Gender Bias and Emotion Reflected Upon The Use of Basic Colorterms: A case Study of Little Women and David Copperfield

Tianyi Zhang

School Of International Studies, Zhejiang University, China

ABSTRACT

This paper investigated gender bias and emotions reflected upon the use of basic color terms in Little Women and David Copperfield through corpus analysis. Eleven basic color terms (black, white, red, yellow, green, blue, brown, orange, pink, purple, and gray) and their collocations were extracted and analyzed. First, the frequencies of those terms were counted to display the pattern of color usage by female and male writers. Second, collocations of red, pink, and blue, the three stereotyping-biased colors were analyzed to illustrate the gender bias of color. Third, collocates of major basic color terms were analyzed to explore the emotion associations. Through AntConc, this study confirmed that first, female writer used more color terms in higher frequency; second, the color pink was especially biased toward femininity; and finally, certain color terms could denote emotions, like red for shyness and passion, blue for sadness, white for pure and black for terror.

Keywords: gender bias, emotion, color, bildungsroman, corpus analysis

INTRODUCTION

Basic color terms are monolexemic (single, noncompound words that lack modifying prefixes or suffixes) and are used principally about the colors of things, without constraint as to what thing is being described (Berlin et al., 1973). According to Berlin and Kay (1973), English has 11 basic color terms: black, white, red, yellow, green, blue, brown, orange, pink, purple, and gray. While color is indispensable in our lives, the use of color displays intriguing patterns, especially in terms of gender and emotion.

On the one hand, color terms are used differently by males and females. Gender-related differences in human color perception, color lexicon, and color preferences, have been widely reported (Fider & Komarova, 2019). Females had a richer color vocabulary and more color usage than males. Women used more color terms than men, and more elaborate terms to describe the color of the novel motif(Lindsey & Brown, 2014). Females had a much richer repertory of color words, including a great variety of monolexemic non-basic color terms and "fancy" color names(Simpson & Tarrant, 1991; Alzoubi et al., 2023). Apart from more frequent color usages, women could segment color space linguistically more densely in the "warm" area such as orange, yellow, and red whereas men do so in the "cool" area including blue and green(Mylonas et al., 2014; Briki & Hue, 2016).

Apart from usages, preferences of color are gender-specific. In Western societies, pink, blue, and red are three common yet prominent gendered colors. The stereotype prevails that pink is the feminine color for girls and blue is the masculine color for boys. Empirical studies by word embedding method (GloVe) and corpus analysis

confirmed that pink was biased towards femininity while no strong gender bias for blue and red(Jonauskaite et al., 2021). While in support of the first half of the story, other findings suggested more detailed gender bias in color preferences and color connotations. Pink was considered to be the color for girls/women and blue for boys/men (Cunningham & Macrae, 2011; Lobue & Deloache, 2011; Winskel et al., 2021). Red, on the contrary, represented being in power, dominant, and of high social status(Lindsey & Brown, 2014). While liked by women, red represents power, stereotypically a masculine characteristic.

On the other hand, certain color terms can denote certain types of emotions.According to the information theory,the use of color terms depends on communicative needs(Regier et al., 2015). Color terms contain more information to achieve better communication. Color term constructions have evolved from predictive descriptors (the sky is blue) to cover nominal (blue is beautiful--the sky is a beautiful blue), actional (the sky reddened), and adverbial functions (the sky went/turned/became/grew red) (Sandford, 2014). What we perceive leaves us with impressions and feelings of each color, giving color further emotional connotations. As a result, basic color terms may take on multiple meanings and positive or negative connotations depending on how they were conceived in the object/surrounding association(Wilms & Oberfeld, 2018).

Linguistic forms could deliver affective meanings revealing strong universal trends in the attribution of affect in the color domain(Adams & Osgood, 1973). In other words, color terms denote metaphorical meaning including emotion and association(Li, 2020).In English, each basic term had one or more conventionalized linguistic associations with an emotion that fit into the color construction (Sandford, 2014). Corpus analysis revealed that collocational patterns of color terms are associated with emotion categories (Steinvall, 2007). Such association is bi-directional where emotions wereabout color categories and vice versa. The emotion was heat when red denotes anger; the emotion was illness or humoral pathology when green denotes envy or yellow denotes disgust, and emotion was weather phenomenon when blue denotes joy (sky), yellow for happiness (sun), and black and grey for sadness (clouds) (Steinvall, 2007; Winskel et al., 2021). Such color-emotion pairs were observed in the corpus analysis of COHA: red was connected with anger-rage-embarrassment-excitement-passion partly because of the physical result of the visible redness of the face due to an increased flow of blood; blue was connected with an effect of sadness and depression since blue sky or blue see causes a sense of calmness; and black was associated with dark, desaturated, negative emotions, anger, exhaustion and boredom since it meant a lacking in color in physical environment(Sandford, 2014; Sutton & Altarriba, 2016; Wu et al., 2018). Apart from the perceivable environment, culture could entitle colors with specific connotations, especially black and white. Black perceptual input has been linked with negative affect as exemplified in death (Black Death), evil (i.e. black hens were used for Satanic rituals), famine, fear and the unknown (black holes), anger (black looks, black words) or sin (Mey, 2014). However, black was also related to some positive states like power, elegance, formality, grief, and mystery in different cultures (Molina Plaza, 2015). In contrast with black, white symbolized light, goodness, purity, righteousness, joy, and virginity in the two cultures (Molina Plaza, 2015). Babies are dressed in white at christenings and brides usually wear white dresses at weddings as a symbol of chastity and purity. White means free from moral blemish or impurity; unsullied "in shining white armor" in Western cultures.

While most of the research above focused on human color perception, color lexicon, and color preferences in either psychological experiments or large collections of texts in a generalized corpus, the investigation of color terms in representative literature works deserves further exploration. Novels are representative samples of corpus data. A novel is a complete body about a certain story. It contains theme, plot, and character that are depicted in a vivid way, where the use of basic color terms contributes a lot. Thus, languages in novels are ideal cases for color term analysis.

The corpus-based technique enables text researchers to show that patterns of co-occurrence among words intexts

are associated with different meanings and uses in communicative events(Sinclair & Carter, 2004). The corpus linguistic approach makes it possible to examine a whole long text and can shed light on some linguistic features and patterns that are unlikely to be found through careful reading or even through manual textual analysis. This study utilizes corpus techniques to investigate the use of color terms in novels. The frequency and collocation of basic color terms are investigated to figure out gender differences and emotion connotations of specific colors.

Given the universality of different colors and the gender bias and emotions carried by different colors, it is valuable to investigate how such patterns are illustrated in literary texts of similar genres by male and female authors as represented by David Copperfield written by Charles Dikens and Little Women written by Louisa May Alcott.

Two questions are proposed:

1. Whether the use of color terms reflect gender bias in novels of similar genre?
2. Whether color terms denote certain emotions?

METHOD

A) Material

Little Women and David Copperfield,two bildungsroman written in the 19th century, are selected to extract and analyze the color terms.

Little Women, first published in 1868, is a classic novel in 188,713 words written by American female author Louisa May Alcott. Drawing inspiration from her own life and her relationship with her three sisters, the novel follows the lives of four young girls named Meg, Jo, Beth, and Amy March, during the time of the American Civil War.

Through a series of vivid scenes and character portrayals, the novel portrays the March sisters' lives, their aspirations, friendships, loves, and the importance of family bonds. Each sister possesses a unique personality and dreams, yet their relationships are tightly woven with love and support. Little Women is beloved for its sincere emotions, vivid characterizations, and warm family atmosphere. Emphasizing the importance of family, friendship, and women's independence, the novel is considered a heartwarming and inspiring classic.

David Copperfield, first published as a serial between 1849 and 1850, is a classic novel in 356, 270 words written by English male author Charles Dickens. It is widely regarded as one of Dickens' greatest works and is often considered a semi-autobiographical account of his own life.

novel follows the life of David Copperfield from his childhood to adulthood, portraying his struggles, triumphs, and personal growth. David Copperfield is renowned for its richly drawn characters, intricate plot, and Dickens' signature social commentary. Through David's journey, the novel explores themes of love, friendship, resilience, and the resilience of the human spirit. It is considered a masterpiece of Victorian literature, offering profound insights into the human condition and society of the time.

Both the two novels fall into the category of bildungsroman. The two enjoy wide popularity and are abound in detailed descriptions, especially in terms of color terms. Since Little Women and David Copperfield are produced by female and male authors respectively, they are ideal cases to reflect gender differences and specific connotations in terms of color terms.

B) AntConc as Corpus Analysis Tool

AntConc 4.0 is a well-known program in corpus linguistics used to analyze linguistic data(Froehlich, 2015). It contains various tools to facilitate analysis. This study mainly utilizes the tools of Word List, Concordance, and Collocate in AntConc. Word List Tool provides the opportunity to perform statistical research by counting the total number of targeted color terms in the corpus and presenting them in a sorted list. The Collocate Tool enables the investigation of non-sequential patterns in language by displaying the frequency, range, likelihood, and effect of collocations. The Concordance Tool in KIWC (keyword in context) format provides searches and results to display basic information about the frequency of the search term and its distributions in texts. In sum, AntConc 4.0facilitates the study of color terms in the two novels to draw some good generalizations concerning the way certain color terms are used in the text.

C) Procedure

The first step was material preparation. Texts of Little Women and David Copperfield were downloaded from the Gutenberg Project, a free online platform that maintains an electronic library of public domain works.

The second step was text cleaning. Special marks like "_" and "}" and redundant information like book introduction and annotation were deleted. Only the main body of the two novels was maintained for analysis.

The third step was analysis. The cleaned texts were inputted into AntConc to extract related information on color terms. To facilitate further analysis, the frequency of each basic color term was calculated based on per 10,000 words. In this study, 11 basic color terms including black, white, red, yellow, green, blue, brown, orange, pink, purple, and gray were extracted and analyzed. Due to spelling differences where "grey" and "gray" denoted the same color in novels, the two did not distinguish each other in text extraction and analysis.

RESULTS AND DISCUSSION

A) Gender Bias in the Use of Basic Color Terms

To figure out whether the use of color terms shows gender-based differences in Little Women and David Copperfield, eleven basic color terms (black, white, red, yellow, green, blue, brown, orange, pink, purple, and gray) in English were extracted and counted by AntConc 4.0.

As shown in Table 1, token counts were starkly different. To make the frequency of basic color terms comparable, the number was standardized by dividing the frequency of color terms by token count. To make the number more prominent, the divided results were amplified by 100,000 to present the frequency of each color term per 100,000 words.

Table 1: provides descriptions for novels.

Title	Little Women	David Copperfield
Token Count	188,713	356,270
Writer	Louisa May Alcott	Charles Dickens
Gender	Female	Male

Year	1868	1849-1850
Genre	Bildungsroman	Bildungsroman

The frequency of basic color terms displayed interesting patterns. As presented in Table 2, Little Women had a total of 375 color terms which covered all 11 basic colors, while David Copperfield contained a total of 392 color terms in 10 basic terms: black, white, red, blue, yellow, green, brown, orange, pink and gray. In Little Women, the color term blue had the highest standardized frequency of 34.97, followed by red at 25.97, white at 33.38, black at 23.85, brown at 23.32, green at 15.90, grey at 15.37, yellow at 10.07, pink in 6.89, purple in 5.30, and orange in 3.71. In David Copperfield, the color term red had the highest standardized frequency of 23.30, followed by black at 22.45, white and blue both at 14.88, grey at 12.63, green at 10.67, brown at 7.86, yellow at 1.68, pink at 1.40, and orange in 0.28.

Table 2: presents the frequency of basic color terms.

Color	Little Women Standardized Frequency	David Copperfield Standardized Frequency
Black	24	22
White*	33.38	14.88
Red	25.97	23.3
Blue*	34.97	14.88
Yellow*	10.07	1.68
Green*	15.9	10.67
Brown*	23.32	7.86
Orange*	3.71	0.28
Pink*	6.89	1.4
Purple*	5.3	0
Gray/Grey	15.37	12.63
Total	198.71	110
4o		

On the one hand, though most of the frequency of basic color terms in the text of David Copperfield outweighed that of Little Women, there was a different story when it came to the standardized frequency. Little Women by Louisa May Alcott, the female writer, contained more use of all 11 basic color terms: black, white, red, blue, yellow, green, brown, orange, pink, purple, and grey. Among those color terms, the standardized frequencies of the color terms black, red, and grey were rather similar in David Copperfield written by male writerCharles Dickens, and Little Women written by female writer Louisa May Alcott. However, the use of white, blue, yellow, green, brown, orange, pink, purple, and gray were two or even more times higher in Little Women compared with

that in David Copperfield.

On the other hand, the top four most frequently used basic color terms were black, white, red, and blue for both Little Women and David Copperfield. Though the standardized frequency of color terms for the female writer was higher than that of male writer, the two novels showed similar preference for colors. In Little Women, white, black, red, and blue in total appeared 223 times, occupying 59.47% of the total color term usage. In David Copperfield, white, black, red, and blue in total appeared 269 times, taking place 68.62% of the total color term usages. The four terms were remarkably high in terms of frequency. The color that was most unlikely to be used was orange, which rang true for Little Women and David Copperfield. Besides, the color term purple had only 5.30 standardized frequency of occurrence in Little Women, the second least-likely-to-be-used color. When it came to David Copperfield, the color term purple did not show up at all. Pink was also among the low-using rank, with6.89 standardized frequency in Little Womenand 1.40 standardized frequency in David Copperfield.

The use of basic color terms in Little Women and David Copperfield reflected a gender bias of color used by female and male authors, which served as evidence that females have more color usage than males and which conformed to previous findings (Lindsey & Brown, 2014; Fider & Komarova, 2019).

The standardized frequency of color terms in Little Women was 198.21, almost as twice the 110 frequency in David Copperfield. Besides, Little Women contained all basic color terms, while David Copperfield contained only 10 terms excluding the color purple. Color terms that had less than 10 standardized frequencies like orange, pink, and purple were considered minority colors. However, even for those color terms, the frequency was unproportionally higher than that in David Copperfield. For example, pink in Little Women had a frequency of 6.89, which was almost 5 times to that in David Copperfield; the color orange served as a more extreme case, the 3.71 in Little Women was more than ten times to that of David Copperfield. For the major color terms that took a lion's share like black, white, red and blue, the 33.38 for white and the 34.97 for blue in Little Women were two times higher than the 14.88 for white and the 14.88 for blue in David Copperfield respectively.

Both Little Women and David Copperfield were masterpieces of the time. The two were all renowned for the richly drawn characters and vivid plot constructions when exploring love, friendship, and resilience. In other words, both Louisa May Alcott and Charles Dikens were skillful in language usage to deliver impressive scenes. Color terms in languages are indispensable to make the scene complete yet impressive and thus provide insights to human beings. However, for all basic color terms, there exists a stark contrast between female and male writers as represented by Louisa May Alcott and Charles Dickens. Results of basic color term usage in the two novels proved a gender preference for color terms, where the female writer has a richer color vocabulary and more frequent color usage.

Such observed gender differences in color term usage could be explained in terms of social and behavioral aspects. Froma social perspective, the divergent patterns of socialization for males and females that instill a greater awareness of color among women lead to male-female differences in the size of color vocabulary (Bimler et al., 2004).The evolutionarily different roles of females and males in society also affect color perception and preference. Females were gatherers and males were hunters meant that that females needed better discrimination to detect reddish fruits against greenish foliage (Hurlbert & Ling, 2007). In such circumstances, females were more capable of detecting and describing colors, leading to more color usage.Furthermore, more color usage and gender bias in color terms could also be attributed to differential socialization for women and men, including different clothing, hobbies, and occupations. Females prefer more colorful clothes and decorations, which also enhance their preference for using more color terms. All these added up to the gender bias in color terms reflected through literature works.

B) The Red, Blue and Pink for "He" and "She"

Red, pink, and blue were the colors that were most vulnerable to gender stereotyping. KWIC showed how specific color terms were used to describe certain genders.

In Little Women, the color red was used to describe both male and female as presented in Figure 1. For example, Laurie as a male character was portrayed as "Laurie spoke very fast and turned very red and excited all in a minute". Here, red was used to vividly present the outlooking of "he". Amy, Jo, and Beth, three female characters, also "turned red". For example, in "Beth suddenly turned very red, and hide her face in a sofa-cushion", the term "red" describes Beth's shyness. Apart from directly denoting the gender, the color red was also attached to the clothes or decorations that specific character wear or use that did not distinguish gender. For example, the "red ribbon" was used by both Laurie and Meg, the male and female character respectively.

The color blue was used mostly to describe female or daily necessities of female characters as shown in Figure 2. For example, in "Annie Moffat has blue and pink bows on her night-caps", the color blue denotes the appearance; and in "I've got a sweet blue silk laid away", the blue represents the color of decoration of Jo, the female character. Interestingly, though the overwhelming yet unexpected use of blue could be that the novel's exclusive focus on four female characters, the actions of certain characters reflect gendered bias in using color. In "Amy put a blue ribbon on the boy and a pink on the girl, French fashion…", the female character, as portrayed by a female writer, displayed a socially entrenched gender bias that blue is for boys and pink is for girls. However, in other cases like "blue apron with pockets", "blue ribbon", etc., the use of blue is exclusively for female characters.

The color pink was used to describe female characters or their decorations or cloth as displayed in Figure 3. For example, in "Annie Moffat has blue and pink bows on her night-caps" and "…looking as fresh and sweet as a rose, in her pink dress, among the green", the color pink was used to represent the looks of decoration and dressing. And the "pink turban", "pink silk" and "pink rose" were all related to the description of female characters.

In David Copperfield, the use of red did not distinguish gender, though in most cases it was referred to the features of male characters. For example, in Figure 4, there were many descriptions of "Red Whisker", who was the male character, and typically descriptions of David himself like in "…and affirmed that he was then as red as I was" and "You were hot and cold, and red and white…". Several "reds" were attributed to female characters like in "the clear red and white of her complexion was not so blooming", which denoted the color of the female's skin.

Thecolor blue decorated both female and male characters as presented in Figure 5. In most cases, it was used to describe the color of eyes like "I saw the sweet blue eyes of little Em'ly peeping after us", or to describe the color of bags, ribbons, and coats used by both genders like in "…Mrs. Steerforth's little parlor-maid, who had formerly worn blue ribbons in her cap" and in "Mr. Heep uncomfortably clutching the blue bag he carried…". The color blue was not biased towards masculinity.

As demonstrated in Figure6, the color pink, however, was used to denote female implicitly only once in "She admires a flower (pink camellia japonica, price half-a-crown)", where the color preference of a female character was pink.

The results of Little Women and David Copperfield confirmed an absolute gender bias for the color pink, which was consistent with previous findings that pink was a typically feminine color(Cunningham & Macrae, 2011;

Lobue & Deloache, 2011; Jonauskaite et al., 2021; Alzoubi et al., 2023). There was a partial gender bias for blue in Little Women but no such bias in David Copperfield. The color red showed no feminine or masculine preference, which was also consistent with the findings of Jonauskaite et al (2019).

	File	Left Context	Hit	Right Context
1	70littlew...	glad I did it?" Laurie spoke very fast, and turned	red	and excited all in a minute, for he had
2	70littlew...	Was he nice?" "Oh, very! His hair is auburn, not	red;	and he was very polite, and I had a
3	70littlew...	in his merry black eyes, that Beth suddenly turned very	red,	and hid her face in the sofa-cushion, quite
4	70littlew...	he said, taking his face out of the sofa-cushion,	red	and shining with merriment. Much elated with her success,
5	70littlew...	mother could be saying to make the girl look so	red	and uncomfortable. She was still redder and more uncomfortable
6	70littlew...	Punch, for there were fat dowagers rolling about in their	red	and yellow coaches, with gorgeous Jeameses in silk stockings
7	70littlew...	I am too stupid to learn,' I blundered out, as	red	as a peony. "'Prut! we will make the time,
8	70littlew...	she said 'John,' as you do, and then turned as	red	as a poppy. Whatever shall we do?" said Jo,
9	70littlew...	it's mine," murmured Amy, with a face nearly as	red	as her fish. [Illustration: Please don't, it's
10	70littlew...	the bundles?" "Yes, thank you." Jo's cheeks were as	red	as her ribbon, and she wondered what he thought
11	70littlew...	and ice-cream and high-heeled slippers and posies and	red-	headed boys to dance with." "How ridiculous you are,
12	70littlew...	up at the thought. "I saw you dancing with the	red-	headed man I ran away from. Was he nice?" "
13	70littlew...	the pain their wearer suffered smilingly. Jo saw a big	red-	headed youth approaching her corner, and fearing he meant
14	70littlew...	Beth sitting on the medicine chest, looking very grave, with	red	eyes, and a camphor-bottle in her hand. "Christopher
15	70littlew...	it." "Suppose you haven't?" said Jo, sewing away, with	red	eyes, at the new collars which were to be
16	70littlew...	and she used to lie there on Beth's little	red	pillow, planning stories, dreaming dreams, or thinking tender thoughts
17	70littlew...	as he said that, and Laurie gently smoothed the little	red	pillow, which he remembered well. "Why didn't you
18	70littlew...	little balloons; then she tied it up with a smart	red	ribbon, and sat a minute looking at it with
19	70littlew...	of yourself," remonstrated Meg, as Jo tied down, with a	red	ribbon, the broad-brimmed, old-fashioned Leghorn Laurie had
20	70littlew...	won't last long if you keep going." Laurie turned	red	again, but wasn't offended at being accused of

Fig.1: Red in Little Women

	File	Left Context	Hit	Right Context
1	70littlew...	find their little books also,--one dove-colored, the other	blue;	and all sat looking at and talking about them,
2	70littlew...	and think. Framed in a brilliant scroll-work of scarlet,	blue,	and gold, with little spirits of good-will helping
3	70littlew...	of father's dear old face, I felt a trifle	blue,	and might have shed a briny drop or two,
4	70littlew...	a refreshing peep at her glove-box. "Annie Moffat has	blue	and pink bows on her night-caps; would you
5	70littlew...	and behind the white curtain appeared Zara in a lovely	blue	and silver dress, waiting for Roderigo. He came in
6	70littlew...	bed which was the dress-circle, and sat before the	blue	and yellow chintz curtains in a most flattering state
7	70littlew...	knit, like a poky old woman!" And Jo shook the	blue	army-sock till the needles rattled like castanets, and
8	70littlew...	Beth said nothing, but wiped away her tears with the	blue	army-sock, and began to knit with all her
9	70littlew...	Meg had not rebelled. They laced her into a sky-	blue	dress, which was so tight she could hardly breathe,
10	70littlew...	same morning, a little girl, in a brown hat and	blue	dress, with a round face and snub nose, went
11	70littlew...	s given you her piano. That comes of having big	blue	eyes and loving music," said Jo, trying to soothe
12	70littlew...	French fashion, so you can always tell. Besides, one has	blue	eyes and one brown. Kiss them, Uncle Teddy," said
13	70littlew...	it, and consoled herself with her wonderfully fair complexion, keen	blue	eyes, and curls, more golden and abundant than ever.
14	70littlew...	her own opinion at least. A regular snow-maiden, with	blue	eyes, and yellow hair, curling on her shoulders, pale
15	70littlew...	a well-sweep to examine the prodigies. "Amy put a	blue	ribbon on the boy and a pink on the
16	70littlew...	Jo bore up very well till the last flutter of	blue	ribbon vanished, when she retired to her refuge, the
17	70littlew...	her pretty white shoulders, and a pair of high-heeled	blue	silk boots satisfied the last wish of her heart.
18	70littlew...	you had a dozen, for I've got a sweet	blue	silk laid away, which I've outgrown, and you
19	70littlew...	on either side, a dead silence reigned, the lamp burned	blue,	and the ghostly figure ever and anon turned its
20	70littlew...	likes with. "To my mother, all my clothes, except the	blue	apron with pockets,--also my likeness, and my medal,

Fig.2: Blue in Little Women

	File	Left Context	Hit	Right Context
1	70littlew...	plenty. There was ice-cream,--actually two dishes of it,	pink	and white,--and cake and fruit and distracting French
2	70littlew...	peep at her glove-box. "Annie Moffat has blue and	pink	bows on her night-caps; would you put some
3	70littlew...	she starched 'em afore they was wrenched, and blued a	pink	calico dress till I thought I should a died
4	70littlew...	looking as fresh and sweet as a rose, in her	pink	dress, among the green. Beth was sorting the cones
5	70littlew...	is the trial of my life," she continued, removing the	pink	mountain from her head, while Laurie seated himself astride
6	70littlew...	Amy put a blue ribbon on the boy and a	pink	on the girl, French fashion, so you can always
7	70littlew...	and a Christmas carol issuing from her lips, on a	pink	paper streamer:-- "THE JUNGFRAU TO BETH. "God bless you,
8	70littlew...	agreeable. Do your hair the pretty way, and put the	pink	rose in your bonnet; it's becoming, and you
9	70littlew...	of flowers, and every fountain reflected crimson, white, or pale	pink	roses, leaning down to smile at their own beauty.
10	70littlew...	with a dashing Frenchwoman, who carpeted the floor with her	pink	satin train. The Serene Teuton found the supper-table,
11	70littlew...	you, ma'am," replied Sallie. "I've got my new	pink	silk for Thursday, and don't want a thing." "
12	70littlew...	rings, for Hortense tied them on, with a bit of	pink	silk, which did not show. A cluster of tea-
13	70littlew...	and tossing her head, on which she wore a great	pink	turban, contrasting oddly with her blue brocade dress and

Fig.3: Pink in Little Women

	File	Left Context	Hit	Right Context
1	David ...	when the party broke up, and the other people, defeated	Red	Whisker and all, went their several ways, and we
2	David ...	me against this man, and one of us must fall.	Red	Whisker made his salad (I wondered how they could
3	David ...	unpacked our baskets, and employed ourselves in getting dinner ready.	Red	Whisker pretended he could make a salad (which I
4	David ...	told him nobody knew where it was, but I. So	Red	Whisker was done for in a moment; and I
5	David ...	So we went back, and they wanted Dora to sing.	Red	Whisker would have got the guitar-case out of
6	David ...	tea-chests, or the golden characters on all the great	red	and green bottles in the chemists' shops! There was
7	David ...	furnished room, with a piano and some lively furniture in	red	and green, and some flowers. It seemed to be
8	David ...	looking at me with an affection that made his eyes	red,	and his hair all kinds of shapes, 'I don'
9	David ...	old admiration of her. You were hot and cold, and	red	and white, all at once when I spoke to
10	David ...	yourself in love! Do you?' 'Fancy, aunt!' I exclaimed, as	red	as I could be. 'I adore her with my
11	David ...	a red spot upon it; but it was not so	red	as I turned, when I met that sinister expression
12	David ...	after his release, and affirmed that he was then as	red	as I was. The mild Mr. Chillip could not
13	David ...	me, I should slap his face.' Her own was as	red	as ever I saw it, or any other face,
14	David ...	fallen leaves, and many more, in beautiful tints of yellow,	red,	and brown, yet hung upon the trees, through which
15	David ...	floor, and saw my face in the glass, so swollen,	red,	and ugly that it almost frightened me. My stripes
16	David ...	was leaning over her to turn the leaves. The clear	red	and white of her complexion was not so blooming
17	David ...	But going on, too, working pretty hard, and busily keeping	red-	hot all the irons I now had in the
18	David ...	thus, looking at the fire, and seeing pictures in the	red-	hot coals, I almost believed that I had never
19	David ...	I believe I had a delirious idea of seizing the	red-	hot poker out of the fire, and running him
20	David ...	beauty, I considered her a perfect example. There was a	red	velvet footstool in the best parlour, on which my

Fig.4: Red in David Copperfield

	File	Left Context	Hit	Right Context
1	David ...	sofa, with his rough cap in his hand, and the	blue	eyes of my child-wife raised, with a timid
2	David ...	I sit in the quiet, shaded, orderly room, with the	blue	eyes of my child-wife turned towards me, and
3	David ...	as they could upon our road, I saw the sweet	blue	eyes of little Em'ly peeping after us, from
4	David ...	But generally, when I raised my head, I saw her	blue	eyes looking at me with the quiet attention of
5	David ...	grown. But when she drew nearer, and I saw her	blue	eyes looking bluer, and her dimpled face looking brighter,
6	David ...	my shoulder, and her chin rested on them, and her	blue	eyes looked quietly into mine. 'Why so?' I asked. '
7	David ...	the arm I twined about her may have brought her	blue	eyes nearer to me: 'I don't mean, you
8	David ...	table, listening with the deepest attention, her breath held, her	blue	eyes sparkling like jewels, and the colour mantling in
9	David ...	turnpike, presents a dazzling combination of cream colour and light	blue;	and both he and Mr. Dick have a general
10	David ...	one view. Abraham in red going to sacrifice Isaac in	blue,	and Daniel in yellow cast into a den of
11	David ...	about them coasts where the sea got to be dark	blue,	and to lay a-shining and a-shining in
12	David ...	go and strain points with a little bit of a	blue-	eyed blossom, like her?' 'Not at all, I am
13	David ...	change was being wrought at home. I thought of the	blue-	eyed child who had enchanted me. I thought of
14	David ...	I am sure my fancy raised up something round that	blue-	eyed mite of a child, which etherealized, and made
15	David ...	Mrs. Steerforth's little parlour-maid, who had formerly worn	blue	ribbons in her cap. She had taken them out
16	David ...	we were attended by a modest little parlour-maid, with	blue	ribbons in her cap, whose eye it was much
17	David ...	to hide her blushes. As to the straw hat and	blue	ribbons which was on the top of the curls,
18	David ...	to him with extraordinary curtness, Mr. Heep, uncomfortably clutching the	blue	bag he carried, replied that he was pretty well,
19	David ...	or write at of an evening; there was Uriah's	blue	bag lying down and vomiting papers; there was a
20	David ...	and quiet mourning; but Mr. Barkis bloomed in a new	blue	coat, of which the tailor had given him such

Fig.5: Blue in David Copperfield

	File	Left Context	Hit	Right Context
1	David ...	hollow merriment. I attached myself to a young creature in	pink,	with little eyes, and flirted with her desperately. She
2	David ...	I should observe, was the name of the creature in	pink,	with the little eyes. 'Though certainly I don't
3	David ...	little room, resting on a sofa. She admires a flower (	pink	camellia japonica, price half-a-crown), in my button-
4	David ...	with a view of St. Paul's Cathedral (with a	pink	dome) painted on the top; at the brass thimble
5	David ...	Red Whisker, and I was adamant. The young creature in	pink	had a mother in green; and I rather think

Fig.6: Pink in David Copperfield

C) Collocations of Color Terms

The top four most frequently used colors and the color with possible gender bias were selected to investigate their collocation patterns. The window span of the Collocate tool was set from 2L to 5R, and the top 8 collocates of black, white, blue, red, and pink in Little Women and were David Copperfield presented in Table 3 and Table 4 respectively.

The collocates of the five basic color terms could be generally classified into human organs, daily necessities

(cloth, cups, decorations, foods, and drinks), adjectives, actions, and other objects (nature, architecture, means of transportation, etc.). The collocate patterns in Little Women and David Copperfieldshare both similarities and differences.

In Little Women, the color term black was more often collocated with human organs to describe appearances, like "black eyes", "black skin", "black brows", "black pinafore" and "black head", while it could also collocate with daily necessities as demonstrated in "black velvet" and "black ribbon". The color term white, however, presented a different story. In most cases, white was linked to objects and adjectives as shown in "white-winged", "white-pressed", "cloudy white", "delicate white", "white wines", and "white roses". Blue was collocated with both objects, adjectives, and human organs as exemplified in "blue sky", "blue dress", "blue brown", "blue sock", "blue blonde" and "blue eyes". The color term red had collocations in objects, daily necessities, actions, and adjectives like "red ribbon", "red jackets", "gorgeous red", "turned red" and "red-headed". The color pink, though its standardized frequency was relatively lower than the former, also displayed a special preference for collocation in daily necessities and adjectives as in "pink silk", "pink calico", "pink teuton" and "oddly pink"

Table 3: presents the collocates of the words 'black,' 'white,' 'blue,' 'red,' and 'pink' as they appear in the text of Little Women.

Color	1	2	3	4	5	6	7	8
Black	eyes	skin	brows	pinafore	velvet	ribbon	head	
White	figure	pressed	delicate	cloudy	winged	shoulders	vines	roses
Blue	sky	dress	gold	brown	yellow	eyes	sock	blonde
Red	ribbon	headed	gorgeous	with	turned	jackets	open	
Pink	silk	turban	oddly	streamer	teuton	dress	bows	calico

Table 4: shows the collocates of the words "black," "white," "blue," "red," and "pink" in David Copperfield.

Color	1	2	3	4	5	6	7	8
Black	velvet	breeches	white	suit	eyes	rusty	crape	jet
White	apron	trousers	black	red	thin	cloth		
Blue	eyes	ribbons	boar	eyed	mug	bag	sky	coat
Red	whisker	hot	tape	eyes	velvet	suns	haired	brick
Pink	creature	dome	camellia	japonica	flirted	eyes	painted	price

In David Copperfield, the color term black was more often collocated with daily necessities to describe the visual environment, like "black velvet", "black suit", "black crape" and "black jet", while it could also collocate with human organs as demonstrated in "black eyes" and "black breeches".

The color term white, however, also presented a different story. In most cases, white was linked to objects as

shown in "white apron", "white trousers", "white cloth", and in adjectives like "white-red" and "red-black". The color term blue did not show special preferences of types. Blue was collocated with both objects, adjectives, and human organs as exemplified in "blue eyes", "blue ribbons", "blue-eyed", "blue mug", "blue bag" and "blue sky". The color term red had mixed collocations in objects, daily necessities, human organs, and adjectives like "red whisker", "red-hot", "red tape", "red brick", "red eyes" and "red suns".

The color pink, though its standardized frequency was relatively lower than the former, also displayed a mixed preference in collocation in daily necessities, human organs, and adjectives such as "pink creature", "pink dome", "pink camellia", "pink japonica and "pink price".

The collocates of different color terms in Little WomenandDavid Copperfield presented similar yet different patterns. A detailed look at specific collocations revealed that almost all these five colors were used to refer to body organs especially eyes in David Copperfield, and white was more likely to be associated with cloth. In Little Women, only black and blue were used to describe eyes, and blue, red, pink, and white were more often used to decorate objects.

D) Color and Emotion

Major color terms were extracted by the KWIC tool to show the context in 15 tokens, and two typical cases that were representative of the emotion denoted by colors were listed as shown in Table 5 and Table 6. In the selected examples, black, white, red, and blue denoted certain emotions in both Little Women and David Copperfield.

The color black was used in a context to denote negative emotions like horror, solemnity, and tension. For example, in "Stand motionless, staring, with a terror-stricken face, at the little blue hood above the black water" in Little Women, the black water pictured a terrifying physical environment that lacked any color, which set the mood of terror since black was typically associated with mystery and emptiness.

The color white, in contrast with black, could illicit a feeling of favorable pureness and gentleness. For example, in "Aren't you ashamed of a hand like that? It's as soft and white as a woman's, and looks as if it never did anything but wear…", white was used as a typical feature of a beauty's hand. Though the whole sentence in context was ridicule, at least it recognized the admirable quality of beauty's hand of being white. Such connotation was deeply embedded in culture, where white was typically a symbol of fragility and purity.

The color red was more often used metaphorically to represent the shyness, excitement, and passion of certain characters. For example, in "a chair when I was left alone, and looked into the glass to see how red my eyes were, and how sorrowful my face.", the color term red vividly depicts the status of the character in remorse. The use of red represented the excitement of the target due to deep sorrow, which was reflected in the physical result of redness in the eye.

The color blue was used to denote calmness or sadness. For example, in "My patience, how blue we are! cried Jo", the term blue was used metaphorically to mean sadness; and in "Mr. Peggotty, looking at the fire, kiender worn; soft, sorrowful, blue eyes; a delicate face…", blue eyes emphasized the attractiveness and mystery of the appearance. In sum, the use of color terms effectively elicits certain feelings or amplifies the emotion that the writer intended to express.

However, not all the color terms were designated to directly denote emotions. In many cases, such terms just

served as minor background for a plot to happen. In such circumstances, color terms meant the details, which to some extent could also help facilitate the expression of emotion and ideas. To sum up, color terms can denote emotions, and their effect was consistent with previous findings that black induced solemnity, mystery, and fear, white symbolized pureness and goodness, red meant excitement, anger, and embarrassment, and blue stood for sadness and calmness (Sandford, 2014; Molina Plaza, 2015)

Table 5: showcasing various cases where emotions are denoted by color terms in the novel Little Women

Color	KWIC (Key Word In Context)
Black	"stand motionless, staring, with a terror-stricken face, at the little blue hood above the black water. Something rushed swiftly by her, and Laurie's voice cried out --" Bring a"
	"were too hot, and so I've made a mess," groaned poor Jo, regarding the black pancakes with tears of regret. "It isn't spoilt; just frizzle it, and tie"
White	"blood -- "A tall figure, all in white with a veil over its face and a lamp in its wasted hand," went"
	"Soberly-- "Aren't you ashamed of a hand like that? It's as soft and white as a woman's, and looks as if it never did anything but wear"
Blue	"and very little fun. We might as well be in a treadmill." "My patience, how blue we are!" cried Jo. "I don't much wonder, poor dear, for you see"
	"Meg put in new ones, but the full front came wrong and they are more blue than the dress. I felt bad but did not fret I bear my troubles"
Red	"all right. Aren't you glad I did it?" Laurie spoke very fast, and turned red and excited all in a minute, for he had kept his plot a secret,"
	"upon Amy, wondering what his mother could be saying to make the girl look so red and uncomfortable. She was still redder and more uncomfortable a moment after, when a"

Table 6: The table lists cases for emotions denoted by color terms in David Copperfield.

Color	KWIC (Key Word in Context)
Black	The earthy smell and sunless air, along with the black and white arched galleries and aisles, evoke memories, while Mrs. Waterbrook introduces me to a somber lady in a black velvet dress and hat, reminiscent of Hamlet's aunt.
White	"It last, Annie?" said her mother. I wondered how I could have thought she looked white, or anything but burning red, when she answered that she had had it safe. Jewellers' shops; and I show Sophy which of the diamond-eyed serpents, coiled up on white satin rising grounds, I would give her if I could afford it; and Sophy
Blue	"So. A slight figure," said Mr. Peggotty, looking at the fire, "kiender worn; soft, sorrowful, blue eyes; a delicate face; a pritty head, leaning a little down; a quiet voice." Deal about the sea, and about them coasts

	where the sea got to be dark blue, and to lay a-shining and a-shining in the sun. I thowt, odd
Red	"When they were gone, and looking at me with an affection that made his eyes red, and his hair all kinds of shapes," I don't make any excuse for a chair when I was left alone, and looked into the glass to see how red my eyes were, and how sorrowful my face. I considered after some hours were

CONCLUSION

This study investigated the use of color terms in Little Women and David Copperfield, which were typical works of female and male writers respectively through corpus analysis.

This study confirmed that basic color terms used in novels had a gender bias. On the one hand, female writers used more color terms in higher frequency, as exemplified in the more frequent use of black, white, red, blue, yellow, green, brown, orange, pink, purple, and grey. On the other hand, specific colors were biased toward feminity. Pink was exclusively used to describe females and thus conveyed gender-biased information in the two novels, and blue was partially biased in Little Women. Besides, this study also confirmed that certain color terms could denote emotions. Red was linked to positive emotions like shyness and passion as well as negative emotions like anger; blue was linked to typically negative emotions of sadness; white was linked to positive connotations of pure, and black, in contrast with white, represented negative emotions of terror and emptiness.

There were several imitations. This study took Little Women by Louisa May Alcottand David Copperfieldby Charles Dickens as cases to investigate the pattern of basic color terms. Though several gender biases indeed occurred, further investigation could be done by involving more literary works to produce more precise results. Besides, the analysis of gender bias and denoted emotions only focused on specific color terms. More analysis could be done by including all terms. Third, basic color terms were far enough to cover all colors. A more thorough investigation could be conducted to include more detailed types of colors like the scarlet in the red domain.

REFERENCES

1. Adams, F. M., & Osgood, C. E. (1973). A cross-cultural study of the affective meanings of color. Journal of Cross-Cultural Psychology, 4(2), 135–156. https://doi.org/10.1177/002202217300400201
2. Alzoubi, A., Hamouri, H., Al-Kadi, T., & Hamdan, A. (2023). The Effect of Gender, Urban/Rural Background, and Profession on Patterns of Use of Color Terms in Jordan. Languages, 8(2), Article 2. https://doi.org/10.3390/languages8020097
3. Berlin, B., Kay, P., & Collier, G. A. (1973). Basic Color Terms: Their Universality and Evolution. Language, 49(1), 245. https://doi.org/10.2307/412128
4. Bimler, D. L., Kirkland, J., & Jameson, K. A. (2004). Quantifying variations in personal color spaces: Are there sex differences in color vision? Color Research & Application, 29(2), 128–134. https://doi.org/10.1002/col.10232
5. Briki, W., & Hue, O. (2016). How Red, Blue, and Green are Affectively Judged. Applied Cognitive Psychology, 30(2), 301–304. https://doi.org/10.1002/acp.3206
6. Cunningham, S. J., & Macrae, C. N. (2011). The colour of gender stereotyping. British Journal of Psychology (London, England: 1953), 102(3), 598–614.

https://doi.org/10.1111/j.2044-8295.2011.02023.x

7. Fider, N. A., & Komarova, N. L. (2019). Differences in color categorization manifested by males and females: A quantitative World Color Survey study. Palgrave Communications, 5(1), Article 1. https://doi.org/10.1057/s41599-019-0341-7

8. Froehlich, H. (2015). Corpus Analysis with Antconc. The Programming Historian. https://doi.org/10.46430/phen0043

9. Hurlbert, A. C., & Ling, Y. (2007). Biological components of sex differences in color preference. Current Biology, 17(16), R623–R625. https://doi.org/10.1016/j.cub.2007.06.022

10. Jonauskaite, D., Sutton, A., Cristianini, N., & Mohr, C. (2021). English colour terms carry gender and valence biases: A corpus study using word embeddings. PLOS ONE, 16(6), e0251559. https://doi.org/10.1371/journal.pone.0251559

11. Li, T. (2020). The Metaphorical Expressions of Basic Color Words in English and Chinese. English Language Teaching, 13, 84. https://doi.org/10.5539/elt.v13n3p84

12. Lindsey, D. T., & Brown, A. M. (2014). The color lexicon of American English. Journal of Vision, 14(2), 17. https://doi.org/10.1167/14.2.17

13. Lobue, V., &Deloache, J. S. (2011). Pretty in pink: The early development of gender-stereotyped colour preferences. The British Journal of Developmental Psychology, 29(Pt 3), 656–667. https://doi.org/10.1111/j.2044-835X.2011.02027.x

14. Mey, J. L. (2014). Horace, Colors, and Pragmatics. In J. Romero-Trillo (Ed.), Yearbook of Corpus Linguistics and Pragmatics 2014: New Empirical and Theoretical Paradigms (pp. 99–121). Springer International Publishing. https://doi.org/10.1007/978-3-319-06007-1_6

15. Molina Plaza, S. (2015). Black and White Metaphors and Metonymies in English and Spanish: A Cross-Cultural and Corpus Comparison. In J. Romero-Trillo (Ed.), Yearbook of Corpus Linguistics and Pragmatics 2015: Current Approaches to Discourse and Translation Studies (pp. 39–63). Springer International Publishing. https://doi.org/10.1007/978-3-319-17948-3_3

16. Mylonas, D., Paramei, G. V., & MacDonald, L. (2014). Gender differences in colour naming (W. Anderson, C. P. Biggam, C. Hough, & C. Kay, Eds.; pp. 225–239). John Benjamins Publishing Company. https://doi.org/10.1075/z.191.15myl

17. Regier, T., Kemp, C., & Kay, P. (2015). Word Meanings across Languages Support Efficient Communication. In The Handbook of Language Emergence (pp. 237–263). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118346136.ch11

18. Sandford, J. (2014). Turn a colour with emotion: A linguistic construction of colour in English. JAIC - Journal of the International Colour Association. https://www.semanticscholar.org/paper/Turn-a-colour-with-emotion%3A-a-linguistic-of-colour-Sandford/427414dce4f8d71169e4dcfe6d91448eb6a5787e

19. Simpson, J., & Tarrant, A. W. (1991). Sex- and age-related differences in colour vocabulary. Language and Speech, 34 (Pt 1), 57–62. https://doi.org/10.1177/002383099103400104

20. Sinclair, J., & Carter, R. (2004, July 31). Trust the Text: Language, Corpus and Discourse. https://www.semanticscholar.org/paper/Trust-the-Text%3A-Language%2C-Corpus-and-Discourse-Sinclair-Carter/ddd6ce07324654b723fb7a95867689a647f737b7

21. Steinvall, A. (2007). Color and emotions in English (pp. 347–362). https://doi.org/10.1075/z.137.23ste

22. Sutton, T. M., &Altarriba, J. (2016). Color associations to emotion and emotion-laden words: A collection of norms for stimulus construction and selection. Behavior Research Methods, 48(2), 686–728. https://doi.org/10.3758/s13428-015-0598-8

23. Wilms, L., & Oberfeld, D. (2018). Color and emotion: Effects of hue, saturation, and brightness. Psychological Research, 82(5), 896–914. https://doi.org/10.1007/s00426-017-0880-8

24. Winskel, H., Forrester, D., Hong, M., & O'Connor, K. (2021). Seeing red as anger or romance: An emotion categorisation task. Journal of Cognitive Psychology, 33(5), 581–594. https://doi.org/10.1080/20445911.2021.1936538

25. Wu, Y., Lu, J., van Dijk, E., Li, H., & Schnall, S. (2018). The Color Red Is Implicitly Associated With Social Status in the United Kingdom and China. Frontiers in Psychology, 9, 1902. https://doi.org/10.3389/fpsyg.2018.01902