

A COMPARATIVE ANALYSIS OF THE SEMANTIC FIELD OF ‘DECEPTION’: A CASE STUDY OF RUSSIAN AND AMERICAN IMAGEBOARD MESSAGES

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Abstract

This article uses the material of anonymous Internet forums to analyse the semantic field of deception by the instrumentality of artificial neural networks. Two major imageboards were investigated: 2ch.hk and 4chan.org, being the most popular Russian and American imageboards. For the experiment an algorithm called Word2vec was used to examine 30 million word usages for either of the languages. This analysis revealed 10 words with the greatest semantic proximity to terms from semantic fields of «deception» for Russian and American English. The results showed the tendency among native Russian imageboard users to link the concept of deception with religion and spiritual sphere, while American forum users associate deception with politics and related concepts.

Keywords: artificial neural networks, deception, semantic field, anonymity, word2vec

1. Introduction: Definitional problems related to the terms: “lie”, “deception” and “falsehood” in a Russian perspective

The study of lies and communication has become particularly intense recently. One can hardly argue that the phenomenon of the “lie” and lying is of extreme importance to mentiology, modern applied linguistics, psychology and psycholinguistics, polygraphology, and jurisdiction. Its increased significance can be explained by the fact that people have been trying to detect deception for years or even centuries, but nowadays due to such advanced technologies as lie detectors and artificial neural networks the act of identifying deception is becoming more feasible and may give more reliable results.

Speech is a way of communication with feedback, a person hears what they say and can control speech to some extent by analysing their own voice. It is easier to deceive, hide or distort the truth with the help of words. A false statement deliberately describes the actual state of things in a distorted way to mislead a communication partner. Lying changes thinking, it is built on a different principle

and “has its own rules [...] and] its methods” (Luria 1927: 92), which can be found in the process of linguistic analysis of statements. Thus, a false statement is information deliberately transmitted in a distorted form, accompanying a change in thinking and leading to a change in non-verbal behaviour. Part of the information is expressed explicitly, i.e. with the help of linguistic means specially designed for its direct expression (cf. Potapova, Potapov 2006: 329).

A false statement is a complex linguistic, psychological and paralinguistic phenomenon. Paralinguistic indicators of deception are features that accompany speech, such as the tone of voice, articulation, facial expressions, gestures, body movements, etc. (Potapova, Potapov 2006: 91). Thus, when analyzing a statement, one should consider all the aspects accompanying speech to get the most accurate results.

The terms “lie”, “deception” and “falsehood” can sometimes be considered convoluted and controversial to define due to their complex and equivocal nature. Besides, semantic fields of these words are quite different in different languages and cultures. That is why a close examination of definitions of these terms offered by numerous researchers can contribute to our understanding of the concept and advance the study on deception detection. Moreover, precise definition of these words will allow us to avoid mistakes in interpreting and translating them.

There are multiple definitions of the terms suggested by famous researchers from different countries. Paul Ekman is one of the world’s leading deception experts and perhaps the most famous one. According to him, a lie occurs when one person intends to mislead another, doing it deliberately, without prior notification of this purpose, and without having been explicitly asked to do so by the target (Ekman, 2009). According to the definition above, lying should correspond to at least five necessary conditions. Firstly, it requires a lying person. Secondly, it requires a recipient who is the intended addressee of the liar. Thirdly, lying requires that the utterance/statement should be deceptive. Besides, there should be an intention to deceive the recipient. Moreover, the sender intends to mislead the communication partner “without prior notification of this purpose”, i.e. depriving him of the legal right (admitted by the sender) to receive full information, his “right to the truth” (Kant, 1994). As can be seen from the above, lie can be considered as denial of the right to receive information, i.e. an illegal action (Potapova, 2016).

Ekman distinguishes two basic forms of lies: concealment of the truth and its distortion (providing the interlocutor with false information). “If a liar conceals information, he does not report false information. In case of information distortion, the liar takes some additional actions—he does not only hide the truth, but also provides false information pretending that it is true” (Ekman 2012: 21). Both types of lies are considered in terms of law violation, according to Ekman’s definition, thus, it is clear that concealment of truth, i.e. silence, can also be regarded an illegal action.

There are other definitions of a "lie" contributing to the idea of its semantic field of human rights violation. A lie can be considered "*a successful or unsuccessful deliberate attempt, without forewarning, to create in another a belief which the communicator considers to be untrue*" (Vrij 2000). Smith describes lying as "*any form of behaviour the function of which is to provide others with false information or to deprive them of true information*" (Smith 2004). Both Vrij and Smith emphasize the illegal nature of lying, outlining that a legal action in this case should have been to forewarn an interlocutor ("without forewarning") and thus not to deprive them of their legal rights to receive information ("to deprive them of true information").

2. Russian scientists' contribution to the study of the concepts of "lie" and "deception"

Significant contribution to the study of the concept of "lie" and "deception" was made by a famous Russian scientist V. Znakov. His research was devoted to the social, psychological and moral nature of lying. His research featuring 317 Russian and 49 Vietnamese people and examination of historical sources and Russian and foreign dictionaries contributed to the study of cross-cultural diversity of the terms and related concepts. The obtained results allowed him to state that although there are many definitions of the word "lie", it is important not to confuse this term with such concepts as "untruth", "lies" and "deception" (Znakov of 1999). Znakov identifies three varieties of the concept of "untruth": 1. verbal equivalent of an error; 2. different forms of allegory (allegory, irony), i.e. words that in a certain context acquire the meaning opposite to their literal meaning; 3. a form of lying. He considers lies to be not an informative, but a communicative phenomenon. In this perspective lying is not so much a means of deliberately distorting facts, but a way of establishing contact and bringing people together. Lies are not intended to be believed, there is no intention of misleading the listener and thus to gain some personal benefit. Znakov believes that it is deception which is based on the conscious desire of one of the interlocutors to create from a false impression of the subject of the discussion, but, he notices, at the same time the deceiving subject does not distort the facts. Moreover, Znakov distinguishes two main types of deception: deception with the help of half-truths and deception by telling the truth. Znakov also highlights that while the major part of definitions of lying, formulated by Western thinkers, are based on ideas of people's rights violation, the ones given by Russian scientists and philosophers outline the immoral nature of lies. He outlines that there is a huge difference in the understanding of the concept of the "lie" by people of different cultures.

A famous Russian philosopher V. Solovyov offered the following definition of lying: "In contrast to the delusion and mistake, a lie means conscious and morally reprehensible opposite of the truth" (Solovyov, 1996). The understanding of lies in the Russian cultural tradition has an essential feature: the definition of

this phenomenon often contains indications of the morally reprehensible nature of the lying subject. For example: “He lies without blushing” (Ozhegov 1992). Thus, it can be seen that Russian scientists tend to describe lying as a dishonorable action that is morally wrong. The definition of lying in Russian culture can be considered in terms of morality, as opposed to the traditions of Western cultures, where the definition of lying is more often considered in terms of its (un)lawfulness.

However, moral representations may gradually change over time. Universal anonymity and the Internet network erode moral principles (Akulich, 2012). In addition, the very notion of the “lie” can change under the condition of anonymity present in modern society. Thus, at the moment, it is of importance to test the above considerations related to the nature of lies for young anonymous Internet users. One of the examples of such active communities with almost complete anonymity is imageboards discussed in the further sections of the paper.

3. Analysis of the semantic fields of “lie” and “deception”

Messages of imageboard users were analysed using the word2vec algorithm, the output of which can be considered to be a form of the associative experiment (Jurgens, 2012). In this study, two imageboards have been considered: 2ch.hk and 4chan.org, which are the most popular Russian-language and English-language imageboards, respectively. The CBOW (continuous bag of words) version of word2vec was used, because it is preferable for short message analysis and gives more accurate results for similar word comparison in the frame of the MSR Word Relatedness Test Set (Mikolov, 2013).

The CBOW Word2vec algorithm is based on a shallow neural network, where $\{x_1, \dots, x_C\}$ are unitary word vectors (the length of the vector corresponds to the length of the dictionary V , all values except the one which corresponds to the current word are zero, the value for the current word is 1, the number of vectors at the output is equal to C - the length of the analysis window. The hidden layer is h , the output is a unitary vector for the predicted word y_j . The task of the network is to predict the missing word based on words from the analysis window. During the training procedure the neural network attempts to minimize the error between the predicted words and the real ones. As a result of the training the neural network using the stochastic gradient descent method based on backward propagation, a trained hidden layer h is obtained for each of the model words. The most frequent words are downsampled to decrease computational requirements and to improve the accuracy of the model. Words that occur less frequently than two times in the training corpus are excluded because it would be problematic to evaluate their vectors for such a small sample. The size of the vector h is 300, which is a popular choice for word2vec models, the used window size is 10. To compare the output words with the predicted ones we averaged their vectors into one vector. Gensim implementation of word2vec was used in the analysis. These resulting vectors can

be compared with each other. Thus, according to the distributional hypothesis posed by Harris (Harris, 1954), words in similar contexts tend to have similar meanings, which, in turn, was phrased by Firth in his much quoted line: "a word is characterized by the company it keeps".

Words can be compared using different metrics but the most popular for word embeddings is the cosine distance between word vectors. It can be computed as $A * B / \|A\| * \|B\|$.

In the present study, most frequent pairs of words were united into bigrams according to the procedure provided in the Gensim library (Rehurek, 2011) and described by Mikolov (Mikolov, Tomas, 2013). This procedure is based on unigram and bigram counts of corpus tokens and can be evaluated as $count(word_i, word_j) / count(w_i), count(w_j)$, where $count(word_i, word_j)$ is the bigram count for two words that occur together, $count(word_i)$ and $count(word_j)$ are unigram count of the respective words.

In the experiment, the resulting vectors h were compared for words from the

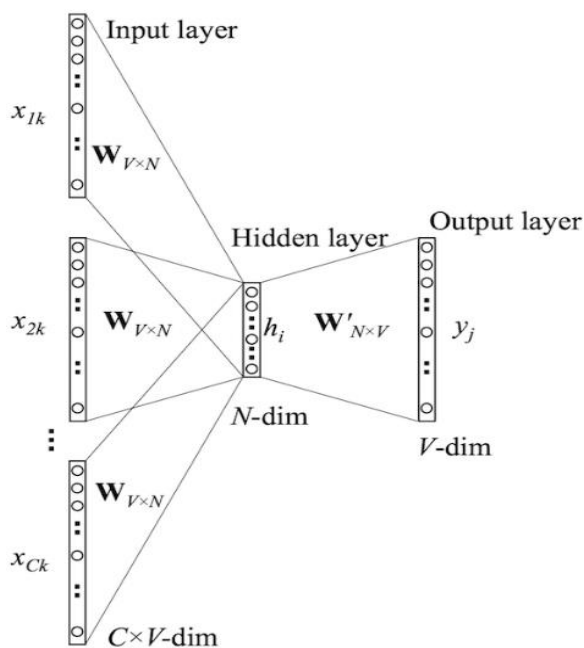


Fig. 1 CBOW Word2vec visualisation

semantic field “Lies” (Bocharova, 2012). In addition, the results were compared with the pre-computed vectors for the National Corpus of the Russian Language (Kutuzov, 2017) and Google news vectors (Mikolov, Chen, 2013). The table containing the comparisons results is provided in the Appendix.

4. Results

From the table above we can conclude that modern Russian-speaking Internet users often associate lies with such phenomena as religion and feminism. In addition, the generalized view shows that for Russian-speaking imageboard users deception is primarily associated with social injustice and the moral side of the phenomenon (including notions of “morality” and “suffering”). American users focus more on the political side of the semantic field of “Aggression” (including notions of “political_correctness”, “Nazism”, “lefties”, “mainstream_media”). An analysis of the data obtained shows that Russian-speaking users pay more attention to the morally reprehensible nature of lies, while American users of the forum associate lies and concepts close to it with the spheres of politics and the media. However, terms such as “fraud” or “slander,” both of which already function as labels for legal categories, in both communities were associated with other law-related terms.

It can also be seen that the trained embeddings used in the research programme contain fewer synonyms, which may signal both the lack of training data, as well as discourse peculiarities of anonymous communities which tend to decrease their use of synonyms. Moreover, training based on short messages which are characteristic of imageboards provides less context for word2vec training.

It seems that using our methodology it may also be possible to identify the most prevalent political views active in the studied communities, yet it would require a more extensive, and differently focused analysis.

5. Conclusion

It is evident that although there is a common core for the concept of the “lie”, the fact that there are many diverse definitions indicates that Russian and West European scholars can interpret it differently. The analysis of the data conducted for the reported study resulted in some significant observations. The obtained results indicate that the semantic field of these terms varies in accordance with the language and culture under analysis. To avoid mistakes while using and translating these terms it is necessary to consider the correct definition of the analysed terms, their semantic fields, their context and some cross-cultural peculiarities of their usage and understanding.

The statistical analysis performed with artificial neural networks revealed the most frequent associations and contexts accompanying “lies” for Russian and American communication imageboard users, which, as it is hoped, can be used for content analysis in further research.

The comprehensive study methods and procedure can henceforth be implied to analyse the semantic field of deception in different cultures and languages and be used for conducting cross-cultural comparative analysis of the conceptualisations

of lying, which should contribute to a better understanding of the terms and related concepts and further also prevent mistakes in translation. The obtained data provide new challenges for future research due to the concepts revealed for "lie," being rather new and understudied research area of Russian science.

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Appendix

Table 1. Comparison of the results of anonymous forums and formal corpora (the National corpus of the Russian language and Google News for English (proximity was calculated as the cosine distance between the vectors of the desired word and most similar ones to it))

Original Word	Semantically closest words for anonymous imageboards	Cosine Similarity	Words from the general corpus (National Corpus of the Russian language for Russian original words and Google news corpus for English original words)	Cosine Similarity
Ложь (Lies)	1. религия (religion)	0.76	1. лицемерие	0.73
	2. домыслы (wild guesses)	0.75	(hypocrisy)	0.71
	3. вера (faith)	0.73	2. неправда untruth	0.70
	4. истина (truth)	0.72	3. полуправда (half-truth)	0.68
	5. мораль (morals)	0.72	4. клевета (slander)	0.68
	6. иллюзия (illusion)	0.71	5. обман (deception)	0.67
	7. глупость (stupidness)	0.69	6. ложь (lies)	0.67
	8. реальность (reality)	0.69	7. вранье (a pack of lies)	0.63
	9. страдание (suffering)	0.69	8. вранье (a pack of lies)	0.63
	10. вранье (a pack of lies)	0.68	9. фальшь (insincerity)	0.63
			10. ЛЖИВЫЙ (deceptive)	
Обман (deception)	1. неравенство (inequality)	0.64	1. обманута (deceived)	0.74
	2. ветви (branches)	0.64	2. обман (deception)	0.68
	3. величайшие (greatest)	0.63	3. ложь (lie)	0.68
	4. созданное (created)	0.63	4. обманом (deception)	0.64
	5. вымысел (fiction)	0.62	5. обманывать	0.62
	6. естественного (natural)	0.61	(deceive)	0.62
	7. величина (magnitude)	0.61	6. надувательство	0.60
	8. историческое (historic)	0.61	(trickery)	0.60
	9. безобразие (disgrace)	0.61	7. самообман (self deception)	0.59
	10. преодоление (overcoming)	0.61	8. самообмана (self deception)	0.59
			9. притворство	
			10. бездельничество	
Клевета (slander)	1. несовершеннолетнего (underage)	0.85	1. клевета (slander)	0.72
	2. совершение (committing)	0.83	2. ложь (lie)	0.68
	3. административного (administrative)	0.82	3. инсинуация (innuendo)	0.66
	4. соединенная (united)	0.81	4. клевета (slander)	0.66
			5. клеветнический (slander)	0.66

	5. подписание (signing) 6. правонарушения (offence) 7. заинтересованностью (interest) 8. совершившим (committed) 9. предусмотренных (foreseen) 10. юридического (legal)	0.81 0.8 0.8 0.8 0 .79 0 .79	6. диффамация (libel) 7. клеветник (slanderer) 8. злословие (obloquy) 9. измышление (insinuation) 10. навет (slander)	0.65 0.64 0.62 0.62 0.61
Лесть (flattery)	1. сигнализирует (signals) 2. притворство (dissimulation) 3. самоиронии (self-irony) 4. хоккинга (stephen hawking) 5. фантастическая (fantastic) 6. суетливый (fussy) 7. inferно (inferno) 8. рецензия (review) 9. нейрофизиология (neurophysiology) 10. крымская (crimean)	0.7 0.7 0.68 0.68 0.68 0.68 0.68 0.67 0.68 0.67	1. лесть (flattery) 2. ласкательство (kindness) 3. льстивый (flattering) 4. лесть (flattery) 5. предан (betrayed) 6. лицемерство (hypocrisy) 7. злоречие (slander) 8. двуличность (duplicity) 9. угодливость (obsequiousness) 10. раболепство (servility)	0.67 0.66 0.66 0.61 0.61 0.60 0.60 0.59 0.59 0.58
Лицемерие (hypocrisy)	1. феминизм (feminism) 2. предательство (betrayal) 3. ложь (lie) 4. атеизм (atheism) 5. общество (society) 6. справедливость (justice) 7. религия (religion) 8. непонимание (misunderstanding) 9. проявление (manifestation) 10. злоба (malice)	0.73 0.69 0.67 0.66 0.66 0.65 0.65 0.65 0.64 0.64	1. ханжество (sanctimoniousness) 2. ложь (lie) 3. двоедушие (doubleness) 4. фарисейство (pharisaism) 5. лицемерия (hypocrisy) 6. притворство (pretense) 7. двуличность (duplicity) 8. двуличие (duplicity) 9. бесчестность (dishonesty) 10. лживость (falseness)	0.73 0.73 0.70 0.67 0.66 0.64 0.64 0.64 0.64 0.63
Коварство (guile)	1. подлых (mean) 2. у***нских (f***ing) 3. двачерских (2ch) 4. илитариев (elite) 5. копрофилов (coprophiles)	0.77 0.73 0.72 0.72 0.72 0.72	1. коварственный (cunning) 2. хитрость (cunning) 3. пронырство (sneaking)	0.68 0.63 0.63 0.62 0.61 0.61

	6. шаблонных (template-like) 7. рогов (horns, cuckold) 8. непорочное (immaculate) 9. донцова (Dontsova) 10. слайсиков (slice of life comedies)	0.72 0.71 0.71 0.71	4. вероломство (perfidy) 5. лукавство (slyness) 6. ревнивость (jealousy) 7. коварный (insidious) 8. двуличие (duplicity) 9. безрассудность (recklessness) 10. лицемерия (hypocrisy)	0.61 0.60 0.60 0.60
Измена (adultery, treason)	1. френдзона (friend zone) 2. дружба (friendship) 3. влюбленность 4. тulpа (tulpa) 5. верная (faithful) 6. честная (honest) 7. имеющая (having) 8. случайность (accident) 9. сексуальная (sexu) 10. любовь (love)	0.71 0.69 0.66 0.64 0.64 0.63 0.62 0.62 0.62 0.62	1. предательство (betrayal) 2. измена (adultery) 3. прелюбодеяние (adultery) 4. неверность (infidelity) 5. измен (adultery) 6. вероломство (perfidy) 7. измене (adultery) 8. изменник (cheater) 9. измены (adultery) 10. клятвопреступление (perjury)	0.73 0.64 0.64 0.62 0.61 0.60 0.60 0.59 0.59 0.59
Мошенничество (Fraud)	1. хулиганство (hooliganism) 2. кражу (theft) 3. вымогательство (extortion) 4. грабеж (robbery) 5. умышленное (deliberate) 6. уголовку (penalty) 7. превышение (misuse of power) 8. правонарушение (offence) 9. вознаграждение (remuneration) 10. оптовая (wholesale)	0.74 0.71 0.71 0.7 0.69 0.68 0.68 0.68 0.67 0.66	1. вымогательство (extortion) 2. мошенничества (fraud) 3. хищение (theft) 4. подлог (forgery) 5. кража (theft) 6. вымогательства (extortion) 7. мошеннический (fraudulent) 8. воровство (theft) 9. шулерство (cheating) 10. подлога (forgery)	0.69 0.67 0.67 0.63 0.63 0.62 0.62 0.61 0.60 0.60
Deception	1. rebuilds 2. hinduism 3. list_goes_on 4. dubious 5. social_constructs 6. toppled	0.91 0.91 0.91 0.9 0.9 0.9	1. deceit 2. deceptions 3. subterfuge 4. dishonesty 5. duplicity 6. deceitful	0.79 0.7 0.67 0.65 0.61 0.61

	7. propensity 8. violenceits 9. butmuh 10. grounding	0.9 0.9 0.9 0.9	7. concealment 8. falsehood 9. misrepresentation 10. mendacity	0.58 0.57 0.57 0.56
Lies	1. global_warming 2. facts 3. ignorance 4. media 5. climate_change 6. mainstream_media 7. stupidity 8. false 9. free_speech 10. conspiracy	0.78 0.78 0.78 0.78 0.78 0.77 0.77 0.77 0.76 0.76	1. lie 2. rests 3. lurks 4. Lying 5. sits 6. exists 7. lying 8. falsehood 9. is 10. resides	0.69 0.57 0.51 0.49 0.47 0.46 0.46 0.45 0.44 0.44
Slander	1. left-wing 2. political_correctness 3. purges 4. identity_politics 5. medias 6. racially 7. incompetence 8. nazism 9. pro_gun 10. suppression	0.9 0.9 0.89 0.89 0.89 0.88 0.88 0.88 0.88 0.88	1. slanderous 2. slandering 3. slanders 4. libel 5. defamation 6. defaming 7. defamatory 8. libels 9. smear 10. calumnious	0.69 0.68 0.62 0.6 0.59 0.59 0.59 0.59 0.58 0.58
Flattery	1. fat_acceptance 2. illusions 3. amino_acid 4. hypnotic 5. self-awareness 6. prompting 7. psychological_warfare 8. holocaust_never_happened 9. sacrificial 10. puerto_rican	0.87 0.87 0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.86	1. cajolery 2. politeness 3. ingratiation 4. blandishments 5. hyperbole 6. sycophancy 7. sarcasm 8. flatterer 9. condescension 10. bullsh**ter	0.49 0.48 0.47 0.46 0.46 0.45 0.45 0.45 0.45 0.45
Hypocrisy	1. lefties 2. bigots 3. liberalism 4. rhetoric 5. progressives 6. idiocy 7. leftists 8. hillary_supporters 9. hypocrites 10. crybabies	0.86 0.86 0.85 0.85 0.84 0.84 0.84 0.84 0.83 0.83	1. duplicity 2. disingenuousness 3. arrogance 4. hypocrisy 5. shamelessness 6. stupidity 7. absurdity 8. hypocritical 9. cowardice 10. insincerity	0.7 0.69 0.67 0.67 0.65 0.64 0.64 0.63 0.62 0.62
Cunning	1. fat_acceptance 2. subculture 3. psyop	0.91 0.91 0.91	1. devious 2. wily 3. canny	0.74 0.71 0.64

	4. curries	0.9	4. Machiavellian	0.64
	5. girl_queen	0.9	5. crafty	0.63
	6. russells	0.9	6. shrewd	0.63
	7. coldland	0.9	7. ruthless	0.62
	8. toppled	0.9	8. wiles	0.62
	9. indigenous_people	0.9	9. outwit	0.61
	10. ban_swords	0.9	10. clever	0.61
Adultery	1. cognizant	0.89	1. infidelity	0.67
	2. animalistic	0.89	2. Adultery	0.63
	3. idealization	0.89	3. adulterous	0.62
	4. disputes	0.89	4. apostasy	0.61
	5. engages	0.89	5. adultery	0.6
	6. infidelity	0.89	6. fornication	0.58
	7. unequal	0.89	7. unfaithful	0.57
	8. free_reign	0.88	8. zina	0.56
	9. assaults	0.88	9. adulterers	0.56
	10. equated	0.88	10. unchastity	0.56
Fraud	1. voter_fraud	0.87	1. frauds	0.77
	2. presidential	0.86	2. fraudulent	0.71
	3. legislation	0.86	3. Fraud	0.7
	4. supreme_court	0.86	4. scam	0.63
	5. senate	0.86	5. scams	0.6
	6. executive	0.85	6. embezzlement	0.59
	7. violation	0.85	7. forgery	0.58
	8. federal	0.85	8. swindle	0.56
	9. electoral	0.85	9. bribery	0.55
	10. federal_government	0.85	10. theft	0.55