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The specifics of the structural organization of the metacognitive components of reflexivity

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Abstaract
Introduction. Currently, the study of cognitive and metacognitive processes in professional activity is becoming particularly relevant. In terms of solving this strategic task, it is objectively necessary to converge research in two important areas, the psychology of reflection and metacognitivism. The novelty of the study lies in the fact that it identifies and interprets the basic features and laws, as well as operational means of the structural organization of reflection and explicating its irreducibility to the additive totality of the main metacognitive processes included in it. **Methods.** The sample (n = 220) consisted of representatives of the main classes of activity – subject-object, subject-subject, and subject-information, as well as students of universities in Yaroslavl and Moscow. Psychodiagnostics was performed using the author's methods of diagnostics of reflexivity (A.V. Karpov, V. V. Ponomareva) and metathinking (A. A. Karpov), as well as a set of methods developed in metacognitivism, the methods of R. Dickson – D. Haltcha (Metamemory in Adult – MIA), the methods of D. Everson for the diagnosis of meta-planning, methods for the diagnosis of motivational metacognitive strategies (MSLQ), etc. **Results.** It is established that the individual measure of reflexivity is not identical to the value of the metacognitive potential formed by an additive set of basic metacognitive processes and qualities. Consequently, in it, as an integral individual quality, there is an action of specifically systemic patterns and mechanisms of the integrative type proper, generating synergetic effects and leading to the generation of new, specific content for it. **Discussion.** The results are interpreted from the positions of the main provisions of metacognitivism as well as the basic provisions of the theory of systems and psychology of reflection. In **conclusion**, it is concluded that the content of reflexivity is incompatible with the additive set of its constituent partial components - metacognitive processes and qualities - which determines the specificity of its psychological status and its uniqueness as an integral mental property.

Keywords
reflexivity, metacognitive processes, metacognitive qualities, structural patterns, integrative mechanisms, synergetic effects, superadditivity, reflection, arbitrary regulation, cognitive processes

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Highlights

- The main metacognitive processes and qualities are partial components of reflexivity; one of the main and most specific patterns of the organization of reflexivity is the nonidentity of the measure of its individual expression and the total value of the metacognitive potential.
- In reflection as a macro–process and, accordingly, in reflexivity as its effective manifestation – an integral individual quality – there is an action of specifically systemic patterns and mechanisms of a type similar to their nature, integrative proper; they generate synergetic effects leading to the generation of a new content specific to it and also explicate it as a formation of a systemic type.

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Introduction

The main and most general trend in the evolution of types and forms of professional activity, as well as changes in their content, is, as is known, its significant complication. It has acquired particularly distinct and multifaceted manifestations due to the widespread use of computer technologies, with their introduction into almost all major areas of professional activity. In turn, the dominant vector of such a complication is the giving of an emphatically informational character to many types of activity and, as a consequence, the increasing role of the cognitive component proper in them. Because of this, the need for more and more complete and in-depth study of similar degrees of complexity of the organization of professional activity, taken in their most complex and complex forms, cognitive, is steadily coming to the fore. The most important of them are the processes of arbitrary, actually reflexive, organization of activity, as well as the underlying patterns and mechanisms of its conscious regulation.

In terms of solving this essentially strategic task, it is objectively necessary to rely not only on those studies that have been carried out in line with the traditional "reflexive problematics", but also on the results that have been obtained so far in one of the main directions of modern cognitive psychology – metacognitivism. The fact is that it is in it that the main subject of research is those processes and qualities that are the main partial components of reflection itself and, accordingly, the main operational means of conscious, arbitrary regulation of activity – metacognitive. Moreover, metacognitivism itself as a whole is, in fact, in many ways the modern manifestation of reflexive problematics as such and, more broadly, the psychology of consciousness, represented in new and recent achievements of cognitive psychology. However, in their light, one of the acute and important, but still unresolved problems is being explained, even a kind of paradox consisting of the following. On the one hand, in the psychology of reflection, it is proved that the property of reflexivity is continuous and has an individual measure of severity, which can be diagnosed by appropriate measuring procedures (A.V. Karpov, 2004). Currently, there are several such procedures,

in particular, the methods of D. A. Leont'ev and E. N. Osin (Leont'ev, Osin, 2014), the method of "reflexivity of activity" (Shadrikov, Kurginyan, 2015), the method of M. Grant (Yzerbyt, Lories, & Dardenne, 1998), as well as the method of diagnostics of the integral level of reflexivity, developed by us with V. V. Ponomareva (A.V. Karpov, 2004). On the other hand, metacognitivism also shows that the main metacognitive processes (in particular, meta-thinking and meta-memory) and their corresponding productive effects, metacognitive qualities, also have a different individual measure of severity. In this regard, studies have been conducted aimed not only at a meaningful analysis of these processes, but also at studying individual variations to the extent of their severity (Abdelrahman, 2020; Allon, Gutkin, & Bruning, 1994; Schwartz & Metcalfe, 2017; Karpov, 2015). Studies are also presented in which an attempt is made to develop special psychodiagnostic techniques aimed at determining this individual measure (Craig, Halle, Grainger, & Stewart, 2020; Dixon & Hultsch, 1983; Schraw & Dennison, 1994; Lim & Ng, 2011; Song, Loyal, & Lond, 2021).

These studies are conducted mainly within a broader theoretical context, in line with, perhaps, the main and defining direction of all metacognitivism, whose main task is to explicate the content and specifics of its subject, as well as to define its boundaries. The most significant concepts that reveal the content and organization of the subject area of metacognitivism are formulated in its course. Among them, it should be noted, first of all, the hierarchical model of metacognitive processes by M. Ferrari (Ferrari & McBride, 2011), the theory of "cognitive metaoperators" by D. Dörner (1978), the concept of "cognitive monitoring" by L. Nelson and L. Narens (Nelson, 1996), the concept of "meta-regulatory functions" by M. Lefebvre-Pinard (Lefebvre-Pinard, 1983), the concept of "synthetic meta-processes" by R. Jarman (Jarman, Vavrik, & Walton, 1995), the concept of structure Metacognitive experience of M. A. Kholodnaya (Kholodnaya, 2012), the theory of "metaarchitectonics of consciousness" by E. Blackie and S. Spence (Yzerbyt et al., 1998). There are also more specific concepts devoted to the study of a particular metacognitive process (A. Brown, J. Borkowski, J. Flavell, R. Kluve, J. Metcalf, R. Paris, E. Madigan, E. Tulving, etc.) (Brown, 1987; Borkowski & Muthukrishna, 1992; Anderson, 2002; Flavell, & Miller, 1993; Kluwe, 1982; Metcalfe, Eich, 2019; Tulving, 1985; Splichal, Oshima, & Oshima, 2018).

These studies show that not only each of the metacognitive formations individually, but their entire totality is also characterized by an individual measure of severity, varying in a very wide range. It should also be emphasized that there is no generally accepted term for its designation yet, although the need for it is being felt more and more acutely. In this regard, concepts such as the metacognitive potential of the subject, metacognitive personality, metacognitive sphere of personality, metacognitive resource, metacognitive giftedness, etc. are used, for example. They are quite constructive conceptual means synthesizing several fundamentally similar functional terms factors of the metacognitive plan but doing so concerning different research tasks. Therefore, the concept of a metacognitive resource is directly related to the resource approach developed by M. A. Kholodnaya and her collaborators in the psychology of abilities (Kholodnaya, 2012). The concept of the metacognitive sphere of personality is more focused on the generalized explication of not only the factors of the metacognitive plan proper, but also on their determination from the side of others, the actual personal qualities (Karpov, 2018). The concept of metacognitive giftedness, also having a close connection with the problem of abilities, is still more relevant to another – the "didactic direction" of metacognitivism, the main subject of which is the metacognitive factors of the learning process and its optimization (Dori, Mevarech, & Baker, 2018; Schraw & Dennison, 1994; Veenman, Van Hout-Wolters, & Afflerbach, 2006; Davidson, Deuser,

& Sternberg, 1994; Mariano, Figliano & Dozier, 2017). The concept of metacognitiveness is more correlated with research in the field of personality psychology since it uses this construct as a conceptual means of differentiation and subsequent study of invariant and relatively orthogonal personal quality (Karpov, Karpov 2015).

It is also important to keep in mind that, despite the obvious and quite natural differences in the concepts presented and their interpretations, they all have one common and very characteristic feature. It consists in the fact that the general degree, a measure of expression, a quantitative explication of the essence that they denote, whether it is "potential", "giftedness", "metacognitiveness", "resourcefulness", etc., is interpreted as a direct derivative of the additive totality of their components, parts, "components", i.e. from their aggregative union. In other words, it is axiomatically assumed that this potential is not only derived from the "sum of parts" of the components forming it, but also reduces to it. However, it is almost completely ignored that it can be determined not only by the sum of metacognitive factors, but also by their organizational structures and associated synergetic mechanisms, and organizational phenomena. Consequently, it can be seen that the current way of interpreting it is not only very close to the analytical approach as such but also has its direct manifestation. And this alone indicates that such an approach is not the most promising and constructive one, since it not only can, but also should be transformed into a different, more heuristically powerful approach, a systemic one. It is from his position that fundamental opportunities open up for the disclosure of patterns of the structural, organizational type proper. However, they remain practically not taken into account and are not explained in the existing approaches to the explication of the metacognitive sphere of personality and the potential that characterizes it.

All this determines the situation that has developed at present and consists of the following. If we base ourselves on the dominant analytical approach today, on the additive interpretation of metacognitive potential, and also take into account one of the main provisions, about metacognitive processes and qualities as the main components of reflection, then we should conclude that the individual degree of reflexivity and the magnitude of metacognitive potential should not just be similar but also practically identical. However, this is exactly what the studies show is not systematically confirmed. In other words, the general level of reflexivity – an individual measure of its severity and the value of metacognitive potential, represented as a superposition of basic metacognitive processes and qualities, as well as other operational means of this type, are different, and in some cases very significantly. This is exactly what seems not only not quite clear, but also partly paradoxical, requiring clarification of its reasons. The attempt to do this is precisely the main purpose of this work.

Methods

Research and measurement procedure

The realization of this goal implies the need to obtain two main sets of empirical data. First, these are data on the individual measure of the severity of general reflexivity of the subjects. Secondly, it is data on the individual measure of the severity of the main metacognitive processes and their qualities. The following diagnostic techniques were used for this purpose.

To determine the individual measure of reflexivity, we used the method developed by V. V. Ponomareva and myself to determine the integral level of reflexivity (A.V. Karpov, 2004). Concerning it, it should be particularly noted that it allows you to diagnose general reflexivity, its integral

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manifestation, and not any, although important, but still a particular aspect of it, one or another of its partial components (which other methods of this type are aimed at, in particular, the M. Grant method, which diagnoses socio- and autoreflexion as its partial manifestations). The integrative nature of this technique is ensured by the fact that it provides special scales for the diagnosis of the basic "components" of reflexivity: actual, retrospective, and prospective; autoreflexion (i.e. self-reflection) and socioreflexion; behavioural and communicative reflexivity, reflexivity in the professional and household sphere, etc. We also emphasize that this technique has been used in research practice – not only by our own but also by other authors, for more than twenty years, systematically confirming its validity and diagnostic capabilities.

Furthermore, the following main metacognitive processes and qualities were diagnosed using appropriate techniques that have also demonstrated their validity and are currently considered the most reliable:

– an individual measure of the development of meta-thinking (MM) as a basic and process (according to the methodology developed by us) (A. A. Karpov, 2018);

– an individual measure of the development of metamemory (MPam.) as another basic meta-cognitive process (according to the methodology of R. Dickson - D. Haltcha "Metamemory in Adult" – MIA (according to (A. V. Karpov, 2015));

– methodology of D. Everson for the diagnosis of the level of development of metaplaning – MPlan. (by (A. A. Karpov, 2018); Tobias & Everson, 2002);

– formation of motivational metacognitive strategies (MMS) by the MSLQ method (Yzerbyt et al., 1998);

– the degree of formation of metaemotional control (IEC) according to the scale of the methodology "Complex questionnaire of the metacognitive potential of personality" (A. A. Karpov, 2018);

– self–assessment of the degree of formation of metacognitive behaviour (MP.) according to the methodology of D. LaCoste (by (A.V. Karpov, 2015));

- measure and nature of metacognitive monitoring of knowledge (MOH) according to the method "Questionnaire of metacognitive awareness" (MAI) (Schraw & Dennison, 1994), defined as the sum of points on two scales: on the scale of "metacognitive knowledge" and the scale of "metacognitive regulation";

– the processes of metacognitive inhibition (MCI) according to the methodology developed by us (A. A. Karpov, 2018), the essence of which is as follows. Recent studies show that metacognitive processes can be directed not only at facilitating conscious control over activity but also at its inhibition–minimization and even almost complete reduction, which is recorded, in particular, in the phenomena of reduction of reflexivity, metacognitive blockade, and metacognitive moratorium. They are very important operational tools that are part of the overall metacognitive potential of the individual and, therefore, must be taken into account when determining it.

We emphasize that in this aggregate there are factors not only of the cognitive plan (meta-thinking, meta-memory) but also factors of a regulatory orientation (the scale of metacognitive behaviour, metaplanning processes). There are not only traditional modes of meta-processes, cognitive and regulatory, but also their other types, in the field of motivational support (MMS) and emotional control (IEC). Not only the factors of operational–procedural orientation but also their final – the so-called "knowledge" manifestations (in the form of procedural knowledge, i.e., "knowledge monitoring" (MOH)). Thus, this set is substantially homomorphic to the main classes of mental processes (cognitive, emotional, motivational, and regulatory). Consequently, it is quite

representative in terms of displaying in it their overall totality as a whole, i. e. the metacognitive potential of the individual.

Research sample

The sample (n = 220; 115 men, 105 women) consisted, first, of representatives of the main classes of activity - subject - object (36 people), subject-subject (59 people) and subject information (65 people) living in four cities of Russia (Yaroslavl, Moscow, Rybinsk, Kursk) aged 26 to 58: < 31 years – 82 people (51.25%), 31-45 years – 56 people (35.0%), > 45 years – 22 people (13.75%).

The type of subject information in the sample was represented by the professions of a programmer, technical editor, web designer, data entry operator, system administrator, IT engineer, software tester, database administrator, and video game developer. *The subject-object type* in the sample was represented by such professions as master builder, electrical welder, electronics engineer, and process engineer. *The subject-subject type* was composed of secondary school subject teachers, university teachers, middle and senior management managers, and front office operators of telecommunications organizations. Secondly, the sample included students from several universities in the years Yaroslavl and Moscow, which ensured the representation of persons engaged in not only professional but also educational activities on another type of basis (60 people, 30 representatives of humanitarian and technical specialities each). Due to considering the differences noted above in the formation of the sample – by type and type of activity, gender, age, educational profile, etc. – the degree of its heterogeneity, which is necessary from the point of view of the general idea of this study, was achieved, which, in turn, is an important condition for its representativeness in terms of solving the main tasks of this work.

Data analisis

During the study, the methodology of *structural and psychological analysis* was implemented, assuming, as is known, a certain sequence of several specific research procedures. Thus, it includes the well-known method of "polar groups", which involves the differentiation of the sample into contrasting groups with subsequent differentiated processing and comparative analysis of the data in them according to a certain criterion. In our case, it was an individual measure of reflexivity. Furthermore, it involves the implementation of a multidimensional correlation analysis procedure. It includes a method for determining intercorrelation matrices of the parameters studied (in our case, the main factors of the metacognitive plan), a method for constructing structurograms of significantly correlating parameters, a method for calculating structural organization indices, a method χ^2 for determining the homogeneity/heterogeneity of intercorrelation matrices. Recall that the essence of the method of determining the indices of structural organization (in our study, the main metacognitive parameters) is as follows. These include, as is known, the structure coherence index (SCI), the structure divergence (differentiation) index (SDI), and the structure organization index (SOI). The coherence index of the structure of parameters is defined as a function of the number of positive significant connections in the structure and the degree of their significance; the structure divergence index (SDI) – as a function of the number and significance of negative connections in the structure; the structure organization index (SOI) – as a function of the ratio of the total number of positive and negative connections, as well as their significance (A.V. Karpov, 2015). At the same time, a "weight" coefficient of 3 points is attributed to the connections at $p < 0.01$, and a "weight" coefficient of 2 points is attributed to $p < 0.05$. The "weights" obtained

throughout the structure are summed up, which gives the values of these indices. Such a method allows, as is known, to identify and characterize the determination of a phenomenon not only in terms of its analytical, "single" connections with an individual's qualities, but also in terms of its complex structural conditionality by their integral subsystems.

Results

Table 1 presents data on the individual measure of the severity of the diagnosed parameters of metacognitive potential, as well as its overall value, in the "polar" groups of subjects, with relatively the lowest and highest reflexivity.

Table 1
Means and standard deviations

Variable	Sample as a whole (N = 220)	Comparison of groups by groups with different levels of reflexivity		
		Low reflexivity (n = 54)	High reflexivity (n = 56)	p
MT	22.06(6,00)	16.95 (5.40)	26.16 (6.95)	**.000**
MM	20.01 (5.66)	18.26 (4.62)	22.82 (5.68)	.328
MMS	64.25 (4.99)	34.41 (4.64)	34.08 (4.22)	.461
MEC	134.18 (9.88)	43.36 (9.57)	45.02 (7.74)	.560
MP	12.29 (2.40)	12.14 (2.63)	12.47 (2.14)	.924
KM	36.59 (3.35)	31.39 (3.11)	37.07 (4.11)	.337
MCB	39.43 (5.14)	35.77 (5.69)	44.09 (8.03)	**.000**
MCI	88.67 (5.18)	87.92 (4.58)	90.43 (5.72)	.331
MCP	61.10 (6.62)	57.68 (3.34)	66.37 (3.55)	**.000**

Note: MT – meta-thinking, MM – meta-memory, MMS – meta-motivational strategies, MEC – meta-emotional control, MP – meta-planning, KM – knowledge monitoring, MCB – meta-cognitive behavior, MCI – meta-cognitive inhibition, MCP – meta-cognitive potential (unlike all other parameters, it is expressed not in points of the corresponding melodics, but as a superposition of wall scores for all 8 parameters, since when determining it, it is not correct to directly summarize the qualitatively different units in which the results are expressed for each of the methods); p is the asymptotic two-sided significance of differences according to the Mann-Whitney test; p<0.10 values are in bold.

Further verification was carried out using a one-way analysis of variance (one-way ANOVA), for which subgroups were identified according to the reflexivity factor, corresponding to low, medium, and high levels of its severity and representing approximately 25%, 50%, and 25%, respectively, on the size of the group under consideration. Multiple comparisons were made according to the Games-Howell test, which does not require the equality of subgroup sizes or homogeneity of variances.

Analysis of the results presented allows us to fix the following facts. First, in general, the individual measure of the severity of individual parameters of the metacognitive plan is somewhat higher in the group with a high level of reflexivity, which, however, is quite natural. However (and this is second) these differences are very moderate - only MT and MCB are significant at a level greater than $p < 0.10$. Third, the most significant fact is that the differences between the groups in terms of the overall value of metacognitive potential, although they also sag, are significant only at the level of a *trend*, that is, with $p < 0.20$. Then, in relation to the obtained data, the procedure of multivariate correlation analysis was implemented, and for each group, the intercorrelation matrices of the studied meta-cognitive parameters were determined, on the basis of which their structurograms were built. They are shown in Figure 1.

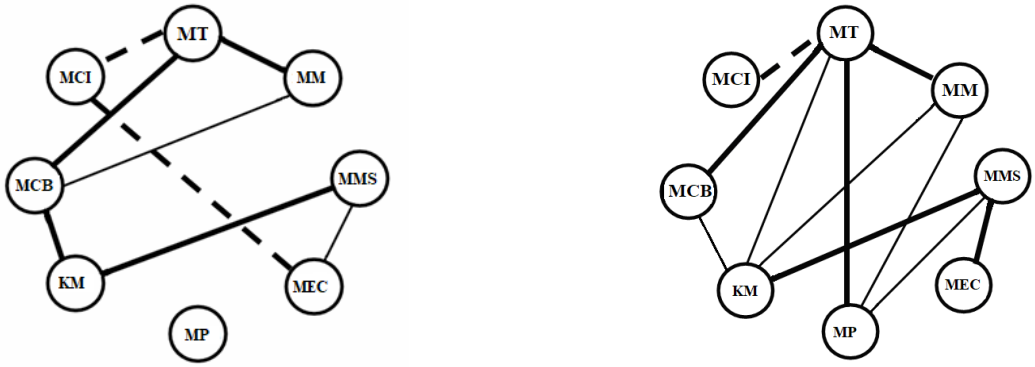

Figure 1. Structural diagram of the main meta-cognitive parameters in the subgroup of low-reflexive (a) and high-reflexive (b) subjects *Legend: the abbreviations in the structurogram correspond to the designations of the parameters given in the description of the methods used; bold line – connections at p < 0.01; thin line – connections significant at p < 0.05; dotted lines are negative links.*

Table 2 presents data on the values of structural indices calculated for each of the subgroups of subjects.

Table 2
Values of structural indices of meta-cognitive parameters

	Low reflexivity group	High reflexivity group
Structure Coherence Index (SCI)	16	25
Structure Divergence Index (SDI)	6	3
Structure Organization Index (SOI)	10	22

Discussion

The totality of the results presented above allows us to establish the following main features and patterns. *First,* with a sufficiently high degree of clarity, the circumstance that was stated above as the initial one and was predicted a priori is revealed. It consists of the fact that there is no identity between the individual measure of the severity of the integral indicator of reflexivity and the value of the metacognitive potential. This fact is manifested in the fact that the value of the metacognitive potential is in the group with high reflexivity, although it exceeds the same value in the group with low reflexivity, but the difference is significant only at the level of a *trend*, that is, with $p < 0.20$, which, known not to be a statistically significant difference. That is, the data obtained once again confirm this fact, which, in our opinion, is very indicative and require its explanation with even greater insistence.

Second, this circumstance finds additional manifestation and confirmation in the fact that significant differences between individual meta-cognitive parameters in the two groups occur only in 2 cases out of 8 (that is, only in a quarter of cases - in 25 %), and then only at levels $p < 0.05$ and $p < 0.10$.

Third, the opposite picture is revealed in the transition from the analytical method of processing the results to the structural one, which involves finding the matrices of intercorrelations of metacognitive parameters, as well as constructing their structurograms and subsequent comparison by the totality of the main structural indices. It can be seen that the degree of coherence of metacognitive parameters in the group of persons with high reflexivity is 25 points, and in the group with low reflexivity it is 16 points, that is, in the first group it is more than 1.5 times higher. Even more pronounced are the differences between the groups in terms of the degree of general organization of the revealed structures: in the first group, it is equal to 22 points, and in the second, it is only 10 points, i.e. in the first group it is already more than 2 times higher. We emphasize that these differences are not only statistically significant, but also very significant in quantitative terms, since they are expressed not only in percentage values (although in them too), but in times - a multiple, that is, not only quantitatively, but also *qualitatively*.

Fourth, synthesising all these results, one should explicate the circumstance of the most fundamental plan. It consists in the fact that the main differences between groups with different levels of individual measure of the severity of reflexivity exist and can be detected not at the analytical level - not in terms of individual metacognitive parameters and their additive totality (i.e., summative association), and at the structural level - in terms of the features of their *integration* and coorganization. At this level, the group of individuals with high reflexivity significantly outperforms the group of individuals with low reflexivity. Consequently, there are all grounds for the conclusion that the very difference in the individual degree of reflexivity expression, reflexivity as such, is determined to a much greater extent not by individual metacognitive parameters and not even by their additive set (although such a determination is also preserved), but by the degree their *integration*, the measure of their coorganization. In other words, this means that reflexivity as a generalized property and a measure of its individual expression as a whole is determined not only by how developed its individual partial components, i.e., the main metacognitive processes and qualities, but also by how integrated they are into integrity, organized and *structured* among themselves. It is *the structural effects* - the effects of an integrative type - that play an important, determining role in relation to this property and to the determination of the degree of its

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severity. They, along with the additive analytical determination, determine its general level, an individual measure of severity. These integrative effects determine the irreducibility of reflexivity to its determination only on the part of metacognitive parameters separately and their summative aggregative, additive association. The significant and very significant determination is generated by their integration and the structural effects that it generates. It is this that should explain the important fact that the level of reflexivity and the measure of metacognitive potential in the general case are not identical. The same or close values of this potential can be accompanied by significantly different values of the total reflexivity, since they depend not only on the sum of the values of the partial components included in it, but on how coorganized and integrated they are. Integration gives rise to that "increase" that distinguishes general reflexivity from the magnitude of the metacognitive potential and the irreducibility of the first to the second.

Fifthly, the presented results not only agree with a whole range of data obtained by us earlier (and thus perform a verifying function in relation to them), but also allow us to deepen and concretize them. We are talking about a group of fundamentally similar regularities of the structural type, identified on the material of various subjects of study, but having a conceptual commonality. In particular, this is the relationship we have established with the degree of *adaptation* of the individual, not only, and in some cases - and not so much with the degree of severity of individual individual qualities (adaptation-important qualities - AIQ) and their additive totality, but with the degree of their *structuring* - integration and co-organization into holistic patterns. They are the subsystems of AIQ, and not their aggregative set, and determine the adaptability of the individual to both professional (Karpov, Orel, Ternopol, 2003) and educational activities (Chimbelenge, 1996). A fundamentally similar regularity of the structural type is established in relation to the efficiency of managerial activity. It is also to a very significant extent determined by regularly organized structures of professionally important qualities, and not by their additive totality (A. A. Karpov, 2018).

Sixth, with all these very significant effects of the structural type, manifested in quite significant differences in the found structure programs, they still cannot be absolutized and succumb to a kind of temptation to hyperbolize the established - indeed, significant effect of the structural type. The fact is that these differences themselves exist and manifest themselves against the background of even more general and, in essence, fundamental laws of the combination of two types (and levels) of determination, analytical and structural. And in this respect, another fact obtained as a result of processing the results is an important confirmation of such generality. It consists of the fact that the comparison of the intercorrelation matrices of metacognitive parameters for their homogeneity/heterogeneity in two groups according to the $\chi 2$ criterion showed their statistically significant *homogeneity*. This means that they differ mainly not qualitatively, not 'in principle', but in terms of structuring and integration, that is, quantitatively.

Both circumstances recorded above deserve special attention, and that is why it is necessary to dwell on them in somewhat more detail. Indeed, at first glance, it seems that the opposite option would be much more “interesting”, in which the matrices would turn out to be heterogeneous, qualitatively heterogeneous. Then it would be possible to make a "catchy" conclusion about the deep fundamental and qualitative transformations occurring in the structure of the metacognitive sphere of the personality under the influence of changes in the individual measure of the severity of reflexivity. However, in reality, this is not observed, and the restructuring is not of a qualitative, but of a quantitative nature. They are traced not in *principle*, but only in *degree*. A detailed

analysis of this result reveals, however, that, despite its, so to speak, 'less and less interesting', it nevertheless corresponds to a much greater extent to the real organization of the psyche, to those basic laws that it obeys. Indeed, if metacognitive processes and qualities, and even more so their general organization (structure), were subjected to deep, fundamental restructuring under the influence of any one, albeit important, factor and, therefore, would be just as fundamentally variable , then we would not have to talk about them as basic and fundamental - as connected with the very basis of the mental with its procedural content - at all. On the contrary, they should be fundamentally *invariant* in their basic features and regularities, including structural ones, which is explained in this study. However, it is against the background of this invariance that, in principle, not only can, but should be presented variations in the degree of action of their basic regularities, which is also revealed above.

This conclusion allows us to explicate another significant pattern, since it allows us to offer a consistent interpretation of those features that are characteristic of reflexivity and its individual expression in terms of two levels (and types) of its determinants - analytical and structural. They, as follows from the presented materials, can be disclosed from the standpoint of attracting the most general and important regularities of the system type proper, established in systems theory. In particular, this is a pattern according to which the overall functional potential of the system and its resource are determined not only by the level of development of its individual components, but also by the level of their structural organization as a whole and, accordingly, by the severity of the effects of the synergetic plan itself. It is this, in essence, direct connection of the individual measure of reflexivity with the degree of structural organization, and consequently with the measure of the representation of effects of a synergistic type, that should be implemented as an interpretive tool to explain its features. At the same time, this also convincingly demonstrates the subordination of the organization of reflection to specific systemic laws, explicating it as the formation of just such a systemic type in which mechanisms and other operational means of an integrative plan play a decisive role.

Seventh, in the most general, actually theoretical terms, the presented results also contribute to the solution of, perhaps, the most important and fundamental question about the psychological *status* of reflexivity as an integral quality and reflection as a process that ensures it. It is known to be especially significant due to the fact that it is reflection that is the most important, the main means of procedural support for consciousness as such, and, accordingly, the main operational means of the highest level of regulation of behavior and activity - conscious, voluntary. This question is usually formulated in the following, although somewhat schematized, but generally correct form: can the procedural content of reflection be reduced to the totality of the contents of those more local processes (in particular, cognitive, metacognitive, and others) that are they really included in it and, moreover, who ensure its implementation? Or, in it and, accordingly, in reflexivity itself as its productive manifestation, such a specific content is formed that cannot be reduced to an additive totality of the content of its individual components - metacognitive processes and qualities? The urgency of this question is also related to the fact that only in the case of a positive answer to it, reflexivity itself can be explained as a formation that really has its own procedural status, which is not fundamentally reducible to all other currently known formations. The results presented above and their interpretation testify in favor of this variant of the answer to this - we repeat, the most fundamental theoretical question. *Reflexivity* as a generalized individual *quality* is revealed as an integrative type formation, which is formed on the basis of

synthesizing the entire set of metacognitive processes and qualities. However, the same is true with respect to reflection as an equally generalized *process* formation: since metacognitive processes are interpreted in theory as processes of the "second order" - fundamentally "secondary", then reflection, which is the product of their integration, acts as a process even more a high level of generalization - as a process of the "third order" of the complexity of the organization. This, apparently, is the true specificity of its level status, as well as its place in the overall organization of the system of mental processes.

In summary of the above analysis, we can formulate the following main *conclusions*. *First,* the development of research in two very significant areas, in the psychology of reflection and in metacognitivism, is characterized by a fundamental and ever deeper convergence, which has now reached such a degree that it already requires their synthesis. The key conceptual tool for such a synthesis can be the interpretation of the main metacognitive processes and qualities, as well as other operational means of the metacognitive plan as partial components of reflexivity, as its basic and most specific "components".

Secondly, the validity of such a conceptualization is associated not only with arguments of a theoretical nature but also with the fact that on its basis new opportunities open up for empirical and experimental research of both reflexivity itself and metacognitive processes and qualities, i.e. with its constructiveness in the actual research plan, with its operationality. This, in turn, creates sufficient conditions for deepening research in both these areas and at their intersection.

Third, one of the main regularities of the organization of reflexivity, explicated by empirical procedures and, therefore, fundamentally objectified, is the nonidentity of the measure of its individual expression and the total value of the metacognitive potential formed by an additive set of basic metacognitive processes and qualities, as well as other operating means of this type.

Fourth, in reflexivity as an integral individual quality and, accordingly, in reflection as a macroprocess that ensures it, there is an action of specifically systemic laws and mechanisms similar to its nature, a proper integrative type, generating synergistic effects and, as a result, leading to generating new content specific to them. It is irreducible to the additive totality of the content of the partial components (meta-cognitive processes and formations) included in reflexivity, thereby explicating its own content and determining the independence and specificity of its status.

Fifth, the revealed connection between the individual measure of reflexivity and the degree of structural organization and, consequently, with the measure of the representation of synergetic-type effects should be considered as an interpretive tool for explaining the fundamental features of its organization. At the same time, this also reveals the subordination of the organization of reflexivity to specifically systemic patterns, explicating it as the formation of just such a systemic plan, in which mechanisms and other operational means of an integrative type play a decisive role.

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Author contribution statement

Anatolii Viktorovich Karpov – ideological scientific guidance based on the application of metacognitive methodology to the development of reflexive problems; theoretical generalization of the results.

Aleksandr Anatol'evich Karpov – disclosure of the idea of the article using the methodology of structural analysis, data processing and interpretation of the results.

Anna Vadimovna Chemyakina – planning an empirical study, applying the method of diagnosing reflexivity, organizing data collection, interpreting the results.

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Conflict of interest information

The authors have no conflicts of interest to declare.