On the Influence of Culture on Language (In the Example of the Amazonian Pirahã Tribe)

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Abstract

One of the central themes of the article is the nature of a culture's influence on its language. A society's civilizational progress contributes to the development of the content component of its language - the expansion of the range of its lexical and grammatical meanings. Everett's hypothesis about the influence of culture on its language system is discussed. Models of human development are proposed, formed by three components: Activity as the main component, with Thinking and Language as auxiliary components that ensure the successful performance of activities. In light of these models, some unusual properties of the language of the Pirahã tribe are analyzed, including its absence of color terms, counting words and passive voice. It is shown that these proper-ties are consequences of the initial stage of the tribe's progress, which would presumably be eliminated in case of its transition to subsequent stages of progress.

Keywords: Pirahã, Activity; Thinking; Language Development; Culture; Color Terms; Color Naming; Counter Words; Human Model

Introduction

On the Pirahã language: does culture affect language? According to the research conducted by Daniel Everett, the language of the Pirahãs - a small community of hunter-gatherers living on the banks of the Maici River (a tributary of the Amazon) - possesses a number of uncommon lexical and grammatical features, such as the absence of numerals, color terms, grammatical number, passive voice and recursion, and poverty of lexical markers for time, kinship, and so forth [1-4]. Everett believes that these features, which set the Pirahã language apart among human languages as most exotic, are conditioned by the community's no less exotic culture.

In the well-known documentary about the Pirahã tribe, *The Grammar of Happiness* (2012), Everett speaks of his goal to prove that culture affects not only the lexicon of a language but also its structure. This thought is also advanced in his book: Like most linguists today, I once believed that culture and language were largely independent. But if I am correct that culture can exercise major effects on grammar, then the theory [...] that grammar is part of the human genome and that the variations in the grammars of the world's languages are largely insignificant-is dead wrong [2].

Not surprisingly, Everett's views on language have undergone a lot of criticisms from researchers who are partial, in various degrees, to generative theory. For example, in the aforementioned documentary, Steven Pinker points out the general rule to which many linguists subscribe: the differences between the world's languages have nothing to do with the cultural differences of the peoples speaking these languages. For example, Pinker argues, in some languages the object follows the verb, as in *John was eating sushi,* while in other languages it precedes the verb, as in *John sushi was eating*. And this has nothing to do with culture (for more criticisms, see [5,6]).

Thus, the controversy over whether culture does or does not affect language has again become an issue in contemporary linguistics. Since the purpose of the present work does not allow for even a brief detour to outline the historical background of this issue, we will discuss only the views of Edward Sapir and Jan Baudouin de Courtenay, as they bear on the view developed below.

Sapir and Baudouin de Courtenay on the effect of culture on language: In order to consider Sapir's views, our approach to the concept of culture must first be clarified. According to [7], "culture [...] may be briefly defined as civilization in so far as it embodies national genius", that is, "culture may be defined as *what* a society does and thinks" [8]. In such an understanding of culture it is important to distinguish between two components: the invariable component, "national genius", and the component that varies over time, "civilization" ("*what* a society does"). Speaking of language in the context of discussing the issue of whether culture effects language, Sapir draws a distinction between the content, the lexicon that reflects the cultural background of a given society, and the grammatical system. As for the effect that the culture of an ethnic group might have on its language, Sapir hypothesized that during the initial stage in the formation of such a group (that is, when it is a 'primitive group' with hardly discernible elements of language and culture) language (both its content and grammatical system) develops in parallel with culture: [T]hey will parallel each other somewhat closely, so that the forms of cultural activity will be reflected in the grammatical system of the language. In other words, not only will the words themselves of a language serve as symbols of detached cultural elements, as is true of languages at all periods of development, but we may suppose the grammatical categories and processes themselves to symbolize corresponding types of thought and activity of cultural significance [9].

As the group continues to develop, the cause-and-effect relationship between culture (with its rapidly changing civilizational constituent) and language (with its much slower change of form) remain, but become fuzzy and hard to detect. Cf.: Though the forms of language may not change as rapidly as those of culture, it is doubtless true that an unusual rate of cultural change is accompanied by a corresponding accelerated rate of change in language. If this point of view be pushed to its legitimate conclusion, we must be led to believe that rapidly increasing complexity of culture necessitates correspondingly, though not equally rapid, changes in linguistic form and content. [...] I am not inclined to consider it an accident that the rapid development of culture in western Europe during the last 2000 years has been synchronous with what seems to be unusually rapid changes in language. Though it is impossible to prove the matter definitely, I am inclined to doubt whether many languages of primitive peoples have undergone as rapid modification in a corresponding period of time as has the English language [9].

It should be noted that over time Sapir became more uncompromising on this issue. The quotation cited above is from a talk given at the end of 1911. In a paper published in 1933, however, he states:

The tendency to see linguistic categories as directly expressive of overt cultural outlines, which seems to have come into fashion among certain sociologists and anthropologists, should be resisted as in no way warranted by the actual facts. There is no general correlation between cultural type and linguistic structure [9].

Baudouin de Courtenay, on the subject of linguistic changes, observes that "they are constant and perpetual because their causes are constant and perpetual" [10]. Among the general causes of linguistic change he names the "subconscious abstraction, the desire to discriminate and differentiate" [Ibid.] - which, as will be demonstrated, is a major driving force of language change.

Baudouin thought that, along with vacillating changes, it is in the nature of language to move in one direction predetermined by the "objective progress of man as a link in the chain of nature" [Ibid.]. Baudouin calls this motion language progress. The crucial "inherent feature of this progress is the ever-growing abstractedness of language" which, in its turn, leads to the "ever-growing spiritualization of language" [Ibid.].

Our position may briefly be characterized as follows. The culture of a society substantially affects its language. However, the effect of culture on language is quite selective and bears mainly on the level of civilization of the society and the content of its language. Namely, the

civilizational component of culture, which changes with the progress of society, preconditions the development of the content of language (which in our view includes both lexical and grammatical meanings). As we will attempt to show, the main criterion of societal progress is the constant expansion of the kinds of activity the society engages in. Thereby the number of professional sublanguages related to new kinds of activity also keeps growing. Certain concepts and terms from these sublanguages diffuse into the representations of the world and the language of the society, acquiring simplified, generally comprehensible interpretations. Due to this process the content part of language is enlarged with new lexical and grammatical items, abstract, metaphorical, and metonymical meanings, and the view of the world characteristic of a given society becomes ever more differentiated and systemic. This process will be described in detail below, using the Pirahã tribe as a case study. It will be demonstrated that the absence, or poverty, of many lexical and grammatical tools in the language of the Pirahãs is related to the non-differentiated (syncretic) character of the corresponding aspects of their representation of the world. Such syncretism, in its turn, is preconditioned by the extremely narrow scope of the kinds of activities the Pirahãs engage in, which is an indicator that the tribe is in an initial stage of civilizational progress.

Further on, in section Models of activity development for individuals and ethnic groups a general-theoretical basis for the proposed view is laid out, and in section Systematization of mental representations and conceptualization of linguistic meanings its main points are illustrated by an analysis of the Pirahã culture and language.

Models of activity development for individuals and ethnic groups

The uniform progress of an ethnic groups: Let us introduce the key concepts used in this section. We will refer to a group of people united by a common language, culture, and a range of ordinary (everyday) activities as an ethnic groups (we do not consider here the issue of ethnic identity as a criterion for identifying tribal communities because it is not directly related to the goals of this article).

The level of progress of an ethnogroup is determined by the qualitative diversity of activities characteristic of the group. The initial level of progress is characterized by a homogeneous group that lacks specialized or what might be called professional activities (for example, pottery as an industry). Such activities are performed by particular individuals who collectively use a specialized professional sublanguage. Common (non-professional) activities are carried out by all members of the ethnogroup who use ordinary (universally understood) language. The Pirahã tribe is an example of a homogeneous ethnogroup. Ethnogroup that cultivate professional activities we shall call heterogeneous.

The concepts introduced above are closely connected with some concepts of Lewis Morgan's theory of the single path of the progress of human societies [11].

In Morgan's theory, three periods are distinguished in the progress of an ethnogroups, each representing a distinct condition of society and distinguishable by a mode of life peculiar to itself [Ibid.]. Of special interest to us are the first two periods, whose characteristics will be used in our further exposition:

1) The earliest period in the progress, characterized by the absence of private property and the equality of all members of the community;

2) The next period of progress marked by the emergence of the pottery industry, agriculture, cattle husbandry, private property, and social hierarchy.

The concepts of homogeneous and heterogeneous ethogroups introduced above correspond to the periods classified by Morgan: the stage of 'homogeneity' corresponds with the earliest period, and the transition of a tribal group to the stage of 'heterogeneity' corresponds to the next period. On the basis of Morgan's analysis, the following inference can be made: the turning point that marks a qualitatively

new stage in the progress of an ethnogroup is its transition from a homogeneous to a heterogeneous state. A heterogeneous ethnogroup is characterized by specialized, professional activities that involve only certain collectives within the tribal group. A homogeneous community is characterized by the absence of such activities: all kinds of activities at this stage bear on everyday life, that is, are accessible to any member of the group.

Among the professional activities that cause a shift in the structure of an ethnogroup, Morgan considered making pottery to be of primary importance. At first sight, this thesis appears to be odd. Why would pottery be so important as to radically change the status of the group? Morgan supported the well-known proposition that, as far as its effects and consequences go, the greatest event in the history of human experience was the beginning of iron production.

Some clarification is needed here. First, the beginnings of pottery in themselves were a remarkable achievement of mankind. It gave humans heat-resistant utensils for cooking food, which had previously been done primitively in clay-plastered wicker baskets and skin-lined pits. Cooking itself was done with the help of preheated stones. Pottery began by plastering wooden utensils with a kind of clay ('a good finger thick') to protect them from fire; only later was it discovered that clay alone could serve the purpose [11].

Second, and this is of paramount importance, according to Morgan [Ibid.] pottery was the first kind of activity engaged in by only a small group out of an entire tribe. This was the pivoting point, when the originally homogeneous community started to turn into a heterogeneous community due to its social and professional differentiation.

The Pirahã tribe and pottery: Everett's analysis of everyday tribal life shows that the Pirahã tribe has a homogeneous status: all its members are equal and there is practically no private property. The Pirahãs have weapons (bows and arrows) but lack either pottery or any other kind of professional activity that requires specialized skills, knowledge, and language which would make it inaccessible to all members of the tribe.

Hunting, fishing, gathering, cooking food in aluminum pots, making wicker baskets, hand spinning (almost every family has "an indigenous handheld cotton spinner" [2]), resting by the fire - all these are common activities accessible to all the members of the Pirahã tribe, not only to adults but to growing children, who get used to these activities from an early age. Members of every family hunt, fish, gather fruits and roots in the jungle, do wickerwork, take part in building a new hut, etc.

The homogeneous status of the Pirahã tribe is reflected in their language which does not have, as has been mentioned above, a whole range of common lexical and grammatical units: numerals, color terms (analogue expressions are used instead, such as 'it is bloodlike' for the color red, 'it is not ripe' for the color green, etc.), lexical indicators of time such as *yesterday, today, tomorrow, morning, evening, week, month,* and passive voice. Below, in section Systematization of mental representations and conceptualization of linguistic meanings it will be argued that the absence of such linguistic expressions is preconditioned by the absence of relevant activities among the Pirahãs. The Pirahãs do not use counting in their ordinary activities; specific colors do not possess identifying functions similar to the colors of traffic lights, for example; their lives are not divided into the usual time cycles we call *morning, evening, yesterday, tomorrow,* etc. (they sleep at odd moments at day and at night); there are no activities in their routine life which would require passive voice to refer to, and so forth [2,3].

To illustrate a possible way for the Pirahã language to develop the above-mentioned lexical and grammatical elements, let us imagine that some members of the tribe have started, for the first time, to practice a certain professional activity. Let us suppose that a large Pirahã family begins to master pottery. First of all, the family and their close community begin to be involved in a whole range of new interconnected activities such as procuring a suitable kind of clay, collecting shells, making a mixture of clay and crushed shells, plastering wooden and wicker utensils with this mixture, drying out these utensils in certain conditions (including their periodic watering and the like),

counting and storing the finished utensils, receiving orders, exchanging finished products, etc. In practice, all these activities must be carried out by daylight. Therefore, the entire family begins to live in a time mode different from that of the rest of the community: they work during the day and sleep at night. With time, the range of manufactured products grows and products of various shapes and sizes appear; paints are obtained from traveling traders and the manufactured utensils are painted in various colors, etc.

Clearly, all these activities become an important external stimulus for the conceptualization of the categories of number, color, size, and time. For the family and the members of the tribe involved in their activities, a need arises for new lexical classes - names for specific product sizes and shapes (*large, medium, small; round, flat, deep,* etc.), quantities (*one, three,* etc.), colors (*green, red,* etc.), time of production (*yesterday, tomorrow*) and so forth.

Certain kinds of work, being carried out over a prolonged duration, cease to meet the immediacy of perception principle characteristic of the Pirahã's way of life - the outcome develops slowly and cannot be directly observed. Moreover, it is often unknown or unimportant to know who is producing the work - it is important to know the current state of the production process, its intermediate or end result. Consequently, the need for the passive voice may arises: *Your order is being processed; The bowls will be finished tomorrow*, etc. Thus, conditions arise under which the immediacy of perception principle loses its dominating role in the life of the Pirahãs.

It is evident that through some such sequence of events a number of previously absent practices may develop, and with them emerge the linguistic means necessary for their description.

Activities: Crossing the Rubicon: Even the above cursory analysis shows that the production of pottery may exert a direct and multifaceted influence on the life and language of potters. But it may also affect, in a similar fashion, other members of the tribe who choose the color and size of the products they purchase and learn to utilize them. Their perception of different time intervals within a day may become more differentiated. Influenced by the language the potters use the language of the community may also expand, adding the most frequently used terms, expressions of politeness practically missing in Pirahã (See, however, [12]). In this way, diversification of activities in an ethnogroup directly contributes to the development of both its language and its representations of the material world.

The emergence of professional activities in an ethnogroup is, to use a metaphor, like crossing the Rubicon in that it effects a qualitative change in the ethnogroup's mental representation of the world. Prior to the emergence of such activities, the progress of the ethnogroup consisted only in the expansion of the range of ordinary activities, knowledge of these activities, and the language used to describe them. Therefore, all members of the ethnogroup shared a similar view of the material world, its opportunities and hazards. Now, on the other hand, through the development of pottery production and other kinds of professional occupations characteristic of a period of heterogeneity, separate collectives are formed that add, as it were, a new, analytical representation of some aspects of the generally shared representation of the world. This analytical representation reflects their experience of enhanced interactions with these aspects, on account of which new elements emerge in their image of the world that are absent in that of the other members of the ethnogroup. And this is important societal growth.

The model of human activity development: basic concepts: In light of the above, we will consider language and thought (principally, human mental representations of perceived reality) not separately but as forming a single whole with a third component, human activity. As will be shown below, human activity, or, rather, the totality of all the specific kinds of activity in which humans engage, is the most important driving force in the development of human thought (where thought is defined as mental representations of the knowledge of the world) and language. In other words, our focus will be on the system: 'thought (world representation) - **types of activity** - language', where 'types of activity' is the main subsystem, and 'thought' and 'language' are supplementary subsystems that facilitate successful

[1]It may be objected that, in this model, thought should be viewed as the main component, because it is thought (discoveries and inventions made by individuals) that ensures the expansion of activities. To counter this objection, let us point out that, in the end, such inventions and discoveries are realized primarily in human activities. It is human activities (the qualitative diversity of types of activity) that serve as a unified criterion of a society's progress. In this respect thought, just like language, is a supplementary system that ensures the diversity and efficiency of human activities.

implementation of specific types of activity[1] (on the interaction between these subsystems in children in the course of their development, see [13]). Since none of these subsystems can evolve and develop without interacting with the other two, they should be studied only in the framework of a single system. This ternary system will be referred to as the **model of human activity development** (hereafter simply the human model). It allows us to study human society as an integral system of activities in the process (at a particular stage) of its development.

The model for an ethnogroup, consisting of the models of its individual members, has a quite similar structure. In it the types of activity represented in the community are comprised of the types of activities of its individual members and the representation of the world and language are the group averages - prototypes of the corresponding subsystems for individual members of the tribal group.

Using this models, let us discuss homogeneous and heterogeneous groups in more detail. All members of a homogeneous ethnogroup are involved in ordinary activities - a conventionally established set of activities necessary to sustain daily life. These ordinary activities provide for the community's necessities, such as food, abode, safety, rest, entertainment, etc. This type of activity spans the entire range of common everyday activities and their associated emotional experiences and physical exertions. We will call the totality of mental representations that a member of an ethnogroup has and that are related to everyday activities (their goals, order and manner of implementation, intermediate results, etc.), an ordinary world representation, or ordinary knowledge.

Hereafter it will be important to distinguish between two types of knowledge about an activity: (a) practical (or procedural) knowledge based on the actual experience of engaging in this activity and, because of such an experience, allowing for understanding of the activity and (b) theoretical knowledge, or mental representations of how this activity is carried out, that is not supported by actual experience (akin to declarative knowledge). An example would be theoretical knowledge about how to ride a bicycle ('mount it, push from the ground and start turning the pedals, using the handlebars to choose a direction') versus the practical knowledge of riding a bicycle that a cyclist has. The cyclist has a subliminal sensory-motor, or 'embodied', understanding of the cycling activity that a person with theoretical knowledge of cycling does not have. As is clear from the above, ordinary knowledge belongs to the domain of practical knowledge.

Directly connected to ordinary knowledge and ordinary activities is the language that describes them. Let us agree to call this language the ordinary language of an ethnogroup. It is adequately used and understood by all members of the community[2]. Thus, the ordinary life of each member of the group is carried out according to the interaction of the thought (knowledge), activity, and language components of the human model. It is understood that all members of the group have similar models.

Ordinary activity is contrasted by specialized, or professional, activity. This is carried out by a particular collective, set apart from the rest of the group, who use a specialized professional sublanguage and specialized concepts unknown outside of the collective. For example, a tea party has to do with the ordinary life of society we are accustomed to. It is a quite common procedure that any member of the society knows and understands well. Participation of tea connoisseurs in a tea party is already a specific kind of activity inaccessible to inexperienced tea lovers without special training; it requires knowledge of special terms and specific techniques of making tea. Cooking and counting are ordinary activities, while the culinary arts and accounting are specialized professional activities. These activities usually arise from the cultivation of certain kinds of ordinary activities, developing into professional activities that are no longer accessible to all the members of a group.

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[2]For space considerations, we will not compare our concept of 'ordinary language' with the well-known (and rather ambiguous) notion of 'ordinary language' in philosophy [14].

Those involved in professional activities possess professional knowledge and practical experience. Thus, typologically the knowledge of the professional group is analogous to the ordinary knowledge of the whole tribe. Engaged in their professional activity, a collective of professionals develops, on the basis of the ordinary language, a professional sublanguage. Consequently, just as for ordinary life, the professional life of the collective is carried out through the interaction of the same three (but in this case professional) components: knowledge, activity, and language. Having knowledge and activity experience, members of the collective adequately understand one another when communicating through the professional language.

Case example: Medical activity and its effects on the language and thought of an ethnogroup: To clarify the development of the human model and the interaction of its components, let us consider the role of language in the activities of a professional community. Take, for example, the medical language of a community of professional doctors and medical researchers. Every member of this community speaks the ordinary language of the ethnogroup to which he belongs, as well as the medical language. The latter is a specialized language that has the structure of the ordinary language but a specialized lexicon that includes terms concerning the structure and function of the human body, diseases, medications, etc., as well as certain specialized syntactic constructions. In addition to this professional sublanguage members of the medical community possess a stock of medical knowledge that supplements the ordinary human representations of the world, as well as the skills necessary for particular medical practices.

It should be stressed that a community of doctors cannot exist and develop in the absence of even one of the components that make up the model of medic similar to the human model - 'medical representation of the human world - **medical activity** - medical language'. Even more, not one of the system's components can exist and develop independently, separated from the other two. For example, if a medical researcher obtains new knowledge about the human organism (= development of medical representations), this new knowledge will receive a description in the medical language that may involve new terminology (development of the medical language) and will quickly become the domain of the medical community. This, in turn, brings to life new methods of treatment (= development of activity), thereby stimulating progress in the medical community. If, on the other hand, for one reason or another, certain kinds of medical activity deteriorate (due to religious bans, withdrawal of funding, etc.), the terms and medical notions related to such activities fall out of use and are forgotten, and the medical community begins to regress.

It is clear from this example that the main component in the medic's model is medical activity. Through the implementation of these activities neural codes are formed in the long-term memory of a medical professional, a surgeon, for example, for specific types of medical practices; these codes are used to store motor, sensory, and mental experience (for more details on these codes, see: [15]). Such neural codes are not formed in the memory of the surgeon's assistant, who helps in the operation process but does not take part in the operation itself. Therefore, the surgeon possesses professional knowledge (medical representations of human organisms, or declarative knowledge) and sensory-motor knowledge, or an 'embodied' understanding of the operation process (experience of the medical activity, i.e. a synthesis of declarative and procedural knowledge), while his assistant has only professional knowledge.

It should be emphasized that the ultimate goal for any existing medical community is successful medical activity. With this in view, the other two components of the model are supplementary. Thought is the second most important component; it paves the way to new kinds of activity. Medical language is third in importance. It is actively involved in the formation of the first two components, supporting collective thought and collective activities.

A most important function of language should be noted, without which the progress of medical thought would be impossible. Suppose a medical researcher discovers a new disease whose symptoms are varied (such as AIDS, for example). He uses a new term to name it and, using medical language, begins to elucidate its meaning (the nature of the disease) to his colleagues. Thus, the new term becomes generally comprehensible in medical circles. Without such a term, the newly introduced concept - 'AIDS disease' - could not possibly be

understood by other doctors because direct reference to the symptoms would not help in this instance. For this reason, it is the term itself that 'contains' the concept and gives it its generally applicable status. Note that in the initial stage of the development of the medical community, when all diseases might, relatively speaking, be called 'sensory', i.e. manifested to medical thought by their observable symptoms, the role of language is not critical. It becomes so with the appearance of 'functional' diseases, that is to say diseases that cannot be identified by their symptoms alone.

Let us now touch upon the issue of the influence professional groups have on other members of an ethnogroup (both professionals in other areas and 'non-professionals'). Let us look at the group of medics again. They directly interact with other members of the ethnogroup in the course of ordinary life and when engaged in medical activities; their influence is therefore multifaceted.

In the first place, the lexicon of the ordinary language expands. Some of the medical terminology diffuses into it, acquiring pseudo-professional (simplified) meanings that are easily understood. These include diseases (*flue, tonsillitis, tuberculosis*, etc.), medicines (*drops, tablet, pill, mixture,* etc.), treatment procedures (*take a medicine, use a plaster cast, go to hospital for a medical examination*), etc.

Secondly, some syntactic structures and grammatical meanings become part of ordinary language. For example, it seems natural to assume that the expression 'if and only if' came from mathematics, the formula *I will speak the truth, the whole truth and nothing but the truth* from jurisprudence and formulae of the type *Take before meals three times a day for two weeks* from medicine[3]. This new content component of language (let us call it pseudo-professional) has an independent status. It is typologically different both from general ordinary language and medical language.

The other components of the human model, knowledge and activity, expand along with language. Knowledge of professional terms and expressions that 'took root' in ordinary language enlarges the layman's knowledge of medical situations. Let us call such knowledge pseudo-professional knowledge. In contrast to practical knowledge (both ordinary and professional), pseudo-professional knowledge is theoretical knowledge not supported by canonical medical activities. Correlating superficially with professional knowledge, it is individualized and may vary from person to person. For example, some know one way of treating the flue or quinsy, some another and some practically nothing about it.

Lastly, expansion of the set of medical notions leads to the growth and finer differentiation of activities related to these notions: diagnosing a disease by its outward symptoms, identification of medicines by their color, shape, type of substance (powder, tablet, drops, mixture), how they are taken (including the time, regularity, and length of treatment), analysis of their effect, etc.

Thus, all components of the human model of members of a heterogeneous ethnogroup are supplemented by pseudo-professional constituents:

(1)   Activity = ordinary + pseudo-professional activity.

(2)   World representation = ordinary + pseudo-professional knowledge.

(3)   Language = ordinary + pseudo-professional language.

For professionals, such as doctors for example, professional constituents are added to the part on the right in (1)-(3).

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[3]Such examples reveal the mechanism (via new professional languages) by which the progress of a society (expansion of its professional activities) leads to linguistic progress, i.e. development of the content component of its language - its lexical and grammatical means. These examples also illustrate Baudouin de Courtenay's thesis that the progress of a language is manifested in the growth of its abstractedness (cf. section Sapir and Baudouin de Courtenay on the effect of culture on language).

Further progress of a heterogeneous ethnogroup - the development of various kinds of professional activity - leads to growing individualization of the pseudo-professional components of the model. Because of this, outside of ordinary activity and ordinary language individuals understand one another less and less because their pseudo-professional knowledge is theoretical and individualized (for more details, see: [13]).

Therefore, the main criterion for the progress of an ethnogroup is expansion of the kinds of activities it engages in. This expansion is supported by the other two components, thought and language, which also develop along with it.

Systematization of mental representations and conceptualization of linguistic meanings

Let us consider in more detail the close interdependencies between the progress of a society (expansion of its activities), the development of the mental representations of the world held by its members, and the development of its language (the expansion of its linguistic units).

The child's conceptualization of color and other properties: Our immediate goal is to explain the absence of color terms in Pirahã. To make that attempt it is necessary to first understand the consistent patterns of adjective acquisition in first-language acquisition. A remarkable paradox may be noted here. Unlike in the case of nouns and verbs, which children learn to use semantically correctly almost at once[4], the semantically correct use of adjectives comes only with time.

Although adjectives appear in a child's active vocabulary by the age of 18 months, for some time after their use is not based on their meanings but rather imitates the speech of the child's caretakers [16,17]). At the same time, the primary notion of semantic features, or classes (Color, Shape, etc.), "becomes apparent earlier than the distinction of homogeneous properties within each class" ([17,18]). Thus, the child soon ceases to confuse heterogeneous adjectives, such as *sour* and *big*, for example, but continues for some time to confuse homogeneous adjectives, calling a big object small, etc., cf: "[Philip] can use one color term instead of another […] he can also say *bad* instead of *good* or *big* instead of *small*. In other words, the child would rarely say *bad* instead of *green*, but he can confuse *bad* and *good* or *green* and *red*" [17-21].

Children begin to distinguish the colors of objects (their toys) at 18 months [22]. However, they require at least another year to learn to use color terms semantically correctly [18,19].

Thus, on the one hand, children at the age of 18 months distinguish concrete colors of objects and yet, on the other hand, over the next 12 or even 18 months they seem to be incapable of naming the colors using appropriate adjectives despite repeatedly hearing these adjectives used correctly by adults.

To explain this paradox, we draw on the following general proposition. At the age of 12 months a child has an initial (but fast-growing) model of the world as a system of prelinguistic concepts (for more detail, see: [15,23]). Because of this the child is able to acquire words (lexical meanings) only when the initial correlates of their meanings have already been formed as elements of the model. To acquire a word the child only has to relate it to a corresponding concept in his model. And this he does based on his observation of particular referential uses of the word by those around him[5]. For example, to learn the meaning of the adjective *red*, the child must have in his model the concept RED - prototypical red color as an independent element separate from other color elements (GREEN, etc.). Then, by observing referential uses of the adjective *red*, the child learns that it is the name of the concept RED. (He already 'knows' that concepts in the model have names and he must simply learn them)[6].

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[4]Some research data indicate that children begin to acquire object categories and names at 12 months, and the categories and names of activities 2-3 months later [23-25].

[5]This is facilitated by the basic ability for shared intentionality the child develops by the end of 12 months; it triggers the processes of joint attention and shared understanding of the current situation [26].

[6]In our view, at the age of 12 months the child's model of the world still lacks many important components found in the adult model, for example concepts of concrete properties. Therefore, at this age, the child is not yet able to understand and learn the names of such properties (for a somewhat different view, see: [23]).

The two-stage process of forming hierarchical representations of objects describes how the color concepts RED, GREEN, etc. are formed. During the first stage (up to 18 months) the child begins to single out separate sensory features in his (syncretic) representation of objects, such as Shape, Color, Size, and so forth. From 18 months on the child does not confuse heterogeneous adjectives like *green* and *small*, because their meanings reveal the character of their feature (Color or Size). But the concrete feature specification - GREEN or SMALL - is not yet contained in their meanings, because the meanings themselves are still syncretic, not broken down into concrete components. Therefore, the child may still confuse adjectives such as *green* and *red*, *small* and *big*, and so forth.

Later (during the second stage), based on the child's practical experience and acquisition of lexical names of feature values (*green, light,* etc.), within each feature are singled out the separate concepts RED, GREEN, etc. BIG, SMALL, etc. different visible feature values. These are now included in the meanings of the corresponding adjectives and children cease to confuse them. According to Voejkova [17], semantic errors in the use of color adjectives in children's speech disappear after the age of 2.5 years [18]). This fact allows us to conclude that, by 2.5 years of age, the child's syncretic meaning of the feature Color transforms into a palette of concrete prototypical colors, each of which acquires an independent status (on further development of the notions of object properties, and particularly on differentiating separate hues of a concrete color, see: [27]).

These developmental stages apply to the feature Size as well. This is indirectly attested by the fact that, while learning the words *big* and *small*, children continue for some time to confuse them just as they confuse color terms. Notably, brain impairment in an adult may lead to regress, when mental representations of certain previously singled out and independent properties are lost. However, the ability to use their more archaic syncretic correlates is retained. For example, a patient with damage to the cerebral cortex could toss a ball into any of three boxes positioned at different distances, yet he was unable to tell which of the boxes was the nearest and which the farthest [28]. The values of the feature Remoteness (concrete distance to an object), previously differentiated, were lost, but his perception of the distance to the box - a syncretic component of his holistic perception - was retained. Another patient, with damage to the basal temporal lobes, unerringly grasped objects of various sizes but was unable to indicate with thumb and index finger the size of the objects grasped [29].

Words for color in Pirahã: the role of color in the life of modern Europeans and Pirahã Indians: According to Everett [2], the Pirahã color terms for black, white, red, and green are not simple words: More accurate translations of the Pirahã words showed them to mean: "blood is dirty" for black; "it sees" or "it is transparent" for white; "it is blood" for red; and "it is temporarily being immature" for green. [...] They perceive the colors around them like any of us. But they don't codify their color experiences with single words that are inflexibly used to generalize color experiences. They use phrases [Ibid.].

Such use of analogy in color naming is not at all unusual. Similar analogous names are not uncommon in European languages, e.g. *bronze, copper*, and the like. What is unusual, however, is that in Pirahã there are no direct names for prototypical colors such as 'red' or 'green'. This brings to mind Berlin and Kay's [30] cross-cultural research of color concepts with its notion of the basic color term - a single-word name for a color (*red, green,* etc.) that designates a basic category for which the prototypical color is the same across different ethnogroup. Summing up Eleonor Rosch's analysis of color terms in the language of the Dani tribe, [31] points out that focal colors have "a special status within color categories – that of the best example of the category".

The absence of basic color terms in Pirahã allows us to assume that the color meanings of the feature Color remain syncretic, undifferentiated in the Pirahãs' mental representations. It would seem they have the same 'best example' of the color red - blood - as speakers of European languages[7]; however, this 'best example' does not seem to have facilitated the formation of a separate, independent prototype for the color red, the concept RED. Therefore, there is no meaning for the basic color term *red.*

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[7]Or, to be more precise, Standard Average European (SAE). This concept was introduced by Whorf [32] to group the modern Indo-European languages of Europe.

Why do Pirahã children not differentiate the syncretic feature Color into a color palette, a set of separate color prototypes RED, GREEN, etc. characteristic of children in Europe, especially in view of the fact that the singling out of the feature Color does take place? The logical supposition based on the discussion above is that the development of Pirahã children does not include the stage responsible for the singling out of separate values of the feature Color. The reason for this, it may be hypothesized, lies in the absence of necessary extrinsic factors, above all relevant practices involving color - ordinary daily interactions with separate color meanings.

Children in modern industrial societies are exposed to at least two extrinsic factors that stimulate differentiation of concrete colors. Firstly, children actively engage in choosing objects exclusively by color. Color is extremely informative in a child's world full of randomly colored artifacts. A child may possess a number of similar toys, pieces of clothing, pairs of shoes, sweets, chess pieces, etc., which are only differentiated by color. Often, color can have a conventional symbolic function - for example, as in traffic lights. In addition, when drawing with crayons or watercolors, children are free to choose which color to use. Secondly, color-naming adjectives such as *red, green,* etc. are used in the ambient language to name both the colors of objects the child sees and the color patterns of multicolored objects - *red stripes, green polka-dots*, and the like.

In the world of Pirahã children everything is different. They are surrounded by a world with its natural invariable (or naturally variable) colors. Artifacts of arbitrary color are very few (the simplest articles of clothing, tools, etc.), and even these are not chosen but acquired or exchanged by chance. Moreover, in those cases when color is informative - for example, green as the evidence that fruit is not ripe - it is usually not the only criterion. While green bananas are sold at grocery stores, the Pirahãs pick bananas only when they are ripe and are not green anymore. And the state of ripeness is assessed by not only the color of the fruit but by other signs as well, such as the color and condition of banana leaves, ripeness of other fruits that ripen at the same time as bananas, and so forth. An additional potential factor in the lack of color terms may be that the Pirahãs seem to lack any inclination for drawing, including the custom of painting their bodies with symbolic patterns - something found in many tribes over the world [2]. Finally, the second, lexical factor is also absent as Pirahã does not have single-word correlates for the adjectives *red, green,* and the like that name colors directly.

Thus, there are grounds to assume that the absence of color-related practices in the ordinary activities of the Pirahãs does not allow their children from differentiating the syncretic spectrum of the feature Color, transforming it into a color palette - a set of separate prototypes as conceptual meanings for basic color terms. This precludes the appearance of the terms themselves. By contrast, appearance of such prototypes facilitates formation of corresponding color-naming words[8].

The logic of the above argument is attested by the following fact. There are, in European languages, numerous analog designations for various color hues: *amber*, *amethyst*, *bronze*, *carrot*, *chestnut*, *chocolate*, *copper,* and so forth. Clearly, they are quite similar to color designations in Pirahã or, say, in Warlpiri: *yalyu-yalyu*, literally, 'blood-blood', meaning 'looks like blood', *yukuri-yukuri* ('grass-grass', or 'looks like grass after a rain'), and the like [34]. It seems reasonable to assume that such designations have a similar explanation: the ordinary life of Europeans does not feature practices that would involve such hues; therefore, they have not been conceptualized in their color palette.

However, in modern communities of artists and designers, in whose activities color hues play an important role, these hues may be singled out as independent prototypes, thereby enriching the set of basic colors. In this case their names may acquire the status of basic

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[8]This thought was first formulated by W. Gladstone in 1858. He expressed it while explaining why "the organ of colour and its impressions were but partially developed among the Greeks of the heroic age" [33], cf.: "The perception of color, Gladstone says, seems natural to us only because mankind as a whole has undergone a progressive 'education of the eye' over the last millennia [...] But why, one may well ask, should this progressive refinement of color vision not have started much earlier than the Homeric period? [...] Gladstone's answer is a masterstroke of ingenuity, but one that seems almost as bizarre as the state of affairs it purports to account for. His theory was that color – in abstraction from the object that is colored – may start mattering to people only once they become exposed to artificial paints and dyes. The appreciation of color as a property independent of a particular material may thus have developed only hand in hand with the capacity to manipulate colors artificially. And that capacity, he notes, barely existed in Homer's day: the art of dyeing was only in its infancy, cultivation of flowers was not practiced, and almost all the brightly colored objects that we take for granted were entirely absent" [35].

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terms. For example, designers may use the descriptor "pistachio" ('a pale yellow-green color') directly, without associating it with the color of pistachio nuts; then the adjective *pistachio* would have become a basic color term for the international community of designers.

Lexical indicators of time: Two-stage acquisition of color adjectives by children is also typical of other groups of words that designate various (alternative) meanings of particular features (common properties). It has been noted above that children confuse indicators of time such as *yesterday/tomorrow*: *My savtra xodili v les* 'We went to the wood tomorrow' (Nastia, 28 months); *Ya k babushke vchra poedu* '*I'm going to my grandma's yesterday*' [17]. Such errors have a similar explanation; the child already distinguishes the feature 'non-present time' from the feature 'present time', but the meanings of the former, 'past-yesterday' and 'future-tomorrow', remain undifferentiated. However, differentiation will happen quickly as it is motivated by the child's daily experience - the daily cycle in which these notions are strictly separate from 'today', and the lexicon (the child keeps hearing the words *yesterday* and *tomorrow* used by others)[9]. But in the mental world of the Pirahãs analogous concepts are absent; their life is not divided into daily cycles: Pirahãs take naps (fifteen minutes to two hours at the extremes) during the day and night. There is loud talking in the village all night long. […] Because different fish can be caught at different times of the day and night, Pirahã men can be found out fishing at any time. This means that there is less differentiation between day and night, aside from visibility. A Pirahã man is as likely to be found fishing at 3 a.m. as at 3 p.m. or 6 a.m. […] If someone catches fish at 3 a.m., then that is when it will be eaten. Everyone will get up to eat as soon as it is brought in [2].

This is why there are practically no direct correlates of such lexical indicators of time in Pirahã as *yesterday*, *today*, *morning*, *evening*, *week,* and so forth, typical for European languages. What Pirahã does have are descriptive time markers that correspond, in their descriptive character, to the descriptive nature of their designations for colors. Here are some of them: *pi'í* 'now', *hoa* 'day' (lit. 'fire'), *ahoáí* 'night' (lit. 'be at fire'), *hisó* 'during the day' (lit. 'in sun'), *hisóogiái* 'noon' (lit. 'in sun big be'), *piiáiso* 'low water' (lit. 'water skinny temporal'), *pi-ibigaíso* 'high water' (lit. 'water thick temporal'), *hibigíbagá'áiso* 'sunset/sunrise' (lit. 'he touch comes be temporal'), *'ahoakohoaihio* 'early morning, before sunrise' (lit. 'at fire inside eat go') [1]. Essentially, all of these are absolute characteristics of time periods immediately recognized by their observable features.

There are both absolute and relative time markers in European languages. For example, the words *morning* and *evening* denote relative periods of time (within a sequence of periods, 'night', 'morning', 'day', 'evening') and do not have directly observable visual markers. And the indicators *now*, *sunrise*, *sunset*, *midday* designate visually identifiable periods of time. Compare also the following pairs: *low tide* - *piiáiso* 'low water'; *midday* - *hisóogiái* 'in sun big be'.

Thus, there are only absolute temporal markers in Pirahã, while European languages have both absolute and relative temporal markers.

Counting and count words: Commenting on the absence of numerals in Pirahã, Everett writes: At first I thought that the Pirahãs had the numbers one, two, and "many," a common enough system around the world. But I realized that what I and previous workers thought were numbers were only relative quantities. […] And I also noticed that they could use what I thought meant "two" for two small fish or one relatively larger fish, contradicting my understanding that it meant "two" and supporting my new idea of the "numbers" as references to relative volume - two small fish and one medium-size fish are roughly equal in volume, but both would be less than, and thus trigger a different "number," than a large fish. Eventually numerous published experiments were conducted by me and a series of psychologists that demonstrated conclusively that the Pirahãs have no numbers at all and no counting in any form [2].

Everett's observations allow us to suppose that the Pirahãs have formed only precursory notions of the category "number": *hói* 'a small number', *hoí* 'a large number', *xogió* 'all or almost all' [1]. However, further differentiation of these notions into concrete sets - exact mean-

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[9]A similar phenomenon may be found in the case of many other names for alternating objects and events. For example, when they begin to use personal pronouns children at first confuse them, using I instead of you and vice versa. Interestingly, this also happens in sign language acquisition; children often use a gesture to point at the interlocutor when referring to themselves, and vice versa [36].

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ings of the feature Number expressed by count words - appears to have never happened. This fact seems entirely natural in light of the fact that the Pirahãs do not use counting in their daily life at all, cf.: "As I observed more carefully, I saw that they never used their fingers or any other body parts or external objects to count or tally with" [2].

A genetically conditioned predisposition to count undoubtedly exists in human infants (see, for example, [37]), but an external factor - the absence of counting practices - slows its development. It should be noted that it is the absence of such practices (and not of count words) that provides the main evidence for the Pirahãs lacking conceptualizations for exact numbers (quantities). It has been shown experimentally [38] that count words do not change our mental representations of number but serve as a tool for dealing with large sets. For example, the Warlpiri (Australian aborigines) use counting despite the fact that the numeral system in their language is impoverished [2]. This seemingly paradoxical situation can be easily explained. It arises through gestural counting, using fingers (and toes or other body parts). Cf.: In the child's developing communication and in the reconstructed languages of many language families, finger gestures serve as symbols for corresponding numbers; this may be considered a universal feature of natural languages in which, as a rule, the numeral 5 used to mean 'one hand', 10 'both hands', etc. [...] [N]europsychologists come to the conclusion that language and mathematics are independent of each other, and to the proposition, in the spirit of Plato, that the notion of number appears before the word that stands for it [...] It may be hypothesized that the earlier notion of number was first embodied in gesture, and only later in word [37].

The need for counting practices is supported by an analysis of count words used by the Mundurukús, a community of hunters-gatherers who also live in Amazonia. As noted by [39], in contrast to the Pirahãs they have some count words: from "one" to "five". However, the Mundurukús use their words for 'three', 'four', and 'five' to refer not only to the exact numbers but also to amounts close to these numbers; they choose these words intuitively, that is, without making an exact count [Ibid.]. Nonetheless, some Mundurukús can count exactly (slowly and non-verbally, using fingers or toes); yet, like Pirahãs, they seldom count as they have no practical need for exact counting [Ibid.]. For a more detailed analysis of the relationship between counting and count words see [12].

It should be emphasized that number acquisition in children is a two-stage process. First, the feature Number is singled out in their mental representations, followed by its meanings - concrete quantities. Evidence for this two-stage process comes from children's acquisition of count words, a process quite similar to the acquisition of color words described above. Initially, in children's utterances, "numerals appear before the noun, but, as a whole, the structure only resembles functionally similar utterances of adults because the real number of objects does not correspond to the number named by the numeral" [17]. Only later does the child learn to name numbers correctly.

Conclusion

The analysis given above shows the magnitude of the influence exerted by the progress of a ethnogroups (its civilizational component, according to Sapir) on the development of the content component of language - its lexical and grammatical elements. In this way we are able to understand the mechanisms by means of which, as Sapir wrote, the rapid development of Western European culture over the past 2,000 years was accompanied by 'a corresponding accelerated rate of change in language' [9].

Regarding Everett's claim that culture directly affects language structure (See section On the Pirahã language: does culture affect language?), it does not seem to be substantiated by hard evidence. Moreover, it is doubtful whether such a claim is justified at all. Indeed, as has been shown above, the crucial factor in the development of language in a developing society is the constantly arising new professional languages. However, each of these languages inevitably uses the syntax of the base (common) language when defining its new terms and metaphorical and idiomatic expressions. With this in view, it would be natural to assume that the culture of a society in an advanced stage of progress (that is to say, its civilizational progress) is unable to modify the syntax of its language - for example, to change its basic word order (SVO, SOV, etc.), as discussed by Pinker (see section On the Pirahã language: does culture affect language?).

Acknowledgements

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