Associative Verbal Network of the Conceptual Domain БІДА (MISERY) in Ukrainian

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Abstract. This paper presents a comprehensive study of the associative verbal network of the conceptual domain БІДА (MISERY) in the Ukrainian language. The associative test is carried out in order to obtain statistical and quantitative data necessary for modeling the conceptual domain БІДА (MISERY) and establishing the areas of its intersection with the related concepts of ENVY and GREED. Determining the 'associative' distance between the concepts (the index of mutual associative relation) and visualizing the test results we identify typologically common and distinct plots within the associative verbal network. The analysis of collocations in the GRAC corpus allowed us to identify associative statistical patterns of their modeling using the latest quantitative, cognitive and ethnosemiotic methods, and describe the taxonomy of the frames. Furthermore, applying Mutual Information score we revealed the ranges of intersection, gradation, opposition, areas of relative and absolute frequency, typicality, uniqueness, gender markedness, etc., of the responses to the stimulus БІДА (MISERY).

Keywords: associative verbal network, associative test, conceptual domain modeling, text corpus, associative distance between concepts, Ukrainian.

1 Introduction

Researchers claim that the associative test "allows a researcher to confirm the psychological relevance of theoretical assumptions, that is, to represent the associative network of senses ... as a reflection of hierarchical conceptual structures in speaker's mind" [1], and reactions to a particular stimulus can be viewed as the reflection of corresponding conceptual structures that are to a certain extent accompanied by emotions and evaluations in accordance with the speaker's individual conceptual worldview. In addition, the associative test is one of the effective ways of exploring linguistic consciousness and its national and cultural specificity, since it explicates the lexical semantic relations and linguistic stereotypes which are objectively given in the speaker's mind [2]. According to the authors of *Polski slownik asocjacyjny*, it is aimed at analyzing the ways of describing, interpreting and perceiving the world, its evaluative categorization by the native speakers, to reproduce the "kulturowo utrwalony system znaczeń" reflecting the mental structures that function in the linguistic consciousness [3].

There are a number of associative dictionaries and associative tests in Ukrainian psycholinguistics, including *The Dictionary of Associative Norms of the Ukrainian*

Language by N. Butenko [4]. N. Butenko conducted an experiment in 1974-1975 with the students of Lviv higher educational institutions aged from 18 to 30 years, whose mother tongue was Ukrainian, believing that students were "a mature and at the same time appropriate group of the population for a mass test" [4]. N. Butenko argued that occupation and gender had little impact on respondents' answers [4]. The questionnaire contained 133 stimulus words, based on Kent-Rozanov's list and supplemented with variant equivalents of words on that list [4]. Unfortunately, the reactions are not distributed by gender and professional field in that dictionary. The author of the dictionary also made an interesting note that the weather data had been recorded, however, that information was not interpreted in any way.

In 1989 N. Butenko's *Dictionary of associative attributes of nouns in Ukrainian* was published [5], combining the idea of associative and attributive dictionaries. This dictionary is based on the results of AT (hereinafter referred to as the associative test) with 200 respondents receiving a list of 35-40 nouns, to each of which five to seven attributes were to be provided (except pronouns and ordinal numbers) [6]. The preface states that the stimuli were the most commonly used nouns of the Ukrainian language [6], however, it should be noted that this statement is rather doubtful. The stimulus words included 816 nouns [5], such as *абажур, абрикос, аварія, автобус, автомат, автомобіль, автор, агітатор, агроном, адвокат, адреса, айстра, академік (lampshade, apricot, accident, bus, vending machine, car, author, agitator, agronomist, lawyer, address, aster, academician), etc*. It is obvious that the stimulus words do not belong to "the most common nouns".

The Ukrainian-language material is also presented in the *Slavic Association Dictionary: Russian, Belarussian, Bulgarian, Ukrainian* [7]. In 2007, S. Martinek published the *Ukrainian Associative Dictionary* [8]. The author used the list of 841 stimuli, "where words of different parts of speech are extensively represented: nouns, adjectives, verbs, adverbs, etc. This list includes words from the previous Ukrainian associative dictionaries [8]. This dictionary contains such stimuli as *бідний, бідність, збіднiти, бідно (the poor, poverty, to become poor, poorly)*, which makes it impossible to trace the stability / variability of associative reactions. In addition, there are a number of 'specialized' associative dictionaries [9].

The approach proposed in this study makes it possible to find out the specificity of the associative verbal network (hereinafter referred to as AVN), in view of the statistics and taxonomy of the frame structures and inter-conceptual associative relations. I. Sternin and Z. Popova claim that "the cognitive interpretation of the results of associative tests can be carried out by describing psycholinguistic significance, but it can also be carried out directly by the direct cognitive interpretation of associations" [10]. In general, our approach is theoretically and methodologically grounded in the experimental psycholinguistic research [11; 12; 13; 14; 15], cognitive science findings suggesting representation of concepts as frames [16] and exploitation of such findings in NLP, in particular, creating a network (or a graph) of concepts, and automatically learning the different patterns of association between concepts [17].

The results of the associative test conducted in 2019 are the material of this study. The characteristic feature of this AT is the fact that it was carried out 'without coercion', in other words, the test was mostly done by the Internet users of their own free will: 194 respondents, including 99 women and 95 men of the following age groups: 14-18 – 9.79%, 19-24 - 50%; 25-34 - 14.43%; 35-43 - 12.89%; 44-59 - 11.86%; 60-74 -

1.03%. A few more people out of those who have completed the test specialize in humanities. The respondents were given 67 stimuli, including *біда, бідувати; бідна як; бідний як (misery, to be miserable; miserable as (f); miserable as (m))*.

2 The Associative Test Methodology

Describing the methodology for conducting the AT, the Russian researcher A. Baranov emphasizes that respondents should give responses on the spot. In our opinion, N. Butenko's instruction is indicative in this sense: "<…> After every stimulus word is given to you, write down the first word that comes to your mind in connection with the stimulus. Then move on to the next word. Always answer in one word; do not omit the words <...>. Do not look away, do not look in the neighbor's questionnaire, do not ask him/her. It is important that your answer is individual. Work quickly until you complete the entire questionnaire" [4]. Presenting the methodology for conducting AT, O. Ulanovich emphasizes that respondents are to answer within a limited period of time, but the author does not indicate the exact time [18]. S. Martinek states that the respondent spent 5-7 seconds on each response during her experiment [8]. The remarks about 'not thinking' and omitting words are symptomatic in this context. Unfortunately, an experimenter cannot claim that a respondent gave the response 'without thinking' that it was the first word that came to mind. In our opinion, indicating non-omission puts a certain pressure on a respondent. The outcomes of our testing show that the respondents provided responses without omitting stimuli, mostly until the middle of the given list, by the end of the list the number of responses decreased. Even at the beginning of the list, some respondents put 'no association' or a dash mark indicating no response. Thus, 194 people took part in our experiment, however, for example, the stimulus *біда (misery)* received 171 responses.

Another problem is the 'regularity' or even 'normativity' of responses. A. Goroshko states that association is "a relation formed under certain conditions between two or more mental entities (feelings, acts, perceptions, ideas, etc.); the effect of this relation – the actualization of association – is that the emergence of one member of association regularly triggers the emergence of the other one (others)" [19]. The statement concerning the regularity of reactions raises some doubts, in particular about the 'degree' of regularity. In this regard, it is important, according to Yu. Ulyanov; "... the perceived word (stimulus) generates in our mind a boundless system of relations and relationships that reflect the images of objects, phenomena, concepts, actions and words, our emotional state at that moment, as well as the life experience of the individual" [20]. In other words, the regularity of emergence of certain associations may be peculiar to a particular period of a linguistic community existence due to the shared experience of the speakers. To a certain extent, this is proved by comparing the results of associative tests with native speakers, but in different periods of time. The dynamics of responses, in particular, may be driven by the dynamics of the semiotic system. In addition, we can speak about the typical appearance of certain words in response to certain stimuli, since they belong to the relevant frames.

3 Results and Discussion

The specificity of the proposed method is to determine the associative distance between concepts by analyzing data on their mutual associations (the index of mutual associative relation) and visualize the results of the associative test, which makes it possible to identify such common plots. Figure 1. presents the AVN plot studied based on the weight of each of the vertices.

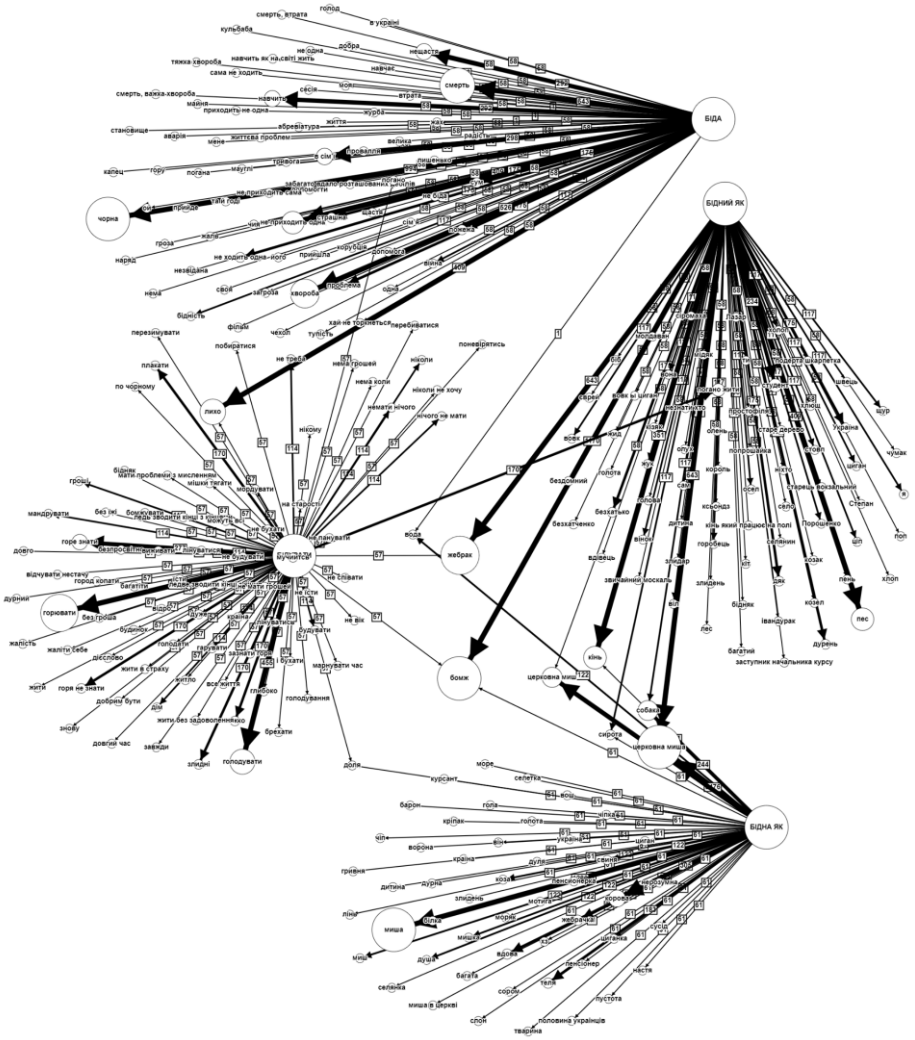

Fig. 1. Associative verbal network (AVN) of the conceptual domain БІДА (MISERY)

Thus, the stimulus *біда (misery)* received a total of 171 responses of the Ukrainian respondents, including 84 unique ones. In this AT, in general, the diversity index of female and male responses to the stimulus *біда (misery)* is approximately the same (f 0.53 / m 0.6). It has been revealed that male and female responses often are the same (see Fig. 2).

Figure 3. presents the most frequent responses to the stimulus *біда (misery)* (distribu-tion by gender). The most frequent response to the stimulus *біда (misery)* given both by women and men is the synonymous response *горе (grief)* (f 18.56%, m 10.81%), which belongs to the descriptive frame and makes up 15.20% of the total number of responses. The following reactions are also synonymous: *лихо (disaster)* (f 2.06, m 6.76, total 4.09), *нещастя (unhappiness)* (f 2.06, m 4.05, total 2.92), *лишенько (dis-aster)* (f 1.03, m 0.00, total 0.58). Antonymic reactions are also given: *щастя (hap-piness)* (f 1.03, m 0.00, total 0.58), *радість (joy)* (f 1.03, m 0.00, total 0.58), *не біда (no trouble)* (f 1.03, m 0.00, total 0.58). Interestingly, only women responded antonymically.

The respondents also responded using *чорна (black)* (f 13.40, m 5.41, total 9.94). The attribute *чорна (black)*, which belongs to the descriptive axiological frame, can be considered a set one, as evidenced by the GRAC corpus data: *чорна біда (black misery)* – 0.03 per million, *біда чорна (misery black)* – 0.03 per million [21].

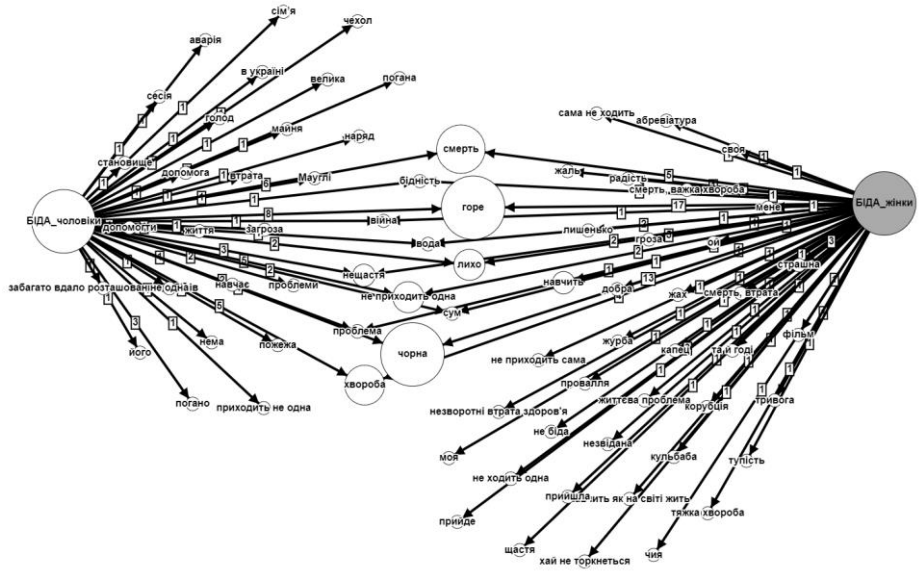

Fig. 2. Male and female responses to the stimulus *біда (misery)*

On the list of responses, we can find evaluative attribute *страшна (terrible)* (f 3.09, m 0.00, total 1.75). In the GRAC corpus, the frequency of the phrase *страшна біда (terrible misery)* is 0.16 per million and, as for *біда страшна (misery terrible),* it is 0.02 per million. In the analyzed associative test on the stimulus *біда (misery)* the following responses were given just once: *незвідана (unknown)* (f 1.03, m 0.00, total 0.58), *добра (good)* (f 1.03, m 0.00, total 0.58); *велика (large)* (f 0.00, m 1.35, total 0.58); *погана (bad)* (f 0.00, m 1.35, total 0.58); *ой (oh)* (f 1.03, m 0.00, total 0.58), etc.

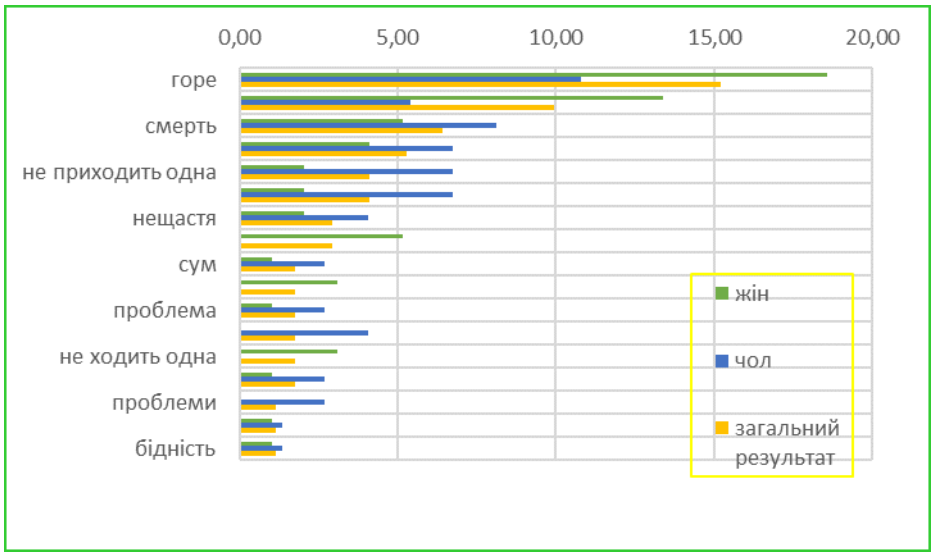

Fig. 3. Most frequent responses to the stimulus *біда (misery)* (Gender Distribution)

It should be noted that the corpus data are compared (see Table 1), although the frequency of occurrence, or rather the occurrence order, of the corresponding word combinations is different from those in the associative test. Table 1. shows collocations with a component *біда (misery)*. The analysis of the corpus data shows that the collocation *велика біда (great misery)* is of the highest absolute frequency collocation model ADJECTIVE + NOUN. However, according to the results of the associative test, the most frequent responses are *чорна (black), страшна (terrible).* The methods currently available to determine 'candidates' for collocations do not allow us to obtain the desired result in terms of determining metaphorical expressions. Today, different methods are used to identify collocations. V.P. Zakharov and M.V. Khokhlova state that most often such methods as MI-score, t-score and log-likelihood are used to detect collocations [22]. The researchers claim that the simplest way to detect a collocation pair is based on the relative frequency, which gives the most common collocation associations, however, this method has a number of drawbacks. Considering this, it is obvious that one of the options could be Mutual Information score (MI) [23]. E. Yagunova and L. Pivovarova concluded that the lists of collocations obtained using MI and t-score differ fundamentally: MI is the best one for distinguishing object names, terms, complex nominations; t-score, on the contrary, works better when distinguishing between 'lexical bundles' (derivative functional words, discourse markers) and 'set expressions' [24]. A word combination is considered to be statistically significant if the MI score is greater than 1, but the COCA corpus states that the semantic relations between words can only occur if the MI score between them is at least 3. Thus, for example, O. Shyshygina accepts a low MI score range of 1.0–2.9, an average one of 3.0–5.0 and a high one of 5.1 and above [25]. The analysis of the data obtained from the GRAC corpus (see Table 1) shows that it is impossible to detect metaphorical expressions by the abovementioned methods without 'manual intervention'.

Table 1. . Candidates for collocations (the GRAC corpus).

	The number of combinations	The number of candidates	T-score	MI	MI3	log likelihood	min. sensitivity	log-Dice	MI.log_f
великий	550	405305	22.43642	4.52923	22.73581	2412.54605	0.00136	5.38593	28.58732
тяжкий	120	22828	10.83198	6.48297	20.29675	842.32581	0.00467	6.34027	31.09095
новий	116	241141	9.45454	3.03306	16.74902	284.53659	0.00048	3.83234	14.44394
страшний	111	35500	10.33763	5.73348	19.32231	665.22927	0.00313	5.89310	27.05341
найбільший	83	43587	8.82927	5.01802	17.76810	416.90955	0.00190	5.29468	22.23394
людський	82	93804	8.44661	3.89478	16.60989	290.05971	0.00087	4.49082	17.21043
невеликий	74	37600	8.34545	5.06560	17.48451	376.41601	0.00197	5.25947	21.87067
справжній	72	86237	7.88801	3.82850	16.16835	248.49723	0.00083	4.39756	16.42602
головний	54	106388	6.49764	3.11050	14.62028	137.46685	0.00051	3.74371	12.46483
гірка |гіркий	34	4919	5.78137	6.87791	17.05283	257.03729	0.00132	5.18518	24.45335
гірший	33	10752	5.63457	5.70667	15.79546	196.46919	0.00128	4.89057	20.12378
чорний	20	114615	2.96597	1.57009	10.21394	17.01193	0.00017	2.22359	4.78016

In addition, the results of the AT reveal reactions related to the descriptive possessive frame: *чия (whose)* (f 1.03, m 0.00, total 0.58), *своя (own)* (f 1.03, m 0.00, total 0.58), *моя (mine)* (f 1.03, m 0.00, total 0.58), *мене (me)* (f 1.03, m 0.00, total 0.58), *його (his)* (f 0.00, m 1.35, total 0.58).

The responses given below are of high frequency: *смерть (death)* (f 5.15, m 8.11, total 6.43), *смерть, втрата (death, loss)* (f 1.03, m 0.00, total 0.58), *смерть, важка хвороба (death, serious illness)* (f 1.03, m 0.00, total 0.58), *незворотна втрата здоров'я (irreversible health loss)* (f 1.03, m 0.00, total 0.58). They are referred to the definitive type (it can be considered that the respondents have responded using the concepts that for them are examples of *біда (misery)*, such as *"біда – це …"(misery is…)*). The definitive reactions also include: *хвороба (illness)* (f 4.12, m 6.76, total 5.26), *тяжка хвороба (severe disease)* (f 1.03, m 0.00, total 0.58), *проблема (problem)* (f 1.03, m 2,70, total 1,75), *проблеми (problems)* (f 0.00, m 2.70, total 1.17), *життєва*

проблема (life problems) (f 1.03, m 0.00, total 0.58); *війна (war)* (f 1.03, m 1.35, total 1.17), *становище (situation)* (f 0.00, m 1.35, total 0.58); *сесія (session)* (f 0.00, m 1.35, total 0.58); *провалля (failure)* (f 1.03, m 0.00, total 0.58); *пожежа (fire)* (f 0.00, m 1.35, total 0.58); *наряд (duty)* (f 0.00, m 1.35, total 0.58); *корупція (corruption)* (f 1.03, m 0.00, total 0.58); *загроза (threat)* (f 0.00, m 1.35, total 0.58); *забагато вдало розташованих дебілів (too many well-placed jerks)* (f 0.00, m 1.35, total 0.58); *життя (life)* (f 0.00, m 1.35, total 0.58); *гроза (thunderstorm)* (f 1.03, m 0.00, total 0.58); *голод (hunger)* (f 0.00, m 1.35, total 0.58); *аварія (accident)* (f 0.00, m 1.35, total 0.58), etc.

A number of responses to the stimulus *біда (misery)* belong to the scenario frame (they are also sometimes referred to as syntagmatic type reactions), such reactions are the activation of corresponding phraseological units in respondents' memory: *не приходить одна (does not come alone)* (f 2.06, m 6.76, total 4.09); *не ходить одна (does not walk alone)* (f 3.09, m 0.00, total 1.75); *сама не ходить (does not walk alone)* (f 1.03, m 0.00, total 0.58); *приходить не одна (does not come alone)* (f 0.00, m 1.35, total 0.58); *прийшла (came)* (f 1.03, m 0.00, total 0.58); *прийде (will come)* (f 1.03, m 0.00, total 0.58); *не приходить сама (does not come alone)* (f 1.03, m 0.00, total 0.58); *не одна (not alone)* (f 0.00, m 1.35, total 0.58). In this case, we observe the personification of *біда (misery)* (the metaphorical model БІДА – ЦЕ ІСТОТА (MISERY is A HUMAN BEING). Similarly, *навчить (will teach)* (f 5.15, m 0.00, total 2.92); *навчить як на світі жить (will teach how to live in the world)* (f 1.03, m 0.00, total 0.58); *навчає (teaches)* (f 0.00, m 1.35, total 0.58); *хай не торкнеться (may not touch)* (f 0.00, m 1.35, total 0.58); *та й годі (and nothing can be done)* (f 1.03, m 0.00, total 0.58).

Moreover, we included in the scenario frame the reactions related to the experience of the subject of misery in a number of states: *сум (sadness)* (f 1.03, m 2.70, total 1.75); *тривога (anxiety)* (f 1.03, m 0.00, total 0.58); *журба (mourning)* (f 1.03, m 0.00, total 0.58); *жах (horror)* (f 1.03, m 0.00, total 0.58); *жаль (pity)* (f 1.03, m 0.00, total 0.58). It should be noted that predominantly women responded to the stimulus *біда (misery)* in this way.

The responses which belong to the scenario frame related to the actions of the subject are not frequent: *допомогти (to help)* (f 0.00, m 1.35, total 0.58), *допомога (help)* (f 0.00, m 1.35, total 0.58). Such reactions were received only from male respondents.

The index of mutual associative relation of concepts and sub-concepts is an important indicator (see Table 2), which is calculated by the ratio of the number of identical reactions to the total number of reactions received [18]. For comparison, the associative relations between the concepts of ENVY and GREED were analyzed.

Figure 4 visualizes the associative distance between the investigated stimuli that verbalize the concepts of БІДА (MISERY), ЗАЗДРІСТЬ (ENVY), ЖАДІБНІСТЬ (GREED).

The index of mutual associative relation between derivatives БІДА (MISERY) and БІДУВАТИ (BE MSERABLE) is 0.040. The common reactions are: *лихо (disaster)* (8), *погано (badly)* (4), *сім'я (family)* (2).

Table 2. The index of mutual associative relation of the concepts and sub-concepts

Concepts/ stimuli	біда	біду-вати	бідна як	бідний як	горе	заздрість	заздрити	заздрісна як	заздрі-с¬ний як	жадібність
біда	0									
біду-вати	0.040	0								
бідна як	0.0657	0.0353	0							
бідний як	0	0.1181	0.573	0						
горе	0.4425	0.0407	0.0422	0.0088	0					
заздрість	0.1392	0.0592	0.0647	0.0222	0.0182	0				
заздрити	0.08	0.1242	0.0063	0.0154	0.1615	0.2140	0			
заздрісна як	0.0067	0.0263	0.1918	0.1204	0.0101	0.1245	0.2601	0		
заздрісний як	0	0.0102	0.2163	0.2491	0.021	0.1027	0.0441	0.373983	0	
жадібність	0.1648	0.0667	0.0157	0.0615	0.0994	0.2901	0.2662	0.1206	0.0478	0

To compare, for ЗАЗДРІСТЬ (ENVY) and ЗАЗДРИТИ (BE ENVIOUS) it is 0.2140. The index of mutual associative relation between *бідна як (miserable as (f))* and *бідний як (miserable as (m))* is 0.573. The most frequent common reactions of the respondents are *церковна миша (the church mouse) (68); миша (mouse) (68), бомж (tramp) (27), жебрак (beggar) (11), кінь (horse) (7), церковна миш (church mouse) (6), собака (dog) (6), Україна (Ukraine) (4)*. To compare, for ЗАЗДРІСНА ЯК (ENVIOUS AS (f)) and ЗАЗДРІСНИЙ ЯК (ENVIOUS AS (m)) it is 0.3740. And, for БІДА (MISERY) and ГОРЕ (GRIEF) the index of mutual associative relation is 0.4425. The most frequent common response to the stimulus *горе (grief)* is *біда (misery)* (32), and conversely the most frequent response to the stimulus *горе (grief)* is *біда (misery)* (25); common reactions are (presented in decreasing order of absolute frequency) – *смерть (death) (22), лихо (disaster) (17), сум (sadness) (11), нещастя (misery) (8), погано (badly) (5), радість (joy) (4), втрата (loss) (4), щастя (happiness) (3), війна (war) (3), пожежа (fire) (2), не біда (no trouble) (2), в Україні (in Ukraine) (2), велика (great) (2), жах (horror) (2), журба (grief) (2), лишенько (disaster) (2), навчає (teaches) (2).* To compare, for ЗАЗДІСТЬ (ENVY) and ЖАДІБНІСТЬ (GREED) it is 0.2901. Table 3 presents the descriptive indices of mutual associative relation of the concepts (IMAR) in descending order.

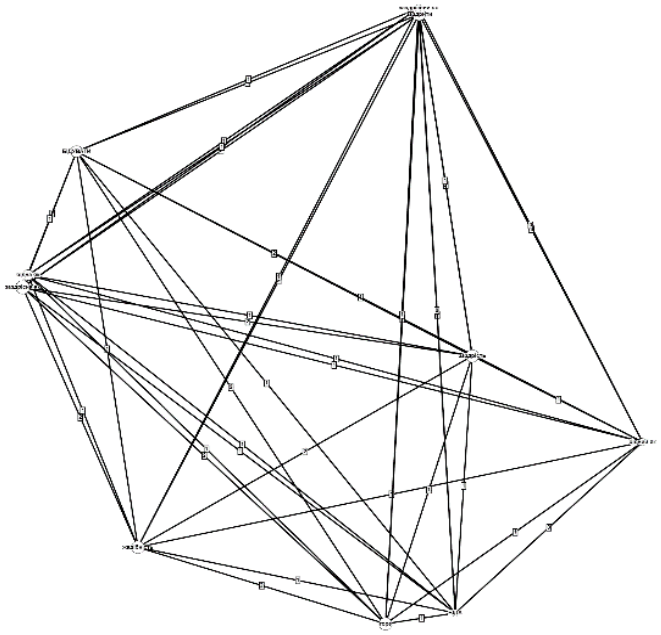

Fig. 4. Associative distance between the concepts of БІДА (MISERY), ЗАЗДРІСТЬ (ENVY), ЖАДІБНІСТЬ (GREED)

Table 3. The indices of mutual associative relation of the concepts

The concept of БІДА (MISERY)	IMAR	The concept of БІДУВАТИ (BE MISERABLE)	IMAR	The concept of БІДНА ЯК (MISERABLE AS (f))	IMAR e	The concept of БІДНИЙ ЯК (MISERABLE AS (m))	IMAR
горе	0.4425	заздрити	0.1242	бідний як	0.573	бідна як	0.573
жадібність	0.1648	бідний як	0.1181	заздрісний як	0.2163	заздрісний як	0.2491
заздрість	0.1392	жадібність	0.0667	заздрісна як	0.1918	заздрісна як	0.1204
заздрити	0.08	заздрість	0.0592	біда	0.0657	бідувати	0.1181
бідна як	0.0657	горе	0.0407	заздрість	0.0647	жадібність	0.0615
бідувати	0.040	біда	0.040	горе	0.0422	заздрість	0.0222
заздрісна як	0,0067	бідна як	0,0353	бідувати	0,0353	заздрити	0,0154
бідний як	0	заздрісна як	0.0263	жадібність	0.0157	горе	0.0088
заздрісний як	0	заздрісний як	0.0102	заздрити	0.0063	біда	0

We can notice higher IMAR for the concepts that are verbalized by units belonging to one part of speech, for example: for *бідувати (to be miserable)* and *заздрість (envy)* IMAR is 0.1242, while for *misery* and *to be miserable* it is only 0.040. The highest IMAR is typical of synonyms, for example: for БІДА (MISERY) and ГОРЕ (GRIEF) it is 0.4425. Figure 5 shows reactions to stimuli БІДА (MISERY) and ГОРЕ (GRIEF) and presents the visualization of associative reactions based on the weight of each vertex.

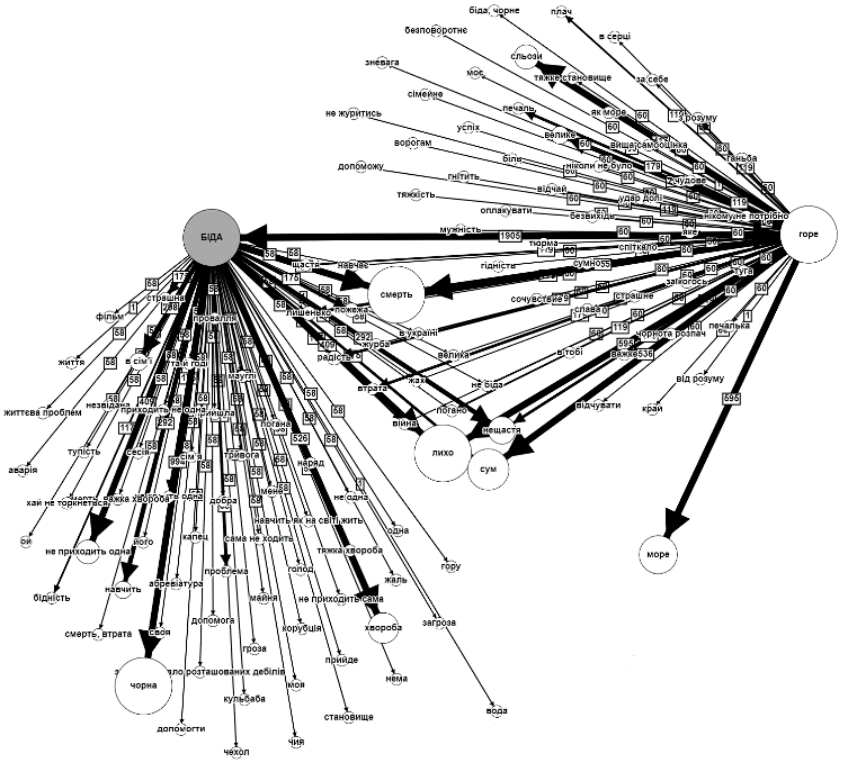

Fig. 5. The responses to the stimuli БІДА (MISERY) and ГОРЕ (GRIEF)

Semantic distance between the words is determined by analyzing distribution. This method is applied to Word2Vec Models trained on Wikipedia. It should be noted that Wikipedia texts belong to scientific and popular scientific styles and only partially reflect the discourse of a particular linguistic community. Obviously, the best option would be to train the tool using the corpus. However, also in this case we observe a certain coincidence of results in the corresponding frames. Top 10 similar words or synonyms for *біда (misery)* are as follows: *рідня (relatives)* 0.701118, *страшна (horrible)* 0.685616, *донечка (daughter)* 0.684960, *старенька (old lady)* 0.676980, *твоя (your)* 0.673573, *тиша (silence)* 0.672945, *недуга (sickness)* 0.667534, *люба (darling)* 0.663111, *завірюха (whirlwind)* 0.657884, *відьма (witch)* 0.652087. See also Figure 6, which shows top 30 analogous words or synonyms for БІДА (MISERY). We can observe more coincidence of the results of our associative test with the results obtained

with the help of the Word2Vec Models tool for stimulus *заздрість (envy)*. Top 10 similar words or synonyms for *заздрість (envy)* are: *жадібність (greed)* 0.843240, *ревнощі (jealousy)* 0.772056, *ненависть (hatred)* 0.766005, *марнославство (vanity)* 0.754607, *гнів (anger)* 0.749902, *злість (anger)* 0.749735, *зарозумілість (arrogance)* 0.745534, *хтивість (lust)* 0.736004, *лицемірство (hypocrisy)* 0.718854. See Figure 7, which shows top 30 analogous words or synonyms for ЗАЗДРІСТЬ (ENVY).

The associative test data and the corpus data are extremely valuable for compiling dictionaries. For example, *The Dictionary of the Ukrainian Language* (СУМ-20) provides the following definition (omitting illustrative material): БІДА (MISERY), і, f. 1. An accident; a nasty incident that causes suffering; misfortune, evil. // Hardships, trouble. // Bad feeling, misfortune. 2. Guilt, harm. The results of the associative test show that the synonym *горе (grief)* is more frequent than *лихо (disaster)*, the latter is used in the definition. In addition, the corpus data should be used to determine collocations and enter the most typical ones into the dictionary.

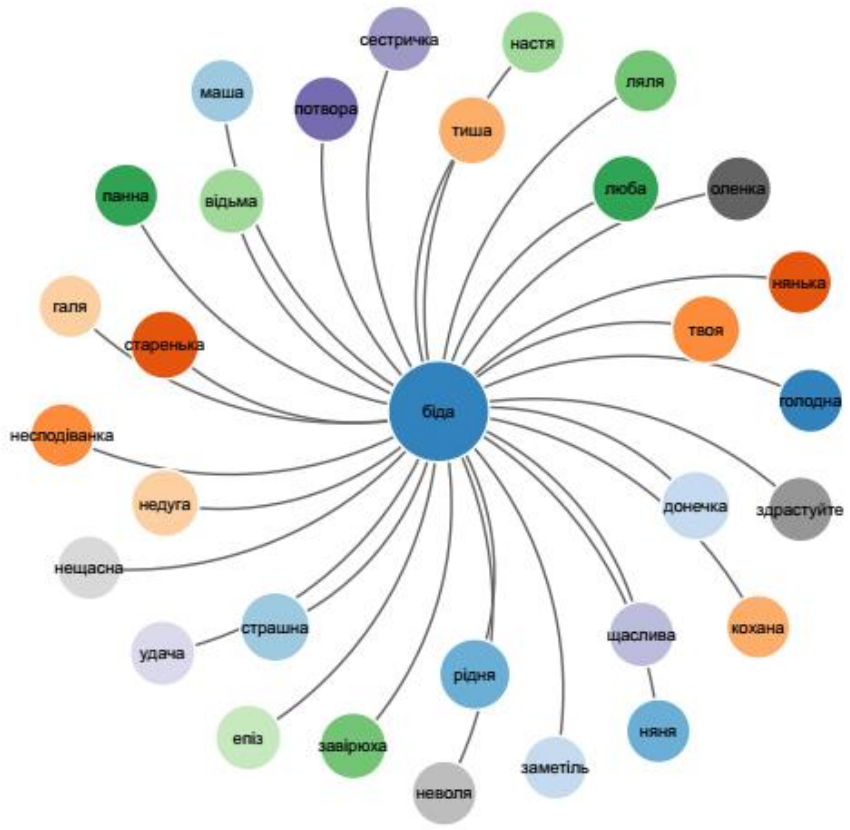

Fig. 6. Top 30 analogous words or synonyms for БІДА (MISERY)

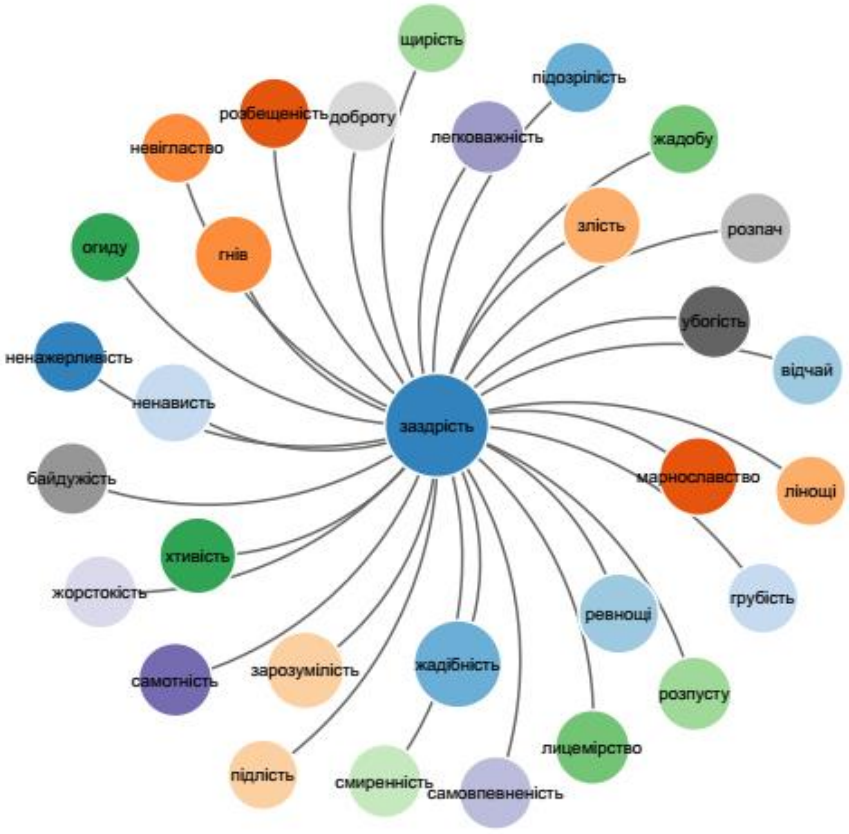

Fig. 7. Top 30 analogous words or synonyms for ЗАЗДРІСТЬ (ENVY)

4 CONCLUSIONS

The associative test was aimed, first, at obtaining statistical and quantitative data necessary for modeling the conceptual domain БІДА (MISERY) and establishing the areas of its intersection with related concepts in terms of the typology of associative relations; second, at revealing the mechanisms of cognitive modeling of the corresponding frames, which reflect the cognitive structure, individual and collective experience of Ukrainians, their values and cultural associations.

Determining the associative distance between the concepts through the reconstruction of data on their mutual associations (the index of mutual associative relation), as well as visualization of the results of associative test conducted by Ukrainian internet users, made it possible to identify typologically common and distinct plots within the obtained associative verbal network of the conceptual domain БІДА (MISERY) (based on the semantic and statistical relevance of each of the vertices represented in the graphs).

Contrastive analysis of collocations and the frequency of metaphorization of word combinations in the text corpora (in particular the GRAC corpus) allowed us, first, to identify associative statistical patterns of their modeling by means of the latest quantitative, cognitive and ethnosemiotic methods; second, to describe the taxonomy of the frames (descriptive, scripted, axiological, parametric, possessive, etc.); and, third, applying Mutual Information score, etc. to find out the ranges of intersection, gradations, oppositions (synonymous and antonymic paradigmatic correlates), areas of relative and absolute frequency, typicality, uniqueness, usability, casualness, gender markedness of the responses to the stimulus БІДА (MISERY).

By establishing the index of mutual attraction and repulsion of the associations within the common AVN (adjacent conceptual domains where we observe the 'reciprocity and derivability of concepts' / and or sub-concepts), the most frequent (absolute) reactions have been presented in ascending and descending order by gender and axiological characteristics. Conclusions have been made based on the statistical typological analysis of comparative phrases, phraseological, socio - and emotionally evaluative responses, mostly semiotically and epidigmatically marked, connected with the vital and family values (LIFE-DEATH, HAPPY, HAPPYNESS, HEALTH, FAMILY, COUNTRY), anthropomorphic metaphors (the metaphorical model БІДА (MISERY) is A HUMAN BEING), stereotypical and prescriptive associations. The in-depth qualitative analysis in terms of interframe merging (the reconstruction of syntagmatic connections with action predicates) made it possible to establish the following areas of respondents' conceptualization: threat, danger, natural disaster, technogenic catastrophe and other destructive forces. This, in turn, made it possible to visualize the associative distance between the stimulus words. It has been revealed that the responses of female respondents, naturally, were closer connected with various fragments of negative experience and internal state of the person, her worries, unlike male reactions, which are mostly reactions related to the concept of COOPERATION (assistance, support in difficult situations).

The conducted associative test (which provides the obtained associative reactions on the basis of weight, relevance of each vertex) gives grounds to argue that higher IMAR is typical of the concepts represented by words belonging to one part of speech or synonyms and it is the lowest in case of derivative responses of respondents, as in БІДА (MISERY) and БІДУВАТИ (BE MISERABLE).

The methodology of determining the semantic distance between words based on the Word2Vec Models allowed us to observe the peculiar isomorphism of adjoining frames and their conceptual correlation within the stimuli БІДА (MISERY) and ГОРЕ (GRIEF) taking into account the qualitative-quantitative correlation with typical reactions to the stimulus ЗАЗДРІСТЬ (ENVY) and its synonyms – ЖАДІБНІСТЬ (GREED), ХТИВІСТЬ (LUST), РЕВНИВІСТЬ (JEALOUSY), etc.

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