

Quantifying verbal semantics: a computer-based discourse analysis of verba sentiendi vs. verba dicendi in Angela Carter's fiction

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Abstract

This article investigates verbal semantics within interiority vs. exteriority aspects through the lens of computer-based discourse analysis and computer processing of verba sentiendi (verbs of thinking) and verba dicendi (verbs of speaking) for deconstructing characters' speech and thought representation in Angela Carter's magical realist fiction. Drawing on applied linguistics, computational analysis, text, and discourse inquiry for quantifying verbal semantics of verba sentiendi and verba dicendi, I unravel the portrayal of Carter's characters' thoughts/mental events as well as speech/reporting events through three categories of verba sentiendi (Thoughts and Opinions, Senses and Perceptions, Feelings and Emotions) and three categories of verba dicendi (Tentative, Neutral, Assertive). By quantitatively examining the frequency values and interpreting descriptive statistics data, my aim is to shed light on the verbal semantic dimension that underlies Carter's fictional tapestry. Using cutting-edge tools such as Voyant Tools and R/R Studio for processing vast volumes of textual data, I quantify the prevalence of verba sentiendi vs. verba dicendi, offering insights into their quantitative significance. Descriptive statistics provides further nuance by revealing central tendencies, variations, and quartiles within the six main categories under study.

Keywords

verba sentiendi, verba dicendi, thought and speech representation, interiority, exteriority, verbal semantics, Angela Carter's fiction, magical realism, descriptive statistics

1. Introduction

Analysis of Angela Carter's magical realist fiction locates the deeply subjective experience of the textual characters amid the cultural and social shifts of the late twentieth century. Carter's characters are usually interpreted as struggling to express their true identities that would be disruptive of social conformity. By writing from the mental interiors of the characters and portraying the external boundaries of identity formation, Carter creates a "liminal space" or a threshold between character interiority and exteriority like the two sides of a coin in her fiction. She demonstrates her commitment to how language transcends

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verbal expression and relates to an individual's inner, most private self in contrast to the outer self, arranged by modes and techniques of speech and thought presentation.

Scholarly debates over the definition of magical realism and its features are still ongoing [1-4]. Special attention is paid to thought (re)presentation [5-8]. The present article analyzes the consequences of the "inner world/outer world" reorganization for the characters' discourse in Carter's fiction that unfolds in the context of magical realism which is understood as a literary form, in which weird and unreal occurrences are narrated as if these events were commonplace but which, ultimately, undermine the dominant cultural conventions.

Quantification of verbal semantics of *verba sentiendi* vs. *dicendi* reveals specific modes of interiority vs. exteriority of characters in Carter's fiction and discloses how the current cultural and social changes in the globalized world are reflected in the fictional experience of the contemporary character. In this article, Carter's fiction thus furnishes instances of character interiority, the common understanding of "self," and exteriority, focusing on their external actions, within a broader social narrative [9-12]. Each of Carter's texts exemplifies different types of narration that shape her characters' interior and exterior personae, exploring the psychological component of human existence in this process.

Interiority, as the key concept explored in this article, refers to what is going on in the minds of textual characters: thoughts, memories, ideas, and daydreams [13-16]. In other words, interiority is what is "inside." By contrast, exteriority is what is external to the fictional characters: their speech and actions, their gestures, as well as the settings, and descriptions of the textual world surrounding them. The inner and outer spaces tied up by characters' thoughts and acts of speaking within the thought and speech representation inevitably interact with each other and, as a consequence, such interaction usually reshapes the interior system, the mind, and sometimes the body. Thus, the theorization of the semantics of *verba sentiendi* vs. *verba dicendi* is in many ways given in speech and thought representation in characters' discourse as the research discussions of the topic assume the dichotomy between the interiority and exteriority, or inner and outer world of textual communicative instances.

Conceiving the dichotomy "interiority/exteriority" as a complex, interdependent relationship in this paper, I deliberately attempt to explain how "external" stimuli affect the "interior" of round characters, who cannot be defined in a single phrase, in Carter's magical realist fiction and how "inner" feelings are expressed "externally" in and by the body of the textual personae. I attach interiority as the umbrella term to the modes of thought presentation of the fictional characters, which I have elaborated in my previous research from the perspective of discourse narratology. These modes include, for example, inner monologue, inner dialogue, stream of consciousness, thought embedded within thought, and inner reflections [17-18]. Exteriority, as the quality of being outside, here serves as the umbrella term for the modes of speech presentation of the fictional characters: thematic speech, speech embedded within speech, hidden speech, and quoted speech. To speak of interiority, of course, is necessarily to create an opposition between "inside" and "outside." Therefore, interiority can serve as a keyword for the distinction between the interior and the exterior in general. In what follows, I predominantly use interiority to refer to this distinction but, where necessary, I spell out its two sides to avoid confusion.

The present article analyzes the consequences of the “inner world/outer world” reorganization for the characters’ discourse in Carter’s fiction. This is a computational linguistic study that, with the help of computer-based discourse analysis and computer processing of verbal semantics, de-constructs characters’ interiority vs. exteriority in Carter’s magical realist fiction, revealing the intricate interplay between her characters’ inner thoughts and external expressions. By leveraging advanced computational tools, this study considers the realms of *verba sentiendi* vs. *verba dicendi* and sheds light on the frequencies and descriptive statistics that shape the representation of interiority and exteriority. As the analysis unfolds, it provides valuable insights into how language, specifically the careful choice and use of certain verbs, contributes to the construction of characters’ cognitive landscapes. Through a unique blend of linguistic analysis and computational exploration, this study contributes to a deeper understanding of Carter’s fiction, unraveling the magical realist aspects within thought and speech representation, comprising the psychological and societal dimensions thematized in her presented oeuvre.

2. Related works

The theoretical background of the paper is, on the one hand, enriched by incorporating an exploration of the interplay between interiority and exteriority in Carter’s fiction, particularly through quantifying of verbal semantics encompassing *verba sentiendi* vs. *verba dicendi* in thought and speech representation. On the other hand, this layer of analysis enhances the understanding of how Carter utilizes language to depict characters’ inner thoughts and external expressions within the broader frameworks of magical realism and feminist literary criticism.

2.1. Magical realist fiction: key features of Angela Carter’s novels

Magical realism, often associated with fiction, is a narrative style that blends fantastical or magical elements with realistic settings, characters, and events [1, 3]. This literary genre challenges conventional perceptions of reality by creating a world where magical occurrences are treated as ordinary, with characters and the narrative accepting these elements without surprise or disbelief [2, 4]. Key characteristics of magical realism include blurred boundaries between the magical and the real. It presents hermetic elements as an intrinsic part of the everyday world, making it difficult for readers to discern where reality ends and magic begins. Cultural embeddedness, employed by magical realism, often draws on cultural or regional folklore, myths, and traditions. It operates with an acceptance of the supernatural: unlike traditional fantasy, magical realism does not treat magical events as extraordinary or in need of explanation. Characters in magical realist fiction often accept the supernatural as a natural part of their lives. Everyday settings: magical realism is often set in ordinary, familiar environments. This juxtaposition of the magical and the mundane creates a sense of wonder and challenges the reader’s perceptions of reality. Symbolism and metaphor: magical elements in these stories often carry symbolic or metaphorical meanings. They may represent cultural or social issues, adding layers of depth to the narrative. Sensory detail: magical realist writers use vivid descriptions to bring the fairy elements to life. This sensory richness contributes to the nature of the storytelling.

Carter is a prolific British feminist writer, who is also known for her contributions to magical realism: “stylistically as well as thematically in Carter’s novels, the beauty of imaginary worlds is a powerful force, one not to be dismissed by those who would change society” [9]. Her works are realistic, albeit in an extravagant manner, anticipating that her readers would discern the underlying ideas beneath the fantastically allegorical surface of her fiction [11]. Her works often reimagine traditional fairy tales with a magical realist twist, incorporating fantastical elements while exploring complex themes related to gender, identity, and societal norms. While the specific magical realist features characterize many sides of Carter’s novels, one can schematically exemplify the selection outlined above as follows: *American Ghosts* – blurred realities: Carter often blurs the lines between reality and fantasy, creating an otherworldly world where supernatural occurrences seamlessly intertwine with everyday life [19]; *Burning your Boats* – mythical and folkloric motifs are incorporated into the narrative [20]; *Fireworks* – symbolism and metaphor [21]; *Nights at the Circus* – surreal and fantastical elements associated with the circus setting [22]; *The Bloody Chamber* – reimagined fairy tales: the fantastical elements are interwoven with the familiar, offering a fresh perspective on well-known stories [23]; *The Passion of New Eve* – gender and identity exploration is accompanied by magical or surreal elements that contribute to the thematic depth of the narrative [24].

Magical realism provides a distinctive narrative experience, urging readers to interrogate and traverse the boundaries separating the commonplace from the extraordinary. Attention to the interplay of magic realism and verbal semantics enriches the exploration of interiority and exteriority within thought and speech representation proposed by this article.

2.2. Verba sentiendi vs. verba dicendi as interiority vs. exteriority

In the context of verbal semantics, and lexical semantics in general, the careful choice and use of verba dicendi vs. verba sentiendi help authors balance the portrayal of exteriority (speech and actions) with interiority (thoughts and feelings) of characters. Such balancing techniques enhance the storytelling depth by providing a well-rounded depiction of both the outer and inner aspects of characters and their experiences in modes available in fiction: thought and speech representation.

Within the genre of magic realism, the balance between exteriority and interiority is crucial. Magic realism often blurs the boundaries between the ordinary and the fantastical, making it potentially challenging for the readers to navigate the physical actions and spoken words of characters as well as the intricate landscapes of their thoughts and emotions. The careful selection of verba sentiendi becomes the linguistic tool through which authors penetrate the characters’ minds, unraveling the intricacies of their inner worlds. An exploration of the semantic groups Thoughts and Opinions, Senses and Perceptions, Feelings and Emotions has the potential to reveal how complexly narrative layers characters’ motivations and psyches. On the other hand, verba dicendi, comprising Tentative, Neutral, and Asserting ones, allow authors to construct vivid dialogues and capture the essence of characters’ interactions with the external world. Whether characters are engaged in mundane conversations or uttering profound statements, these speech verbs

serve as the linguistic bridge that connects the reader to the unfolding events. A mutual integration of verba sentiendi and verba dicendi plays a pivotal role in articulating the cognitive relations between interiority and exteriority. Through thought and speech representation, the narrative weaves together the tangible and the intangible, the seen and the unseen (Figure 1).

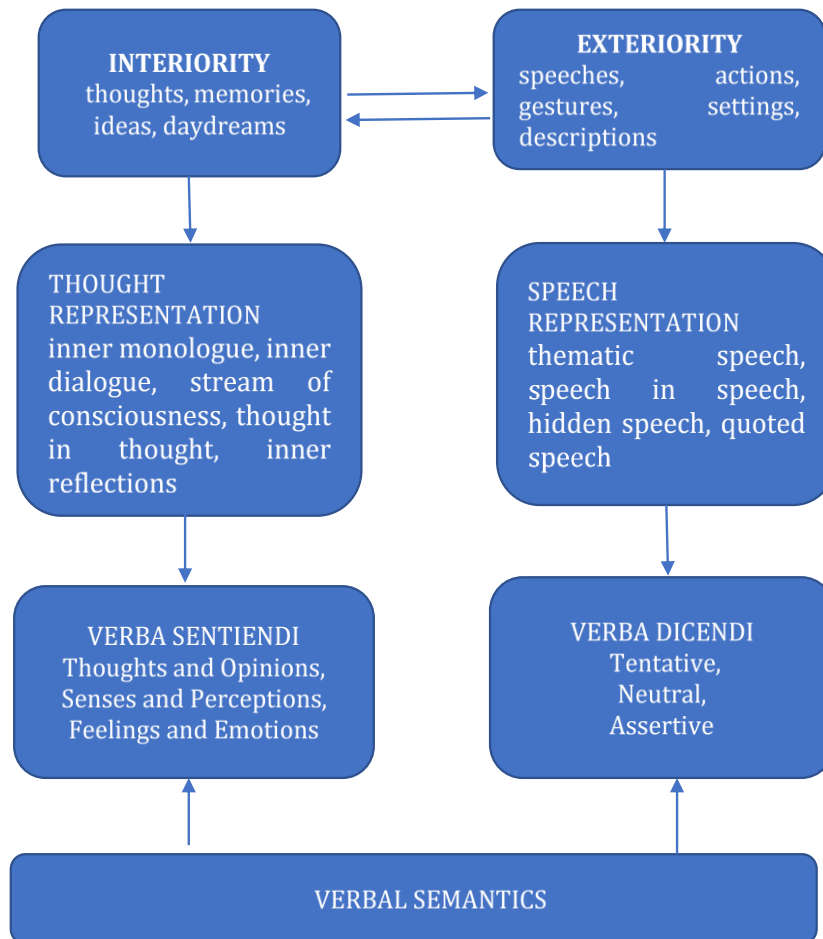


Figure 1: Dichotomy of interiority and exteriority expressed in verbal semantics.

In Carter’s fiction, the careful use of verba sentiendi in various thought representation techniques adds layers of psychological depth to her characters due to modes of thought presentation. Inner monologue involves the presentation of a character’s thoughts in a continuous, uninterrupted flow. It allows readers to access the innermost musings and reflections of a character. Verba sentiendi are the gateways through which the author expresses the character’s contemplative and introspective moments; inner dialogue engages characters in a conversation with themselves, expressing conflicting thoughts or debating decisions within their minds. Verba sentiendi play a vital role in representing this internal discourse. Through these verbs, Carter gives voice to the conflicting sentiments and internal struggles of her characters; the stream of consciousness presents a continuous flow

of thoughts and feelings without a clear structure, mimicking the natural progression of a character's mind. In this context, *verba sentiendi* often capture the immediacy and spontaneity of thoughts. Words like *feel*, *sense*, and *perceive* become essential in conveying the raw and unfiltered nature of the character's stream of consciousness; thought within thought presents a character having nested layers of thoughts, where one thought leads to another in a cascading manner. *Verba sentiendi* like *realize*, *conclude*, and *understand* are pivotal in depicting the progression of thoughts within thoughts. They convey the evolving nature of the character's understanding and awareness; inner reflections show how characters engage in reflective moments where they contemplate their experiences, actions, or the world around them. *Verba sentiendi* are instrumental in conveying the depth and introspection of these reflective moments. Through these verbs, Carter allows her characters to explore and make sense of their inner and outer worlds.

The presentation of speech in fiction involves various modes that authors use to convey dialogue and communication and serves different narrative purposes. Thus, thematic speech involves the presentation of speech that is thematically relevant to the narrative but may not be directly quoted. It captures the essence or content of the speech without providing the exact words; it often relies on *verba dicendi* that convey the general tone or subject matter of the speech rather than presenting a verbatim account. This approach allows authors to emphasize the significance of the speech without delving into the exact wording; speech within speech entails a character quoting or incorporating another character's speech within their own dialogue. Additionally, *verba sentiendi* might be employed to express the character's feelings or thoughts, usually with a series of traumatic ordeals, about the quoted speech; hidden speech refers to the indirect or implied presentation of speech without providing a direct quotation. The narrator conveys the content of the speech without explicitly stating the words spoken. The abundant use of modal verbs like *may*, *might*, and *could* presenting hidden speech serves as a linguistic tool to craft narratives that are rich in ambiguity, fantasy, and a willingness to challenge traditional narrative conventions. *Verba dicendi*, such as *say*, *said*, *tell*, and *told*, are fundamental in indicating the exact words spoken. Additionally, *verba sentiendi* might be used to carry the emotional or psychological state of the speaker at the time of the quoted speech.

In a nutshell, the uses of *verba sentiendi* vs. *verba dicendi* in Carter's magical realist fiction reflect the interconnectedness of these linguistic expressions with the broader concepts of interiority and exteriority. The choice of speech representation modes depends on the author's stylistic preferences and the narrative goals. Thematic speech, speech within speech, hidden speech, and quoted speech each contribute to the overall texture of dialogue in literature. The careful use of *verba dicendi* vs. *verba sentiendi* enhances the effectiveness of these modes, allowing authors to convey not only what is said but also the nuances of how it is said and the impact it has on the characters and the narrative.

3. Method

Computer-based discourse analysis in connection to verbal semantics [25-26] – and, specifically, *verba sentiendi* and *verba dicendi* – involves examining how language functions

within larger contexts, particularly in communication and expression of thoughts and feelings and characteristics of characters' thoughts/speech [18]. This type of analysis aims to understand the role of these verbs in creating particular styles of fictional discourse, such as magical realism, and in the representation of characters' inner and outer experiences in terms of interiority vs. exteriority. This approach facilitates a deeper understanding of the relationship between verbal semantics based on descriptive statistics and the construction of meaning in Carter's fiction, which subverts the gothic tradition.

The data processing involves two stages, one of which is quantitative text analysis to define verbs' frequency using "Voyant Tool" [27]. This step allows for a systematic examination of the occurrence of *verba sentiendi* vs. *verba dicendi* throughout the corpus of Carter's work. The second stage involves the study of descriptive statistics, including measures such as mean, median, standard deviation, and quartiles using "R Studio" [28]. These statistical analyses provide a quantitative framework for understanding the distribution and variability of speech and thought verbs [29]. For instance, the mean frequency offers an average representation of how often these verbs appear, while the standard deviation indicates the degree of dispersion around this average. Quartiles provide insights into the distribution of verb frequencies within the data set, helping identify outliers or distinctive patterns. Similarly, the median, as a measure of central tendency, plays a crucial role in grasping the distribution of verb frequencies in Carter's magical realist fiction. Unlike the mean, which represents the average frequency and can be influenced by extreme values, the median is the middle point in a data set when it is arranged in ascending or descending order. It captures the center of the distribution, making it a valuable metric for examining the typical or central occurrence of *verba sentiendi* vs. *verba dicendi*.

Through these quantitative analyses, researchers can discern not only the prevalence but also the variability and distribution of speech and thought verbs, contributing to a more comprehensive understanding of Carter's narrative choices. The combination of computer-based discourse analysis and descriptive statistics offers a structured and systematic approach to unraveling the intricate mosaic of language use in magical realistic fiction, allowing for insights into the interplay of verbal semantics revealing interiority vs. exteriority in Carter's fiction.

The corpora of the present study are made up of the following novels by Carter: *American Ghosts & Old World Wonders* [19], *Burning Your Boats* [20], *Fireworks* [21], *Nights at the Circus* [22], *The Bloody Chamber and Other Stories* [23], and *The Passion of New Eve* [24].

The procedure for conducting a computer-based discourse analysis includes:

- Preparation of the texts for analysis: this involves the meticulous processing and organization of researched textual data to ensure it is in an optimal format for upload into "Voyant Tools" via its web-based interface. The texts are then seamlessly integrated into "Voyant Tools".
- Extraction of *verba sentiendi*: by utilizing "Voyant Tools", I extracted *verba sentiendi* along with their corresponding absolute frequency values, categorized into three distinct groups: Thoughts and Opinions (*agree, believe, doubt, guess, imagine, know/knew, mean/meant, recognize, remember, suspect, think/thought,*

understand/understood), Senses and Perceptions (*be/was, feel/felt, hear/heard, look, see/saw, seem, smell, appear, taste*), and Feelings and Emotions (*dislike, hate, like, love, prefer, want, wish*).

- Generation and visualization of the data frame: this step relies on the tools of “R Studio” to create a data frame by employing vectors for each category, representing the absolute frequency of verbs. Subsequently, this data frame was engaged in additional quantitative processing.
- Shaping a graph of verba sentiendi: by employing the `bar_plot` function in “R Studio”, I generated a graph that illustrates the absolute frequency values.
- Counting up descriptive statistics of verba sentiendi: the calculation of statistical measures, including mean, median, standard deviation, and quartiles for each category of verba sentiendi, was conducted using the summary and aggregate functions in “R Studio”.
- Extraction of verba dicendi: using “Voyant Tools”, I retrieved verba dicendi along with their respective absolute frequency values due to three specific groups: Tentative (*assume, conceive, consider, contemplate, could, entertain, explore, intimate, may, might, ponder, propose, suggest, wonder*), Neutral (*announce, capture, depict, inform, point, present, render, reply, say, said, tell, told*), and Assertive (*affirm, argue, assert, claim, declare, insist, maintain, proclaim, promise, state*). Modal verbs contribute to the Tentative category of speech verbs because they introduce a sense of possibility, probability, or conditionality, reflecting the character’s or narrator’s attitude toward the situation being discussed.
- Generation and visualization of the data frame in “R Studio” and further quantitative processing.
- Shaping a graph of verba dicendi, using the `bar_plot` function in “R Studio”.
- Counting up descriptive statistics of verba dicendi in “R Studio” including statistical measures such as mean, median, standard deviation, and quartiles for each category of verba dicendi.

4. Results and discussion

This section presents the quantitative insights derived from the computer-based discourse analysis of Carter’s fiction, focusing on the interiority vs. exteriority aspect. Utilizing “Voyant Tools” and descriptive statistics in “R Studio”, I quantify the nuances of verbal semantics and illustrate the results as visualization of word frequency in 10 textual segments (Figures 2, 3, 4, 10, 11, 12), fragments of R codes (Figures 5, 7, 9, 13, 15, 17), R visualization (Figures 6, 8, 14, 16).

4.1. Quantifying verbal semantics of verba sentiendi

Quantifying verbal semantics of verba sentiendi consisted of their extraction, shaping the graph and counting up the descriptive statistics.

4.1.1. Extraction of verba sentiendi

Computer-based text analysis through “Voyant Tools” facilitated the streamlined processing of corpus data, enabling the quantification of both absolute and relative frequencies of verba sentiendi within the corpus. The absolute instances of verbs within each category of verba sentiendi, presented in either present or past tense forms, are as follows: Thoughts and Opinions (agree 13, believe 208, doubt 39, guess 60, imagine 84, know 713, knew 418, mean 258, meant 55, recognise 15, remember 217, suspect 22, think 363, thought 474, understand 83, understood 41) (Figure 2); Senses and Perceptions (appear 151, was 6005, be 9052, feel 150, felt 325, hear 731, heard 192, look 911, see 1513, saw 649, seem 504, smell 123, taste 64) (Fig. 3); Feelings and Emotions (dislike 11, hate 47, like 1657, love 662, prefer 23, want 305, wish 71) (Figure 4). The relative frequency ranges from 0.005 to 0.015, with the verb was (Senses and Perceptions category) having the highest frequency (Figures 2-4).

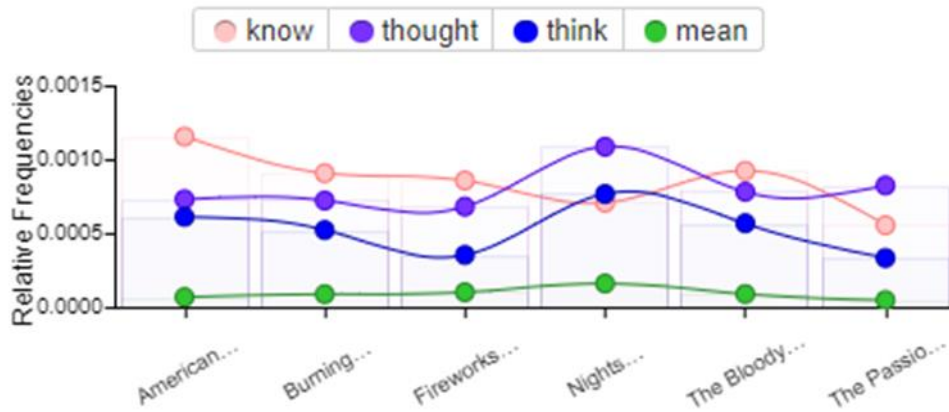


Figure 2: High-frequency verba sentiendi in Thoughts and Opinions category.



Figure 3: High-frequency verba sentiendi in Senses and Perceptions category.

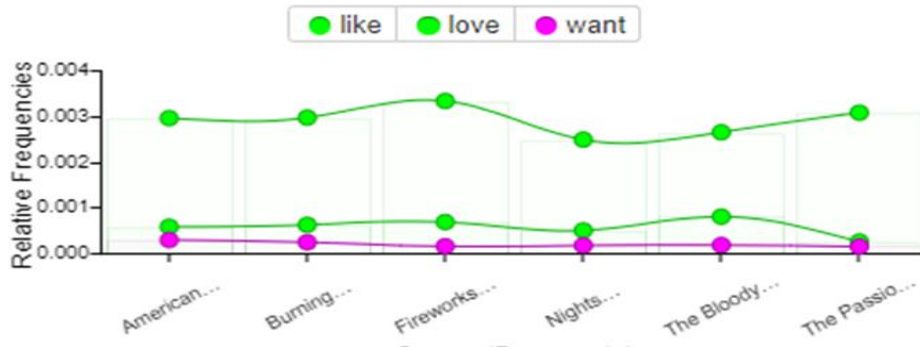


Figure 4: High-frequency verba sentiendi in Feeling and Emotions category.

The high frequency of verba sentiendi in Carter’s fiction signifies a deliberate emphasis on the characters’ inner experiences, thoughts, and emotional states. The repetition of verbs such as know, thought, think, mean, was, see, look, like, love, and want suggests a conscious effort by Carter to explore and depict the intricate workings of the characters’ minds. Verba sentiendi serve as linguistic tools for a representation of the complexities of human consciousness, providing readers with insights into characters’ perceptions, feelings, and subjective experiences. The recurring use of these verba sentiendi contributes to the establishment of a rich and layered narrative, allowing readers to engage with the characters on a deeper level. Carter’s choice to frequently employ these thought verbs indicates her commitment to designing a narrative that goes beyond mere actions and dialogues, prioritizing the exploration of characters’ inner worlds.

In the process of creating a data frame called `verbs_data` in R, vectors are formed to represent rows and columns. This data frame consists of three columns: Category, Verb, and Frequency. The vectors are populated with information related to three categories of verba sentiendi, namely Thoughts and Opinions, Senses and Perceptions, and Feelings and Emotions. Each row in the data frame corresponds to a specific verb within its respective category, and the Frequency column contains the absolute frequencies associated with each verb. The data frame organizes and presents information about the different categories of thought verbs and their frequencies in a structured format for further analysis (Figures 5-6).

```

1 # Creating vectors for each category
2 thoughts_and_opinions <- c('agree', 'believe', 'doubt', 'guess', 'imagine', 'know', 'knew', 'mean', 'meant', 'r
3 senses_and_perceptions <- c('appear', 'was', 'be', 'feel', 'felt', 'hear', 'heard', 'look', 'see', 'saw', 'seen
4 feelings_and_emotions <- c('dislike', 'hate', 'like', 'love', 'prefer', 'want', 'wish')
5
6 # Creating corresponding frequencies
7 thoughts_and_opinions_freq <- c(13, 208, 39, 60, 84, 713, 418, 258, 55, 15, 217, 22, 363, 474, 83, 41)
8 senses_and_perceptions_freq <- c(151, 6005, 9052, 150, 325, 731, 192, 911, 1513, 649, 504, 123, 64)
9 feelings_and_emotions_freq <- c(11, 47, 1657, 662, 23, 305, 71)
10
11 # Creating a data frame
12 verbs_data <- data.frame(
13   Category = rep(c('Thoughts and opinions', 'Senses and Perceptions', 'Feelings and Emotions'),
14                 times = c(length(thoughts_and_opinions), length(senses_and_perceptions), length(feelings_and_e
15   Verb = c(thoughts_and_opinions, senses_and_perceptions, feelings_and_emotions),
16   Frequency = c(thoughts_and_opinions_freq, senses_and_perceptions_freq, feelings_and_emotions_freq)
17 )
18
19 # Displaying the data frame using the View function
20 view(verbs_data)

```

Figure 5: Code for data frame creation of verba sentiendi.

	Category	Verb	Frequency
1	Thoughts and Opinions	agree	13
2	Thoughts and Opinions	believe	208
3	Thoughts and Opinions	doubt	39
4	Thoughts and Opinions	guess	60
5	Thoughts and Opinions	imagine	84
6	Thoughts and Opinions	know	713
7	Thoughts and Opinions	knew	418
8	Thoughts and Opinions	mean	258
9	Thoughts and Opinions	meant	55
10	Thoughts and Opinions	recognise	15
11	Thoughts and Opinions	remember	217
12	Thoughts and Opinions	suspect	22
13	Thoughts and Opinions	think	363
14	Thoughts and Opinions	thought	474
15	Thoughts and Opinions	understand	83
16	Thoughts and Opinions	understood	41
17	Senses and Perceptions	appear	151
18	Senses and Perceptions	was	6005
19	Senses and Perceptions	be	9052
20	Senses and Perceptions	feel	150
21	Senses and Perceptions	felt	325
22	Senses and Perceptions	hear	731
23	Senses and Perceptions	heard	192
24	Senses and Perceptions	look	911
25	Senses and Perceptions	see	1513
26	Senses and Perceptions	saw	649
27	Senses and Perceptions	seem	504
28	Senses and Perceptions	smell	123
29	Senses and Perceptions	taste	64
30	Feelings and Emotions	dislike	11
31	Feelings and Emotions	hate	47
32	Feelings and Emotions	like	1657
33	Feelings and Emotions	love	662
34	Feelings and Emotions	prefer	23
35	Feelings and Emotions	want	305
36	Feelings and Emotions	wish	71

Figure 6: Data frame table of verba sentiendi.

The generated table, displayed using the View function, provides a comprehensive overview of the data frame named `verbs_data`. The table is organized into three main columns: Category, Verb, and Frequency. Each row corresponds to a specific verb within its respective category, and the frequency column indicates how often each verb appears. This

tabular representation makes it easy to visually assess and analyze the distribution of different categories of verbs along with their frequencies.

4.1.2. Shaping the graph of verba sentiendi

In R, we utilized the ggplot2 package to generate a frequency graph. This graph is a bar plot that contrasts the frequencies of verbs across the three categories. On the x-axis, we have the categories, while the y-axis signifies the frequency. Each bar is color-coded based on its respective category. The geom_bar function, set with stat = identity, represents the frequencies, and the position = dodge parameter is employed to arrange the bars side by side (Figures 7-8).

```
21 # Creation of a bar plot for the frequency graph of all categories
22 frequency_plot_combined <- ggplot(verbs_data, aes(x = verb, y = Frequency, fill = Cat
23   geom_bar(stat = "identity", position = "dodge") +
24   labs(title = "Verbs Frequency Distribution",
25     x = "verbs",
26     y = "Frequency") +
27   facet_wrap(~ Category, scales = "free_y") + # Facet by category
28   theme_minimal()
29
30 # Display of the combined frequency plot
31 print(frequency_plot_combined)
```

Figure 7: Code for frequency graph creation.

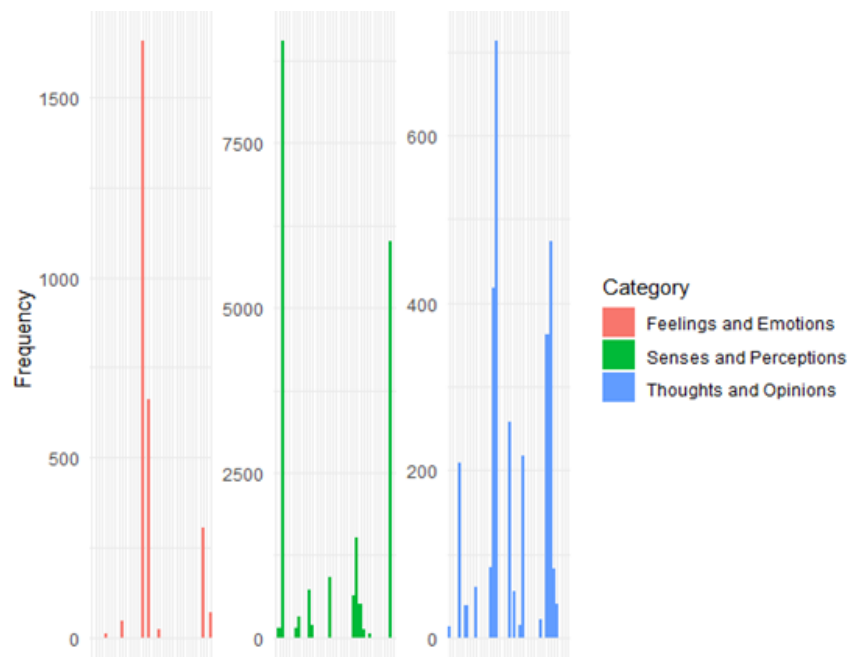


Figure 8: Graph of verba sentiendi frequency distribution.

The height of each bar represents the frequency of a specific verb within the categories. Higher bars indicate higher frequencies, suggesting that those verbs (*know, thought, think*,

mean; was, be, see, look; like, love, want) are used more frequently in expressing thoughts and opinions.

4.1.3. Counting up descriptive statistics of verba sentiendi

To derive descriptive statistics for the three investigated categories of verba sentiendi (Thoughts and Opinions, Senses and Perceptions, Feelings and Emotions), we employed the summary and aggregate functions in “R Studio”. These functions facilitated the calculation of key summary metrics such as mean, median, standard deviation, and quartiles for each category. The aggregate function was used to compute the summary statistics for each category. It grouped the data based on the Category column and subsequently applied specified functions to determine the mean, median, standard deviation, and quartiles of the Frequency column within each category. The resulting data frame, `category_summary`, encapsulates the descriptive statistics of verba sentiendi (Figure 9).

```

40 # Display of the descriptive statistics for each category
41 category_summary <- verbs_data %>%
42   group_by(Category) %>%
43   summarize(
44     Mean = mean(Frequency),
45     Median = median(Frequency),
46     SD = sd(Frequency),
47     Q1 = quantile(Frequency, 0.25),
48     Q3 = quantile(Frequency, 0.75)
49   )
50
51 # Printing the summary statistics
52 print(category_summary)

```

Category	Mean	Median	SD	Q1	Q3
<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
1 Feelings and Emotions	397.	71	603.	35	484.
2 Senses and Perceptions	1567.	504	2748.	151	911
3 Thoughts and Opinions	191.	83.5	206.	40.5	284.

Figure 9: Code and the results of descriptive statistics of verba sentiendi.

Interpreting the presented results in the context of Carter’s fiction, particularly concerning the category of Thoughts and Opinions and the associated verba sentiendi, can provide insights into how she crafts the interiority of her characters. The following aspects have been considered: mean (191) – the moderate mean frequency suggests that the use of thought verbs within this category is not excessively high, indicating a balance in the presentation of characters’ thoughts; median (83.5) – the median being lower than the mean suggests a potential variability in the frequency of specific thought verbs. Carter may utilize certain verbs more sparingly, perhaps reserving them for moments of particular significance or emotional intensity; standard deviation (206) indicates a moderate level of variability in the frequency of thought verbs. Carter’s use of verba sentiendi within the Thoughts and Opinions category may exhibit diversity, capturing a range of characters’ cognitive processes and reflective moments; First and Third Quartiles (40.5 and 284) the interquartile range of 243.5 suggests variability in the central 50% of the data. Carter’s representation of characters’ thoughts spans from more frequent usage to less frequent, indicating a comprehensive exploration of interiority without being overly repetitive.

4.2. Quantifying verbal semantics of verba dicendi

Quantifying verbal semantics of verba dicendi consisted of their extraction, shaping the graph and counting up the descriptive statistics.

4.2.1. Extraction of verba dicendi

The streamlined processing of verbal semantics within corpus data was made possible through computer-based discourse analysis using “Voyant Tools”, allowing for the quantification of both absolute and relative frequencies of verba dicendi within the corpus. The absolute occurrences of verbs within each category of verba dicendi, expressed in either present or past tense forms, are delineated as Tentative (assume 17, conceive 17, consider 18, contemplate 18, could 1245, entertain 17, explore 15, intimate 26, may 160, might 632, ponder 37, propose 17, suggest 41, wander 41), Neutral (announce 52, capture 34, depict 10, inform 24, point 158, present 115, render 32, reply 30, say 501, said 803, tell 239, told 226), and Assertive (affirm 7, argue 3, assert 11, claim 21, declare 13, insist 23, maintain 20, proclaim 5, promise 43, state 109). The relative frequency ranges from 0.0001 to 0.003, with the verb *could* (Tentative category) having the highest frequency (Figures 10-12).

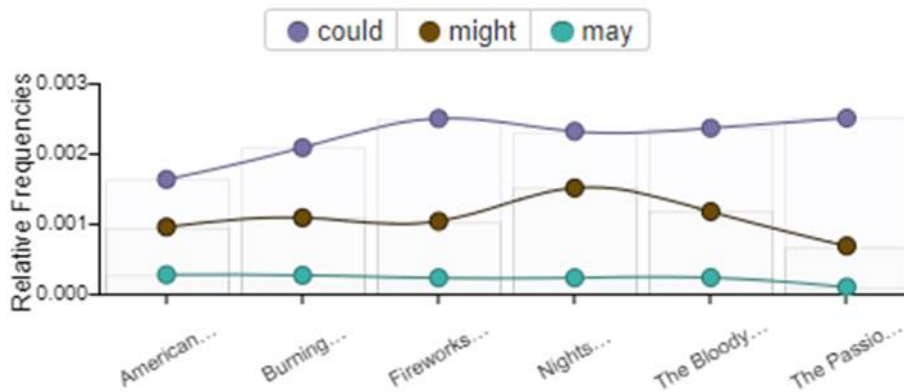


Figure 10: High-frequency verba dicendi in Tentative category.

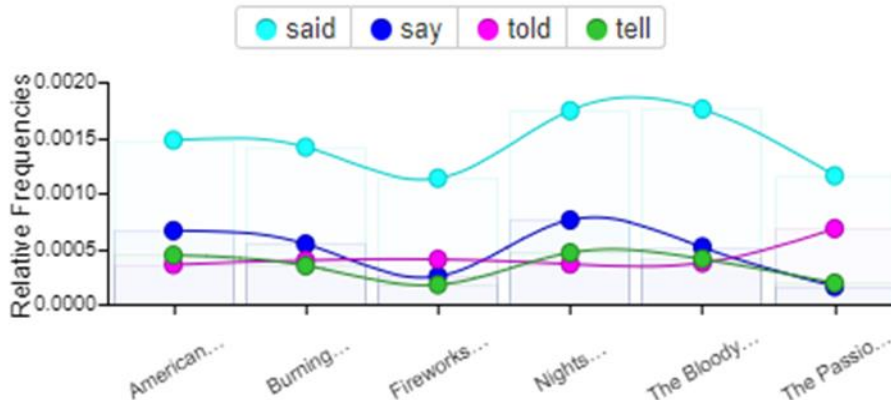


Figure 11: High-frequency verba dicendi in Neutral category.

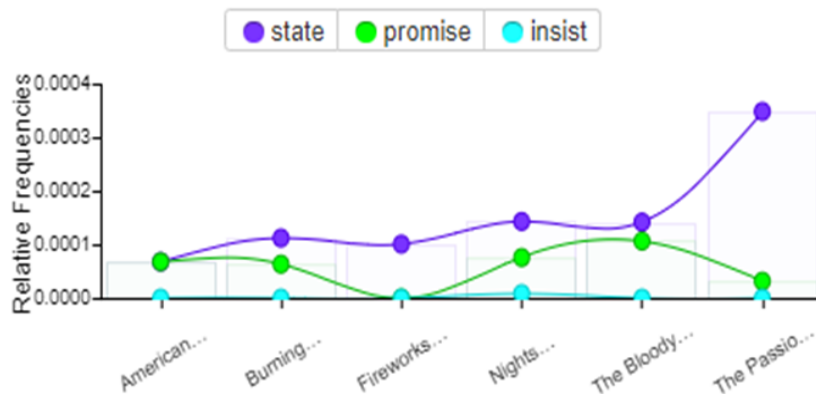


Figure 12: High-frequency verba dicendi in Assertive category.

The frequent use of verba dicendi in Carter’s fiction serves several significant purposes: characterization – the choice of speech verbs contributes to the characterization of individuals within the narrative. Tentative verbs like *could*, *might*, and *may* suggest uncertainty or hesitancy in a character’s speech, providing insights into their personality traits or emotional states; dialogue style – neutral verbs such as *say*, *said*, *told*, and *tell* form the backbone of dialogue representation. They maintain a standard and clear way of presenting speech, ensuring readability and coherence in conversations; expressive nuances – assertive verbs like *state*, *promise*, and *insist* add depth to characters’ expressions, showcasing their confidence and determination during communication. These verbs convey a sense of conviction or emphasis in characters’ speech; narrative tone – the frequency and choice of these speech verbs contribute to the overall tone of the narrative. Whether it leans towards tentativeness, neutrality, or assertiveness can influence the atmosphere and dynamics within the story.

Setting up a data frame for verba dicendi involves creating a structure that represents the frequency of each verb in different categories (Tentative, Neutral, and Assertive). Below there is a code snippet in R to create a data frame for the extracted verb frequencies. This code defines a data frame named `verba_dicendi_data` with columns `Category`, `Verb`, and `Frequency`, and populates it with the provided verb frequencies categorized into Tentative, Neutral, and Assertive (Figures 13-14).

```

61 # Defining the verb frequencies
62 verba_dicendi_data <- data.frame(
63   Category = c(rep("Tentative", 13), rep("Neutral", 12), rep("Assertive", 10)),
64   Verb = c(
65     "assume", "conceive", "consider", "contemplate", "could", "entertain",
66     "explore", "intimate", "may", "might", "ponder", "propose", "suggest",
67     "announce", "capture", "depict", "inform", "point", "present", "render",
68     "reply", "say", "said", "tell", "told",
69     "affirm", "argue", "assert", "claim", "declare", "insist", "maintain",
70     "proclaim", "promise", "state"
71   ),
72   Frequency = c(
73     17, 17, 18, 18, 1245, 17, 15, 26, 160, 632, 37, 17, 41,
74     52, 34, 10, 24, 158, 115, 32, 30, 501, 803, 239, 226,
75     7, 3, 11, 21, 13, 23, 20, 5, 43, 109
76   )
77 )
78 # Data table viewing
79 view(verba_dicendi_data)
80

```

Figure 13: Code for data frame creation of verba dicendi.

	Category	Verb	Frequency
5	Tentative	could	1245
6	Tentative	entertain	17
7	Tentative	explore	15
8	Tentative	intimate	26
9	Tentative	may	160
10	Tentative	might	632
11	Tentative	ponder	37
12	Tentative	propose	17
13	Tentative	suggest	41
14	Neutral	announce	52
15	Neutral	capture	34
16	Neutral	depict	10
17	Neutral	inform	24
18	Neutral	point	158
19	Neutral	present	115
20	Neutral	render	32
21	Neutral	reply	30
22	Neutral	say	501
23	Neutral	said	803
24	Neutral	tell	239
25	Neutral	told	226
26	Assertive	affirm	7
27	Assertive	argue	3
28	Assertive	assert	11
29	Assertive	claim	21
30	Assertive	declare	13
31	Assertive	insist	23
32	Assertive	maintain	20
33	Assertive	proclaim	5
34	Assertive	promise	43
35	Assertive	state	109

Figure 14: Data frame table of verba dicendi.

The table produced and viewed using the View function presents a summary of the data frame named `verbs_data`. Structured with three key columns – Category, Verb, and Frequency – each row corresponds to a particular verb within its designated category, and the frequency column quantifies the occurrence of each verb. This tabular format simplifies the visual evaluation of the distribution of various verb categories, facilitating a comprehensive analysis of their frequencies.

4.2.2. Shaping the graph of verba dicendi

Shaping a graph for verba dicendi involves visually representing the frequencies of categories of speech verbs. This can provide a clear overview of how verbs are distributed across Tentative, Neutral, and Assertive categories. A code snippet in R uses ggplot2 to visualize the three categories of speech verbs simultaneously (Figures 15-16).

```
82 # A bar plot creation for verba dicendi
83 ggplot(verba_dicendi_data, aes(x = Verb, y = Frequency, fill = Category)) +
84   geom_bar(stat = "identity", position = "dodge") +
85   labs(title = "Verba Dicendi Frequencies by Category",
86        x = "Verb",
87        y = "Frequency") +
88   theme_minimal()
```

Figure 15: Code for frequency graph creation.

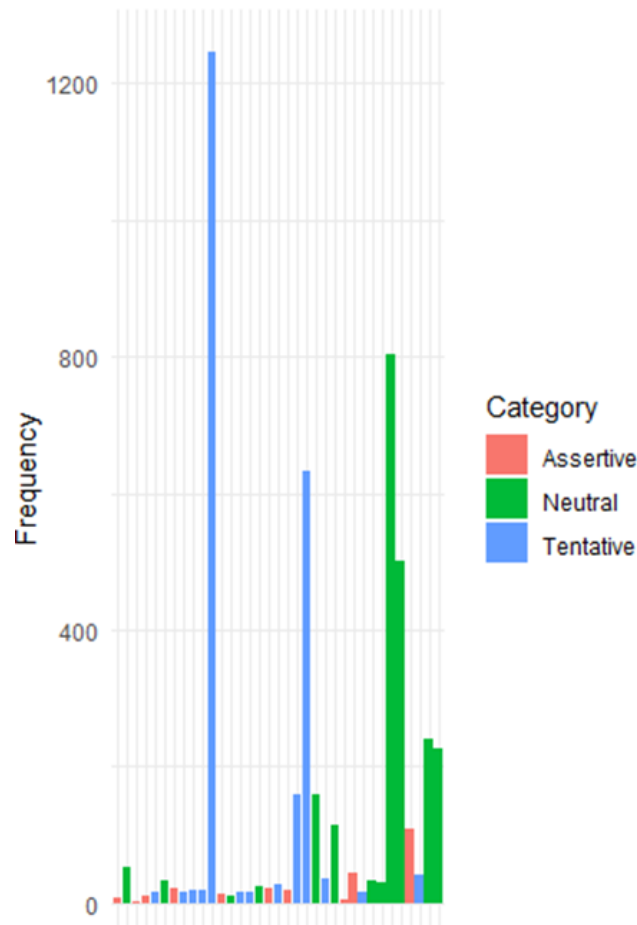


Figure 16: Graph of verba dicendi frequency distribution.

The vertical dimension of each bar in the generated graph corresponds to the frequency of a particular verb within the respective categories. Taller bars signify greater frequencies, indicating that verbs such as *could, might, may; said, say, told, tell; state, promise, insist* are employed more frequently. This suggests a heightened occurrence of these verbs in expressing exteriority.

4.2.3. Counting up descriptive statistics of verba dicendi

To obtain statistical insights into the three explored categories of verba dicendi (Tentative, Neutral, Assertive), I utilized the summary and aggregate functions in R. These functions enabled the computation of essential summary metrics, including mean, median, standard deviation, and quartiles for each category. Employing the aggregate function involved grouping the data by the Category column and applying specified functions to calculate mean, median, standard deviation, and quartiles of the Frequency column within each category. The resultant data frame, `category_summary`, encompasses the descriptive statistics corresponding to each category of verba dicendi. This code uses the `dplyr` package to group the data by the Category column and then calculates the mean, median, standard deviation, and quartiles for the Frequency column within each category. The results are stored in the `category_summary_dicendi` data frame, which is then printed for examination (Figure 17).

```

88 library(dplyr)
89
90 # calculating descriptive statistics for each category
91 category_summary_dicendi <- verba_dicendi_data %>%
92   group_by(Category) %>%
93   summarise(
94     Mean = mean(Frequency),
95     Median = median(Frequency),
96     SD = sd(Frequency),
97     Q1 = quantile(Frequency, 0.25),
98     Q3 = quantile(Frequency, 0.75)
99   )
100
101 # The resulting summary data frame
102 print(category_summary_dicendi)

```

	Category	Mean	Median	SD	Q1	Q3
	<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
1	Assertive	25.5	16.5	31.6	8	22.5
2	Neutral	185.	83.5	241.	31.5	229.
3	Tentative	174.	18	364.	17	41

Figure 17: Code and the results of descriptive statistics of verba dicendi.

The overall analysis of verbal semantics of verba dicendi categories reveals a deliberate and nuanced approach by Carter in portraying characters' communication in her magical realist fiction. The intentional use of speech verbs contributes to a balanced and diverse representation of the characters' interiority, ensuring authenticity and depth in their speech presentation. The variability in median frequencies and standard deviation across

categories reflects Carter's strategic and varied use of speech verbs to capture the richness of characters' communicative experiences. The interpretation of results comprises the following aspects: mean (95.33) – the moderate overall mean frequency across all categories suggests a balanced and intentional use of speech verbs in Carter's fiction and a measured portrayal of characters' communication; median (18) – the moderate overall median indicates potential variability in the frequency of specific speech verbs. Carter selectively uses certain verbs for impactful or significant moments, contributing to a dynamic portrayal of characters' communicative expressions; standard deviation (175.65) – the moderate overall standard deviation (175.65) suggests a reasonable level of variability in the frequency of speech verbs. Carter's intentional and diverse use reflects a dynamic and nuanced representation of characters' communicative interactions; first and third quartiles (22.5) – the overall interquartile range indicates variability in the central 50% of the data. Carter's representation of characters' speech spans from less frequent to more frequent, ensuring a comprehensive exploration of communicative expressions without excessive repetition. In summary, Carter's choice and use of *verba dicendi* contribute to a sophisticated narrative strategy, ensuring a multifaceted depiction of the characters' communication.

5. Conclusion

The comprehensive analysis of quantifying *verba sentiendi* vs. *verba dicendi* in Carter's magical realist fiction provides valuable insights into the portrayal of interiority and exteriority within her narratives. Quantifying verbal semantics enabled a thorough examination of interiority vs. exteriority and facilitated a holistic understanding of how speech and thought representations are employed in various contexts. To compare frequencies of related words and compile descriptive statistics data, a combination of computational tools "Voyant Tools" and R was used, which offered a quantitative validation of linguistic observations. The results concerning frequency distribution and interpretation of *verba sentiendi* vs. *verba dicendi* signify that Carter employs a deliberate and nuanced approach to both thought and speech representation.

The distinction observed in the researched verbs underscores a statistical preference for *verba sentiendi*. The moderate mean frequency of *verba sentiendi*, recorded at 191, indicates a predominant use of thought verbs, contributing to a vivid portrayal of the thoughts and intentions of characters, who are haunted by their past mistakes and often have to face terrible consequences. The median value of 83.5 shows variability in the use of specific thought verbs, facilitating an exact depiction of characters' cognition. With a high standard deviation of 206, there is considerable variability, introducing diversity in the portrayal of characters' thoughts and refining the interiority in magic realistic fiction.

In contrast, *verba dicendi* are less numerous and lack statistical significance, indicating that Carter does not employ them extensively to depict exteriority through the representation of characters' speech. The overall mean frequency of *verba dicendi*, standing at 95.33, suggests a measured use of speech verbs, aligning with the focus on characters' inner worlds, i.e., their mental state (interior). The low median of 18 does not suggest variability in the usage of specific *verba dicendi*, highlighting the selectivity in characters'

speech. The standard deviation of 175.65 implies a minimal level of variability, signifying a restrained application of *verba dicendi*.

In sum, Carter employs verbal semantics balancing exteriority vs. interiority depiction in her magical realist fiction. The higher frequency of *was* in *Senses and Perceptions* signifies a robust emphasis on portraying the external world and prevailing thought in thought representation. At the same time, the more restrained use of *could* in *Tentative* category suggests a selective presentation of characters' hidden speech and speculative elements. This subtle interaction and the blurred border between interiority and exteriority contribute to the richness and depth of Carter's narrative style, creating a captivating blend of magical realism and intricate character exploration. The combination of verbal semantics and descriptive statistics provides a robust methodological framework in applied linguistics. Insights derived from the quantitative analysis of *verba sentiendi* vs. *verba dicendi* can have practical applications in language teaching, natural language processing, and other applied linguistic domains.

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