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THE QUANTUM-SEMANTIC PSYCHOLINGUISTIC ANALYSIS METHOD FOR THE ENGLISH-LANGUAGE TEXT OF PROPAGANDA DISCOURSE

Abstract. The actual scientific problem of increasing the effectiveness of counteracting the impact of information propaganda on the basis of English-language texts is solved in the article by creating the quantum-semantic psycholinguistic analysis method for the English-language text of propaganda discourse. The subject of the study deals with the methods of psycholinguistic analysis, as well as the methods of providing quantum-semantic text analysis. The method consists of five stages and includes the basic psycholinguistic properties definition, a typical psycholinguistic profile constructing, identifying the manipulative features of the text and correlating them with the psycholinguistic profile, the technological strategy of information warfare determination and forming a model of propagandist's psycholinguistic portrait on the basis of quantum-semantic analysis, which allows determining the features of text perception by using n-grams. At the same time, the approach of automated discourse analysis based on the advanced ID3 algorithm with the use of intensional logic was improved. The psycholinguistic peculiarities of text written exactly by the propagandist are determined by means of carrying out the first two method's stages through the solution of the semantic particle determination inverted problem, based on the informant's survey method. The manipulative features detection in the psycholinguistic portrait is carried out on the basis of the psychological influence traces study in the text through analyzing the English manipulative constructs and stylistic-semantic entropy, which, allows detecting manipulative deviations in text after correlating the set of semantic particles with a typical psycholinguistic profile. The results of the study provide a propagandists' psycholinguistic portrait definition in order to carry out the further actions of reverse targeted impact on him, taking into account his psychological characteristics for reducing the subconscious resistance and thus increasing the effectiveness of counter-propaganda. This will increase the level of the state's information security.

Keywords: psycholinguistic analysis; information propaganda counteraction; quantum-semantic research; propaganda discourse; psychological influence detection; the model of psycholinguistic portrait.

Introduction

The access to information is constantly simplified with the development of information technology, but at the same time, the ways to manipulate consciousness and to influence the subconscious are being arised. Such a situation threatens the state security, and therefore there is a need to counteract information propaganda, which in turn entails conducting information warfare. The Noam Chomsky's propaganda model, the propaganda platforms and ways analysis, which are described in [1] proves that a text is a unique mean of information providing and therefore is a mean of influence providing. However, due to the fact that the English-language text is a mean of communication in the modern world [2], as well as in Ukraine, it is necessary to counteract English-language propaganda to prevent the possibility of using one of the probable purposes of propaganda [3], namely discreditation of English-speaking countries by conducting propaganda in English-language texts. One of the effective ways to counteract such an impact is to carry out an inverse influence on the propagandist [4] in order to balance the process of information confrontation. However, against the prepared for countermeasures specialist, ordinary methods will not be effective. It can be possible to influence the propagandist's consciousness, bypassing the protective barriers only having information about his psycholinguistic portrait. The relevance of the article is conditioned by the fact that in case of unknown psycholinguistic portrait of the attacker in advance, or if only his superficial psychological features are known without taking into account the subconscious processes of textual information perception, it becomes necessary

to construct his portrait and determine the peculiarities of the text perception by him.

Review of the literature and problem statement.

The founders of the criminal's psycholinguistic analysis for the tasks of criminalistics, as it is noted in [5], were American scientists John Douglas and Murray S. Myron. Today, there are 3 basic methods of language material processing: introspection, observation and experiment [6], on which basis the methods of psycholinguistic analysis are built. For the purposes of computer psycholinguistic text analysis it's possible to use only observation and partly an experiment, which is advisable to carry out using the informant survey method [7]. Of course, there are many modern methods of psycholinguistic research, some of which are [8-11]. However, all of them, besides the advantages, also have a number of imperfections in context of the problem being considered. Some methods are not formalized, and therefore not adapted to automation, others are based on the study of a language that is not international, a number of automated methods do not take into account the quantum entanglement of the text's semantic particle perception by different persons, namely semantics worlds and are not correlated with the wave nature of the text. The problem of informational propaganda counteraction is urgent, and, as proved in [4], constructing a text along the propagandist's individual semantic line in order of impacting him will counteract such an informational influence. It follows that the existing means of psycholinguistic analysis are not sufficient to solve the problem. And this means that the corpuscular-wave properties of the text should be taken into account, quantum-semantic analysis should be held, and the factor of carrying out the influence and

propagandist's readiness to counter-measures should be considered. At the same time, discourse is important in text perception [8], in this case propaganda discourse, which means that existing methods of automated discourse analysis [12, 13] need to be adapted for taking into account propaganda discourse and corpuscular-wave properties of the text to solve the inverse problem of determining the coordinates of semantic particle in English text with a known psycholinguist portrait of propagandist [14]. All this requires the creation of a new method of psycholinguistic analysis

The aim of the article is increasing the effectiveness of counteracting the information propaganda influence in English texts by developing the quantum-semantic psycholinguistic analysis method for the English-language text of propaganda discourse.

For achieving the aim, the following **tasks** have been set: defining the psycholinguistic peculiarities of text written exactly by the propagandist; identifying the manipulative features in the psycholinguistic portrait; improving the approach of automated discourse analysis for determining the goals and objectives of information warfare; constructing a propagandist's psycholinguistic portrait by the known textual semantic component.

Main material

The quantum-semantic psycholinguistic analysis method for the English-language text of propaganda discourse involves five consecutive stages: the basic psycholinguistic properties definition, a typical psycholinguistic profile constructing, identifying the manipulative features of the text and correlating them with the psycholinguistic profile, the technological strategy of information warfare determination and forming a model of propagandist's psycholinguistic portrait.

Stage 1. The basic psycholinguistic properties definition.

The basic psycholinguistic properties of a text are known to be expressed both through morphological-syntactic features (the use of passive or active voices, simple or complex sentences, errors in sequence of tenses, etc.) and the semantic textual and contextual features of text and its discourse. To determine the basic psycholinguistic properties of the text, it is necessary to form a set S_1 with statistically dependent groups of morphological and syntactic features of the text and set of semantic features S_2 . The sets' elements are appropriate groups of synonymic psycholinguistic constructions. Formation is based on searching the individual unitary objects O_n of the text, each of which is analyzed in turn. Unitary objects of the psycholinguistic portrait's morphological and syntactic category belong to four groups in order of their research priority increasing: words \rightarrow phrases \rightarrow grammatical constructions \rightarrow sentences. These groups can be labeled as o_{n_1} , o_{n_2} , o_{n_3} , o_{n_4} respectively. In this case, text is analyzed in 4 stages. Firstly, it is being formed a set O_1 , consisting of n elements, at that $n = k$, where k – the text's words number. Let O'_1 be a synonyms set according to a synonym dictionary, the elements of

which are the sets of appropriate synonymous groups o'_{m_1} , and if $o_{n_1} \in o'_{m_1}$ then an appropriate categorical feature is assigned to a set o_{n_1} in performing the condition $n > 1$. Thus, the statistical distribution of the categorical feature is checked and the possible signs of the psycholinguistic portrait are formed. Similar actions are performed in forming sets O_2 , O_3 , O_4 , that are statistically dependent categorical synonymous features of the phrases', grammatical constructions' and sentences' use. The words dependence in such constructions is determined with the help of existing morphological-syntactic analysis methods [15], which is not difficult considering the constant word order in English, and synonymous constructions are revealed then.

The text's semantic features definition is made in analogous way with [14] by using contextual connections features with the core and indicator relations rules. However, in contrast to the described approach, the inverse problem is being solved: the set of propagandist's possible categorical features is being constructed instead of checking the text element with the existing categorical feature. Let an unitary object O_n of the text be an indicator, then the hierarchy will be built as follows: using the lexical function the connection of O_n with the

core D is found at $D \in B^1$, where B^1 is the highest category in the hierarchy of the psycholinguistic features concepts. Since it is unknown exactly whether the found core belongs to the psycholinguistic portrait of the propagandist, the search for semantic constructs cores is carried out. It follows that B_r^1 – found cores of the highest category. Each core will have subcategories that can be marked through B_n^2 . Searching the lowest categories $B_{n_r}^m$ of any core is carried out by finding the set $B = \{B_n^m \in B_r^1 \mid B_n^m \sim B_{n_r}^m\}$.

Stage 2. A typical psycholinguistic profile constructing.

As noted in [8], the discourse's functioning conditions depend on the recipient. That is why the informant survey method [7] is suggested to be used to improve the accuracy of the obtained data concerning the propagandist's psycholinguistic profile and its discourse. According to the [5], defining a psycholinguistic profile involves defining of three sections: the author's demographic profile, the author's character, and, finally, the possibility of committing actions the author warns (in the propaganda context, it is an opportunity of implementation the threats the author warns and which he proposes to solve). It follows the need of distinguishing the author's peculiarities from the set of basic psycholinguistic features of the text and clarifying them by using the method of informants' survey. First of all, it is necessary to highlight the unusual frequency of synonymous morphological-syntactic structures use and to determine the percentage value of the studied structure's R^{S_1} belonging probability to the author's psycholinguistic portrait by the formula (1):

$$R^{S_1} = \left(\left| \ln \left(\text{Freq}_{O_0}^{S_1} \cdot 100 / \sum_{i=1}^k O_i \cdot \text{Freq}'_{O_0} \right) \right| / b \right) \cdot 100, \quad (1)$$

where $\text{Freq}_{O_0}^{S_1}$ is the use frequency of the unary object initial form O_0 , belonging to the morphological-syntactic features' set S_1 in the text being studied; Freq'_{O_0} – the use frequency of the unary object initial form O_0 according to the frequency dictionary; $\sum_{i=1}^k O_i$ – all the unary objects' sum at k is the total words number in the text; b – accuracy coefficient $b \approx 4,605$. Thus, is detected the deviation from the normalized frequency of morphological or syntactic unary object use in the formed set of basic psycholinguistic features in order to further specifying them in applying the informant survey method to construct a psycholinguistic profile.

First of all, the distribution of synonymous constructions is made into S'_1 , consisting of set's S_1 elements in performing the condition of a significant possibility of the construction's belonging to the author's psycholinguistic portrait (more than 50%), determined by studying the text's unary objects use frequency. The resulting set is divided into 2 subsets: S'_1 and S'_2 , consisting of elements that have the features of the author's demographic profile and his character respectively. To specify the obtained conclusions, a text of a provocative character is selected according to the revealed psycholinguistic features. Its predicative constructs (according to their most informative load and the constant word order in the English text) are modified and a new text T is forming according to the principle (2):

$$T = \frac{\prod_{k=1}^n (G+H)_k}{\prod_{k=1}^m (G^{S'_1} + H^{S'_1})_k} + \prod_{k=1}^m \left(G^{S'_1} + H^{S'_1} \right)_k, \quad (2)$$

where $(G+H)$ is a predicative construction, which consists of G – subject and H – predicate; n – the number of all modified text's predicative constructs; m – the number of all predicative constructs belonging to the formed sets S'_1 and S'_2 in performing the

condition that $(G+H)_n \Rightarrow (G^{S'_1} + H^{S'_1})_n$. Thereafter, a similar text-response study is performed to obtain the set S''_1 , which elements determine the demographic profile and character of the new text's author. If the value in truth table formed for $S'_1 \wedge S''_1$ is 1, then the characteristic belongs to the author.

The last element of the psycholinguistic profile, namely the possibility of committing actions the author warns, can be investigated only by revealing the semantic features of the author, using quantum-semantic text analysis. First of all, it is necessary to distinguish the individual semantic component belonging to the author, that is, to perform the inverse problem described in [14] and, thus, to investigate the corpuscular

properties of the text's semantics. To do this, it is necessary to distinguish a number of arbitrary coefficients P (3), with changes due to the individual characteristics of the English-language text's author.

$$\begin{aligned} P_n &= -(P_1 \cdot A'_2 + P_2 \cdot A'_3 + \dots + P_{n-1} \cdot A'_{n-1} - E''1) / A'_n; \\ P_{n+1} &= -(-P_1 \cdot A'_1 + P_n \cdot A'_3 + \dots + P_n \cdot A'_{n-1} - E''2) / A'_n; \\ &\dots; \quad P_{\sum_{n=1}^m} = \\ &= \left(-P_{m-1} \cdot A'_1 - \dots - P_{\sum_{n=1}^m} \cdot A'_{n-2} - E''m \right) / A'_{n-1}, \end{aligned} \quad (3)$$

where E''_m – semantic meaning of the text's separate lexical-semantic unit being studied; A'_n – English lexical units. Considering the fact that an arbitrary coefficient in performing the condition of using information propaganda in English text [14] $P_n = U_n + r$, where U_n is an arbitrary coefficient for the text-interpretation of another language's native speaker then it follows the search of a component r , which influences the forming process of a semantic particle in English text by the formula (4):

$$\begin{aligned} r_1^{S_2} &= P_n - U_n; \quad r_2^{S_2} = P_{n+1} - U_n; \quad \dots \\ r_m^{S_2} &= P_{\sum_{n=1}^m} - U_n. \end{aligned} \quad (4)$$

Thus, it is being formed a semantic psycholinguistic features' set $S_2^* = \{r_1^{S_2}, r_2^{S_2}, \dots, r_m^{S_2}\}$, while the set $S_2^* \in S_2$. However, the wave features of the text should also be considered at the same time to determine the possibility of committing actions the author warns. Let M_n be the semantics points, existing in the text under study, then after applying them to the XOY plane and Lagrange it will be received a function $f(x^{S_2}, y^{S_2})$, describing the linear and logical development of the text's semantic component. There will be 2 extreme's in such a function: $M_{n'}(x_{n'}^{S_2}, y_{n'}^{S_2})$ and $M_{n''}(x_{n''}^{S_2}, y_{n''}^{S_2})$, which are responsible for the threat and its resolution, respectively. Since, the author's individual features will go beyond the semantic line of the text, then the individual semantic component (J) depending on the text's semantic function (4) will be a set of values which distance from extreme's are to be studied.

$$J = S_2^* \setminus D(f(x^{S_2}, y^{S_2})).$$

The distance can be determined if the elements j_n of the set J will be taken as the vector's beginning and the extreme's as the vector's end. Then, the possibility of committing actions will be inversely proportional to the vector's length $\left| j_n M_{n''}(x_{n''}^{S_2}, y_{n''}^{S_2}) \right|$.

Stage 3. Identifying the manipulative features of the text and correlating them with the psycholinguistic profile.

Based on the fact that the article deals with the problem of propaganda texts analysis, and the [4] proves that the basis for propaganda is texts published in mass

media, it can be argued that the text should be written in a journalistic style. So, first of all, it is necessary to prove that the text corresponds to this style. To do this, it is necessary to determine the unconditional semantic entropy (5) for the detection of journalistic style signs, using the technique [16], which will also be necessary in determining the n-grams [17] when forming a model of the propagandist's psycholinguistic portrait.

$$H_{\text{без.}}(x) = \sum_{i=1}^b \sum_{j=1}^h P(x_{ij}) \cdot \log_2 \frac{1}{P(x_{ij})} \approx C_{\text{jour.}}, \quad (5)$$

where x – lexical unit of the text under study; b – frequency dictionary size; h – the journalistic dictionary size; $P(x_{ij})$ – the appearance possibility of a journalistic dictionary lexical structure according to the appearance frequency of that structure; $C_{\text{jour.}}$ – an entropy constant of journalistic style text.

In case of confirming the studied text's belonging to the category of journalistic style texts, the detection of manipulative features is carried out, which, first of all, involves determining the psychological influence presence in the studied text. Article [18] describes the features, structure, stages, strategies and target elements of psychological influence in details. Accordingly, it can be argued that quantum-semantic research occurs in conditions of the second stage of psychological influence, namely, the situation of such influence implementation with the use of specific means and techniques is considered. As to the applied strategies of suggestive influence, the first and the second strategies are considered: imperative and manipulative respectively. Thus, the signs of the text's logical structure violation presence in the regulation of the activity of the subject are studied in the text, and it is being formed the sets: Q_1 – synonymous constructions that have categorical signs of needs and interests; Q_2 – synonymous constructions with categorical signs of activity and action; Q_3 – synonymous constructions with emotional character. Particular attention is paid to such constructs as Subjunctive mood and Imperative mood, and to the relation of these constructs with the predicative construct. Suppose V is the set of lexical units that form sentences V' – the set of lexical units that are grammatically modified to form the constructs of Subjunctive mood and Imperative mood. Then condition (6) is checked:

$$\sum_{i=1}^n v_i \neq \sum_{i=1}^n (v' \cdot e)_i, \quad (6)$$

where e – is an element that changes the lexical unit to form a grammatical construction.

If this condition is fulfilled, it means the possibility of using propaganda in the sentence, and therefore the sentence needs further studying. The next stage studies the relation e with the semantics core in the semantic particle to comply with the corpuscular properties of the text. Thus, it is being formed a semantic particles' set B^* with the psychological impact signs and the core's category is being determined:

$$B^* = \{e \in Q_n \mid B_{n_r}^m \in Q_n\}. \quad (7)$$

After that, the correlation of the obtained set of semantic particles bearing the propaganda traces with the typical psycholinguistic profile is carried out by searching for common elements of the semantic psycholinguistic features set and the semantic particles set with signs of psychological influence: $S_2^* \cap B^*$. The percentage value of text modification possibility Z' for the purpose of the author's propaganda influence is determined:

$$Z' = \left(\left| S_2^* \cap B^* \right| / \left| S_2^* \right| \right) \cdot 100. \quad (8)$$

In addition to the sentence examination, it is necessary to examine the whole text, namely its semantic line, where imperative constructions and phrases-markers bearing the target psychological influence are extremums $M_{m'}^{Q_n}(x_{m'}^{Q_n}, y_{m'}^{Q_n})$ of the function that describes the consistent development of the text semantics. Remoteness of the set's B^* elements $b_{m'}^*$, that correlate with the core of an appropriate category by the psycholinguistic influence signs from the extremum, which is an element of psychological influence indicates the propaganda integrated in the text.

In considering b_n^* as the vector's beginning, and an appropriate extremum as the end, then the probability of the author's propaganda will be inversely proportional to Z'' , which will be determined:

$$Z'' = \sum_{i=1}^{m'} \left| b_i^* M_i^{Q_n}(x_i^{Q_n}, y_i^{Q_n}) \right| / m'. \quad (9)$$

Stage 4. The technological strategy of information warfare determination.

In case of detecting the fact of integrating the manipulative features by the text's author or editor, it can be stated that there are elements of propaganda in some type. It follows that propaganda discourse analysis should be held in order to identify the connections of the technological strategy of information warfare. According to the table of information warfare technological aspects [3], the propaganda methods follow the ways, and propaganda objects follow means by defining which, it is possible, to predict the goals and objectives of influence, to evaluate the result, and this requires the propaganda discourse study. Discourse analysis will provide information about the author's environment and, as a consequence, his perception of the environment. This perception correlates a typical psycholinguistic profile with a particular model of the propagandist's psycholinguistic portrait. The propaganda discourse should be analyzed using the method [12]. However, this method requires improvement for taking into account the corpuscular-wave characteristics of the text. The discourse tree construction should be carried out by applying the ID3 advanced algorithm, adapted for the contextual connection analysis in order to comply with the corpuscular properties of the text when correlating the categories of the core with the target element of psychological influence and the attribute of informational-psychological warfare determination:

$$Attr(Q_n) = H(B_{n_r}^m) - H_{Q_n}(B_{n_r}^m), \quad (10)$$

where Q_n – synonymous constructions with the psychological influence signs, $H(B_{n_r}^m)$ – the entropy of the categories set of semantic core in contextual connection, and $H_{Q_n}(B_{n_r}^m)$ is calculated:

$$H_{Q_n}(B_{n_r}^m) = \sum_{i_r=1}^n \left(\left| \frac{B_{i_r}^m}{B_{i_r}^m} \right| \cdot H(B_{i_r}^m) \right). \quad (11)$$

Taking into account the entropy calculation features (5), the final formula for the attribute calculation (12) is possible to be determined.

$$Attr(Q_n) = \sum_{i=1}^m P(B_{n_r}^i) \cdot \log_2 \frac{1}{P(B_{n_r}^i)} - \sum_{i=1}^n \left| \frac{B_{i_r}^m}{B_{i_r}^m} \right| \cdot H(B_{i_r}^m), \quad (12)$$

where m – the size of the core categories set; $P(B_{n_r}^i)$ – the appearance probability of a semantic core category.

In addition, the wave features of the text according to the text semantics perception by the author and the object of psychological influence are described by the function (13) according to the intensional logic rules in the Montague formal semantics [19].

$$F : D_{\langle e,t \rangle, S_2^*, W, Attr(Q_n)}^{S_2^* \times W}, \quad (13)$$

where $D_{\langle e,t \rangle}$ – predicative constant, S_2^* – individual semantic elements, W – perception worlds' set.

In this case, the extremum of the function will indicate the particular attribute's predominance. By defining an attribute, it can be followed the propaganda method and goals. At the same time, other elements of the author's environment are determined by studying the attributes' antiphases, and the world of semantics perception will point to a model of psycholinguistic portrait.

Stage 5. Forming a model of propagandist's psycholinguistic portrait.

After analyzing the text of propaganda discourse, it is possible to form a psycholinguistic portrait of the propagandist. The main characteristics that determine his subjective reality perception is his memory and experience. Since n-grams help to allocate the subject's normal memory [17], it can be assumed that this approach will allow the processing of the semantics core's categorical features. Based on the approach described in [20], the most probable sequences of the semantics core's categorical features in contextual connection (14) are determined by the direction of semantics development and the defined world of text perception.

$$P(B_{n_r}^m \cdot W' | B_{n_r}^1 \cdot W', \dots, B_{n_r}^{m-1} \cdot W') = \frac{P(B_{n_r}^1 \cdot W', \dots, B_{n_r}^{m-1} \cdot W')}{\prod_{i=1}^{m-1} P(B_{n_r}^i \cdot W' | B_{n_r}^1 \cdot W', \dots, B_{n_r}^{i-1} \cdot W')}, \quad (14)$$

where W' – the propagandist's perception world.

When W' is determined by the entropy E' of the semantic psycholinguistic characteristics set S_2^* of the arbitrary coefficient components $r_m^{S_2^*}$ of English text interpretation by the propagandist (15).

$$E' = \sum_{i=1}^{|S_2^*|} P(i) \cdot \log_2 1/P(i). \quad (15)$$

Thus, the perception world is defined (16):

$$W' = E' \cdot \int_{\langle e,t \rangle, S_2^*, W, Attr(Q_n)}^{S_2^* \times W} dW \cdot W_n. \quad (16)$$

In addition, it should be specified, taking into account the propaganda discourse identified in the fourth stage of the method and the temporal characteristics t_n of the psychological portraiture development. Thus defining the world of the propagandist's perception, regardless of the text writing time W'' will be (17):

$$W'' = W' / (Dis \cup t), \quad (17)$$

where Dis – the author's propaganda discourse environment set of attributes; t – a time moments' set.

As a result, the model of propagandist's psycholinguistic portrait (Mod) will be formed on the principle:

$$Mod = \prod_{i=1}^{|S_2^*|} (W'' + Attr(Q_n))_i, \quad (18)$$

where $W'' + Attr(Q_n)$ – the components of the propagandist's psycholinguistic portrait semantic category. Thus, conducting element-wise decomposition of psycholinguistic portrait's indicators and obtaining attributes inherent to the investigated individual are the last steps.

Conclusions

The actual scientific problem of increasing the effectiveness of counteracting the impact of information propaganda on the basis of English-language texts is solved in the article by creating the quantum-semantic psycholinguistic analysis method for the English-language text of propaganda discourse.

The psycholinguistic peculiarities of text written exactly by the propagandist are determined by defying the basic psycholinguistic properties' means and constructing a typical psycholinguistic profile through solving the inverted problem of determining the coordinates of semantic particle in English text with a known psycholinguist portrait of propagandist, based on the informant's survey method which allows forming a psycholinguistic features' set that contains the coefficient components used to identify propaganda features in a psycholinguistic profile.

The manipulative features detection in the psycholinguistic portrait is carried out on the basis of the psychological influence traces study in the text through analyzing the English manipulative constructs and stylistic-semantic entropy, which, allows detecting

manipulative deviations in text after correlating the set of semantic particles with a typical psycholinguistic profile.

The approach of automated discourse analysis was improved based on the advanced ID3 algorithm through the entropy of contextual core's categorical features using the intensional logic rules in order to comply with both corpuscular and wave features of the text, which allows to determine the goals and objectives of information warfare conducting, the tool of which is the studied text and the author's perception of his environment in order to correlate a typical psycholinguistic profile with a specific model of the propagandist's psycholinguistic portrait.

The quantum-semantic psycholinguistic analysis method for the English-language text of propaganda discourse was developed for the first time on the basis of quantum-semantic text analysis by using n-grams for the normal memory allocation and the processing of the semantics core's categorical features, while applying the

intensional logic in the psycholinguistics' research tasks that allows taking into account the corpuscular-wave features of the text for constructing a model of propagandist's psycholinguistic portrait and determining the peculiarities of text information perception by him.

A process of defining a function that describes the subjective semantic line of the text and its correlation with the objective semantic line requires further research, as well as a complete attributes' classification of informational and psychological warfare in the context of information propaganda.

The results of the study provide a propagandist's psycholinguistic portrait definition when counterpropaganda conducting through carrying out the further actions of reverse targeted impact on his subconscious, while automating the main processes of the countermeasures' preparatory phase. In addition, it is possible to make text formation through the propagandist's psycholinguistic profile determining based on the results of the study.

REFERENCES

- Fuchs, C. (2018), "Propaganda 2.0: Herman and Chomsky's Propaganda Model in the Age of the Internet, Big Data and Social Media", in Pedro-Carañana, J., Broudy, D. and Klaehn, J. (Ed.), *The Propaganda Model Today: Filtering Perception and Awareness*, University of Westminster Press, London, pp. 71-92. DOI: <https://doi.org/10.16997/book27.f>
- Poonam G. H. (2013), "Impressive Tool to Communicate in Modern World is the Language English", *International Journal of Social Science and Humanity*, Raipur, No. 3 (3), pp. 319-321.
- Hryshchuk, R. V., Kankin, I. O. and Okhrimchuk, V. V. (2015), "Technological aspects of information warfare at the present stage", *Ukrainian Information Security Research Journal*, NAU, Kyiv, No. 17 (1), pp. 80-86.
- Tarasenko, Ya. V. (2019), "Using the principles of quantum linguistics in information warfare", *Ukrainian Scientific Journal of Information Security*, NAU, Kyiv, No. 25 (2), pp. 96-103, DOI: <https://doi.org/10.18372/2225-5036.25.13671>
- Obraztsov, V. A. and Bogomolova, S. N. (2002), *Kriminalisticheskaya psihologiya* [Forensic psychology], Unity-Dana, Moscow, 448 p.
- Gusev, K. Yu. and Burkovskiy, V.L. (2015), "Psiholingvisticheskiy analiz informatsionnykh dannykh [Psycholinguistic analysis of information data]", *Bulletin of Voronezh State Technical University*, VSTU, Voronezh, No. 11 (4), pp. 23-25.
- Shakhnarovich, A. M. (2011), "Linguistic experiment as a method of linguistic and psycholinguistic research", *Voprosy psiholingvistiki*, Institute of Linguistics RAS, Moscow, No. 1 (13), pp. 191-195.
- Peshkova N. P. (2014), "Discourse understanding problems in psycholinguistic and pragmalinguistic aspects", *Bulletin of ChSU, Chelyabinsk*, No. 6 (335), pp. 73-77.
- Kučera, D. and Havigerová, J. M. (2016), "Quantitative Psycholinguistic Analysis of Formal Parameters of Czech Text", *SGEM 2016*, Proceedings of the 3rd International Multidisciplinary Scientific Conference on Social Sciences & Arts, Albena, August 22 – 31, Book 1, Vol. 1, pp. 313-320, DOI: <https://doi.org/10.5593/SGEMSOCIAL2016/B11/S01.041>
- Kučera, D. "Computational Psycholinguistic Analysis of Czech Text and the CPACT Research", *SGEM 2017: Science & Society Conference*, Proceedings of the 4th International Multidisciplinary Scientific Conference on Social Sciences and Arts, Albena, August 22 – 31, Book 3, Vol. 2, pp. 77-84, DOI: <https://doi.org/10.5593/sgemsocial2017/32/S11.010>
- Mahlberg M., Conklin K. and Bisson M.-J. (2014), "Reading Dickens's characters: Employing psycholinguistic methods to investigate the cognitive reality of patterns in texts", *Language and Literature*, No. 23(4) pp. 369-388. DOI: <https://doi.org/10.1177/0963947014543887>
- Zhao, J., Chevalier, F., Collins, C. and Balakrishnan, R. (2012), "Facilitating Discourse Analysis with Interactive Visualization", *IEEE Transactions on Visualization and Computer Graphics*, No. 18 (12), pp. 2639-2648. DOI: <https://doi.org/10.1109/TVCG.2012.226>
- Stegmeier, J. (2012), "Toward a computer-aided methodology for discourse analysis", *Stellenbosch papers in linguistics*, University of Stellenbosch, Stellenbosch, No. 41, pp. 91-114, DOI: <https://doi.org/10.5774/41-0-45>
- Tarasenko, Ya. V. (2019), "Determining the coordinates of semantic particle in english text with a known psycholinguist portrait of propagandist", *Ukrainian Information Security Research Journal*, NAU, Kyiv, No. 21 (3), pp. 168-174, DOI: <https://doi.org/10.18372/2410-7840.21.13820>
- Perfiliev, A. A., Murzin, F. A. and Shmanina, T. V. (2010), "Methods of syntactic analysis and comparison of constructions of a natural language oriented to use in search systems", *Bulletin NCC: Computer Science*, No. 31, pp. 91-109.
- Bentz, C., Alikaniotis, D., Cysouw, M. and Ferrer-i-Cancho, R. (2017), "The Entropy of Words – Learnability and Expressivity across More than 1000 Languages", *Entropy*, No. 19(6):275, available at: <http://www.mdpi.com/1099-4300/19/6/275/htm>, DOI: <https://doi.org/10.3390/e19060275>
- Kitamura, T., Ogawa, S. K., Roy, D. S., Okuyama, T., Morrissey, M. D. Smith, L. M. Redondo, R. L. and Tonegawa, S. (2017), "Engrams and circuits crucial for systems consolidation of a memory", *Science*, No. 356 (6333), pp. 73-78, DOI: <https://doi.org/10.1126/science.aam6808>
- Nikolaienko, S. and Nikolaienko, S. (2011), "The category of "psychological influence" in psychology", *Svitohliad-Filosofia-Relihiia*, Education and Research Institute for Business Technologies «UAB» of STU, Sumy, No. 1 (1), pp. 76-84.

19. Dowty, D. R., Wall, R. and Peters S. (2012), *Introduction to Montague Semantics*, Kluwer Academic Publishers, Dordrecht / Boston / London, 316 p.
20. Filatov, S. Yu. (2017), "A review of predictive text input methods", *Novyye informatsionnyye tehnologii v avtomatizirovamyih sistemah*, NRU "Higher School of Economics", Moscow, No. 20, pp. 55-61.

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Метод квантово-семантичного психолінгвістичного аналізу англомовного тексту пропагандного дискурсу

Я. В. Тарасенко

Анотація. В статті вирішується актуальна наукова задача підвищення ефективності протидії впливу інформаційної пропаганди в англомовних текстах шляхом створення методу квантово-семантичного психолінгвістичного аналізу англомовного тексту пропагандного дискурсу. Предметом дослідження є методи психолінгвістичного аналізу, а також методика забезпечення квантово-семантичного аналізу тексту. Наводиться метод, що складається з п'яти етапів та включає в себе визначення базових психолінгвістичних властивостей, побудову типового психолінгвістичного профілю, виявлення маніпулятивних ознак тексту та співвіднесення їх з психолінгвістичним профілем, визначення технологічної стратегії проведення інформаційного протиборства та формування моделі психолінгвістичного портрету пропагандиста на основі квантово-семантичного аналізу, що за рахунок використання n-грам дозволяє визначати особливості сприйняття тексту пропагандистом. При цьому, було вдосконалено підхід автоматизованого дискурсного аналізу на основі вдосконаленого алгоритму ID3 із застосуванням інтенціональної логіки. Психолінгвістичні особливості написання тексту саме пропагандистом визначаються шляхом проведення перших двох етапів методу за рахунок вирішення оберненої до визначення координат семантичної частки задачі на основі методу опитування інформанта. Виявлення маніпулятивних ознак у психолінгвістичному портреті проводиться на основі дослідження слідів психологічного впливу в тексті за рахунок аналізу маніпулятивних конструкцій англійської мови та стилістично-семантичної ентропії, що після кореляції множини отриманих семантичних часток з типовим психолінгвістичним профілем дозволяє виявити маніпулятивні відхилення у ньому. Результати дослідження забезпечують визначення психолінгвістичного портрету пропагандиста з метою подальшого проведення дій по здійсненню зворотного цільового впливу на нього з урахуванням його психологічних особливостей для зниження підсвідомого опору та підвищення таким чином ефективності контрпропаганди. Це дозволить підвищити рівень інформаційної безпеки держави.

Ключові слова: психолінгвістичний аналіз; протидія інформаційній пропаганді; квантово-семантичне дослідження; пропагандний дискурс; виявлення психологічного впливу; модель психолінгвістичного портрету.

Метод квантово-семантического психолингвистического анализа англоязычного текста пропагандного дискурса

Я. В. Тарасенко

Аннотация. В статье решается актуальная научная задача повышения эффективности противодействия влиянию информационной пропаганды в англоязычных текстах путем создания метода квантово-семантического психолингвистического анализа англоязычного текста пропагандного дискурса. Предметом исследования являются методы психолингвистического анализа, а также методика обеспечения квантово-семантического анализа текста. Приводится метод, состоящий из пяти этапов, который включает в себя определение базовых психолингвистических свойств, построение типичного психолингвистического профиля, выявления манипулятивных признаков текста и соотнесение их с психолингвистическим профилем, определение технологической стратегии проведения информационного противоборства и формирования модели психолингвистического портрета пропагандиста на основе квантово-семантического анализа, который за счет использования n-грамм позволяет определять особенности восприятия текста пропагандистом. При этом, было усовершенствовано подход автоматизированного дискурсного анализа на основе усовершенствованного алгоритма ID3 с применением интенциональной логики. Психолингвистические особенности написания текста именно пропагандистом определяются путем проведения первых двух этапов метода за счет решения обратной к определению координат семантической доли задачи на основе метода опроса информанта. Выявление манипулятивных признаков в психолингвистическом портрете проводится на основе исследования следов психологического воздействия в тексте за счет анализа манипулятивных конструкций английского языка и стилистическо-семантической энтропии, что после корреляции множества полученных семантических частиц с типичным психолингвистическим профилем позволяет выявить манипулятивные отклонения в нем. Результаты исследования обеспечивают определение психолингвистического портрета пропагандиста с целью дальнейшего проведения действий по осуществлению обратного целевого воздействия на него с учетом его психологических особенностей для снижения подсознательного сопротивления и повышения, таким образом, эффективности контрпропаганды. Это позволит повысить уровень информационной безопасности государства.

Ключевые слова: психолингвистический анализ; противодействие информационной пропаганде; квантово-семантическое исследование; пропагандный дискурс; выявление психологического воздействия; модель психолингвистического портрета.