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## Multidisciplinarity As a Verification Searching Methodology (The Case of Whorf's Hypothesis Refuted)

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*The methodology which the paper presents is a way verification might grow its accuracy. The material to counter-evidence is Whorf's hypothesis, namely its strong version that claims a language determines the way its speakers think and create their cognitive categories. To provide a successive justification methodology the authors begin with explication of the logic which might rest in Whorf's mind, then they reveal weak points of the theory itself via linguistics- and semiotics-related arguments-against. Further they go to the philosophy of language presented in the article by J. Derrida and F. Girenok providing no accurate proof for they speak in the name of a generalization-oriented domain. The discipline to approximate language and thought correlation is cognitive psychology, the domain that applies experimental methods. The most accurate verification of thought and cognition primacy over language is found within the 5 principles of psychoneurophysiology. Thus, the authors both meet the requirement toward science verification and conclude beneficiaries to be philologists who could overview a logo-centered approach to language and speech analysis.*

*Keywords: proof, overturn, hypothesis, Whorf, mind, thought, cognition, language, word, semiosis, determine, logo-centered, language philosophy, postmodern, cognitive psychology, experiment, psychoneurophysiology, principle, verification.*

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### Introduction

As compared to natural sciences, the field of humanities hardly adheres to the principle of reliability. In philology there are unobservable inputs to be depicted – a way preverbal and mental acts occur, then thoughts and words “meet” before speaker utters. In this light our concern is which instruments sciences can offer to explicate the inputs and outputs, whether scholars provide grounding, strict argumentations of an idea to cleave to

the credibility principle, and if so, whether they are relevant and consistent enough to posit them as verification. To illustrate this we should refer to a theory, which is a matter of considerable interest of numerous generations of researchers, so confirmed and/or refuted now and then, and which attracts another ample attention in the course of time. The Sapir-Whorf theory of linguistic relativity is one of them. The like theories directly or indirectly affect well-known ideas or fundamental laws

of life, as a result they overgrow with legends and secondary interpretations.

We are also ones of those who wish to refute the main argument of the hypothesis – that language determines / influences on thinking and cognition, but we will do it from the position of a multi-stepped methodology. In Foreword to ‘Language, Mind, and Reality’ (1942) John B. Carroll says: ‘If Whorf was too daring in his postulations, the burden of proof will remain with the present and future generations of scientists’ (Whorf 1952, p. 168).

### Theoretical framework

To recall, the theory was formulated in the 1930s by Benjamin Lee Whorf, who was impressed by Edward Sapir’s lectures how language affects the formation of worldview.

Here are two of Whorf’s abstracts:

- (1) *Inlinguistic and mental phenomena significant behavior (or what is the same, both behavior and significance, so far as interlinked) are ruled by a specific system or organization, a “geometry” of form principles characteristic of each language. This organization is imposed from outside the narrow circle of the personal consciousness, making of that consciousness a mere puppet whose linguistic maneuverings are held in unsensed and unbreakable bonds of pattern. It is as if the personal mind, which selects words but is largely oblivious to pattern, were in the grip of a higher, far more intellectual mind which has very little notion of houses and beds and soup-kettles, but can systematize and mathematize on a scale and scope that no mathematician of the schools ever remotely approached (Whorf 1960, p. 177).*
- (2) *‘It was found that the background linguistic system (in other words, the grammar) of each language is <...> the shaper of ideas, the program and guide for people’s mental*

*activity <...>. Formulation of ideas is <...> part of a particular grammar. <...> We dissect nature along lines laid down by our native languages. <...> <...> we are parties to an agreement to organize it in this way (Whorf 1956, p. 212–213).*

It is obvious these abstracts show the way the main idea unfolds:

- (1) a “geometry” of form principles forms of a person’s thoughts are controlled by laws of pattern (structure of words) – the thesis that illustrates that language is “a symbolic key to behavior” (Sapir 1993), the key to understanding how we think and perceive;
- (2) hence language (pattern) indicates understanding of our logic, it **can** control and determine ways of systematizing knowledge, and thereby determine the way of thinking. Note that here the most important point of our refutation lies.

### Statement of the problem

Derek Bickerton claims that to be people the latters should have something to differ from nature/animals; language, mind, and evolution are the ones to give more than nature needs. People did have thoughts before there came language but language provided the condition to get thoughts *complex* (Bickerton 2014). The idea seems to partially support the hypothesis, but, however, like many other scholars who, on the contrary, deny Whorf’s idea about language determining thinking and creating cognitive categories, Bickerton does not offer a sound proof of the counter-belief. Our objective is to offer it.

### Methods

The basic *how-method* applied in this paper deals with a cognitive sphere within which speech production and perception pilot. Compared to a *what-method*, it is monadic (atomic), reality approximating and devoid of

generalization technique. The method meets an interdisciplinary research, namely in the aspect of verifiability of the beliefs claimed. In the core of our methodology lies a firm belief in isolatedness of thought and verbal structure. The latter got clear after Broca's and Wernicke's findings in XIX century, and in the course of time proved in aphasia – a speech production pathology (*see* issues raised in American Journal of Speech-Language Pathology, Journal of Speech and Hearing Disorders, Luria 1976, Paradis 2004). On our side we illustrated this state of neurothings in a Buryat-Russian switched code (Dashinimaeva, 2015).

The *methodology* itself is in presentation of a number of domains up to the criterion “the issue of speech perception and thought-and-speech production grows its accuracy from the standpoint of evidential effect” – from linguistics to language philosophy, further to cognitive psychology, and, finally to psychoneurophysiology.

Let us begin *Discussion* with linguistics framework.

Whorf claims that the North American Indians' Hopi language does not have grammar forms of time description. Alongside, there are forms that indicate other characteristics of time flow, such as tempo, duration, intensity, and so on. Though Whorf admits that worldview is built within different categories, not universal ones, we present rhetorical questions of counter-argument character:

1) Is the criterion of “time division into the past-present-future” the only indicator of a “civilized” thinking about time? Of course not. This approach comes from Standard Average European, but didn't Sapir put forward the principle of cultural relativism, according to which one cannot analyze the language of other cultures in terms of their own criteria?

2) Aren't action-specific characteristics as important temporal categories as time axis

(Dashinimaeva 2009)? We say yes, which means the Hopi language has “prepared” grammatical indicators of time-&-space.

3) In this context how do we evaluate dynamics of form changes, when language rejects “redundant” language tools in order to achieve compactness of expressions, to exemplify, the English language freed from a set of morphological tense forms? Then, how to analyze the shift evolution (see “category modification”) when native speakers voluntarily get rid of some expression markers of space-&-time relationship? Shall we evaluate it as impoverishment of thinking and perception ways?

As one can see, these rhetorical questions against the background of modern linguistics deny a form-structure-oriented approach, which postulates a split whole of form and thought (e.g. in a double model F. De Saussure).

### **Postmodernist vision applied as a refutation ground**

In postmodernist linguistic philosophy such a position is described as logo-, phonocentric vision of correlation between speech and thought, which is determined by the omnitude of outside world, that is reference. The radical “anti-phonocentrist” Derrida protested against the closure of thinking in language, against the “oppression” of written language on the background of oral speech. On the one hand, “irreversible linear sequence”, i.e. written language, on the other hand, the potential values, hidden in the written speech, and *there must be a gap* (diastema) between them, diversity “becoming a space of time” and the deployment of the values in some inherent locality. According to Derrida, a diversity of values “does not obey the linearity of logical time already, the time of consciousness or preconscious of time “verbal representations” (Derrida, 2000, p. 276).

Thinking about why “literary criticism in any era in essence and purpose is structuralism,”

Derrida notes that “the form fascinates when there is no more power to understand the power inside out. That is “<...> a creation is carried out not only in” the form, attitude and configuration, “but in the specific integrity” (Derrida, 2000, p. 9-10). Apparently, concept is integrity: it is not a word, it is for the thought formation. This understanding is likened to the concept of Roland Barthes “transcendental signified”, that is thought outside of the linguistic sign (because the signified precedes the process of signification). Both Derrida and Deleuze, and Barthes, rightly criticized logocentric metaphysics, according to which thought and meaning imply the presence of text (language) with pure and simple connections.

Next, we will quote a modern Russian philosopher F.I. Girenok to reinforce our arguments: idea does not refer to language. Idea never coincides with the spoken. <...> Thoughts are in language but not from language. And language nonsense is not from language, but from a productive capacity of imagination. There is no creativity in language itself, like, the new is not in stone but in those hallucinations the sculptor wants to grasp. In other words, the novelty is in the meeting of consciousness and language, these two self-contained entities, between which there is no family relationship. Between language and consciousness is possible treatments *overlay, intersection, friction, etc* <...>. *Human language is not a signal of non-linguistic dimension* (Girenok by: <http://www.censura.ru/view.htm?articulum=47>) (translated by D.P.). We fully agree with this reasoning, because it emphasizes discreteness of thinking from the form of its presentation, the preceding being nature of thought and succeeding being its verbal manifestation.

These findings suggest that the French postmodernist’s “diversity”, “irreversible”, “linear” and “potential value” correlate to the Russian philosopher’s “meeting”, “imaginary”,

“arbitrary actions of man for himself” and language, devoid of “creative.”

Against these lingua-philosophical protests, linguistics in general has always been logocentric, relying on a tangible, visible and audible material, i.e. something that provides a verification opportunity. On the contrary, something transcendental, invisible, not clothed in the outer envelope, does not correspond to the principle of “presence” because it is unproven or does not deserve a rigorous description (“diversity”).

*Semiotic approach in linguistics*, on the other hand, is more advanced in the issue treatment for they do not interpret “presence” in the like materialistic way. However language is of the same significance dominance at that. Here we recommend to view thought-&-language correlation from another semiotic perspective: insert pragmatics between word and thought as a stage that transforms “thought for oneself” into “thought regulated for others”. In order to have this thesis more credible we go to an inter- and multi-aspect of the question posed initially.

In this respect we remind of “World Declaration on Higher Education for the XXI Century”, adopted by UNESCO in 1998, which states that “the younger generation will have to acquire new skills, knowledge and ideas. <...> Everywhere higher education is faced with serious challenges and difficulties <...> At the same time higher education faces new horizons associated with the technologies that contribute to knowledge creation, management, dissemination, access to and control over them. Equitable access to these technologies should be ensured at all levels of educational systems” (<http://www.lawmix.ru/abrolaw/9374>). Next, Articles 5 and 6 contain recommendations for promotion of transdisciplinary approach use to solve complex problems of nature and society, not only for research aims but also in educational programs of universities.

*Discussion. Areas of knowledge with a high degree of verification*

To refute Whorf's theory from the point of view of transdisciplinarity we take a postmodern idea-antithesis of "empty" sign as a fundamental principle to get a proof, that is to turn an unobserved semiosis into an observed one (after all, the idea of "empty" sign cannot be a proof by its own).

Let us first refer to a mediated visualization level of experiments conducted in cognitive psychology, in particular, the one of Elizabeth Spelke and her colleagues (in: *Cognitive Psychology*, 2002). For example, showing infants different pictures and watching which of them fix more attention, the researchers consider whether babies have cognitive abilities. A definite set of objects in the same picture alternates another set with fewer or more objects. Testees' reactions support the idea that they can distinguish objects combinations, so they induce and deduce before they learn to speak. The research proves: 1) babies have an active representation ability, for they perceive causality and foresee changes in the state of things hardly having any experience of perception and action; handling these representations lets them discover the world; 2) there exists a sort of "core knowledge in infants" (Ibid. p. 367). Thus, not having mastered motor and verbal skills yet, infants analyze, compare and synthesize what they have seen without its verbal support.

A number of psychologists from University of Surrey, UK, held a cross-cultural study of English and Setswana speakers on a colour triads task to test the Sapir-Whorf hypothesis. Speakers of the two languages did a task to choose the colour which was least like the other two. As a result the authors note: "<...> the choices made by the two samples were very similar for both kinds of triads, thus supporting universalism. But there were small but reliable differences associated

with linguistic differences, thus supporting Whorfianism" (Davies et al, 1998, p.1).

Another base to test the hypothesis weak form is human's ability to give a counterfactual reasoning. The research experiment held by Terry Kit-Fong Au, Harvard University, United States, yielded no support for the Sapir-Whorf hypothesis. The scholar revisited both Bloom's findings and the hypothesis using Chinese and English versions of a new counterfactual story as well as the story used by Bloom. The findings "suggest that the mastery of the English subjunctive is probably quite tangential to counterfactual reasoning in Chinese" (Au, 1983, p. 155), demolishing speculations about how Chinese language might influence Chinese thought, in particular that the putative lack of counterfactual markers hinders the understanding of counterfactuals (Bloom 1981), since in fact, Chinese does mark counterfactuals. Focusing on the relationship between language and cognition the author summarized via the two questions addressed by the author: "Can we think without language?" and "Can language shape thought?". The answers are, respectively, *yes* and *no*, thereby rejecting Whorf's hypothesis in favor of the mainstream separate-but-equal view of language and cognition. The author notes that there is now a "Whorfian renaissance", though none of the recent Whorfian research on Chinese is cited (e.g., Zhang & Schmitt 1998, Boroditsky 2001) (Ibid, pp. 281-286).

*Psychoneurophysiology* seems to have a more plausible verification basis for data from neurology, neurosurgery, psychiatry, and cognitive psychology integrated with data obtained through the use of modern neuroimaging techniques such as functional magnetic resonance, positron emission tomography, and magnetoencephalography. The methods help to measure and visualize brain electrical activity, i.e. to study ways information processes in brain in real time, and as a result

the unobservable becomes observable. Although neurophysiology of thought and speech refers to a new domain, its roots go back to 1918, when the “pioneer” of neuroimaging C.E. Dandy first applied Pneumoencephalography to the brain.

Basic principles of psychoneurophysiology of thought and speech, described in scattered forms in different sources (Geschwind 1982, Ojemann and Whitaker 1978, Paradis and Goldblum in 1989, Clark 1989, Vendrell 1995, Mack 1998, Deacon 1999, Harasty 2000, McDonald 2000, Barsalou 2003, 2009, MacWhinney 2005 Paradis 2004, 2007, Hale et al. 2010 [www.neuroscience.ru](http://www.neuroscience.ru) al.), are given in this paper as a neurosemiotic system (see Dashinimaeva, 2011).

The first principle is neuroanatomic and physiological isolation of linguistic forms and respective semantic entities (French surgeon Paul Pierre Broca is known to have registered the discovery of this form of autonomy in 1865). From this basic initial principle we pose that the external speech stage succeeds the flow of thoughts. A thought and speech separate activity means that both “are served” by different neural threads. Thus, the principle is self-sufficient enough to put an end to the issue posed initially. Also, the principle is an epistemologically meaningful benchmark: taking it into account we can review methodology in linguistics and literature, and other humanities.

The most traditional confirmation of the above claims are the deaf who manifest their thoughts in a nonverbal code. Another proof is a unidirectional meditation, for example, in Buddhist practice. It is for a reason that Zen buddhism regards word as a kind of barrier: “reality can only be grasped by bare hands, “without gloves”, which means without resorting to words, <...> to transmit teaching without words, from mind to mind” (Kudryashov by: <http://lib.roerich-museum.ru/node/931>). Therefore enlightenment, known to occur when a person

gets rid of word and attachment to sign, is for a good reason.

Next going principles reinforce evidential value of the first law.

Principle 2 determines the mechanism of formation and development of verbal and nonverbal behavior skills. In its core there lies the electrochemical mechanism of neuron activation itself, which claims that each perception and production establishes, modifies or strengthens appropriate neural connections. Thus, the stronger the connections the easier the action is implemented or said which means, the subject has regularly perceived and/ or produced the corresponding action. So, any experience that has turned into a skill is a consequence of the multiplicity of the corresponding neural activations.

How does this principle support our counter-argument? It denies a symmetric and split cohesion of form and content, since the formal cover of a word is static, its content is endlessly dynamic, for the speaker “contributes” a unique semantics into every speech. For example, the Hopi native speaker utters a grammatical form to indicate, say, the speed of action performance, but in one case meaning a derogatory attitude to the tempo, in the other – a neutral or approving attitude, say nothing of the event and the participants specifics described.

The third principle that we call “metonymic” (in the sense of cause and consequence relation) explains that the mechanism of neuron activation starts and implements in the name of committing a behavioral act, not for the sake of meeting a stimulus intention (Alexandrov, Y., Anokhin, K. etc.). This means that first comes into mind an intention (idea) to do something, both physical or mental, but not to produce a particular string of words. To verify the principle we might refer to E. Aronson who notes the relationship between different objectives set to the tested in a reading

experiment (1980). “When set to memorize certain grammatical groups the reading has prolonged stops at the borders of these forms <...>, while the problem “understanding” causes more time in reading most important semantic units of the text” (by: Velichkovsky 2006, p. 134). In this aspect the instructors who set objectives before reading are considered to supervise in the right way.

The fourth principle is functional brain plasticity, systemogenesis flexibility. It claims that cells might enter into new forms of coordination, changing or altering the old ties in accordance with the degree of “its specialization.” It is obvious that this principle is directly linked with the preceding principles. E.g., a human sets the task to think more positive, and thereby their thinking and talking positive leads to (un)conscious modifications of the old corresponding neural connections, i.e. to a systemogenesis change.

Here goes an indirect verification of semantic priority to formal. In the age between two and three years children form a “verb island” up to their contexts (Ibid, p. 140). E.g., modal verbs denoting ought, desire, and the possibility of situation occurrence form a probabilistic implementation algorithm. In other words, the context (meanings, semantics) causes the appearance of the form, but not vice versa.

The fifth psychoneurophysiology principle is based on cell proliferation: neurons don’t only die, but reappear in large quantities in the brain to “serve” new experience of the subject. It might be mastering a foreign language, or new words and language structures. However, cognizing other cultures in the ways of their thinking does not mean learning their language forms and

structures. Now it is vivid that the latter do not automatically give new forms of knowledge, since they are only the key to the door behind which there is another culture. Entering, a human might not see something new in this space, for to see new perceptions – the way foreigners do – they should have them separately cognized.

### Conclusions

The five speech-thinking activity principles contribute a great deal to the initially posed verification “thinking ultimacy in relation to language production in speech” on the atomic – psychoneurophysiological – level. Since scholars of various directions go on describing language and speech phenomena in their research, our recommendation is to heed these five principles and to have a look at the “original locality” of thoughts and stop equalling “stone” and “sculpture”. The tension between the Sapir-Whorf universality and the relativity perspective has dominated much of linguistic and psycholinguistic research for the past fifty years (Myers, J., et al, 2007), but psychoneurophysiology has become sufficient enough to turn the Sapir-Whorf hypothesis close to question.

Due to the fact that our study is still classified as a dominant-philological, the last “nail on the chalkboard” evidence should not be atomic. Let it be a well-known metaphor: the idea is an impending cloud that may rain with words, and the motivation of thought is the wind, driving the clouds (Vygotsky, 1999, p. 332). Our contribution to the metaphor is that 1) cloud and rain are separate units, and not every cloud may result in a rain, and 2) cloud is unique, since water drops and pieces of ice are never of the same nature and configuration.

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## **Мультидисциплинарность как методология поиска доказательств (на примере опровержения гипотезы Уорфа)**

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*На примере поиска доказательств, системно и последовательно опровергающих основной постулат Уорфа о детерминированности мышления и познания языком («сильная» версия гипотезы), в статье представлена мультидисциплинарная методология исследования по принципу «нарастание степени верификации». Сначала выявляется логика прихода Уорфом к гипотезе, затем определяется слабость доводов внутри самой теории при помощи чисто лингвистических и семиотико-направленных аргументов. Далее представлены идеи Ж. Деррида и Ф. Гиренка из философии языка, не предоставляющей доказательства в силу обобщающего характера дисциплины, когнитивной психологии, приближающейся к достоверности описания происходящего в мозге посредством экспериментов. Наконец, наиболее точной области в аспекте презентации обоснований – психонейрофизиологии, представленной в виде пяти принципов речемышления. Таким образом, авторы не только предоставляют доказательность научного знания, но и подводят читателя к выводу о пересмотре логоцентристских традиций описания языковых и речевых явлений. Следовательно, бенефициариями результатов исследования являются прежде всего сами филологи.*

*Ключевые слова: доказательство, опровержение, гипотеза, Уорф, мышление, познание, язык, слово, семиозис, обуславливать, логоцентризм, философия языка, постмодернизм, когнитивная психология, эксперимент, психонейрофизиология, принцип, верификация.*

*Научная специальность: 24.00.00 – культурология.*

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