

Properties of The Tuple <Subject, Need, Goal, Task, Method> and the Properties of its Basic Elements

Yu. V. Sidelnikov^{1,2*}

¹*V.A. Trapeznikov Institute of Control Science of the Russian Academy of Sciences,
Moscow, Russia*

²*Moscow Aviation Institute, Moscow, Russia*

Abstract. The purpose of this article is studying the properties of both arbitrary tuples and the individual N-ary tuple <subject, need, goal, task, method>, as well as the properties of the relevantly named objects comprising this tuple. It is proposed to reconsider and offer a clearer view of the basic concepts in the collective subject related field, as well as to implement emerging new opportunities for their analysis. 2 postulates, 10 assumptions, and one hypothesis are introduced to accomplish this. The new concepts of «intelligent tuple» and «conceptual field» are introduced, and the properties of the relevantly named objects are examined. The possibility of tuple operations is considered. The necessary and sufficient collective subject properties are proposed and discussed.

Keywords: subject; need, goal; task; method; tuple properties; necessary and sufficient collective subject properties

INTRODUCTION

We proceed from the following **Postulate No. 1**: «The certain development phase of scientific fields and theories forces scientists to definitely re-examine and offer a clearer view for the basic concepts and their collocations within the relevant field, as well as to implement emerging new opportunities for their study.»

This, for example, happened when Galileo Galilei, Johannes Kepler, and then Isaac Newton, guided by their works, formalized such basic concepts of physics as force, acceleration, and mass of an object in a more distinctive manner. We believe that the matter of creating a categorical system is one of the keystones in any science.

We propose that «The categorical system development level determines the science maturity, and its unity is an indicator of the scientific knowledge integrity and systematicity» is not just associated with psychology. «Categories as stable scientific invariants promotes an integrating function, ensure the psychology system formation, define the scientific inquiry tasks and guidelines, and represented important reference points in explaining and understanding scientific phenomenology» [Page 3,1].

Tuples are becoming increasingly important in current conditions and further development of control sciences considering they are the form of data presentation necessary for practical solutions development in the interdisciplinary issues.

This applies to control and management of biological and social active systems.

In healthcare (which is both biological and social) the recent internationally recognized classification of healthcare interventions (WHO International Classification of Healthcare Interventions, ICHI) can be considered as a complex of tuples [2].

It specifies the location, method, and other characteristics of medical interventions related to the disease and the degree of functional impairment.

* Corresponding author: sidelnikovy@mail.ru

Tuples are also important for proceeding with interdisciplinary data and development of management decisions in healthcare [3].

A while proactive risk-based concept and the healthcare model present clinical, economics, social and other information in format of sequentially linked tuples. [4].

We believe it is essential to investigate tuple as a specified distinct object of study, while exploring its properties. For instance, the central focus of the philosophical and methodological works by V. S. Stepin was studying the connective («object is what we study, and method is defined by tools») [5]. He thoroughly explored the scientific knowledge structure and contextually examined in detail the constituent elements of the «object-method» connective. We define that as binary tuple <Object of study, and method as a tool for its study>, which, for example, could and should require introducing and exploring a new property, not individual for the separate components, but for the tuple itself: «the complexity of studying an object through a certain research method.»

The most general concepts in the considered field, which are also categories in essence, include the following: «subject,» «need,» «goal,» «task,» and «method.» We believe that developing this topic requires desirably to consider and study not only each of these categories as research objects, but also arbitrary tuples and their properties, in particular, tuple: <subject, their needs, scientific research goal, scientific tasks to be solved to achieve this goal, and their solution methods>.

Furthermore, we will briefly denote the following as tuple <subject, goal, task, method>.

At that, we come from **Hypothesis No. 1** «N-ary tuple <subject, need, goal, task, method> recreates the new meaning in greater depth, than ternary tuple <subject, goal, task>. This is precisely why we examine the above tuple in detail.

Deriving from the above **Hypothesis № 1**, we formulate the goal of this study as follows: investigating properties of both arbitrary tuples and individual N-ary tuple <subject, need, goal, task, method>, as well as some of its basic component properties.

We decompose this goal and formulate the following tasks required for its implementation:

1. Study the properties of the objects named as «N-ary tuples».
2. Introduce the new concepts of «intelligent tuple» and «conceptual field» and examine the properties of the relevantly named objects, as well as the tuple operation capabilities.
3. Study category «subject» as one of the components of N-ary tuple <subject, need, goal, task, method>.
4. Consider the necessary and sufficient collective subject properties.
5. Consider the factors for setting and developing the proper subjective qualities of large social groups, as well as the assumptions involved in examining a hierarchically organized set of subject types.
6. Study category «need» as one of the components of N-ary tuple: <subject, need, goal, task, method>.
7. Suggest new promising research directions on this topic.
8. Finally, provide summarized comments and conclusions.

1. PROPERTIES OF THE OBJECTS NAMED AS «N-ARY TUPLES»

We come from the following interpretation of tuple concept: «a finite sequence (may be repeatable) of the elements of some set X. [Page 31, 6].

Let us consider some of the tuple properties:

- ranking - elements are stored in a specific order;
- invariability - once created, elements cannot be added, deleted, or modified;
- indexability - elements can be accessed by indexes;
- allows duplicates - can contain duplicate values;
- can comprise different data types - integers, strings, lists, etc.» [7].

It should be noted that a lot of mathematical objects are conveniently represented as a tuple. For example, a directed graph is defined as binary tuple $\langle V, E \rangle$, where V is the set of nodes, and E is a subset of pairs in $V \times V$ corresponding to the graph's arcs [8].

Such mathematical object as function may be conveniently considered a ternary tuple $\langle \text{range of definition, range of function, and correspondence rule} \rangle$.

If we draw the analogy between the N-ary interpretation of the tuple concepts and collocations, then we shall take into account that it is easier to identify and understand complex meaning in a collocation rather than in a single word.

In doing so, we derive from the statement, that «linguistic semantics dominates form, since 'it is much easier to explain language application based on a semantic model' [9, 10]. Therefore, the semantic language structure is its main component [9, 11], associated with the recognition of not word, but collocation as the main language unit at the level of its two basic units» [12].

2. INTRODUCE NEW CONCEPTS AND EXAMINE PROPERTIES OF THE RELEVANTLY NAMED OBJECTS, AS WELL AS THE TUPLE OPERATION CAPABILITIES.

We consider the tuples that contain at least two distinct concepts and create a new meaning that differs from each of their individual component meanings, if any. We call those «intelligent tuples.»

We give examples of binary intelligent tuples: $\langle \text{good, evil} \rangle$, $\langle \text{goal, means} \rangle$, $\langle \text{cause, effect} \rangle$, $\langle \text{goal, task} \rangle$, $\langle \text{task, method} \rangle$, $\langle \text{manufacturer, product} \rangle$. (The introduction and application of the latter tuple was discussed by the American philosopher E. A. Singer [13]).

Let's give examples of ternary intelligent tuples: $\langle \text{solution complexity, task, method} \rangle$, $\langle \text{subject, goal, task} \rangle$, $\langle \text{morning-evening, morning-evening, morning-evening} \rangle$.

Let's give an example of the N-ary intelligent tuple: $\langle \text{subject, need, goal, task, method} \rangle$.

2.1. Let's consider the properties of objects named as follows: «intelligent tuple» and «conceptual field»

We assume that:

2.1.1. If we consider inverted connectives of intelligent tuples, then either a new meaning may emerge, or they may distort the meaning, or just become meaningless.

2.1.2. We assume that each two or more concepts cannot form an intelligent tuple. Non-intelligent tuples can be obtained through an attempt to combine randomly selected data types into a single whole, for example, numbers, concepts, and lists. We assume that the following tuple: $\langle -\sqrt{2}, 31; \text{porridge} \rangle$ is not intelligent.

2.1.3. Using intelligent tuples, we can create «specific semantic context,» or briefly «conceptual field.»

Let's explain this new concept with a few examples. To do this, let's consider:

- a situation or text based on the inseparable connective of two concepts, which are essentially intelligent tuple: $\langle \text{good, evil} \rangle$. If based on this tuple, we can obviously describe a certain situation or create a text that will be founded on those concepts opposed. Thus, a new context will be formed as a separate conceptual field;
- an interpretation of a certain physical phenomenon based on the inseparable connective of two concepts, which are essentially intelligent tuple: $\langle \text{cause, effect} \rangle$. Thus, a conceptual field is created that can be called the Laplace determinism, as a kind of «philosophical concept that asserts that all events, including human thoughts and actions, are predetermined and inevitable, since they are the result of causal relationships. Everything in the world occurs under certain laws, and if we knew all these laws and initial conditions, we could predict the entire future» [14];
- an interpretation of a situation or text based on the connective of two concepts, which are essentially intelligent tuple: $\langle \text{man, woman} \rangle$. Thus, when describing, a context is created

as the conceptual field that can include possibility of emerging a new meaning of «family» as a collective subject. At that, such a conceptual field significantly differs from the conceptual field created by tuple <Parent No.1, Parent No.2>;

- Interpretation of two poem lines:
 <Morning-evening, morning-evening>,
 Why am I still not eternal?

This couplet creates a specific semantic context, characterizing the subjective feeling of an increasing pace of change in the author's life.

2.2. Consider the tuple operation capabilities

Let's consider two intelligent tuples: <good, evil> and <cause, effect>. Each of them creates their own separate conceptual fields. By considering those two tuples together, we can obtain the conceptual field unification endowed with a new meaning. For example, consider a text that combines two conceptual fields: <good, evil> and <cause, effect>.

We assume that if each tuple element belongs to a set where a partial order relation can be introduced, then a partial order relation can also be introduced on the set of such tuples.

As an example, consider two tuples: <(2, 4), 7> and <(1, 4), 5>. It is known that the first interval element of these two tuples characterizes an instrument accuracy. Thus, the smaller the interval, the greater the accuracy, and for the second element of these two tuples, it is known that the larger the interval, the better. In this case, these two tuples are easily comparable, and the first tuple is preferable as an estimate.

Let us consider the following two intelligent N-ary tuples:

- <student, math 5, physics 5, literature 3, behavior 3, Ivanov> and
- <student, math 3, physics 3, literature 5, behavior 5, Petrov>.

We assume that the teacher will have no doubts when making a decision on sending a student to a math competition when correlatively comparing the two above tuples.

In general, we can approve that even linear order can be introduced on the set of intelligent tuples if:

1. The tuples have the same number of elements (they have 6 elements each in the above example.)
2. Only verbal and mark gradations in the same order[†] are present. (But, in the event that:
 - number of elements in tuples does not match;
 - are matched elements can be neglected, and
 - coinciding is in the same order,
 then the transformed tuples can be mapped).
3. Verbal assessments either completely coincide in the same order, or have comparable meanings within the same category. (Different names for the same category, for example, «surnames» are represented in the above example).
4. There is an inter-expert reproducibility of mark gradations.
5. The categories of mark gradations are connected by an ordering relation. (For example, math as a category is preferable to literature for justifying the specified student selection type «math competition»).

We assume that multicriteria selection can be used to select the preferred tuple.

3. STUDY CATEGORY «SUBJECT» AS ONE OF THE COMPONENTS OF N-ARY TUPLE: <SUBJECT, NEED, GOAL, TASK, METHOD>

We proceed from the above-mentioned **Hypothesis No. 1**: «N-ary intelligent tuple: <subject, need, goal, task, method> recreates new meaning in greater depth than ternary tuple <subject, goal, task>.» This is precisely why we examine the above tuple in detail.

[†] Those tuple elements have the similar indexes.

Among collective subjects, we consider only those that consist of individual ones. We will call them collective subjects of the first type.

Hypothesis No. 2. I believe that despite culture is a collective subject [15], it is not a subject of the first type.

This approach to identifying individual types of collective subjects is not a new one. For example, the anthology «Development of Concepts in Modern Psychology». (Methodology, Theory, and History of Psychology), edited by A. L. Zhuravlev [16] «presents theoretical foundations of the contemporary collective subject development problem, extracted from the early works of S. L. Rubinstein. The key collective subject attributes are formulated, characterizing a group simultaneously, but with various degrees of expression. Based on the dominance of one attribute or another, various levels of the group's subjectivity manifestation are identified: interrelationship and interdependence, joint activity, and self-reflectiveness. The combination of the identified collective subject attributes is interpreted as various psychological types of subjectivity (and subjects), i.e. potential, real, and reflective type».

The subject types may be surely considered in the following way.

For example, an individual subject, then a family, a small group, a business team [17] etc., up to the absolute intellectual civilization, as the aggregate of all intellectual civilizations in the Universe [18].

In this case, we proceed from **Assumption No. 1**, that a linear order relation can be defined for the set of such subject types.

Due to the essential volume limitations, we will analyze only the individual tuple components in this article, such as «subject» and «need».

Since the «need» concept must be defined through the «subject» concept, we will first consider it in this section. In doing so, we derive from the important application of two closely related but distinct concepts, i.e. individual and collective subject.

Furthermore, we proceed from the following assumptions, where each subject, whether individual or collective, has the following properties:

Assumption No. 2. We suppose that the subject is being developed, and its development stages can be roughly identified.

We briefly explain the concept of «individual subject». In this article, we use the philosophical interpretation concept of category. «The subject category[‡] has a long history of philosophical understanding and interpretation, while changing its meaning from a predicate to a designation of the essential human characteristics» [P. 16, 1].

It should be noted that the concept of category has a different meaning in mathematics[§].

As an example, we interpret Thomas Aquinas, who was one of the first to write in his *Summa Theologica* about the subject (subiectum) as the cognitive mind, as follows: «The subject of charity is the rational mind (mens rationalis)» [21].

Another non-modern interpretation: «The subject (subjectus (lat.) – lying below at the base, from sub – under and jacio – throwing or laying the base) is the bearer of activity, consciousness, and cognition. This subject understanding originates in modern philosophy, which is associated with its subject-centrism characteristic. Prior to this, the subject was understood as the metaphysical foundation of things, objects, primarily those objectively really existed. Most classical philosophers identified the subject with the center of consciousness, with the self... For modern philosophy, the subject is predominantly a concrete, and corporeal

[‡] «Categories (Greek Kategoria – indication, evidence) in philosophy are basic concepts that reflect the most general and essential properties, aspects, and relationships of the reality and cognition phenomena» [Page 169, 19].

[§] «Category is a concept that identifies a number of algebraic properties of morphism (mapping) sets of the one-type mathematical objects (sets, topological spaces, groups, etc.) into each other, provided those sets contain identical mappings and are closed with respect to the sequential execution (composition or multiplication) of mappings» [Page 761, 20]

individual, existing in space and time, embedded in a particular culture, with a biography, and engaging in communicative and other relationships with another people» [22].

Let us consider some modern interpretations of the «subject» concept:

- «bearer of activity, consciousness, and cognition» [23];
- «individual, who cognizes the external world (object) and affects it through his practical activity» [24].
- subject is necessarily «sensible, living (moving, growing) being» [p. 10, 25].
- Let us clarify the «collective subject» concept.

«Alongside the individual, some philosophers and representatives of specialized sciences about human and society (psychologists, sociologists, science scholars, etc.) also distinguish a collective (group) subject. The latter is understood as the bearer of certain standards of activity, cognition, and collective consciousness, i.e. «collective representations,» as a system of relationships among its individual members. There are serious grounds to believe that developing culture and cognition (in particular, scientific one) can only be understood through considering collective processes» [24].

Another modern interpretation of the «subject» concept: «an individual or a consolidated group of individuals (for example, the scientific community), society, culture, or even humanity as a whole, contrasted with a cognizable or transformable object» [24].

Now let us turn to the various interpretations of the «collective subject» category in diverse scientific fields.

«One of the fields where this concept is frequently applied is social psychology. «The «collective subject» concept has been widely engaged in the general theory of social psychology over the past twenty years, largely owing to the works of K. A. Abulkhanova-Slavskaya, A. V. Brushlinsky, A. I. Dontsov, B. F. Lomov, A. S. Chernyshev, and others. ... The modern social psychology applies the «collective subject» concept in several meanings (or senses).

First, «collective subject» is understood as the epistemological sense of the collective....

Second, «collective subject» is understood as an alternative (opposition) to «individual subject» or «subject» in general, which is antecedently understood as «individual subject»...

Third, the content of «collective subject» is the collective (group) certain quality, i.e. the quality of being a subject, which characterizes collectives to a different degree...

Fourth, a collective subject is any group of people acting or behaving together. To summarize, it can be concluded that there is no generally accepted understanding of the «collective subject» in contemporary social psychology, and furthermore not even any widely accepted interpretation» [26].

We additionally remark that: «as K.A. Abulkhanova-Slavskaya notes, «summarizing the «subject» concept word application in contemporary psychology, one can conclude, on the one hand, its prevalence, and on the other hand, its ambiguity, turning it into a meaningless epithet, that leads to impossibility of its definition role, and the need for a problematic disclosure of its meaning and criteria» [1]. We come from the fact that, despite the discussion regarding the «group subject» reality (see, for example, articles [27, 28]), it is nevertheless advisable to actively implement this concept, and not only for certain and distinguished small and large groups, but also for teams, and not limited by psychology field.

According to A.L. Zhuravlev: «It is necessary to reveal and identify «the main approaches to understanding this phenomenon», and to propose «the basic attributes, which allows to define a group as a collective subject, when discovered: a) the interrelationship and interdependence of individuals in the group; b) the group's capacity for various joint activity forms; c) the group's capacity for self-reflexivity» [pp. 116-161, 29].

Another area to frequently apply this concept is the general theory of law. The article by I. V. Samylov indicates that: «two approaches to understanding of the collective subject position in the general legal subject system can be distinguished in modern literature in the most general sense. The former approach is historically closely allied to the German scholarship tradition

developed at the early 19th century, which designated all legal entities except for natural individuals by general term 'legal entity' [30].

The latter approach to understanding of legal entities was expressed in science by V. Ya. Boytsov in the 1970s. He «criticized splitting subjects into individual and collective ones (organizations), and alternatively proposed a tripartite classification; in doing so, he identified the following groups: social individuals, social formations (organizations), and social communities (people, nations, work collectives, and territorial people associations)» [31, 32]. This approach has been developed in a number of modern studies.

It should be noted that the Constitution of the Russian Federation precisely declares the «multinational people» of the Russian Federation as the bearer of sovereignty and the source of power (Article 3). Perhaps that is why the Decree of the President of the Russian Federation highlights the national interests of the Russian Federation defined through «the objectively significant needs of the individual, society, and the state for security and sustainable development» [33].

The matter of the collective subject is considered in economics either, where the «subject» category is also engaged in a new context [33, 34].

According to B. I. Pruzhinin: «the «collective subject of knowledge» phenomenon are increasingly focused in the modern philosophical and methodological scientific reflections» [35].

4. NECESSARY AND SUFFICIENT PROPERTIES OF A COLLECTIVE SUBJECT OF THE FIRST TYPE

Let us consider the necessary and sufficient properties of a collective subject of the first type, i.e., where people are considered as elements. For example, a business team [34].

4.1. Necessary properties of being a collective subject of the first type

V. A. Lektorsky's article describes the following first five necessary properties for any collective subject:

- 1) «A collective subject, like an individual one, exists in space and time and presumes relationships with other collective subjects.
- 2) It simultaneously differs from an individual subject in a number of characteristics.
- 3) Collective thinking, or collective problem-solving, or collective memory are pertinent wordings here. However, it is hardly possible to attribute experiences to a collective subject (although individual experiences are always collectively mediated).
- 4) A collective subject does not exist without its individual subject components. However, changing composition of the individuals within a given collective subject does not necessarily mean a change in the latter. The subject is an essential pole of subject-object relations» [22].

The author's article [36] describes the following ten necessary properties of a collective subject:

- 5) «It is present in a specific, objectively existing environment, being an isolated element of the material world.
- 6) It is a comprehensive whole (in particular, all of its components necessarily interact).
- 7) It has its own objective, which is not generally reachable for the subjects comprising the given collective subject.
- 8) It has a sense of purpose, i.e. its goal setting and goal achievement.
- 9) It is capable of activity, and manages it.
- 10) It can work out control actions.
- 11) It contains the source of its existence within (i.e., restores its structure, properties, energy, processes, and functions).
- 12) It is capable of self-motion, as an impact for reproducing itself (causa sui).

- 13) It implements the people's internal interaction.
- 14) It can generate self-development as well as control this development and objects.» Furthermore, the following necessary properties of being a collective subject can be added:
- 15) It should be noted that when considering a collective subject consisting of researchers, we believe that, first and foremost, they are united by the mutual scientific research topic.
- 16) 16) The presence of «Me», but already a collective one. (See the article by V. S. Pronskikh [37]. «Considering the enormous cost of research and the wide resonance of such statements, P. Galison attempted to understand who bears the responsibility, and for which statements, and what type of knowledge is attached to them. [36]. He describes in detail, and referring to documents and private communications, how a modern collaboration regulates through its decrees, which of its members are granted the right to speak publicly, what reports and communications he submits, and who is entitled to sign approved articles and statements. This is how the collective «Me» is constructed, with different discourses depending on the situation and audience. According to V. S. Pronskikh, all the changes described by P. Galison witness to a new type of author in great science. The collaboration, as an author, becomes a postmodern phenomenon to a significant extent.» [38].

4.2. Sufficient Properties of Being a Collective Subject

Let us consider a number of sufficient conditions defining a «collective subject»:

- 1) «Capable to make decisions.
- 2) Possesses decision-making rights and the possibilities to implement them.
- 3) Bears responsibility for the decision consequences.
- 4) Able to distinguish itself from the environment, separate the object reflection from the object itself, and realize its activity, and especially its psyche [pp. 565-566, 39].
- 5) Furthermore, another sufficient condition to define a «collective subject» is: «that other subjects take it into account, i.e. consider its capabilities. Let us clarify this last point. A group of people can transform into a collective subject in the process of socialization, developing throughout the entire life cycle. For example, a group of people in production area, when achieving their goals, transforms the subjective properties of its members and becomes a single whole (a team means a collective subject), which opinion is taken into consideration, and which can be developed throughout all the team's development stages» [40].

4.3. Critical synthesis of definitions regarding the «collective subject» concepts

Due to the article length limits, we will consider only a critical synthesis of definitions regarding the «collective subject» concepts from various and modern schools only, that are composed of individual subjects (i.e., the first type ones), and are not merely limited to the concepts of «small group» and «business team».

We assume that «critical synthesis is a method involving not just the ordinary combination of various elements, ideas, or approaches, but their critical evaluation, revealing contradictions, and their integration into a unified, and logically valid system. It aims to create a holistic, comprehensive, and objective understanding of a situation or problem» [41].

At that, we will rely on the theory of definitions as a branch of classical logic.

It should be noted that the theory of definitions has been evolving for over two thousand years. There has occasionally been an experience of very interesting studies; for instance, a treatise by Marius Victorinus, written during Late Antiquity, describes fifteen types of definitions [42].

Deriving from these foundations, we will discuss the above-mentioned definitions. We believe that:

1. The «collective subject» concept in work [22], which «is understood as a bearer of specific norms of activity, cognition, and collective consciousness «collective perceptions», and as the interrelationship system among the constituent individuals «, does not actually contradict any of the necessary and sufficient conditions examined in this article and represents a clear anthropic definition. However, it is also a so-called «incomplete definition» **, that is «sufficient only to distinguish the defined object from others but does not reveal its content in full scope» [43].
2. The «collective subject» concept in work [24], described as «an individual or a consolidated group of individuals (for example, the scientific community), society, culture, or even humanity as a whole, contrasted with a cognizable or transformable object», which is essentially an enumerative definition in terms of its structure [p. 430, 44]. It is also an incomplete definition, even though it highlights a significant general property, such as «contrasted with the object being cognizable or transformable.»

4.4 Let us consider the «level of subjectivity» concept, and not only for the individual personality

Briefly describe research relevant to the «level of subjectivity» concept for the individual. Among the development level criteria for the subject as an individual, the «unity of the value-time continuum and self-awareness» can be referred as a criterion for the optimal individual self-realization. [45] The subjectivity types or levels exposed by a person are discussed in paragraph 4.1 of L. V. Alekseeva's dissertation [46].

When defining subjectivity as an integrative personality characteristic reflecting the self-determination ability, M. N. Tsygankova [47] notes that «this characteristic from the point of professional self-determination represents the ability to independently direct and define (determine) one's professional development. A high level of subjectivity is expressed in the following characteristics:

- independent goal setting and intelligence of life;
- adequate self-assessment and self-reflectivity of personal capabilities, possibilities, motives, and professional interests;
- personal future strategy understanding, and awareness of the means to achieve it;
- generated professional preferences and plans, knowledge of their implementation method, and the specifics of professional activity priority areas;
- the ability to prepare for and achieve professional self-realization through active and creative work;
- self-regulation based on an internal control locus;
- the mediation of external self-determination factors by means of personal autonomy.»

Assumption No. 3. The subjectivity level can vary for any subject.

Assumption No. 4. We assume that the subjectivity level is directly proportional to the level of implementing all its needs at each stage of development.

In a simpler case, the subjectivity level can be measured through a scoring scale. As, for example, in work [48]. «The educational process subjectivity is the child's readiness and ability to acquire knowledge and skills. Subjectivity is associated with «SELF»: self-sufficiency, self-knowledge, self-realization, self-organization, self-affirmation, and so on. You can stuff tons of knowledge into a child, but it will be actually useless until getting a response from him, until he himself wants to learn, and «pocket» the knowledge from teachers. Our subjectivity scale has ten levels. For understanding and citing an example, we will consider the 1st and 10th here. The first level is conventionally called «OFF.» This level generates the activity impact from an adult; no internal need is exposed; the child needs a role model and clear instructions from an adult. And the tenth level is called «I MYSELF (ENLIGHTENMENT).» This means: I set the

** The work of Joseph Ursus de Chergonne examined the concepts of incomplete definitions and complete definitions, like those that cover the entire content of the objects which they are related to [43].

task myself; I can find solutions myself; I see further development paths myself; I apply it myself in new conditions.»

To ensure inter-expert reproducibility of such scoring assessments, it is required to ensure at each stage of a subject's development:

- the same number of scoring gradations for those parameters that are common and characterize the subjectivity level among different subjects;
- similar or identical interpretations of scoring gradations for those parameters that are common. (For example, the qualification levels for a 3rd-category cabinetmaker, which are applied according to the UWRB (Unified Wage Rate Book) grading grid: «He independently produces standard furniture and decorative details. Applies hand tools, creates moderately labor-intensive fasteners, and manages basic processing methods.») [49];
- identical standardization of numerical parameters characterizing the subjectivity level among different subjects.

Assumption No. 5. In general, the subjectivity level, as a parameter, can be formally represented as a tuple, where the ordered parameter values can be described either by scoring gradations or by normalized numerical values of the levels of implementing all its needs at each of its development stages.

5. LET US CONSIDER THE BASIC FACTORS FOR SETTING AND DEVELOPING PROPER SUBJECTIVE QUALITIES OF LARGE SOCIAL GROUPS, AND INTRODUCE A NUMBER OF ASSUMPTIONS

5.1. Factors for setting and developing proper subjective qualities of large social groups.

Let us consider the factors for setting and developing proper subjective qualities of large social groups.

According to V. A. Petrovsky: «The great interest is actually the study of how particular factors influence constructing and exhibiting known socio-psychological phenomena of group identity, social categorization, intergroup relations, self-assessment of the certain group development prospects and its ability to influence the social environment, etc., and how, on their basis, the proper subjective qualities of large social groups are being set and developed. These minimally include the following:

- social activity and initiative;
- social responsibility;
- high self-organization and self-management degree;
- skills and experience in performing coordinated group actions;
- relative autonomy, independence, and self-sufficiency;
- group self-reflexivity (presence and level);
- openness/closedness to intra-group or inter-group interaction, etc. [50].

6. STUDY CATEGORY «NEED» AS ONE OF THE COMPONENTS OF N-ARY TUPLE: <SUBJECT, NEED, GOAL, TASK, METHOD>

«Even the philosophers of Ancient Greece and Rome achieved significant success in understanding human needs. Ancient thinkers recognized needs as the primary motivating forces of human activity. ... The matter of needs began being considered as an independent scientific problem in philosophy, sociology, economics, and psychology in the first quarter of the 20th century. Generally, need can be defined as a want, a necessity for something. ... Currently, there are a lot of different points of view on the need essence. Most scientists agree only on the fact that almost everyone admits need as the primary motivating force of human

activity. However, there is neither complete unanimity nor unambiguous interpretation of this concept.» [51].

Let us give an example of interpreting the «need» concept. «A need is a want or deficiency in something essential to support the vital activity, a human being, a social group, or society as a whole. [52].

There are many classifications of needs [53]. In this case, we will consider needs based on the subject type, i.e. individual, group, collective, or social.

The Russian scientist A.A. Sokolov in his work «The Theory of Taxes» [54] separately considers individual and collective (social) needs.

At that, he points out that the latter differ significantly from individual needs and have the following attributes:

- «firstly, their emergence is determined by the common interest of an entire, more or less large group (class) of people and households;
- secondly, they are satisfied not individually, but collectively; and,
- thirdly, they can be divisible or indivisible depending on the possibility of possessing a certain good or service» [54].

As examples of divisible collective needs, the author considers: «the needs for postal services, telegraphs, railroads, education, healthcare, etc.»

As examples of indivisible collective needs, the author considers: «the needs for maintaining the state administration apparatus, national defense, and public order.» [54].

According to the author of work [55], «The situation with satisfying collective needs is not quite simple and straightforward. As conceived by the authors of this theory, the state is a public economic organization, i.e. an economic subject. However, the state activities as an economic subject aimed at satisfying collective needs cannot be founded on market relations. State services for the population to satisfy collective needs cannot be of the nature of market goods sold and bought at a specific price, and such service relations shall be based apart from the market principles. Thus, the purpose of the state as an economic subject is to satisfy collective needs. Then which ones: divisible or indivisible, and on what basis? «

The German school, represented by L. Stein and A. Schaeffle, the Italian school, represented by F. Nitti (1868-1953) and A. Lorne [56], and the Russian school, represented by economists such as A. A. Bukovetsky, P. V. Mikeladze, and A. A. Sokolov [54], contributed to creating the fundamental provisions of the collective need theory.

Let us consider and introduce the postulate and basic assumptions characterizing the subject needs from various aspects.

Assumption No. 6. Any subject, both individual and collective one of the first type, represents and implements an interconnected, and hierarchically arranged set of its needs.

Assumption No. 7. When choosing the needs by a subject, priorities are determined by its development stage.

Assumption No. 8. When choosing the needs by a subject, not only its own needs are considered but also some needs of all those collective subjects where it explicitly or implicitly presumes to be their part.

Assumption No. 9. The subject needs are achieved through generating and implementing a corresponding goal.

Let's consider the assumption regarding the relationship between the subject need classification and the arrangement of its goals.

We derive from **Assumption No. 10.** For both an individual and a collective subject, the classification of its needs in some cases determines the arrangement of its goals, which may arise based on these needs.

At that, we proceed from the fact that: «The classification of needs is simultaneously an arrangement of goals that can arise based on these needs, i.e. gnostic, communicative, related to the satisfaction of natural needs, etc.» [57].

Postulate No. 2. To realize all the subject needs, its activity is necessary, with the essence determined both by the presence of corresponding goals and their implementation.

7. NEW PROMISING RESEARCH DIRECTIONS ON THIS TOPIC

1. Operationally define the concepts of «intelligent research goal» and «intelligent scientific task».
2. Systematically consider both the concept of a goal and its interpretation as objects, as well as the tasks, which would help to achieve this goal, when solved. Furthermore, study their properties and identify the requirements that their elements must be satisfied.
3. Other qualitative subjectivity types must be separately considered, for example, culture as a subject. This approach to culture is discussed in the works of Doctor of Philosophy A. A. Pelipenko [58].
4. Identify, if possible, the basis reasons for classifying N-ary interpretations of concepts.
5. Determine the dependence of the identified properties of N-ary interpretations of concepts on the types of various groups of natural languages.
6. Determine whether it is useful to use a metalanguage, as a logical language where logical characteristics and logical relations between the object language expressions of are recorded, for working with tuples.
7. Determine whether it is possible to apply hermeneutic techniques and methods to effectively interpret signs as tuples.

8. CONCLUSION

In the final section, we will consider generalized comments and conclusions.

- 1) The following concepts are introduced, and the properties of the relevantly named objects are considered:
 - «intelligent tuple», «conceptual field», «subjectivity level». (Some cases represent examples of such objects);
- 2) «collective subject of the first type». (This concept is defined in the sense of those collective subjects structured by individual ones).
- 3) A number of operations with certain types of tuples is introduced.
- 4) A retrospective analysis is conducted for the «subject» and «need» categories.
- 5) 14 essential properties of being a collective subject of the first type, and 5 sufficient conditions for their definition are proposed.
- 6) The factors are considered, which underlie the composition and development of the subject properties of large social groups.
- 7) 2 postulates, 2 hypotheses, and 9 assumptions are introduced, which facilitate the transition to a higher operationalization level of the introduced concepts.
- 8) The studies are briefly described, which touch upon the «subjectivity level» concept for the individual.
- 9) New promising research directions on this topic are proposed.

REFERENCES

1. Bogdanovich, N. V. (2004) Sub'ekt kak kategoriya otechestvennoj psikhologii [A subject as a category of state psychology]. *PhD thesis*. Moscow, Russia: YuSK-poligrafiya, [In Russian]
2. World Health Organization (2023) *Compendium of WHO and other UN guidance on health and environment: version with International Classification of Health Intervention (ICHI) codes*. Geneva, Switzerland: World Health Organization.

3. Meshkov, D., Lobanov, A., Dzebisashvili, A., Makosko, E. & Lysova, P. (2026) Input of Medical Interventions, Medical Technologies, and Accessibility Factors in Lung Cancer Treatment Outcomes, *Advances in Systems Science and Applications*, **26**(1), 118–126. doi: 10.25728/assa.2026.26.1.2096
4. Meshkov, D., Bezmelnitsyna, L. & Cherkasov, S (2020) «A Data Management Model for Proactive Risk Management in Healthcare, *Advances in Systems Science and Applications*, **20**(1), 114–118. doi: 10.25728/assa. 2020.20.1.864.
5. Stepin, V. S. (1970) The Problem of Subject and Object in Experimental Science, *Voprosy Filosofii*, **1**, 80–90.
6. Grishin, V. N. (1982) *Matematicheskaya enciklopediya* [Mathematical Encyclopedia]. Moscow, USSR: Sovetskaya enciklopediya, [In Russian].
7. Ruwiki (2026) *Homepage*, [Online]. Available: <https://ru.ruwiki.ru>.
8. Kormen, T. H., Lejzerson, C. I., Rivest, R. L. & Shtajn, K. (2005) *Algoritmy: postroyeniye i analiz* [Introduction to Algorithms]. Moscow, Russia.: Izdatel'skiy dom «Vil'yams», [In Russian].
9. Chejff, L. (1975) *Znachenie i struktura yazyka* [The meaning and structure of language]. Moscow, USSR: Progress, [In Russian].
10. Burling R. (1964) Cognition and componential analysis: God's truth or hocus-pocus? *American Anthropologist*, **66**, 20–28.
11. Ellis, D. (1992) *From language to communication*. London, UK: Home-London, 1992.
12. Shafikov, S. G. (1999) *Teoriya semanticheskogo polya i komponentnoj semantiki ego edinic* [The theory of semantic field and the components of its units]. Ufa, Russia: Izdatelstvo Bashkirskogo universiteta, [In Russian].
13. Singer, E. A. (1959) *Experience and Reflection*. Philadelphia, PA: University of Pennsylvania Press.
14. Spacehub (2026) *Determinizm Laplasa* [Laplace determinism], [Online]. Available: https://vk.com/wall-33047219_24684, [In Russian].
15. Pelipenko, A. A. (2007) *Dualisticheskaya revolyutsiya i smyslogenez v istorii* [The Dualistic Revolution and Semantic Genesis in History]. Samara, Russia: VEK#21, [In Russian].
16. Zhuravlyov, A. L. (2018) *Razrabotka ponyatij sovremennoj psihologii (Metodologiya, teoriya i istoriya psihologii)* [The development of modern psychology terms (Methodology, theory and history of psychology)]. Moscow, Russia: Institut psihologii RAN, [In Russian].
17. Vartanyan, A. A. & Sidel'nikov, Yu. V. (2005) Cel' gruppy [The goal of a group]. *Ekonomicheskie strategii*, **07**(41), 114–119, [In Russian].
18. Sidel'nikov, Yu. V. (2003) Chelovechestvo, kak kosmicheskij sub'ekt [The humanity as a cosmic subject], *Materiali XXX obshchestvenno-nauchnyh chtenij, posvyashchennyh pamyati Yu.A. Gagarina*, 159–170, [In Russian].
19. Rozental, M. M. (Ed.) (1972) *Filosofskij slovar'* [Philosophical vocabulary]. Moscow, Russia: Politizdat, [In Russian].
20. Vinogradov, I. M. (Ed.) (1979). *Matematicheskaya enciklopediya* [Mathematical encyclopedia]. Moscow, Russia: Sovetskaya enciklopediya, [In Russian].
21. Akvinskij, F. (2019) *Summa teologii, Glava 3, Vopros 25: Ob ob'ekte lyubvi* [The sum of teology, Chapter 3, Question 25: on the object of love]. Moscow, Russia: LIBROKOM, [In Russian].

22. Lektorskiy, V. A. (2001) «*Ya, Ob»ekt*». *Novaya filosofskaya enciklopediya* [«I, object». A new encyclopedia of philosophy]. Moscow, Russia: Mysl', [In Russian].
23. Lektorskiy, V. A. (2010) *Sub'ekt* [A Subject]. Moscow, Russia: Mysl', [In Russian].
24. Ivin, A. A. (Ed.) (2004) *Filosofiya: Enciklopedicheskiy slovar'* [Philosophy: an encyclopedic vocabulary]. Moscow, Russia: Gardariki, [In Russian].
25. Arshinova, V. A. & Lepsky, V. E. (2007) *Problemy sub'ektov v postneklassicheskoy nauke* [Problems of subjects in post-classic science]. Moscow, Russia: Kogito-Centr, [In Russian].
26. Zhuravlev, A. L. (1999) Ponimanie «kollektivnogo sub»ekta»: osnovnye podhody v psikhologii [Understanding «a collective subject»: main approaches in psychology], *Proc. of Individual'nye i kollektivnye sub»ekty v izmenyayushchemsya obshchestve. K 110-letiyu so dnya rozhdeniya S.L. Rubinshtejna: tezis dokladov k mezhdunarodnoj nauchno-prakticheskoy konferencii* (Moscow, Russia), 68–70, [In Russian].
27. Zhuravlev, A. L. (2009) Kollektivnyj sub'ekt: osnovnye priznaki, urovni i psichologicheskie tipy [Collective subject: main features, levels and psychological types], *Psihologicheskij zhurnal*, **30**(5), 72–80, [In Russian].
28. Mit'kin A. A. (2002) *Gruppovoj sub'ekt: real'nost' ili metafora? Sovremennaya psikhologiya: sostoyanie i perspektivy issledovanij. Chast' 2* [Group subject: reality or a metaphor? Modern psychology: current state and the perspective of research. Part 2]. Moscow, Russia: Institut psikhologii RAN, [In Russian].
29. Zhuravlev, A. L. (2018) Kollektivnyj sub'ekt kak fenomen i ponyatie v sovremennoj psikhologii [Collective subject as a phenomenon and notion in modern psychology]. In: Vilenskaya, G. A. (Ed.) *Razrabotka ponyatij sovremennoj psikhologii*. Moscow, Russia: Institut psikhologii RAN, [In Russian].
30. Samylov, I. V. (2009) Ponyatie i sistema kollektivnyh sub'ektov prava [The notion and the system of collective subjects of law], *Vestnik Permskogo universiteta*, **4**(6), 25–32, [In Russian].
31. Bojcov, V. Ya. (1970) O krugе sub'ektov sovetskogo gosudarstvennogo prava [On the collection of subjects in Soviet state law], *Sbornik nauchnyh trudov*, **1**, 79–93, [In Russian].
32. Bojcov, V. Ya. (1972) *Sistema sub'ektov sovetskogo gosudarstvennogo prava* [A system of subjects in Soviet state law]. Ufa, Russia: Ufa, [In Russian].
33. RF Government (2021) *Ukaz Prezidenta Rossijskoj Federacii ot 02.07.2021 g. № 400. O Strategii nacional'noj bezopasnosti Rossijskoj Federacii* [President Order by 2021.07.02 #400 On the strategy of national security of the Russian Federation], [Online]. Available: pravo.gov.ru, [In Russian].
34. Vartanyan, A. A. & Sidel'nikov, Yu. V. (2005) Cel' biznes-komandy kak ponyatie [The task of business team as a notion], *Trudy mezhdunarodnoj nauchno-prakticheskoy konferencii «Teoriya aktivnyh sistem»* (Moscow, Russia), 51–54, [In Russian].
35. Pruzhinin, B. I. (2019) Kollektivnyj sub'ekt v nauchnoj tradicii (Filosofsko-metodologicheskie zametki) [Collective subject in science traditions (Philosophical notes)], *Gumanitarnye issledovaniya v Vostochnoj Sibiri i na Dal'nem*, **1**, 105–110, [In Russian].
36. Sidel'nikov, Yu. V. (2008) Ponyatie celi gosudarstva kak kollektivnogo sub'ekta [The notion of state task as a collective subject], *Refleksivnye processy i upravlenie*, **1**, 85–94, [In Russian].

37. Pronskih, V. S. (2018) Kollaboraciya bol'shoj nauki kak vyzov transcendental'nomu sub'ektu [Collaboration of big science as a challenge to transnational subject], *Voprosy filosofii*, **5**, 88–92, [In Russian].
38. Galison, P. (2018) Kollektivnyj avtor [Collective author], *Voprosy filosofii*, **5**, 93–113, [In Russian].
39. Marks, K. & Engels, F. (1956) Iz rannih proizvedenij [From early writings]. Moscow, USSR: Gospolitizdat, [In Russian].
40. Selezneva, N. T., Drozdova, L. N. & Kurkotova, E. A. (2010) Sub'ektno-razvivayushchaya paradigma: kriterii i urovni sub'ektnosti [Subject-developing paradigm: criteria and subjection levels], *Sovremennye naukoemkie tekhnologii*, **10**, 153–156, [In Russian].
41. Moodle (2026) *Moodle*, [Online]. Available: https://moodle.enu.kz/pluginfile.php/180645/mod_resource/content/1/
42. Pronay, A. (1997.) *C. Marius Victorinus. Liber de definitionibus. Studien zur klassischen Philologie*. Frankfurt, Germany: Peter Lang.
43. Easycounter (2026) *Electronic library*, [Online.] Availabe: <https://social.easycounter.com/elib.bsu.by>
44. Bocharov, V. A. & Markin, V. I. (2008) *Introduction to Logic: A Textbook*. Moscow, Russia: FORUM/INFRA-M.
45. Top Technologies (2026) *Article 26060*, [Online]. Available: <https://top-technologies.ru/ru/article/view?id=26060>
46. Alekseeva, L. V. (2006) Psihologicheskaya harakteristika sub'ekta prestupleniya [Psychological characteristics of a criminal subject]. *Ph.D. thesis*, Peterburgskij universitet MVD RF, [In Russian].
47. Cygankova, M. N. (2015) Sub'ektnost' kak faktor lichnostnogo i professional'nogo samoopredeleniya uchashchihsya s ograničennymi vozmožnostyami zdorov'ya v yunosheskom vozraste [Subjectivity as a factor of personal and professional self-identity of disabled teen students], *Chelovecheskij kapital*, **5**(77), 33–37, [In Russian].
48. MALTa private school (2026) *10 iz 10. Chto takoe shkala sub'ektnosti i kak eto svyazano s uspevaemostiy?* [10 out of 10. What is a subjectivity scale and how is it connected with academic performance?], [Online]. Available: https://vk.com/wall-182946798_1910, [In Russian].
49. DTF (2026) *Obuchenie na stolyara-krasnoderevshchika* [Cabinetmaker training], [Online]. Available: https://dtf.ru/ncpo_ru/4760857-obuchenie-na-stolyara-krasnoderevshchika.
50. Archinov, V. A. & Lepskiy, V. E. (2007) Problemy sub'ektov v postneklassicheskoy nauke [Problems of subject in post-classical science]. Moscow, Russia: Kogito-Centr, [In Russian].
51. Wikipedia (2026) Wikipedia, [Online]. Available: <https://ru.wikipedia.org/wiki/>
52. Berezhnoj, N. M. (2007) *Social'naya filosofiya* [Social philosophy]. Moscow, Russia: Izdatelstvo Moskovskogo universiteta, [In Russian].
53. Glossariy (2026) *Potrebnost'* [Need], [Online]. Available: http://www.glossary.ru/cgi-bin/gl_sch2.cgi?RPuywlhtuxyo
54. Sokolov, A. A. (1929) *Teoriya nalogov* [Tax theory]. Moskva, USSR: Finansovoe izd-vo NKF SSSR, [In Russian].

55. Sudfile (2026) File 11387583, Page 6, [Online]. Available: <https://studfile.net/preview/11387583/page:6/>
56. Loria, A. (1907) *Finansovaya politika kak rezul'tat i orudie interesov vladel'cheskih klassov* [Financial politics as a result and a tool of interests of possessing classes]. Moscow, Russia: Osnova, [In Russian].
57. Tihomirov, O. K. (1977) *Ponyatiya «cel'» i «celeobrazovanie» v psihologii* [Task and task-forming notions in psychology]. Moscow, USSR: Nauka, [In Russian].
58. Pelipenko, A. A. (2012) *Postizhenie kul'tury. Ch.1. Kul'tura i smysl* [Culture comprehension. P.2: Culture and sense]. Moscow, Russia: Rossijskaya politicheskaya enciklopediya (ROSSPEN), [In Russian].