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COMPARATIVE MODEL OF TEXTS AND THEIR DESCRIBED OBJECTIVE SITUATIONS CONFORMITY

At the present time brain, as a tool of both intellectual activity and models implemented by it at solving functional objectives are poorly studied. This is brain activity automation (imitation) fundamental "brake component". Further progress in the direction of "intelligent" information processing systems is impossible without solving a formal description problem of intelligent activity functional-purpose models and algorithm of their realization. Achievement of success in this field requires systematic, laborious work to create a problem-oriented methodological and tool base for solving the problem of formal description, i.e. intelligence activity identification model. One of the most important tasks of the intellect theory is to obtain subjective states formal description of a person which is enough full for practical purposes by objective physical methods. Functional aspect of human intelligence is very similar to a digital computer and is subjected to the same restrictions as any computer system. Both calculating machine and human intelligence are capable of information perceiving, transforming and formation. Human intelligence-operated information has the form of words in the role of texts, sounding speech, objects sensual images. The role of information entry in a human is performed by the sense organs, the role of information output – organs of motion and speech. These organs have finite sensitivity and final resolving power, that is why human can perceive signals (letters) only from a finite multiplicity (alphabet) in each moment of time. Organs of senses, movement and speech have a finite bandwidth, so they can transmit only a finite number of letters par unit of time to the intelligence and from it. In the intelligence theory a general method of human mental conditions objective physical study– comparative identification method is developed. In this work the comparator predicate structure is studied.

Keywords: *intelligence theory, finite predicates algebra, comparator identification.*

Introduction

This work is a continuation of the articles [1–3], which proposed a multidimensional comparator identification predicate model, axiomatic of this model was considered; models and axiomatic relations in the finite predicates algebra language, operations on predicates; properties of operations on predicates included into the model of comparator identification are considered, formulas for quantifiers calculation are proposed, when there are both objective and predicate variables in the subquantifier.

The main predecessors of this article were the following works: monograph [4], in which algebra of finite predicates – mathematic base of intelligence theory was created; articles [5–6] in which some practical and theoretical issues of comparator identification, created in the frames of intelligence theory for objective physical study of human mental conditions were considered.

In this work features of the formulation and requirements to the experimental part of comparator method are considered. The structure of comparator predicate is analyzed.

1. Comparator predicate

Let's consider an experiment, in which the subject realizes a binary predicate $P(X,Y)$, multiplicity on the Cartesian product $A \times B$ of A and B multiplicitys. Let's name P predicate as situational-textual. Researcher presents situation to the subject as X signal. It is not yet possible to determine in even terms what a situation is since such a definition is just one of the intelligence theory tasks, which should be solved. That is why we limit with the examples, explaining intuitive content of this concept.

In the role of X situation it is possible, for example to use a view from the window of the room to the street. Looking out the window at different time of the day, a man will always perceive some situation. In this case in the role of multiplicity A we take, for example, multiplicity of all situations, which can be observed from the window of the room during every minute of the day. Another examples of X signal and A multiplicity:

1) X – life day of a person; A – all life days of this person

2) X – film frame «Funny boys»; A – all frames of this movie;

3) X –view from the window of the train, with a route Moscow – Leningrad, on one of the kilometer sections of the track; A – a multiplicity of such views on all kilometer sections of this path;

4) X –painting of Aivazovskyfrom Feodosia Museum; A – collection of all paintings of Aivazovsky located in Theodosia Museum.

Situation is physical reality, provided to the subject in his feelings. Situations exist independently of the subject's consciousness and are reflected in it in the perceptions and impressions form. Situations are the only source of primary information, which is then used by the intellect in his mental activity. The thing, which has not been extracted by the senses of the subject from situations cannot then appear in his mind. Any situation is limited in space and time. For example, view to the street from the room window is limited in the space by an aspect angle and houses on the opposite side of the street.

In time, each situation is limited by the duration of its observation by the subject. Situations are also limited by the subject's attention focus. For example, watching Aivazovsky paintings in the museum, a human favorable receives a lot of side impressions from the outside, but does not pay attention to them. Situations perception is also limited by the subject training level, amount of his knowledge, focus of his interests. Each situation is perceived by the subject with a finite resolution both in space and time. The same applies to light rays, sounds, tactile, taste, olfactory and other kinds of influences. In this respect, any situation is a physical world fragment, some of its part. A multiplicity of all situations can be chosen by researcher arbitrarily at his own will, consistently with the specific tasks that he sets for himself used in this experiment over the subject.

In the role of Y signal researcher provides the subjects with text. Definition in the text concept precise terms is one of the important problems of the intelligence theory, which is still waiting for its solution. The sense of the text concept is explained on intuitive level below. Any text should express a definite thought. The thought contained in the text is called the sence of this text. For example, the following phrases are considered to be texts: «The sun is shining», «It is raining», «It is not raining», «It is raining or the sun is shining», « It is raining. The sun is shining».

Text is considered to be a physical object and nonsubjective result of its perception or understanding by the subject. In recently given examples strips of black ink stains on a white sheet of paper, limited by quotes, serve as text. Voice messages pronounced aloud can act as texts, then they will be considered as sound vibrations of air. B multiplicity represents particular, quite clearly delineated texts totality, formed by the researcher in accordance with the subject intelligence studying tasks in this experiment.

It means, that the subject has an ability to derive a main thought from the text, presented to him, i.e. to understand the text. Text in foreign language, which is not familiar to the subject is not considered to be the text relatively to this subject. Unfinished sentence fragments are not considered to be the texts, for example: «in the role of multiplicity we take», «from the room window during». The sentences, expressing a question or command, for example, «What time is it?», «Solve a task!» are not considered to be the texts. It is supposed, that the researcher has a way of any situation, contained in a multiplicity A forming, as well as by the mean of distinguishing or identifying of two any situations from this multiplicity. The same is related to the texts, included to B multiplicity. It is not necessary for the researcher to be able to describe situations and texts internal structure, he can simply treat them just as with multiplicity pairwise distinct elements A and B.

It is assumed, that texts describe situations properties. That is why, when the subject perceives a pair (X,Y), formed from a situation X and text Y, then he can establish if this situation and text match each other. We will consider that text corresponds to the situation in that case, if it expresses some property of the situation. If the property expressed by the text is not found in this situation, then we consider that the text does not correspond to the situation presented to the subject.

For example, the subject looks out the apartment window to the street and compares the seen situation with the text "It's raining". If it really rains on the street, then the subject believes that the text presented to him corresponds to the perceived situation. It actually it is not raining, he will consider such correspondence without real content. The researcher suggests the subject to perform the following task in the experiment: having apprehended the presented situation X and text Y, to establish, if they correspond to each other. If it turns out, that the subject is possible to perform this task for all pairs (X,Y) from $A\times B$ multiplicity, then by his actions he implements the situation-text predicate $P(X,Y)$.

Let’s consider, that $P(X,Y)$ predicate meaning is equal to one, if there is a correspondence between the situation X and text Y, and equal to zero, if the correspondence is not observed. We suppose, that all situations used in the experiment and texts are such that the subject always responds 0 or 1 for any pair (X,Y), belonging to $A\times B$ multiplicity. If $P(X,Y)=1$, then we will say, that Y text is true for X situation. If $P(X,Y)=0$, then we say, that Y test relatively to the X situation is false. It does not make a sense to speak about the truth or falsity of the text without a relation to any situation. Let’s name $t=P(X,Y)$ meaning of P predicate as a true meaning of Y text for X situation.

$P(X,Y)$ predicate really exists if and only if the subject uniquely reacts with a binary response to each pair (X,Y) of X and Y multiplicity from $A\times B$ mul-

tiplicity. Let's name this require as P predicate existence postulate. If existence postulate is performed, then upon repeated presentation of any pair a situation-text from $A \times B$ the subject will always react by the same answer, as at the first time. An exact study of the human intellect by the method described here is possible only in case when the postulate of existence is fulfilled. However, an ideal existence postulate is never fulfilled. It is reasonable to count only for its approximate implementation. If the postulate of existence is approximately fulfilled, then the human intelligence will be mathematically described with the same degree of approximation.

It is conditioned with the fact, that the researcher extracts information about the subject's intelligence mechanism only from the predicate (now we are talking only about those particular formulation of the intelligent research problem, which is described in this paragraph). The researcher does not have any other initial data if he adheres to the method of comparative intelligence identification. According to this method, the researcher receives all information about the predicate solely from studying the physically observed behavior of the subject. Involving introspective data, except for a heuristic purpose is not admitted by the method of comparator identification. Thus, any information about the human intelligence, obtained with this approach will be always based only on a physical, i.e. purely objective examination of the subject's behavior.

Inaccuracy in the existence postulate fulfillment is conditioned by many reasons. They include non-ideal stability of the sensory organs, their finite sensivity. The human brain is not an infallible mechanism. Attention of a human is abstract, thinking process can be disturbed with any interference (toothache, violent excitement, loud noise, etc.). Let assume, for example, the subject must determine whether it rains on the street or not. In case when the intensity of the rain is sufficiently small (the rain dizzles), the subject may feel insecure when forming his answer. Under these conditions the subject's answer can become ambiguous: once he will react with a positive answer and the other – with a negative on this situation. This function describes a process of situation transforming into a perception of this situation. Let's denote a multiplicity of all values f function values, i.e. aggregate of all perceptions, generated by situations from A multiplicity as letter M. f function reflects A multiplicity on M multiplicity.

It is important to note, that the diversity of situations perceptions can turn out to be less than a diversity of these situations. That is why such different situations that emit equal perceptions are possible. For example, the same color sensing (color) can be generated in the subject's consciousness by completely different luminous radiations. Luminous radiations, generating the same color are usually called metameric. Comparing to these situations, that generate equal perceptions in the subject's mind we call metameric for this subject.

Perceiving text Y and understanding it, the subject extracts from it a completely definite thought y, which is a subjective image of the text. We will assume that the thought Y is uniquely determined by the text that generated it. Let's name the dependence expression $y = g(Y)$ of y dependence function on Y test as text understanding function. This function describes the process of text converting to the meaning of this text. Multiplicity of all g function values, i.e. multiplicity of all thought, generated by texts from B multiplicity, will be denoted by the letter N, g function reflects B multiplicity for N multiplicity.

The same thought can be expressed by different texts, so that cases when different texts generate the same thoughts in the subject's mind have place. Let's texts, expressing the same idea be designated as identical. For example, identical texts «It's raining, or the sun is shining» and «The sun is shining, or it's raining». Identical texts are logically equivalent. If texts a and b are identical, then of a follows b, and of b follows a.

We believe that the respondent's answer $t = P(X, Y)$ is completely determined by $x = f(X)$ perception X situation and $y = g(Y)$ sence of Y text. It follows, that predicate $t = L(X, Y)$, realized by the examinee, which we call the awareness predicate exists. The choice of this term is conditioned by the fact that the subject forms a value $t \in \{0,1\}$ of $L(x, y)$ predicate as a result of conformity comprehension $(t = 1)$ or $(t = 0)$ discrepancy of y thought to x perception. P and L predicates, f and g functions and X, Y, x, y variables are bound by the dependence:

$$P(X, Y) = L(f(X), g(Y)) = L(x, y). \qquad (1)$$

We call attention to the fact that functions f and g, variables x, y and predicate L are introduced not on the basis of physical experiment, but on the basis of introspective data on subjective phenomena, observed during the experiments on the subject. Such an introduction therefore needs to be justified by objective data.

2. Decomposition of the comparator predicate

Predicate structure, introduced by expression (1), was obtained by us on the basis of introspective data with subjective character. That is why it has only a heuristic value and needs a physico-mathematical justification, based only on objective data. This justification is possible. Existing of L predicate of f and g functions, their specific form and relationship, expressed by relation (1), it is possible to set, basing solely on the physical observation subject behavior, which is characterized

by a predicate $P(X,Y)$. The method of predicate structure substantiating is described below

Let's introduce predicates

$$E_1(X_1,X_2) = \forall Y \in B(P(X_1,Y) \sim P(X_2,Y)), \quad (2)$$

$$E_2(Y_1,X_2) = \forall Y \in A(P(X,Y_1) \sim P(X,Y_2)), \quad (3)$$

which are uniquely determined by the predicate P. Predicate E_1 is given on the set $A \times A$, predicate E_2 - on $B \times B$ multiplicity. Let's name predicate E_1 as situations metamerism predicate, predicate E_2 as texts identity predicate.

$E_1(X_1,X_2)$ predicate can be used for the objective definition of the concept of metamerism of any situations X_1 and X_2, belonging to the A multiplicity. In fact, if $E_1(X_1,X_2)=1$ then, according to (a), $P(X_1,Y)=P(X_2,Y)$ for any text Y of B multiplicity. This means, that all situations properties of X_1 and X_2, expressed by texts from B multiplicity match, consequently for tested (according to its behavior) situations X_1 and X_2 are indistinguishable, i.e. metameric. If $E_1(X_1,X_2)=0$, then there will appear such a text $Y \in B$, for which $P(X_1,Y) \neq P(X_2,Y)$. In this case not all properties of situations X_1 and X_2, expressed from B multiplicity match. Consequently, X_1 and X_2 situations are different according to the physically observed reactions of the subject, i.e. they are not metameric for it.

$E_2(Y_1,Y_2)$ predicate can be used for objective definition of any texts identity concept Y_1 and Y_2, belonging to B multiplicity. In fact, if $E_2(Y_1,Y_2)=1$, then $P(X,Y_1)=P(X,Y_2)$ for any X situation of A multiplicity. This means that texts Y_1 and Y_2 simultaneously correspond to the situation X, or both do not correspond to it. In such a way objectively texts Y_1 and always express the same property of situations. In other words, there is no such situation in A multiplicity, which would have the property, expressed by Y_1 text, and without the property, expressed by Y_2 texts, and vise versa.

Consequently, Y_1 and Y_2 texts, according to the behavior of a subjective are indistinguishable for it within the meaning, i.e. are identical to each other. If $E_2(Y_1,Y_2)=0$, then $x \in A$ situation, for which $P(X,Y_1) \neq P(X,Y_2)$. This means, if X situation has the property, expressed by Y_1 text, and does not possess the property expressed by the text Y_2, or X situation does not possess the property, expressed by Y_1 text, and has the property, expressed by Y_2 text. In both cases Y_1 and Y_2 texts express different situations properties, which means that these texts, according to physical observed reactions of the subject have a different meaning, i.e. are not identical.

Predicates E_1 and E_2, defined by expressions (a) and (б) from the previous paragraph are reflective, symmetric and transitive. This means, that E_1 and E_2 are equivalences. Predicate E_1 defines a partition R of A multiplicity on the situations layers. All situations, belonging to one layer of R decomposition are metameric. Any two situations, taken from different R partition layers are not metameric. E_2 predicate defines S portioning of B multiplicity for the texts layers. All texts, belonging to one decomposition layer of S are identical. Along with this, any two texts, taken from equal partition layers S are not identical.

E_1 and E_2 predicates can be represented as:

$$E_1(X_1,X_2) = D_1(f(X_1),f(X_2)), \quad (4)$$

$$E_2(Y_1,Y_2) = D_2(g(Y_1),g(Y_2)). \quad (5)$$

Here f is canonical reflection of A multiplicity for R partition, g is canonical mapping of B multiplicity for S, D_1 partition is equality predicate for $R \times R$, D_2 is $S \times S$ equality predicate.

Let's interpret partition layer R, containing X situation as an image $x=f(X)$ of X situation. Let's interpret partition layer S, containing Y layer, as a sense $y=g(Y)$ of Y text. R partition serves as M multiplicity of all perceptions, generated by situations taken from the set of A. S partition serves as N multiplicity of all thoughts, generated by texts, taken from B set. We will revise $D_1(x_1,x_2)$ predicate as formal capacity equivalent, tested to establish coincidence or difference of any perceptions x_1 and x_2 from M multiplicity. We interpret predicated $D_2(y_1,y_2)$ we interpreted y_1 and y_2 of N multiplicity, performed by the examinee.

We emphasize that the functions f and g, of (4) and (5), are physically introduced, on the basis of objectively observed facts, Because they use only P predicate, characterizing the behavior of the subject. Along with this it is clear, that it should be the same f and g functions, which are present in the expression (1) and which are introduced on the basis of introspective data on subjective phenomena observed by the subject during the experiment on it. We see that both subjective and objective data on the human intelligence are important for its formal description, but the role of this data is different. Subjective data prompts the kind of transformations realized by the intelligence, objective data justi-

fies (or refutes) it. Subjective data have heuristic value, objective - have evidentiary power.

Class V_a of all situations $x \in A$, metameric situations $a \in A$, i.e. perception, generated in the mind of the subject, the predicate

$$V_a(X) = E_1(X, a). \quad (6)$$

Correspond to class W_b of all $y \in B$ texts, identical to $b \in B$ text, i.e. thought arising in the mind of the subject in response to the text b presentation corresponds the predicate

$$W_b(Y) = E_2(Y, b). \quad (7)$$

Taking into consideration (2) and (3), we obtain formulas:

$$V_a(X) = \forall Y \in B(P(X, Y) \sim P(a, Y)), \quad (8)$$

$$W_b(Y) = \forall X \in A(P(X, Y) \sim P(X, b)), \quad (9)$$

which express the subjective nature of the perceptions and thoughts of the subject through a predicate P, characterizing its objectively observable behavior.

Conclusions

No one physical conformity can be verified in the experiment exactly. Any measuring instruments work only with finite accuracy, their stability is not ideal. Measurements are always made against background noise. Any physical device can fail, give incorrect observations. No physicist is immune to errors. Nevertheless, physics successfully copes with the task of physical processes laws studying, constantly expanding the scope of knowledge about the world around us. When a physicist confronts the limited sensitivity of his instruments, he expects that, he will find something new in the object of research by increasing it. In some respect, the theory of intelligence is even in a better position than physics. The physical world, as many philosophers say, is inexhaustible, it is impossible to cognize it to the end. Human intelligence is finite, that is why, in principle, it can is fully cognizable.

References

1. Shabanov-Kushnarenko, S.Yu. and Abed Tamer Kudhair (2015), "Postroenie predikatnyih prototipov strukturiruemyih ob'ektov na osnove ponyatiynogo podhoda" [Construction of predicate prototypes of structured objects on the basis of the conceptual approach], *Uralskiy Nauchnyiy Vestnik*, No. 15 (146), pp. 5-12.

2. Shabanov-Kushnarenko, S.Yu., Kudkhayr Abed Tamer and Leshchynskaia, Y.A. (2013), "Predykatnyi podkhod k formalyzatsyy neiavnykh znanyi" [The predicative approach to non-obvious knowledge formalization], *Information Processing Systems*, No. 9 (116), pp. 113-116.

3. Shabanov-Kushnarenko, S.Yu. and Kudkhayr Abed Tamer (2015), "Razrabotka metoda formyrovanyia predykatnykh modelei prototypov strukturyrovannykh ob'ektov" [Development of the predicate model of structured objects prototype forming methods], *Information Processing Systems*, No. 9 (134), pp. 83-87.

4. Shabanov-Kushnarenko, S.Yu., Kudkhayr Abed Tamer and Leshchynskaia, Y.A. (2013), "Razrabotka predykatnykh modelei lohycheskykh sviazei poniatyi" [Development of concepts logical connections predicative models], *Scientific Works of Kharkiv National Air Force University*, No. 4 (37), pp. 144-147.

5. Bondarenko, M.F. and Shabanov-Kushnarenko, Yu.P. (2007), "Teoryia yntellekta" [Theory of Intelligence], SMIT, Kharkiv, 576 p.

6. Bondarenko, M.F., Shabanov-Kushnarenko, Yu.P. and Shabanov-Kushnarenko, S.Iu. (2011), "Modely komparatornoi ydentyfykatsyy v vyde semeistv yntehralnykh odno- y dvukhparametrycheskykh operatorov" [Models of comparative identification in the form of families of integral one- and two-parameter operators], *Byonyka intellekta*, No. 2, pp. 86-97.

7. Bondarenko, M.F., Shabanov-Kushnarenko, S.Yu. and Shabanov-Kushnarenko, Yu.P. (2009), "Prakticheskie prilozheniya komparatornoy identifikatsii lineynyih konechnomernyih ob'ektov" [Practical applications of comparative identification of linear finite-dimensional objects], *Bionika intellekta*, No. 2(71), pp. 5-12.

8. Bondarenko, M.F. and Shabanov-Kushnarenko, Yu.P. (2011). "*Mozgopodobnyie strukturyi*" [*Brain-like structures*], Naukova dumka, Kyiv, 460 p.

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КОМПАРАТОРНА МОДЕЛЬ ВІДПОВІДНОСТІ ТЕКСТІВ ТА ОБ'ЄКТИВНИХ СИТУАЦІЙ, ЩО ОПИСУЮТЬСЯ НИМИ

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На цей час мозок, як інструмент інтелектуальної діяльності, так і реалізовані їм при вирішенні функціональних цільових завдань моделі, вивчені досить не повно. Це є основним «гальмом» моделювання діяльності мозку. Без вирішення проблеми формального опису функціонально-цільових моделей інтелектуальної діяльності та алгоритмів їх реалізації принципово неможливе подальше просування в напрямку створення «інтелектуальних» систем обробки інформації. Досягнення успіхів у зазначеній галузі вимагає створення проблемно-орієнтованої методологічної та інструментальної бази вирішення проблеми формального опису, тобто ідентифікації моделей інтелектуальної діяльності.

Одна з найважливіших задач теорії інтелекту полягає в тому, щоб об'єктивними фізичними методами отримати досить повний формальний опис суб'єктивних станів людини. Людський інтелект в функціональному відношенні дуже схожий з цифровою обчислювальною машиною і схильний до тим же обмеженням, що і будь-яка обчислювальна система. Так само, як і обчислювальна машина, людський інтелект здатний сприймати, перетворювати і формувати інформацію. Інформація, якою оперує людський інтелект, має вигляд слів, в ролі яких виступають тексти, чуттєві образи предметів. Роль входу інформації у людини виконують органи чуття, роль виходу інформації - органи руху й мови. Ці органи характеризуються кінцевої чутливістю і кінцевої роздільною здатністю, тому в кожен момент часу людина може сприймати сигнали (літери) тільки з кінцевого безлічі (алфавіту). Органи почуттів, руху і мови мають смугу пропускання, тому вони можуть передати інтелекту і від нього лише кінцеве число букв в одиницю часу. В теорії інтелекту розвивається загальний метод об'єктивного фізичного вивчення психологічних станів людини - метод компараторної ідентифікації. У даній роботі вивчається структура предиката компаратора.

Ключові слова: *теорія інтелекту, кінцеві алгебри предикатів, ідентифікація компаратора.*

КОМПАРАТОРНАЯ МОДЕЛЬ СООТВЕТСТВИЯ ТЕКСТОВ И ОПИСЫВАЕМЫХ ИМИ ОБЪЕКТИВНЫХ СИТУАЦИИ

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В настоящее время мозг, как инструмент интеллектуальной деятельности, так и реализуемые им при решении функциональных целевых задач модели, изучены весьма не достаточно. Это является основным препятствием в моделировании деятельности мозга. Без решения проблемы формального описания функционально-целевых моделей интеллектуальной деятельности и алгоритмов их реализации принципиально невозможно дальнейшее продвижение в направлении создания «интеллектуальных» систем обработки информации. Достижения успехов в указанной области требует создания проблемно-ориентированной методологической и инструментальной базы решения проблемы формального описания, то есть идентификации моделей интеллектуальной деятельности.

Одна из важнейших задач теории интеллекта заключается в том, чтобы объективными физическими методами получить достаточно полное формальное описание субъективных состояний человека. Человеческий интеллект в функциональном отношении очень схож с цифровой вычислительной машиной и подвержен тем же ограничениям, что и любая вычислительная система. Так же, как и вычислительная машина, человеческий интеллект способен воспринимать, преобразовывать и формировать информацию. Информация, которой оперирует человеческий интеллект, имеет вид слов, в роли которых выступают тексты, чувственные образы предметов. Роль входа информации у человека выполняют органы чувств, роль выхода информации - органы движения и речи. Эти органы характеризуются конечной чувствительностью и конечной разрешающей способностью, поэтому в каждый момент времени человек может воспринимать сигналы (буквы) только из конечного множества (алфавита). Органы чувств, движения и речи имеют полосу пропускания, поэтому они могут передавать интеллекту и от него лишь конечное число букв в единицу времени. В теории интеллекта развивается общий метод объективного физического изучения психологических состояний человека - метод компараторной идентификации. В данной работе изучается структура предиката компаратора.

Ключевые слова: *теория интеллекта, конечные алгебры предикатов, идентификация компаратора*