



MBNA Publishing House Constanta 2022



Proceedings of the International Scientific Conference SEA-CONF

SEA-CONF PAPER • OPEN ACCESS

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To cite this article: A. Balagiu, Proceedings of the International Scientific Conference SEA-CONF 2022, pg. 19-25.

Available online at www.anmb.ro

ISSN: 2457-144X; ISSN-L: 2457-144X

doi: 10.21279/2457-144X-22-003

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Metaphor as way of Enriching the Electric and Electronic Terminology

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Abstract

The technical and scientific domains were considered of having no connection to any trope and especially with metaphors. When we started to study the technical and scientific phrases from the electric and electronic engineering domain, the relatively great number of metaphors proved (what has already been demonstrated for other scientific languages) that this type of language could not be separated from the general vocabulary. The electrical terminology, although a new one, is based on general English vocabulary so that many compounds and phrases include metaphors. The new terminology has been created by metaphorisation of words used in other domains of activity or branches of science like geography, biology, construction or manufacturing, or everyday language.

1. Introduction

The metaphor is a figure of speech mainly used in literature: poetry, novels, short-stories and drama, but it is also an important part of everyday communication because people try to make comparisons between the objects, phenomena and actions they know and the new ones. The comparisons are transformed in language in metaphors especially due to the rule of keeping the act of speech as concise as possible. The scientific language was considered to be the only part of the communication where the metaphor had no role as long as the scientific style should have been concise and clear. However, starting with the last decade of the last century, the linguists realized that the common point between scientific language and everyday speech was the conciseness which sometimes was given by metaphors.

We have been witnessing an inter-fields change of scientific metaphor which is considered a cognitive one. The metaphor is for scientific language a kind of *passé-partout* used to fill the semantic gaps of the new domains like electronics, robotics, computer science etc. Due to metaphors the complex scientific phenomena can be more easily understood because they become partly similar to some well-known realities.

In a previous article [1] we talked about metaphorisation taking into discussion electric and electronic terms divided into several classes: zoomorphic metaphors, anthropomorphic metaphors, illusions and traditions, clothing, and construction and architecture. We have also realized that there are some other categories that deserve to be analyzed and mentioned. Taking into consideration the transfer of meaning through image from the common language to the electric and electronic terminology, the other categories found could be: natural phenomena, geography, vegetal life (including fruit), family members, weaponry and well-known objects that can be found in the house, around the house, tools, instruments and miscellaneous, people and words related to eating and drinking.

2. Short Consideration about Metaphors

The metaphor may be considered the favorite figure of speech both for writers and for linguists. Starting with Aristotel, the metaphor was analyzed and classified according to different criteria. Some of the considerations will be mentioned below. The first classification divides the metaphors into semantic, structural and functional. These main classes are in turn subdivided into subclasses based on different criteria.

The semantic classification is divided according to the similarity between the objects (function, form, structure etc), logical and grammatical meaning (Tarasova, 1975), the similarity between part and function according to which there can be anthropomorphic metaphors, zoomorphic metaphors, vegetative metaphors etc, or the similarity based on the concrete versus abstract notions. (Shelestiuk, 2006)

The subclasses of the structural classification are given by the length of the metaphor (word metaphors, phrasal metaphors etc); the recurrence of the metaphor in another sentence, or the parts of speech involved in the metaphoric structure. (Brocke-Rose, 1963)

Functional metaphors make a connection between the tasks you can perform in a traditional environment and those you can perform in a new environment.

Some metaphors are considered to be 'dead' metaphors divided by Newmark into "opaque dead metaphors" that have foreign assets, and "transparent dead metaphors" which can be found in technology.

3. Classification and analysis of metaphors in electric and electronic terminology

The metaphors found in the electric and electronic terminology can be classed as semantic metaphors that are based on the similarity between part and function and can also be considered functional metaphors. As mentioned above, we have divided them into several categories that are to be analyzed.

3.1. Natural phenomena

The first category includes terms like: **avalanche** breakdown, **avalanche** injection, **avalanche** photodiode, **cascade** connection, **cascade** control, **cascade** system, **cascaded** systems, **delta** rule, **delta-delta** transformer, **dust** core, **dust** cover, **dust**-ignition-proof machine, **erosion**, **extinction** cross section, **ground** (with 17 compound words), **halo**, **ripple**, **shadow** casting, **shadowing**, **snow** noise, **spin echo**, **star** connection, **star** point, **star-star** transformer, **star** network, **stream**, four-**wave** mixing, scalar **wave**, sky **wave**, standing **wave**, trapped **wave**, traveling **wave**, vector **wave**, vector **wave** equation, square-**wave**.

The first metaphorized word is **avalanche** with three terms formed. "An avalanche is a large mass of snow that falls down the side of a mountain" but there is also a figurative meaning derived from the first one "An avalanche is also the sudden arrival of too many things". The second word is **cascade** meaning "a waterfall or series of waterfalls over rocks" also meaning "a large amount of things" figurative meaning that must have been used for the formation of new terms.

The word **ground** formed many terms in the electrical terminology. As the main meaning the ground is the surface of the earth, coming from the "Old English grund; related to Old Norse grunn shallow, grunnr, grund plain, Old High German grunt". For the electrical terminology is "a wire that makes a connection between a piece of electrical equipment and the ground, so the user is protected from feeling an electric shock if the equipment develops a fault" (Cambridge Dictionary).

A term formed by two words denoting natural phenomena is **spin echo**, **spin** as a verb means to rotate or cause to rotate quickly (many other meanings deriving from the main one) and **echo** "the reflection of sound or other radiation by a reflecting medium, especially a solid object" as main meaning. The meaning of the term in magnetic resonance is: "the refocusing of spin magnetization by a pulse of resonant electromagnetic radiation".

Another word largely used for creating terms in the field analyzed is **wave** with nine compounds. The main meaning of the word wave is: “a raised mass of water on the surface of water, especially the sea, which is caused by the wind or by tides making the surface of the water rise and fall”. It was changed by metaphorisation into “a shape or outline having successive curves” meaning used in science and technology.

3.2. Geography

The second category is formed of terms made by metaphorization of words specific to geography, although it was difficult to dissociate between the two categories natural phenomena and geography. The metaphors found are: control **horizon**, **earth**, **earth bus**, **earth capacitance**, **earth electrode system**, **earth station**, **earth wire**, **earthing**, **field**, ambient **field**, series **field**, **path**, optical **path**, parallel **paths**, data **path**, diversity **path**, propagation **path**, through **path**, scan-test **path**, signal **constellation**. Mainly there are five words that were used to form electric and electronic terms, three of them giving the most compounds. They can be considered ‘transparent dead metaphors’ that are used not only in the domain analyzed but also in other terminologies. **Earthing** and **grounding** are used as synonyms to show that an electrical installation has a neutral.

3.3. Vegetation

The category comprises mainly phrases similar to those found in the vegetal world including plants, part of plants and fruits. The category is formed of the following terms: **banana**, **branch address**, **branch circuit**, **branch current**, **branch instruction**, **branch line coupler**, **branch penalty**, **branch prediction**, **branch relation**, **branch target buffer**, **branch target cache**, **branch voltage**, unconditional **branch**, **bunch**, **bushing**, **core**, reactor **core**, **daisy chain**, **daisy chaining**, fiber optic **bundle**, gold-leaf electroscope, **grass**, **hedge**, linguistic **hedge**, **kernel**, **nut**, **root sensitivity**, **root locus**, **speckle**, **speckle pattern**, **tree**, **tree code**, **tree coding**, fault **tree**, H-**tree**, neural **tree**, parse **tree**, quad **tree**, **tree network**, **tree structure robots**, **tree structured vector quantization**, **tree wire**, **tree structured VQ**, **tree-search**, water **tree**, **trunk feeder**.

From the above mentioned terms **branch** and **tree** are the most productive words. A branch has the main meaning “one of the parts of a tree that grows out from the main trunk and has leaves, flowers, or fruit on it”. The image of something continuing another part is used in the metaphorical phrases from the terminology. An example is the definition of the term **branch current**: “A **branch** is a section of a circuit that has a complete path for current” (Collins Dictionary). The term is used in many terminologies like medical, administration, agriculture, literature etc. The other productive term is **tree** with the main meaning: “A tree is a tall plant that has a hard trunk, branches, and leaves” (Collins Dictionary). As for the previous word, the image is dominant, giving the metaphor, implying the comparison to everything that has a tree-shape. The water tree seems to be the most beautiful and intriguing metaphorization. The meaning is: “In the presence of water, a diffuse, partially conductive 3D plume-like structure, called a water **tree**, may form within the polyethylene dielectric used in buried or water-immersed high voltage cables”. The most unexpected metaphor is formed from a chain of daisies forming a diadem. In electric and electronic terminology a **daisy chain** is “a number of computers or pieces of computer equipment or software that are connected to each other in a series” (Cambridge Dictionary)

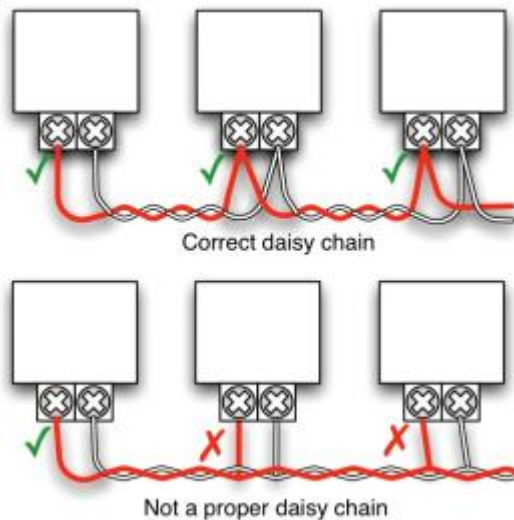


Figure 1 Daisy chain

3.4. *Weaponry*

A very brief category formed of only three terms: **bayonet** fitting, **trigger**, **shotgun**, making the analogy with well-known weapons or parts of weapons. The first two words were apparently first used in the 17th century, **bayonet** originates from French and **trigger** comes from Dutch. The last word is a compound mainly used in American English, originating in the 18th century.

3.5. *Family members*

One of the least numerous categories: **daughter** board, **motherboard**, **mother** wavelet, **father** wavelet. The terms are made of dead transparent metaphors frequently used in electronics.

3.6. *People and words connected to their activities*

The subclass is extensive comprising the terms: **birthmark**, **boys** camera, **donor**, **governor**, **leader**, **master**, **master** boot record, **master** control relay, **master** copy, **master**–slave flip-flop, **master**–oscillator–power–amplifier, nearest **neighbor** algorithm, **neighborhood** in self-organizing system, **neighborhood** operation, **signature**, single-**step**, unit **step**, **stray** current, **stride**, vector **stride**, variable resolution **hierarchy**, **wraps**.

The most productive words to create metaphors are **master** and **neighbor**. The word **master** has a variety of meanings, most of them connected to people. The first meaning is: “a man in a position of authority, ownership, or control” and from that the title of the person in command of a ship called Master, so the metaphors from the electric and electronic terminology are connected to the idea

of “expert, in control, main”. The word **neighbor** appears as a single term or as the compound **neighborhood** similar to adverbs of place: near, next to, beside, by etc. maintaining the meaning. The word **wrap** (singular) or **wraps** (plural) has as main meaning “a loose outer garment or piece of material” while as a term it means “A method for constructing circuit boards with turns of wire, without having to make a printed circuit board, now mainly used to assemble prototypes that can then be modified by hand”. Starting from the metaphor the term extended beyond the use of such a construction.

3.7. *Eating and drinking*

The category is formed of terms created from words connected to actions of eating and drinking: bit-**slice** processor, **slice**, **dish**, electronic **bottleneck**, data **bottleneck**, **fork**, **knife**-edge diffraction, **salt and pepper** noise, **plate**, **poison**, **platter**, **wafer**, **wafer** fab, **wafer** sort, **wafer** scale.

The most unusual and intriguing terms from this category, are, in our opinion, **salt and pepper noise**, **poison** and **wafer**. The definition of the compound **salt-and-paper** is “dotted or speckled with contrasting colors, esp. black and white”. The image is translated into the sound, keeping a connection to the image, too, because the definition of the term is:

“Salt-and-pepper noise is a form of noise **sometimes seen** on images. It is also known as impulse noise. ... It presents itself as sparsely occurring white and black pixels.”

Poison which is a word meaning a toxic substance that kills animals is used as a metaphor in many domains like politics, chemistry, pharmacy and the term we have found and is used in electrical engineering meaning “any material or process which absorbs neutrons and thus dampens a nuclear fission reaction, e.g., control rods”.

The term with many compounds is **wafer**, which developed from the initial meaning: “a thin crisp biscuit which is usually eaten with ice cream” (Collins Dictionary), by metaphorization, into the term used in electronics “a large single crystal of semiconductor material, such as silicon, on which numerous integrated circuits are manufactured and separated”. The image below shows the similarity between the common desert everybody enjoys, and the object used in electronics.

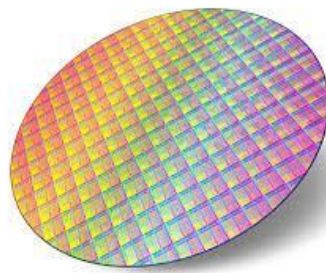


Figure 2 Wafer

3.8. *Well-known objects*

This category was in turn divided into several subcategories taking into consideration the main meaning of the words that were metaphorised and their function.

3.8.1. *Objects used mainly in the house.*

In this category are included some terms formed from the well-known objects used (in our opinion) inside houses: **blanket**, **brush**, **brush** rigging, carbon **brush**, **brushless** DC motor, **brushless** exciter, **brushless** rotary flux compressor, **comb** filter, **comb** function, **comb**-line filter, **flower pot**, **threshold**, oscillation **threshold**, **pincushion** distortion, bubble **chamber**, **thread**.

Among many terms that have been made by comparison to objects that can be usually found in a house, the term **flower pot** seems to be the most unusual. The meaning of the term is “a cover for the bushing of a pad-mount transformer”.



Figure 3 Flower pot

3.8.2. *Objects used around the house.*

It is a numerous subgroup including: back **porch**, front **porch**, **barrel** distortion, **bucket**, **bucket** truck, **chain** code, **chain** matrix, **chain** parameters, **chain** reaction, end **bell**, **gate**, **gate** array, logic **gate**, **gateway**, polarization logic **gate**, **heap**, **ladder** diagram, **mailbox**, **stack**. All these terms connect the world people are used to, to other objects or phenomena that usually are difficult to be explained, thus bringing the science and technology closer to the user. As it can be noticed the most productive terms are **chain** and **gate**, suggesting the either the numerous components for terms formed with **chain** or parts of a more complicated system as **gate** “A **gate array** is a prefabricated silicon chip with most transistors having no predetermined function”.

3.8.3. *Tools.*

The subgroup includes terms that were made by metaphorisation from words that basically denoted tools: **saw-tooth** coupler, DC **chopper**, **latch**, dirty **bit**.

3.8.4. *Musical Instruments.*

The subgroup is formed of one word forming two terms: magnetic **drum**, **drum** memory.

3.8.5. *Miscellaneous.*

The subcategory includes terms formed by similitude with words that could not be included in other categories: **mask**, entry **mask**, **envelope**, **envelope** delay, **envelope** detection, **envelope** detector, **flag**, **flag** register, sign **flag**, **hole** (with 8 compounds), lamp-**cap**, **pitch**, **pole pitch**, **pole** top pin, **pot** head, **raceway**, **race** condition, rolling **ball**, **ruby**, **scale**, **string** test, **tank**, trouble **ticket**, **guy**, **guy** anchor, **chip**, **guy** guard.

The word **guy** was first included in the category People and words connected to their activities because it has two meanings. The first meaning “man, fellow” is very well-known and used, and from that meaning the misjudgment, however, the other meaning is “a rope, chain, wire, etc, for anchoring an object, such as a radio mast, in position or for steadying or guiding it while being hoisted or lowered”(Collins Dictionary). The second meaning is of Dutch origin and is more probable to have been used long before the other one.

4. Conclusion

Metaphor is an important factor in developing and enriching various terminologies and among the new ones that are growing very quickly are the electric and electronic ones. The metaphors are constantly used to designate new realities, more and more complicated, but which need a link with our

daily reality so that they can be understood mainly by the specialist using the concept, and also by specialists from other related domains and eventually by people using different devices or concepts. Due to metaphors the electric and electronic terminologies have an imaginative component, although the general belief is that terminologies are close and precise systems. We tried to demonstrate that English electric and electronic terminologies, which are very much connected, have been formed using, among other linguistic methods, metaphorisation of the most usual and normal objects of people's daily life.

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