

## COLOUR IN SCIENCE, CULTURE AND LANGUAGE

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**Key words and phrases:** basic colour terms; colour name; colour perception; colour universalities; cultural differences; native language; primary colours; theory of colours.

**Abstract:** This article deals with the problem of basic colour terms, their universality and evolution in different cultures and languages. The linguistic significance of theory of colours is described in detail.

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This paper could be named an echo of an echo. Its primary impetus was given by Brent Berlin and Paul Kay's *Basic Colour Terms: Their Universality and Evolution*, a work that today has become a classic that can hardly be ignored when speaking about the relations of colours and language.

The following years saw the publication of a number of articles dealing with the terms, psychology, and symbolism of colours.

Berlin and Kay's main postulations need not be introduced here in detail, as there are enough reviews of them (Allik 1989). Some of the specifications of their theory will be discussed below. To make it very brief, Berlin and Kay's main conclusion was that the basic colour terms are universals, i.e. their meanings in different languages coincide and that they appear in languages in a certain order.

The authors who have relied on Berlin and Kay's hypothesis (e.g. Boynton, Olson 1987; Bornstein 1973; Witkowski, Brown 1977; Kay, McDaniel 1978; Kuschel, Monberg 1974; Turton 1980, etc.) try to demonstrate its validity and elaborate the theory without changing its essence. One of the most important articles here is obviously Paul Kay's and Chad K. McDaniel's *The Linguistic Significance of the Meanings of Basic Color Terms* (Kay, McDaniels 1978).

The theory of colours has always been and will be a strongly interdisciplinary study. The so-called classical colour theory would include optics and the divisions of chemistry dealing with exact measurements of light (or rather its wave length) and pigmentary colours, their origin, combinations (both additive and subtractive) and interactions. In addition, there is the study of colour perception as a part of theory of human vision. So one may say that the colour theory does not exist as an autonomous field of study. In a broader view colours are also treated in the theories of different arts, psychology, linguistics (colour names), etc. In fact, it is the names for colours that add a new plane to the colours and colour perception, giving us a more complicated connexion: colour  $P_1$  – perception – designation/word – association – colour  $P_2$ .

The primary colour  $P_1$  is what we see and encode, for example, into a word, a colour name. The encoding can also be numerical, e.g. the standard or catalogue number of a colour, etc. Uttering, hearing or reading a word denoting a colour, i.e. in a process

of communication, the corresponding association  $P_2$  arises, which not necessarily corresponds with the original colour. This could be explained with the following reasoning.

In comparison with the other visually perceived qualities colour is characterized by a considerably weaker capacity of abstraction. A red ball is better characterized by its roundness or the geometrical figure – the sphere – rather than its red colour. Of course, one can also find examples to the contrary. In the first place one thinks of an orange, which really seems to be best characterized by its colour. At the same time, the orange colour of an orange is associated with its shiny and uneven peel; the same colour with a different surface texture does not necessarily remind us of an orange.

Psychology uses the so-called colour and form tests to find out the relationship between form and colour. People of different ages and nationalities are asked to group a number of objects according to a characteristic that they find suitable for themselves (studies of colour and form have been done by R. Scholl, D. Katz, H. Rorschach). For example, there are yellow, blue and red cubes, cones and spheres that the informant must group either according to the colour or according to the form. Or a child is shown a blue square and a red circle and asked whether a red square resembles the square or the circle. Children under six tend to group objects according to the colour, while those over six (i.e. schoolchildren) group them according to the form. There are also some ethnic differences: people from the southern countries are more inclined to group things according to the colour, while northerners tend to group them according to the form. According to H. Rorschach and E.G. Schachtel, the preference of form or colour also depends on the person's mood; extroverts are said to prefer colour and introverts form.

However, these tests make allowances to the colour, or rather, the colours of the figures have been made more similar to each other with the help of a similar surface texture. If, for example, the items to be grouped were a red and a blue lamp, and a red and a blue armchair, or even armchairs and spheres, even a child would hardly group them according to the colour. So it seems that in the human mind form is more abstracted than colour or, rather, it functions more as a categorizing quality. Hence the evident conclusion that colour is much more related to an object than form. We are inclined to support the view (see Norman, Scott 1952) that colour is almost invariably associated with a certain object or phenomenon. Even when speaking about colored light we cannot say that it is the very colour in its pure essence, but rather that it is *light of certain colour*. The recent researches on perception indicate that colour and form are perceived through different channels of the brain (Livingstone 1988).

The colour memory is extremely short. It seems that to preserve the colour in memory for a longer period, a human being uses verbal encoding, i.e. the medium of a word. So colour is an important means for distinguishing objects, but not for their recollection. Therefore, although a human being can differentiate between 100,000 hues, in dangerous situations (e.g. in traffic) only seven colours can be used in the function of a signal (Boynton et al., 1989).

For exact definition of a certain colour at least three characteristics are necessary: hue, saturation or chroma (colorfulness), and lightness or value. Therefore all colour models and systems are three-dimensional, because two dimensions simply cannot comprise all different hues. The colour domain that is signified with a certain colour term is also three-dimensional. This colour domain occupies all colours for which we can use that particular colour name. So we can speak about yellow, red, etc., colour domain. For example, we can say *red brick, ochre, flag, sky, cow, flame, hair*, although we perceive the colour of all these objects as quite different. And yet, all the colours labelled as *red* are more similar to each other than all the different shades of colour that we classify as *brown*. In other words, the colour domain embraced by the word *brown* is obviously larger than that of *red*. So the colour domains corresponding to the basic terms are of different extent and partially overlapping.

It is possible to speak about two different criteria – all conceivable colours that can be signified with the word *red*, and the most appropriate colour, the best example of that particular term. The latter has usually been called the *focus* of that colour.

Returning to the connection  $P_1...P_2$ , we may say that the association created with the mention of a colour name is always more strictly demarcated and probably coincides roughly with the focus. Thus  $P_2$  is always narrower than  $P_1$ , and usually located within the latter as a concentric circle.

Of course, this applies only to the cases where the colour word is abstract, not implying the colour of any particular object or phenomenon. Hardly anybody would think of the focal red when speaking about a *red cow grazing on a meadow*. At the same time the association created at the mention of the word *red* is usually one of the most exactly determined, being mostly identified with crimson or the colour of blood. It seems, however, that the foci are not so important problem in itself. Their relations with the human colour perception are, in fact, logical enough. More interesting is the question of the difference or similarity of the limits of a colour domains in different languages. It is evident that the larger the colour space, the greater the divergence of the focal colour (e.g. which hue of green is the most typical green?).

Colour terms have been an enticing theme in the linguistics from handy examples up to comprehensive treatises. The reason for that is surely the, at first sight, simple system of colour vocabulary and the limited amount of words. It is a paradox that colour terms had been used as paradigmatic examples by contrasting theories. Broadly these can be divided in two trends:

(a) cultural relativism, i.e. the theories stressing the primacy of the culture and the language for human cognition and non-linguistic behavior. The most typical one is Edward Sapir's (1921) and Benjamin Lee Whorf's (1956) theory of linguistic relativity. According to that each language is semantically arbitrary relative to every other language. So different languages categorize the colour continuum in a different way and a certain colour term in one language need not signify the same colour domain as its equivalent in another language. This would mean that the association colour evoked in different languages by the word *red* is different. All colour names within the semantic space of colours of that particular language have an equal status that does not depend on their different frequency of usage. The signification of a colour name, e.g. *red*, does not depend on some kind of quality in the surrounding world or on the visual perception of the speaker. This only depends on the position of the word within the structure of semantic space of colours of that particular language. If a language has the words for *orange* and *yellow*, it certainly reduces the sphere of denotation of *red*. So language is unquestionably primary to the perception of colours and affects its development.

The cultural relativist conception of colour terms, as it drifts from work to work, was formulated already by L. Bloomfield: "Physicists view the colour-spectrum as a continuous scale of light-waves of different lengths, ranging from 40 to 72 hundred-thousandths of a millimeter, but languages mark off different parts of this scale quite arbitrarily and without precise limits, in the meanings of such color-names as *violet*, *blue*, *green*, *yellow*, *orange*, *red*, and the colour-names of different languages do not embrace the same gradations."

Until the publication of Berlin and Kay's *Basic Color Terms* such opinions were widespread. In fact, it is possible to take their hypothesis as a counterbalance to Sapir and Whorf's relativism.

After the publication of Berlin and Kay's book there came numerous objections from the supporters of cultural relativity theory. However, many authors have supported the view in their occasional remarks. There is, for example, the common migratory example of the differences in the categorization of spectral colours in different languages (Sahlins 1976).

(b) linguistic universalism, development hypotheses. The research works of this group proceed from the axiom that the basic colour terms in a language correspond to certain foci in the colour continuum, determined by our perception, therefore these are semantic universals. Since human (and not only human) perception essentially divides the spectrum in a similar manner, into similar categories, therefore these categories correspond to colour terms with similar meanings in different languages. The authors who share this opinion might be called colour universalists. They stress the universality of basic colour terms in different languages, their independence from the particular culture: the focal colour, the corresponding colour perception and term are in one-to-one correspondence. The most typical example is definitely Berlin and Kay's hypothesis of the evolution of basic colour terms (1969), according to which the development of material culture (technology) induces the transition of the language from one stage to the next, but the essence and sequence of the stages is determined by the neurophysiology of colour perception (see also Kay, McDaniel 1978).

Broadly speaking, this is a question of the autonomy of language in relation to other aspects of culture and the so-called pan-linguistic laws that take the psychophysiological rather than geographic or cultural determination of a language as their point of departure. In other words, while the supporters of cultural relativism stress the primacy of language to thinking, its influence on the person's world view and the mutual relations of language and other aspects of culture, universalists, on the other hand, emphasize that language is determined by common basic structures and at least the terms of the abstract categories of perception (incl. colour terms) are secondary to perception.

Between these two extremes all theories should find their place that proceed from the material available in a language (and culture in general), i.e. that use the method of deduction, while taking into consideration the existing development hypotheses. At best they also take into consideration the perception of colours. These would include Koski's (1983) and Viires's (1983) treatments.

What a human being perceives as colours is in fact light of certain wave length. The result of the visual process in the human consciousness is a coloured image of the surroundings, which in fact has no equivalent in reality – a good material for an agnostic. Hence the questions: are the coloured images of the same object seen by two persons different, i.e. do human beings perceive colours similarly? (level I – perception); do they speak about it in a similar manner? (level II – concepts/language); do they understand each other adequately? (level III – association and communication).

That human beings perceive colours similarly seems to be the generally shared opinion of perception psychologists. As for the next level – the identical expression of their identical perception – the opinions are not so accordant, as we could see above. From the point of view of the "colour universalists" the communication between people speaking different languages would be easy. The focal colours resulting in the categorization of the colour continuum conform to colour names that are in one-to-one correspondence in different languages.

Since the mid-19th century two directions in the studies of colour perception have been in competition:

a) component theories, in the first place Young-Helmholtz' principle of trichromatic colour vision that takes three primary colours (red, green, violet) as a basis;

b) Hering's opponent theory of colour vision, founded on two opposite pairs – red-green and blue-yellow. Here another opposition, that of black and white, is also important, so that with some concessions we can speak of six primary colours.

By the second half of this century this antagonism seemed to have come to an end. The opinion that the retina contains three types of cones that are not sensitive to colours, but to certain wave length, is by now generally accepted. The coded visual information

(changed into impulses) arising on the retina is further treated in the following perception process by four types of spectrally opponent cells. Thus we can say that colour perception is based on simultaneously three and four primary colours (Livingstone 1988).

At this point we should go back to Berlin and Kay's hypothesis. The notion *basic colour term* is defined by them through four characteristics. If with these four it is not quite clear whether that particular colour term is a basic one, there are four more characteristics. So the basic colour term should meet the following requirements:

(I) it is a *monolexeme*; that is, its meaning is not predictable from the meaning of its parts;

(II) its signification is not included in that of any other color term;

(III) its application must not be restricted to a narrow class of objects;

(IV) it must be psychologically salient for informants. Indices of psychological salience include, among others, (1) a tendency to occur at the beginning of elicited list of color terms, (2) stability of reference across informants and across occasions of use, and (3) occurrence in the idiolects of all informants.

If these characteristics leave room for doubt, then:

(V) the doubtful form should have the same distributional potential as the previously established basic terms. For example, in English, allowing the suffix *-ish*, for example, *reddish*, *whitish*, and *greenish* are English words, but *aguaish* and *chartreus(e)ish* are not;

(VI) colour terms, that are also the name of an object characteristically having that color are suspect, for example, *gold*, *silver*, and *ash*. This subsidiary criterion would exclude *orange*, in English, if it were a doubtful case on the basic criteria (I – IV);

(VII) recent foreign loan words may be suspect;

(VIII) in cases where lexemic status is difficult to assess [see criterion (I)], morphological complexity is given some weight as a secondary criterion. The English term *blue-green* might be eliminated by this criterion.

Berlin and Kay made a number of experiments to find the focal points and the outer boundaries of the basic colour terms. Their subjects were people speaking 20 different languages. This was augmented by the analysis of 78 more languages on the basis of written sources and personal contacts. The choice of languages was a representative one, but for the fact that Balto-Finnic languages were not included; the Uralic languages were represented only by Hungarian, and the Turkic-Tartar family of languages was left out altogether.

At first in a conversation with the informant they tried to find out the basic colour terms in his/her native language (unfortunately this process has not been described in detail). After that they were given a table of 329 colour samples provided by Munsell Color Company and asked to mark on the cover acetate all the chips corresponding to that term, and the best example of that colour. The experiment was repeated three times with a week's interval.

The drawback of the method was that the subjects of the experiments were mostly extracted from their native language environment and subjected to the influence of the English language (chiefly foreign students studying in the USA). Their constant use of English may have influenced their native colour vocabulary. Many languages were represented by only one informant.

Second, the presentation of colour samples in a table controls to some extent the decision of the test subject. In such a presentation one of the colour domains is inevitably split (in this case that of the red colour), and there is a certain amount of interaction of colours. Evidently the experiment should have been repeated with a different placement of colours, or presenting the samples one by one. One dimension of colour space – saturation – was omitted and so the domain of less-saturated colours,

brown, pink and grey was diminished. Thus the result was but an ideal model; with a model, however, there is always the danger of over-absolutising the result, and of letting unnoticed the exceptions. The disadvantages of Berlin and Kay's method have repeatedly been pointed out (e.g. Kuschel, Monberg 1974), but nobody has succeeded in disproving it completely.

The data of Berlin's and Kay's experiments concerning the foci of basic categories supported their hypothesis of the universality of basic colour terms in different languages. However, they left aside the results of the second part of the experiments – the category boundaries. The main reason was the wide range of variation of the data, which made them unreliable.

There are, however, some interesting points concluded from these results. First – the most similar or identical foci in different languages were those of white, black and red. These corresponded to one or two colour samples only. These were also the colours that had the best determined category boundaries. Wider, and often also overlapping, were the domains of blue and green, and their foci were not so clearly defined. Similar results about the difference in the range of colour domains were also attained by R.M. Boynton and C.X. Olson, whose tests made use of a considerably larger set of colour samples that were more uniformly divided over the colour space (see Boynton, Olson 1987).

The greatest divergence between different languages seems to arise in the foci and domains of purple, pink and brown.

The translations of the English *purple* e.g. in the French, German, Swedish and Norwegian languages are also derived from the word-stem *violet*. One of the reasons for these differences is probably the fact that the well-known purple dye of the ancient times could produce a wide scale of different hues from dark red to dark blue. The word-stem appeared in different languages at different times and was borrowed from different sources.

The vagueness of the border-area between blue and green, which probably most people have experienced in their everyday life, is one of the co-effective reasons for the changes in the sensitivity of the eye to yellow and blue, depending on the age and geographic location. This phenomenon is caused by the growth of the pigmentation of the retina of elderly people as well as those inhabiting the equatorial areas. Consequently, children and Nordic people perceive green as brighter than aged people and Southerners (Bornstein 1973).

On the grounds of the comparison between different languages Berlin and Kay concluded that the appearance of basic colour terms in a language follows a certain order where one can distinguish between seven stages.

The appearance of *black*, *white* and *red* in the first two stages is reliable, but there may be doubts and controversies concerning the following ones. Especially the coming of *green* before *blue* and of *grey* only in the last grade have not found confirmation in a number of later investigations (cf. Kay, McDaniel 1978; Kay, Berlin, Merrifield 1991).

Elaborations of Berlin and Kay's hypothesis (in the first place, Kay, McDaniel 1978) have introduced the notions of composite category and primary category. The latter correspond to the six psychological primary colours. According to Kay and McDaniel, in the first stage one of the colour terms signifies the entire domain of dark and cold colours (the composite category of black, blue, and green), and the other signifies the entire warm and light domain (the composite category of red, yellow, and white). In the second stage, the warm and chromatic composite category is detached from the latter; in the third and fourth stages this is further divided into the primary categories of red and yellow, and the cold-chromatic composite category separates. In the fifth stage all the six primary categories are separated, and in the next stages derived categories are introduced into the language. According to the elaborated variant *grey*

can also appear earlier. Thus the appearance of colour names in a language has become much more flexible.

Perhaps the greatest contribution of Kay and McDaniel's article was that they did not deal with mere focal colours, but with the three-dimensional colour space. However, they disregarded the differences of the colour domains corresponding to different colour terms, and thus the results concentrated on the centres of colour domains only. The neurophysiological explanation of the origin of colour terms was added, which was absent in Berlin and Kay's treatment, and the analysis was conducted with a mathematical method, the fuzzy-set theory. According to Kay and McDaniel, the neurophysiology of colour perception has given rise to (or, to be more exact, the opponent colour perception corresponds to) six (primary) colour terms: *black, white, red, yellow, blue, and green*. The rest of the basic terms have arisen in the intermediate space between these primary colours. Thus:

pink = red + white; purple = blue + red; grey = black + white; orange = red + yellow; brown = yellow + black.

Obviously, the origin of derived categories is the most questionable part of Kay and McDaniel's hypothesis. Especially the last, the development of brown as an intersection between yellow and black, seems to be disputable to anyone who has ever dealt with the mixing of colours, since brown can be obtained by blending various colours. Certainly, brown does contain an element of red. The reason, of course, is also the three-dimensionality of colour space, which enables to place intersections between different domains of primary colours.

It is not clear, why exactly the derived categories developed between those, and not other primary colours. However, they believe that these much derived categories will in the future produce new basic colour terms in the language. This is the explanation for the word *goluboi* in Russian, a permanent source of discussion; the English words about to become basic terms are believed to include *turquoise, lime, maroon*, etc. They state that some people already use these colour terms in the role of basic ones. This, however, does not correspond to the fourth condition of the basic colour terms. These words also create some confusion with the second condition: the given colour cannot be marked with another existing basic colour term. Kay and McDaniel came to the following conclusions:

(1) the semantics of color display substantial linguistic universals;

(2) these semantic universals are based on panhuman neurophysiological processes in the perception of color.

Consequently, the authors find that these finding place strict limits on the applicability of Sapir-Whorf's hypothesis and related hypotheses of extreme linguistic/cultural relativity (Kay, McDaniel 1978:644).

Not wishing to deny importance of Kay and McDaniel's work, one still should avoid applying their pattern automatically. With every concrete language, one should take into account its particular cultural background, that is to say, to penetrate into the colour terms of that language, or to play over the basic terms from the insider's viewpoint on language. This is certainly demonstrated by the divergence found by Mauno Koski and Ants Viires in the Balto-Finnic languages. Unfortunately, there are no research works as comprehensive as to Koski's into the diachronic aspect of colour terms in some other language families, in the first place, naturally, in the Indo-European languages.

Second, as a result of the elaboration of the theory, the appearance of colour terms in a certain language has become quite vague, and therefore all that remains is the statement that in a certain stage of development any language has a certain number of basic colour terms. The proof for the first stage is provided by a few primitive languages, and even this proof has been criticised (e.g. Heider, Rosch 1972). Fairly logical is the second stage with three colour terms. Evidently, the emergence of *yellow*,

*blue* and *green* also follows the rule. It still seems that there are too many discrepancies concerning the rest of the colour terms and the order of their appearance is better explained with the peculiarities of culture, with the need to use them (for economic, technological, cultural, climatic reasons) to distinguish between colours.

Third, there is the danger to over-absolutise this temptingly exact scientific-looking theory, for example, by concluding from the number of colour terms in the language, that the speakers are incapable for perceiving or discriminating other colours; or else, to establish the age of a text (folk song) by the number of colour terms used there. It is in no way established that a song should contain all colour terms existing in the language in that particular period; however, there are some general conclusions to be drawn from this. One of the most immoderate examples would be Heino Eelsalu's attempt to date the Finnish and Estonian songs of creation with the help of (Lascaux?) cave paintings. He assumed that when the cave painters used only a certain limited number of colours, and the names of the same colours can be found in a certain type of folk song, the age of the paintings and the song should be the same. At that time the use of colours depended primarily on the knowledge of colour pigments and their availability. So, almost everywhere the best known and the most easily obtainable have been red, yellow, white and black coloured earth. It is not explained why the language of the cave painters should have had the basic names for these very colours that they used in their paintings. It is also not clear what could have been the relationship between the cave painters' and early Finno-Ugrians' languages.

And so we can speak about six colour terms, in fact, primary colour terms, the evolution of which is determined by neurophysiology: *black*, *white*, *red*, *yellow*, *blue* and *green*. Their origin is best explained by Berlin and Kay's hypothesis, so that in conclusion we can speak about four stages of development of languages, as far as the basic colour terms are concerned; there seem to be no inconsistencies with respect to these stages.

Stage 1: the language has words to denote black (the whole dark-cold area), white (light area) and red (warm area). This stage can be composed of two steps, i.e. the category of red develops later.

Stage 2: yellow is separated from the composite category of warm, and blue or green is separated from the category of black to denote the cold area (the exact order may vary in different languages). In this stage the word for grey may also come in.

Stage 3: green and blue, grey, and the word denoting the warm unsaturated colour (brown).

Stage 4: the basic terms for other intersections come in.

In conclusion, we may assume that at least the development of primary colour terms is a two-sided process. On the one hand, the categorisation of the colour space into primary colours is determined by the neurophysiology of colour perception. This, however, does not induce the evolution of colour terms unless the corresponding colour finds a sanction, an equivalent in the surrounding environment, i.e. unless there is a "déjà-vu" effect. As is well known, people find pure spectral colours to be the most fascinating and pleasant. A good example may be the orange, which indeed represents the purest orange colour and which in many languages is marked with the same word that is used to denote its colour. Also, *red* is often derived from the word signifying blood. At the same time, nature manifests conspicuously more intermediary stages of blue and green – from the colours of all the different plants to the ever-changing shades of water and skies; maybe for that reason the words are also less stable.

Naturally, every language has a multitude of possibilities to denote colours even if there is no exact basic colour term for that particular hue. To systematise other colour terms (e.g. compound words and phrases: *light red*, *pitch-black*; words derived from the names of things/phenomena of some characteristic colour, but still firmly associated with the original meaning: *golden*, *silver*, *chalky*; dialectal words and other abundant



colour vocabulary), one would need some kind of classification, since in practical usage it is not merely basic terms that come in one's way.

The colourfulness of our environment is our everyday experience, and, as it is with customary things, we tend to forget about it. We notice in the first place those colours that stand out from their background, that strike us as somehow extraordinary. This explains the frequent use of red, black and white (the colours of the first division) in folk poetry and literature – they are associated with the extraordinary rather than the ordinary, and they automatically attract attention.

First, the opposite *white* and *black*, which are mostly associated with light and darkness, further with day and night. These meanings play an unavoidably important role in all cultures of the whole world. The secondary association is with cleanness and dirtiness. The aspect of judgment, *good-evil*, which is predominant in Christianity (in the Bible since the myth of the Creation) and in the German popular culture, seems to be weaker here; something ominous is rather associated with the word 'grey'. Nevertheless, the pair *light-darkness* does convey some kind of judgment, since night has always struck human beings as more terrifying than day.

The neutral pair *black-white* is opposed to the highly chromatic *red*. The attention paid to the red colour by probably every culture has several mutually contributing causes:

(1) the visual sensation of the red colour has psychologically the most powerful stimulating effect;

(2) as the complementary colour to the cold green, red stands out the most sharply from its surrounding nature. At the same time the red colour is very rare in our geographical zone, which gives the colour the required uniqueness;

(3) finally, the association with blood has an especially strong psychological power, as has that with fire and the rising or setting sun.

On the grounds of the above reasoning we can conclude the fairly significant role of white, black and red in our popular culture, and possibly in the whole human culture.

At this point we should make some remarks. First, there is Jaan Puhvel's reasoning from his *Comparative Mythology*. He speaks about the crucial role of the tricolour red-white-green in the Indo-European cultures. So, in ancient Rome the participants of the chariot race at the New Year celebration were divided in three 'tribes', who wore clothes of those colours. Further, Puhvel hypothesizes that red, white and green or blue were the canonised colours of the three classes of Indo-Europeans (there are traces of their presence among nearly every Indo-European nation): white was the colour of priests, red that of warriors and green or blue the colour of the productive class. He sees the significance of the combination for Indo-Europeans in its continuation in the colours of flags of many states (Italy, France, the Netherlands, Norway, Ireland, Great Britain and the United States).

For J. Puhvel this contemplation is rather a side issue and he gives no precise explanation for the hypothesis, therefore there is no reason to dwell on it. The connection with the state colours is somewhat questionable, because it is simply an attractive combination and each flag has a different history. For example, the Norwegians just inserted a blue cross into the Danish flag, to distinguish themselves from the Kingdom Denmark in such a prosaic way.

Another remark pertains to the colour symbolism in general, which we are inclined to deny in its conventional meaning (*à la* blue means this and yellow means that). The colours do have a certain sphere of associations, as we have seen with red, white and black. The association may have an etymological, cultural, natural or personal explanation (see also: Allik 1989). The colour terms themselves are often polysemantic. The colour as a sign that can be interpreted unequivocally can exist only in a closed system, a definite cultural tradition, where all members would understand it identically – for example, the Catholic liturgy, the iconography of a certain period in the history of

art, certain kinds of Chinese and Japanese theatre. In art a colour can be in the function sign only when the nature of the art of that particular period aims at encoding, not depicting the surrounding world, that is, principally at the periods when and in the countries where deep religious attitudes prevail. There have never been any comprehensive metacultural symbol systems, except, perhaps, the above-mentioned universal associations of black, red and white (and even these depend on the context in their functioning). The main reason for this is probably the poor capacity of abstraction of colours, which was mentioned above, but definitely also the indiscreteness of colours. The discreteness in a colour space is not created by the focal points of the primary colours, i.e. discrete points that are connected with each other by indiscrete transition areas. In a similar way, we cannot say that a sound of a certain pitch should symbolise a particular idea.

We are not surprised at our daily awakening, washing, and other day-to-day routine. Such actions are rather mechanical, automatic, one need not be mindful of them. This is the reason why in the folklore archives the greatest number of reports concern such customs that seem somehow different from the ordinary life – birth, weddings, death – or activities that are familiar but take place after a lengthy interval, e.g. on St. George's Day, at harvest time, or at the beginning of autumn. Everything concerning diseases and magical actions is also quite novel and worth mentioning. But colours surround us from morning till night, and therefore it is only on extraordinary occasions when they are somehow striking that a human being is mindful of them. For example, unusual atmospheric phenomena, rainbow, sunset; also activities directly connected with colours such as cloth or yarn dyeing, but also the necessity to disguise oneself or, the other way round, to stand out from the surroundings. In the latter case the best way in our Estonian green, dirty of snowy landscape and against grey buildings is to apply the red colour. And finally, colour is one of the most suitable methods in analogy magic: red as the allegory for blood, the utilisation of yellow plants a.o. to cure hepatitis, etc.

The following analysis is focused on the red colour, or on the most typical examples of its traditional usage in customs, clothing and folk songs. To explain why namely this colour is chosen, it is possible to refer to the afore-given reasoning about the most exact definition of red in the colour perception, and perhaps to the fact that in custom accounts the most frequently mentioned colour is red. It would over-expand the article if we discussed all colours here, moreover, this would require the inclusion of all colour combinations. Therefore, let red be here one of the most handy and convenient examples, a paradigm for others.

If we leave aside the late Paleolithic custom in Southern Europe and among many American Indian tribes to colour the dead bodies red with ochre (obviously a replacement of blood sacrifice), in the cultures of the antiquity and, moved by these, in early Christianity the use of red has been mostly influenced, besides the association with blood, by the valuable purple dye. Its value explains also the purple colour of the Roman Emperor's robes. The high esteem of purple gowns was then, of course, transferred to the Occidental cultural tradition. Another important colour of clothing in the antiquity was crimson. This was the colour of the Roman soldier's uniform, where we might assume attempts of certain psychological effect on the enemy, especially in the close combat. Thus, the purple coat given to Christ in the gospels according to Matthew, Mark, Luke, and John was nothing but an ordinary Roman soldier's coat, which was changed into purple as a result of the development of the image of Jesus on the throne. There are many references to red and purple clothes in the Old Testament (in the first place, the instructions for making the tabernacle and the priests' robes). Also, we can find instructions to sacrifice red yarn after being purified from leprosy (real or suspected). For example:

*"... then the priest shall order that two pure living birds shall be taken for him, who is purified, and cedar wood, scarlet yarn and hyssop." (Leviticus 13:4).*

In the New Testament and in early Christianity the red colour is primarily associated with the blood sacrifice of Christ and the martyrs and with the red wine of the Eucharist. In the Middle Ages, up to the Renaissance, purple was condemned as too luxurious and it was used only for cardinal's robes.

If we compare the Russian and German traditions, one of the most striking features is the parallel meanings of the word *krasnyi*, 'beautiful' and 'red', that were there as late as in the 15th century. Thus in the Russian language and doubtless also in the traditional rites red has had an established positive connotation.

In the German folk culture such connotation is not so conspicuous. The numerous folk beliefs and customs connected with the red colour are rather of a menacing character; this is probably the result of the condemning attitude of Lutheran and other sectarian doctrines towards the earlier traditions.

The most common association is that with blood, principally in a wide variety of customs connected with red yarn, string, thread. Let us take the following description as an example. The Pennsylvanian Dutch tie a red string, brought from a shop without having had to pay for it, around a thimble with a spider in it; this is hung over the bed of a child suffering from whooping cough. A remedy for tonsillitis and diphtheria is to tie around the sick person's neck a red string, with which an adder has been strangled. It was a common practice to tie red yarn about the ailing part of the body, whether it was a swollen leg or whatever.

Red yarn was also a part of fertility magic (for instance, in Austria Minor people used to tie red bands around fruit trees on Shrove Tuesday; similar bandages were also tied around the last sheaf, etc.) and it played an important role as protection against the evil eye.

As was mentioned, the use of red yarn has already been referred to in the Bible, and it seems to be widely accepted by nearly all nations, therefore it is difficult to speak about the immediate sources of borrowing.

Close to the practices with red yarn is the use of red details of clothing. This colour, usually a preventive measure against all evil, plays a significant part all over the German-inhabited world, especially in the wedding customs. So, the bride's costume included red stockings, a red bridal veil or some other item. At the same time, there are also reports about the use of red in burial traditions and, to the contrary, its prohibition in bridal costumes, since red was said to attract lightning.

In fertility magic red-painted Easter eggs were very important. These were given to children by their parents and godparents; the eggs were buried in the middle of the field on Maundy Thursday, or put into the first sheaf, on Easter eve young girls sent these eggs to the boys, to attain their love. In preventive and protection magic the practice of painting the doorjambs red and the use of all kinds of plants with red fruit were also significant. The red colour of the berries could also be one of the explanations why the rowan-tree was attributed magic qualities.

Another association of the red colour in the German traditional beliefs is with fire, flame and lightning. These are connected with red animals – above all, naturally, a red cockerel, but also fox, squirrel, red cat, bullfinch and redstart. The thunder god Donar had red hair and red beard, and red-furred animals were thought to be Donar's sacred animals. People believed that red animals, plants and things would attract lightning. As is often the case, in places the belief is quite the other way round – these were said to protect you from lightning.

In Christianity Donar merged with the devil, who then inherited also his red colour. It is the German devil whose attribute, besides the black coat, is often a red one.

Further there was the belief that the people who tied red yarn around their bodies had sold their souls to the devil. And red yarn and ink were also used in the genuine black magic. One may remember that a contract made with the devil had to be signed in blood or red ink. Rivers and creeks with red water, or red stones were dangerous, since they indicated a site of murder. Red skies or a red spot on a child's skin seemed ominous; finally, we should remember the common mistrust towards red-haired people.

In brief, in German tradition the red colour was attributed intermingled, fertilising and generative, protective and preventive, altogether controversial powers and it has always been associated with a characteristic thing of phenomenon, especially with blood. The positive or negative disposition of red has also depended on the role attributed to its wearer – it was either good or bad, regardless of the qualities of the abstract colour.

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## Цвет в науке, культуре и языке

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**Ключевые слова и фразы:** основные цветообозначения; цветовые наименования; восприятие цвета; цветовые универсалии; культурные различия; родной язык; основные цвета; теория цвета.

**Аннотация:** Рассматривается проблема основных цветообозначений, их универсальности и эволюции в различных культурах и языках. Детально изучается лингвистическая значимость теории цвета.

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## Farbe in Wissenschaft, Kultur und Sprache

**Zusammenfassung:** In diesem Artikel wird das Problem der Hauptfarbebezeichnungen, ihrer vielseitigen Anwendbarkeit und der Evolution in der verschiedenen Kulturen und Sprachen betrachtet. Es wird die linguistische Bedeutsamkeit der Farbethorie detailliert erlernt.

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## La couleur dans la science, la culture et la langue

**Résumé:** Dans cet article est examiné le problème des significations des couleurs, de leur universalité et de leur évolution dans de différentes cultures et langues. Est étudiée en détails la valeur linguistique de la théorie de la couleur.

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