put forward hypotheses. We believe that studies of brain oscillations can contribute to the understanding of the processes behind the distribution and modulation of efforts, as they allow us to consider the correlates of individual top-down processes. (Buzaki et al., 2012; Siegel et al., 2012).

In this article, we have tried to connect modern theories of effort with known data on the modulation of oscillatory correlates of cognitive tasks. Our task was to describe and combine two separate theoretical directions (the theory of motivational intensity and theories of mental effort), substantiate the hypothesis about the possibility of interpreting oscillations in terms of these theories, and review the existing experimental data in the context of these theories.

Theoretical justification

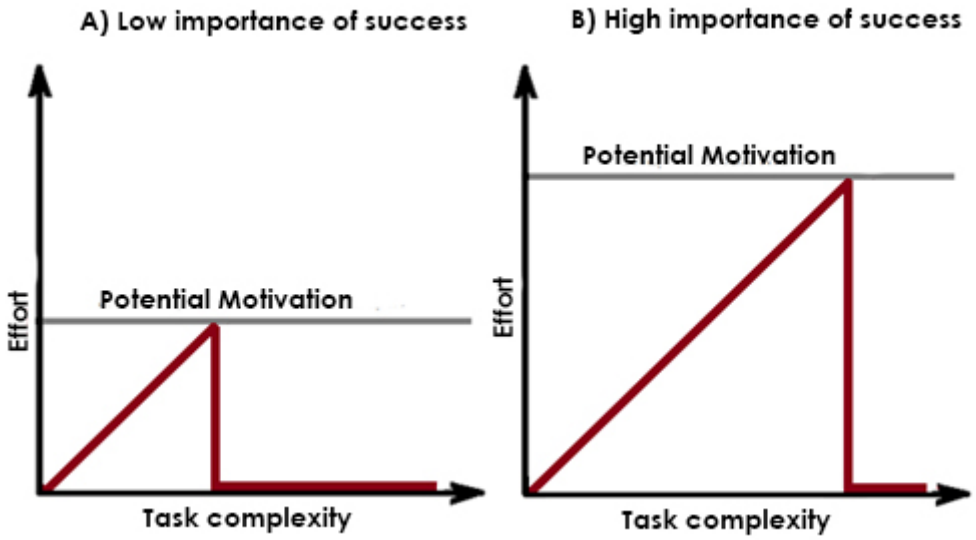
Mental effort. Definition and basic concepts

The concept of effort is necessary in order to explain the following phenomenon: when performing various tasks, it is common for people to not realize their physical or mental abilities to the fullest. For example, the introduction of rewards often improves the quality of task completion (Richter et al., 2016). Thus, the result of the task is determined not only by the ability of a person, but also by the degree of effort applied to its implementation.

There are several approaches to the definition and study of mental effort. Richter and colleagues define effort as the mobilization of resources to maintain a particular behavior (Richter et al., 2016). The authors consider effort in the context of Brehm's motivational intensity theory (Brehm & Self, 1989), which is based on the principle of resource conservation. Motivation intensity theory postulates that effort increases with increasing task complexity if success is possible and the effort is justified. At the same time, the level of effort drops sharply if the task becomes so difficult that, on the one hand, it exceeds human capabilities and makes success too unlikely, and, on the other hand, requires an unreasonably high level of resource mobilization (Brehm & Self, 1989). Thus, in accordance with the principle of conservation of resources, the intensity theory of motivation predicts a sharp decrease in effort when performing particularly difficult tasks. Potential Motivation - this is the hypothetical maximum effort that is justified and that a person is ready to make to complete the task. This indicator, in turn, depends on the significance of success for a person (Fig. 1) (Richter et al., 2016).

Figure 1

Motivational intensity theory predictions for low (A) and high (B) importance of success (modified figure, Richter et al., 2016).



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In a number of studies testing the theory of intensity of motivation, the mobilization of efforts was assessed by fixing the physiological reactions of the cardiovascular system : the heart rate as a period of isovolumic contraction (cardiac pre-ejection period), systolic blood pressure, heart rate. Thus, it was shown that these reactions become more pronounced with an increase in the complexity of cognitive tasks and decrease sharply in conditions when the task is impossible (Richter et al., 2008 ; Gendolla and Richter, 2006 ; Smith, Baldwin and Christenson, 1990). At the same time, high motivation prevents the effect of the drop in effort (Eubanks, Wright & Williams, 2002), and too low motivation does not lead to an increase in effort (Wright, Shaw, and Jones, 1990). Thus, in these studies x the basic provisions of the theory are confirmed - the dependence of effort on the complexity of the task, the possibility of success and motivation (Wright, 1996).

Cognitive mechanism of effort modulation

In the Brehm et al., 1989 approach to explaining the phenomenon of effort, the key mechanism of effort is to increase the intensity of the overall motivation to complete the task (Brehm et al., 1989). In parallel with the theories described and empirical studies, theories of mental effort are being developed to explain the cognitive mechanism of effort modulation.

Mental effort is defined as a mediator between, firstly, the complexity of the task and the cognitive abilities of the subject, and, secondly, the final quality of information processing (expressed in reaction time and task accuracy) (Shenhav et al., 2017). The first two factors determine the potentially achievable level of task performance. Mental effort as an intermediate process influences the level of performance actually realized.

The cognitive mechanism that explains the nature of mental effort is associated with the idea of the need to involve executive functions (executive control functions) to control information processing processes with varying degrees of automation (Earle et al., 2015 ; Luria, 1980). Regularly repetitive stereotypic processes are well automated and require less effort, while those involving cognitive control require more effort (Botvinick & Cohen, 2015). This approach argues that a key function of effort is to maintain focus on the goals of the assignment and prevent them from being replaced by competing goals or being distracted by environmental factors. Thus, task characteristics may require different levels of activation of voluntary attention or the executive component of working memory (Kane & Engle, 2002), which in turn affects the amount of effort required for successful implementation.

The presence of an intermediate variable between cognitive abilities and the result of the task is explained by the limited resource necessary for the distribution and maintenance of controlled processes (cognitive control). There are several theoretical explanations for the limits on the amount and time of maintaining control. Among the factors explaining these limitations are the brain's limited metabolic resources (Muraven, Tice & Baumeister, 1998), as well as the limitations of information processing systems themselves - the occurrence of interference due to the need to use common processes for different tasks (Musslick et al., 2016).

Enough evidence that humans and animals avoid effort (Dreisbach & Fischer, 2015 ; Kool et al., 2010; Hull, 1943 ; Silvestrini, 2017). Many authors agree that effort is inherently unpleasant and costly, and they attribute this phenomenon to the need to conserve limited cognitive control resources (Inzlicht et al., 2018).

Theories of mental effort postulate the need for a mechanism to distribute control among various processes based on signals of necessary costs and opportunities. For example, Shenhav

et al. (2017) develop the theory of the expected cost of control (expected value of control). This theory involves adjusting the necessary intensity of control and the choice of processes that need to be controlled. For this, the estimate the necessary costs of a limited resource and the likelihood of benefits (Shenhav et al., 2013)

Tasks requiring cognitive effort involve a network of cortical structures that includes the dorsal anterior cingulate cortex (ACC), insula, lateral prefrontal cortex, and lateral parietal cortex (Shenhav et al., 2013). The activity of these structures is more pronounced when performing tasks that require holding voluntary attention, retaining information in short-term memory, and suppressing automatic (dominant) responses (Power & Peterson, 2013). In general, the functions of these structures are associated with the distribution of controlled processes, although the specific functional roles of individual areas are discussed. In some models that explain the role of the dorsal ACC in the distribution of control, patterns of activity are correlated with a determination of the level of effort required (Shackman et al., 2011). The authors of the cost of control (EVC) theory suggest that the role of the brain structures involved in solving tasks requiring control (including the dorsal ACC) is to integrate the signals necessary to determine the cost of control and distribute the effort between controlled processes (Shenhav et al., 2016). The possibility of modulation by the frontal regions of the activity of the occipital regions during the performance of tasks on cognitive control is shown, for example, in the work of Cohen and van Gaal (2013). Using the Granger causality method, the authors showed that the cognitive control neural network sends downstream signals to touch areas. Mikhailova et al. (2021), analyzing directional connectivity in theta and alpha rhythms, also observed coherence descending from the frontal cortex to sensory areas when solving a working memory task. Thus, in terms of the cost of control theory, the effects of the distribution of effort can manifest themselves not only in the frontal areas associated directly with cognitive control, but also in other areas of the cortex associated with the implementation of controlled processes.

Thus, the authors associate the concept of mental effort with brain correlates of cognitive control processes. Cognitive control is expressed in various modulations of brain activity. In this article, we consider modulations of electroencephalographic (EEG) and magnetoencephalographic (MEG) oscillations. First of all, cognitive control is associated with the activation of the frontal theta rhythm (4 - 7 Hz) and suppression of the parietal alpha rhythm (8 - 13 Hz) (Pfurtscheller, 1977; Missonnier et al., 2006; Yordanova, Kolev & Polich, 2001), which will be discussed below. Based on this, it can be assumed that these correlates of the performance of complex cognitive tasks may reflect the modulation of mental effort. In the following sections of the article, we consider the oscillatory correlates of performing tasks that require executive functions as possible indicators of effort, derived from the described complementary theories.

Significance of studying oscillations as correlates of cognitive processes

At the physiological level, cognitive processes occur in the brain through the interaction between functionally specialized but widely distributed populations of neurons that form networks. This interaction occurs due to synchronization of membrane potential oscillations of neurons included in the network (neuronal oscillations; Siegel et al., 2012). EEG or MEG methods provide information about changes in extracellular potential in the cerebral cortex. This makes it possible to detect neuronal oscillations and obtain information about the course of cognitive processes with a high temporal resolution (Buzsaki et al., 2012). Thus, studying the modulations of EEG/

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MEG oscillations associated with the performance of cognitive tasks can help researchers find a common basis under seemingly different cognitive processes or, conversely, separate similar processes (Siegel et al., 2012).

For example, Richter et al. (2008) in their study of effort modulation during the Sternberg task on working memory used the responses of the cardiovascular system as an indicator of effort. Meanwhile, like other cognitive tasks, the Sternberg task requires the activation of many processes, such as stimulus encoding, stimulus retention in working memory, stimulus retrieval from working memory (Sternberg, 1996). Time-frequency analysis of oscillations associated with the execution of the Sternberg problem makes it possible to separate these processes (Wianda & Ross, 2019; Proskovec et al., 2019; Heinrichs-Graham & Wilson, 2015; Pavlov & Kotchoubey, 2021) and examine their relationship to task difficulty and motivation separately. Therefore, the study of task-related oscillations may allow one to relate various top-down cognitive processes to theories of effort, and thus develop an understanding of the cognitive mechanism of effort.

Below we show that numerous studies of oscillations associated with the performance of complex cognitive tasks are consistent with the mental effort theories described.

Results

Relation of oscillations to the complexity of the problem

In the reviewed studies, participants mainly perform the working memory tasks, the Sternberg task and the n- back task, because such tasks have several levels of difficulty. The performance of both tasks is associated with a relative increase in power (synchronization) of the theta rhythm (4–7 Hz) and a relative decrease in power (desynchronization) of the alpha rhythm (8–13 Hz; Klimesch et al., 2005). Both of these effects have traditionally been interpreted as correlates of activation of cognitive control, downward attention, or executive functions of working memory (Klimesch et al., 1998; Cohen & Donner, 2013; Sauseng et al., 2010).

In most studies, analysis of the power of alpha and theta rhythms shows synchronization of the theta rhythm and desynchronization of the alpha rhythm with increasing task complexity. Thus, the sensitivity of alpha rhythm desynchronization to changes in task complexity was shown in a study by Stipacek and co-authors (2003). Participants in the study completed a short-term memory task, which required memorizing and recalling sequences of numbers (three or five digits), and a working memory task, which also required additional manipulation of numbers (counting). In both tasks, with increasing complexity, desynchronization of the fast alpha rhythm increased, most pronounced in the posterior parts of the brain. In the short-term memory task, this pattern was more noticeable than in the working memory task.

A linear increase in both the relative and tonic (absolute) power of the frontal theta rhythm with increasing work memory load was also shown in a study by Zakrzewska and Brzezicka (2014). Study participants completed the Sternberg task, which required them to memorize two to five digits.

In a study by Gevins et al. (1997), study participants completed an n- back task with two difficulty levels: 1-back and 3-back. In the n- back task, participants are presented with a sequence of symbols and are required to answer whether the presented stimulus was encountered among the previous n symbols. The power of the theta rhythm in the median frontal region was higher in a difficult condition compared to an easy one. Also, the lower alpha rhythm (8 - 10.5 Hz) in the parietal region and the upper alpha rhythm (10 - 13.5 Hz) in the parietal-occipital region were

more pronounced in the mild condition. In another study by Gevins et al. (1998), participants performed spatial and verbal versions of the n- back task. It was shown that with increasing task complexity, the power of the frontal theta rhythm increases, the power of the alpha rhythm in the parietotemporoccipital region decreases, and the power of the beta rhythm in the central region.

Increased depression of the central-frontal beta rhythm with the complication of the task was also found by Pavlova et al. (2019). The linguistic task used required the extraction of the verb from semantic memory. The participant had to name the associated verb in response to the noun. Complexity was regulated by the number of possible associations. The suppression of the beta rhythm was interpreted by the authors as an increase in the level of effort upon activation of the semantic-motor association.

In a study by Scheeringa and colleagues (2009), participants completed the Sternberg task, in which the length of a sequence varied from zero to seven consonants. With an increase in the complexity of the task, an increase in the power of the posterior alpha rhythm and an increase in the power of the frontal theta rhythm during the retention of information in working memory were observed.

An increase in the power of the frontal theta rhythm with increasing task complexity was also obtained using the Sternberg problem, in which the number of letters in the encoded sequence varied from one to four (Gundel & Wilson, 1992).

Using the machine learning method, Goryushko and Samochadin (2018) created a classifying model that determines the degree of cognitive load according to the severity of the background theta rhythm. The experiment used the Sternberg problem, which includes from two to ten consonants. Result of this experiment indicates a positive relationship between the power of the theta rhythm and the level of task complexity.

Not only a decrease, but also an increase in the power of the alpha rhythm may be necessary to perform complex cognitive tasks. Scheeringa and colleagues found an increase in posterior alpha power synchronization with increasing difficulty in the Sternberg task (Scheeringa et al., 2009). The authors explain the regularity obtained by the hypothesis of the relationship between the power of the alpha rhythm and the downward functional inhibition of areas that disrupt the process of retaining information in working memory. The hypothesis about the role of the alpha rhythm in the maintenance of working memory was tested by Bonnefond and Jensen (2012). In the study, participants performed a modified Sternberg task involving distractors (distracting stimuli) in the retention period. The power of the alpha rhythm in the temporo-occipital region has been shown to increase in anticipation of a distractor. Increased alpha power during this period also predicted better task performance.

In the described studies, linear relationships were observed between oscillatory correlates and task complexity. Such dependences only allow us to draw a conclusion about the relationship of these correlates with cognitive load. And x is not enough to prove the connection of these correlates with motivation and theories of effort. Recently, however, the first studies have appeared that use very complex levels of tasks and have obtained non-linear dependencies that can no longer be explained solely by cognitive load. Such an effect of increasing the level of difficulty of tasks on the modulation of oscillations is shown in the study by Fairclough and Ewing (2017) and Fairclough et al. (2019). Members performed back n- backs at three difficulty levels (easy n = 1, difficult n = 4, very difficult n = 7). The power of the frontal medial theta rhythm increased from a simple conditions to difficult and again decreased to very difficult. Similar results were

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obtained for the alpha rhythm: depression of the alpha rhythm was most pronounced under difficult conditions (n = 4) and decreased under simple and very difficult conditions (n = 1 and n = 7). Recent results provide an argument for linking occipital-parietal alpha depression and frontal theta activation with effort in the context of motivational intensity theory.

This article is devoted to the oscillatory correlates of the performance of cognitive tasks. Such correlates reflect the prolonged activity of the cortex associated with the implementation of cognitive processes. However, it is important to note that EEG studies of stimulus-related evoked potentials (Nidal & Malik, 2014) are also consistent with oscillation studies. Thus, many studies have found an increase in the amplitude of various components of the evoked potential with an increase in the complexity of the task (Koshkin et al., 2018; Pavlova et al., 2017; Shelepin et al., 2009). At the same time, under particularly difficult conditions, a drop in the amplitude of the P3 component associated with high-level processing of the stimulus was observed (Johannes et al., 2021).

Similar results have been shown in other studies of oscillations, but only for certain groups of subjects, these studies will be described below.

Influence of Motivation on Oscillatory Correlates of Cognitive Task Performance

According to the motivational intensity theory, the alpha and theta correlates of cognitive task performance increase as rewards for success increase (Glazer et al., 2018). In the conditions of x expectation of a reward, there is an increased desynchronization of the parietal-occipital alpha rhythm associated with stimulus evaluation, expectation of feedback (Bastiaansen, 1999; Bastiaansen, 2001; Pornpattananangku I & Nusslock, 2016), performing an n- back task on working memory (Fairclough & Ewing, 2017) and Stroop tasks on cognitive control (van den Berg et al., 2014). The authors interpreted these results as increased attention with increased motivation to complete the task.

More controversial results have been obtained regarding the frontal theta rhythm as the main correlate of the performance of complex cognitive tasks (Glazer et al., 2018). Some authors have found an increase in the power of the frontal theta rhythm associated with stimulus coding in working memory with increased reward (Gruber et al., 2013), while others found no such association (Fairclough & Ewing, 2017). Knyazev and Slobodskoy-Plusnin (2009) showed that the relationship between the frontal theta rhythm and expectation of reward or punishment depends on intrinsic sensitivity to reward or punishment. Hypothetically, this result may explain the controversial data on the relationship between theta rhythm and motivation.

There is also evidence of increased desynchronization of the alpha rhythm and synchronization of theta rhythm associated with stimulus coding, with increased intrinsic motivation (Pukhachee et al., 2019 ; Ermakov & Vorobyeva).

The relationship of the observed EEG correlates with the theory of motivational intensity can also be assumed when studying the individual differences of the subjects. The conflicting results of studies focusing on individual differences in the modulation of brain activity depending on the complexity of the task are described below, and the possible resolution of contradictions when paying attention to the motivational characteristics of the subjects is explained.

Studies on the relationship between EEG correlates of task performance and intelligence also paradoxically lead to a hypothesis about the relationship of these indicators with the motivation of the subjects. Subjects with a high level of intelligence or high accuracy of answers have

a reduced desynchronization of the alpha rhythm associated with the performance of tasks for logical thinking and memory (Neubauer & Fink, 2009; Neubauer et al., 1995; Jausovec, 1996; Vogt et al., 1998; Jausovec, 2000 ; Stankova and Myshkin, 2016). The authors attribute this phenomenon to the neuronal efficiency hypothesis. According to hypothesis, more capable subjects tend to process information more efficiently and can complete tasks with fewer resources and less mental activity (Neubauer & Fink, 2009; Jausovec, 2000). Confirmation of this hypothesis was also obtained in the analysis of theta-correlates of task performance (Doppelmayr et al., 1998; Karatygin N.A. _ al., 2022). It is worth noting that the effect of neuronal efficiency does not contradict the modern theory of motivational intensity. According to the authors of the theory, more capable subjects invest less effort in performing simple tasks (Richter et al., 2016). However, other studies have shown the opposite effect, demonstrating increased alpha desynchronization in subjects with high levels of intelligence or high response accuracy (Doppelmayr et al., 2005; Grabner , Neubauer & Stern, 2006; Klimesch et al., 2007; Jausovec & Jausovec, 2005; Belousova, Razumnikova and Wolf, 2015). These studies used memory tasks, as well as logical and spatial thinking tasks. Explaining the effect obtained, the authors suggest that people with high abilities demonstrate more efficient brain function, that is, they have access to more resources, which allows them to solve more complex problems.

Separate studies have also shown that the difference in activation of the parietal cortex between groups of subjects with high and average levels of intelligence depends on the level of task complexity. These studies used analytical and figurative thinking tasks. Desynchronization of the alpha rhythm (Doppelmayr et al., 2005; Hanslmayr, 2005) as well as amplification of the fMRI signal (Preusse et al., 2011; Perfetti et al., 2009) have been interpreted as an increase in cortical activation required to perform a task. For simple tasks, a neuronal efficiency effect was observed. For complex tasks, the opposite effect was observed - an increase in cortical activation in capable subjects, and a downward trend in less capable subjects. Such a trend can be explained by the drop in effort in less capable subjects who view difficult tasks as not worth a large cognitive cost.

A similar phenomenon was obtained for the theta rhythm as a correlate of the performance of the Sternberg task (Pavlov & Kotchoubey, 2017). The authors analyzed the relationship between the power of the theta rhythm and several levels of task complexity: memorization of five to seven letters in the presence of their manipulation in working memory. The power of the theta rhythm steadily increased with the complexity of the task only in subjects with high accuracy of answers. In subjects with low accuracy, the power of the theta rhythm decreased under the most difficult condition of the task. The authors suggested two explanations for this difference in theta rhythm modulation between groups. Perhaps the less capable subjects were not able to use the required amount of required resources to complete the most difficult level of the task. That's why they resorted to changing the strategy to a less resource-intensive one. Another explanation is the drop in effort in less capable subjects under the most difficult condition, associated with reduced motivation to complete the task.

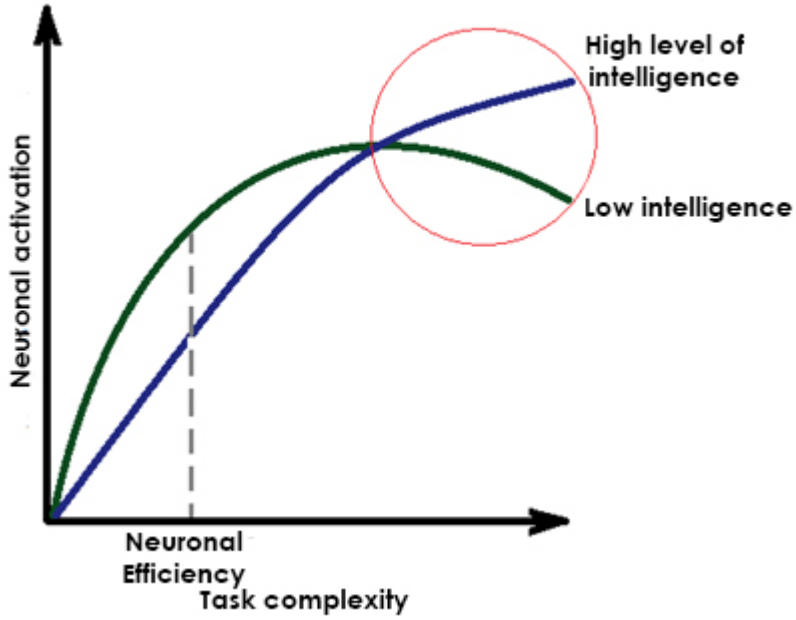
Thus, the described individual differences in alpha and theta modulations can be explained both by the effect of the reached ceiling and by the effect of the drop in effort due to lack of motivation.

Larson et al (1995) supports the second explanation. The authors compared PET activation in subjects with high and average intelligence a. PET activation increased in subjects with high intelligence when the task became difficult. At the same time, in subjects with an average level

of intelligence, activity decreased. For all subjects, the authors used the conditions of subjective complexity : easy task - 90% correct answers, difficult task - 75%. Thus, the authors leveled the impact on the results of the cognitive abilities of the subjects - the tasks were equally difficult for all subjects in the easy and difficult conditions. The observed difference in the modulation of brain activity between groups of subjects can be explained more by their different reactions to a high level of subjective complexity than by the level of intelligence itself. This dependence can be explained by the level of motivation to perform a complex task y, which differs for more and less able x test subjects (Larson et al., 1995; Neubauer and Fink, 2009). At the same time, decreased brain activity As well as the deactivation of the alpha rhythm, in subjects with high intelligence when performing the simplest tasks, the authors explained the effect of neuronal efficiency, that is, cognitive differences (Fig. 2).

Figure 2

Dependence of brain activation on task complexity (modified figure, Neubauer & Fink, 2009). The authors suggest that at the most difficult levels of the task, the effects of motivation and emotional reaction to complexity are manifested. This effect (highlighted with a circle) is well explained by the theory of motivational intensity.



The described effects are well explained by the described theories of effort: in subjects less motivated to perform a complex task, the effect of reducing the effort invested in conditions of increased complexity is observed. To date, there have been no similar studies focusing on brain oscillations associated with task performance. However, based on studies of oscillations and individual differences described above, it is logical to assume that a similar effect should be observed for the oscillatory correlates of top - down cognitive processes. The severity of these

oscillations should increase with the complexity of the task, but fall in particularly difficult conditions in subjects with low motivation. To test these hypotheses, further studies of oscillatory correlates of various top - down processes and their dependence on the subjective complexity of the task. This should take into account the cognitive abilities and the level of motivation of the subjects. By motivation we mean both external and internal, both situational and personal, including, in particular, the level of self-confidence.

Discussion

Summarizing the known theories of effort, we can draw the following conclusions. Cognitive effort determines the expenditure of limited cognitive resources to perform tasks that require complex top-down cognitive processes. Cognitive effort increases with the complexity of these tasks until the task becomes unnecessarily difficult. The determination of this critical level of difficulty, at which there is a drop in effort, is influenced by the level of motivation to succeed.

Summarizing studies analyzing the relationship between the power of oscillatory correlates of cognitive processes and the complexity of the task, motivation, and cognitive abilities, we can draw the following conclusions. These spectral indicators can be modulated in accordance with the theoretical provisions described, and, therefore, can reflect mental effort. The main oscillatory correlates of performing complex cognitive tasks are synchronization of the frontal theta rhythm (generally interpreted as activation of executive control) and desynchronization of the posterior alpha rhythm (generally interpreted as activation of controlled attention). According to theories of mental effort, these processes are directly related to the process of distribution of effort in the performance of a task. The severity of these oscillatory effects increases with the complexity of the tasks. At the same time, under conditions of the most complex tasks, the level of expression of these oscillations is presumably influenced by motivation. Presumably, less motivated subjects show a decrease in the severity of these correlates. This effect is explained by a drop in the level of effort invested according to the theory of motivational intensity and is consistent with theories of mental effort.

The study of oscillatory correlates of various cognitive processes will expand the understanding of the neuronal foundations of cognitive effort and the relationship of effort with various cognitive functions. Since oscillatory measures allow researchers to isolate the correlates of individual cognitive processes, such studies will expand the understanding of the cognitive mechanism responsible for the distribution of effort.

Currently, there are practically no studies that test the described hypotheses. A review of the literature showed that researchers rarely use tasks with a large variability in complexity in experiments, including both very simple and very complex conditions. However, in order to reveal the effects of an increase in effort with increasing complexity of the task and a decrease in effort with an unreasonably complex task, the experimental problem must have many levels of complexity. The greatest interest for this area of research is not the objective, but the subjective complexity of the problem, since the modulations of effort associated with it will not be explained by cognitive abilities. Therefore, they can be explained by the influence of emotional and motivational aspects. It is necessary to select the complexity conditions so that when the task becomes more complicated, the maximum number of subjects demonstrate a decrease in the quality of performance to the level of random guessing. This will provide an opportunity to test the hypothesis of a decrease in oscillatory effects under the condition of maximum subjective complexity.

Also, for such studies, the correct choice of the task is necessary, taking into account the cognitive processes that it requires, and their known oscillatory correlates. The problem should allow the dissociation of the correlates of different processes either by their frequency range or by their time period. For example, the n- back task requires the simultaneous activation of the process of encoding relevant and the process of suppressing irrelevant information, resulting in desynchronization and synchronization of the alpha rhythm, respectively. This leads to confusion between the correlates of the two processes and unclear results (Klimesch, Schack & Sauseng, 2005). While the Sternberg problem, for example, allows you to separate the processes of encoding, retention, and retrieval of information from working memory. Many of the studies described have analyzed only general desynchronization of the alpha rhythm as an indicator of cortical activation. Such studies can be performed with other methods of measuring cortical activation, so they are consistent with data from fMRI and PET studies (for example, Bekhtereva et al., 2000; Kharauzov et al., 2018). However, we propose to use EEG and MEG methods with high temporal resolution to study the relationship of individual cognitive processes with effort modulation.

Also, to date, there are not enough studies analyzing the influence of motivation on oscillatory effects associated with the performance of tasks of varying complexity. Research on this topic should include various indicators of intrinsic and extrinsic motivation as a factor that determines the modulation of effort under conditions of particularly complex tasks. An analysis of the influence of the level of motivation on the severity of the effects, taking into account the level of complexity of the task, should show the connection between these effects and the theory of motivational intensity. Finding different relationships between these variables, as well as finding different relationships for different types of motivation, will help develop an understanding of the mechanism of distribution of effort in the face of complex tasks.

Conclusion

According to the theory of motivational intensity, the degree of effort invested in the performance of a task depends on the estimated subjective complexity of the task and the motivation to complete the task.

Theories describing the cognitive mechanism of mental effort suggest a connection between oscillations as correlates of controlled cognitive processes and the phenomenon of effort.

Modulations in the severity of task-related oscillations (such as frontal theta synchronization and parietal alpha desynchronization) appear to be consistent with motivational intensity theory. A review of existing research shows a non-linear dependence of these oscillations on the complexity of the task and individual differences in this dependence. These effects can be explained by the influence of the motivational-emotional characteristics of the subjects in the context of the theory of motivational intensity. However, to date, there are not enough correct studies to confidently confirm these hypotheses.

The study of oscillatory correlates of cognitive task performance can help develop theories describing the mechanism of effort distribution and modulation by correlating theories with individual cognitive processes.

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Information about the conflict of interest

The authors declare no conflict of interest.