

Memory Study in *The Danish Girl* (2000) by David Ebershoff Through Voyant Text Mining Tools: A Digital Humanities (DH) Study

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Abstract

In this digital era, the world has revolutionised its ways of extracting knowledge patterns based on diverse and large texts using a digital humanities (DH) approach and a range of digital text mining tools available to deconstruct and visualise literary texts. This paper attempts to explore the characters of the novel, 'The Danish Girl' by David Ebershoff, through the study of their individual or collective memories through Voyant, a text-mining digital tool for textual analysis. Analysis revealed knowledge patterns on memory in the text through the Voyant text mining tool, which recognizes repeating words and phrases and provides insights into the author's language choices and how they relate to memory studies. It provided textual analysis and allowed data visualisation, collocations, and quantitative and qualitative analysis of the text. The study unveils the summary tool features of the overall corpus, cirrus, unique words, dense words, themes, and phrase tools using a digital humanities approach to text mining, underscoring the significance of digital tools in advancing our understanding of literature and memory.

Keywords: Memory, Voyant Text-Mining Tool, The Danish Girl, Digital Humanities

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INTRODUCTION

Text mining is one of the key domains of digital humanities (DH), an intersection of humanities and digital tools to reveal digital knowledge analysis and patterns. Through data visualisation, text analytics unveils unknown interactive knowledge patterns. Insightful thoughts and deep learning have been communicated with the help of text mining (Hearst, 1999). Big data are heaping up with the passage of time, and close reading of all the data becomes very difficult in a short time. Technology has swayed the academic world, and radical changes worldwide are happening because of technological gadgets, applications, software, and tools. It necessitates the introduction of distant reading and text mining of literary texts to explore the theme of memory through digital tools and how these knowledge patterns fulfill several scholarly pursuits.

Memories play a very important role in everyone's life, especially the incidents that people not only went through but also suffered through. It builds people's lives by allowing them to learn from their mistakes in the past and recall their past to make better decisions in the future. Occasionally, current incidents remind people of experiences that occurred years ago. As Emily Dickinson said, "The Brain has corridors surpassing material place." *The Danish Girl* (2000) by David Ebershoff is critically analyzed through the lens of the memory study. How does the Voyant text mining tool intricately explore and allow the characters through episodic, individual, and collective memory study using a digital humanities approach? How does the author use memory as the narrative device in exploring the character's identity, through the Voyant text mining tool?

LITERATURE REVIEW

The Brain is wider than the sky,

For, put them side by side,

The other will contain

With ease, and you beside. (Dickinson, 1999)

The Danish Girl by David Ebershoff is based on the real story of Lily Elbe, one of the first transgender to have gender surgery at a time when gender issues were not as well acknowledged as they are now. Einar Wegener and his wife, Greta, are the protagonists of the story. Other characters also play an important role in their lives, and memory shapes their identities in the novel. In the story, Einar recalls incidents from his childhood that are associated with him as Lily, as well as forming the identity of Lily and many other memories, such as his paintings, that also depict the events from his past. Paintings play an important role in their lives, as David Ebershoff said (Ebershoff, 2015), “I thought of Lili I began to think of her life as a story of art, love, and identity.” Memory draws a boundary between the identities of Einar and Lilly (Sampsel, 2018).

METHODOLOGY

Voyant text mining tool was developed by project leads Stéfan Sinclair (McGill University) and Geoffrey Rockwell (University of Alberta). Both Digital Humanities scholars are committed to textual analysis and visualisation, especially Voyant Tools and its companion projects. Voyant text mining can be used to find patterns and relationships within literary works that would be difficult to detect using typical close reading methods, revealing new perspectives into how memory is represented and produced. Voyant text mining indicates that memory is a complicated and multifaceted phenomenon that is fundamental to the novel's inspection of identity, gender, and loss in David Ebershoff's novel *The Danish Girl*. The research strategy used is to upload the digital version of the novel *The Danish Girl* in Voyant and get its textual analysis (Miller, 2018). This tool was chosen for a test study, which focused on using and incorporating various text analysis and data visualisation tools as part of the revitalization phase on one of the latest digital scholarship projects at Middle Tennessee State University. There are five windows in the main home of the Voyant

shows that all the windows are linked. (Sinclair, 2021) “Cirrus presents a cloud that displays the top 25–500 words where higher frequency words have larger fonts in the center.” Cirrus Tool discovers knowledge patterns of the characters of the novel to their memories. The size of each word shows the frequency of that word in the text. Greta (92) is the largest word in the Cirrus, Einar (60), Lilli (49), thought (36), Hans (25), bolk (21), think (20), academy (17), bog (17), painting (16), memory (11), Copenhagen (11), reminded (10), mother (8) Bluetooth (6), kiss (6), thinking (5), wardrobe (5), and some other words. Greta, Einar, and Lili’s names were in the largest sizes, highlighting that they are protagonists of the story, and thought comes after them with low frequency as the main theme of their process of remembering memory. All these words show the frequency of characters, Greta, Einar, Lilli, Hans, and Bolk remembering memories of their incidents of the past, recalling different places at different times, like the Royal Academy where Einar and Greta first met and kissed each other on the steps of the Academy. Many events, happening in their lives, reminded them of their previous instances, like whenever Greta worried about Einar, she remembered her ex-husband Hans Axcil, Einar remembering his childhood in his native village Bluetooth, also painted paintings of the bog and heaths from his memory. Whenever he saw female dresses in Greta’s wardrobe and at another point, he saw dresses in the wardrobe of the rented apartment when they went to France for their holidays, he remembered the wardrobe in his father’s room with his mother's dresses.

Word Tree



Figure 2. Word Tree

The Voyant text mining tools word tree tool is an effective visualisation tool for investigating the relationships between words and sentences in a text. The word that appears in the center of the tree is the stem and the most important word in the tree, and all the branches are related to it. The word tree above, of “The Danish Girl,” is about the memory process of the individuals. The branches at the left side of the tree portray the individuals or characters who are involved in the process of memory, and the branches at the right side of the tree portray the subjects that can be remembered through words like ‘of,’ ‘about,’ and ‘to.’ (Ebershoff, 2015) “Then Einar wondered if he felt something on his stomach, but he wasn’t sure. He thought of a stomach alive with glow worms nested from the Bluetooth bog” (Ebershoff, 2015). “Einar thought about the past winter, when more often than not he would go to bed and have no idea who he would be when he woke in the morning” (Ebershoff, 2015). “She thought to herself, although not in so many words, what have I done to my husband?” The Word Tree in Voyant encapsulates larger ideas, repeated most simplistically at different points in a text. When branches are clicked, further branches emit from them, if available, and when one word is linked to other words in the branches of the tree, the color of the words on the branches changes.

Dreamscape:

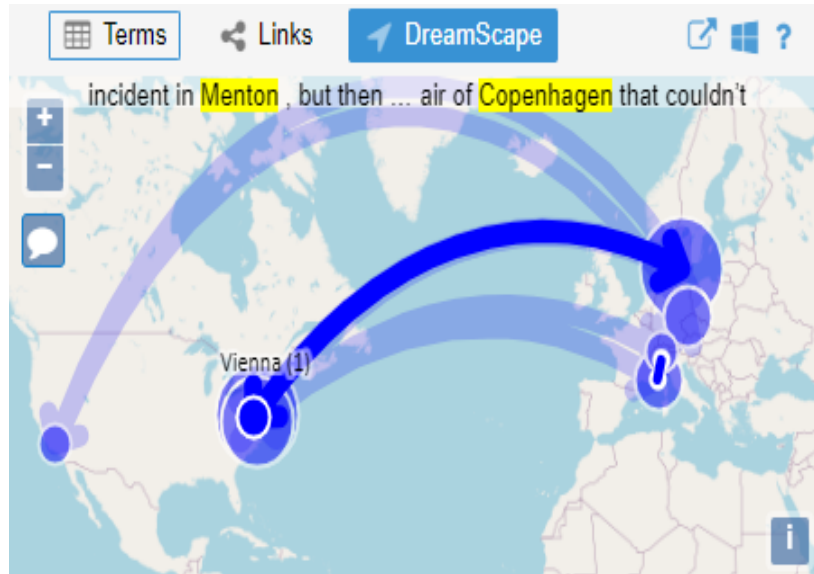


Figure 3. Dreamscape

The Dreamscape Tool in the Voyant text mining tool proved beneficial on another level in the context of the memory study in the novel *The Danish Girl*. The Dreamscape tool visualises the map with the areas mentioned in the text. It is a Geospatial tool, directly associated with certain geographical regions. Lines in the form of arrows continue moving on the map according to the timeline in the novel. But in the case of memory study, in the novel, the dreamscape map visualises the areas of the memories that characters recall at different times, going into memories and coming back into their current regions. The circles repeated at one point highlight different areas at different times in the memories. Clicking on them shows the locations in the text. Figure 3 above indicates locations in the memories of the individuals. The bigger the circle, the more expectancy of the frequency of the location in the memory. Clicking on the circles, the Dreamscape tool mentions the location's name with the frequency number.

The biggest circle in Figure 3 is of Pasadena (11), where she recalled the memories of the dropcloth she used around her easels; when she was with Hans, Hans embarrassing her in his arms, she remembered the memory of the hill house in Pasadena, once Greta told Lili the event of her painting her mother, in the Pasadena, and so many other incidents. The smaller circle than Pasadena is entitled California (8); when Greta asks

Hans about their departure towards California, she remembers her childhood and adulthood in Pasadena and California with Carlisle and Teddy Cross. Then, the third circle is of Vienna (1), which has only one incident in the memory of Professor Bolk when he told Greta about his career.

Copenhagen (11) is displayed on the other side in the big circle. Greta remembers her drawings in Copenhagen, in the offices of the officials, and Einar remembers his adulthood in Copenhagen to write in the obituary. Copenhagen repeated many times while Einar was thinking of his obituary. (Ebershoff, 2015) “The obituary would miss that day as well. It would also miss that one afternoon in August with Greta. It was before they were married, just after the war had ended. Greta had been back in Copenhagen only a month.” Near Copenhagen, Voyant puts Dresden (3) on the map with the help of the Dreamscape tool. Einar was on his way to Dresden by train when he thought that his memories would be written in his obituary after he died. Beneath Dresden, Manton (3) is presented, then Lucerne (1). Lily tells Henrik about Bluetooth in Jutland and Lucerne's grass field. And on the left side of the map is the circle of the Bakersfield (1) (Ebershoff, 2015). “Greta thought of Teddy Cross, whom she had also once thought of as capable of miracles. There was that time with Carlisle's leg. Greta and Teddy had been married only a few months, and they were living in the Spanish house in Bakersfield, and the first hot winds were beginning to blow through the eucalyptus groves.” Clicking on the circles of the locations gives the option to view occurrences of that location on the text and remove the respective location from the map.

Links

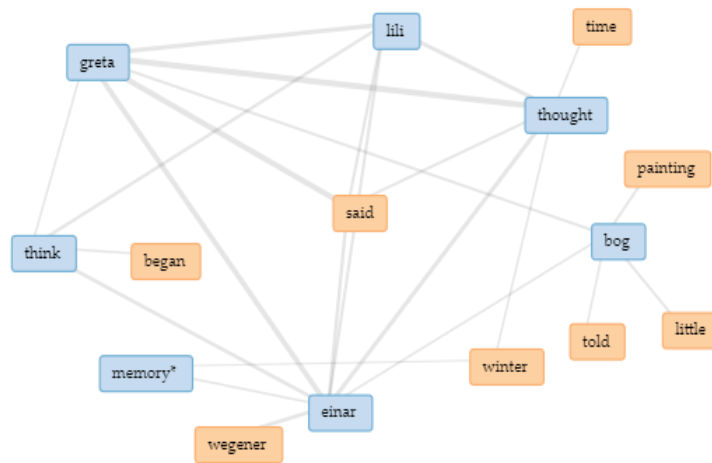


Figure 4: Links

Link is another useful and to-the-point Voyant tool in the Cirrus window. It is also a visualising tool. Words are linked to each other according to their relations in the text. The link shows connections between words. (Zafar Ullah, 2022) “The Links tool showed the interconnectivity of characters, thoughts, and themes. The interrelationship is integral for understanding the internal weaving of a novel, links of characters, bonding of themes since the critique of the novel revolved around the links mentioned above.” Figure 4 above shows a clear visualisation of the memory study throughout the novel “The Danish Girl”. ‘Thought’ is connected to all the characters in the Links. Greta, Einar, Lili, and what these characters thought about are also linked with the ‘thought’. They thought about time, about winter. Winter is connected to memory, highlighting the point that Einar painted his paintings from his memory of winter in his childhood. (Ebershoff, 2015) “Einar, small and not yet thirty-five, painting from memory a winter scene of the Kattegat Sea.” Whenever they passed through an experienced moment, their minds began to think of memories from the past. Greta, memory, and began are linked to each other. (Ebershoff, 2015) “The flat, cold surface had somehow reminded her of kissing Einar, and she began to think of that kiss on the stairs of the Royal Academy as something similar to kissing herself.” Bog is connected

to the paintings and with Greta and Einar, through which Greta imagines the childhood of Einar, which Einar told her through his memories to Greta. Bog is also connected with little, showing that Einar painted many paintings of bogs and stormy heaths. Wegener is connected to Einar.

Stream Graph

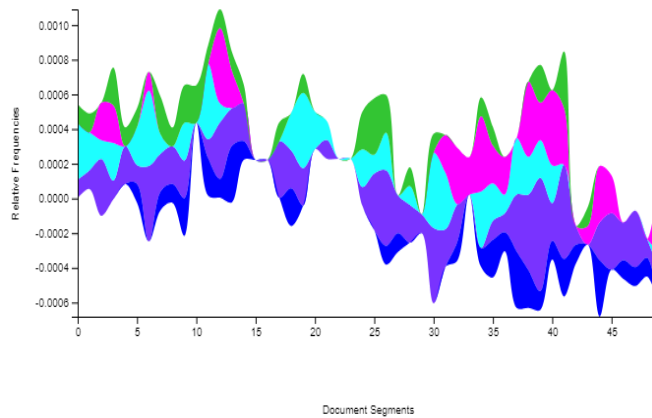


Figure 5. Stream Graph

Voyant has another visualising tool for the frequencies of the words, characters, and themes repeated in the novel. The x-axis of the graph (horizontal) shows the segments of the novel with particular intervals. The y-axis of the graph (vertical) shows the relative frequencies or raw frequencies. There is a frequency option under the graph where the frequency can be selected. Each stream's width shows the relative frequency of the word during a certain period. In the above graph, different colors show different words. Green represents 'said,' pink represents 'Lili,' Celeste represents 'Einar,' purple represents 'Greta,' and blue represents thought. The graph mentions all the important characters and themes in the memory study of the Danish Girl. Greta's line's width is bigger than others, representing that Greta has a major role in the novel. The novel's three protagonists are Greta, Einar, and Lili. When there was Einar, Lili disappeared; when Lili appeared, Einar disappeared. But Greta remains there throughout the along with Einar and Lili. The graph shows how characters and their memory procedure go from time to time at various

points throughout the novel. Where the line of any word ends and starts from the next point, it shows the presence of that theme or that character in the corpus. Lili completely disappears at some points, highlighting the role of Lili to which extent she appeared in the text.

Trends

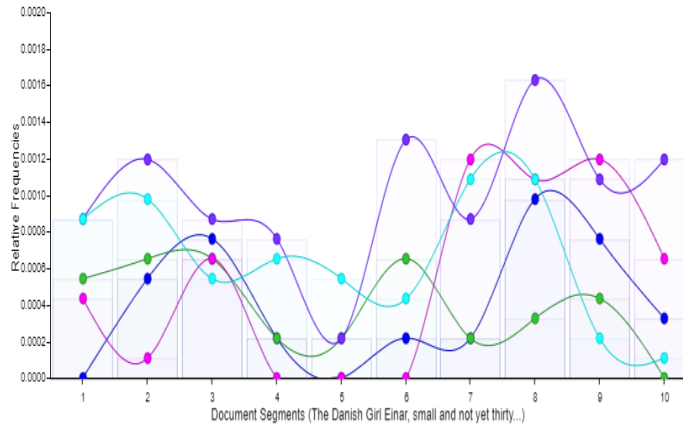
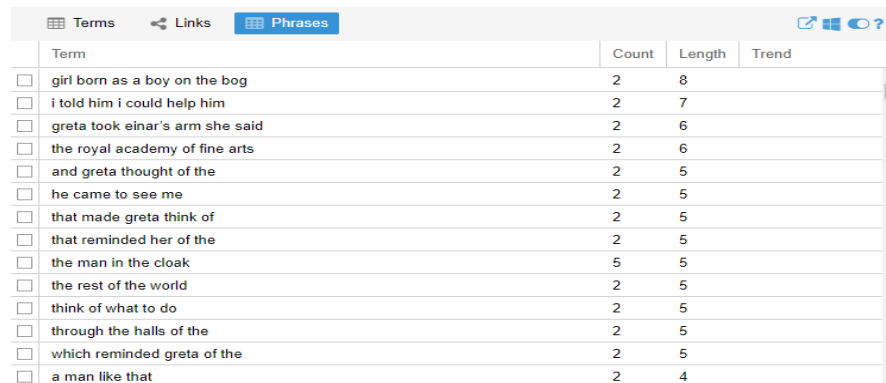


Figure 6. Trends

The trend graph is similar to the stream graph in certain ways. The x-axis of the graph (horizontal) represents novel segments, and the y-axis (vertical) represents relative frequencies or raw frequencies. Like Stream Graph, Green represents 'said,' pink represents 'Lili,' Celeste represents 'Einar,' purple represents 'Greta,' and blue represents thought. The text is divided into ten segments along the horizontal line. All other words in the first segment are at any frequency rate, but the memory thinking process is at 0. However, in the following sections, memory begins to rise along with the persons, three protagonists, Einar, Lili, and Greta. It continued to increase in the next two segments, segment 2 and segment 3, before beginning to decline in the fourth segment and finally disappearing in the fifth. Then it began to rise in the same segment. It changes frequencies but does not disappear during the next five segments. The 'thinking' line disappeared in the fifth segment because there were no frequencies of additional words, and no characters were present as in the previous segments. The thinking process is present when characters appear

frequently in the graph. Furthermore, similar to the Stream Graph, Lili's line on the graph disappeared indicating Lili's existence in the text. Greta appears more frequently than the others in most segments. Einar and Greta remain throughout the story as their lines do not disappear on the graph. So, the Trend Graph helps a lot in studying the thinking process of the characters at which part of the novel, which characters are recalling their past events, and thinking about their memories in the novel.

Phrases



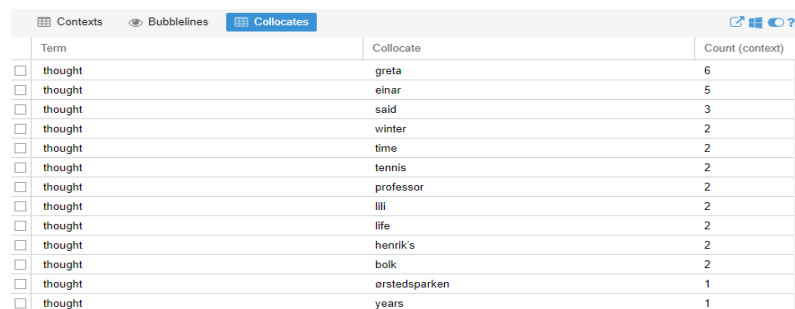
Term	Count	Length	Trend
<input type="checkbox"/> girl born as a boy on the bog	2	8	
<input type="checkbox"/> i told him i could help him	2	7	
<input type="checkbox"/> greta took einar's arm she said	2	6	
<input type="checkbox"/> the royal academy of fine arts	2	6	
<input type="checkbox"/> and greta thought of the	2	5	
<input type="checkbox"/> he came to see me	2	5	
<input type="checkbox"/> that made greta think of	2	5	
<input type="checkbox"/> that reminded her of the	2	5	
<input type="checkbox"/> the man in the cloak	5	5	
<input type="checkbox"/> the rest of the world	2	5	
<input type="checkbox"/> think of what to do	2	5	
<input type="checkbox"/> through the halls of the	2	5	
<input type="checkbox"/> which reminded greta of the	2	5	
<input type="checkbox"/> a man like that	2	4	

Figure 7. Phrases

Phrases are a textual feature of the Voyant text mining tool that shows repeated phrases in a given text. In the phrase window, the count represents the number of repetitions of the phrase in the text and length shows the number of words in that specific phrase. In the phrases, that Voyant highlighted, most of them are about the memory process of individuals. In above Figure 7, most phrases are about individuals recalling their memories. “Girl born as boy on the bog”, represents Einar remembering his past with the emotions of Lili like when he recalls his memory of Hans kissing him in the kitchen, whenever he sees wardrobes, he remembers using his mother’s clothes from his father’s wardrobe, and while thinking of writing the obituary. ‘The Royal Academy of the Fine Arts’ represents both Greta and Einar’s memories. The Royal Academy of the Fine Arts is the place where Greta and met each other for the first time. When Greta kisses Hans and his first husband Teddy Cross, she remembers kissing Einar at the stairs of the Royal Academy of the Fine Arts, and when Einar

thinks about his obituary, he remembers Greta in the Royal Academy of the Fine Arts. Lily recalls Einar giving lectures to his students about paintings. ‘And Greta thought of the’, ‘that made Greta think of’, and ‘which reminded Greta of the’, at many points Greta thought of past events and her past experiences, when she was with Hans she thought of the hill house in Pasadena, when she visited Bluetooth, watching the bog she thought of the Earthworms in the winter season. When she asked Hans about going to California Greta thought of past life and her life with Einar and Teddy Cross. In many incidents (Ebershoff, 2015), “Greta thought of the handstand she performed when she was ten” (Ebershoff, 2015). “The clerk was narrow-faced, and there was something in his soft brown eyes that made Greta think of Einar”. ‘Thought the halls of the’ is a phrase that represents memories of the Einar in the halls of the Royal Academy of Fine Arts. When Einar thinks about writing his obituary, he recalls all the memories from his childhood to his adulthood in the halls of the Royal Academy of Fine Arts. A man in a cloak praising his painting in the halls of the academy, a girl kissing him on the stairs, in the hall of the academy, and he remembers town halls which he painted in his childhood. Lili remembers Einar in the halls of the academy kissing a girl, named Greta. All these phrases are a combination of the memories of the individuals that were scattered at different points in the text.

Collocations



Term	Collocate	Count (context)
<input type="checkbox"/> thought	greta	6
<input type="checkbox"/> thought	einar	5
<input type="checkbox"/> thought	said	3
<input type="checkbox"/> thought	winter	2
<input type="checkbox"/> thought	time	2
<input type="checkbox"/> thought	tennis	2
<input type="checkbox"/> thought	professor	2
<input type="checkbox"/> thought	lili	2
<input type="checkbox"/> thought	life	2
<input type="checkbox"/> thought	henrik's	2
<input type="checkbox"/> thought	bolk	2
<input type="checkbox"/> thought	erstedsparken	1
<input type="checkbox"/> thought	years	1

Figure 8. Collocations

Collocations are also another textual tool of Voyant for the analysis of the text. Collocations look for patterns and trends in text to learn deeper into the meaning of words and phrases. Collocates are subjects and objects, such

as who has thought and thought of which thing. The term ‘thought’ collocates with Greta, Einar, Lili, and Professor. The characters are thinking as Einar thought about the winter season when he paints, Einar thinks about tennis, how Hans guided him, and how he watched Hans while playing tennis. Professor Bolk recalls the memory of his career in front of Greta. Lili thought of the memories of Einar. Lili thought of the scar on Henrik’s face, she thought of Henrik when she left Henrik in the park. (Sinclair, 2021) “Collocates generates a list of connections that exist between co-occurring words.”

Voyant helps in various ways through various tools. All the tools work efficiently and all are connected. Voyant visualises text relationships and compares text’s different versions. It clarified the characters' relationships with their memories. (Sinclair, 2021) “Overall, the easy-to-use design, the diverse analytical suite, and the data-driven approach provide valuable opportunities for users to move beyond close readings of texts to discover patterns in a more quantifiable and less subjective manner.”

Memory

Episodic and Semantic Memory both are obvious at various points throughout the novel. They both are a type of collective memory. In both Episodic and Semantic memory, a character remembers specific events from their past. For episodic memory, the time and place should also be remembered along with the incident, whereas in Semantic Memory, time and place are not important to remember (Tulving, 2002). “Episodic memory is about happenings in particular places at particular times, or about ‘what,’ ‘where,’ and ‘when’.” (Nünning, 2008). “Other memories, semantic memories, do not possess this temporal or spatial specificity.” Spatial is related to space and temporal is related to time. Episodic memory in the novel can be seen through the memories of Greta, Einar, and other characters.

When Greta was kissing Teddy Cross and later on at one point meeting Hans on the steps of the Royal Academy of Fine Arts, once she kissed a mirror, she remembered kissing Einar on the stairs of the Royal Academy. This memory haunted Greta's mind repeatedly on several occasions. Firstly, Greta recalled it when she left Valley Hunt Club along with Teddy Cross, her first husband, they kissed on a bench in the Tennis Court. (Ebershoff, 2015) "She couldn't help thinking how different Teddy's kiss was from Einar's. On the *Princess Dagmar*, she had stood at the mirror in her stateroom and kissed herself. The flat, cold surface had somehow reminded her of kissing Einar, and she began to think of that kiss on the stairs of the Royal Academy as something similar to kissing herself. But Teddy's kiss was not like that at all. His lips were rough and firm, and the whiskers on his upper lip scratched at her mouth. His neck, nuzzling into her own, was strong and hard." This is an episodic memory that she remembers when and where she kissed Einar Wegener. In this specific type of memory, we can also experience emotions and sensations present in that memory's current situation. Later on, when she was with Hans at the steps of the Royal Academy, she recalled the same memory with Einar. John Sutton (2010) stated that episodic memory is a personal memory, reliving of a past moment and semantic memory is the memory of facts. Most of the time, in the novel, the characters' memories comprise the elements of episodic memory. When Professor Bolk asked her that he wanted to meet Einar, Greta began to remember Einar again on the stairs of the Royal Academy of Fine Arts.

It also happened in the case of Einar, when one day Einar, as Lily returned to the apartment in Paris, was informed through Greta that Greta's brother Carlisle was coming and he was to arrive in a moment. Einar avoided meeting Carlisle, left the apartment, and went into the room he rented for five francs at Madame Jasmin-Carton. There, through one of the windows, he saw a man looking at the body of Lily through the window. At that time, half of him was Einar, and the other half was Lily. After

watching Einar's body of Lily through the window, he came into the room and Einar had a sight of his penis as his pants zip was opened. Einar recalled different memories, the first one on the smell of the penis, and the other on the sight of the penis. When the penis was coming closer to him, he remembered because of his salty smell (Ebershoff, 2015) "of the beaches of Jutland, of Skagen, where his mother was laid to sea in the fishing net picked clean of gills." And then on seeing it, (Ebershoff, 2015) "A blur of images ran through his head: the inn with the seaweed roof, the bricks of the peat stacked in the fields, the white boulder speckled with mica, Hans lifting Einar's imaginary hair to tie the apron." There were so many flashes of memories that went through Einar's mind, he remembered the inn with the seaweed roof where his father first kept his mother before marriage and where he was born. The white boulder, speckled with mica that could not be seen in the sunlight, where Hans taught Einar how to climb on the oak tree, that roots were wrapped around the boulder. And the memory of Hans lifting Einar's imaginary hair to tie Einar's grandmother's apron when he first tried to kiss Einar and Einar's father caught them and scolded Hans. These are episodic memories from Einar's past in which Einar clearly remembers about space and time.

In Paris, when Einar went to the Library to consult studies on sexes, in the library he saw tables that reminded him of the (Ebershoff, 2015) "worktables the Copenhagen fisherwomen used when chopping the chub heads at the Gammel Strand fish market." Another example of episodic memory.

Other characters with episodic memory are Hans, Professor Bolk, and, at one point Einar's grandmother. Einar's grandmother gave Hans a notebook in which to write his thoughts. She used to remember the War in Jutland when the German Federation occupied it in 1864. During the War, she snatched the notebook from a soldier. (Ebershoff, 2015). "Took his notebook and shot him" she sometimes said, churning her cheese." Hans

narrated his memories of Bluetooth to Greta and Lily when they talked about Einar.

The perspective of collective or cultural memories also comes through the novel (Matos, 2015). “Individual memories – and collective memories – are always selective. We have all had that banal experience: we remember episodes we shared with friends or family that they have forgotten. Or vice-versa: they remember things we have forgotten.” Lily and Hans recalled their memories of Einar, in one of the restaurants in Paris. When Greta and Hans met for the first time along with Lily. They reminded past events of Einar and Hans in Bluetooth. Hans narrated his memory of Einar to Greta and Lily, a form of narrating memory (Ebershoff, 2015). “Hans then told them how Einar used to carry his box of pastels to the side of the road to draw scenes of the bog on the boulders. The drawings would wash off at night in the rain, and the next day, he’d haul the box back and sketch again. ‘Sometimes he’d draw pictures of you,’ Lili said. ‘Oh yes, for hours, I would sit at the edge of the road so he could sketch my face onto the rock.’”

Gender identity through memory is also very clear throughout the novel when Einar remembers the things related to Lili's emotions, and Lili remembers the events related to Einar's feelings. Memory creates a clear difference in their way of memorising past events. Andreano and Cahill (2018) stated that the sex is binary between males and females in the language of the clinic and scientific literature, but gender behavior, how a person behaves in society, and their psycho-social characteristics draw a line between males and females. (Cahill, 2018) “Renewed interest today in the issue of sex influences in memory appears driven heavily by neurobiological investigations, which have identified numerous sex differences in the brain related to memory.” A small minority of people are intersex, which means they have biological traits that do not efficiently fall into the male/female dichotomy. In Einar's case, he was once both male

and female, but his memory built up his gender identity when he thought about his former memories involving Einar and Lily (Ebershoff, 2015). “He realised that Lily and he shared something: a pair of oyster-blue lungs; a chugging heart; their eyes, often rimmed pink with fatigue. But in the skull, it was almost as if there were two brains, a walnut halved: his and hers.” There are many examples, one of which is indicated above: when he saw the man's penis in the room rented from Madam Jasmine, he remembered having feelings for both Einar and Hans because he was half Einar and half Lili at the time. He remembered the boulders as Einar and remembered Hans as Lili. Hans lifted her grandmother's apron to tie and attempted to kiss her. Whenever Einar or Lily recall a memory of having feelings for one another they think of it as the memory of another person, like a narrating one. All the memories of Hans' incident of kissing Einar in the kitchen are memories of Lily's feelings and emotions. So, this is Lili's memory. An episodic memory. When Lili kissed a painter, Henrik, across Rådhuspladsen and was about to go into a fit due to bleeding in her nose, Henrik, frightened of Greta, ran away. (Ebershoff, 2015) “The handsome slap of his foot on the cobble eerily similar to the flat punch of Einar's father's hand to his cheek when he discovered Einar in his grandmother's apron as Hans lips pressed towards his neck.”

When he got too busy with Lili's public identity, he abandoned his painting career and did not even miss drawing landscapes. He was becoming Lili, and when he thought about art, he imagined himself as someone else who had painted all of them. “Painting is memory and hope—one looks backward, the other forward.” ~ Grandma Moses

Having the qualities of episodic memory, and semantic memory. Einar's paintings are also a clear reflection of these types of memory. You Li (1939), a Chinese scientist, stated that artists affected by significant emotional changes express the impact of major events in their forms of artwork, which mark many stages of their lives. He worked on the example

of Frida Kahlo and declared that her paintings are self-reflections of the stories of her life (Li, 1939). “Many of her life events are expressed in the paintings and all the dream-like scenes are elements of her own memory. Hence, Frida can be labeled as a surrealist, but it is important to remember that her paintings are not dreams. They are her reality.” Einar painted landscape paintings through his memory of his childhood, of bogs, moors, and storms in his native village, Bluetooth. As Li tried to point out common features in Frida Kahlo’s paintings, as each painting has (Li, 1939) “hair worn in a bun, subtly frowning Latino eyebrows that join together, straight-looking eyes, little mustache above her lips.” Same in Einar's paintings, there were so many bogs and stormy heaths. (Ebershoff, 2015) “Recently she had tired of Einar’s landscapes. She never understood how he could paint them over and over. He would finish off this heath tonight and begin another in the morning.” Greta thought of Einar’s paintings, even repeating the same features, again and again, were overshadowing her career, (Ebershoff, 2015) “His little dark paintings of moors and storms-really, some were no more than gray paints on black_ earned more and more kroner each year.” Sometimes, paintings themselves work as a source of memory of the past. Either the paintings are done from memory of the past or done in the past, in both ways they represent memory. Even the novel starts with the Einar making a painting from his memory of the Kattegat Sea. (Ebershoff, 2015)“Painting from memory a winter scene of the Kattegat Sea. The black water was white-capped and cruel, the grave of hundreds of fishermen returning to Copenhagen with their salted catch.” Einar's paintings of stormy heaths and bogs reminded him of his childhood in his native village, Bluetooth. When Lily studied one of the paintings of Einar, that Greta gave her when she was leaving for Dresden for her last transgender surgery, she remembered Einar’s thought of his village Bluetooth through the painting (Ebershoff, 2015). “Lili studied the paintings, the box surrounded by hazel bushes and linden trees, and a great oak seemingly growing around a boulder. She had a memory, although it

wasn't her own, of following Hans down a trail, the muck sucking her boots as she stepped. She remembered throwing things stolen from her grandmother's kitchen into the bog and watching them sink forever: a dinner plate, a pewter bowl, an apron with cotton-grass strings. There was the work of cutting the peat into bricks, and the hoeing in the sphagnum fields. And Edward 1, a runt of a dog, one day slipping off a lichen rock and drowning in the black water." Lili shuts her eyes after viewing the paintings and recalls Einar memories of the bog where he grew up, his white dogs, his grandmother, his friend Hans, and, curiously, young Greta at the Royal Academy of Art holding new brushes.

Even through narrated memories of Einar of his village and through the paintings, Greta knew all the details of the village and could imagine it (Freeman, 2010). "Much of what we remember about the personal past is suffused with others' memories—which are themselves suffused with other others' memories." She also remembered Einar's village through his narration and paintings of various incidents. When Greta was showing the paintings of Einar to Lily and asked her if she would like to bring them with her, seeing the paintings of the landscapes of bogs, stormy heaths, and oak tree with boulder, she recalled that it is the place where Einar belonged. One day in Copenhagen, she returned to the Widow House and saw Einar painting a bog landscape, she asked her (Ebershoff, 2015), "It is the bog in Bluetooth?" Mark Freeman, in his essay *Telling Stories: Memory and Narrative*, stated that personal experience is called first-hand memory, and external factors, such as narrating of others' memories or some other sources, such as pictures, are called second-hand memory. Second-hand memory sometimes influences first-hand memory and dominates. Mark Freeman also claimed that one can remember one's personal past by narrating it through memoirs or autobiographies. Narrative memory plays a huge part in their lives, Einar narrated his memory of Hans, and his village to Greta, and Professor Bolk narrated his memory of his achievements and of the boy whom he was going to do surgery for the very first time, Einar

narrating his memory through imagining it writing in the newspaper on the news of his death. A complete chapter in the novel reflects Einar's narrative memory of his childhood in Bluetooth. When Greta came to know Lili's relationship with painter Henrik, she asked her if she had a relationship with any other man, then Lili told him the story of her childhood friend Hans.

CONCLUSION

Through the analysis of David Ebershoff's novel *The Danish Girl* using Voyant text mining tools, this DH study has explored the themes of memory. The study revealed the complex interplay of memory in the novel, highlighting how characters grapple with their memories as well as the collective memories of past generations. The circular plot in the novel exemplifies the crossover between different types of memory, suggesting that as time passes and memory transmission becomes reliant on media and narrative, the boundaries between filiation, affiliative, and adoptive witnesses become less strict (Kazanova). This study also emphasizes the role of literature in reshaping discourse about historical events, such as the conflict depicted in *The Danish Girl*. Overall, this DH study demonstrates the value of digital tools in uncovering patterns and analyzing textual data to deepen our understanding of literary works. This study also underscores the significance of literature in shaping discourse and memory surrounding historical events. Furthermore, the study highlights the evolving nature of memory as it becomes increasingly dependent on media and narrative. Through the use of digital tools, this DH study has contributed to our understanding of memory in *The Danish Girl*. In conclusion, this DH study on memory in "The Danish Girl" by David Ebershoff has provided valuable insights into the intricate relationship between memory in the novel. It has demonstrated the importance of digital tools in uncovering patterns and analyzing textual data to deepen our understanding of literary works. The findings of this study suggest that memory is a complex and intertwined

process, influenced by personal experiences, historical events, and the passage of time. Furthermore, the study has highlighted the role of literature in reshaping discourse and memory surrounding historical events. This DH study on memory in *The Danish Girl* by David Ebershoff has underscored the significance of digital tools in advancing our understanding of literature and memory.

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