

Quantitative Features of the Words Representing Nonverbal Behaviour in Ian McEwan's Fiction

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Abstract

The computer-assisted textual research reveals a set of quantitative features (absolute and relative frequency, quantity, rank) of the words which articulate the meaning of a fiction text. This meaning is presented as nonverbal behaviour in Ian McEwan's novels *Sweet Tooth* and *Solar* under the research framework of quantitative analysis, in particular, computational text analysis. The set of quantitative features in each text was complemented by qualitative parameters (types of nonverbal behaviour: paralanguage, moving; groups of meaning of nonverbal behaviour: descriptive, nondescriptive) which disclose the peculiarities of contextual nonverbal behaviour through its relation to the categories of "coherence" and "character" in Ian McEwan's fiction.

Nonverbal communication possesses a great potential in conveying the meaning of the message in human interaction. Real-life nonverbal communication is transferred by a writer to a fictional text as nonverbal behaviour playing a significant role in readers' understanding of the nonverbal behaviour of characters and thus providing the coherence of the fictional text. The two types of nonverbal behaviour components – paralanguage (voice qualities) and moving (movements of the body) – establish the core of nonverbal behaviour presentation being the most frequent types which are referred to in Ian McEwan's novels. Words denoting paralanguage and moving are not homogenous in the researched text contexts conveying two groups of meaning of nonverbal behaviour – descriptive (interprets fiction characters' nonverbal behaviour) and nondescriptive (explains fiction text coherence). Voyant-Tools software is applied to extract quantitative data in text corpora.

Keywords

Nonverbal behaviour, quantitative features, paralanguage, moving, textual coherence, Voyant-Tools, textual analysis

1. Introduction

Modern linguistics is closely connected with IT technologies which stimulate quantitative textual researches, in particular statistical (quantitative) text analysis. British fiction of the 21st century is a substantial source to study nonverbal behaviour. It is overflowing with nonverbal behaviour components, especially paralanguage and moving. F. Poyatos [1], B. Korte [2], J. A. Hall, M. L. Knapp [3], and A. Kendon [4] review this wealth of nonverbal components on the basis of a large and growing body of modern research in nonverbal behaviour. S. Johar [5] proves that the description of nonverbal

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behaviour contributes to both the description of characters' nonverbal behaviour and the coherence of the fictional text. Presently, the research of nonverbal behaviour in contemporary British fiction goes far beyond simple language processing: fast and accurate systematic computer calculations, as J. Flanders and F. Yannidis argue, provide more sophisticated tools and more reliable results in quantitative analysis and interpretation [6]. In spite of the fact that a multitude of subjective convictions determines readers' understanding of a fictional text, there are factual premises that we study in terms of text data to ground the set of quantitative features and make them complete and visible.

The objective of the research is to detect a set of quantitative features of nonverbal behaviour in two novels *Sweet Tooth* and *Solar* by I. McEwan [7, 8], a British novelist, short-story writer, and screenwriter whose restrained, refined prose style highlights the horror of his dark humour and deviated subject matter. We consider the intended objective through quantitative (computational) and qualitative (interpretational) textual analysis [9-11]. Empirical data is effective while being grounded on web-based text analysis. Voyant Tools (voyant-tools.org), an open-source project, which is available through GitHub, proves to be effective in the context of quantitative and qualitative analysis of fiction texts.

2. Study reasoning

Fictional text as a novel is traditionally a form of literature that has responded to social and political movements, and literary fiction in a certain period has close ties with societies and culture. The late seventies outlined a period of political, social and cultural change that reveals some of the fundamental characteristics of contemporary Britain from the end of World War II up to the present day. Literary critics regard the fiction of I. McEwan as "most continued reflection on the form of the novel, and the inherited tradition of modern (especially Anglophone) fiction and criticism" [12].

The novels under examination, *Sweet Tooth* and *Solar* by I. McEwan, are modern classic ones. *Sweet Tooth* explores the relationship between artistic wholeness and government propaganda to reveal diverse acceptance of literature; the boundary between real life and fiction is depicted throughout [13]. *Solar* is a fictional text that draws heavily on natural science and modern history references. It is a satire about a Nobel-winning physicist whose broken personal life and devious ambition make him chase a solar-energy based solution for climate change. In 2010, *Solar* got the Bollinger Everyman Wodehouse Prize, a British literary award for comic writing.

Any description of nonverbal behaviour by a writer is *ipso facto* significant since "a creator of the fictional texts would not record constant background noise and redundant paralanguage of everyday life" [14]. Novels by I. McEwan are the relevant source of investigation of nonverbal behaviour.

3. Research method

Ideas associated with contemporary British fiction expose the variety of linguistic phenomena to be studied as a set of quantitative features, e.g., absolute and relative frequency, quantity, the rank of the words. One of the productive ways of fictional text analysis is its inquiry with the help of computer software. Computational tools are privileged in extracting necessary data from a vast amount of fictional text. They allow to investigate and interpret different aspects and features of fictional texts, including the aspects of meaning.

Computational approaches to understanding this phenomenon exemplify accurate lexical and semantic data. Just as researchers can implement computational linguistics in various fields and through a wide assortment of tools and procedures, the research fields include a diverse range of topics [15]. Among them, computational text analysis plays a critical role in enriching qualitative approaches with quantitative ones [16, 17].

Linguists define a style in terms of a domain of language use (e.g., what choices a particular author makes in a specific genre, or in a certain text). B. Bloch draws attention to the style of a text as to the message carried by the frequency distributions of its linguistic features [20]. Therefore, style consists of choices made from the repertoire of the language [18]. While linguistic features do not constitute a fictional text's "meaning", a quantitative account of linguistic features serves to ground a stylistic

interpretation and to help to explain why certain groups of meaning or types of nonverbal behaviour are possible [19, 20].

The quantitative research of the words representing nonverbal behavior involves the application of the following methods: textual analysis (semantics), quantitative analysis (computational linguistic) and qualitative analysis (interpretation).

Textual analysis is a holistic, systematic approach to the study of a fictional text by dividing it into parts (e. g. words) to analyze each of its elements in combination with other textual elements as a set of linguistic means that convey the semantic unity of a fictional text. In the context of a fictional text, the characteristics of different textual levels are interdependent and not isolated [6, 14, 21]. The method was used to characterize the words of a specific fictional text in connection to its content.

Quantitative analysis implies handling quantitative data in linguistic study [22-24]. In our research *quantitative analysis* is a method of observing a fictional text in terms of its quantitative features (word frequency, word quantity, and word ranks). The quantitative analysis results obtained in the process of word/word form extraction applying computer software are presented in tables and diagrams. Being designed for a wide range of applications and users, Voyant-Tools is used in the present study as a reading and visualization environment to extract the words and indexes of their frequency; to find the context for each word among single fictional text through network analysis/keyword/feature extraction. By applying advanced analytical techniques, such as Naïve Bayes, Support Vector Machines (SVM), and other deep learning algorithms, we can explore and discover implicit relationships within structured and unstructured data.

Qualitative analysis is the method of interpretation that means studying the contexts of fictional text to define “paralanguage” and “moving” types of nonverbal behaviour, to sort out descriptive and nondescriptive groups of the meaning of nonverbal behaviour. Interpretation involves making equations between linguistic forms and the meanings contracted by the function of these forms in a context of a fictional text. The method also aims to make sense of quantitative data in definite corpora in the context of a fictional text.

The procedure involves the following steps of analysis as corpus processing:

1. The fictional texts *Sweet Tooth* (Corpus 1) and *Solar* (Corpus 2) by I. McEwan are selected and made available for uploading in Voyant-Tools software in pdf format as text corpora. Digitalized data are inspected for errors.

2. Data aggregation means a reduction of dimensions of the data by aggregating individual text elements into broader categories. Here, all of the data are reduced to word absolute frequency in the textual corpus. The words *said*, *v* (320), *went*, *n* (144) in Corpus 1, and the words *said*, *v* (217), *came*, *v* (108) in Corpus 2 are defined as the most frequent words in corpus concerning nonverbal behaviour presentation (see Table 1).

3. Data query is the extraction of specific data from stored items. The most frequent words, mostly verbs, and their word forms form two types of nonverbal behaviour – paralanguage (say*v; tell*, v; talk*, v; speak*, v; sound*, v; sound*, n; voice*, n) and moving (go*, v; come*, v; walk*, v; follow*, v; turn*, v), and two groups of the meaning of nonverbal behaviour – descriptive, nondescriptive. The word with the mark «*» means the word and its forms

4. We did quantitative data analysis considering the quantity and absolute frequency of the words and their word forms and applying Voyant-Tools to extract the words in two text corpora. The total quantity of “paralanguage”, “moving”, “descriptive meaning”, “nondescriptive meaning” is counted and compared in Table 2 and Table 3.

5. Qualitative data analysis considers fictional text contexts extraction by Voyant-Tools to interpret the meaning and sort out the types of nonverbal behaviour (paralanguage, moving) and groups of the meaning of nonverbal behaviour (nondescriptive, descriptive).

6. The *research material* consists of two corpora: Corpus 1 (*Sweet Tooth*) and Corpus 2 (*Solar*) by I. McEwan. The summary of each corpus, automatically generated by Voyant-Tools, is shown in Table 1 that exhibits that the corpora have approximately the same quantity of words and unique word forms. The vocabulary density, readability index, and average quantity of words are higher in Corpus 2. The table also shows the first fifteen more frequent words in corpora. The words *said*, *v*; *went*, *v*; *came*, *v* are the most frequent and valid in the researched texts.

Table 1
Summary of research corpora

	Corpus 1 Sweet Tooth	Corpus 2 Solar
Total words	103,948	92,438
Total words exposed to qualitative and quantitative analysis	1965	1312
Unique word forms	15,093	16,420
Vocabulary density	0.145	0.178
Readability index	9.322	11.400
Average words per sentence	14.7	18.3
The most frequent words in the corpus	said (320); didn't (206); like (206); thought (186); tom (185); way (180); know (171); i'd (159); time (151); knew (144); went (144); just (131); told (124); it's (123); room (123).	beard (494); said (217); like (159); time (139); thought (133); man (113); way (112); just (103); years (100); away (99); came (108); knew (97); rest (96); know (92); room (92).

4. Theoretical linguistic background

Fictional text is a complex unit, which implies the creative consciousness of an author, so each lexical component (word) in its way is chosen to represent a common single aspiration of the whole text. M. Short and G. Leech, P. Simpson, B. Bloch, and R. Barthes [25] argue that textual analysis is the “stylistic of choice” in revealing the meaning of the text, which is an objective phenomenon, subjective experience, and the intersubjective meaning. The text permanently impregnates potential meanings and a reader that perceives, identifies and actualizes them.

Thus, the quantitative analysis “requires a complete description”, which is “not a list of certain elements”, but “the identification of a system of functions” [26]. A full-fledged quantitative analysis is always a holistic one: it identifies not the building material but the constructive relationships of the whole as a “complexly constructed meaning” [27]. The quantitative analysis approach divides a complex unity (fictional text) into units as products of its analysis (words), which, unlike elements, do not lose the properties of the whole entity, but present in their simplest, original form those properties of the whole entity, for the sake of which the analysis is undertaken [28]. So, we argue that quantitative analysis identifies building material to explain the whole text’s structural and semantic relationships as complexly constructed meaning. One of the most productive ways of understanding how a text works, as S. Statham notes, is to challenge it or intervene in its stylistic makeup in some way [29].

The revealing of both different types of meaning and the whole meaning of a fictional text is possible due to interpretation: it is a sense-making process or revelation of meaning. This intellectual operation cannot be reduced to an explanation, which, answering the question “why?” turns it from the present into the past. Interpretation, on the other hand, is oriented toward the future since it always explicitly or implicitly answers the question “why?” (“what” is the significance of this fact for a reader) [30]. Interpretation is a subjective process, a kind of dialogue between two realities: subjective and aesthetic ones. The interpretation is a mental turn into an object of self-interest [31].

Consequently, the interpreter’s task of a fictional text is to comprehend its semantic content “better than the author”; to understand the individual significance of the fictional text as an aesthetic experience. The purpose of interpretation in quantitative analysis is not a reconstruction of the author’s intention but the construction of meaning [32, 33]. It is a creative process of interaction of the reader with the text and its internal dialogue with its personality. Hence, there are not and cannot be two identical readings of the same fictional text – the same reader doesn’t make an identical sense every time he rereads a fictional text, i. e., a reader may ignore or not actualize the components of nonverbal behaviour that are objectively present in the text. Quantitative analysis is precisely that field, which

establishes a particular sector of the adequacy of reader co-creation; it identifies the boundaries beyond which there is an area of the reader's destructive reception.

4.1. Representation of nonverbal communication and nonverbal behaviour in a fictional text

Nonverbal communication, in general, is associated with human nonverbal behaviour, and it ranges from aspects of voice to gestures, movements, and interpersonal spatial positioning, accessed by the vision and other senses. M. Danesi defined nonverbal communication as a group of human attributes or actions in which words are not involved but which have a shared social meaning. The criteria on the components of nonverbal communication also varied; it encompassed all kinds of nonverbal elements ranging from bodily signals to architecture [34].

The meanings of nonverbal communication (nonverbal behaviour) usually permeate the fictional text perceived, identified and understood by a reader. For the purpose of quantitative analysis, the term "nonverbal communication" refers to the forms of nonverbal behaviour exhibited by characters. A writer addresses a fictional text to a reader not directly but through a kind of "inner vision", "inner hearing", and "empathy for the characters". This kind of impact is organized by the semiotic activity of the author (a narrator, to be exact), using a definite set of lexical units or words. "A fictional text is a purely intentional object and is a product of the author's conscious" [35].

X. Jiang proves the importance of nonverbal communication in fiction, especially paralanguage (voice qualities) and kinetics (body movements) and how it contributes to an effective relationship between the text, the writer and the reader [36]. Nonverbal communication in a fictional text is transferred from real-life nonverbal communication presented by the author through the words which describe the *characters' nonverbal behaviour* and are the way to contribute to *textual coherence*. Such transferring accounts for how the fictional text interlocks with the semantic process, notably those of "moving" and "saying", and how these processes influence characters. As part of fictional text, the words denoting nonverbal behaviour are under two types of meaning: descriptive (denotes nonverbal behaviour and contributes to the characters' nonverbal behaviour in fictional text) and nondescriptive (denotes nonverbal behaviour and contributes to fictional text coherence). Thus, representation of nonverbal behaviour is an indication of certain stylistic characteristics more accentuated in some writers than in others, and therefore an important touchstone for the quantitative analysis of fictional texts supported by processing techniques of computational linguistics.

5. Results and discussion

This section manifests a computer-assisted case study of the words representing nonverbal behaviour in a fictional text through some quantitative data which expose a set of quantitative features in text corpora. Thus, we identified 1965 words in proper contexts to show the difference between two groups of nonverbal behaviour (paralanguage, moving) and two types of meaning (descriptive, nondescriptive). We delivered and visualized the results of the research as follow: Figure 1, Figure 2 (the most frequent words in corpora and their relative frequencies); Table 2, Table 3, Table 4, Table 5 (absolute frequencies, contexts, quantity of the words); Figure 3, Figure 4, Figure 5, Figure 6 (absolute frequencies of the words); Table 6 (rank and absolute frequencies of the words).

The significance of nonverbal behaviour presentation is connected to the frequency of words denoting paralanguage and moving in text corpora: Corpus 1 (Figure 1) and Corpus 2 (Figure 2).

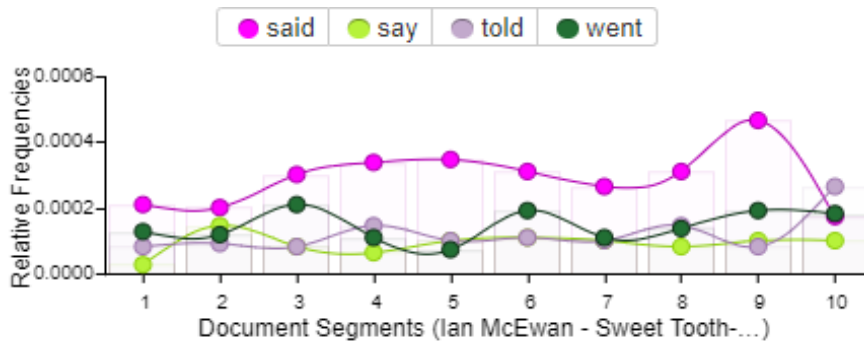


Figure 1: Diagram of relative frequencies of the most frequent words in text segments of Corpus 1

The diagram indicates relative frequencies of the most significant words of nonverbal behaviour presentation in Corpus 1 (*said*, v (320); *say*, v (100); *told*, v (132); *went*, v (144)) and their distribution among 10 segments of the corpus text. The most unstable word *said*, v is the most frequent one and has a higher frequency index in the 9th text segment. The rest of the words do not have such sharp fluctuations, and they are approximately the same relative frequencies throughout the text.

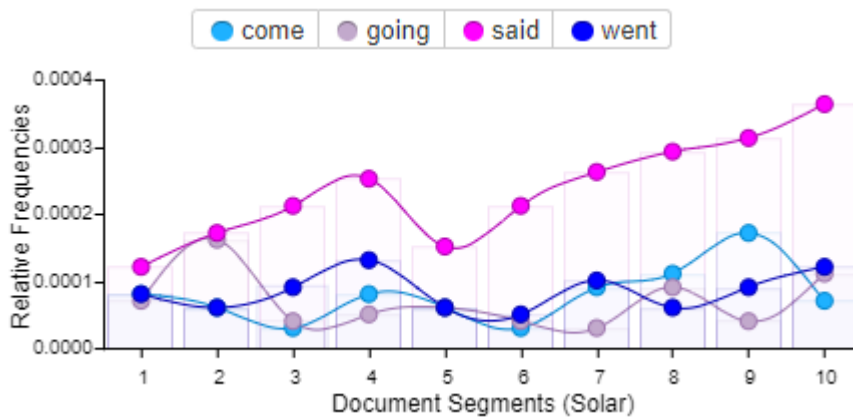


Figure 2: Diagram of relative frequencies of the most frequent words in text segments of Corpus 2

The diagram conveys relative frequencies of the most significant words for nonverbal behaviour presentation in Corpus 2 (*come*, v (220); *said*, v (217); *went*, v (84); *going*, v (64)) and their distribution among 10 segments of the corpus text. The most unstable word *said*, v is the most frequent and has higher frequency usage in the 10th text segment. Compared to Corpus 1 the relative frequency of the word *said*, v falls in the 5th segment and rises sharply in the 10th segment of the textual corpus. The relative frequencies of the rest of the words, except *going*, v which increases in the 2nd and 8th segments, do not have such sharp fluctuations; they have approximately the same relative frequencies throughout the text corpus. The word *said*, v has a higher relative frequency in Corpus 1 – 0.0005 than in Corpus 2 – 0.0004.

The analysis of the representation of nonverbal behaviour in fiction was extended by considering word forms of the most frequent words, which are the same in each of two corpora. They are the following words and word forms: *say**, v (*said*, v ; *say*, v ; *saying*, v ; *says*, v); *tell**, v (*told*, v ; *tell*, v ; *telling*, v ; *tells*, v); *talk**, v (*talked*, v ; *talk*, v ; *talking*, v ; *talks*, v); *speak**, v (*spoke*, n , *spoken*, v ; *speaking*, v ; *speaks*, v); *sound**, v (*sounded*, v ; *sound*, v ; *sounding*, v ; *sounds*, v); *sound**, n (*sounds*, n); *voice**, n (*voices*, n) for “paralanguage”; and *go**, v (*went*, v ; *go*, v ; *going*, v ; *goes*, v); *come**, v (*came*, v ; *come*, v ; *coming*, v ; *comes*, v); *walk**, v (*walked*, v ; *walk*, v ; *walking*, v ; *walks*, v); *follow**, v (*followed*, v ; *follow*, v ; *following*, v ; *follows*); *turn**, v (*turned*, v ; *turn*, v ; *turning*, v ; *turns*, v) for “moving”.

The following tables (Table 2, Table 3, Table 4, Table 5) contain *quantitative* and *qualitative results* of the research. Quantity and absolute frequencies of the words denote two types of nonverbal behaviour

(paralanguage and moving) and two groups of meaning (descriptive, nondescriptive). Qualitative results are presented as a textual locale for each word form according to descriptive or nondescriptive meaning.

Descriptive meaning of nonverbal behaviour is defined as the meaning which contributes to characters' nonverbal behaviour, e.g., the words denoting nonverbal behaviour have descriptive meaning if they are followed by some description of voice qualities or the way the movement is done; for example: *to say coolly; to tell in flat voice; to go slowly; to turn minimally*. The descriptive meaning of "moving" is direct and may not be followed by the adjective or the adverb which describes it, but it may indicate the direction: *to come into the room; to go through a door; to turn onto the side*.

Nondescriptive meaning of nonverbal behaviour is defined as meaning which contributes to textual coherence, e.g., the words denoting nonverbal behaviour have nondescriptive meaning if they are not followed by any description of voice qualities or the way the movement is done; for example, *he said that ...; he told us something ...; I was going to see ...; It would come soon ...*. Nondescriptive meaning of "moving" is often indirect, metaphorical: *to go mad; her drinking came; to follow the logic*.

Table 2, Table 3, Table 4 and Table 5 contain a total quantity of words denoting two types of representation of nonverbal behaviour and two groups of meaning in corpora.

Table 2

Quantity and absolute frequency of the words denoting paralanguage presentation in Corpus 1

Word / absolute frequency/ quantity	Descriptive meaning of nonverbal behaviour/quantity	Nondescriptive meaning of nonverbal behaviour/quantity
Paralanguage		
Say, v* 462	43	419
Said, v 320	'This isn't exactly chatty,' she <i>said coolly</i> ... (p. 10). - 38	Tom had <i>said</i> he didn't want to see the reviews ... (p. 159) - 282
Say, v 100	He said, 'I like it when you <i>say brilliant</i> .' (p. 88) - 3	I don't find this easy to <i>say</i> , but I'm deeply disappointed.' (p. 23) - 97
Saying, v 31	'Our <i>cover</i> ,' she kept <i>saying in a loud whisper</i> (p. 48). - 2	Tony was <i>saying</i> , 'You know where this all has to lead, don't you?' (p. 23) - 29
Says, v 11		Though Monica never <i>says</i> so, it is clear she doesn't believe him (p. 91). - 11
Tell, v* 288	7	281
Told 132	A man came out ... and <i>told me in a nervous, pleasant way</i> that I should wait (p. 54). - 4	... she ignored questions and <i>told us</i> nothing ... (p. 67) - 128
Tell, v 128	He was going <i>to tell me in his own way</i> ... (p. 22). - 2	He wouldn't <i>tell me</i> what it was (p. 12). - 118
Telling, v 24		... while I stood there watching him, wondering whether he was <i>telling</i> the truth (p. 40). - 24
Tells, v 12	She pauses, and then she <i>tells him, in that same flat voice</i> , that all his climbing gear has been taken too (p. 93). - 1	She is sick of her life, she <i>tells</i> him, sick of being financially dependent ... (p. 92) - 11
Talk, v* 122	-	122
Talked, v 30		So we <i>talked</i> of other ... (p. 119) - 30

Talk, v 49		I need to <i>talk</i> to Serena (p. 146). - 49
Talking, v 42		'But she's very kind really and she'll like <i>talking</i> to you (p. 145). - 42
Talks, v 1		He watches her closely as she <i>talks</i> , and knows that every word is a lie (p. 95). - 1
Speak, v* 82	6	76
Spoke, v 27	We <i>spoke in identical tones</i> , we were socially confident ... (p. 30) - 6	She <i>spoke</i> of her Syrian doctor, I spoke of Jeremy Mott, but not of Tony Canning (p. 31). - 29
Spoken, v 9		Within a week my mother had <i>spoken</i> to my headmaster (p. 8). - 9
Speak, v21		He went to <i>speak</i> but was stuck for words (p. 86). - 21
Speaking, v 15		Everyone was <i>speaking</i> of 'the crisis' (p. 112) - 15
Speaks, v 2		As he <i>speaks</i> to the desk sergeant, he feels a bit of a cad or a snitch (p. 92). - 2
Sound, v* 37	37	-
Sounded, v 21	I mumbled something modest but it <i>sounded dismissive</i> ... (p. 13) - 21	
Sound, v 10	I said, hoping I didn't <i>sound like I was pleading</i> (p. 88). - 10	
Sounding, v 3	...he couldn't stop himself from <i>sounding</i> abject one moment and over-emphatic ... (p. 149) - 3	
Sounds, v 3	It <i>sounds</i> very promising (p. 166). - 3	
Sound, n* 18	18	2
Sound, n 16	...I thought I heard the <i>sound</i> of a voice (p. 173). - 16	I thought I heard the sound of a <i>voice</i> . 173 - 2
Sounds, n 2	What then of my <i>politely muted sounds</i> ? (p. 111) - 2	
Voice, n* 38	36	
Voice, n 31	Yes, she agreed in her affectless <i>voice</i> ... (p. 93) - 29	
Voices, n 7	In <i>low voices</i> we talked office gossip for the first quarter of an hour (p. 68). - 7	
Total (words and word forms of paralanguage): 1047	Total (words and word forms of descriptive meaning of paralanguage): 147	Total (words and word forms of nondescriptive meaning of paralanguage): 900

Table 3.

Quantity and absolute frequency of the words denoting moving presentation in Corpus 1

Word / absolute frequency/ quantity	Descriptive meaning of nonverbal behaviour/quantity	Nondescriptive meaning of nonverbal behaviour/quantity
	Moving	
Go, v* 394	263	131
Went, v 144	Desolate, I <i>went slowly</i> along Great Marlborough Street (p. 27) - 118	My light-headed alliterative prose <i>went down</i> well (p. 10). - 26
Gone, v 35	... and a half later, the men <i>had gone</i> (p.17). - 8	Everyone had <i>gone mad</i> , so everyone said (p. 19). - 27
Go, v 109	... Tony asked me if I would <i>go</i> for a longish walk in the woods (p. 17). - 64	It was a matter of letting my eyes and thoughts <i>go</i> soft, like wax ... (p. 9). - 45
Going, v 85	... she was in the crowd <i>going out</i> through the door (p. 47). - 67	I wasn't <i>going</i> to see the New Year in with you (p. 176). - 18
Goes, v 21	He <i>goes</i> upstairs and lies on the bed ... (p. 94). - 6	As far as <i>hand-holding goes</i> , it won't be much of an imposition (p. 103). - 15
Come, v* 249	116	133
Came, v 116	I <i>came out</i> of the cubicle, splashed my face ... (p. 102). - 47	... drinking <i>came</i> later (p. 108). - 69
Come, v 83	If he <i>comes</i> looking for you, you're to turn ... (p. 168). - 49	His Foundation money hadn't arrived, but he was sure it would <i>come</i> soon (p. 111). - 34
Coming, v 38	I heard Shirley <i>coming</i> and quickly put the pile in order ... (p. 52) - 15	I knew I had an interview <i>coming up</i> ... (p. 20) - 23
Comes, v 12	The person who <i>comes in</i> with a holdall and sets down ... (p. 94). - 5	... so the money that <i>comes</i> to me each month is not simply an impersonal ... (p. 103). - 7
Walk, v* 84	84	-
Walked, v 41	We <i>walked</i> in silence. He didn't know what to say (p.40). - 41	
Walk, v 20	It takes him an hour to <i>walk</i> the mile to his house (p. 94). - 20	
Walking, v 21	We knew what we <i>were walking</i> towards (p. 108). - 21	
Walks, v 2	... Sebastian <i>walks</i> back towards the Street ... (p. 91) - 2	
Follow, v* 56	22	34
Followed, v 27	With the music fading behind me, I <i>followed</i> their directions ... (p. 83) - 18	There <i>followed</i> a session of small talk (p. 54). - 9
Follow, v 10		I didn't <i>follow</i> the logic of this, but I said nothing (p. 8). - 10
Following, v 18	I started out following her path, the one she describes in her memoir... (p. 28) - 3	The <i>following</i> day I arrived home in the cathedral close with all my belongings (p. 28). - 15

Follows, v 5	She establishes that there is a brother and <i>follows</i> him to London ... (p. 64) - 1	
Turn, v* 135	54	81
Turned, v 91	Then he <i>turned and glanced</i> round the room, looking for me... (p. 140) - 40	Lately the weather had <i>turned</i> mild... (p. 144) - 51
Turn, v 28	... he managed to <i>turn onto</i> his side (p. 73) - 7	This <i>in turn</i> delays the repayment to Monica's brother ... (p. 93) - 21
Turning, v 12	...and I saw in front of me a restrained movement of heads tilting or <i>turning minimally</i> (p. 46) - 4	... nothing resolved, thoughts still <i>turning</i> , when I heard footsteps on the stairs (p. 117). - 8
Turns, v 4	He <i>turns</i> and standing before him ... (p. 91) - 3	The DI switches off the projector and <i>turns up</i> the lights (p. 94). - 1
Total (words and word forms of moving): 918	Total (words and word forms of descriptive meaning of moving): 539	Total (words and word forms of nondescriptive meaning of moving): 379
Total (words and word forms of paralanguage and moving): 1965	Total (words and word forms of descriptive meaning of paralanguage and moving): 686	Total (words and word forms of nondescriptive meaning of paralanguage and moving): 1279

Table 4.

Quantity and absolute frequency of the words denoting paralanguage presentation in Corpus 2

Word/absolute frequency / quantity	Descriptive meaning of nonverbal behaviour/quantity	Nondescriptive meaning of nonverbal behaviour/quantity
	Paralanguage	
Say, v* 302	60	242
Said, v 217	"Solar energy?" Beard <i>said mildly</i> (p. 27) - 52	She <i>said</i> she did not mind what he did (p. 9) - 165
Say, v 54	He was starting to <i>say conversationally</i> (p. 108). - 4	... he had no idea what he wanted <i>to say</i> (p. 42). - 50
Saying, v 27	... deep female voice behind him <i>saying kindly</i> ... (p. 61) - 4	... he was <i>saying</i> , but it seemed too abstract (p. 162). - 23
Says, v 4		... she <i>says</i> she's wrong (p. 195) - 4
Tell, v* 126	1	125
Told, v 66	... she told him plainly <i>to go away</i> (p.38). - 1	He <i>told</i> himself that things are often not as bad as you think (p. 131). - 65
Tell, v 42		But he would <i>tell</i> no one (p. 58). - 42
Tells, v 1		His doctor <i>tells</i> him that not thinking about that thing make it go away (p. 260). - 1

Telling, v 17		She seemed on the point of <i>telling</i> him something else ... (p. 207) - 17
Talk, v* 67	3	64
Talked, v 12		... he <i>talked</i> about his work and travels ... (p. 164) - 12
Talk, v 33	He had <i>to talk fast</i> (p. 140). - 1	She had come <i>to talk</i> ... (p. 47). - 32
Talking, v 22	... laughing and <i>talking at a relaxed, normal pitch</i> (p. 90). - 2	I'm <i>talking</i> to a lawyer in Oregon (p. 252). - 20
Talks, v		-
Speak, v* 73	13	60
Spoke, v 34	... Tom Aldous <i>spoke with the lilted confidence of a prize pupil</i> ... (p. 28) - 12	When Beard's turn came, he <i>spoke</i> to the point (p. 96). - 22
Spoken, v 5		These half-truths were the best words he had ever <i>spoken</i> (p. 177). - 5
Speak, v 22		Beard thought it important <i>to speak</i> first (p. 43). - 22
Speaking, v 11	... and <i>speaking in a measured, husky tone</i> ... (p. 33) - 1	She was nervous <i>speaking</i> in public... (p. 128) - 10
Speaks, v 1		He still <i>speaks</i> at conferences... (p. 259) - 1
Sound, v* 12	7	1
Sounded, v 10	It always <i>sounded</i> like a lie (p. 63). - 10	
Sound, v 1	... and then, determined <i>to sound grave rather than querulous</i> , he said... (p. 163). - 1	
Sounding, v 1		When he heard himself <i>sounding off</i> , he was not at all convinced... (p.183). - 1
Sounds		-
Voice, n* 51	38	13
Voice, n 40	... though her <i>voice was as bright as ever</i> (p. 13). - 32	... she would hear his <i>voice</i> but not his words (p.17). - 8
Voices, n 11	... the sound of children's <i>voices</i> approaching ... (p. 45). - 6	His turn to listen to <i>voices</i> through the wall? (p. 24) - 5
Sound, n* 36	28	8
Sound, n 35	... from inside came <i>a muffled sound of bare feet</i> ... (p. 24). - 27	At that thought he heard <i>a sound</i> above him ... (p. 42) - 8
Sounds, n 1	... from the galley ... came the smell of frying meat and garlic and the <i>sounds of spoons</i> ... (p. 61) - 1	
Total (words and word forms of paralinguage): 667	Total (words and word forms of descriptive meaning of paralinguage): 154	Total (words and word forms of nondescriptive meaning of paralinguage): 513

Table 5

Quantity and absolute frequency of the words denoting moving presentation in Corpus 2

Word/absolute frequency/quantity	Descriptive meaning of nonverbal behaviour/quantity	Nondescriptive meaning of nonverbal behaviour/quantity
Moving		
Go, v* 267	179	88
Went, v 84	... Beard wondered ... as he left one office and <i>went glumly</i> toward the next ... (p. 31) - 66	After two or three glasses of the white, the red <i>went down</i> painlessly, like water, at least at first (p. 72). 18
Gone, v 29	His groin was so tender that he waited until the others <i>had gone</i> inside... (p. 69) - 12	Even the hangers <i>were gone</i> (p. 9). - 17
Go, v 84	Beard preferred to <i>go around</i> alone ... (p.26). - 60	... the demand for energy <i>will go on</i> rising as the world's population expands ... (p. 173) - 24
Going, v 68	... before <i>going in</i> he found a litter bin and disposed of the plastic bag (p. 81). - 41	I'm <i>going</i> to talk to Aldous, then I'm <i>going</i> to take him with me to Design (p. 33). - 27
Goes, v 2		Honestly, it <i>goes</i> deeper ... (p. 82). - 2
Come, v* 220	96	124
Came, v 108	And here he <i>came</i> , a gaunt parchment-faced fellow ... (p. 105). - 36	The machine <i>came to life</i> at first touch (p. 68). - 72
Come, v (participle 2) 23	She <i>had come</i> to talk, not to listen (p. 47). - 13	... long-running sinecures <i>had recently come</i> to an end ... (p. 19) - 10
Come, v 54	I thought I'd <i>come</i> and have a look round (p. 43). - 25	" <i>Come on</i> , man. Let's go!" (p. 54) - 29
Coming, v 31	Tarpin ... <i>was coming toward</i> him with a firm stride (p. 45). - 20	But he, Beard, had had many affairs himself ... and, probably it <i>was coming to an end</i> (p.92). - 11
Comes, v 4	... he'll be arrested if he phones or writes or <i>comes</i> within 500 yards of our house (p. 212). - 2	... though at times he <i>comes closer</i> to being pathetic ... (p. 260). - 2
Walk, v* 39	39	
Walked, v 24	... he <i>walked</i> unhurriedly down the garden path ... (p. 88). - 24	
Walk, v 4	He asked if he could at least <i>walk</i> with her across the parks (p. 180). - 4	
Walking, v 11	... and it seemed he was <i>walking</i> directly toward it now (p. 109). - 11	
Walks, v	-	-
Follow, v* 24	6	18

Followed, v 9	... so Beard <i>followed</i> a narrow concrete path ... (p. 41) - 3	... the sound of a hiss <i>followed</i> by a whiplike crack... (p. 154) - 6
Follow, v 2	"I <i>follow</i> you," Jan said (p. 54). 2	
Following, v 10	Within seconds he was bouncing across the plain, <i>following</i> through the sight holes (p. 55). - 1	During the <i>following</i> week, some commentators agreed with her (p. 97). - 9
Follows, v 1		A confrontation <i>follows</i> (p. 86). 1
Turn, v* 95	32	63
Turned, v 62	... he groaned and <i>turned</i> angrily on his side (p. 65). - 25	... spoiled generation <i>turned its backs</i> on the fathers who fought the war (p. 60). - 37
Turn, v 21	Rather than <i>turn</i> and have his face ripped away, he hunched his shoulders (p. 68). - 5	It would be difficult <i>to turn</i> her from this calm, seductive mode (p. 161). - 16
Turning 12	Hammer, <i>turning</i> to Beard, looked like he was about to go down on one knee (p. 247). - 2	By <i>turning his shoulder into the room</i> , Beard was able to prompt his host ... (p. 135) - 10
Turns	-	-
Total (words and word forms moving): 645	Total (words and word forms of descriptive meaning of moving): 352	Total (words and word forms of nondescriptive meaning of moving): 293
Total (words and word forms of moving and paralinguage): 1312	Total (words and word forms of descriptive meaning of moving and paralinguage): 506	Total (words and word forms of nondescriptive meaning of moving and paralinguage): 806

The absolute frequencies of words according to types of representation of nonverbal behaviour and groups of meaning are manifested in Figure 3 (Corpus 1) and Figure 4 (Corpus 2).

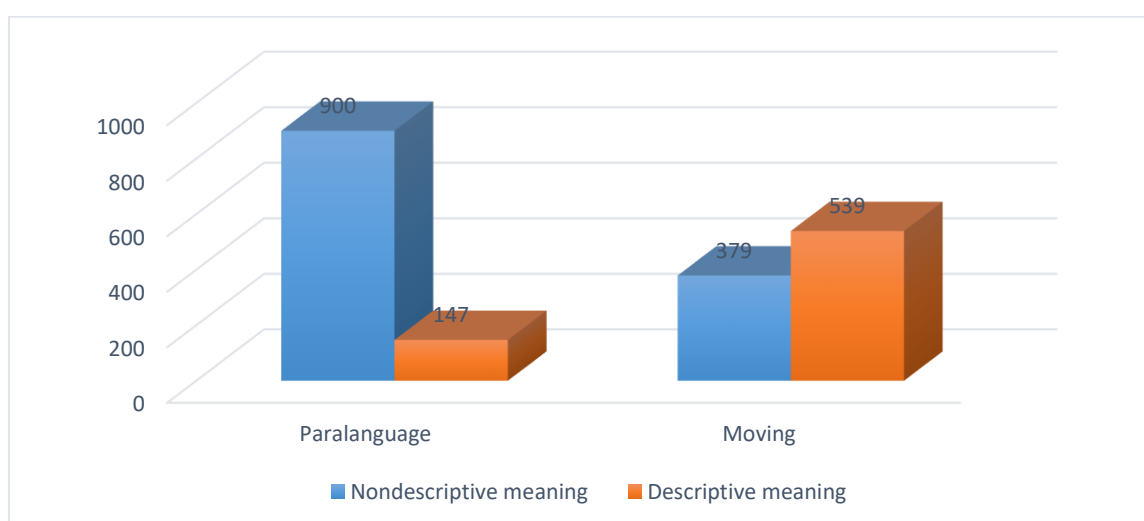


Figure 3: The diagram of absolute frequencies of words as to types of representation of nonverbal behaviour and groups of meaning in Corpus 1

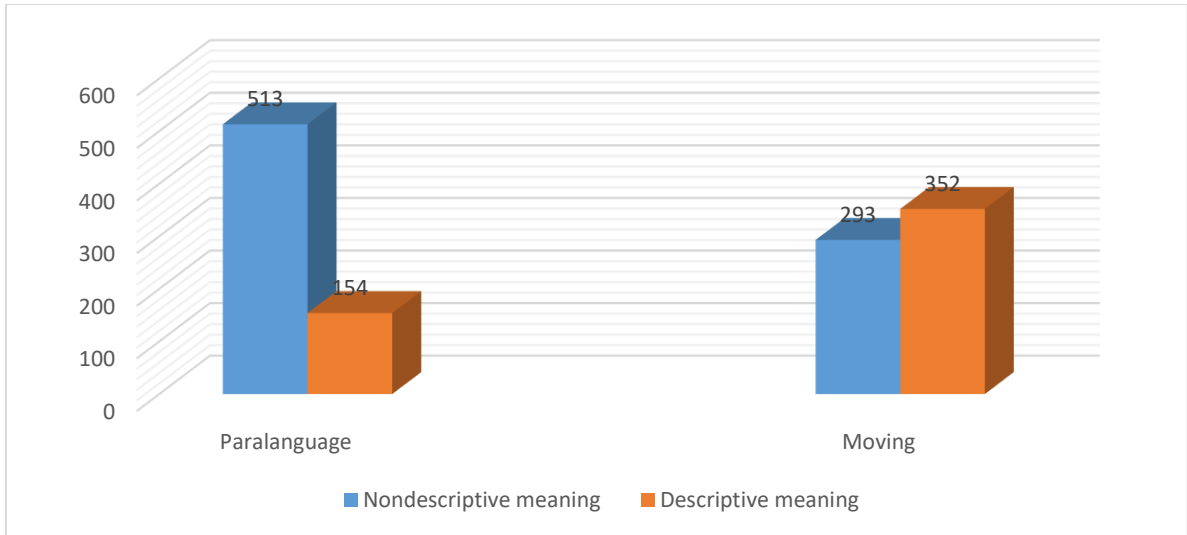


Figure 4: The diagram of absolute frequencies of words as to types of representation nonverbal behaviour and groups of meaning in Corpus 2

Paralanguage is a type of nonverbal behaviour; it prevails in the group of nondescriptive meaning in both fictional texts. It means that a writer uses words denoting paralanguage to indicate textual coherence. The descriptive meaning of moving is significant for the characters' description. The quantity of words belonging to nondescriptive meaning is almost the same in both Corpora. At the same time, the quantity of words used to describe paralanguage in nondescriptive meaning is two times larger in Corpus 1. The quantity of words denoting moving is approximately the same in two groups of meaning.

The absolute frequencies of words and word forms representing nonverbal behaviour in the texts are shown in Figure 5 (Corpus 1) and Figure 6 (Corpus 2).

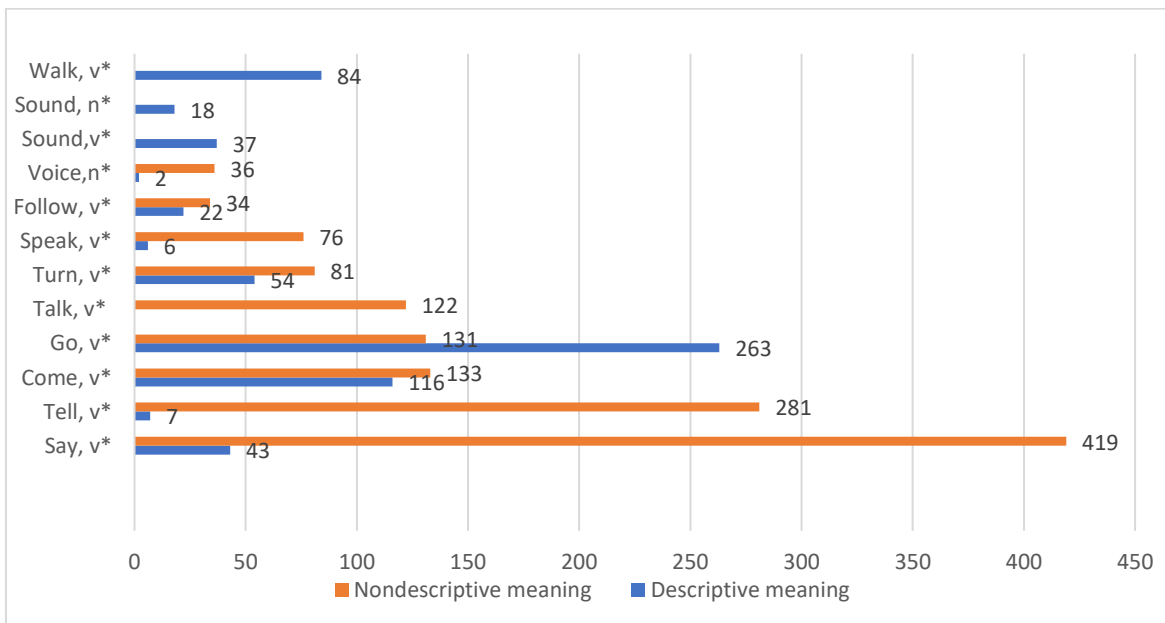


Figure 5: The diagram of absolute frequencies of words and their word forms, which represent nonverbal behaviour in Corpus 1

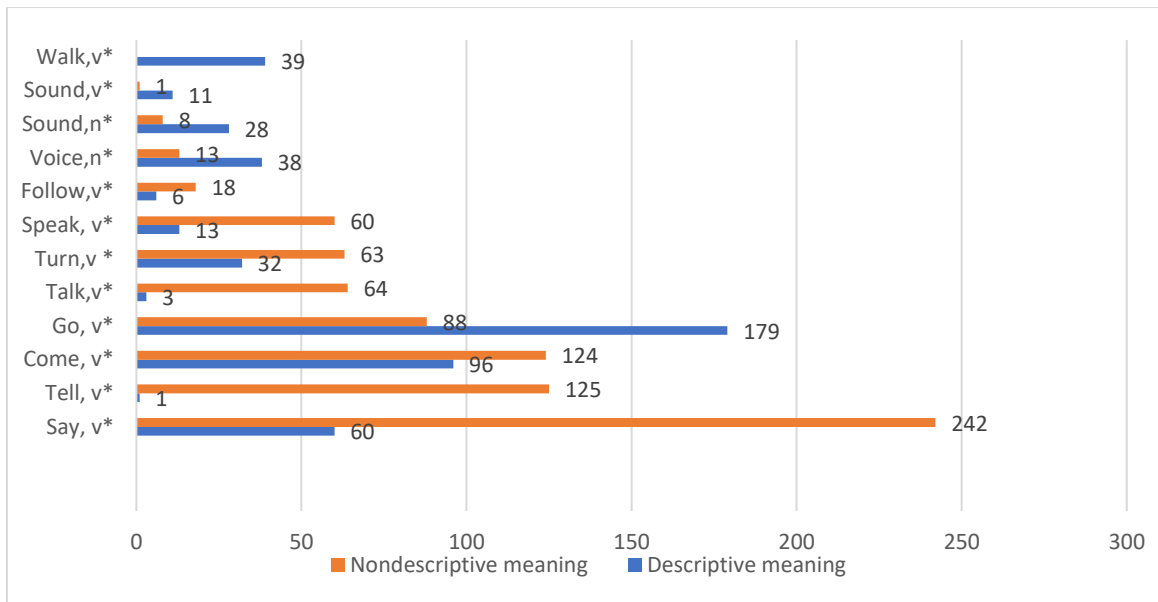


Figure 6: The diagram of absolute frequencies of words and their word forms, which represent nonverbal behaviour in Corpus 2

The words and the word forms of *walk, v**, *sound**, *n, sound, v**, *voice, v**, *go*, v*, *come*, v* are productive in creating descriptive meaning in fictional texts. The words and word forms of *tell*, v*, *say*, v*, *talk*, v*, *speak, * v* are not usually used for this purpose in both corpora.

Ranks and absolute frequencies of the words denoting representation of nonverbal behaviour in Corpus 1 and Corpus 2 are shown in Table 6.

Table 6.

Ranks and absolute frequency of the words denoting representation nonverbal behaviour

Rank	Corpus 1		Corpus 2	
	Nondescriptive meaning	Descriptive meaning	Nondescriptive meaning	Descriptive meaning
1	Say, v* 419	Go, v* 263	Say, v* 242	Go, v* 179
2	Tell, v* 218	Come, v* 116	Tell, v* 125	Come, v* 96
3	Come, v* 133	Walk, v* 84	Come, v* 124	Say, 60
4	Go, v* 131	Turn, v* 54	Go, v* 88	Walk, v* 39
5	Talk, v* 122	Say, v* 43	Talk, v* 64	Voice, n* 38
6	Turn, v* 81	Sound, v* 37	Turn, v* 63	Turn, v* 32
7	Speak, v* 76	Voice, n* 36	Speak, v* 60	Sound, n* 28
8	Follow, v* 34	Follow, v* 22	Follow, v* 18	Speak, v* 13
9	Voice, n* 2	Sound, n* 18	Voice, n* 13	Sound, v* 11
10	Sound, v* -	Tell, 7*	Sound, n* 8	Follow, v* 6
11	Sound, n* -	Speak, v* 6	Sound, v* 1	Talk, v* 3
12	Walk, v* -	Talk, v* -	Walk, v* -	Tell, v* 1

The rank of the words denoting paralanguage and moving as nondescriptive meaning of paralanguage coincides in two text corpora. The words *sound*, v*, *sound*, n*, *walk*, v* denote only descriptive meaning, and the word *talk*, v* denotes only nondescriptive meaning in Corpus 1. The word *walk*, v* denotes only descriptive meaning in Corpus 2. The rank of the words denoting paralanguage and moving as descriptive meaning is different: only the word rank of *goes*, v*; *come*, v* coincides. There are the same word ranks of *follow*, v* (Corpus 1) and *turn, * v* (Corpus 2).

6. Conclusion

Computer-assisted textual research has a considerable effect in studies disclosing the meaning of fiction texts. The words, denoting nonverbal behaviour in I. McEwan's novels *Sweet Tooth* and *Solar* are important in textual interpretation. Computation text analysis has served to exhibit two types of nonverbal behaviour and two groups of meaning which were defined by a set of quantitative features: absolute, relative frequency, and the rank of the words and word forms a writer uses to create the coherence or to describe nonverbal characters' behaviour in fictional texts. Qualitative data was received due to fictional contexts interpretation.

Representation of nonverbal behaviour in case studies of I. McEwan's contemporary fiction comprises the following most frequent words and word forms: *say**, *v*; *tell**, *v*; *talk**, *v*; *speak**, *v*; *sound**, *v*; *sound**, *n*; *voice**, *n* to describe paralinguistics; and *go**, *v*; *come**, *v*; *walk**, *v*; *follow**, *v*; *turn**, *v* to describe moving. The words and word forms of *walk*, *v**, *sound**, *n*, *sound*, *v**, *voice*, *v**, *go**, *v*, *come**, *v* are usually used by the writers to describe characters' nonverbal behaviour while providing fiction text coherence is mostly bounded to the words *tell**, *v*, *say**, *v*, *talk**, *v*, *speak**, *v*. The importance of paralinguistics is determined by its absolute frequency of the word *say**, *v* – 462 and 320 in Corpus 1 and Corpus 2 respectively. The total quantity of words and word forms denoting paralinguistics and moving is 1965 in both corpora. The same rank index of the words which denote the nondescriptive meaning of paralinguistics and moving in two text corpora manifests and proves the idea that coherence is a text-forming and stable category. The words that describe characters' nonverbal behaviour contribute to creating dynamism in fictional texts.

The set of quantitative data of the present research is the ground for further development of software for linguistic tasks to study the author's writing style. Supplemented by the data about collocations, obtained practical results might contribute to the study of corpus linguistics, in particular to compile a corpus digital dictionary of words and word forms of nonverbal behaviour represented in contemporary British fiction.

7. References

- [1] M. Danesi, Nonverbal communication, in: M. Danesi (Ed.), *Understanding Nonverbal Communication: A Semiotic Guide*, Bloomsbury Academic, London, 2022, pp. 1–26. doi:10.5040/9781350152670.ch-001.
- [2] M.G. Frank, A. Solbu, Nonverbal communication: evolution and today, in: R. Sternberg, A. Kostić, (Eds.), *Social Intelligence and Nonverbal Communication*, Palgrave Macmillan, London, 2020, pp.119-162. doi. 10.1007/978-3-030-34964-6_5.
- [3] J. A. Hall, M. L. Knapp (Eds.), *Nonverbal Communication: Handbooks of Communication Science*, Walter de Gruyter, Berlin, Boston, 2013.
- [4] S. Trenholm, *Thinking Through Communication: An Introduction to the Study of Human Communication*, 9th ed, Routledge, New York, 2021. doi:10.4324/9781003016366.
- [5] S. Johar, *Emotion, Affect and Personality in Speech. The Bias of Language and Paralinguistics*, Springer, New Delhi, 2016.
- [6] J. Flanders, F. Yannidis (Eds.), *The Shape of Data in Digital Humanities: Modeling Texts and Text-based Resources*, Routledge, New York, London, 2019.
- [7] I. McEwan, *Sweet Tooth*, Alfred A. Knopf, Canada, 2012.
- [8] I. McEwan, *Solar*, Doubleday, New York, 2010.
- [9] I. Bekhta, N. Hrytsiv, Computational linguistics tools in mapping emotional dislocation of translated fiction, in: *CEUR Workshop Proceedings, Vol., 2870, Proceedings of the 5th International Conference on Computational Linguistics and Intelligent Systems, COLINS 2021, Volume I: Main Conference, Lviv, Ukraine, 2021*, pp. 685-699.
- [10] N. Bondarchuk, I. Bekhta, Quantitative characteristics of lexical-semantic groups representing weather in weather news stories (based on British online press), in: *CEUR Workshop Proceedings, Vol., 2870, Proceedings of the 5th International Conference on Computational Linguistics and*

- Intelligent Systems, COLINS 2021, Volume I: Main Conference, Lviv, Ukraine, 2021, pp. 799–810
- [11] O. Levchenko, N. Romanyshyn, D. Dosyn, Method of automated identification of metaphoric meaning in adjective + noun word combination (based on the Ukrainian language), in: CEUR Workshop Proceedings, Vol., 3286, Workshop Proceedings of the 8th International Conference on Mathematics. Information technologies. Education, MoMLeT&DC, 2019, pp. 3370-380.
- [12] D. Head, Ian McEwan: Contemporary British Novelists. Manchester University Press, Manchester, 2007.
- [13] B. Tonkin, Ian McEwan: Why I'm revisiting the seventies. The Independent, 2012. URL: <https://www.independent.co.uk/arts-entertainment/books/features/ian-mcewan-why-i-m-revisiting-the-seventies-8076683.html>
- [14] M. H. Eaves, D. Leathers, Successful Nonverbal Communication: Principles and Applications, 5th ed, Routledge, New York, 2018. doi. 10.4324/9781315542317.
- [15] C. Bown, Computational phylogenetics, Annual Review of Linguistics 4 (2018) 281-296.
- [16] D. McIntyre, B. Walker, Corpus Stylistics: Theory and Practice, Edinburgh University Press, Edinburgh, 2019.
- [17] E. Purssell, N. McCrae, Reviewing Quantitative Studies: Meta-analysis and Narrative Approaches, in E. Purssell, N. McCrae (Eds.), How to Perform a Systematic Literature Review, Springer, Cham, 2020, pp. 69-101. doi: 10.1007/978-3-030-49672-2_7.
- [18] M. H. Short, G. N. Leech (Eds.), Style in Fiction: A Linguistic Introduction to English Fictional Prose, 2nd ed., Pearson ESL, London, 2007.
- [19] A. Gibbons, S. Whiteley, Contemporary Stylistics: Language, Cognition, Interpretation, Edinburgh University Press, Edinburgh, 2022. doi.10.1515/9780748682782.
- [20] D. McIntyre, B. Walker, Corpus Stylistics: Theory and Practice, Edinburgh University Press, Edinburgh, 2022. doi: 10.1515/9781474413220.
- [21] G. Ignatow, R. Mihalcea, An Introduction to Text Mining, SAGE Publications, Thousand Oaks, 2018. doi:10.4135/9781506336985.
- [22] J. Kuhn, Computational text analysis within the Humanities: how to combine working practices from the contributing fields? Lang Resources & Evaluation 53 (2019) 565–602. doi:10.1007/s10579-019-09459-3.
- [23] S. M. Rasinger, Quantitative Research in Linguistics: an Introduction, 2nd ed., Bloomsbury, London, 2013.
- [24] N. Nørgaard, Multimodal Stylistics of the Novel: More Than Words, 1st ed, Routledge, New York, 2018. doi:10.4324/9781315145556.
- [25] M. L. Jockers, T. Underwood, Text-mining the humanities, in: S. Schreibman, R. Siemens, J. Unsworth (Eds.), A New Companion to Digital Humanities, Wiley-Blackwell, West Sussex, 2016, pp. 291-306.
- [26] J. C. Ho, Using computational text analysis with social media text, SAGE Research Methods Cases, 2022. doi:10.4135/9781529603590.
- [27] E. Alsop, Making Conversation in a Modernist Fiction: Theory Interpretation Narrative, Ohio State University Press, Ohio, 2019.
- [28] G. Liveley, Narratology, Oxford University Press, Oxford, 2021.
- [29] S. Statham, The year's work in stylistics 2020, Language and Literature 30/4 (2021) 407-433. doi:10.1177/09639470211056687.
- [30] T. Ogata, T. Akimoto (Eds.). Post-Narratology Through Computational and Cognitive Approaches, IGI Global, 2019. doi: 10.4018/978-1-5225-7979-3.
- [31] J. Attard, The Connection between literature and aesthetics: is it problematic? Symposia Melitensia 14 (2018) 79-90.
- [32] B. Stopel, Aesthetic appreciation and the dependence between deep and surface interpretation, Journal of Literary Theory, 14 (2020) 94-119. doi: 10.1515/jlt-2020-0006.
- [33] W. Bisschop, Interpretation and aesthetic appreciation, Journal of Literary Theory, 14 (2020) 1-9. doi: 10.1515/jlt-2020-0001.
- [34] M. Danesi. Understanding Nonverbal Communication: A Semiotic Guide, Bloomsbury Publishing, London, 2021.

- [35] O. Hargie, *Skilled Interpersonal Communication: Research, Theory and Practice*, 7th ed, Routledge, London, 2021. doi: 10.4324/9781003182269.
- [36] X. Jiang, (Ed.), *Types of Nonverbal Communication*, IntechOpen, London, 2021. doi: 10.5772/intechopen.83004.