centration of about 322 ppM in 1970 as the base. The concentration of $CO_2$ will be about 385 ppM in the year 2000 and was about 290 ppM at the beginning of the industrial area (*sic*).

In the same volume, p. 86, Bacastow and Keeling suggest something considerably more radical. "On the assumption that industrial $CO_2$ production continues to increase at the rate of the past 20 years and that the ultimate increase in biomass of the land biota is no more than twice the present biomass, the atmospheric $CO_2$ concentration will reach a value six to eight times the preindustrial value in 100 years.

[40]Fermor, John H., 1978. Paleoclimatology and infra-red radiation traps: Earth's antediluvian climate. *Symposium on Creation VI*, pp. 15-27. Pacific Meridian Publishing CO., Seattle.

There would be a disintegration of what is known as Rossby cell circulation for planetary wind systems. This applies especially to the midlatitudes where westerly wind systems prevail, and bring as the case may be, rains or lack thereof.

The Rossby cell which predominates above the Tropics of Cancer and Capricorn would be replaced by a Hadley cell circulation. This system today is typical of the tropics, and is characterized by trade winds, which are easterly and more gentle than the typical midlatitude wind system which is westerly and more blustery.

A Hadley- type cell circulation for winds would extend from the equator to both poles. This is our analysis of climatic change.

[41]When the atmospheric $CO_2$ concentration was increased by 27% (from 315 ppM to 400 ppM), there was an increase of 7 to 7% in net photosynthesis using the partial stomatal closure model. Simulations of plants that do not close stomata in response to $CO_2$ gave a 21% increase. Furthermore, increases in diffuse radiation which may accompany climatic changes often gave larger predicted net photosynthesis rates. See Ekdahl and Keeling, "Atmospheric Carbon Dioxide and Radiocarbon", *Carbon and the Biosphere*.

[42]Carbon-14 dating scenarios require an adjustment to be made for the recent industrial enriching of $CO_2$ in the atmosphere; otherwise there would be a built-in error. This adjustment is known as the Suess effect. The Suess effect also needs analysis and application for the era prior to 1000 B.C. when, if Figure 1 is a reasonable approximation, the ratio of C-14 to C-12 was also diluted, and very much diluted.

[43]St. Augustine, *loc. cit.*

# LANGUAGE WAS CREATED, NOT EVOLVED

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*During the preparation of a graduate thesis in the area of comparative linguistics, the author found that practically all linguistic theory is based on the evolutionary hypothesis. But there is no sound reason for basing it thus; it is merely a presuppositon. The Biblical teaching, that language was brought into being fully developed at the Creation, and that it was miraculously diversified at the time of the Tower of Babel, is in better accord with the facts.*

Historically, the controversy between the creationist and the evolutionist explanation of origins has focused in the biological and geological realms of science. This is understandable, since it is here that the two theories come into the sharpest contrast, and it is here that the interpretation of the data has been most disputed. As a result, however, other areas also affected by the differing presuppositions of the two theories have been neglected, and some virtually ignored. One such area would seem to be that of linguistics.

For most people, language is a given, something taken for granted. To a certain extent, this is not invalid, since one of the first rules a beginning language student must learn is not to ask why a language does something, but to accept the arbitrariness of it, and to learn it as it is. Even in one's native language, 'rules of grammar' are but a systematic observation of how specific groups of fluent speakers of that language handle the normal exigencies of verbal expression.

Yet, for all of the 'rules' (at times to the consternation of grammarians), language is not a constant. It changes through both temporal and geographical dislocation. It does not take much reflection to observe how rapidly and drastically it can change. The literary specimens of *Beowulf* and Chaucer contrasted with modern English serve as excellent examples with the English language. Perhaps less dramatic, but equally clear are the works of Shakespeare or even the King James translation of the Bible. Even more recent is the development of a technical 'jargon' during the technological explosion of the past several decades, much of which has been assimilated into general usage.

It has not been questioned, however, whether or not this observed change is 'evolution.' Of course, someone with evolutionary presuppositions would reply in the affirmative. Unfortunately, there has been either no reply, or merely a tacit acquiescence from the creationists. This silence apparently stems from several factors.

One such factor would seem to be a dichotomy between linguistic and scientific studies. Since linguistic studies fall under the broad category of the 'liberal arts,' while, as noted above, the evolutionary controversy has focused in the 'hard sciences,' it is hardly surprising that there might be a lack of personnel trained in linguistics who were also adequately trained in the overall creation/evolution issue to apply investigative principles in this area. On the other hand, those who are in the heart of the debate normally don't deal with language except in a secondary or practical sense.

A second factor would seem to be the fact that the field of linguistics developed amidst the swelling popularity of the evolutionary hypothesis. Comparative linguistics can be traced no further than Franz Bobb's *On the Conjugation System of Sanskrit Compared With That of the Greek, Latin, Persian, and Germanic Languages*, published in 1816.[1] However, it was not until the second half of the nineteenth century with such men as Saussure and von Humboldt that it became an integrated science.

The discovery that modern languages could be traced back to and could be shown to have developed from earlier languages which may or may not be defunct pro-

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foundly influenced the thinking of nineteenth century scholars. It is therefore perhaps not surprising that early linguists embraced the Darwinian hypothesis so ardently. The key to historical linguistics is change. The goal is to trace the changes back historically, and thus to discover and demonstrate common ancestry, ultimately to arrive at the 'original language' of mankind. Of course, this ultimate goal is not to be realized for several reasons, not the least of which is that the linguist leaves the realm of history when written sources are lost. For example, the modern romance languages (French, Spanish, Italian, etc.) can be traced back to Latin. The northern European or Germanic languages can be traced back to non-written primitive Germanic. Because of common peculiarities, these, along with Sanskrit, Greek, the Slavic languages, and several others, can be grouped under a common reconstructed ancestor, 'Indo-European.' At this point, all reconstruction must stop because of the pre-historicity of this reconstructed 'language.'

Because of the overwhelming evidence of change, including up to 4000 or more years of written documentation, it was assumed, if not from the start, then shortly thereafter, that this was the 'evolution' of language. More than this, however, the concept was woven into the fabric of the evolutionary theory. Ernst Haeckel, one of the foremost early proponents of evolution stated it thusly:

> August Schleicher, of Jena, in particular, has proved that the historical development of language takes place under the same phylogenetic laws as the evolution of other physiological faculties and their organs. Romanes (1893) has expanded this proof, and amply demonstrated that human speech, also, differs from that of brute only in *degree* of development, not in essence and kind.[2]

Additionally, the evolution of language was considered a verification of the overall theory of evolution. This theory necessitated a growing linguistic ability in 'man,' a growth that correlated with the more basic idea of mental development.

Darwin stated it as:

> . . . we may confidently believe that the continued use and advancement of this power (speech) would have reacted on the mind itself, by enabling and encouraging it to carry on long trains of thought. A complex train of thought can no more be carried on without the aid of words, whether spoken or silent, than a long calculation without the use of figures or algebra.[3]

Haeckel was more explicit:

> The higher grade of development of ideas, of intellect and reason, which raises man so much above the brute, is intimately connected with the rise of language. Still here also, we have to recognize a long chain of evolution which stretches unbroken from the lowest to the highest stages.[4]

While it may not be surprising that the proponents of the evolutionary hypothesis so quickly embraced this concept, it is somewhat surprising to note the extent to which this theory developed into a presupposition underlying linguistics. For example, Paul A. Gaeng in his *Introduction to the Principles of Language* cites eight different theories which seek to explain the origin of language. All are based upon the evolutionary hypothesis.[5]

Even more surprising is the extent to which scholars in the area of biblical languages have acquiesced to or even embraced this hypothesis. For example. A.T. Robertson, the great Greek scholar noted in his comprehensive Grammar, "There is, besides, no evidence that primitive man could produce speech at will."[6] Again, the three compilers of one of the standard Hebrew lexicons, Francis Brown, S.R. Driver, and Charles A. Briggs, all expressed explicit evolutionary views in their other writings.[7]

It is at this point that the question must be raised as to whether the evolutionary hypothesis is indeed a valid working hypothesis for linguistic theory? It is the suggestion of this writer that not only does the evolutionary hypothesis fail to explain the phenomenon of language, but that it also fails to explain the *observed* data of linguistic change, and furthermore fails to explain some of the basic consequences of linguistic theory. It is further his contention that the Biblical view of creation does in fact explain all three areas.

### The Phenomenon of Language

As noted above, there are at least eight evolutionary theories related to the appearance of language. The one common factor is the supposition that basic verbal communication 'evolved' from the basic signs or sounds of a limited non-verbal communications system such as is observed among 'primitive' peoples and some of the higher animals. This suggests either a spontaneous irruption of language and the accompanying mental skills, or that a self-aware, intelligent group of men consciously developed a system to communicate with one another. The former view is that taken by the classical evolutionists, such as Darwin and Haeckel as noted in their statements quoted above. The latter is the view apparently favored by modern linguists. For example, Gaeng states: "In any event, man had to have certain biological capabilities and a psychic constitution before he could use language."[8]

This perspective has been borne out by recent ape-language studies which have indicated a far greater gap between man and even the highest animals than many had deemed possible. For example, after five years of work with a chimpanzee named Nim Chimpsky, Herbert S. Terrace discovered:

> . . . after analyzing videotapes of his 'conversations' with his teachers, I discovered that the sequences of words that looked like sentences were subtle imitations of the teacher's sequences. I could find no evidence confirming an ape's grammatical competence, either in my own data or those of others, that could not be explained by simpler processes.[9]

The essence of this and two other articles on animal communications in the same issue is that while certain animals can learn a large number of symbols, what has been taken as verbal communication is in reality a "subtle non-verbal communication."[10]

While these observations are problematic for the

evolutionary view of language, they are strongly supportive of the Biblical view of language which is set forth in Genesis 1, 2, and 11. From these passages, several principles are to be noted.

First, Genesis 2:16-17 suggests that language was originally given by God to man in order to enable man to understand the responsibilities which were his as the steward God created him to be. Additionally, Genesis 1:27-30 and Genesis 2:22-24 suggest the secondary role of communication between the members of the human race in order to fulfill the stewardship responsibilities outlined. Thirdly, in Genesis 2:19, it is suggested that it is an indication of his stewardship position over the animals. Note especially that the very first requirement of man demanded an abstract reasoning ability.

Beyond this question of the origin of language in concept is the question of the origin of languages in their plurality. This is especially problematic when all of the diversity must be explained only by geographic separation. Consequently, linguists are torn between monogenesis and polygenesis. That is, they debate whether all the languages originated in one 'evolution' from non-language which diverged into the many languages known historically, or that several irruptions of basic language occurred in different geographic locations. The proponents of the former view look at the overall pattern of linguistic similarity. The proponents of the latter view look at the very vivid distinctions which divide language families. Again, the evolutionary hypothesis is hard pressed to explain why, on solely natural grounds, with such overall unity in the concepts of human language, there are such sharp dichotomies between the language families.

The Biblical view is that after the creation, there was only one language with a common vocabulary as noted in Genesis 11:1. However, man utilized this commonality of language to violate one of the basic prerequisites of his stewardship—to fill and subdue the earth. Consequently, they began to build a city and a tower, "lest they be scattered over the face of the whole earth." This was part of the reason that the same God who had given man language originally then produced differing language families (Genesis 11:7). The result is succinctly noted in Genesis 11:8 as the fact that they were scattered over the face of all the earth. Thus, the Biblical view of creation explains not only the unity, but the diversity of language.

### The Observed Data of Linguistic Change

If the evolutionary view of language development is correct, then language began as a 'non-language,' then became a prehistoric 'pre-language' consisting of signs and appropriate onomatopeia, which transcended into concrete terms denoting specific reference to observable realities, i.e. physical, sensational, or emotional phenomena, finally developing into abstract terms, or terms characterized by disassociation with observable realities. If this is so, then it must follow that language itself has developed, or become more complex.

What has not been explored in this context is, how does one denote degrees of complexity in language? Bodmer suggests four elements which are useful in tracing history and genealogy, and which consequently may be useful in determining the degree of development.[11] These are: 1) similarity of vocabulary, 2) accidence, 3) syntax, and 4) phonetics. However, of these only accidence and syntax are useful for the purpose of determining the degree of development.

Vocabulary is not useful for this purpose because of the high flexibility and virtual randomness of borrowing, coinage of new words, and the deletion of old words for seemingly inexplicable reasons. This is even more compelling in a non-written language, for in a written language, an 'obsolete' term may lurk for decades or even centuries in an obscure written passage and remain in that language field as long as that written passage remains in existence.

Phonetics is more ordered, with sounds and sound changes seeming to follow regular patterns. However, there is yet insufficient study to establish in more than very general terms what these patterns of change are, let alone to establish any fixed criteria for the dating of development, or to develop any comprehensive theory.

Consequently, only accidence and syntax are instrumental in determining the degree of development of a specific language. Surprisingly, the evidence of these two seems to run counter to the expected pattern.

For example, in the use of accidence, very simply stated, it is deemed that a language with a greater degree of flexion in person, tense, number, comparison, gender, case, mood, and voice is older. That is, the greater the decay or loss of flexions, the more recent or 'more highly evolved' is the language. Bodmer cites on one hand that "noun flexion is *always* a reliable index of linguistic progress (italics added)," and again cites the relative 'primitiveness' of the verb in both Celtic and Sanskrit, solely because of the great degree of flexion.[12] As in illustration, compare Spanish, French, and Latin. The former two both derive from the latter, yet while Latin has three genders (Masculine, Feminine, and Neuter), the others have only two (Masculine and Feminine). Additionally, while Latin has flexion for six cases (Nominative, Genitive, Dative, Accusative, Ablative, and Vocative), both Spanish and French have none. Similar data could be noted for the verbal systems.

In the case of syntax, generally the rule is, the greater the flexibility in word placement in a sentence, the older the language. This seems to reflect an inverse relationship to accidence. For example, the placement of the direct object is fairly rigid in English, while it is much more open in German and Latin because of the case endings which indicate the Accusative case.

Generally speaking, this is the opposite of what one should expect in an evolutionary system of language development, especially in the area of accidence. There, one would expect an increase in flexion as language grew from imprecise semi-verbal communication to a complex system of verbal communication capable of reduction to writing. However, this is precisely the phenomena one would expect in light of a Biblical view of creation. Here, the languages as given by God would reflect the best features available for carrying out the missions for which language was given. In a corrupt,

fallen world, however, they would also tend to degenerate, as has been noted historically.

### The Basic Consequences of Language Theory

There are most likely several consequences that may be derived from the basic language theory one holds. Some, such as the question of verbal roots in the Semitic languages, most notably Hebrew, are specific and thus do not fall within the confines of this article. More general is the question of concreteness versus abstraction. If one accepts the evolutionary hypothesis, the natural consequence is the development of language from inarticulate sounds, with the corollary that abstract thinking is necessarily based on advanced language development predicated by high intellectual and reasoning ability.[13]

Beyond the theological problems created by this view, there are also language problems. For example, it seems to follow in that view, that primary language usage was concrete rather than abstract. That is, primitive language in its essence was developed to communicate only on a very pragmatic specific level.[14] As man's language grew, his intellectual and reasoning ability grew, leading to thought which was more abstract, and consequent language expansion to accommodate this.

Admittedly, the terms 'concrete' and 'abstract' are nebulous and open to varying interpretations. Barr correctly notes "'abstract' is far from clear or suitable as a term in linguistic description." He then notes the school, which would seem to define the 'concrete' as that which is very specific, such as 'red cow' or 'white cow.' and 'abstract' as that which is more generalized, such as the concept of 'cow.' He states "the idea of the extreme concreteness of the languages of 'primitive' peoples has been much criticized," and even has had its existence questioned, yet also notes that it is common to never-the-less "point to an extreme degree of 'concreteness'" in these languages.[15]

Bloomfield suggests that the form relates to 'abstractness' as part of an "elaborate part of speech system."[16] It would appear that this makes abstraction a question of morphology.

It is suggested that the former school tends to eradicate the distinctions between 'concreteness' and 'specificity,' while the latter would seem to divide between abstract terminology and abstract thought. Consequently, the following definitions are suggested for concrete and abstract:

Concrete: characterized by immediate association with realities, whether physical, sensational, or emotional.

Abstract: characterized by disassociation with realities, whether physical, sensational, or emotional.[17]

Thus, the view which would seem to typically characterize the evolutionary hypothesis is that ultimately the original meaning of *all* of man's vocabulary was concrete, or tied to a readily perceptable reality. Abstract usage then followed later. This creates problems for the theoretical linguist, in that it does not really answer the question of the origin of language. Cassirer realizes this when he states:

> So the question of the origin of language tends always to become—even for the thinkers who have taken it most profoundly and struggled hardest with it—a veritable monkey puzzle. All the energy devoted to it seems only to lead us about in a circle and finally leave us at the point from which we started.[18]

The problem which he notes repeatedly, and which seems to lead him to this conclusion, would appear to be that man, somehow, seems to possess an intuitive apprehension of the abstract.

As noted above, this is in very close harmony with the Genesis view of language, especially as related in Genesis 1 and 2. Here, it is presupposed that man, created in the image of God, was rational from the beginning.

With this perspective, it is no problem to contemplate that man from the beginning possessed an abstract reasoning ability. In conjunction with this ability, it would be expected that his language would contain abstract terminology, also from the beginning. Thus it could be maintained that neither concrete nor abstract are necessarily prior, but, rather, that both stem from the origin of man.

This is not to say that within a given historical period specific usages might not be utilized to illuminate nuances of the abstract semantic field. The problem occurs when, from etymological reasoning, an a priori implication is generated that the abstract derived from and thus is necessarily contingent upon the concrete. This would appear to be what Bloomfield had in mind when he stated: "The surface study of semantic change indicates that refined and abstract meanings largely grow out of more concrete meanings."[19]

Thus, the viewpoint of language development one adopts is determinative of how one views the original meanings of words. If one accepts the evolutionary hypothesis, when he is looking at the history of usage of a particular word, the minimal effect would seem to be that he would tend to opt for the 'concrete' rather than the 'abstract' in the case of a toss-up. This would tend to produce a stilted view of language, especially in the area of historical linguistics. This would also tend to affect one's research in any area involving precise fields of meaning where the word history is deemed to be of value in determining that field.

### Conclusion

It is the contention of this writer that as reflected above, the Biblical view of creation provides the only valid basis for historical linguistics. Furthermore, he contends that this understanding further substantiates scientifically the validity of Biblical creationism, and consequently, the invalidity of the evolutionary hypothesis. It is his hope that other scholars will investigate this hitherto neglected area of study, not only in the area of historical linguistics, but also, if this is a valid perception, in other areas of cultural anthropology.

*(Continued on page 59)*

### The Recession of the Galaxies Would Increase Photon Wave Lengths

A distant galaxy is supposed to be moving radially away from us with a speed $v$ proportional to its distance $r$. The constant of proportionality is Hubble's constant, $H$. Thus, $v = Hr$. The fraction $\Delta\lambda/\lambda$ by which the galactic light is Dopplier-shifted equals the fraction $v/c$ of the galaxy's speed relative to the speed of light.

When $v = Hr$ is substituted into $\Delta\lambda/\lambda = v/c$, the result is

$$\Delta\lambda/\lambda = Hr/c \text{ (Doppler shift alone)} \qquad (A1)$$

### The Expansion of the Universe Could Increase Photon Wave Lengths

The number of Big Bang photons in the universe has to be constant after the Big Bang. Big Bang theorists assume the Big Bang photons do not interact with the matter of the universe after the Big Bang.[14]

The photon distribution is supposed to be given by the blackbody radiation laws at all times during the expansion of the universe after the Big Bang.[15] The energy density $E/V \propto T^4$, where $T$ is the absolute temperature of the photons. The average energy per photon $E_p = hf = hc/\lambda$ is proportional to the photon temperature $T$, so that $T \propto 1/\lambda$. The photon energy density is then $E/V \propto \lambda^{-4}$.

The number density of photons $N/V$ is found by solving the equation (energy density) = (number density) × (energy per photon). The result is $N/V \propto \lambda^{-3}$. The total number $N$ of Big Bang photons within a sphere of radius $R$ centered at the location of the Big Bang is the number density $N/V$ times the volume of the sphere, $4\pi R^3/3$, or $N \propto (R/\lambda)^3$.

The number of photons within this sphere is assumed to be constant as the expanding universe expands. Thus, during the expansion of the universe, Big Bang photons increase in wave length so that $N \propto (R/\lambda)^3$ remains constant. If $R/\lambda$ remains constant, then

$$\Delta\lambda/\lambda = \Delta R/R \qquad (A2)$$

The fraction by which the universe has expanded during the travel time of the photon is found from the Hubble law.

$$v = Hr$$
$$\frac{\Delta r}{\Delta t} = Hr$$
$$\frac{\Delta r}{r} = H \cdot \Delta t \qquad (A3)$$

Photons from a galaxy a distance $r$ from us at the time of emission travel for $\Delta t = r/c$ to reach us. Thus, if that galaxy were *stationary*, the rest of the universe expanding around it, there would be no Doppler effect, but during their travel to us photons would lose energy because of the expansion of the universe. When equations (A2), (A3), and $\Delta t = r/c$ are combined,

$$\frac{\Delta\lambda}{\lambda} = \frac{Hr}{c} \qquad \text{(Expansion of universe alone)} \qquad (A4)$$

The fractional change in wave length due to Doppler shift alone given by equation (A1) equals the fractional change in wave length due to the expansion of the universe alone given by equation (A4).

### References


[1]Psalm 19:1.
[2]Wald, Robert M., 1977. Space, time, and gravity. University of Chicago Press, Chicago, chapters 3 through 6.
[3]Silk, Joseph, 1980, The big bang. W. H. Freeman, San Francisco, chapter 4.
[4]*Ibid.*, p. 48.
[5]*Ibid.* p. 63.
[6]*Ibid.*, p. 139.
[7]*Ibid.*, pp. 139-140.
[8]*Ibid.*
[9]Shipman, Harry L., 1978. The restless universe. Houghton Mifflin, Boston, pp. 394-396.
[10]*Ibid.* chapter 4.
[11]Akridge, Russell, Thomas Barnes, and Harold S. Slusher, 1981. A recent creation explanation of the 3° K background blackbody radiation. *Creation Research Society Quarterly*, 18(3):159-162.
[12]See the Appendix for a derivation.
[13]Psalm 19:1.
[14]Silk, *op. cit.*, chapter. 8.
[15]*Ibid.*, pp. 137-139.
[16]Kittel, Charles and Herbert Kromer, 1980. Thermal physics. W.H. Freeman, San Francisco, p. 94.


## Language was Created, Not Evolved

*(Continued from page 55)*

### References


[1]Watkins, Calvert, 1973, Language and its history. *Daedalus* 102, 99. (Summer).
[2]Haeckel, Ernst (trans. Joseph McCabe, 1900) The riddle of the universe. Harper and Brothers, New York. P. 18.
[3]Darwin, Charles, The descent of man. (Edition in: The Great books of the Western World, 1952.) Encyclopaedia Britannica, Chicago. P. 299.
[4]Reference 2, p. 126.
[5]Gaeng, Paul A., 1971. Introduction to the principles of language. Harper and Row, New York. Pp. 3-6.
[6]Robertson, A.T., 1934. A grammar of the Greek New Testament in the light of historical research. Broadman Press. Nashville. P. 144.
[7]Compare Briggs, Charles Augustus, 1900. General introduction to the study of Holy Scripture. Charles Scribner's Sons. Reprinted 1970. Baker Book House, Grand Rapids, Also Driver, S.R., 1899. Hebrew authority. (In) Authority and archeology, sacred and profane, ed. David G. Hogarth. P. 9. Also Brown, Francis, 1908. The laying of the corner-stone of the new building of the Union Theological Seminary and the inauguration of the Reverend Francis Brown as the President of the Faculty. Union Theological Seminary, New York. P. 44.
[8]Reference 5, p. 10.
[9]Terrace, Herbert S., 1979. How Nim Chimpsky changed my mind. *Psychology Today* 13, 67. (November).
[10]Seboek, Thomas A., and Jean Umiker-Seboek, 1979. Performing animals: secrets of the trade. *Psychology Today* 13, 91. (November).
[11]Bodmer, Frederick, 1944. The loom of language. W.W. Norton and Co., New York. Pp. 170-180.
[12]*Ibid.* pp. 419 & 87.
[13]Reference 2, p. 187.
[14]Reference 11, p. 77.
[15]Barr, James, 1961. The semantics of Biblical language. Oxford University Press. P. 28.
[16]Bloomfield, Leonard, 1933. Language, Holt, Rinehart, and Winston, New York. P. 271.
[17]Webster's Third New International Dictionary, s.v. "concrete" and "abstract".
[18]Cassirer, Ernst, Language and myth. Tr. Susanne K. Langer. Dover Publications, New York. P. 31.
[19]Reference 16, p. 429.