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Linguistic Data Model for Natural Languages and Artificial Intelligence. Part 3. Recognition

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Introduction. The paper continues a series of publications on relations linguistics (hereinafter R–linguistics) and is devoted to the analysis of the recognition problem in relation to the approach considered in the series. Recognition directly affects language forms, especially since the model used in the framework of R–linguistics creates significant features in recognition.

Methodology and sources. The research methods consist in the development of the necessary mathematical concepts for linguistics in the field of identification, which uses the verbal approach to previously obtained results on identification in linguistic spaces.

Results and discussion. As a recognition problem in R-linguistics, two tasks are identified: types recognition and signs value recognition. Each of these tasks has a specific dimension, the extension of tuples of parameters, blocking errors in recognition, etc. In addition, the presence of a linguistic model helps to simplify the solution of these problems. In the section the features and ways of solving both problems of recognition are formulated taking into account the stated specifics.

In this section, based on the material of all three parts, the general contours and properties of the linguistic model of the world are described. It also discusses various aspects of recognition associated with linguistic spaces: variables, memory, expansion problems, etc.

Conclusion. In conclusion, the law of creative thinking is formulated, which follows from a linguistic data model.

Key words: R–linguistics, recognition of types, recognition of meanings of signs, action recognition.

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Лингвистическая модель данных для естественных языков и искусственного интеллекта. Часть 3. Распознавание

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Введение. Статья продолжает серию публикаций по лингвистике отношений (далее R–лингвистика) и посвящена анализу проблемы распознавания применительно к рассматриваемому в рамках серии подходу. Распознавание непосредственным образом

влияет на языковые формы тем более, что модель, используемая в рамках R–лингвистики, создает существенные особенности в распознавании.
Методология и источники. Методы исследования заключаются в разработке необходимых математических понятий для лингвистики в области идентификации, для чего используется вербальный подход к ранее полученным результатам по идентификации в лингвистических пространствах.
Результаты и обсуждение. В качестве задачи распознавания в R-лингвистике выделены две задачи: распознавание видов и распознавание значений признаков. Каждая из этих задач имеет специфику по размерности, по расширению на кортежи параметров, блокированию ошибок в распознавании и т. д. Кроме того, наличие лингвистической модели способствует упрощению решения указанных задач. В разделе сформулированы особенности и пути решения обоих задач распознавания с учетом изложенной специфики.
На основе материала, изложенного в данной серии публикаций, описываются общие контуры и свойства лингвистической модели мира. Здесь также обсуждаются различные аспекты распознавания, связанные с лингвистическими пространствами: переменные, память, проблемы расширения и т. д.
Заключение. Сформулирован закон созидательного мышления, следующий из лингвистической модели данных.

Ключевые слова: R–лингвистика, распознавание видов, распознавание значений признаков, распознавание действий.

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Introduction. The first two parts contain a mathematical development of the axiomatic approach to linguistics. A number of facts have been obtained that are expected to be discussed in this article. This article does not contain mathematical proofs, as it establishes the connection of the facts already stated with the outside world in connection with pattern recognition in linguistics. It is here that formal features come into contact with real parameters. Despite the humanitarian nature of the material, it requires a good knowledge of the previous articles in the series.

Methodology and sources. As a research method, the results obtained in the previous articles of the series are used, which are interpreted and analyzed here. Based on this, the recognition problem and related problems are formulated, the type of linguistic model and its properties are determined.

Results and discussion.

Recognition in R-linguistics.

Pattern recognition is a separate topic, and it is well developed [1–4]. We will not consider specific methods of recognition, because it is not yet clear how consciousness technically solves this problem. This article will discuss only recognition features directly derived from R-linguistics.

So, there are objects that, through their behavior in relationships, are grouped in a certain way into the verb-related linguistic spaces [5]. This is the behavioral aspect of objects. Further, these spaces generate systems of abstract signs for the formed concepts [6]. But the objects included in the concepts are characterized by a real set of different properties. What properties are important in terms of this behavior? How many of these properties are needed to characterize behavior?

Without solving these issues, we will not be able to create a predictive function. Before us is a diverse behavior on the one hand and hundreds of parameters on the other hand. It's discouraging, but we just need a bridge between these shores to survive. This bridge is the pattern of recognition.

So far, we've talked about categorization and identification as intuitive processes that happen to objects. But what is an object? An object is the result of some algorithm, which, somehow evaluates the parameters, decides that it is the same. In other words, this algorithm according to some principle identifies many different tuples of parameters. Since these tuples are different, they cannot bear the basis of such identification. The principle of identification is given from the outside of the recognition problem, but in the process of its solution is implemented through the analysis of parameter meanings. Thus, in example 11 [6], the principle of identification was determined by the same behavior of tuples representing fish. Despite the fact that the fish moved and gave different projections on the retina, their categorization remained constant, because their trophic behavior was constant.

So far I have ignored a very important parametric aspect. Firstly, it is not clear how we identify the parameters. In other words, how do we claim that it is the same parameter, only with different meanings? Perhaps the immutability of the sense organ, the continuity of changing and spatial characteristics are taken into account. Secondly, it is not clear how we can claim that this parameter refers to this object. Here, too, spatial representations and synchronicity of change with other parameters seem to be of great importance. The question of spatial representations will mainly be discussed in another part, but in any case these two issues are of the utmost importance, although I am not ready to discuss them seriously now.

So, from example 11 [6], when you go to tuples, you can see that the types of linguistic space do not actually contain objects, such as carp and roach, but contain tuples of parameter meanings with the same behavior. From the point of trophic relation a carp and a roach is the same object. And only other aspects of its behavior allow us to separate these objects [5, Proposition 22]. But as we know, species form a division of linguistic space into disjoint classes. This split is kept on the tuples representing the objects categorization, if, of course, the measured parameters are enough to separate objects. The assignment of tuples to partitioning classes constitutes the classical task of pattern recognition. In other words, the solution of the categorization task gives rise to the task of pattern recognition.

Since the field for solving this problem is now the Cartesian product of the parameter scales, the recognition problem is extended from the observation tuples, which now plays the role of a training sample, to the entire Cartesian product. No matter how the task of pattern recognition is solved, it extends the classification of species from the training sample to the entire Cartesian product. Each recognition algorithm forms its own way of extending to the Cartesian product and this means that each recognition algorithm on some tuples can make mistakes. In example 11 [6] just due to the expansion (algorithm of recognition of value of signs) also there was a forecast for a pike perch. Note that the signs in this example remain unchanged. Of course, the signs also form a Cartesian product, but the identification should not be expanded to the unknown combinations of signs, not to produce centaurs. This also reveals the difference between signs and parameters.

Pattern recognition can occur in two ways, which, as we will see later, define two forms of language.

Recognition of signs meanings.

When signs (variants of signs) are defined, it is necessary to learn to define their meanings. This assumes the reality of the calculated signs. Firstly, the reality of the sign means, that for each measured parameter we can answer the question: does this parameter characterize the sign in question? Secondly, by the meanings of the parameters characterizing the sign, we can answer what meanings the sign takes. Thirdly, the signs meanings are separated, that is, there is no tuple of parameters characterizing the sign, which is simultaneously corresponds with two or more non-zero meanings of the sign. By looking at the evidence in the previous section it is easy to verify, that the independence of signs extends to the tuples of their parameters.

As an example of a real sign can be a sign of 'teeth' from the example 11 [6], because we are able to choose the parameters and method of analysis to uniquely characterize the presence of teeth in fish. Another thing is that we cannot always formalize this process, but we do it successfully. When using real signs, we obtain a set of local pattern recognition problems, the result of which is to determine the meanings of the signs.

If the signs are real, the recognition is greatly simplified. Firstly, it simplifies the selection of the necessary parameters, as only the parameters characterizing this sign are selected, and not the entire object. Secondly, to recognize the meaning of a sign it requires significantly fewer parameters than for the entire object. Thirdly, due to the independence, the recognition of the meanings of each sign can be done separately from the recognition of the meanings of other signs, conjunctively combining them later. Fourthly, in recognition of the meanings of the sign, extension, which performs the algorithm of recognition, can be made more secure as each sign has a ‘trash bag’ – a value of 0. Finally, the process of identifying categories by signs meanings is much more secure than recognition, because it can control cases of expansion. Consider this aspect of identification.

Let us consider three cases of identification of binary relations [6, Fig., 2 *a*]. If in the process of recognition of signs meanings it was found that the relation is transitive and reflexive, it corresponds to the category that has its own type – quasi-order. Thus, the result of identification will be a quasi-order. Let's assume that as a result of recognition it is established that the relation is symmetric and transitive. On the construction of signs, each meaning corresponds to the ∩-generator. But the intersection of ∩-generators is a category, consisting of one object – equivalence. But for the equivalence relation, the sign of reflexivity must have the meaning “reflexively”. But this does not follow from linguistic space. Hence, we are dealing with some kind of relationship that was not part of the original universe and appeared as a result of the transition to the representation of relations by tuples of signs. In other words, we are dealing with the result of an extension of the identification algorithm. Finally, if signs recognition leads to the definition of the meanings “asymmetric” and “reflexive”, the intersection of the corresponding ∩-generators will give an empty category, which would mean the obvious appearance of a centaur, the existence of which is incompatible with the universe in question. But since the centaur in this case is real, it indicates an error in recognizing the meanings of signs. In other words, the expansion in recognition was wrong either by the sign of “reflexivity” or by the sign of “symmetry”.

Recognizing types of.

It is not always possible to find real signs corresponding to the calculated ones in the surrounding world. This means that the problem of recognition has to be solved directly. So, in the process of categorization the partitioning the universe into types are formed. In the transition to the representation of objects as the tuples of parameters, the tuples representing the objects in the universe are converted into the training sampling on the Cartesian product of scales of parameters. It is necessary to use this information to construct a mapping of Cartesian product tuples into a set of types or, in other words, to extend a partially defined factor-mapping to the whole set of tuples. As it is known from [5], each type corresponds to some ∪-generator and vice versa. Thus, recognition of the types actually maps each tuple in some of the smallest category (∪-generator) in which this tuple first appeared. This allows you to get the maximum forecast after solving the recognition problem, because the smaller the category, the more significant forecast it allows you to make.

Can the knowledge of linguistic space help in solving the problem of pattern recognition? This is possible when you consider that the category hierarchy generates the types hierarchy [5, Fig., 1 *b*]. This allows, by analogy with the signs, to consider General and separating parameters. For example, if type A is older than type B, then the objects that make up type A are more general than objects of type B. It follows that objects of the type B in part of the parameters must have the same meanings as these parameters in tuples of type A. In addition, there must be separating parameters that distinguish tuples of type B from tuples of type A. This information for some recognition methods can facilitate the construction of the algorithm. The hierarchy of species is clearly visible from human activities in pattern recognition. For example, in a collision with an unknown dog, we, first of all, determine the dog, not a shepherd or a German shepherd. It's as if our recognition stops at some middle level and usually doesn't go to the full detail possible. But the "dog" category has its own type. This is a common mongrel feral dogs. The recognition algorithm, for the reasons described above, primarily determines the senior types, because it allows you to quickly get a forecast of possible actions of objects from the category "dog". A sufficient number of such examples can be given. I note only that when you identify the dog through the analysis of signs meanings it will be identified ⋃-generator "dog" with its own type as well.

Action recognition.

It turns out that not only categories obey certain axioms, but this fully applies to conceptual verbs (verbs that form categories). In the continuation of the series we will discuss this issue. Comparison of axioms of concepts and verbs allows to formulate the principle of duality in linguistics. The principle of duality implies that categories and actions are one: categories rebuild verbs of language, and verbs rebuild concepts. For this reason, object recognition and action tasks are also integrated. After all, the identity of behavior allows you to "close" objects within types and Vice versa, the ability to select objects based on the observation of parameters allows you to solve the problem of recognizing actions.

In order to take advantage of the predictive properties of the linguistic model, it is necessary to understand what linguistic spaces (relations) are in question. Therefore, not only the objects themselves are recognized, but also the actions (behavior) in which they will participate or already participate. In other words, we must define verbs in addition to categories. When an action occurs, the tuples of the object inside the type follow each other in one way or another one (along one path or another), depending on the action. Because an action can be characterized by a binary verb or even a ternary verb, it may be necessary to consider tuple paths within views for multiple objects to identify the action.

For example, consider the following situation. A group of tourists returned to the Parking lot, where in its absence remained one member of the group. This person is in an excited state and, explaining the reasons of the excitement, tells that the bear came, saw him: he cried being scared and the bear escaped. So, here, the tourist first of all recognized the bear. Without it, he could not have made all the other conclusions. Which means "the bear came"? This means that the tuple of parameters, which the tourist recognizes as a bear, changed in such a way (without leaving the type, which includes the concept of "bear"), that these changes in the opinion of the tourist corresponds to the verb "go". Note that this verb is neither binary nor ternary. He's unary! But a unary relationship is a category. Hence, the unary verbs are not actually talking about the interaction, and characterize the trajectory of the tuples inside the type that should be already formed. Unary verbs differ from verbs discussed in [5]. They stand out in verbs precisely because, like binary and ternary verbs, they correspond to certain intraspecific trajectories, however, only for one category. For example, if the object "girl" has a periodic change in the trajectory of tuples, we say that "girl is spinning".

Let us return to our travelers. So, the bear saw the tourist, and it means that the bear's eyes met the tourist's eyes. It is a binary verb that describes the interaction. In order to recognize this action it is necessary to highlight the bear's eyes. In other words, to recognize this action, we need to analyze the trajectory of the bear's eyes, and therefore must first of all decompose the object (decompose into signs) to the level of 'eye'.

For binary verbs, by definition, it is necessary to control two objects, in particular the position of one's eyes and the bear's eyes. Another example, the binary verb "eat" we used in example 11 [6]. In order to identify the fact of eating predatory pike of carp, it is necessary to track the trajectory of two tuples (pike and carp) in two different types, and after the spatial convergence of the two tuples to fix the disappearance of one of them. These examples clearly show that action recognition can require control of the most exotic events in the change of tuples of parameter meanings. So, the recognition of both categories and verbs is based on the analysis of the observed parameters. Recognition of categories is based on the analysis of their meanings, and verbs – on the study of the dynamics of their changes.

Action recognition shows us the origin of verbs that do not form categories: these verbs simply fit the trajectories of one or more objects. When categories are defined, it is possible to investigate intra-specific trajectory changes of tuples that correspond to actions. In [6] it was already mentioned about the abundant presence in the language of verbs that do not form concepts, but use categories formed by other verbs. This means that some characteristic trajectories, which have received certain names, can be observed in the parameters of other objects. Such verbs (they can be called trajectory verbs) actually connect concepts on the basis of similarity of trajectories of change of parameters. Thus, verbs that define categories (conceptual verbs) combine objects into categories based on the similarity of their behavior, and then the similarity of behavior (trajectories) is used to describe the interaction of other verbs. For example, the verb "run" means certain trajectories of changing the parameters of the position of the limbs. With the advent of the pendulum clock, an obvious analogy was found between the trajectory of the pendulum and the trajectories of the limbs when running. It is this similarity that allowed the verb "run" to be applied to time (for example, "time runs"). Of course, the verb "run" is not conceptual for hours. Moreover, it was hardly used for clocks and time in the era of the sundial, water clock or hourglass. But because of this once-observed analogy, now for the hydrogen standards of time we say: "time runs".

Some insights.

General scheme of the model.

Let's sum up the interim results and at least outline the contours of the model. Did we manage to "overcome" the relational model? No way! Firstly, many objects of the surrounding world must be remembered literally in signs or even in parameters. For example, I literally remember own child, own parents, own car, own house, etc. These 0-ary relations are still kept in the model. Secondly, we still often need to remember unstructured information: zip code, car brand, number and sex of children of the employee, etc. This is due to the fact that we are surrounded not only by stable, but also variable relations, which are not reflected in the appearance of stable signs on the objects involved in these relations. For example, in the relationship between animals and regions of their habitat, polar animals should be thick wool or a thick layer of fat. Of course, any relationship can be categorized using verbal categorization. This can be done even with n-ary relations (we will discuss this later). But what's the point? So, the model is divided into the basic part of knowledge about the world, formed by conceptual verbs, and the variable part, which is formed by the current observation or current communication and changes over time.

For definiteness, I will assume that the recognition is made using tree structures. This does not mean that these structures are used by the brain, but they are universal enough to explain the model. It is clear that linguistic space is not stored as a lattice of categories. After solving the problem of identification, it can be replaced by a signs tree (we will see this in the part devoted to the language), which reflects the original linguistic space by its structure. Trees recognition of signs meanigs have as their endings the tops of the signs tree. Those categories, which themselves turn out to be universums, generate trees of signs, corresponding to the nested linguistic spaces, coming from them. Between the vertices trees of the signs are set mappings (verbs), which are not only the address of the outgoing vertex and the destination vertex. These algorithms are capable of analyzing the trajectories of parameters. In order to analyze trajectories, it is necessary to have generators of reference trajectories and compare reference trajectories with the actual ones.

If you move from the end vertex of the tree, which corresponds to some type or sign meaning, to the root, you can collect the parameters that characterize object or sign. To these parameters, you can add additional parameters obtained as a result of communication, as well as parameters from stored samples of 0-ar objects. Thus, we can return to the images of objects. If we add to this the work of generators of reference trajectories, it is possible to force these objects to be changed in accordance with certain actions. Animal lovers know that, for example, dogs sometimes run in their sleep and even bark. In other words, their minds also create acting images.

Of course, the described model is a very rough sketch, but before moving to the language, I want to fix some image of the model, because there are quite good reasons to believe that the models of the world are based on the same principles in different animals that do not speak the language.

Firstly, the activities of many people happen together with animals. For example, grazing of herbivores is often carried out with the help of herding dogs. These dogs have goals, make predictions and make decisions. Of course, they are taught, but this training is successful most likely because the principles of modeling the world in humans and these animals are the same. It is unlikely that the joint activities of the person and dogs would be successful if there was no identity of the principles of building their models.

Secondly, in the animal world is widespread mimicry, when living beings in their forms and color texture coincide with the environment. This prevents the selection of parameters that correspond to the object and, ultimately, its identification. Mimicry creates the same problems for both animals and people. This means that we equally select the parameters that characterize the objects.

Thirdly, our models are united by cunning. Under cunning I mean the creation of parametric distortions that lead to an erroneous prediction of the model. Cunning is successful because the model works correctly and gives the known forecast. For example, the harmless milk snake painted like the coral snake is a very dangerous poisonous snake. Any predator facing a milk snake will make a prediction of serious problems when attacking it. We will make the same forecast. Here is a fly, painted under a wasp, the mantis pretended to be a twig, the possum pretended to be a corpse, the angler fish demonstrates the bait. All of them create parametric distortions based on the same work of the models of the surrounding living beings.

Fourthly, in order to attack the weakest point of the deer – its neck, and not to get under the hooves or horns, it is necessary to successfully allocate the neck, horns and hooves. We, together with the predators do it the same way, and so we allocated the same signs, decompose the deer in the same way, and ultimately, equally decomposing linguistic spaces.

Although we are in contact with different parts of the world and therefore generally have different models, it is unlikely that the principles of their construction differ significantly in humans and animals.

Finally, you need to understand that the forecast of the behavior of objects is of great importance to detect changes in behavior. It is the discrepancy between the forecast and the real behavior that we fix the fact of a malfunction of the machine or a dog's disease. We (humans and animals) are constantly subconsciously making predictions that are impossible without some model.

Spatial representations.

Probably, the greatest number of daily forecasts is connected with space and movement in it. The result of the spatial prediction is a chain of muscle sensations, the implementation of which ensures the achievement of a certain point (tactile touch). When I type this text, my brain constantly makes predictions of the necessary contractions of the hand muscles so that the fingers reach the desired touches of keys.

The categories of space are points. Essentially the point is a category consisting of many chains of muscular sensations, that achieve the same touch. After building a "muscle" space, you can select signs that allow you to identify points (categories) of space. The possibility of selection such signs is most likely provided by the existence of solids around us, which allow us to separate spatial changes from all other transformations. In fact, the possibility of separating the spatial changes of parameters from the transformational changes of the object and the subject of touch is provided by the immutability (at some time interval) of the forms of the object and the subject of touch. Perhaps if we lived in a liquid world where all forms are constantly changing, the choice of such signs would be difficult. The selected signs (accommodation, retinal video signal, pressure of sulfur crystals in the ears) allow us to build a recognition system and move to the forecast.

Now we can predict muscle tension to reach a certain point. For example, after the forecast, I can take the TV remote control from the table even with my eyes closed. In many living beings, the spatial model is present from birth or requires only minimal refinement. For example, a dragonfly needs only time to harden its wings, after which it is able not only to move, but to hunt in the air, that is, to predict not only its muscle tension, but also the trajectory of the victims. It is clear that such mobility requires the exact identity of the muscular structure of dragonflies. For this reason, the evolution of such creatures is extremely difficult and the stage of growth has to be transferred to forms with primitive spatial representations. Born antelope calf within two hours after birth are able to move follow mother and born a kitten it required much more time. The cat is a predator, and it needs to have a more detailed space than the space of the antelope. Therefore, for the period of categorizing muscular sensations kittens even remain blind to the signals from the retina do not interfere with the formation of muscle space. Anyway, in weightlessness, muscle receptors don't work. It would be interesting to study the behavior of a blind creature in weightlessness, although this can have tragic consequences. Why does Actinia (a sea predator resembling a bunch of grass) have no eyes? In its space (in the form of globe) eyes hardly can help it. This visual space will not be consistent with muscle space.

Any creature that can move purposefully already has a linguistic model, because purposeful movement is impossible without prediction. Step over an obstacle, jump over a hole, take something in hand (paws, teeth) – all this is possible only after predicting what muscles should be reduced and how much.

Creating a model of space is a colossal activity. Probably, never in my life person does not think so much, like a baby. From the previous description it follows that, in fact, we have formed two spaces: one space is determined through relations (we will consider these relations in another part of the series) and makes up the muscular space, and the second space is determined through the signs and makes up the visual space. These spaces are consistent with each other, although the visual space has extrapolation: we see objects (clouds, stars, etc.), to achieve which there is no muscle prediction.

When spaces mismatch, it can cause laughter or discomfort. Each of his childhood remembers how fun to look through binoculars on the contrary: By the visual space we expect a lot of effort to reach the point, but in fact for the muscle space it is close. Of course, the main primary space is muscle space, otherwise the blinds could not move successfully. Similarly, the linguistic space formed through relations is primary in relation to the space formed by signs. It would be useful to take into account those who are engaged in the movement of robots.

A little more about the categories and signs.

Problems with variable relations and signs lead to the appearance of many quirky solutions in the language. In this subsection, I will focus on just three features solely to demonstrate this diversity.

As already noted, variable relationships do not generate full-fledged categories. For example, the relation of friendship is changing: people meet, quarrel, reconcile, and this attitude is not reflected in them by some external steady signs. However, for example, the concept of "friends" is well known to all. At first glance, this contradicts the statement said.

For example, let us consider the axiom of correctness [5], where the concept of "friends" stands for category K. Choose as X random people who are friends with someone. It may well be that sworn enemies will fall into the set of X. But then the categorization of X will not lead to the formation of any private category of friends, and we may well go beyond the category K. In fact, the concept of friends 'is not a category, but a variable or variable predicate. The values of this variable are some subsets of people. In this sense, it resembles pronouns.

For example, the pronoun 'I' is also a variable and at the same time the name of the algorithm by which the variable x, given on a set of people, is assigned a specific value, so I(x) means the following: you must find the person who said the name of this algorithm, and assign it to the value of the variable X. In these terms, the value of the variable "my friends" is defined as $(I(x))\Delta$, where Δ corresponds to the relation "friendship". You can easily find many such variables in a language. These variables are concepts because they can act as subjects and objects of different actions, but they are not categories because they do not satisfy the axioms of categorization. For example, the sentence "I love friends" has no categories at all. Of course, variables can also exist for stable relationships.

One should not confuse concepts-variables with categories that did not find expression in signs, such as the category "predators". The category "predators", like any category, is a concept, but not a concept-variable. Problems with signs for it are associated with the use of a very large and too diverse universe, where the conditions for the independence of signs are not fulfilled: any attempt to define this category in signs will lead to the appearance of centaurs. The same can be said about the category "game". They have only verb definitions.

When it is difficult to find the necessary signs or determine their meanings, people use instead of signs the property of unambiguity of transition from one category to another. For example, the periodic law determines the properties of chemical elements (relations “react”) depending on the value of the sign “number of protons in the nucleus of an atom”. Determining the value of this sign is completely nontrivial, therefore it is replaced by the result of the action that characterizes the group of elements. For example, “alkali metals” are metals that react with water to form alkali. Yes, with such a replacement, the prognostic ability to react with water is lost, but the possibility of forecasting for other reactions remains. For example, to predict other reactions, we firstly conduct a reaction with water and, depending on its results, make a forecast.

In example 11 [6] we have built a linguistic space for the results of the observations of trophic relationships of some freshwater fishes. Let's say we built a model and check the correctness of its predictions. As a result of this test, it turns out that the pike behaves completely wrong: it does not attack the fish. The discrepancy between the forecast and behavior means that the “pike broke”. As a result of clarifying the reasons we found that the pike is well fed and therefore non-aggressive. So, the body of a pike showed up memory. Her body remembers the results of a successful hunt through a feeling of satiety. In other words, we for a clear prediction of the behavior of pike lacks some sign. We can directly measure this sign if we look at the pike through an x-ray machine and see a fish in her stomach. But on the pond it is necessary to bring this unit and also need to catch this pike. We can artificially form the meaning of this sign simply by remembering the fact of its successful hunt. Then in order for our interlocutor to also make correct predictions, he will need to be informed that the pike is full. Of course, this is a very simple case of memory, but it shows that life itself causes us to give rise to signs obtained as a result of observation, or rather, by compensating the objects memory of observation with our memory.

Conclusion. *The law of creative thinking.*

The linguistic model gives us an effective way to control the world. Let's call it the law of creative thinking. The law of creative thinking includes two stages. The first stage begins after the formation of the system of signs and the transition to the definition of categories through signs or parameters. At this stage, cause and effect change places. From the moment of construction of the algorithm of the analysis of signs or parameters, the reasons of belonging of object to this or that category is defined according to the owner of linguistic model, not relations, but signs. For example, the Amur tigers are tigers that correspond to the area of the Amur River in the relation between the tigers and the regions of the planet. But we need to determine the region of residence by the parameters of the tiger itself. As a result of the search, we have determined the following parameters: The Amur tiger has the thickest wool and is the largest of the tigers. These parameter meanings are a consequence of its habitat. Now if we ask a specialist: “Why is this Amur tiger?” Then we will hear in response: “Don't you see? See how big he is and how thick his wool is”. Tiger became Amur tiger for other reasons. In the same way, after identifying the book, we can go to the librarian and ask: “Why do you think this book is about algebra?” He will tell us that there are certain key words and also in the annotation says ... But after all, this book is a book on algebra precisely because algebraists enter into the “reading” relation with it? Not! Now this is no longer the case. Of course, there are quite exotic cases where we are still forced to recall the relationship, but this is a great rarity.

At the next stage, the hypothesis is applied that the “correct” meanings of the signs and parameters will lead to the desired relationship. The phenomenon is that it almost always works, and it works everywhere! People force objects to enter into desired relationships, providing these objects with the necessary meanings of signs and parameters. People use the process of building a language model exactly the opposite. They believe that God (Nature) maintains the constancy of existing laws, and if the necessary conditions for the event are chosen correctly, the event must happen. They believe that if artificially recreated some of the signs that correctly identify the object category in the context of a relation, it is a signal of sufficiency of selected characteristics for committing the event. If the event still does not occur (the relation is not implemented), they simply say that the signs system was incomplete and something else should be added to it. This law operates on a subconscious level and is therefore ineradicable. Since ancient times, when people put the skull of a bear on their heads to get the signs of a bear and enter into relations with the world like a bear, and ending with modern civilization, in which this law is used everywhere, it is not questioned, despite periodic failures in its application.

Do you want to enter into a relationship of attention to your personality? Buy beautiful cosmetics and provide with it the necessary signs of attractiveness. Do you want your team to have the desired tournament attitude? Look at the signs of the current championship game. This is not at all a method of analogies, although it is a bit like it. It is something deep, indestructible, something at the level of faith. Do you have relationship problems? They are not the ones you would like? Without delay, follow a psychoanalyst and find out what signs you need to enter into your life so that the relationship takes on the desired character. Do you want to have the behavior of a healthy person? Bring your signs and parameters to the meanings of a healthy person. Here is a medicine for your high blood pressure, and here is to eliminate pain. I could give thousands of examples, but you will do it better than me. The law of creative thinking directly follows from the linguistic model and its predictive abilities: people recreate signs that identify an object into a category, from this category the verb leads to the desired category... Everything! That is the only way it should be. And although from a logical point of view – this is the ravings of a madman, they cannot escape from this law, because their thinking is so arranged.

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