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**Investigating how Reddit users discuss Anthropomorphism and Identification regarding  
the Movie “Avatar – The Way of Water”**

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## Abstract

Anthropomorphism describes the attribution of human characteristics to non-human beings. It is often used as a technique in the movie industry for achieving emotional engagement. The Avatar-movies, directed by James Cameron, are environmental fiction films covering topics such as environmental protection and connection with nature. Environmental movies can influence the attitudes of the viewer through the identification with characters through merging with them. Human-like attributes make it easier to identify with film characters. The production team of Avatar used advance motion capture techniques to create realism by recording markers on actor's bodies, to achieve human-like movements and it was aimed to produce an even more realistic movie with part two: Avatar 2 – The Way of Water. This study aims to investigate the impact of anthropomorphism and identification in the second movie on the viewers. Through text mining techniques, the topics discussed in the fan community of Avatar 2 on Reddit were analyzed with the topic modelling technique Latent Dirichlet Allocation (LDA). It was aimed to find out how the fan audiences talk about the anthropomorphic portrayal of the non-human Na'vi characters, and whether the viewers identify with them due to their human-like look. At first, it was searched for the words anthropomorphism and identification in the subreddit “r/Avatar”, to get an overview about whether those topics are discussed there. Then, the filter “Avatar 2: TWoW (2022)” was used in this subreddit to get textual data from the fan community of the Avatar 2 movie up to the date of the extraction, the 19<sup>th</sup> of March 2024. The final dataset included 9885 that were analyzed. It was found that discussions about anthropomorphism included two levels, namely, the outer appearance of the Na'vi characters, as well as their inner characteristics. An identification with the Na'vi was observed, as viewers were relating with them, sympathizing, and even identifying themselves more with them than with the human species. Especially the anthropomorphism regarding inner characteristics seemed important for the identification with the characters. Even though limitations, especially regarding the dataset, influenced the study, it can serve as a starting point for further research and the film industry, as it gives insights into important factors to achieve identification with animated characters.

*Keywords:* anthropomorphism, human-likeness, identification, environmental movies, avatar, text mining, topic modelling

## Introduction

Movies are an important component of modern life. In current times of digitalization, mankind is exposed to a mass of films - whether as short video clips on social media, or productions on streaming services (Weng et al., 2007; Indriani et al., 2022; Kerrigan, 2018). The word movie stems from the invention of pictures that are moving, first presented by a horse galloping while a rapid succession of still images was captured by the camera (Bell, 1975; Kerrigan, 2018). At present, each year, around 4500 movies are created by the film industry (Weng et al., 2007). Movies serve not only for entertainment, but they can also be used as a means for political propaganda and emotional involvement (Kerrigan, 2018; Weng et al., 2007).

Temporary theorists concur that movies give their audience a psychologically realistic experience. They can create the illusion of realism, or look natural, therefore controlling what the person is viewing, when, and how. Through that, they can elicit emotions in human beings (Carroll, 1985; Tan, 1995). As the film-technology developed a lot over the years, this realism was created even more through audio-visual techniques, which influenced the emotional involvement even more (Cañas-Bajo, 2020). A study by Kim (2012) has shown that this emotional involvement through watching films is positively associated with visiting movie locations, an act of fandom towards those movies (Waysdorf, 2017; Kim, 2012). Thus, it is assumed that movie fans can experience substantial levels of emotional involvement while watching.

To evoke a personal involvement, movies do not necessarily need to depict real settings or human actors. Also animated, non-human characters can lead to an emotional engagement, and this effect can be even stronger if movie characters are presented as anthropomorphic to human beings. Anthropomorphism is the perception of a non-human with human-like attributes (Hetherington, 2015; Edwards & Shafer, 2022; Holliday, 2016). Although there is literature about the relationship between perceived anthropomorphism and identification with animals, there is a gap in the literature about self-identification with anthropomorphic movie characters (Serpell, 2003; Grasso et al., 2020). Thus, it is currently unclear whether anthropomorphism in movie characters is related to identification with those.

Movies are often concerned with current topics in which many people are interested (Ma & Liu, 2024; Kim & Park, 2021). The society is currently facing environmental problems like climate change or global warming, and those topics are also increasingly represented in movies. Environmental movies cover topics like nature, sustainability, or hazards for the

natural environment (Kim & Park, 2021; Pop, 2020). It has shown that one year after the release of environmental movies, businesses had improved their environmental behavior and performance, thus such movies appear to be able to influence the attitude and behavior of the society (Kim & Park, 2021). Literature provides ample evidence of the impact of mass media on public attitude. Much less is known, however, about the impact of movies, even though people of all ages and genders like viewing movies (Kim & Park, 2021). McCormack et al. showed that environmental films have an influence on the human-nature connection, as well as on pro-environmental behavior (McCormack et al., 2021). Thus, it can be assumed that watching environmental movies can also support a pro-environmental attitude in viewers. Various movie productions have incorporated environmental topics into their movies. One well-known example for environmental films are the Avatar movies, by James Cameron (Romadhon, 2011).

### **The Avatar-Movies**

The film Avatar: Departure for Pandora, directed by James Cameron, was released as a sci-fi action film in 2009. It is about Jake Sully, an ex-marine, who travels to the planet Pandora in the year 2541. The valuable mineral unobtainium is mined on Pandora, which could solve people's existential resource problems. A group of scientists therefore sets off to begin negotiations with the indigenous inhabitants of Pandora, the Na'vi, about the colonization of their homeland. Among them is the wheelchair-bound Jake, who slips into the skin of an avatar, a cloned Na'vi body, in place of his deceased brother. The Na'vi do not approve of humans mining the Unobtainium without regard for nature. Jake is supposed to serve as a spy in the Na'vi body, but his perspective changes. In his new body, he can walk again and explore the new world. He also meets Neytiri, in whom he finds an ally and a friend (Teufel, 2024; Filmstarts, n.d.).

The first avatar-movie used 3D-camera-technology and a system called "Performance Capture", which records and interprets markers positioned at body locations to capture the movement of an actor's body, to create realism. Those points are used to create an animated character's skeleton, therefore leading to human-like movements. A facial camera setup that includes the actor's actual facial expressions allowed human-like facial appearance. Those techniques enhanced the viewer's ability to immerse into another universe, Pandora, and partly even led to increased levels of depression after watching the Avatar-movie (Bolat & Sirer, 2023; McGowan, 2010; Hurwitz, 2023). Thus, even though the avatar-characters are taller than 2 meters, with blue skin, and longer legs and arms, it seems to be possible to

identify with them. As the production crew talked about how to make the performances even more realistic for future sequels after the original movie's release, questions arose regarding the impact of anthropomorphic elements in the second avatar movie on the viewers (Chen & Li, 2015; Hurwitz, 2023).

### ***Avatar 2 – The way of Water***

The sequel *Avatar 2: The Way of Water*, was released in 2022. The movie is again about Jake Sully who has merged with an Avatar body and is now living in Pandora for 10 years, with the warrior Neytiri and their family. Their life is getting in danger because the Resources Development Administration (RDA) comes back to the planet to mine the mineral unobtainium. The family flees to the exotic underwater world of Pandora, and tries to protect it from destruction by humans (KinoCheck, n.d.; *Avatar: The Way of Water - Teaser-Trailer Deutsch*, 2022).

The film covers topics such as the protection of natural resources and the environment. The underwater world of Pandora is an ecosystem that is threatened by humans. The Na'vi people have a deep connection with nature, and they are prepared to fight to protect their planet from harm. The film *Avatar 2* also deals with the importance of cultural preservation and the struggle to maintain traditions in modernization. The Na'vi are a spiritual and connected society, and their way of life is threatened by human technology (KinoCheck, n.d.).

Both avatar movies had big successes in the film industry. The first movie became a film with the biggest profit for the production team during that time with over \$2.7 billion. Part two also showed high successes, and became the third-highest movie in terms of ticket sales, trailing only the first avatar movie, and “*Avengers: Endgame*” (Tang, 2011; Rubin, 2023).

### **Anthropomorphism**

The success of the two films could be attributed to so-called anthropomorphism, that can be observed in the the characters in both films (Pop, 2009). Anthropomorphism describes attributing human-like qualities to non-human entities (Nowak & Rauh, 2008; Nass & Moon, 2000). A definition of anthropomorphism is “perceiving a non-human as having human form, thoughts, feelings, and/or goals”, thus, it can also be described as “human-likeness”. In the cinematic world, this technique serves as a powerful tool for emphasizing and emotional engagement, blurring the lines between fiction and reality (Edwards & Shafer, 2022).

The “Uncanny Valley” effect, a term implemented by a robotics professor named Masahiro Mori in 1970, described rules in the relation between anthropomorphism of robot technologies and emotional responses. Those rules are also discussed in the production of animation movies, as film characters nowadays can be designed as hyper-realistic (Kaba, 2013; Moore, 2012; Mori et al., 2012). According to the Uncanny Valley, the more something appears human-like, the more positive emotions are felt by the audience. A distancing effect, however, happens if it seems nearly entirely human. The theory suggests that an entity gains acceptance among humans based on how much it resembles a human being until it almost appears real. The Uncanny Valley effect happens at a point where a creature only breaks through into acceptance if its human-likeness becomes even more pronounced. According to recent studies, the effect is a result from a perceptual mismatch caused by contradictory clues in a character's look. Continuously unrealistic characters are more accepted by people than characters who exhibit several facets of realism simultaneously, such as abnormally wide eyes in a realistic face. This creates conflicting indications and can elicit negative feelings (Kaba, 2013; Moore, 2012; Mori et al., 2012; Flueckiger, 2011; Schwind et al., 2018). Thus, it seems to be a challenge to create a degree of anthropomorphism in film-characters that ensures identification with them, and emotional involvement, instead of negative feelings. The non-human Na’vi figures in the avatar-movies show human-like features, as 3D-scans were made of the actors, and especially the actor’s mouth areas were captured as much as feasible. The production team wanted to achieve a clear resemblance to the human actors, at least in terms of the face. However, the anthropomorphism is limited, as the figures for instance have blue skin, tall bodies, and cat eyes. According to the director James Cameron, the characters have surmounted the Uncanny Valley effect. However, it is questionable to what degree the avatar fan communities regard the characters as anthropomorph, as the used technology in the film production could have achieved a human-like appearance (Flueckiger, 2011; Kaba, 2013).

### **Fan Communities**

A fan base has grown up around the Avatar-movies (Istoft, 2010). Fan communities increased during the last years with the rising media industry, and can be found in various internet forums. Fans are people who develop a subculture that is based on their shared interest and a belonging to a sense of community concerning media objects. They are active in their consuming and creation of media, and thus, they have a considerable impact on movie marketing (Cristofari & Guitton, 2017; Jenkins, 2007; Tsay-Vogel & Sanders, 2017). There are many film fan communities online who express their opinions on platforms like Reddit.

There, users can search in so-called subreddits, to get more information on a theme of interest (Pandunata et al., 2023; Eberhard et al., 2019). A study by Pandunata et al. (2023) used text mining and a sentiment analysis to find key elements that viewers of Avatar 2 frequently debate, giving insightful information for movie creation and marketing. It was found that the aspects of character, and mise-en-scene, defined as “the contents of the frame and the way that they are organized” (Gibbs & Gibbs, 2002), were discussed the most (Pandunata et al., 2023). The study gave an inspiration to use text mining techniques to dive deeper into the discussions on Reddit to find information concerning the Avatar-movies, anthropomorphism, and self-identification.

### **Three pathways towards human-nature connection and pro-environmental behavior**

Environmental films, as the avatar-movies, are narratives that may influence attitudes concerning human-nature connection, as well as pro-environmental behavior. McCormack et al. (2021) outlines three pathways in which those movies can affect attitudes and behaviors: Reduced resistance to persuasion, Interactions with Identity, and Meaningful Media Experiences (McCormack et al., 2021).

#### ***Pathway 1: Reduced resistance to persuasion***

The goal of narrative persuasion is to use the special powers of storytelling. Resistance is a barrier to persuasion, as it leads to disregarding the content message. This resistance might be overcome by narratives in two ways. First, narratives lower the quantity and potency of refuting or rationally analyzing the message. And second, they increase identification with the figures, which also lowers resistance (McCormack et al., 2021; Dal Cin et al., 2004). Deictic shift, meaning an immersion into the story, entails perspective taking of the narrator, and is central to that pathway as it can lead to less resistance. It diminishes the viewer’s cognitive capacity to evaluate the story negatively. Moreover, narratives have entertaining and absorbing qualities, which could conceal their attempt to persuade, therefore reducing resistance, and positively affecting human-nature connection and pro-environmental behavior (McCormack et al., 2021). Another factor influencing the viewer’s resistance is the impact on the perception of persuasive intent, for example through humor, which enhances the source’s appeal and perceived legitimacy (McCormack et al., 2021).

#### ***Pathway 2: Interactions with Identity***

Persuasion can also occur through the viewer’s identity. Media can lead to social comparisons between the viewer and the movie-characters, partly strengthening a person’s sense of self in relation to significant characteristics of the movie character, as values, or

beliefs. Those comparisons can lead to striving towards becoming a ‘better’ person. Moreover, even social learning, as imitating behaviors or characteristics of the movie-characters can take place. The perceived capability of engaging in the same behavior, however, is influenced by the degree of resemblance between the viewer and the character (Igartua & Frutos, 2017; Cohen et al., 2018; McCormack et al., 2021). Thus, there seems to be a relation between anthropomorphism and the attitude and behavior of the viewer.

Moreover, identification with the characters can happen, defined as the viewers merging themselves with the movie figures (Cohen et al., 2018; McCormack et al., 2021). This identification may also lead to less resistance towards persuasion, and to behavioral changes as well. Empathy is an important concept in relation to identification, however, in empathy, there is a differentiation between the self and others, while in identification, a merging takes place. This can be elicited also for non-human subjects. Here, anthropomorphism plays a role as well, because human-like attributes lead to an easier identification with the movie characters. According to literature, even human-nature connectedness and pro-environmental behavior is strengthened by anthropomorphism (Cohen et al., 2018; McCormack et al., 2021).

The identification with the characters from the avatar-movie already seemed to work out well as there is a huge fan base of the avatar-movies, which seems like a real community, using words as “clan” and “family” (*Community - Avatar.com*, o. D.). For example, an environmental project, named “Keep our oceans amazing”, was conducted in 2022 to increase public awareness of the problems that the seas and marine life face. Fans were invited to take part in the “Virtual Pandoran Ocean”, a digital experience where they could create individual ocean creatures. Disney donated money for every digital creature to “The Nature Conservancy’s (TNC)”, in order to assist the group in the protection of the ocean (*Community - Avatar.com*, o. D.; Grasser, 2022). Thus, it can be assumed that pro-environmental behavior can be motivated by the movies. Moreover, there are videos and audio-clips available on fan-pages to learn the Na’vi sign language, that is used by the habitants of Pandora (*Community - Avatar.com*, o. D.), which leads to the assumption that an identification with those even non-human movie characters can happen.

### ***Pathway 3: Meaningful Media Experiences***

Attitudes and behaviors can also be influenced by meaningful media experiences. There are two forms of responses by viewers, characterizing media experiences: Hedonic experiences, on the basis of satisfaction and pleasure, as well as meaningful media experiences, also called eudaimonic experiences, fostering connectedness and well-being.



Even self-transcendent media experiences can take place, considered as a higher form of eudaimonic experiences. They lead to more appreciation, including feelings as awe, as well as peak- and flow-experiences, meaning to be at a highest moment, and absolutely involved. Those experiences can enhance human-nature connectedness and could therefore also lead to pro-environmental behavior (McCormack et al., 2021).

## **The Current Research**

This study focuses on stream 2, Interactions with Identity, as it will explore if viewers of Avatar 2 identify with the non-human characters. Reddit-posts of the avatar-2-movie fan community will be explored for getting information about the anthropomorphic portrayal of the characters as well as identification with them due to that portrayal. Text mining will be utilized, as it uses single words from a data set regarded as specific for a topic, whereas traditional content analysis prioritizes the use of sentences. With using text mining, information from big textual datasets, as in Reddit, can be extracted, and it is based on algorithms, thus, it strengthens the reliability of the study (Aureli, 2017). Through topic modelling it will be investigated in which way reddit users discuss anthropomorphism in Avatar 2 and self-identification with the non-human characters.

- 1. How do fan audiences on Reddit talk about the anthropomorphic portrayal of characters in Avatar 2, specifically non-human Na'vi characters?*
- 2. Do the Avatar 2-fan audiences on Reddit identify with the non-human Na'vi characters in relation to the anthropomorphic portrayal?*

## **Methods**

### **Design**

A qualitative exploratory text mining approach, involving topic modelling, was used to investigate the discussions within the Avatar-2-movie fan community on Reddit. Through topic modelling, the specific topics regarding anthropomorphism, and self-identification, were analyzed.

### ***Topic modelling***

Large textual datasets can be automatically indexed, interpreted and summarized using topic modelling. This technique can be utilized to find abstract subjects and hidden topics within a text corpus (Tong & Zhang, 2016; Bioinformatics Laboratory, University of

Ljubljana, n.d.-b). One topic modelling method that is widely used today is Latent Dirichlet Allocation (LDA). It is a data-driven algorithm, therefore it reduces researcher bias in extracting a list of themes from a text corpus and choosing keywords. LDA is a feasible approach for the current study, as it is able to analyze big datasets as from Reddit (Tong & Zhang, 2016; Westrupp et al., 2022). It outperformed other algorithms as Latent Semantic Indexing (LSI) in earlier studies regarding the accuracy in word indexing processes (Negara et al., 2019; Edi, 2022).

## **Data**

To get a dataset suitable for the research questions, it was important to find keywords that define the topics of interest. As both research questions were based on anthropomorphism, it was decided to choose it as the main key word for the data extraction. At the beginning of the study, I, as a researcher, wanted to get an overview about my topics of interest in Reddit. Thus, I registered there as a user, and subscribed to the subreddit “r/Avatar” to get an overview about the available data regarding the anthropomorphic portrayal in the movie. There, I realized that anthropomorphism is a very specified topic and that there is not much data available covering exactly this word. As anthropomorphism can also be described as human-likeness, which is also a word that is more common than anthropomorphism, it was decided to filter the data according to the key words “anthropomorphism” and “humanlike” (Edwards & Shafer, 2022). To cover as many posts and comments regarding those topics as possible, it was decided to include words from the same root as well, like “anthropomorph”. As the research questions regarding identification based on anthropomorphism, it was decided to search for fitting information in that dataset. As earlier research found a connection between identification and anthropomorphism, the key word “identification” was included as well (Holliday, 2016).

The final dataset included the extracted textual data from the fan community in the subreddit “r/Avatar” with the filter “Avatar 2: TWW (2022)”. Reddit encompassed approximately 430 million users in 2023 and various online film communities express their opinions on Reddit (Helmker, 2023). On this platform, users can search for their topic of interest in so-called subreddits (Pandunata et al., 2023; Eberhard et al., 2019). Reddit is a platform based on user-generated content, thus, posts and comments are subjective and include opinions and individual viewpoints and sentiments of users (Chen, 2016). The platform originally developed as a meme-page, thus, it includes slangs, abbreviations, partly ironic or obscene contributions (Helmker, 2023; Barnes et al., 2021; Singer et al., 2014;

Wicaksana & Candrasari, 2023). In Reddit, text data is organized in subreddits, thus, data was filtered according to the topics of interest. As the research questions were focused on the personal opinions of the avatar 2 fan community, the user-generated content of Reddit was used to dive into chats and conversations, and into various viewpoints openly expressed by the users (Le & Mao, 2018; Amaya et al., 2021; Park et al., 2018; Lim et al., 2017).

Thus, the primary aim of the data collection was to extract relevant posts and discussions from the subreddit “r/Avatar”. The dataset covered the available conversations and viewpoints up to the 19<sup>th</sup> of March 2024. It was filled by comments and posts by active members of the Avatar-2-movie fan community on Reddit. The inclusion criteria encompassed users who have contributed to discussions concerning the specified topics up until the date of the data extraction.

### **Data extraction**

After getting an overview of the Reddit community and deciding for keywords, the data extraction and cleaning started in python. Python is a programming language from 1991 that is useful for software- and web development. It works on various platforms as Mac, Windows, or Linux and can be employed to read data files or modify them. Moreover, it can be utilized to deal with big data (*Introduction to Python*, n.d.; *Welcome to Python.org*, 2024; Van Rossum & Drake, 1995).

To get comments that were related to the second avatar movie, the filter “Avatar 2: TWW (2022)” was used in Reddit. The final keywords for the data extraction included “anthropomorph”, “anthropomorphism”, “humanlike”, “humanization”, “humanize”, and “identification”.

At first, comments and posts were extracted separately from Reddit. Two packages were mainly used, pandas, for creating data frames from the collected posts and comments and to save them as CSV files, and praw, the Python Reddit API Wrapper. This package was used to search for posts and comments in the chosen subreddit and to process the data. ChatGPT and a website to combine two excel files helped to merge the comments and posts into one dataset and to bring it to a format that can be processed in Orange (OpenAI, 2023; *CSV-Dateien Zusammenführen - Online, Schnell Und Einfach*, n.d.). The data set, consisting of comments and posts regarding the keywords in the Avatar 2 subreddit, contained some structural problems after the extraction with Python. There were empty lines and comment lines at the beginning, and the header had double semicolons at the end, as did some records. Some data records contained line breaks within the fields. These structural errors were

corrected in Python by removing comment lines and empty lines as well as the double semicolons. Lines that were separated by line breaks within the fields were merged and thus the file was cleaned up. The cleaned dataset, including 9885 messages, was then uploaded to Orange, for preprocessing and data analysis.

### **Data Preprocessing and Data Analysis**

For the preprocessing of the data and the following text mining analysis, the program Orange version 3.37.0 was used. This data mining program is used for “open source machine learning and data visualization” and has several thousand users per week, which makes it to one of the biggest open source data science environments powered by visualization (Bioinformatics Laboratory, University of Ljubljana, n.d.; *Bioinformatics Laboratory*, n.d.). The program encompasses functions to carry out different data analyses using a widget catalogue. As my impression of the dataset was that text content regarding anthropomorphism would be rather small, I decided to use as much data as possible, thus, I used the standard preprocessing settings in Orange. Those included to put the textual data into lowercase, to use the Regexp function for splitting the text into words while leaving out punctuation marks, and to filter out stop words, to get a better overview of the textual data. To get an overview about the topics discussed in the data, a word cloud of the corpus was generated that represented the most important words and calculated their frequency, which was displayed visually.

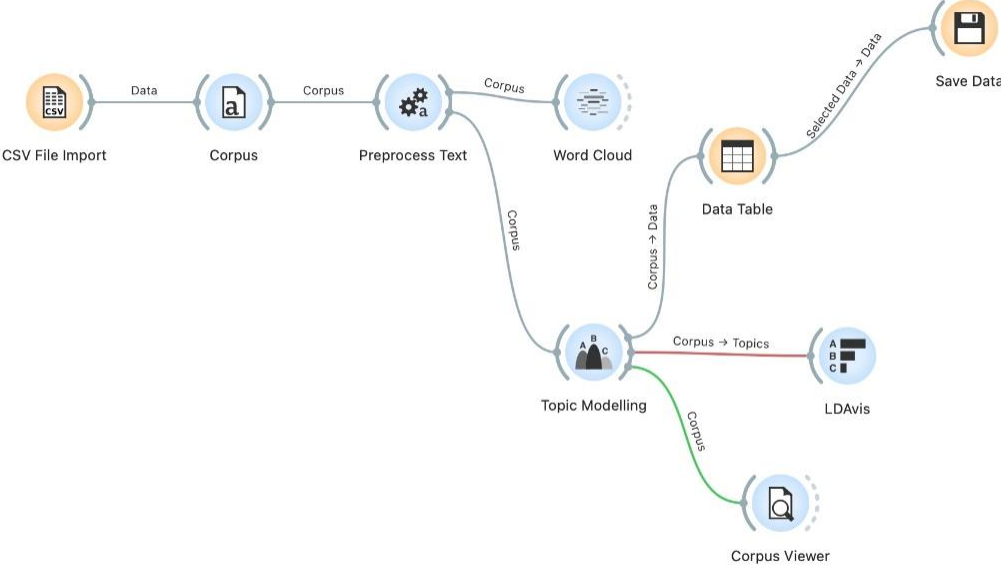
This method helped to decide to further filter regarding more stop words (Bioinformatics Laboratory, University of Ljubljana, 2017). According to literature about text clustering, stop words are exceedingly popular terms that would seem to be of little use in choosing textual data that meet the topics of interest (Manning, 2008). Stop words in this study included words that were not necessary for the text content interpretation, as “even”, or “also”. Words as “would”, or “could” were removed as well, because they often contribute more to grammar in general than to a specific content, and they can be present in various contexts, thus, they do not help to discriminate between different topics. Moreover, the dataset showed typographical elements like “t3\_1096n5e”. This seems to be an ID code, as Reddit organizes inputs with IDs to identify the referred thread (Manning, 2008; Siutla & Havaste, 2019). The words “avatar”, “2”, “human”, “like”, and “humans” obviously showed up frequently as the whole dataset was retrieved from the avatar 2 subreddit and filtered regarding human likeliness. Thus, they were deleted as well, to get more information about the topics of interest discussed in the subreddit. It was also considered to filter out “na” and “vi”, as it seemed obvious that they would show up frequently. However, it was decided to

leave them in, as it was interesting for the researcher to find out, if the viewers identified with someone, with whom this would have happened. Even though various stop words were filtered out before, some words unnecessary for the analysis still appeared in the data, which could be due to technical issues during the extraction. Those words will be left out in the results, as they are not important for the interpretation of the textual data. The whole list of stop words can be found in the Appendix (Appendix A).

In Orange, topic modeling was carried out to uncover the thematic patterns within the textual data from Reddit (Bioinformatics Laboratory, University of Ljubljana, o. D.; Hagen, 2019; Gharehchopogh & Khalifelu, 2011). The pre-processed data was used for the analysis, as topic modeling uses the complete data set. Latent Dirichlet Allocation (LDA) was applied to identify clusters of words that frequently occur, to uncover underlying topics in conversations within the subreddit r/Avatar (Gao et al., 2021; Curiskis et al., 2020). As a first result of the topic modelling, ten different topics were identified, a number that was set as a standard in the Orange menu. According to Morstatter and Liu (2016), one can manually inspect the different topic models to understand the different themes of interest covered in the data. An important aspect in the analysis is to have a look at the “between-topic” measure, which means to assess the quality of themes by the distinction to random words. Topics are assessed as good if random words and topic words can be separated. Not every topic seemed important for the further process or irrelevant for the research questions, as some keywords were too general and random for an interpretation. For example, one topic that included words like “see”, “character”, “yes”, or “well” was left out, as it still included stop words and other words that seemed not specific enough to interpret further (Morstatter & Liu, 2016). Moreover, other topics included more technical or typographical words, words related to the data from reddit, like “comments”, “com”, “jpg”, “number”, “content” or “etc.”. Those topics were also left out as they did not seem related to the research questions, but to the dataset in general. Two topics were merged into one due to an overlap between the topics. They included similar keywords and seemed to be both related to the same theme. Merging them can strengthen the interpretability of the topic, as closely related keywords lead to a higher “within-topic” coherence (Morstatter & Liu, 2016; Cui et al., 2011; Manning, 2008; Chakraborty et al., 2013). Therefore, at the end, six topics were chosen for further analysis. Then, I decided for fitting labels that would describe the topics. In orange, the topics do not get labels automatically, but they need to be interpreted and labeled subjectively, usually based on the most frequent terms in each topic. Thus, the labeling was done by hand based on research knowledge. Every topic was represented through a group of keywords. I, as a

researcher looked up definitions of unfamiliar terms and searched for similarities between the words to find a fitting label that encompasses all of them. I set the keywords in context of the avatar 2 movie, including knowledge from literature, thereby focusing on what could be important in the context of anthropomorphism and identification. At the end, a data table was created to get an overview of which comments or posts fall into which topic. An overview about the whole workflow in Orange can be seen in Figure 1.

**Figure 1**  
*Workflow in Orange*



**Results**

This section presents the results of the text mining analysis of the Reddit discussions about "Avatar 2". Firstly, the results of the word cloud and topic modelling are described. The various topics are then explained in more detail and the connections to anthropomorphism and identification are established.

The word cloud of the final preprocessed data, created to get a first overview of the topics discussed in the subreddit of avatar 2, is displayed in figure 2. The bigger the words, the higher the frequency of those words in the subreddit. The most frequent words with a weight, or frequency, over 1000 are displayed in Table 1. The other most frequent words included “na” and “vi”, “jake”, “think”, and “people”. In the word cloud it can be seen that



**Table 2**

*Collection of keywords with their topic labels and Marginal Topic Probability (MTP)*

<b>Topic</b>	<b>MTP</b>	<b>Topic label</b>	<b>Topic keywords</b>
1	0.42	Conflicts in Pandora	na, vi, pandora, earth, make, much, think, rda, get, know, people, humanity, way, planet
2	0.06	Characters and families	Spider, kiri, gif, parents, sigourney, tsireya, child, probably
3	0.11	Main characters and their experiences	Jake, Neytiri, spider, quaritch, na, vi, first, see, think, time
4	0.05	Reactions and discussions about Avatar	Canon, oh, watch, said, good, hope, love, youtube
5	0.05	Space travel and interstellar missions	Mars, planet, interstellar, travel, system, space, suits
6	0.08	First experiences with Na'vi and Pandora	Na, vi, think, cool, jake, first, look, avatars, fingers

### **Topic 1 – Conflicts in Pandora**

The first topic was the most important since it had the highest marginal topic probability. Key words in this topic are “na”, “vi”, “pandora”, “earth”, “make”, “much”, “think”, “rda”, “get”, “know”, “people”, “humanity”, “way”, and “planet”. Overall, this topic seemed to evolve around the Na’vi, the indigenous species living on Pandora, and the human invaders, who are part of the RDA (Resources Development Administration), a company that exploits Pandora’s resources. Based on manual inspection of messages in this topic, a theme that runs through the contributions is the conflict between both of those groups and the



comparison between Pandora and the earth. For example, one reddit user wrote “the navi seems to have been friendly at first towards humans until they did what they did [...]”. Other contributions include “The RDA needs the unobtanium and can only get it on Pandora [...]”, “The Na’vi lived millions of years before humanity have, and have survived that many without the need of our roads, our technology, our medicine, and our education [...]”, and “Humanity did that damage to Earth, not the Na’vi, why should they have to pay for what they did? [...]”. The word “humanity” also indicates that the conflict between humans and Na’vi was discussed. For example, one user writes: “[...] But I feel like the bigger thing that needs to change is humanity itself, it needs to move away from the hyperconsumerism and total exploitation personified by RDA and towards something closer to the way the na’vi live [...]”. Another user also describes the conflict in Avatar 2: “Not “the humans”, the companies like the RDA. That’s all they do, they wring every last drop of profit out of everything to the detriment of everybody but the top brass, and then move on to the next thing to do it again. Corporations ruined earth, and plan to do the same to Pandora [...]”.

In this topic, anthropomorphism seems to be present in a way that reddit users mostly emphasize differences concerning the looks of Na’vi and human beings. For example, they share: “[...] first time watching this movie i didn’t realize how huge the Navi where compared to humans [...]”; “Pure Na’vi have 3 fingers + thumb. Avatars have human DNA entwined and have 4 finders + thumb just like humans do. This trait got passed to the kids (Lo’ak and Kiri) [...]”. However, even though the Na’vi are not regarded as obviously anthropomorph here, some interesting discussions related to identification can be observed. Some fans are emphasizing with the Na’vi and speculating about how their feelings would be in the real world: “Do you think the Navi want to eat our food really? We torture and abuse animals for it, we keep them in cramped terrible conditions. It would break the Navi’s heart to see what we do to animals [...]”. The identification in this topic seems to be mostly related to the different attitudes concerning the dealing with nature and living beings. Users are merging themselves into the feelings of the Na’vi and are comparing their attitudes with those of humans, thereby partly placing the Na’vi on a pedestal. Some people even discussed that they would like to be Na’vi themselves, which shows that those fictional species can be regarded as role models from viewers. One user wrote: “Even the smallest chance of me being a Navi sounds like a dream come true. The only issue is the acceptance of the Navi, though even if they didn't accept me, I would still try to transfer [...] if I could choose to be something else than a human [...] then I would leave my human body in an instance. Why be a human, when

you can be someone else? [...]”. Some are even discussing about whether they would like to have intimate relationships with the Na’vi: “[...] I dont think that finding Navi hot is weird anymore. Whats weird is that we have a person on the sub [reddit] who wants to have sex with Navi [...]”. As intimate relationships are conducted within the same species it seems like users can identify with them, and are observing an attraction towards the Na’vi. It seems like there is still a level of human-likeness observed, even though the differences of the outer appearance were emphasized.

## **Topic 2 – Characters and Families**

“Spider”, “kiri”, “gif”, “parents”, “Sigourney”, “tsireya”, “child”, and “probably” are the topics connected to the second topic. The discussions seem to be about the film characters, as Spider, Kiri, or Tsireya, and their family relations, which is one main topic in Avatar 2. “Sigourney” could be related to the actress Sigourney Weaver, who played Kiri in the movie. The data included for example “Dude I think Spider has no choice. His surrogate mother was willing to kill him at the drop of a hat [...]”, “That parents braiding their child's kuru for the last time is a big thing”, or “Lo’ak mentioned he knew where his dad came from. Kiri watches her moms video logs, and in the comics the kids watch jakes video logs from the first movie [...]”. Anthropomorphism is discussed here mostly regarding outer differences between the human beings and the Na’vi: “[...] compared to humans jakes height is different. Human Norm (6’2) is under jakes belly, spider (6’3) is over jakes belly button [...]”. Some also evaluate the looks of the Na’vi: “[...] Good design although the tail is wrong. It stands on it's 2 foot so no need for a tail to balance the head. As I remember correctly they said it is added to increase Navi's emotional expressions hence sympathy of the people who watches [...]”.

Thus, the viewers are comparing the outer appearance between the species, regard it as not similar and emphasize differences. However, they are looking for human-likeness, they just do not find it. They also mention sympathy in relation to emotional expressions from the Na’vi. Thus, it could be that the facial expressions of the animated figures are perceived as human-like. Moreover, it was discussed about techniques to film Sigourney Weaver, as she played a 14-year old girl: “They could film him with someone younger and Sigourney separately, and use the footage of Sigourney in the final shot. Because that's kind of what they do with all scenes of spider when he interacts if Na'vis, isn't it? [...]”. Thus, the viewers are talking about techniques to achieve a realistic effect of the human actress playing a young Na’vi character. Moreover, they are also trying to find suitable categories to categorise the

Na'vi: “[...] Just for the fact that we see Neytiri pregnant and the fact that she has breasts to me seems like that confirms that Navi are mammals. They apparently have a live birth and they have breasts for some reason [...] They have hair, are warm-blooded, have complex brains, and their young are born defenseless [...]”. Thus, here, mostly general similarities to human beings are discussed. It is also hypothesized about emotional meanings behind the body paintings of the Na'vi: “[...] The body paints have deeper meanings [...]. Neytiri's black markings over her eyes symbolize mother's grief and tears”. Thus, human feelings and thoughts are transferred to the non-human species. Identification with the Na'vi seems to have happened here on a more emotional level. Users engaged in emphasizing on a deep emotional level with some movie characters and try to find explanations for some behavior: “The main thing that him and Lo'ak have in common is that they both struggle to live up to their parent's expectations, more specifically their fathers [...]. Him and Lo'ak both have reckless personalities and struggle to make their parents proud but the main difference between them is how they cope with their sense of inadequacy; Lo'ak is a bit insecure and a screw-up but he has a huge heart underneath it all, but Ao'nung takes out his insecurities on others, hence the bullying [...] Ao'nung [...] has a lot to live up to which is why he shuts down when being scolded by his parents [...]. I feel like he disappoints his parents pretty often and he's used to getting yelled at, which may be why he doesn't have as much of a reaction [...]. He knows the drill; mom and dad are mad at me and the best thing to do is to shut up and listen”. Identification can be observed in a way where people try to emphasize and understand the non-human characters. In that way, they are transferring human-like traits to the figures, like struggling to make the parents proud or putting insecurities on others. This can be described as anthropomorphism, however, not on a level of the outer appearance.

### **Topic 3 – Main characters and their Experiences**

“Jake”, “Neytiri”, “spider”, “quaritch”, “na”, “vi”, “first”, “see”, “think”, “time” are keywords that encompass the main characters Jake and Neytiri, as well as the new and important character Spider and the main antagonist Quaritch. Thus, this topic seems to be about their experiences. Comments and posts in the subreddit include: “Do I think Jake was weird for wanting to sleep with Neytiri? No cause he literally spent so much time in his Avatar. He wasn't sure which body he belonged to [...]”, and “While Jake and Quaritch's marine style of fighting, is more subjugation, quick precise and aim to incapacitate or kill their opponent [...]”.

The connection to anthropomorphism can be found, as some users are comparing the Na'vi characters to human beings. For example, one user wrote: "In ATWOW Jake says "it was love at first sight" which implies physical attraction. And additionally in Avatar it is clear in their first interactions the first night they met that Jake is at least slightly attracted to her in his mannerisms toward her [...] I point to Jack and Rose from Titanic. Jack didn't know her, but when he first saw her when she came out to get some air on the first class deck he knew nothing about her but was infatuated [...]". Thus, the user is comparing the non-human characters with human characters from another movie, thus pointing to some similarities between the species, however more concerning actions, or feelings than concerning outer appearance. However, it was also talked about physical attraction towards the Na'vi: "[...] Fantasizing about such intimacy is... often the output/reaction of finding someone attractive. Not always!! But often... and I think... that's okay and not weird at all (if it's a harmless attraction) [...]"; "You know what's funny for me is that when I saw Avatar 1 back in 2009 I was 15. Loved it. Didn't find the Na'vi hot. Yes Neytiri was always beautiful though and Jake was "cute" but nothing more than that. But then when the teaser trailer for ATWOW dropped I remember being like "hmmm" to who turned out to be Quaritch when he ducked under the tree [...] Now I'm crushing HARD haha Attraction just happens I guess! [...]". As mentioned before, physical attraction and intimate relationships are happening within species, therefore, this indicates sort of anthropomorphism regarding the Na'vi's look. Identification with the main characters can be observed as well: "Jake probably fell in love with Neytiri's personality and kindness to him, followed by her looks [...]". Here, one person is hypothesizing about the feelings of the main characters, therefore emphasizing with them. Moreover, one user is comparing him- or herself with some of the main movie characters and presents a fan fiction, a story where she continues the story of Avatar with her own ideas, therefore merging with the different characters to deliver a coherent story: "So I guess I'm similar in many ways actually! The story I wrote for example is like a Neytiri equivalent but for Quaritch. Because I think he's interesting as a villain and want to see him find love and what that would do for his relationship with Pandora! So I wrote such. [...] So my Na'vi OC has elements of myself (as I said the same way Jake Sully defo probably has elements of James Cameron) but it's not a blatant self insert."

#### **Topic 4 – Reactions and Discussions about Avatar**

Topic 4 includes the key words "canon", "oh", "watch", "said", "good", "hope", "love", "youtube". A common theme seems to be the reactions and general discussions about

the movie, expressed by emotions, opinions or evaluations, thereby sharing evaluations or external content as from YouTube. For example, the word “canon” describes how consistent fictional events are, thus, discussions about what is “canon” are important to get an insight into what fans regard as acceptable for the content of the movie (“Omg yes this is canon for me [...]). One citation that shows a reaction to another fan reaction is “God that was a good post, you’ve summed it up well, and the phrasing was on point. Great job and I agree with everything [...]. Another user referred to an external source speculating about a plot twist “Good job! Totally agree. There's an interesting [youtube video] arguing that the Na'vi are NOT actually from Pandora. That would be a very interesting plot twist for sure that I would really love [...].”

If it is really talked about anthropomorphism is not entirely clear. One user is discussing and evaluating an outer look, which seems to be about an animated character. However, it is not mentioned how the person evaluates the features, if he or she is comparing them with a human or not: “Yeah I know, that's an easteregg. I say it's not canon because the nose isn't the right shape, the ear placement is wrong, there's no queue, the toes aren't correct and the height is way off. It's just some early concept art they used as set dressing because no one would care. But it's so inaccurate that it has no influence on the actual canon. And even if it is canon you can still just see it as a propaganda piece, because again, too many inaccuracies [...]. However, one user writes about humanity in the movie: “[...] humans are the problem in the movie. Their dangerous behavior and lack of regard for the wellbeing of life and nature [...] Now we are literally dehumanizing Quaritch, saying he is evil, and obviously thus deserves to die, be punished, etc for what he has done. We are as evil as he is in many ways, and yet we would like to think we are not like him. We like to think that we are the good ones [...] I imagine Quaritch thinks the same exact thing. This is what makes the movie spiritual, because we know deeply there is a part of us that is beyond human. Whatever it may be, I hope Quaritch finds it. Personally I think it is a deep connection to all things living. Not just the human and human body, which is merely flesh and temporary, but instead something more permanent, or as some like to say, infinite [...]. Here, the user is talking about Quaritch, who is a human, but cloned as an avatar, thus, also appearing with a blue body and differences to humans in the appearance. As he appears non-human but is a human, it turns out to be difficult to interpret more regarding anthropomorphism. But, at least, it can be said that it is talked about different looks, dehumanization, and a perceived connection between all living species. The sentence “[...] I imagine Quaritch thinks the same exact thing”

shows identification with the character, but, as mentioned before it is questionable how important that information is, as the character is not really non-human. However, one user writes: “There’s the Kelutral and LearnNavi websites. The discord and I’ve also made some notes if you would like them [...]” which shows that there is an interest in learning the language, thus merging more with the characters (Learn the Na’vi Language Online at kelutral.org, n.d.). Moreover, that users are speculating about how “canon” things are in the movie, and discussing various theories about it shows an emotional involvement which is also related to identification.

### **Topic 5 – Space Travel and Interstellar Missions**

“Mars”, “planet”, “interstellar”, “travel”, “system”, “space”, “suits”, are all words related to space missions. Avatar 2 is partly about the travel from the earth to Pandora and the technological details and challenges of it. Thus, the discussions could be about the space travel content of Avatar 2, as well as about comparisons with real world space missions and technologies. Some users are comparing the fictional space with the real world: “Polyphemus - the gas giant that Pandora orbits - has 13 other moons that are all in the habitable zone of their star [...]. In our solar system, Mars and Venus are also in the habitable zone, and yet they aren't habitable [...] The concept really has limited usefulness [...] So yeah, the reason I said "interstellar" is because I meant "interstellar", not "within the Polyphemus planetary system [...]”; “Wouldn't it cost more to get humans to Pandora since it is a lot more further from earth than Mars would [...]”; “[...] What if Pandora and earth are just a result of directed panspermia as the the physical and chemical similarities seem to indicate? Would those precursors be bad for giving us the opportunity to exist?[...]”. The word “suits”, however, seems to be more related to the clothes that the RDA people are wearing in the movie, not especially during space travels (“I like their mech suits and helicopters. If only they were arrow-proof...[...]).

It is noticeable here that anthropomorphism in the sense of human likeness is discussed less. Nevertheless, references are made to the reality of humans and the solar systems are compared with each other. Although anthropomorphism is not discussed, the fictional world is compared with the real world, which shows that people can identify with the story in some way and make references to their own world. This becomes clear when reading through a few texts on Reddit that are discussing human space travel in respect of the movie: “I don’t think you realize how small 30 years is in terms of space travel. Humans first went to space in 1961 and now 62 years later we still haven’t entered another planet, though we have

still progressed extremely heavily in terms of aerospace. As the first ship to take humans into space went at 7.9m/s which was the fastest of its time and our current fastest ship goes at a 163km/s [...]”. Some users are also discussing pro-environmental attitudes in relation to space travel in avatar 2 and in the real world: “[...] if you really want to save Earth and humanity, you don’t even have to come to Pandora. Hell, you don’t even have to go interstellar. The ISVs sent to Pandora presumably use a laser sail from the Earth part of the journey to Pandora, which is in the Alpha Centauri system 4.3 light years away. I assume these laser sails get the photon power from the Sun or something else, which would have to be extremely energetic since each ISV is thousands of tons massive. If the RDA or humanity really was thinking right, they could use this energy to power their entire infrastructure for possibly \*millions of years\*. A bonus would be reterraforming the Earth and colonizing other planets and moons in the Solar System. Idk why humans in Avatar are like this. Maybe for the plot or to show corrupt corporations. One of the reasons why I don’t like Avatar.” The user argues that there is no need to travel to Pandora to save Earth and humanity and writes that the technological resources used for interstellar travel could be used to solve the problems on Earth itself. He or she criticizes that the humans in the movie do not act rationally and prefer undertaking interstellar travel rather than using the resources available to save the Earth, thus displaying a dystopia. This critical commentary reflects a deep emotional engagement with the plot and ethical implications of the film. It shows that fans not only look at the visual and emotional portrayal of the characters, but also critically scrutinize their actions, motives, and the underlying logic of the plot. In this way, they put themselves in the shoes of various film characters in order to understand their actions or reject them because they cannot identify with them.

## **Topic 6 – First Experiences with Na’vi and Pandora**

Topic 6 includes “Na”, “vi”, “think”, “cool”, “jake”, “first”, “look”, “avatars”, “fingers”. A common theme that encompasses these words seem to be the first experiences of the viewers with the Na’vi on Pandora, and their outer appearance. Users write their opinion about the appearance of the Na’vi and are comparing their bodies with human: “I don't find them hot but to say they look like animals is a stretch. They're taller, skinnier blue humans with bigger eyes, four toes and fingers instead of five, only animalistic features are the ears, noses, teeth and maybe the tails [...]”; “How did you look at their children and think "they mostly inherited the human DNA", if that was the case, they would look human [...]”; “Wasn’t it Kiri’s fingers that first caught their attention tho (‘half breeds’)? Plus Spider, a

human kid, being with them, I don't think they could've gotten away with just being regular Na'vi children, gesture or not [...]". This shows a comparison of the Na'vi with the human species.

Even though differences are outlined, especially the first comment mentions Na'vi as "taller, skinnier blue humans". Thus, he or she really regards Na'vi as human, which shows a clear connection to anthropomorphism. Moreover, some are comparing their first opinion of the looks of the characters with the first movie and reflecting about possible design choices: "I think one of the reasons might be to create easier scale for scenes with human characters. I think for Na'vi and Avatar characters they just added around 1m to their real life height [...] They are still tall but in the first movie it was more breath taking. Spider now looks super tall next to them compared how small was Grace when Jake carried her [...]". It shows that viewers are trying to understand choices that were made in the movie production, thus, more identifying with human decisions and human beings here, instead of with the Na'vi. However, in relation to the design of the avatar's looks, an identification is discussed as well: "It may have been more practical for the actors considering that Spider is in a lot of scenes in this movie with other Na'vi. Personally, I think the change in height is symbolic of how we (the human audience) are growing closer to these characters who we relate and sympathize with. The Na'vi are becoming closer to the humans in this story both diplomatically and now 'physically in terms of height'! [...]". The viewers are emphasizing with the actors and are analyzing the movie from a distant perspective to understand some choices made. However, they regard the relating and sympathizing with the characters as a reason for those choices. Thus, identification is here discussed more from a meta-perspective, as viewers regard their identification with the Na'vi as a reason for design choices.

## Discussion

The aim of the study was to find out how Reddit users talk about anthropomorphism and identification in relation to the movie avatar 2. This qualitative approach, supported by automated topic modelling, was conducted on two levels. First, a data corpus was collected where the chances were high to get content related to the topics of interest. Second, it was investigated in that text corpus what topics the reddit users are talking about, and how anthropomorphism and identification are mentioned in different topic models.

For the first research question (*How do fan audiences on Reddit talk about the anthropomorphic portrayal of characters in Avatar 2, specifically non-human Na'vi characters?*), it can be said that various users compared the Na'vi and human beings on two



different levels, namely their outer physical appearance and their inner characteristics. They were looking for similarities regarding the looks, which shows that they were comparing their species with the Na'vi. Interestingly, they mostly discussed differences instead of similarities concerning the outer appearance of the two species, like the different heights, fingers, or mentioned animalistic features. But even though they mostly saw differences, the Na'vi were compared more often with human beings than with animals or other species. Here, the second level of character traits could give an explanation about why the viewers consider more differences between physical characteristics, but are still comparing humans with the Na'vi. Advanced animation techniques, such as those used in Avatar 2, make it possible for film characters, whether objects or animals, to be given human characteristics and actions. In some Disney films, viewers are also confronted with objects or animals that can think, feel, speak, and act like humans, which has not necessarily something to do with how they look. People tend to transfer their emotions to other beings when they recognize familiarity in them (Pfeffer, 2012). This seems to have happened in the fan community of Avatar 2 – The way of water on Reddit. Viewers were describing emotions and mental attitudes similar to those of humans and also mentioned that they were relating and sympathizing with them. Similarities were found more in character traits than in their look. The subreddit members were comparing different attitudes and sometimes even put the Na'vi on a pedestal as they criticized human actions in comparison to the Na'vi's. This is also something that can be described as a sort of identification, as the viewers were putting themselves into the shoes of the non-human characters.

The second research question was *Do the Avatar 2-fan audiences on Reddit identify with the non-human Na'vi characters in relation to the anthropomorphic portrayal?*. In addition to fan pages such as Avatar.com, where the language of the Na'vi is practised, the discussions on Reddit also clearly show that identification with the Na'vi took place. They were sympathizing, feeling, emphasizing, and relating with the non-human characters. Some even wished to be of the Na'vi species as they could identify themselves more with them as with humans. The question arises as to how much of this identification, the merging of human beings with non-humans, is a consequence of an anthropomorphic portrayal. Even though a clear connection with the outer human-like representation was not clearly observed in the textual data, studies indicate that anthropomorphism is an important part of animated films in order to ensure emotional involvement and identification (Community - Avatar.com, n.d.; Pfeffer, 2012; Cohen et al., 2018; McCormack et al., 2021). The definition of anthropomorphism was “perceiving a non-human as having human form, thoughts, feelings,

and/or goals” (Edwards & Shafer, 2022). Thus, the second level of anthropomorphism that was present in this study, the inner characteristics as thoughts or feelings, seem of a greater importance than the actual look of the non-human characters. Moreover, according to the Uncanny Valley effect, positive emotions increase with human resemblance, but negative emotions can be triggered if something looks almost real but has contrary characteristics (Kaba, 2013; Moore, 2012; Mori et al., 2012; Flueckiger, 2011; Schwind et al., 2018). Negative feelings towards the Na'vi regarding their appearance were not evident at all? in the Reddit fan community. The users were talking about differences but still comparing both species with each other. This suggests that James Cameron may be right in his statement that his characters have bypassed the Uncanny Valley effect (Flueckiger, 2011; Kaba, 2013). It seems that especially the inner characteristics of the Na'vi led to a comparison and to an identification among the viewers. Additionally, the outer appearance was not too similar to human beings to elicit negative emotions. This could have led to the identification that was observable among the reddit community. Thus, the visual similarity of Na'vi and humans alone does not seem to be necessary in order to identify with them, but the human-likeness concerning inner characteristics.

### ***Limitations and Implications for further research***

Even though the findings gave insights into the topics of anthropomorphism and identification in the fan community, there were some limitations in the study. The data set was pre-filtered with specific words related to anthropomorphism as well as with the word "identification". This meant that all posts and comments on the topic of identification were included, regardless of whether they were related to anthropomorphism or not. Although this resulted in a large data set that can provide many insights, it also resulted in more general topics, and it was more difficult to connect identification to the anthropomorphism. Moreover, due to that, the data is not representative anymore for all the posts and comments on the movie, as it could be that anthropomorphism and identification related to the avatar characters are discussed less in general. This gives rise to ideas on how this study could be improved. In a re-run of the study, more colloquial every-day words should be found to describe anthropomorphism, thus limiting the data set to contributions to anthropomorphism only. In this smaller data set, it would then be easier to find correlations to identification. As the data set for this study was significantly larger due to all the content for identification, there were also technical difficulties in the computer program Orange, which limited the possibilities for data analysis. These technical difficulties could be resolved by using a more compressed data

set. This could also lead to smaller, more detailed topics in topic modelling that give more insight into the discussions regarding anthropomorphic portrayal and identification.

Additionally, using Reddit as the source of data has its strengths and weaknesses. As it organizes textual data in subreddits, it makes the data extraction concerning the topics of interest easier because of the filter on the platform (Le & Mao, 2018; Amaya et al., 2021; Park et al., 2018). Moreover, the study focused on the discussions and opinions from the avatar fan community on reddit, and this platform encourages subscribers of the subreddits to converse with one another, and freely express their opinions and feelings, leading to various viewpoints and different discussions (Kang et al., 2014; Lim et al., 2017). However, choosing Reddit as data source can also lead to possible biases because reddit users are not necessarily representative for the general public. Not everyone uses Reddit, and children, or elderly people could have different viewpoints concerning the Avatar Movies than reddit users, who are mostly aged between 18 and 34 (Proferes et al., 2021; Westrupp, et al., 2022). Moreover, reddit is in general used by more men than women, thus, it could be an interesting implication for further research to also focus on women's identification with non-human characters (Reddit.com, 2021; Proferes et al., 2021; (Reddit: Nutzung Nach Geschlecht Weltweit 2023 | Statista, 2024).

Moreover, one weakness of the study is that the definitions of anthropomorphism and identification chosen have a lot in common. The definition of anthropomorphism was "perceiving a non-human as having human form, thoughts, feelings, and/or goals" (Edwards & Shafer, 2022), identification was defined as a merging between the viewers and the movie figures (Cohen et al., 2018; McCormack et al., 2021). While the definition of anthropomorphism encompasses the two levels of outer and inner characteristics that were also present in the reddit discussions, the definition of identification was very broad. "Merging" can have a lot of meanings and also has similarities with anthropomorphism. For example, if a user is putting him or herself in the position of a non-human it can be regarded as a sort of merging, but also as a comparison of inner characteristics that could indicate anthropomorphism on the second level. Thus, as it can be regarded as a strength of the study to highlight the two different levels of anthropomorphism and their different importances for fan communities, a limitation is the inadequate anthropomorphism-related delineation of identification. Therefore, in further research attention should be paid to finding a clearer definition of identification and maybe also identify different levels of it to separate it more from anthropomorphism. In that way, the relationship between the anthropomorphic portrayal

and identification could be clearer investigated, as it now seems a bit obvious that both relate with each other because of similar definitions.

Another limitation that should be mentioned is a possible researcher bias that could have impacted the results. Latent Dirichlet Allocation served as a useful tool for analyzing a huge dataset and finding data-driven topics. However, there are no clear uniform recommendations available on how to determine an appropriate number of topic models, thus, this decision was purely based on the researcher's knowledge. Decisions on how to clean the data appropriately before conducting the LDA method were also done by the researcher (Westrupp, et al., 2022). Therefore, the methodological approach chosen, including the decisions about stop words or about the final list of topic models, could limit the validity of the results (Günther & Joshi, 2020). This could be improved in a re-run of the study with including a team of researchers to make significant decisions considering different expert viewpoints. This could also lead to an improved dataset, as the filter words to extract the data were also based purely on the definitions the researcher considered important. There might be more words to describe anthropomorphism, as this word is less used in common language. Here, a deeper research into the definition of anthropomorphism and discussions with other experts – maybe with a deeper knowledge about the possibilities of Python and Orange – could help to get a more nuanced dataset.

## **Conclusion**

This study investigated how Reddit-users talk about anthropomorphism and identification related to the non-human characters in the movie Avatar – The Way of Water. Anthropomorphism was discussed on two different levels, the outer physical appearance of the Na'vi, and their inner characteristics. Moreover, an identification with the characters was observed in the data. Especially the anthropomorphism regarding inner characteristics seemed important for an identification with the non-human Na'vi characters. All in all, this study can serve as a basis for gaining an understanding of the topics the Reddit fan community of Avatar 2 talks about. It gave an insight into different discussions concerning the content of the movie, different levels of anthropomorphic portrayals and discovered that human-likeness concerning inner characteristics of non-human characters can be of great importance for identifying with them. Those insights could be useful for the production of other animation movies that want to achieve emotional involvement and identification. Even though the current study had its limitations, some perspectives for further research were outlined, which

could be helpful to dive deeper into the topics of identification and anthropomorphism in animation movies.

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## **Appendix**

### Appendix A

#### *List of Stopwords*

would

could

human

like

humans

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2

3

4

5

6

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15

avatar

even

also

t3\_10ff69I

t3\_10ff69l

t3\_1345fit

t3\_zyu9uq

t3\_152b0vi

t3\_10r6n38

t3\_156n8b0

t3\_15tmypi

t3\_1096n5e

t3\_1579nzo

t3\_15i6nt2

t3\_18431h0  
t3\_14pln9h  
t3\_10r6n38  
t3\_16lvmjj  
t3\_11eo8ld  
t3\_14xqk9l  
t3\_1amazzw  
t3\_15ktygl  
t3\_10dwdrv  
t3\_12ta265  
t3\_106t8o7  
t3\_13dq9i5  
t3\_102oz8r  
t3\_zuy6i5  
t3\_16jq745  
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t3\_14uywgp  
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12  
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t3\_11arpe7  
really  
11  
www  
t3\_1072j5v

t3\_13ze8sf