

A Linguistics-oriented Study of the Primary Aspects of the Processes Involved in the Perception of Graphic Images

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Abstract: This article describes a study which has been carried out with a focus on the physiological and cognitive processes involved in the perception of graphic images. The point is presented that in recent decades, there has been a major rethinking of the role of the image in an overall sense, and it has come to be regarded as a key aspect in many philology-related disciplines of study. A classification of non-verbal means which can be found in the English-language media, including the Internet, is presented in this article. A detailed physiological description of the eye has been made, and some of the peculiarities of image perception have been analyzed. In this article it has also been demonstrated that a clear distinction must be made between the perception of images and other graphic devices of a non-verbal character, and the perception of verbal features; and the concept is explored with regard to the manner in which the brain reacts differently to verbal and non-verbal input.

Keywords: non-verbal means, verbal devices, image, eye, perception, brain.

Images occupy a key position in visual and textual communication in the present era. It is possible to discern a constant increase in their value and in the role which they play, a process which is intriguing both to observe and to analyse. In view of this, it is not surprising that contemporary linguistic scholars are devoting a great deal more attention to this topic than was evident in earlier periods. In this era of digitization which affects all spheres of life, the visual or non-verbal mode of representing meaning has become a highly significant component in texts of various natures and thematic orientations. We might go so far as to say that images rule the world of communication now. If this seems like a startling and almost a radical notion, we need to recall the fact that images were actually the predecessors of syllabic or alphabetic writing systems. It could be said that we in our generation are witnessing a return to a system of representing reality which is graphic and multimodal in nature—the forms which were predominant long ago when written communication was just beginning to develop.

Images and other graphic devices of non-verbal nature besides symbols, which are used, for letter symbols are now the central issue of many linguistic schools. Scholars are engaged in the study of non-verbal means from various perspectives and in a number of different newly-created fields, including Susan B. Barnes [1] (visual communication, visual linguistics), Gunter Kress [11], Theo van Leeuwen [12], Kay O'Halloran [13], and Carey Jewitt [10] (multimodal linguistics, multimodal communication, social semiotics, cognitive semiotics). Other fields such as graphic linguistics, palalinguistics, and linguistics of text which have been established earlier, are also developing further. Such branches as computer paralinguistics and cognitive semiotics have been established as a result of the development of branches which already existed before. Media linguistics (Norman Fairclough [7]) and Internet linguistics (David Crystal [5]) are also new areas. They are connected with each other but they also have some distinctive aspects. John A. Bateman's [3] study also deserves respect and particular attention. It's worth mentioning there the existence of the variety of philologically-related branches doesn't mean that there is no problems concerning the study of images and any other graphic devices at all.

The roster of research areas which we observed in the previous paragraph points to the fact that many fields are involved in the area of multimodal communication studies, and the pattern is constantly accelerating; this contrasts strongly with the situation in previous centuries, when the research areas themselves, and sometimes the material which is available for study, was almost totally absent. The fact that so many branches have sprung into existence which are absolutely new in linguistics has created certain problems, and sometimes has caused the very research process to be more complex than is evident at first sight. Scholars in their various respective fields were preoccupied with devising systems of terminology and methods of research, but one consequence was that many terms have come to be used in referring to one single idea, such as semiotic resources, signs, modes, and devices. One more aspect which can be rather problematic is the subject and the object of the research of these fields of study, which are very often overlapping, apart from a few rather narrow aspects.

It is precisely with the thought of seeking to work toward a resolution of some of the problems mentioned in the paragraph above that we feel that the study presented in this article has current scientific value, and that there is some intrinsic benefit connected with the investigation of graphic images and other devices of a non-verbal nature which are employed in modern English communication. We consider it advisable to consider various approaches to this material, involving inductive and deductive methods, analysis and synthesis; the methods of semiotic, functional and componential analysis; the discourse approach; and contextual and descriptive patterns of analysis.

It is interesting to consider the fact that the importance of this research is in a sense illustrated and confirmed in an article headlined "Words fail us: Why the word of the year isn't even a word", which was published in the November 15, 2015 issue of the Canadian newspaper "The Globe and Mail" [16]. This very development may well have the effect of stimulating research in this area, and producing greater depth in its scope. One interestingly point was made in the article just referred to: "Oxford Dictionaries, bastion of the language and publisher of the definitive Oxford English Dictionary, has named an emoji as its word of the year" [16]. It stressed the fact that it concerns

“Not the word “emoji” – an actual emoji”. The Oxford Dictionary defines the emoji is a “small digital image or icon used to express an idea or emotion in electronic communication. The emoji in question, a little yellow laughing face with big tears coming out of the eyes, refers to something so funny, you laugh until you cry... Because, what is language if not a rigid series of symbols that, when placed in a codified sequence, convey a fixed meaning to the viewer that cannot be misinterpreted? Because no one ever misinterprets words, right, or expresses an idea by using words that signify the opposite of the intended meaning? [16]”. The author explains this to be a reason for the development of language. In this sense, it has been modified intentionally or unintentionally in a scarcely credible way. Who could have predicted that in this millennium with all its advances, we would very often change words into images or some other graphic modes in order to convey an idea?

Donis A. Dondis, in his book entitled “A Primer of Visual Literacy” states that “In print, language is the primary element, while visual factors such as physical setting or design format and illustration, are secondary or supportive. In the modern media just the reverse is true. The visual dominates, the verbal augments. Print is not dead yet, nor will it ever be, but nevertheless, our language-dominated culture has moved perceptibly toward the iconic. Most of what we know and learn, what we buy and believe, what we recognize and desire, is determined by the domination of the human psyche by the photograph and it will be more so in the future” [6, p. 6 – 7]. Donis A. Dondis foresaw the future. And this trend is being developed at hyper-speed, much more rapidly than different writing systems changed one another.

Nowadays, images can be combined with letters for conveying information. In this sense they can form words, word-combinations, sentences and even texts. Quite often, the images are interspersed with letter symbols. There are also other types of non-verbal devices which are often meaningful and are able to convey information, and which are at the same time context-dependent. In our investigation we have already identified several groups of non-verbal means—segmentation and other graphic effects; font and color; non-pictorial and non-photographic graphic textual elements; iconic language elements (images); and other non-verbal means.

By the term of the first group, “segmentation and other graphic effects”, we refer to the location of text on the page, line spacing, page orientation, margins, text width, text positioning/orientation (vertical, horizontal, diagonal, situational (arbitrary)), corrections, underlining, insertions, strikeout text, highlighting, and non-standard juxtaposition of words without intermediate spacing. The second one, “font and colour”, includes italicization, capitalization, boldface accentuation (partial or full), highlighting, and unusual patterns of writing words by manipulating fonts. The group “non-pictorial and non-photographic graphic textual elements” comprises punctuation marks (full stops/periods, commas, semicolons, exclamation marks, question marks, colons, dashes, single and double quotation marks, round brackets (parentheses) and square brackets, double dashes, apostrophes, hyphens), diacritical marks (acute accents, grave accents, circumflexes, diaereses, tittles, macrons, breves, cedillas, tildes), typo-

graphic and subsidiary signs which include other elements; figures (numbers), mathematical symbols, formulas, text language abbreviations which contain additional **non-verbal means**.

One other group, which we have termed “iconic language elements ((images))” consists of pictures of varying natures (still lifes, landscapes, paintings, and any drawings created with a pencil or paints or produced using computer software); cartoons, comics and any other non-photographic illustrations; pictograms (iconic, abstract, logotypic) logotypes or emblems, maps, photos, and smiley-faces. The group called “other non-verbal means” includes graphs (bar graphs, line graphs, pie graphs and scatter plots), and tables. The typology of graphic means which is proposed may be improved further in the process of investigation if some more new components are created or identified which do not currently belong to any of the groups given above.

Image perception is beyond doubt one of the most complicated processes, and differs from the perception of verbal means. Arthur A. Berger states that “Seeing is a complicated phenomenon. When we see an image, our brain breaks the image down into various components and processes them separately, before reconstituting these parts as an image. For example, the brain processes properties such as colors, textures, the edges of objects, light and shadow, and motion separately and then brings them together into an image (*how* it does this still is something of a mystery)” [4, p.19]. Other researchers also say that “people only remember 10% of what they hear and 20% of what they read, but about 80 percent of what they *see* and do” [15].

The language of verbal means is different from the language of images, which might be said to have greater capacity. Thanks to the physical structure of the eye, which is special but at the same time natural, we can simultaneously perceive many things around us at one time. In fact, it is almost unfathomable how many objects and activities a human eye can perceive within the space of a few seconds—but human beings are born with the ability to process large amounts of information. This capacity varies from one individual to another, and depends upon many factors. The processes of seeing and perceiving are also different from each other. We can see a great deal in different dimensions but how much of that we perceive and process successfully depends on the individual, as well as on sociocultural and extralinguistic factors.

The eye is an extremely complicated organ [8; 14; 15], and one which has enormous value to the individual. The various “responsibilities” which each constituent part of a human eye fulfils enables it to take in light and to perceive the things within view, distinguishing their colour, shape, and capacity, as well as various other details the individual might wish to focus on. If all the parts of the eye function properly, a person can receive an overall understanding of everything that is around him.

The eye and the nervous systems are closely interconnected and interdependent. The brain receives information from the eyes and the individual is able to react appropriately to the data they provide. If there are any problems with the nerves the brain receives an incorrect message, so the process of perception may be incomplete or inaccurate if the input of relevant information is insufficient. Apart

from our consideration of the contribution that the eye makes to the process of perception, we consider it of value to provide an overview of the eye's actual structure.

The internal structure of the eye [8; 14; 15] is quite complex, but in this study we give particular attention to those parts which are directly connected with the process of seeing and perceiving images. The cornea is rather like a transparent window that permits the transmission of light and images, and facilitates focusing on specific objects. In the center of the front of the eye is the pupil, which facilitates concentration on that which is directly in front of us. The coloured disk which surrounds the pupil is called the iris; its function is to control the amount of light that enters the eye. The pupil dilates or constricts in a manner similar to the aperture of a camera lens, in response to changes in the amount of light to which the eye is exposed. Thus it allows more light into the eye when the environment is dark, and less when it is bright. The size of the pupil is controlled by the action of the pupillary sphincter and dilator muscles.

Situated behind the iris is the lens, which is able to change shape in order to focus images onto the retina. The action of small muscles called the ciliary muscles makes the lens thicker, for focusing on nearby objects or thinner, for focusing on more distant objects. At the back of the eye is the retina, the part of the eye which reacts to light and receives the image in such a way that it can be re-transmitted: the retina is connected to the optic nerves that transmit the images the eye sees to the brain so that they can be interpreted. In the centre of the retina is the macula, with a central zone called the fovea, which enables sharp images to be discerned for processing by the brain.

James Garrity mentions that "The retina contains the cells that sense light (photoreceptors)... The most sensitive part of the retina is a small area called the macula, which has millions of tightly packed photoreceptors (the type called cones). The high density of cones in the macula makes the visual image detailed, just as a high-resolution digital camera has more megapixels... The photoreceptors in the retina convert the image into electrical signals, which are carried to the brain by the optic nerve. There are two main types of photoreceptors: cones and rods. Cones are responsible for sharp, detailed central vision and color vision and are clustered mainly in the macula. The rods are responsible for night and peripheral (side) vision. Rods are more numerous than cones and much more sensitive to light, but they do not register color or contribute to detailed central vision as the cones do [8]."

All the parts of the eye are required for accurately deriving verbal and non-verbal information that is displayed in a visible manner; each part functions independently, in a sense, and yet all are interdependent in the processing of enabling the individual to see. Most people are scarcely aware of the vital function performed by their eyes, and of all the component parts that play a role in that process, functioning and carrying out their separate responsibilities in effective harmony.

It is also known that the human brain consists of several different regions, each of which performs different (specialized) functions as well. There are still some unresolved issues regarding the responsibilities of different parts of the brain, and the opinions of specialists do not fully coincide, sometimes even being contradictory to one

another. Considering some of the observations and investigations that have been made, David Crystal states that "...on the basis of various kinds of experimental and clinical evidence, some generalizations have been made. With right-handed people, the left hemisphere is found to be dominant in such activities as analytical tasks, categorization, calculation, local organization, information sequencing, complex motor function and language. The right it is said to be dominant for the perception and matching of global patterns, part-whole relationships, spatial orientation, creative sensibility, musical patterns, and emotional expression or recognition" [5, p. 269]. It is interesting to note that he also expresses the opinion that "These identifications must be made cautiously, avoiding an overestimated contrast – such as is found when people talk about the left hemisphere as the "Analytical" or "intellectual" part of the brain, and the left hemisphere can handle certain non-verbal tasks that require intellectual capacity ... and that there is a limited capability for auditory analysis and compensation". The scholar also stresses that "there are several activities that usually involve both hemispheres (such as face recognition, and the factors involved in attention and fatigue) – a fact that is currently attracting a great deal of scholars focus on the brain's integrating (rather than the lateralized) abilities [5, p. 269]".

For our research the following statement suggested by David Crystal is relevant: "The area at the back of the occipital lobe is used mainly for the processing of visual input [5, p. 271]" All of this illustrates the point that there is no a unanimous approach in terms of describing the process of the brain's reaction to images, whether both of the hemispheres are employed, or only the right hemisphere. However, it is possible to go so far as to postulate that since multimodal texts include different modes (both verbal and non-verbal) both hemispheres are involved in the process of perceiving them. The scholars are also in general agreement that images constitute the more powerful component in multimodal texts in most cases, regardless of the structure or the topic involved.

Ann Marie and Seward Barry state that "The power of each image, whether produced in art, photography or in the mind's eye, may be seen as composed of a number of physiological implications related to various content factors—colour, lighting, angle, focus, size, distance, shape, texture, and tone. Each separate element has its own impact, and in combination, these factors ultimately create a whole mindset that effects each part, just as each part affects the whole. Selective perception, past experience, personal and cultural attitudes and values—all these combine in a variety of ways to interpret and fill in perceptual stimuli to build a rationally and emotionally meaningful communication" [2, p. 139 – 140].

With respect to the hemispheres, Harry Jamielson expressed the concept that "The right mode is employed to describe so-called visualisers, people strong on spatial, non-verbal modes of thought; the left mode is reserved as a category to describe verbalisers, people whose thought is considered to be mainly linear, sequential and analytical [9, p.19]" Specifically with regard to viewing images, speed of reception is not the only factor to consider; attention must be given to aspects of relationships and form. The capacity to take in various types of inputs without a predictable structure or nature means that non-logical

thought-processing patterns are possible, sometimes in the direction of ambiguity, intuition or paradox. This type of aspect favours individuality. However, the serial, left-brain patterns cannot be discarded completely in most situations, because some left-mode sequential reasoning needs to be employed to arrive at a valid conclusion or resolution. However, it is valid to speak of 'visual thinking' that doesn't actually have a verbal component, and which is evident in creative thinking in art and science.

Thus, the research which has been carried out clearly demonstrates that there are still questions which need to be studied in greater depth. The study of images and any

other graphic devices of a non-verbal nature is relatively new and there are in reality more questions in this field of science than there are suggested solutions. There is no question but that in this approaching era of total digitization, this area of research will prove to be one of the most promising and fruitful. Future research will no doubt be focused more on issues which still seem to be incomplete at the present time. These involve the classification of non-verbal means and the peculiarities involved in perceiving and recognizing them. Particular attention will be devoted to the images as well as to visual or multimodal literacy, which are emerging fields of contemporary studies.

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Лингвистически-ориентированное исследование базовых аспектов восприятия графических изображений.

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Аннотация. Статья посвящена изучению физиологических и когнитивных процессов, связанных с восприятием графических изображений. В работе обращено внимание на то, что в последние десятилетия значительно изменились подходы ученых к роли и функциям изображений. Как результат, они стали одним из центральных аспектов исследования в разных филологических дисциплинах. В статье предложена классификация письменных невербальных единиц, функционирующих в средствах массовой коммуникации. В этом исследовании детально описано физиологические особенности глаза человека, проанализировано отдельные аспекты восприятия. Отмечено, что существуют определенные различия в процессах восприятия изображений и других графических вербальных и невербальных средств. Рассмотрено также специфику человеческого мозга с учетом его реакции на вербальные и невербальные средства.

Ключевые слова: невербальные средства, вербальные средства, изображение, глаз, восприятие, мозг.