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METAPHORIC TERMS OF HYDROTECHNICAL TERM SYSTEM (IN RUSSIAN AND ENGLISH LANGUAGES)

A.G. Shirokolobova

Kuzbas State Technical University (Kemerovo, Russian Federation).
E-mail: nastja_shirokolo@rambler.ru

Abstract. The article deals with comparative analysis of Russian and English hydrotechnical terms in cognitive aspect. A metaphor is one of the most usual ways of nomination of facts in a language, so it is analyzed as the way of nomination of technical objects, and this allows making conclusions about peculiarities of mental processes of representatives of different nations. The paper presents a comparison of the metaphoric terms nominative models in Russian and English hydrotechnical term system. The analysis material of Russian and English term systems proves that metaphorical transfer of meaning is carried out by means of function, technical characteristics and external characteristics nomination. The material shows that semantic spheres of borrowing are: the man's world, the world of flora and fauna, the spatial orientation in the world, the world of objects and their states and the world of the exact sciences.
Keywords: concept; term; metaphor; comparative aspect; term systems; metaphorical transfer of meaning.

The purpose of this paper is a comparative analysis of the metaphorical Russian and English terms of hydrotechnical term systems with cognitive positions; this analysis allows comparing fragments of scientific knowledge in language processing and following the trends of mental processes of English and Russian cultures' representatives.

The role and the importance of a metaphor in organization and nomination of a term system are difficult to overestimate. A metaphor is often one of the most adequate ways of nomination of facts in a language; it allows conveying the essence of any phenomenon that has no established concept.

The material of analysis was based on Russian and English monographs and scientific articles about the construction of tailing dams and their functioning, and accidents at these dams [1-14]. The second block of sources was reference and educational literature; that is why special dictionaries were analyzed: English-Russian Polytechnic Dictionary (2001); English-Russian Dictionary of Hydraulic Engineering (1983); textbook for high schools "Hydrology and Hydraulic Structures" (1988); collection of standards 34.21.308-2005 "Hydraulic Engineering. The Basic Concepts. Terms and Definitions" (2005). The empirical basis of the study became Russian and English data file of hydraulic term systems, containing 920 term units (460 in each).

The material description is done by the following scheme: the basic concepts are defined at the first stage of the analysis; the selected concepts are analyzed on the material of the Russian language, and then on the material of the English language at the second stage. The analysis is based on the number of terms. Thus, the cognitive aspect of a description is based on the term "concept". Like Z.D. Popova and I.A. Sternin, we understand the term "concept" as a "quantum of structured knowledge" - a semantic category of the highest abstraction degree, including specific meanings of concretization of general semantics of a separate notion" [15: 4]. The term "concept" is used in the article to describe the deep semantics of terms in Russian and English hydrotechnical term systems, demonstrating "clusters of meaning" in transferring of special knowledge through the nominative function of terms, which is closely related to their significative function, and the ratio of processes refer to objects (object classes) and notions of objects. Without prejudice to the primary meaning of the term "concept", we see it as a set of semantic units of cultural specialized field, reflecting the specific worldview of native speakers.

Concepts' definition in Russian and English term systems is an important step because a scientific concept gives an idea of the conceptual construct which makes the analyzed term systems. To conduct the comparative cognitive analysis of hydrotechnical term systems it is necessary to identify the direction of grouping the nominative units. A concept, as a mental unit, is traditionally described through the means of analyzing its language objectivation, as the scientific concept description methodology is being developed; we define our position regarding the definition of the main concepts of hydrotechnical term system.

The construction of the nominative field of a scientific concept is the establishment and description of a set of linguistic resources nominating the investigated concept and its individual features. There is always a problem of a concept correct structuring because of the heterogeneity of the nominative field. When constructing the nominative field of a concept sphere of a hydrotechnical term system, we were not limited by the direct nomination, but revealed all available nominative fields of defined concepts, including the nomination of their denotations sorts for which we have established key terms-representatives - lexical units that describe the process of hydraulic structure construction.

Thus, the term-representative of the concept "The dam's type" is the term "dam" because of its frequent use in the analyzed material sources. The core of the nominative fields was determined through the synonymous expansion of the key term: for the term "dyke" they are: "dike", "embankment", "dam dike", "bund", "water storage tank", "settler".

The next step in the concept definition was to determine the features of the concept on the basis of the analysis definition of the term, verbalizing

this concept. The term "dam" means "hydraulic structure in the form of a mound of periodic action for the preservation of the territory from the effects of water" [16] or "a barrier preventing the flow of water or solids (such as soil or snow), or a barrier locking water flow in order to prevent flooding" [17].

The definitions show that nuclear components of the term "dam" are presented in semes: "barrier", "partition / fence", "water or solids", "waters", "flooding". The definitions' analysis of the term "dam" suggests speaking about the semantic opposition: on the one hand, this is a barrier from water or solids overflow, on the other it is a device for the accumulation of large amounts of water. Such opposition of meanings founded in one term, allows suggesting that it combines various features or functional characteristics: on the one hand it is a protecting object, on the other - a cumulative one. Consequently, the terms, including the term-representative "dam" in their structure and having the above features and characteristics, verbalize the concept "The dam's type". Thus, this concept is characterized by the following conceptual features: "hydrotechnical object", "technical features of the object" and "functional role".

The concept "The dam's structure" is verbalized by terms indicating a hydrotechnical structure in their semantics. From the definition of the term-representative "structure" - "location and connection of parts that make up the whole" [16] - the basic conceptual features are seen, namely: "location", "part of the whole". Consequently, it can be assumed that the terms verbalizing this concept, contain in their semantics an indication how this part makes up the structure and where it is in regard to the whole unit.

The concept "Equipment" is verbalized by units nominated objects or physical resources serving to equip a person or some technical things. The definition allows concluding that the nuclear feature of the concept is manifested through "set of items" or "set of things" which are used for equipment. Consequently, the division of three subconcepts, intending a certain set of parts ("Filters", "Weir", "Pipe system"), is justified and is made from the basic concept "Equipment". The concept "Equipment" in regard to its subconcepts actualizes "part - whole".

Thus, the concepts "The dam's fill type", "The material saved by dam" and "Minerals" were identified on the basis that the terms verbalizing them, manifest features such as "material" and "kind of material". The concept "The types of dam's failure" was defined on the basis of the analysis of the term-representative "emergency". An accident is a random act or situation which results in negative consequences. The nuclear feature of the concept is a mark of "accident" in the definition of terms verbalizing this concept.

Thus, the hydrotechnical sphere of concepts is verbalized by seven leading concepts:

- "The dam's type";

- "The dam's structure";
- "Equipment";
- "The dam's fill type";
- "The material saved by dam";
- "Minerals";
- "The types of dam's failure".

The determined hydrotechnical concepts of the sphere of concepts can be attributed to the main concepts due to the fact that they reflect the general idea of dam building field of knowledge; they display the system of components and relationships with each other, indicating the complex of functional characteristics of tailing dams and the mechanisms of their functioning.

Let us turn to the analysis of the Russian term system. First of all it should be mentioned that, as in the English term system, in Russian one, the term "dam" is the family of words forming the term, which is a part of 44 terms of the concept "The dam's type". This term was borrowed from Dutch, and maintained its original form and initial root. The term "dam" has two synonyms: "dyke" and "dam dyke". The term "dyke" means dyke, it is the native English word "dyke", which means a barrier from earth or stones. It should be noted that for Russian, the term "dyke" is a trace borrowing, which exists and is used with the term that appeared as a result of descriptive translation. The term "dam dyke" is also a trace borrowing from the German "Buhne", which has retained its original form in the process of transition to the Russian language, as well as the term "dyke". The term "embankment" is derived from the verb "embank" - it is embank mass of water that received the terminological name.

Analyzing the concept "The dam's type" it is necessary to draw attention to the fact that almost all terms have "talking" inner form, which can clearly demonstrate the purpose of an object, for example "water raising dam", "water storage dam", "spillway", "water supply dam" and so on. The group is also presented by the terms whose internal form shows us not only the purpose of the dam, but also its technical characteristics, such as "overflow weir", "blind dam", "slime dam" and so on. In the analyzed context there are terms which have indication of the external features of a technical object in their name, for example: "low dam", "timber dam", "arch dam in series" and so on.

Let us analyze the term the "tailing dam", derived from the term "tails", which means the waste from mineral processing. The investigated term appeared on the basis of a common word "tail" as a result of transferring of a metaphorical meaning. The term "gabion dam" was formed by the first element borrowing from the Italian word "gabion", which means a wire box filled with stones to protect coasts from erosion, i.e. this object is braided grating. Why, then, this type of dam is not called, for example, grating or braided dam? Obviously, in the nomination process an attempt was made to

save the name of the design structure, since a "gabion dam" is a "dam, which is a setting of two-way boxes (gabions) which are filled with stone material. Boxes are made of high-tensile wire with a special anti-corrosion coating and they are designed so as to use the strength properties of the metal" [16].

Let us refer to the following concept - "The dam's structure". Here, as in the first concept, most of terms have "talking" inner form, which indicates the object destination. For example, the terms "slope", "grade", "fill", "shaft". The term "dam's body" occurred by metaphorical transfer of meaning of a common word "body, corpus" on the hydrotechnical object. In the terminologization process an object got some animation, i.e. the name "body", associating with the largest part of a living organism, was fixed to the object.

The concept "Equipment" is verbalized by the term "filter" and its derivatives, which are part of a significant amount of term combinations. The term "filter" is derived from the Latin "filtrum" by a metaphorical transfer of the meaning by similarity; and any filter was used to designate a material that looks like felt and as a result of practical usage the word "filter" got new meanings, which the word "felt" couldn't have.

Concepts "The dam's fill type" and "The material saved by dam" are verbalized mostly by terms appearing in the process of terminologization of common words. The term "slurry" (powdered product, containing noble metals precipitated in electrolysis of copper and other metals) is the borrowing from the German language, and in common usage means "dirt"; and the term "pulp" (dispersed system (smaller than 1 ± 0,5 mm) of mineral with water) appeared thanks to metaphorization of the Latin word "pulpa", meaning "flesh".

In the concept "Minerals" there are no examples of terms metaphorization, but there is metonymy process, as the concept is verbalized (90%) by borrowings from classical and other languages, for example "copper" was taken from the name of the country "Media", "bauxite" was named after the name of a place where its deposits were found for the first time, "kaolin" was named after the name of the hill where there were its deposits, "gypsum" - from the Greek "chalk", "potash" - from the English "pot" and "ash", "fluorite" - from the Latin "fluorine" and so on.

Referring to the concept "The types of dam's failure" it should be noted that this concept is represented in 95% by common words with "transparent" inner form which became terms. For example, the term "landslide", flood", "collapse", "wear", "break", "capping".

Let us turn to the analysis of the English term system. Analyzing the concept "The dam's type", it is necessary to draw attention to the fact that the term "dam" is the family of words forming term in this concept; it is a borrowing from Dutch, and the term retained completely its original form in the transition to English. The term "dam" has two synonyms: "dyke" and

"bund". The term "bund" is a borrowing from the German word "buhne". The term "dyke" is originally an English word; it means a barrier of earth or stones. A metaphorical transfer is obvious in the term's semantics; it is a complex hydrotechnical object, performing the same protecting function.

Let us analyze the term "tailing dam". As in Russian the English term "tailings" is derived from the word "tail", which, of course, is associated with a part of the animal's body with the object placed behind, or with something not used in everyday life. With the use of imagination these associative meanings were transferred, and the term "tailings" was formed, denoting waste from mineral processing. The term "tailing dam" denotes the type of a dam that holds liquid wastes, remaining after minerals processing, i.e. the term semantics has the meaning of vestigiality. The nomination of this phenomenon shows primarily the role of imagination because the word "tail" is perceived as unnecessary.

Let us consider the term "impounding dam". It's possible to say that it was resulted from the word "pond", or its dialect meaning "damming, filling the dam". It is clear that the practical application of this type of dam played an important role in nomination of the object: this dam is used to raise the water level. Consequently, imagination and associative thinking were involved in the term nomination, as the meaning to "fill with water" turned into the meaning to "raise the water level".

Let us analyze the term "water retaining dam" from the point of view of motivating internal form. The first component of the term is "water", the second - "retaining" - from the verb "to retain" and the third - "dam", and the meaning 'save" is the central component of a given term. Therefore, we can assume that a significant role in nomination of the term was played by such processes as perception and creative thinking, and a practical application of the technical object caused that the specified type of a dam is perceived as holding or water retaining.

Here are some more examples. For example, an "overtopped dam", where the "overtopped" is a compound word consisting of the adverb "over" and the noun "top". The nomination peculiarities of this phenomenon / object is that it accents the direction - "up" qualified by the adverb "too much", i.e. the water level in the dam is high above measure. One could argue that in this example sensory perception of the object can be seen, which indicates the need to drain water. The feature of overtopping in the nomination process was transformed into functional characteristics of this type of a dam, i.e. the dam which stored a lot of water and which must be emptied. Thus, it is possible to say that there was a revaluation of reality, and fullness was seen as something that must be drained.

One more example is the term "basket dam". The word "basket" means "a woven container" or, rarely, to "braid by wire". The term "gabion" is a borrowing from the Italian word "gabion", which means "a box of wire

filled with stones, which protects the coast from erosion" [16]. This term is metaphorical, since the nomination of the object makes actual a certain way of construction of the object on the basis of similarities.

The term "check dam" denotes a dam to protect the area and structures located on it from flooding at high levels of water in the watercourse. In the process of nomination there was a transformation of the verb "check", resulting in a reconsidered term which means protection of something due to low pressure. Let us analyze some more terms. It seems that in the process of nomination of the term "soil saved dam" a person primarily actualized the functions of the object, so a dam saves, protects the soil from erosion, hence, the estimated characteristics of the protective type of a dam affected the nomination process of the term.

In the term "butterfly dam", interpretation and imagination also played an important role. It is obvious that the constructions of water gates of this kind of dam resembles a butterfly and are compared with wings. The given term is a prime example of a metaphorical transfer on the basis of similarities with the animal world. Another term created in the same way is the "beaver type dam. The metaphorical transfer is done on the similarity to the animals work, i.e. this dam looks as if it was built by beavers - natural dam builders.

Let us analyze the terms actualizing the concept "The dam's structure". In contrast to the previous concept "the dam's type", this concept is verbalized by one word terms appearing from the process of terminologization. Here are some examples. The term "slope" is derived from a common word "slope"; as a result of rethinking, the term "slope" has fixed the original meaning of a common word. It should be noted that in the process of nomination of the term a successful attempt was made to retain its original lexical meaning, seen in the form and shape of the object, since the slope is an inclined surface.

The term "head of the dam" has also descended from a common word "head". We can assume that in the nomination of this term the importance of the object is primarily actualized, and then there was the metaphorical transfer (with subsequent representation) to a new object of a particular notion of common vocabulary in the form of linguistic signs, i.e. the word "head" became a term with the meaning of "upper part", "the main element". Moreover, imagination pointed that this element of the construction is the main by analogy with the head - the upper part of a human body.

The same processes can be observed in analyses of the terms "body" or "toe". The term "body" appeared by metaphorical transfer of meaning of a common word "body" on the hydraulic object. It is also obvious that in the process of terminologization there was some object animation, i.e. the word "body" associated with the human body was fixated for the object, but not, for example, the "corpus".

Let us analyze the term "toe", which descended from a common word "toe", and means "big toe, sole". As a result, under the influence of reflec-

tion and imagination the initial meaning "sole" transformed into the "base" in the form of a prism, and the function of the thumb which is used to support and stop while walking, transformed into the "stop".

The term "tree" has also appeared from a common word "tree". It is a very good example of how perception influenced the semantic meaning of a term. A tree is a vertical object and can be used as a support, hence, the metaphorical meaning of the term - "vertical diaphragm, support". The term "foundation" comes from the Latin "fundamentum". However, in Russian hydrotechnical term system, only the term "foundation" is used for the word "foundation", although in other areas of knowledge other translations are possible.

Let us analyze the terms, actualizing the concept "Equipment". As it was noted previously, the term system has a family of words forming terms that create special microsystems constructed on separating any distinguishing objects features or phenomena. In the investigated group, such terms are "pipe" and "drain" and their derivatives. Consider these terms' semantics.

The term "pipe" is derived from the French word "pipette", indicating a narrow glass tube. The original word, according to the phonetic rules, was reduced to "pipe", and the original meaning has also undergone significant changes - the word "pipe" came to mean "smoking pipe", "musical instruments in the form of tubes", "water pipe". The terminological meaning of the word "pipe" is a pipe, a pipeline, and a canal. Thus, the word "pipette" was transformed in the course of practical activity under the influence of imagination, and later the meaning of the term saved the image of the original form of the tube in its semantics, transmitting liquid, gas and sound.

The term "drain" came from English into French - "drainage", and then into Russian [18], and in all languages it has preserved its original form. The word "drain" means to "dry", to "drain", the "system of branch pipes", as the term "drain" is translated as "drainage ditch", "filter". The meaning to "drain" was transformed into the meaning to "pass through itself or absorb liquid".

The term "decant" was derived from the French "decanter", which means to "filter off" [Ibid]. It can be assumed that the process of fluid pumping was rethought, and based on the meaning "purified by straining through something (tissue paper)" As a result, the notion of the filter appeared, which was fixed as the first meaning of the term "decant".

The term "filter" derived from the Latin "filtrum" [Ibid]. In the process of practical activity humans needed words to describe the process of passing various suspensions through felt, as well as the term to describe materials that replaced the felt. It seems that the choice of this form of the word occurred as a result of the metaphorical transfer, and the main properties of felt were actualized signs: strength and its passing capacity. In addition, the borrowed word "filter" refers to the general concept, while naming as "felt" materials that have nothing in common with it, is illogical.

Let's pay attention to the term "blanket". The word "blanket" is commonly used and means a "blanket cover". In transition from the common words in terminology, a metaphorical transfer occurred based on real similarities, when under the influence of imagination an object (filter), which also has a flat shape, was called "blanket", and the perception prompted that any protective layer may also be referred to by the term "blanket", as a blanket is a protection against cold cover, noise, light and so on.

The term "outlet" is also an example of an orientation metaphor, consisting of spatial preposition "out" and the verb "let", indicating the direction outside. The motivational sign of the object nomination is obvious – it's a pipe, draining water. The family of words forming term "pipe" produces a metaphorical term 'outlet pipe", which is also an example of an orientation metaphor with a "transparent" inner form. The term "runoff" is formed by the verb "run", and postfix "off", indicating the action termination. Consequently, the term can mean quick removal, and since we are talking about hydrotechnologies, it becomes obvious that only liquid can be removed quickly. Thus, understanding of the inner form of a term allows us to trace the nomination process, and a selection of actualized feature in a term metaphorization is not accidental, and provides insight into the worldview perception of a particular ethnic group.

The concept "The dam's fill type" is a small group that includes 15 terms, composed mainly of common words that became terms as a result of terminologization and metaphorical transfer. For example, the term "slime", derived from the German "Schlamn" [18]. The term "slime" means "sludge", i.e. the word preserved the original form and semantics in transition from the common word to a term.

The term "fill" is a result of terminologization of a common word which means "a sufficient amount to fill anything", i.e. it is possible to say that the term retains its original semantics, and its internal form is transparent. The term "bulk" shows the same process. As a common word, "bulk" means "heap", "mass", as the term it means "bulk", preserving the original semantics. The term "bitstone" is formed from the noun "bit" and "stone". On the basis of metaphorical transfer, the term "bitstone" appeared i. e. small loose stone.

Let us analyze the concept "The material saved by dam". The term "scrap" as a common word means a "piece", "clipping", and "balance". After terminologization, the word "scrap" underwent a metaphorical transfer - small residual pieces were called crowbar.

The word "beach" in terminological usage means "alluvial material". It is possible to assume that the initial meanings of the coastal rocks under the influence of perception and imagination were compared, and there was a metaphorical transfer of meaning of sea pebbles in the term "beach", which must not necessarily be of marine origin. Coastal stones are constantly

washed by water, get polished, and, therefore, the word "beach" can be called a material that is sluiced.

The term "crushed rock" has a very interesting semantics. The word "crushed" is the participle II of the verb "crush". "Rock" is translated as stone, rock. The process of metaphorical transfer is obvious, i.e. the meaning of fragmentation was extended to a part. The term "faulty water" consists of the word "fault" which means "deficiency", "error", and "guilt". During terminologization a negative meaning of water occurred - water that cannot be used.

The concept "Minerals" is verbalized by borrowings from different languages: Greek, Latin, French, Chinese, and German. For example, the term "zink" is borrowed from German. Latin "zincum" is translated as "white patches". The origin of this word is not precisely determined. Presumably, it comes from the Persian "cheng", though this name refers not to zinc, but to all stones. The word "zinc" is found in the works of Paracelsus (1493-1541) and other researchers of the 16-17th centuries, and it dates back probably to the Germanic "zinc" (bloom, an eyesore). The term "bauxite" derived from French, from the village name "Les Baux", where it was discovered (the south of France). The term "kaolin" was borrowed from Chinese, from the name of the hill where it was found, and means "white clay". In nomination of these terms, the tendency to name the object on the current feature is seen.

Let us analyze the terms describing the concept "The types of dam's failure". First of all, it should be noted that all names of the thematic group appeared in the process of terminologization of common words. For example, the term "slide" originated from a common word "sliding". As a result of the associative transfer of meaning and under the influence of imagination the original meaning of maintaining the essence of the process, moving forward, touching the surface changed. Thus, the word "slide" became the term "slide", which means "the mass of anything that creeps down, forward, sag". The "landslide" became a synonym of this term; it was formed by adding words "land" and "slide", i.e., the term means "slip of the soil".

A number of terms deserve special attention. For example, the English term "capping" originated from "cap" as an "object, located on the top that protects against external influences" [18]. However, the term refers to the lower part of the foundation, distributing the load on the ground. It is possible to assume that due to differences of attitude among native speakers, one perceives an important element of the structure to be the top, and the other - the base. The term "boil" derived from the common word; the terminological meaning of "boil" is the process of removal of fine particles of water filtered in rock mass or soil. A process of boiling looks like water boiling; thanks to imagination and perception, a metaphorical transfer occurred on the similarity of features and the word "boil" became a term, and preserved the original

semantics. The term "sloughing" occurred from "slough", which means "slough off", "peel off", "break off a habit". Under the influence of imagination there was the comparison of the outer layer of the dam with the skin, and the word "sloughing" got terminological meaning "collapse", "slide" - rather slow process, which can be compared with the shedding of the skin by reptiles. The process of rethinking of the word "bulging" is interesting, the original meaning of the word "bulge" is inflated leather bag, sack. Thus, under the influence of imagination, a metaphorical transfer occurred and the term "bulging" originated.

The investigated material confirms the activity of metaphor as one of the most adequate ways of objects' nomination and allows conveying the essence of phenomena which have no well-established concepts. As a result, the comparative analysis has revealed regularity in nomination of metaphorical terms, reflecting the characteristic features of both term systems (see table).

Comparison of metaphoric terms nominative models of Russian and English hydrotechnical term system

Metaphoric terms nominative model of Russian term system	Metaphoric terms nominative model of English term system
Function nomination	Function nomination
Technical characteristics nomination	Technical characteristics nomination
External characteristics nomination	External characteristics nomination

As it is seen from table 1, metaphorical transfer of meaning in Russian and English term systems is carried out by means of function, technical characteristics and external characteristics nomination. Models of metaphorical transfer of meaning are the same in both languages, but the English model of external characteristics nomination corresponds to all three models of nomination in Russian. In other words, the formation of metaphorical terms is a complex creative process, which uses such cognitive processes as perception, imagination, conceptualization and nomination of objects and phenomena of the world, reflecting the world vision and scientific worldview of representatives of two different cultures. A distinctive feature of a hydrotechnical term system is the presence of several metaphorical terms to refer to similar phenomena, objects and processes, but in most cases the difference between terms is due to the necessity to distinguish various features that are crucial for hydrotechnical professionals in different language cultures. The presence of several metaphorical terms to name similar phenomena, objects and processes became a distinctive feature of term systems, but in most cases the difference between the terms is due to the peculiarities of fundamental importance.

Another distinctive feature identified in the analysis of Russian and English term systems is the presence of metaphorical terms borrowed from various fields of knowledge. Semantic spheres of borrowing are: the human world, the world of flora and fauna, the spatial orientation in the world, the world of objects and their states, the world of the exact sciences. Metaphorical terms created by transfer of meaning are typical for English (32%), and Russian (26%) term systems. An individual, as a rule, sees the form of the object like the structure of a human body, i.e. giving objects a head, body, legs, feet, and so on. For example, this feature is clearly visible in the nomination of the following English terms: "head", "body", "toe" and so on. Russian terms are formed using such metaphors less often, but there are a few examples of terms: "body", "crest of the dam", "toe". In terms of compared term systems, the color palette of the real world is not reflected, i.e. the objects are colorless, indicating that the color is less important than the form or function of an object.

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