Emoji Explication in Digital Communication: Logical-Phenomenological Experiment

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ABSTRACT

The paper examines the digital linguistic sign Emoji in digital communication through the logical-linguistic lens. It is concluded that the explication of the content plane and expression plane of an optical digital sign due to the bilaterality of its structure is inexhaustible, because emoji optics include psychophysiological factors that appeal to both linguistic and extralinguistic elements of sign formation. Consequently, the substrate for the study of the emoji sign is its polylaterality. The latter allows the synthesis of structural (logical) with the conceptual (phenomenological) level of explication of the sign, because the plane of content and the plane of expression of the optical sign in digital communication is both in its form and in the semantic load. The study focuses on an empirical experiment – an online survey called "Emoji-association", which contains 147 perceptions and interpretations of emoji signs from recipients. The experiment results are tested through G. Frege's semantic triangle, which schematically demonstrates a bilateral approach to the plane of content, depending on both the abstract denotation (word proper) and the specific meaning. With emphasis on polylaterality and its verification, hypothetical-deductive syllogisms are created, which includes interpretive tokens, which, according to digital analysis of answers using the web-application package Voyant Tools, are more common in frequency. According to the results of the experimental logical-linguistic approach to the study of the emoji sign in digital communication, it is concluded that the logical tools applied in the study, provide for the fractalization of agrammatical formants of the emoji sign with the verbal versions of its formants, with subsequent verification of both.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in collaborative and social computing**;

KEYWORDS

emoji, digital communication, digital humanities, G. Frege's semantic triangle, polylaterality, syllogism, structure, qualia

1 INTRODUCTION

If to consider tokens not from the point of view of semantics, but from the point of view of semiotics, i.e. as signs in a form, then it can exist outside the context. Thus, the word acquires the characteristics of the code, which requires testing and verification not only in terms of content but also in terms of expression, i.e. in the appeal to the optics of the sign (especially true for digital, graphic-based communication), taking into account the individual characteristics of the semantic load of the sign. Pavlov [9] once addressed all the above, and in particular – the impossibility of reproducing the meaning of the internal form of the word. It was he who nominated the word only as a stimulus, which replaces direct signals, where the generalization of the semantic load, expressed by the token itself, presupposes polysemy. According to the latter, it is concluded that its optical reproduction is necessary to concretize the plane of the content of a sign.

Therefore, it is possible to appeal to the semantic triangle of Gottlob Frege [3, 5] (figure 1), which schematically demonstrates a bilateral approach to the plane of word content, depending on both the abstract denotation (the word proper) and the specific meaning. Defining the meanings that a person connects with the world at a certain period of life, we, according to the semantic concept of the scientist, being, energy), which has nothing to do with the arbitrariness of individual perceptions, despite the fact that these meanings may belong to completely opposite or even non-existent objects. Therefore, the search for truth in being or, as closer to logic, the truth of being is somehow a "language game", which, in turn, was revealed in detail by Ludwig Wittgenstein – it all depends on

the movement of the structure (language), which eventually forms a structure (grid) depending on the meaning laid down by us in it. All this appeals to the synthesis of extralinguistic and linguistic factors, which are divided into natural and acquired. The construction of language belongs to the logical substrate of the study of the emoji sign, and the perception of recipients – to the phenomenological. Thus, the semantic triangle is introduced into the experiment to formalize what is not subject to final verification – the idea of the meaning of the sign, because, as the logician points out, the idea is completely subjective, because we can never determine how the sign and ideas, especially since one person may have different images of one sign at different times in life, not to mention the impossibility of two different people to find any identical ideas.
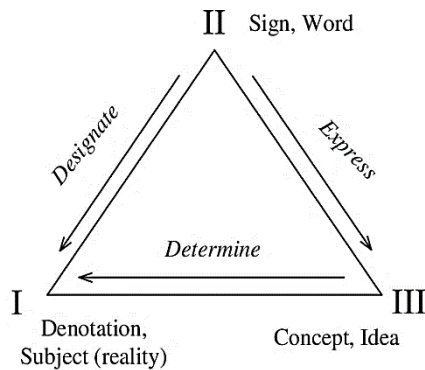

Figure 1: Semantic triangle of Gottlob Frege.

Thus, the formation of an optical plane of a sign content with explication of specific (individual) preconditions and features with complete exclusion of conditionality, inherent in polysemy with its semantic reproduction, which can be traced only in context, passes into the psychophysiological plane of research of the optical sign as an object in digital communication.

147 respondents aged 10 to 70 participated in the survey. Such a large-scale coverage of the age category allowed to fundamentally reflect the picture of the world and digital literacy of mentally different representatives, and also allowed to distinguish groups of people whose linguistic pattern differs significantly from respondents of other age categories. All this is directly reproduced in the interpretation of the optical digital sign. Thus, the results of the experiment show that emoji is used more by respondents whose age category is from 10 to 20 years, and to a lesser extent – from 40 years. Accordingly, such results explain the verbal skills of the recipients, depending on professional and mental qualities. It is this conclusion, based on the results of the survey and allowed to consider the emoji sign from two antithetical positions – logic and phenomenology in order to trace and analyze the difference between static conditionality of the sign (i.e. its structure and nomenclature assigned to it in computer life) and dynamic perception of a particular sign, the dynamics of which is manifested in natural (age, gender) and acquired (education, society, cultural paradigm, profession, experience) factors.

First of all, it should be noted that we are not talking only about the mental factors of the formation and explication of the sign provided by the CNS, which is what psycholinguistics emphasizes. The study adheres to the belief that the mental paradigm of the sign cannot be considered without taking into account the physiological paradigm, which includes ethnolinguistics with its mental frames, depending on both mental (tradition, upbringing, culture) and physiological conditions inherent only in a particular ethnic group (features of the structure of articulation, physiognomy, sign language), as well as without taking into account the logical apparatus of agrammatization of the optical sign.

Therefore, the objective of this study is the empirical decoding of the emoji signs in digital communication in a synergetic conglomerate of formalistic (logical) and phenomenological (natural, biological, psychophysiological, philosophical) levels with the output of the results on the truth table with their subsequent verification of implied features of meaning.

The study of groundwork principles of optical signs generic, reliable recognition and surface/implied semantic verification in digital communication is a parcel of an interdisciplinary framework project TRANSITION: Transformation, Network, Society and Education [8].

2 REVIEW OF THE LITERATURE, CONCEPTUAL FRAMEWORK, AND HYPOTHESES

For a real full-fledged (complex, synergetic) connection of language and speech, the essence of language must be a category of being – the being of the essence. After all, only the category of being determines the synthesis of semantic linguistic experience – historical, social, collective, individual (including mental). All of the above has led to the interpretation and study of language as being and vice versa, because being is the whole phenomenology of language to the phenomenology of a single linguistic fact in its specific speech application. To explain a certain phenomenon subordinated to the broad meaning of being, language is needed as a systematizer and construct, in turn, language, in terms of systematization and construction, and becomes the existential dimension through which both cognition and the formation of new things are possible.

Appealing to Aristotle's teaching on the transformation of physics into a cognizable essence (language), which is defined as true or false, and which is always material, the problem of the relationship between language and being is also of interest to logic. Trying to rationalize this relationship, scientists turn to the fundamental maxim of Plato, which is that the ontological counterparts of truth and error are the categories of being and non-being, which, in turn, allows the application of the principle of duality to the statements that operate in these categories, and hence to the analysis of ontological problems [10, p. 48].

The principle of duality, which became basic with the advent of the works of structural scientists, paradigmatizes, in fact, all the fundamental definitions of the concept of being (general-specific, broad-narrow, abstract-material) in one plane, appealing to the fact that for scientific knowledge of being (the organon, according to Aristotle) the presence of a paradigm expressed by a dichotomy is a necessary condition. After all, dichotomy verifies the bilaterality of any sign, and therefore, its study is subject to the trajectory

of knowledge from the phenomenological (mythological, psychological, theological, etc.) to the formal (logical-linguistic) level or vice versa. The latter became possible with the advent of classical logic, which, in fact, is designed to interpret the logic of existence. Logician and philosopher Frege [2, p. 180] immanently points to another step, following the bilaterality of de Saussure [1], – to multimodality and polysemioticity – polylaterality [6, p. 142] of the same sign. Immanently, because he does not speak directly about the polysemiotic nature of the sign. This conclusion was made possible by the introduction of Frege's formal language, which, in fact, is the mobile construct capable of forming new meanings of the same signs. Thus, the logician concludes the following [2, p. 313]:

(1) Signs that do not denote any objects also have meaning;
(2) Many meanings can be connected with one subject;
(3) Knowing the meaning of a sign or its expression, we will not always be able to identify the object that the sign signifies. And the establishment of this correspondence between the sign and the expression is precisely the essence of scientific discoveries;
(4) The meaning is objective and intersubjective, accessible for clear understanding to all communicators;
(5) Meaning is not a psychological formation of an individual, nor his subjective idea of the subject.

Frege is primarily a logician, and at one time was fundamentally opposed to psychology in logic, so the 5th position, although natural in the context of the position of the scientist, raises the most questions from linguists, in particular from psycholinguists, because the generation of content plane and sign expression plane occurs in the human brain, directly depending on the central nervous system (CNS) – this is in relation to internal factors. The materialization of language is inseparable depending on the processes of the CNS, which forms in the brain a signaling system provided by internal (genetic, ethnic, etc.) and external (cultural, educational, etc.) factors. Each communication point of the system sends a signal to the next, combining with each other, some of them work simultaneously, and thus at the final point the signal is transmitted to the left hemisphere – to the Broca's and Wernicke's area, which reproduces the human articulatory apparatus. The perception of the signal by the Wernicke's area precedes the Broca's area, because it is also responsible for the perception and assimilation of oral and written speech at the same time, i.e. it is the center of word decoding. For example, the meaning of a word and its understanding by a person is considered as a natural part of the general speech and speech mechanism. And this mechanism is formed in the human CNS on the basis of external perception of speech, and the output has its variable reproduction.

However, it is also necessary to take into account mental frames (cognitive processes in the human brain, depending on anthropological and geographical factors) and external factors – culture, upbringing, environment, social order and so on. However, Frege does not exclude in his position the above: it is important for a scientist to have a tool (formal language) to express both the meaning of the sign and the possibility of meaning, i.e., as he notes, "some sign (a word, a phrase or a graphic symbol) is not thought only in connection with the signified, which could be called the meaning of the sign, but also in connection with the fact that I

would like to call the meaning of the sign that contains the method of data (signified)" [2]. In order to verify this fractalization of the meaning of the sign into the signifier and the signified by Frege, a semantic triangle was created. Defining the meanings that a person connects with the world at a certain period of life, according to the semantic concept of the scientist, we are dealing with objective material (physics, being, energy), which has nothing to do with the arbitrariness of individual perceptions, despite that these meanings may belong to completely opposite or even non-existent objects. Therefore, the search for truth in being or, as closer to logic, the truth of being is somehow a "language game", which was revealed in detail by Wittgenstein [11] – it all depends on the movement of the structure (language), which eventually forms a structure (network) depending on the meaning input.

3 RESEARCH METHODOLOGY

In the paper following methods are applied:

- the empirical method – in order to study the phenomenon of emoji sign decoding in digital communication by experiment and rational processing of the obtained data;
- the structural method – in order to identify and analyze structural elements, individual components, categories, etc. that form the emoji sign;
- the method of the component analysis – in order to identify the minimum semantic elements that form the content component of the sign;
- the semiotic method – in order to study the emoji sign from the standpoint of its organization, the properties of its elements and categories;
- the logical-analytical methods, namely the methods of induction and deduction, which allow to consider the content of the object, specifying and generalizing its concept;
- the method of formalization as the study of an object by reflecting its structure in symbolic form;
- statistical methods involving the use of different formulas to identify the rules of distribution of language units in digital communication, to measure the relationships between language elements, to establish trends in the development and functioning of language, to establish the relationship between qualitative and quantitative characteristics of language of digital communication;
- logical-mathematical methods with elements of language modeling and the hypothetical-deductive method of language research.

4 FINDINGS AND DISCUSSION

The immediate study task was to terminate (in a nominal sense) a specific EMOJI sign in digital communication, taking into account its surface and latent structural and semantic features. The preliminary conclusion of our experiment was the derivation of the hypothesis about the dichotomous conditionality of the emoji sign, which reveals differentiation depending on the above factors. Thus, this explains the nomination of the emoji sign as polylateral in content. Therefore, the study turned to the semantic triangle of G. Frege, taking into account its modification into qualia – the term qualia was "introduced into analytical philosophy to denote

the most common thing for us: how things look to us" an applied previously to the study of semiotics of digital communication [6, 8]. They can be defined as qualities or sensations, such as redness or pain, and are considered separately from their impact on behavior, as well as from any physical conditions that may have caused them. In more precise philosophical terms, qualia is a property of sensory experience. The functionality of qualia is explained by the example of a red apple, i.e. in this case qualia is redness, not the apple itself or its properties. We can note that extensionally "redness" is a signification of the denotation "apple" [4, 9].

Subsequently, the inquiry takes for consideration the emoji sign – SMILING FACE WITH OPEN MOUTH AND COLD SWEAT EMOJI [U + 1F605 (128517)] (figure. 2).

Figure 2: Smiling face with open mouth and cold sweat emoji.

All the proposed associations for the emoji sign (figure 3) were selected from an online survey "Emoji-association", devised and tested by the authorial team (147 responses total in the form of free-range associations), from 21.01.2021 onward, https://goo-gl. me/tawmx).

The three most frequently used tokens, which formed the basis of a simple categorical syllogism, were grouped by genus and species. COMIC is a category of the genus, because it contains a generalized characteristics of the concept of "comic", which, in turn, is branched off into smaller (more specific, more detailed) ones.

Thus, according to the frequency of use of the same or similar synonymous associations, tokens were distinguished that belong to one category | the comical |. Therefore, the selection of tokens "laughter", "joy" is evident as the surface semantic features of the sign. The token "inconvenience" is perceived as immediately gleaned through the sign interpretation to a lesser extent. It can be presumed that the association of discomfort is due to the specifics of the visualization of the sign in digital communication, namely – its aquatic element – a signifier, resembling a sweat-bead flowing from the forehead. The latter, in turn, is a figurative (experienced) signifier that expresses fear, insecurity, which is visualized as sweat from the forehead. In selected associations there are also concepts synonymous with inconvenience: awkwardness, shyness, embarrassment, tension, panic, nervous, and therefore, it is necessary to introduce the most commonly used semantic feature "inconvenience" to the terminology of the syllogism, along with the tokens "laughter" and "joy".

To verify the inherence of additional semantic features of the emoji sign, the following complex implicative sentence is constructed, from the predicative parts of which a simple categorical syllogism is formed:

If any laughter prolongs life, and any joy prolongs laughter, it means that any joy prolongs life

A general affirmative proposition (Barbara mode, AAA) is formed, which can be structurally represented by the following formula:

$$(Asm \cap Amp) \supset Asp \qquad (1)$$

The following terms are distinguished: greater foundation (p) – joy; smaller base (s) – laughter; middle term (m) – awkwardness. Let's construct a syllogism according to the first mode Barbara AAA:

Any awkwardness is eliminated with joy.
Any laughter eliminates the awkwardness.
Any laughter is a joy.

Let's try to follow the path of set-theoretic interpretation, where P has the value of the truth domain of the predicate $P(x)$, and prove the truth of the syllogism by the Barbara mode:

$$\forall\chi(M(\chi) \rightarrow P(\chi)), \forall\chi(S(\chi) \rightarrow M(\chi)), \forall\chi(S(\chi) \rightarrow P(\chi)) \qquad (2)$$

1. $\chi \in M \rightarrow \chi \in P$
2. $\chi \in S \rightarrow \chi \in M$
3. $\chi \in S$ (*supposition*)
4. $\chi \in M$ (*modus ponens*, 3, 2)
5. $\chi \in M$ (*modus ponens*, 4, 1)
6. $\chi \in S \rightarrow \chi \in P$ (*introduction* $\rightarrow$)

According to the obtained data, the formula is devised with the subsequent verification using truth tables (tables 1, 2, 3, 4, 5):
$M \Rightarrow P \cap S \Rightarrow M \Rightarrow S \Rightarrow P$

Table 1: Conjunction $P \cap S$

P	$P \cap S$	Results
t	t	t
t	f	f
f	t	f
f	f	f
t	t	t
t	f	f
f	t	f
f	f	f

Table 2: Conventionality / implication $S \Rightarrow P$

P	$S \Rightarrow P$	Results
t	t	t
f	t	t
t	f	f
f	f	t
t	t	t
f	t	f
t	f	f
f	f	t

Heretofore, having verified the syllogism with the help of the truth table, one can see that the syllogism is true – one that is formally constructed correctly.
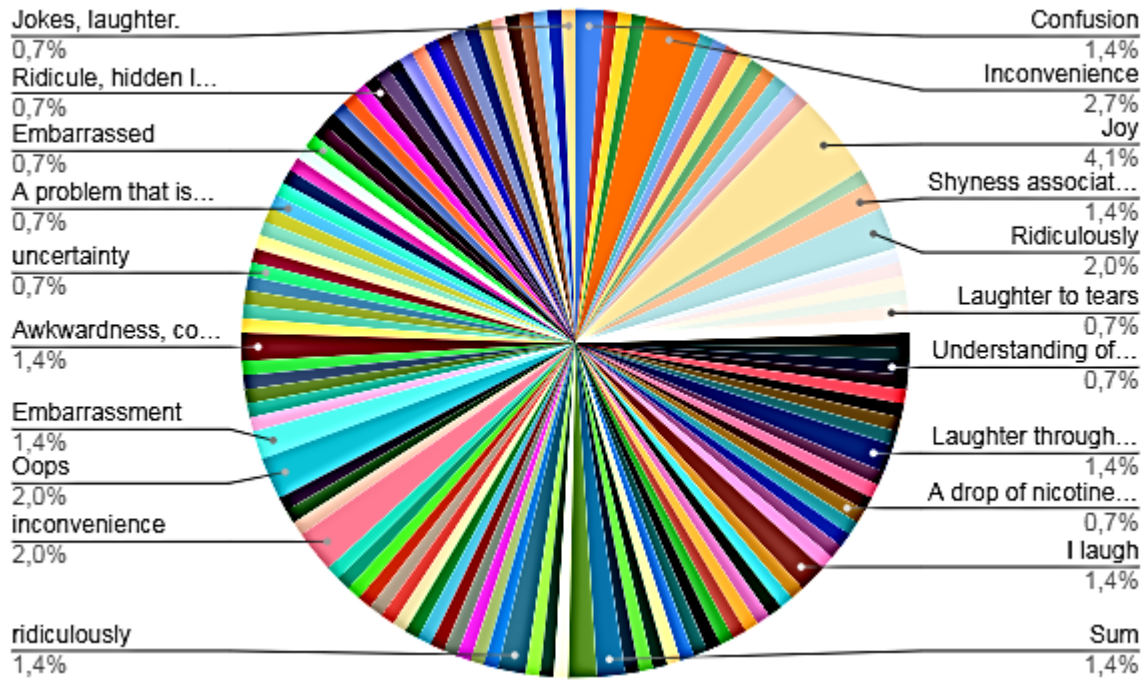
Figure 3: Recipients' association with the sign "Smiling face with open mouth and cold sweat emoji".

Figure 4: Frequency of use cirrus of the same associations via an online application "Voyant Tools" (https://voyant-tools.org/).

Table 3: Conventionality / implication $M \Rightarrow S \Rightarrow P$

P	$M \Rightarrow S \Rightarrow P$	Results
t	t	t
t	t	t
t	f	f
t	t	t
f	t	t
f	t	t
f	f	t
f	t	t

Table 4: Conventionality / implication $P \cap S \Rightarrow M \Rightarrow S \Rightarrow P$

$P \cap S$	$M \Rightarrow S \Rightarrow P$	Results
t	t	t
f	t	t
f	f	t
f	t	t
t	t	t
f	t	t
f	t	t
f	t	t

Table 5: Conventionality / implication $M \Rightarrow P \cap S \Rightarrow M \Rightarrow S \Rightarrow P$

M	$P \cap S \Rightarrow M \Rightarrow S \Rightarrow P$	Results
t	t	t
t	t	t
t	t	t
t	t	t
f	t	t
f	t	t
f	t	t
f	t	t

Note that the feature "inconvenience", due to the subjectivation of the vision of communicants in the digital ambient, is not a semantic constant, but only an interpretant, which was introduced into the syllogism. Thus, it is taken into account that the sign SMILING FACE WITH OPEN MOUTH AND COLD SWEAT EMOJI represents a subset of a larger set of meanings in the category | the comical | in digital communication, and the given sign reproduces a specific notion (laughter), which is one of the concepts of the comical.

Let us visualize the experiment with G. Frege's triangle sign and interpreter qualification, entering the terms of the obtained and verified syllogism into the triangle (figure 5).

5 CONCLUSIONS

The authors' appeal to the science of logic as a substrate of a structural approach to the study of language signs is primarily revealed not in human cognitive processes during speech, but in the rules
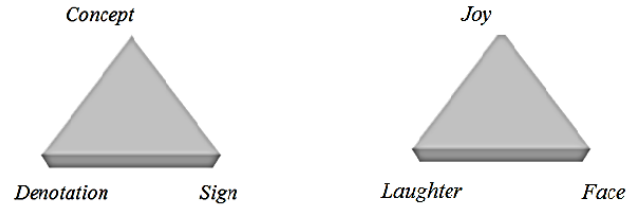

Figure 5: Verification of interpretants qualiacation by G. Frege's semantic triangle.

and norms of transition from one sign structure and at the same time from one sign meaning to other such categories. That is, thus, with an appeal to the normative (formal) conditions, the truth of the language sign is ensured as a result. The latter is divided into two areas: 1) structural (internal) and 2) phenomenological (external) areas, which, as we emphasize in our study, in the study of language signs can not be considered unilaterally, because it eliminates the causal relationship of sign generation. Thus, polylaterality is formed, the characteristic feature of which is not only in the structural aspects of the sign, but also in his cognitive experience, which, in fact, forms a language map, in particular – and individual human language. In turn, the individual language, to which L. Wittgenstein appealed in his teachings, is a product of structuring and restructuring of language signs, and therefore, is a cognitive result of previously tested formalizations with signs. Such formalization should be called logical operations, because "language games" are the process of generating a single semantic field for the interpretation of a sign, however – this semantic field can be visualized in one optical sign with an attached signifier and signifier. However, in the process of interpretation we encounter the cognitive processes of the human CNS, i.e. the human brain, reading the sign as a fact of information, triggers mental activity dependent on genetic, educational, cultural, geographical, etc. factors of speech as a result of cognitive processes. At the end of the above we are dealing with the perception of a linguistic sign, which is a priori formed in the subjective part of human existence. All this has allowed us to create a syllogism that is based on the perceptions of the respondents and on a nomen linked to the emoji sign in the computer being. The syllogism was verified with the truth tables.

Approbation and verification of the emoji sign surface and latent meaning in digital communication is possible on both logical and phenomenological levels simultaneously, taking into account all tiers of the essence of being in relation to the perception and interpretation of the sign by the recipient. In particular, it is about real/objective being with its psychophysiological prerequisites for development (nature as a mentality due to geographical, climatic, historical, etc. factors), biology (physiology, human psychology = physiognomic features of a particular person) and abstract being, which, in turn, determines the structuring of essence and existence both in reality and in digital format (computer being). The logical tools that were used involve fractalization of the agrammatized formants of the emoji sign with the verbal versions of its formants with subsequent logical verification of both.

This approach to the study of emoji signs aims to demonstrate the possibility of application of a logical-linguistic methodology to

test the perception and interpretation (and hence, the representative speech acts) of any emoji sign in digital communication.

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