

How has the Barbie Movie by Greta Gerwig influenced the online discussion about feminism?

Buket Aydogdu (2085475)

Berker Senol (2087152)

Denise Deiss (2099080)

Dauda Sulemanu (2093615)

Marisa Seiter (2100083)

Abstract

Introduction - The Barbie Movie by Greta Gerwig was not only the highest-grossing film of 2023, but also the highest-grossing film by a solo female director and the highest-grossing film ever released by Warner Bros. Not only the enormous financial success of the film, but also its critical examination of the topic of feminism, underline the social relevance of the Barbie film. After its release, the film was widely discussed and criticized on various social media platforms, both positively and negatively. The aim of this paper was to explore whether and, if so, how Greta Gerwig's Barbie film has influenced the online discussion about feminism.

Method - In order to approach this research question, all relevant posts regarding the Barbie Movie were extracted from the social media platforms TikTok and Reddit using the keyword "Barbie the movie". The appropriate APIs used to gather data from Reddit and TikTok in order to look into the conversation surrounding "Barbie the Movie" and the correlation with the feminism subject. Community detection was implemented, and user behaviors and topics were explored. Sentiment analysis was used to analyze the movie's impact on feminism discussion.

Results - The results show an increase in agency for Reddit after the release of the movie, while there is no change for TikTok. Affiliation, on the other hand, only increased for the TikTok community, but for Reddit. We conclude that the movie partially influenced online feminism discussion, reflecting key concepts but not introducing new aspects. Overall the movie didn't substantially diversify the discussion around feminism.

Keywords: Social Network Analysis, Barbie Movie, Feminism, Patriarchy, Agency, Affiliation, Online discussion, Reddit, TikTok

1. INTRODUCTION

“[The Barbie Movie] is most certainly a feminist film” (The Guardian, 2023, P. 1). That is how the director Greta Gerwig describes her new blockbuster, which was released in cinemas on July 21, 2023. The movie became not only the highest-grossing film of 2023 but also the highest-grossing film by a solo female director and the highest-grossing film ever released by Warner Bros. However, it is not only the commercial success of the film starring Margot Robbie and Ryan Gosling in the leading roles of Barbie and Ken that gives the film an extraordinary position in pop culture but also the social significance and the media and online discourse surrounding the Barbie movie.

The Barbie Movie won "Cinematic and Box Office Achievement" at the Golden Globes 2024 (Guardian, 2024) and was recently back in the spotlight after the Oscar nominations for the 96th Academy Awards because the film's leading women, which are lead actress Margot Robbie and director Greta Gerwig, were not nominated for an award. On the other hand Ryan Gosling, who played Ken was nominated in the category named: "Actor in a supporting role" (Oscars, 2024). Ryan Gosling had clear words about the recent developments: “To say that I'm disappointed that they [Margot Robbie and Greta Gerwig] are not nominated in their respective categories would be an understatement” (stylistmagazin., 2024).

But it is not just the recent awards and nominations that have brought the film into the limelight. The online debate in particular began with the release of the film in July 2023 and was met with mixed opinions.

“(...) the summer of 2023 is at least furnishing a triumph of feminism, and it's been cinema's privilege to host it. Supposedly, Greta Gerwig's fantasy comedy Barbie is ushering womankind on to the true path to sisterly empowerment. Really?” ~ David Cox, The Guardian (2023)

“114 minutes of spiteful, bitter, mean-spirited, borderline unhinged hatred of men” ~ Critical Drinker, The Guardian (2023)

[Barbie is] “the ultimate bearer of ideals that self-conscious women cherish today” ~ Reina Wiskerke, CNE (2023)

These are just three of many quotes that reflect how controversial the opinions surrounding the Barbie movie are and how much room for discussion the movie offers. From an academic point of view, it is now important to examine how the Barbie Movie has influenced the online discussion about feminism.

2. THEORETICAL APPROACH

2.1 The Barbie Movie - Background and Main Themes

The movie is based on the doll Barbie, a fashion doll created by Ruth Handler, manufactured by the American toy company Mattel and launched in 1959. Mattel has sold over a billion Barbie dolls, making it the company's largest and most profitable line (Quilty, 2023). The Barbie doll product range has long moved away from the stereotypical slim Barbie in a bikini with long blonde hair from the 1970s. Martel currently produces over 100 different Barbies with different cultural backgrounds and body shapes (Quilty, 2023).

The doll is intended to symbolize an independent, strong woman, which Martel expresses with the words “imagining she

can be anything is just the beginning. Actually seeing that she can make all the difference" (Martel, 2024).

Barbie is considered a role model and is supposed to encourage young girls in their dreams by symbolizing self-confidence and diversity. The changing image of the Barbie doll reflects the changing role of women in society.

The Barbie Movie builds on this basis. The plot of the film can be briefly summarized as followed:

All the Barbies live together in Barbieland, a matriarchal utopia in which women can do anything, for example be president or have other highly professional careers whereas the Kens only co-exist without further purpose.

One day, the stereotypical Barbie unexpectedly becomes depressed and notices physical imperfections such as cellulite and death thoughts. She realizes that in order to recover and to become the perfect beauty again she needs to find the person who plays with her as a doll in the real world. On this journey, she is accompanied by Ken.

In the real world, Barbie and Ken are then confronted with the male patriarchy. While Ken is fascinated by the influence of men in the real world, Barbie has to painfully realize that the real world does not resemble her perfect worldview she left behind in Barbieland.

After returning to Barbieland, Ken introduces the idea of sexism and patriarchy he saw in the real world to Barbieland and creates Kenland. The gender roles are now reversed, which means that former Barbieland is now ruled by the Kens. At the end of the movie, the Barbies succeed in reclaiming their land and breaking the spell of patriarchy by underlining the cognitive dissonance of being a woman in a male patriarchy, aka in the real world, which leads to a

reprogramming of the Barbies who went along with Kenland's new idea.

At the very end the Barbies are showing the Kens that they are enough even without the emotional validation of them. From now on, it is decided that there will be more equality in Barbieland.

The Main themes tie in well with the movie's slogan: "She's everything; he is just Ken." Therefore, Babie is the center of attention. For her, every day is a good day for Ken, a day is only good when Barbie looks at it. The movie deals with gender roles, self-determination as a woman, emotional dependency, patriarchy, and equality, all within the genre of a feminist movie, which is why the theme of feminism makes up the largest part of the movie and unites all themes under itself.

2.2 Feminism

Since the Barbie Movie is "most certainly a feminist film" (The Guardian, 2023, P. 1) it is part of a burgeoning genre of feminist television and movies described supposedly as the fourth wave of feminism (Cattien, 2019).

Feminism is defined as an "umbrella term for a number of cultural phenomena related to the ever-deteriorating situation of women under the patriarchal status quo" (Malinowska, P. 1).

In fact, the discussion around feminist themes such as gender equality, patriarchy or female self-determination has not just begun in this decade but rather looks back on several hundred years of history (Malinowska, 2020). It has developed and above all, evolved in various stages.

The first wave of feminism represented the pioneering stage of feminist activism. At the heart of that first stage was the idea of a 'new woman', an ideal of femininity that challenged boundaries set by a male-dominated society. Therefore, the

first wave mainly referred to social campaigns that expressed dissatisfaction with the limited rights of women in terms of work, education, property, reproduction, marital status and social action, and above all campaigned for the female right to vote (Malinowska, 2020).

Later, the second phase of feminism emerged from the early 1960s to the end of the 1980s and mainly focused on gender roles and women's sexuality. More precisely, efforts were made to loosen the social idiom of femininity. influenced by post-structuralism, deconstruction and psychoanalysis, the wave focused strongly on the structuring of femininity (Malinowska, 2020).

Moreover, the second wave also revolved around women's struggle for their presence on television. It was important to overcome employment patterns and representation patterns to create a more balanced, equal, and reliable reality for both genders. The male-dominated environment especially of television and the social functions of the genders were to be reshaped as women were pushed out of positions of authority and reduced to technical, organizational, administrative or entertainment roles (Malinowska, 2020).

Finally, in the 1990s the era of the internet began. For feminism evolution, the new possibilities offered by new technologies meant a new awareness of the role of women especially in technological development (Malinowska, 2020).

Currently, the literature argues that we are in the middle of the arrival of the fourth wave of feminism (Ferreday & Harris, 2017), characterized as previously said by the burgeoning genre of 'feminist' television (Cattien, 2019) and the resulting assumption that 'feminism' has become a label in (pop) culture (Cattien, 2019). Kira Cochrane (2013)

mention additionally that online mobilization on media platforms like Facebook as well as the hashtag campaigns like #MeToo mark a new period in the feminist struggle and therefore can be seen as a fourth wave of feminism. The contemporary feminist wave paired with the international reach and great success of the Barbie movie makes the movie socially highly relevant and helps to create awareness (Thangavelu, 2020) as previously mentioned.

2.3 Agency

In psychology, the term agency refers to the observation that individuals can make choices impacting their lives or their environment (Frabetti et al., 2023; Gallagher, 2000; Schlosser, 2019; Synofzik et al., 2013). This implies that they can act as agents of influence, capable of provoking actions and thus bringing changes (Frabetti et al., 2023). Behavioral scholars define agency as "an individual's striving to master the environment, to assert the self, to experience competence, achievement, and power" (Diehl et al., 2004, p. 1).

In sociology scholars refer to human agency as "the capacity of socially embedded actors to appropriate, reproduce, and, potentially, to innovate upon received cultural categories and conditions of action in accordance with their personal and collective ideals, interests, and commitments" (Emirbayer & Goodwin, 1994, p. 1442-1443). In other words, agency is "a human capacity to influence one's own life within socially structured possibilities." (Hitlin & Elder, 2006, p. 56-57). In their empirical model, Hitlin and Elder (2009) conclude that agency is a multifaceted phenomenon that encompasses both feelings of efficacy and a sense of forward-looking optimism (Hitlin & Elder, 2006). The development of social interactions and group interactions in

social networks can be understood as an expression of human agency (Code & Zaparyniuk, 2011). In this line, agency is sometimes referred to as an “active exercise of ability and will” (p. 2378).

In communities, agency refers to the ability of individuals or groups to drive change and respond to challenges (Ling & Dale, 2014). In social networks agency can be “an individual’s will to initiate events with members of one’s social network” (Carrasco et al., 2008). Researchers assume that the presence or absence of agency is an indication of whether a group is able to respond to challenges and find coherent solutions and therefore solve problems (Ling & Dale, 2014; Newman & Dale, 2005).

Agency is a “basic dimension of evaluations of social groups” or “a basic dimension of human perception signaling dynamism and goal achievement” (Formanowicz, 2020; Formanowicz et al., 2021, p. 75). Scholars argue that language is a form of social action and agency is the driving force behind it (Ahearn, 2001; Ling & Dale, 2014). This capacity can be exercised or expressed linguistically in different ways (Goodwin 1990). There are two ways in which agency “can be conveyed through language” (p. 77): Semantic agency and grammatical agency (Formanowicz et al., 2021). Semantic agency refers to the choice of words. Grammatical agency refers to how something is said, meaning the use of verbs, nouns or adjectives. (Formanowicz et al., 2017).

The extent to which people assign agency to others – or how agentic people perceive others is influenced by grammatical choices. Verbs are known to be markers or indicators of agency because they often describe actions and therefore indicate activity (Formanowicz, 2020; Vigliocco et al., 2011). People seem to attribute agency more to pseudo-verbs than to pseudo-adjectives or pseudo-nouns (they perceive them to be

more agentic) (Formanowicz et al., 2021; Pietraszkiewicz & Formanowicz, 2023). Furthermore, the use of verbs compared to adjectives increases the effectiveness of messages (Formanowicz et al., 2021). This might be because verbs often describe actions. Formanowicz found the Verb Intergroup Bias, which is a linguistic phenomenon that captures the tendency to use verbs more frequently in reference to in-groups compared to out-groups. This means that people assign more agency to in-groups than out-groups.

2.4 Affiliation

Affiliation “is the act of associating or interacting with one or more other people” (Fiske et al., 2010, p. 865). Group affiliation is about the sense of belonging and identification with a group (Turner, 1984). The term “affiliations” in social network analysis typically “refers to membership or participation data” (Borgatti & Halgin, 2011, p.1). According to social identity theory (Tajfel & Turner) people experience “a sense of shared self” when they are around others that are similar to them and therefore belong to their own group (Ashokkumar & Pennebaker, 2022, p. 2; Henry Tajfel & Turner, 2004). The strength of these group identities effects “cognitions and behaviors”, including outcomes such as collective action (Ashokkumar & Pennebaker, 2022; van Stekelenburg, 2022). Social media platforms offer spaces for “identity-based online communities”, enable people with a shared identity to meet and exchange ideas (Ashokkumar & Pennebaker, 2022, p. 1). Scholars therefore attempt to capture, understand and comprehend group identities online in various ways, including through linguistic language analysis (Ashokkumar & Pennebaker, 2022; Zappavigna, 2011). High measures of affiliation can be translated to “having a strong group identity”, which is associated with the feeling of being connected to

others within the group (Ashokkumar & Pennebaker, 2022, p. 2). This state of group affiliation can manifest in connection-focused language, for example the use of “first person plural pronouns (e.g. we and us) that refer to one’s collective self and other affiliation-related words (e.g. together, love)” (Ashokkumar & Pennebaker, 2022, p. 2; Hart, 1971).

3. RESEARCH QUESTIONS

In this study, we examine whether and how the Barbie film by Greta Gerwig has influenced the online discussion about feminism. To do so, we refer to the content and topics of the discussion as well as to the indicators of agency and affiliation described above.

RQ1: *How has the Barbie Movie by Greta Gerwig influenced the online discussion about feminism?*

RQ1.1 *How do the topics of discussion about feminism before the movie's release differ from the topics of discussion regarding the Barbie Movie after the release?*

RQ1.2: *Is there a difference in grammatical agency seen in the online discussion about feminism after the Movie's Release?*

RQ1.3: *Is there a difference in group affiliation in the online discussion about feminism after the Movie's Release?*

4. METHOD

4.1 Data Extraction

The aim of the project was to examine how the Barbie movie affected conversations on and opinions about feminism. The Barbie movie was an essential element of the research. The dataset used for the analysis was downloaded from Reddit and TikTok by using the free web APIs. The Barbie movie was released on July 21, 2023. The period

has been separated into two categories: pre-release (until July 20, 2023) which focused on feminism discourse in general, and post-release (until July 21, 2023) which focused on discussions related to the Barbie movie specifically. Reddit API has been employed to obtain posts and comments from relevant subreddits and the TikTok API has been used to allowed us to gather hashtags, video descriptions, and comments from that platform. Advanced querying techniques, such as targeted keywords and hashtags related to feminism and the Barbie film, were used to search both platforms for data.

While getting data extraction from Reddit, it has been started by identifying feminism focused subreddits in order to collect a wide range of feminist discussions. The search was limited to 100 subreddits and keyword ["Feminism"] has been used to find communities on Reddit that were relevant to feminism keyword. To make sure we focused on the most significant and active forums, the resulting subreddits were then sorted according to the number of subscribers. We retrieved up to 1000 posts by focusing on top posts in every subreddit on our list. By utilizing keyword, we were able to identify subreddits that were relevant to our interest topics. For the data extraction part of the Tiktok platform, ["Feminism"] keyword has been used and a 1000 posts selected. Due to the lack of data extraction, 30 comments from each post have been extracted. Afterwards, for the analysis of discussions post release of the Barbie movie for Reddit, ['WhitePeopleTwitter, movies, AskMen, Cinema, BarbieTheMovie] keywords were used. We limited our search to 30 subreddits and used the Reddit API to find any that matched these terms. To give importance to more popular communities, the corresponding subreddits were sorted according to the number of subscribers.

Similar to the feminism focused subreddits we extracted 1000 posts on every subreddit. This step was essential to ensuring that the relevant and active online communities were the focus of our data extraction process. For the analysis of the Tiktok for post release, ["BarbieTheMovie"] keyword and extraction up to 1000 limitation have been selected and from each post, 30 comments have been selected to be extracted for filtering part of processes.

After extracting un-filtered data for the Reddit platform, in the part of feminism-related information before the Barbie movie came out, 1916 comments were extracted. This dataset allowed us to create a baseline for comparison by providing information on the pre-release feminism discourse on Reddit. We were able to extract a larger dataset for the section of our study which examined the discussions that followed the Barbie movie's premiere. 4078 comments were selected from subreddits that were identified using movie-related keywords. This increased amount of data is evidence of the Barbie movie's widespread influence and high levels of participation across numerous internet communities. For Tiktok platform, 1324 posts and 713 comments have been extracted for feminism-related information before the movie release from the Tiktok Posts-Comments sections in total. After the movie release 762 posts and 433 comments have been extracted for the movie-related keywords for further process.

4.2 Data Filtering

The cleaning and preparation of the dataset was done with a focused and effective approach. First, for the Reddit platform a superficial cleaning function which cleans all the insignificant characters was employed after the dataset which is before the movie release selected. Then a primary cleaning on the DataFrame's 'title' field.

Using BeautifulSoup and Python's re-module, this step was essential for removing fundamental information inconsistencies. It involved creating a contraction map to fix abbreviated words into more formal form, removing HTML tags and special characters as well as changing text to lowercase for clarity. After that, the spaCy library was used for advanced language processing. This involved utilizing the deep_cleaning function, which focuses exclusively on important speech components like nouns and verbs, to lemmatize and remove stopwords. These actions were essential in preparing the text for a comprehensive review. In addition, a get_hashtags approach was utilized to extract hashtags, allowing topic analysis. The cleaned text was then added to the DataFrame by adding two new columns called "text_deep_clean" and "text_deep_clean_pos." A column was created for hashtags. The last step was to use NumPy to create word and hashtag frequency matrices, which are essential for statistical analysis.

The precise analysis of topics in our study required this data preparation using methods like spaCy, BeautifulSoup, re and NumPy. After the data filtering processes that focused on the period before the Barbie movie's release for content connected to feminism, the comments were further filtered, leading to a reduced total of 915 comments. Similarly for the post-release period of the Barbie movie, comments related to Barbie content were reduced to a total of 2832 responses. With the set of data more closely connected with the specified and relevant substance for further analyses, these reductions show the effective implementation of the filtering methods. For Tiktok platform, because of the low size of the data the posts and comments depending on those posts merged into one

dataset for feminism and also for BarbieTheMovie keywords.

For before release of the movie feminism-related dataset became 2037 and after movie film-related dataset became 1195. Afterwards, choosed 'user' column and applied the superficial and deep_leaning_functions to the dataset and took only the data which is before the movie released part from the dataset. For the period before the Barbie movie's release for content connected to feminism, the dataset was reduced to 871. Similarly for the post-release period of the movie on the Tiktok platform, comments related to Barbie content were reduced to a total of 618 responses. After the data filtering step, for both Reddit and Tiktok datasets which involve before feminism-related datasets and also after release movie-related datasets have been built to have occurrence matrix for words and hashtags separately for all of the datasets.

By doing that the occurrence matrix reveals relationships in the data, suggests words or hashtags that often co-occur and might share similar topics or concepts, provides insights for the overall structure and topics that have been discussed on clustering communities. Also It is possible to calculate network metrics like centrality,modularity and density based on the occurrence matrix. By getting those values it is able to quantify the overall network's overall structure and interconnectedness. After getting the occurrence matrix for words and hashtags separately, those two separate occurrence matrices merged and depending on the least occurring word criteria, some words and their dependent documents have been removed and stored in a pickle file for further processes.

4.3 Community Detection

After creating the occurrence matrices, the probability matrix calculation based on TF-IDF Matrix has been calculated.In this way it can be detected not only how often the words and hashtags appear in the document but also their individual importance can be calculated on overall frequency within the data which is crucial step in text analysis and NLP for enhancing the representation of the text data, inputs have been implemented into 3 community detection algorithms used which are; Soft Louvain, Hard Louvain and BertTopic.

Hard Louvain algorithm is the original algorithm which iteratively optimizes the modularity to identify communities with strong internal connections and weak connections between other communities for large networks. It uses a two-phase iterative process in which each node is first assigned to a community. If, during a local optimization phase, this results in an increase in modularity which is a metric for how strongly a network is separated into communities and nodes are then moved to the communities of their neighbors. It then gathers nodes that are part of the same community and creates a new network with the communities as its nodes. Iteratively repeating these processes continues until no further modularity can be added. As a result, it creates a strong separation into clusters with dense internal and lesser external connections. Soft Louvain community detection algorithm is a variation of the original Louvain algorithm, it is widely used for community detection for large networks based on community detection. Instead of assigning each node to a single community, it allows overlapping communities and lets them partially belong to multiple communities simultaneously. Which is more realistic than assigning one node to a one community and letting them belong to multiple groups.

Lastly, BERTopic is a topic modeling technique that finds and extracts topics from large text document datasets. To create embedded data that capture the specific to the context meanings of words in the documents, it utilizes the use of a transformer model called BERT. After that, BERTopic lowers the complexity of these embedded data and groups related documents using a clustering technique, where each cluster represents an individual topic. This method helps in identifying the common themes in the text. In conclusion, the combination of the BERTopic modeling with the Louvain algorithm provided a comprehensive analysis of the dataset that captured both the complex network architecture and thematic features found within. This framework of dual methods allowed for a more in-depth investigation, revealing the complex dynamics and thematic relationships underlying the discussions about feminism and the Barbie movie. The combination of these analytical methods improved our understanding of the dataset and provided insightful information about the complex connections between the various themes and structural relationships in this particular context.

Understanding the structure of networks depends on community detection, which shows how nodes are grouped into groups that are more interconnected than the rest of the network. Because of Hard Louvain's scalability and capacity to reveal hierarchical structures, this approach is especially ideal for our research. It enables us to identify the complex clusters within the discussions. We were able to identify various communities within the discourse, each of which represented a different viewpoint or topic clustering, with the help of the Louvain algorithm.

4.4 Agency and Affiliation

4.4.1 Agency

The BERTAgency tool was used to evaluate the agency levels in data that was obtained from Reddit and TikTok. A significant amount of user-generated information was analyzed and evaluated using the BERTAgency tool, which is based on the BERT (Bidirectional Encoder Representations from Transformers). After collecting and analyzing the data, the results were merged into a bar chart that presented the agency scores before and after the movie's release.

4.4.2 Affiliation

The Linguistic Inquiry and Word Count (LIWC) has been used for finding the affiliation in the semantic network analysis. LIWC is a psycholinguistic dictionary that groups the words according to a specific emotion they are related to. In the project, LIWC offered valuable insights into the semantic shift of those discourses. LIWC is not strictly a network analysis tool, but due to its ability to analyze psychological and linguistic characteristics for the texts it made a perfect tool to compare the both datasets for each platform.

In the affiliation based analysis which is from the social concerns categories, LIWC meticulously processes written or transcribed text in digital formats. The text analysis module conducts comparison of the words against the dictionary then identifies the related word-category associations relevant to psychology. LIWC calculates the percentage of the words in the predefined categories which each word aligns with.

Essentially, LIWC acts like a quantitative instrument and scrutinizes the comments to quantify the presence of the words which reflect diverse emotions, cognitive styles and social concerns like affiliation. LIWC designed language categories tailored to

capture nuances of human social and psychological conditions as expressed through language.

For the analysis, the Reddit and Tiktok datasets have been used. Two included feminism and two movie-related. After the LIWC analysis, there were many categories that is why besides one of the main research subjects which is effect of affiliation between datasets, some other categories also have been extracted to get a wider look on the analysis.

4.5 Hashtag Creation

In a later stage of the project, we were faced with the issue of Reddit users' minimal use of hashtags in discussions. We created an approach that took advantage of the results of our topic detection algorithm in order to improve our dataset with suitable hashtags. We focused on extracting every important keyword that the BERTopic model detected. 'hashtags_2', a new column in the DataFrame, was added to store these generated hashtags. We iterated over the terms in the 'text_deep_clean' column for each component in the dataset. Words were added to a list of hashtags for each entry they matched in our topic model. This method not only contributed to Reddit discussions' absence of hashtags, but it additionally made sure that the newly generated hashtags closely matched the main themes found in our topic analysis, increasing the dataset's semantic richness and relevance.

4.6 Network

The initial task we performed when building the network was preparing the information collected from Reddit and TikTok discussions. Two essential elements were used for the creation of the network: unique hashtags and unique words identified within the comments. These elements, that represent the topical and semantic depth of the discussions, act as the basis for our

nodes. Every node was assigned to represent a distinct hashtag or word, containing the fundamental components of discussion. To establish significant links among these nodes, we analyzed the co-occurrence of hashtags in individual comments. We created matching combinations of hashtags using the itertools library, making sure that every pair was unique and preventing self-loops by eliminating pairs that had identical elements. Weight assignment was used to determine the importance of each edge, inside the network. The frequency of each hashtag pair's co-occurrence across the dataset was used to calculate weights. By this method, we were able to measure the strength of the connections between the topics we covered and their relevance to the community's discourse. Once the nodes and weighted edges of our network were established, we used the NetworkX package to make our network function. The creation of a graph that illustrates the complex network of relationships between the words and hashtags that were found was made possible by this tool. By selecting edges according to weight, the graph was further improved and made more focused for a more detailed look at the most important links. This step is required for a clear network and analysis. The network included a representation of the discussion's environment, highlighting the links between different themes and how they interact.

We used Gephi, an open-source network analysis and visualization program, to improve our analytical approach and obtain further understanding of the dynamics and structure of our network.

5. RESULTS

26 topics were found from the Feminism Reddit discussion network using the hard Louvain technique, a strong community

structure is indicated by the moderate Normalized Mutual Information (NMI) of 0.620687 and the modularity score (Q) of 0.440357. For the Barbie Reddit discussion, 27 topics were detected by the Louvain algorithm with Normalized Mutual Information (NMI) of 0.545017 and the modularity score (Q) of 0.391572. By looking at the results, the Louvain algorithm allowed us to quickly and effectively sift through data and gain useful information about the various ways feminism is discussed. For the Tiktok dataset the same calculations have been extracted and got the best result with the Hard Louvain algorithm. These values of the Barbie network are less than the values of the Feminism network, yet they still show a clear community structure. This shows that even though community structures exist on both networks, the Feminism network has a clearer and stronger community separation than the Barbie network. The community structures of the two networks differ significantly from one another, as seen by the comparison of their modularity and NMI scores. In addition to having higher scores in both metrics, the Feminism network also showed stability and some improvement after community detection was improved. It means that the community structure in the Feminism network is stronger and more defined. 17 topics have been found from the Feminism for Tiktok discussion network. The moderate Normalized Mutual Information (NMI) of 0.617648 and the modularity score (Q) of 0.442401. For movie-related Tiktok discussion, 17 topics have been found from the movie related for Tiktok discussion network. The moderate Normalized Mutual Information (NMI) 0.684550 and the modularity score (Q) of 0.536070. The reason behind why Hard Louvain has been picked is, the output values of the BERTopic was lower so for the analysis, it is better for

the researchers to look at more diverse topics.

For the Reddit part of the research, there were two networks analyzed: one for feminism before the Barbie movie was released and the other for Barbie after the movie was released. Modularity was an important factor used to evaluate the level of community organization in these networks. Before the Barbie movie was released, the feminism network had a modularity score of 0.245 . Indicating that the network consists of subgroups or communities that are more densely connected inside than with the rest of the network, this value shows a moderate level of community structure. Within the feminism network, a modularity level of such indicates a specific level of specialization or focus, with clusters representing different feminism movements, philosophies, etc. On the other hand, an analysis of the Barbie network analyzed after the movie's release showed a modularity score of 0.196. In comparison to the feminism network, this lower modularity score shows a less significant community structure. The decrease in modularity increases the possibility that a more cohesive or integrated network resulted from the Barbie movie's release. This integration may indicate that the movie promoted a merging of groups or interests inside the network, potentially as a result of the themes or Barbie's representation in the movie's power. For the Tiktok part of the research, there were also two networks analyzed: one for feminism before the Barbie movie was released and the other for Barbie after the movie was released. The feminism network had a modularity score of 0.246. Below 0.3 modularity score typically indicates that the network does not have a strong community structure. For the Tiktok After movie release dataset that is movie related, has

0.307 modularity score which is between the 0.3 and 0.7 so, it indicates that this is exceptional and it may indicate that very strong community structure and because the score is not too high the risk of overfitting has been solved.

5.1 Topic detection RQ 1.1

To answer the research question RQ 1.1 and find out to what extent the topics of discussion about feminism before the release of the movie differ from the topics of discussion about the Barbie movie after the release, one can take a closer look at the topic detection of both points in time. The feminist discussion before the release of the Barbie movie was mainly about women and men, as these nodes are among the largest in the network. These two keywords were frequently used in the feminist discussion on both the social media platform reddit and Tiktok. Both genders, among others, are a huge focus of feminist discussion, bringing gender roles and equality to the forefront.

In addition, feminism on both platforms seems to be ambivalently associated with positive attributes such as "love" or "good", but also with negative attributes such as "toxic" and "negative". Other important topics are "sexuality" and "violence". Further key concepts are patriarchy, misogyny, manosphere, equality, femininity and community, all of which were also addressed and thematized in Greta Gerwig's film.

This allows a bridge to the topics of discussion regarding the Barbie Movie. After the release, people on TikTok and Reddit mainly discussed Christopher Nolan's blockbuster Oppenheimer, which was released at the same time, but also topics related to the movie such as "feminism" and "sexism" in particular. It can

therefore be said that many topics that are directly and clearly linked to the film were addressed, e.g. the actors of the film and the director as well as the parallel running Blockbuster Oppenheimer or the production company of the Barbie doll Martel and the associated color pink. Nevertheless, it must be noted that the film with its feminist content also caused key concepts of the previous feminist discussion to be taken up, especially on the social media platform Reddit. The keywords "feminism", "feminist", and "sexuality" can be found in the Barbie Movie discussion, as can gender roles regarding men and women.

Interestingly, the keyword "patriarchy" does not appear in the discussion around the Barbie movie, although this concept is explicitly mentioned in the plot of the movie and even provides the base for the idea of Kenland. The keyword was probably removed from the semantic network due to minimum weight. Although patriarchy was part of the feminist discussion before the Barbie movie does not seem to have reinforced this aspect, at least not to the extent of the above-mentioned keywords that can be found in both discussions: Gender roles, sexism, feminism and feminist.

Finally, it should also be mentioned here that the discussion about the Barbie movie is ambivalent so that negative attributes such as "hate" and "terrible" or "hard", but also positive attributes such as "inspire" and "beautiful" or "happy" can be found in the semantic network. Moreover, the socially relevant part of the discussion takes place primarily on Reddit, while on TikTok there is more discussion about the movie's plot than its meaning for society. This can be seen, for example, in keywords such as "dancing", "dream house", and "pink" - these

nodes are more important in the TikTok discussion than in the Reddit discussion.

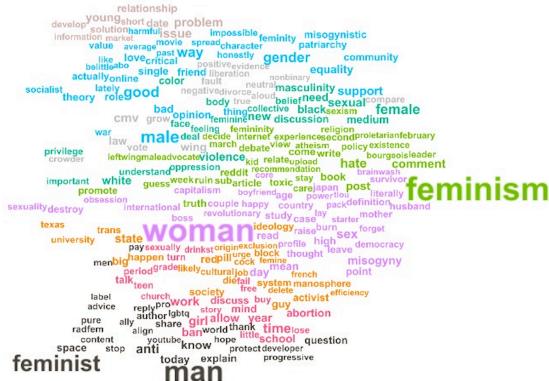


FIG 1: Communities Network of feminism discussion before Barbie Movie's release - Reddit



FIG 2: Communities Network of feminism discussion before Barbie Movie's release - TikTok

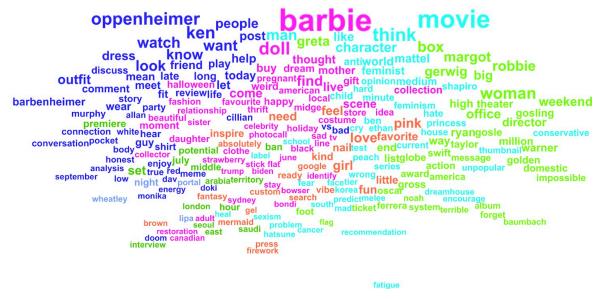


FIG 3: Communities Network of Barbie Movie Discussion after Barbie Movie's release - Reddit



FIG 4: Communities Network of Barbie Movie Discussion after Barbie Movie's release - TikTok

5.2 Agency RQ 1.2

Regarding research question RQ1.2 (Is there a difference in grammatical agency seen in the online discussion about feminism after the Movie's Release?) We identified an increase in the agency scores after the release of the Barbie movie (FIG 5). However, this difference was only found in the Reddit data, not in the TikTok data (FIG 6).

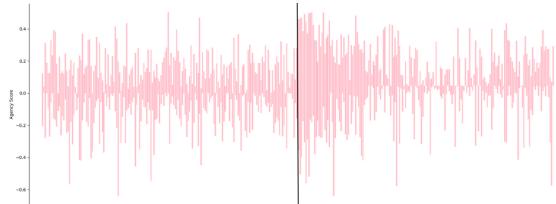


FIG 5: Agency Scores on Reddit Data

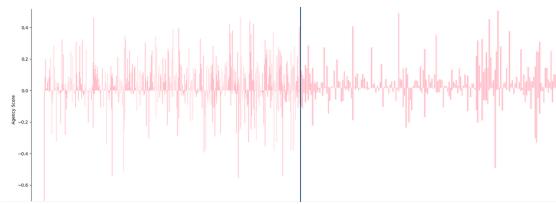


FIG 6: Agency Scores on TikTok Data

5.3 Affiliation RQ1.3

Regarding the question of whether there is a difference in group affiliation in the online discussion about feminism after the Movie's Release, we see mixed results. On one side there is a rise in affiliation for the TikTok

data, but on the other side there is a decrease in affiliation in the Reddit data. For Reddit the affiliation score before the movie's release was at 2.43 (mean). For the network after the movie's release the algorithm was not able to find specific words associated with affiliation and therefore resulted in the score zero.

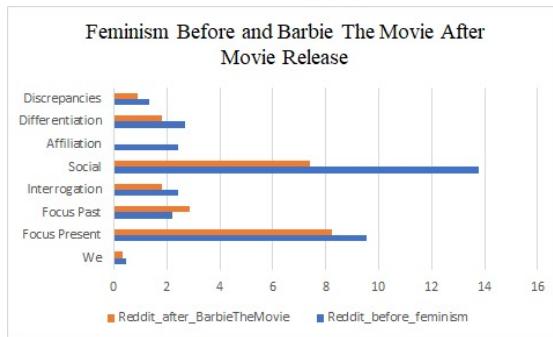


FIG 8: Affiliation Scores on Reddit Data

For TikTok we see a positive rise of affiliation from a mean of 2.34 up to 3.08 (FIG 8).

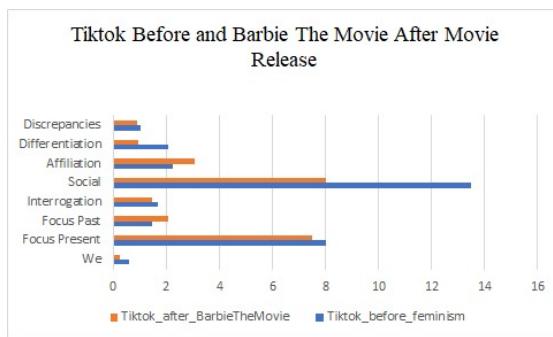


FIG 9: Affiliation Scores on TikTok Data

Interestingly, we saw further differences in other psychometrics apart from affiliation. For both Reddit and TikTok we identified a decrease of the use of the 1st person plural personal pronouns "we". As well as the decrease of the social score. Overall we only see an increase of the psychometric "focus past" for the Reddit Data. Every other metric was decreasing after the movie's release.

6. DISCUSSION

The fact that an increase in agency in the TikTok data could not be found. That might be due to the fact that the topics of discussion on the platform were rather based on the plot, instead of its implicit meaning. Overall, this makes sense, as TikTok is more of an entertainment platform, unlike Reddit, where users deliberately seek out content discussions, especially in subreddits that deal specifically with movies. We suggest that the TikTok discussion is rather focussed on the visual aesthetic of the Movie.

The decrease in agency in the discussion on TikTok after the movie's release can possibly be explained by the content of the discussion. In comparison to Reddit, we see almost exclusively adjectives and nouns in the TikTok community network. These are less agentive than the verbs that are present in Reddit, such as "want", "know", "watch", "discuss" or "think". This assumption is supported by previous research on grammatical agency (Formanowicz et al., 2021; Pietraszkiewicz & Formanowicz, 2023).

Another interesting implication is the fact that we only found an increase in affiliation for TikTok but not for Reddit. This could be due to the fragmentation of topics in the feminism discussion on Reddit after the movie's release. Furthermore, there is no broader discussion about feminism and its various aspects. This is also evidenced by the fact that patriarchy was not discussed. It is possible that this fragmentation of the communities and especially the discussion of aspects such as the actors, Oppenheimer etc. did not create a sense of belonging and group identification because positions on feminism were barely discussed, if at all.

The fact that we see a higher affiliation on TikTok could be due to the fact that

TikTok's algorithm suggests content to users that confirms their own views (filter bubble). Furthermore, we do not see any different or even critical positions on feminism here either. It is conceivable that humorous content has led users to see themselves more as a fan group, as they like the aesthetics of the film and not its political message.

6.1 Limitations

There are some limitations to this research. The data collection is limited to only two specific platforms, i.e. TikTok and Reddit; other social media platforms such as Instagram, TikTok or Twitter are therefore not included in the analysis, although there was also an online discourse about the Barbie Movie on these platforms. Furthermore, only the posts that were written in English could be taken into account.

Moreover, a limited amount of subreddits have been extracted during the data extraction process, in order to get only the related subreddits which involve specific keywords and for the Tiktok platform, 50 credits have been given to researchers per day to extract the data. Therefore, the amount of data that has been extracted is low.

6.2 Further research

Future research could first of all examine the Barbie Movie without a specific focus on feminism, for example with a focus on the actors or the director. Second of all, it would be conceivable to use our findings and compare the Barbie Movie with other feminist films in pop culture such as the classic Movie "Legally Blonde" from 2001 by Robert Luketic.

In this context, one could also look at the extent to which it might make a difference for the discussion about feminism whether the film was directed by a man or a woman. Moreover, In this study, all people's social

media posts were considered. In the future, it would also be interesting to differentiate the posts according to gender in order to find out how the different genders react to a feminist film and then compare them. However, due to the anonymity of the internet and the often gender-neutral usernames on social media platforms, this could be methodologically difficult. In addition, the research on affiliation on the Reddit platform produced a surprising result, which is why it is important to explore this aspect further in future research, especially as it was not entirely clear which words were considered as indicators of affiliation by the algorithm and which were not.

7. CONCLUSION

To put it in a nutshell our research has shown that Greta Gerwig's Barbie movie has sparked an international discussion beyond just feminism. It has been shown that the topics of discussion on Reddit and TikTok have a broader thematic spectrum. To be precise, people did not just dive into the movie's portrayal of feminism, but also scrutinized the actors, examined the role of the Mattel company and expressed mixed opinions on the Barbie movie. Additionally, Reddit tends to address more socially relevant topics than TikTok. However, it must be noted that the movie did not create a more diverse discussion around feminism.

In relation to our research question, this means that the Barbie Movie has partially influenced the online discussion about feminism, as individual key concepts such as gender roles and sexuality are reflected at both points in the discussion, i.e. before and after the release of the movie. Still, new feminist aspects have not emerged as a result of the movie. Therefore, the Barbie Movie did not reinvent the discussion about feminism.

Interesting results were found when measuring agency and affiliation. Different trends can be seen on the investigated social media platforms. While an increase in Agency was observed on Reddit, the same trend could not be observed on TikTok. In the case of affiliation, there are even contrary trends on the two social media platforms. While affiliation has increased on TikTok, it has decreased on Reddit. In summary, it can be said that the Barbie movie has not substantially changed the feminist discussion, but feminism has nevertheless gained greater online visibility.

References

- Ahearn, L. M. (2001). Language and Agency. *Annual Review of Anthropology*, 30(1), 109–137. <https://doi.org/10.1146/annurev.anthro.30.1.109>
- Ashokkumar, A., & Pennebaker, J. W. (2022). Tracking group identity through natural language within groups. *PNAS Nexus*, 1(2), pgac022. <https://doi.org/10.1093/pnasnexus/pgac022>
- Borgatti, S. P., & Halgin, D. S. (2011). *Analyzing Affiliation Networks*. The Sage. <https://www.torrossa.com/en/resources/an/4913739>
- Carrasco, J. A., Hogan, B., Wellman, B., & Miller, E. J. (2008). Agency in Social Activity Interactions: The Role of Social Networks in Time and Space. *Tijdschrift Voor Economische En Sociale Geografie*, 99(5), 562–583. <https://doi.org/10.1111/j.1467-9663.2008.00492.x>
- Cattien, J. (2019). When ‘feminism’ becomes a genre: *Alias Grace* and ‘feminist’ television. *Feminist Theory*, 20(3), 321–339. <https://doi.org/10.1177/1464700119842564>
- Christian Network Europe (2023, Mai 9). In the film, Barbie is everything, except a mother. CNE. <https://cne.news/article/3566-in-the-film-barbie-is-everything-except-a-mother> [02.02.2024]
- Cochrane, K. (2013). *All the rebel women: The rise of the fourth wave feminism*. London, UK: Guardian Books.
- Code, J. R., & Zaparyniuk, N. E. (2011). The Emergence of Agency in Online Social Networks. In *Virtual Communities: Concepts, Methodologies, Tools and Applications* (S. 2378–2394). IGI Global. <https://doi.org/10.4018/978-1-60960-100-3.ch716>
- Diehl, M., Owen, S. K., & Youngblade, L. M. (2004). Agency and communion attributes in adults' spontaneous self-representations. *International journal of behavioral development*, 28, 1–15. <https://doi.org/10.1080/01650250344000226>
- Emirbayer, M., & Goodwin, J. (1994). Network Analysis, Culture, and the Problem of Agency. *American Journal of Sociology*, 99(6), 1411–1454. <https://doi.org/10.1086/230450>
- Ferreday, D. & Harris, G. (2017). Investigating ‘fame-inism’: the Politics of Popular culture. *Feminist Theory*, 18(3), 239–243. <https://doi.org/10.1177/1464700117721876>
- Fiske, S. T., Gilbert, D. T., & Lindzey, G. (2010). *Handbook of Social Psychology*, Volume 2. John Wiley & Sons.
- Formanowicz, M. (2020). Verb Intergroup Bias: Verbs Are Used More Often in Reference to In-Groups than Out-Groups. *Social Psychological and Personality Science*, 11(6), 854–864. <https://doi.org/10.1177/1948550619893957>

Formanowicz, M., Pietraszkiewicz, A., Roessel, J., Suitner, C., Witkowska, M., & Maass, A. (2021). "Make it Happen!". *Social Psychology*, 52(2), 75–89.
<https://doi.org/10.1027/1864-9335/a000435>

Formanowicz, M., Roessel, J., Suitner, C., & Maass, A. (2017). Verbs as linguistic markers of agency: The social side of grammar. *European Journal of Social Psychology*, 47(5), 566–579. <https://doi.org/10.1002/ejsp.2231>

Frabetti, M., Gayraud, F., & Auxéméry, Y. (2023). Étude de l'agentivité dans le discours de femmes souffrant de trouble de stress post-traumatique dans les suites de violences conjugales. *L'Encéphale*, 49(5), 516–524. <https://doi.org/10.1016/j.encep.2022.09.002>

Gallagher, S. (2000). Philosophical conceptions of the self: Implications for cognitive science. *Trends in Cognitive Sciences*, 4(1), 14–21. [https://doi.org/10.1016/S1364-6613\(99\)01417-5](https://doi.org/10.1016/S1364-6613(99)01417-5)

Hart, R. P. (1971). The rhetoric of the true believer. *Communications Monographs*.
<https://doi.org/10.1080/03637757109375718>

Henry Tajfel, & Turner, J. (2004). An Integrative Theory of Intergroup Conflict. In *Organizational Identity: A Reader* (S. 56–65). OUP Oxford.
https://books.google.de/books?hl=en&lr=&id=BgBREAAAQBAJ&oi=fnd&pg=PA56&dq=%Tajfel++1979.++An+integrative+theory+of+intergroup+conflict.&ots=5sRfEmjq4r&sig=qyREJlrzG7sdZNOsitAMI1KFUR8&redir_esc=y#v=onepage&q=Tajfel%20%20%201979%2C%20.%20An%20integrative%20theory%20of%20intergroup%20conflict.&f=false

Hitlin, S., & Elder, G. H. (2006). Agency: An Empirical Model of an Abstract Concept. *Advances in Life Course Research*, 11, 33–67. [https://doi.org/10.1016/S1040-2608\(06\)11002-3](https://doi.org/10.1016/S1040-2608(06)11002-3)

Ling, C., & Dale, A. (2014). Agency and social capital: Characteristics and dynamics. *Community Development Journal*, 49(1), 4–20. <https://doi.org/10.1093/cdj/bss069>

Malinowska, A. (2020). Waves of feminism. *The International Encyclopedia of Gender, Media, and Communication*, 1–7. <https://doi.org/10.1002/9781119429128.iegmc096>

Mattel (2024). IMAGINING SHE CAN BE ANYTHING IS JUST THE BEGINNING. ACTUALLY SEEING THAT SHE CAN MAKES ALL THE DIFFERENCE.shop.mattel
<https://shop.mattel.com/pages/barbie-role-models> [01.02.2024]

Newman, L., & Dale, A. (2005). The role of agency in sustainable local community development. *Local Environment*, 10(5), 477–486. <https://doi.org/10.1080/13549830500203121>

Oscars (2024). THE 96TH ACADEMY AWARDS | 2024: NOMINEES. Oscars.<https://www.oscars.org/oscars/ceremonies/2024> [01.02.2024]

Pietraszkiewicz, A., & Formanowicz, M. (2023). Verbs Are Associated With Agency. *Social Psychology*, 54(5), 271–282. <https://doi.org/10.1027/1864-9335/a000522>

Quilty, R. (2023, August 16). *Brand Yourself Like Barbie*. LinkedIn.
<https://www.linkedin.com/pulse/brand-yourself-like-barbie-rachel-quilty/> [06.02.2024]

- The Guardian (2023, August 4). *Barbie's muddled feminist fantasy still bows to the patriarchy*.
Theguardian.<https://www.theguardian.com/film/2023/aug/04/barbies-muddled-feminist-fantasy-still-bows-to-the-patriarchy> [01.02.2024]
- The Guardian (2024). *Golden Globes 2024: the full list of winners*. Theguardian.
<https://www.theguardian.com/film/2024/jan/07/golden-globes-2024-the-full-list-of-winners> [01.02.2024]
- Schlosser, M. (2019). Agency. In E. N. Zalta (Hrsg.), The Stanford Encyclopedia of Philosophy (Winter 2019). Metaphysics Research Lab, Stanford University.
<https://plato.stanford.edu/archives/win2019/entries/agency/>
- Stylistmagazin (2024, January 24). *To say that I'm disappointed that they are not nominated in their respective categories would be an understatement.* Instagram
<https://www.instagram.com/stylistmagazine/p/C2e-NWYs3y4/> [06.02.2024]
- Synofzik, M., Vosgerau, G., & Voss, M. (2013). The experience of agency: An interplay between prediction and postdiction. *Frontiers in Psychology*, 4.
<https://www.frontiersin.org/articles/10.3389/fpsyg.2013.00127>
- Turner, J. C. (1984). Social identification and psychological group formation (H. Tajfel, Hrsg.; 1. Aufl., S. 518–538). Cambridge University Press.
<https://doi.org/10.1017/CBO9780511759154.008>
- Van Stekelenburg, J. (2022). Collective Identity. In The Wiley-Blackwell Encyclopedia of Social and Political Movements (S. 1–8). John Wiley & Sons, Ltd.
<https://doi.org/10.1002/9780470674871.wbespm039.pub2>
- Vigliocco, G., Vinson, D. P., Druks, J., Barber, H., & Cappa, S. F. (2011). Nouns and verbs in the brain: A review of behavioural, electrophysiological, neuropsychological and imaging studies. *Neuroscience & Biobehavioral Reviews*, 35(3), 407–426.
<https://doi.org/10.1016/j.neubiorev.2010.04.007>
- Zappavigna, M. (2011). Ambient affiliation: A linguistic perspective on Twitter. *New Media & Society*, 13(5), 788–806. <https://doi.org/10.1177/1461444810385097>