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Balint, Katalin; Rooney, Brendan

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## 9 Shot Scale and Viewers' Responses to Characters in Animated Films

*Katalin E. Bálint and Brendan Rooney*

### Introduction

Dudok de Wit, in his Academy Award-winning animated film *Father and Daughter* (2000), presents a highly emotional story about a daughter's constant grieving of and deep longing for her father, whom she lost at a young age. Remarkable in this animated film is that the director chose not to show any facial detail of the characters. The mood is implied via simple colors of sepia, brown, and grey, repetitive music, and body language. As there are no close-ups on the face, the viewers are invited to fill in the emotional gaps for themselves and arrive at an emotional understanding of the character's mind without receiving ready-made information. Dudok's artistic decision to not show the face goes against the current trends in filmmaking (just think of the exaggerated facial expressions of *Inside Out*, discussed in this book) but also calls for a practical investigation: *What is the role of close-ups in animated narratives in viewers' understanding of characters? Do viewers of computer-animated narratives need close-ups for the understanding of characters' emotion? If yes, how many close-ups are enough (or too much) to activate understanding? At which point in the narrative is it the most effective to show the close-up to activate responses in viewers?*

Addressing these questions, the present chapter focuses on a key feature of visualization, namely shot scale, a formal feature of the moving image through which animation designers can regulate the apparent distance and size of objects on screen (Zettl 2013). Close-up is the type of shot scale suitable for showing the details on screen. When reviewing the role of close-up, this chapter draws primarily on a number of empirical studies conducted in media psychology and communication studies. These interdisciplinary fields apply empirical–experimental methods of the social sciences for studying psychological responses to mediated messages. Experimental methods are rarely used in film and animation studies, although they can provide scholars with important insights. One of the main advantages of experimental methods is that they can detect causal mechanisms between a selected visual feature and a specific response in viewers. This kind of knowledge is of great value for the advancement of animation studies.

## Theoretical Framework

Computer-animated films are ideal objects for scientific investigations of emotional expressions. On the one hand, recent technological advancements in computer software, algorithms, and capacity made computer-animated narratives an extremely powerful media for expressing and eliciting emotions. On the other hand, the technique of computer animation is an ideal combination of total freedom and absolute precision. It offers an endless number of creative ways for displaying emotional experiences onscreen and makes highly systematic experimental investigation also possible. Visualization, the way and techniques through which content is visually presented, is considered a key element in this strong emotional effect (Wells 2013). For example, in visual stories, the scene can be staged to allow all characters to be seen at the same time or to focus on just one character. Colors and lighting can be used to draw attention to some elements of the scene, and music can communicate mood or other emotional information. Other techniques, such as crosscutting (successively switching between two elements), are a particularly effective way to prompt viewers to predict what will happen next (Magliano et al. 1996). These decisions on visual design have consequences for viewers' responses to the story. Despite the importance of visualization in film narratives, a systematic, evidence-based body of research on the role of formal-visual features in viewers' responses is still missing.

In order to understand the effect of close-ups on viewers' responses to animated narratives, first we present a model of the process of narrative comprehension. Then we review findings related to shot scale and, afterwards, present our own work on animated narratives – a series of experiments conducted with a special focus on issues related to close-ups, such as shot scale distribution, close-up frequency, and sequential serial order of close-ups, and their effects on social cognition.

Although the significance of formal features in the emotional power of storytelling has been acknowledged by film studies for a long time, the empirical studies of visualization have been lacking a comprehensive framework that integrates formal features, narrative processing, and viewers' responses. Despite the important developments in the understanding of various kinds of emotional and cognitive responses in viewers of visual narratives, empirical findings on the role of formal features are scattered across different disciplines. In the following, we briefly introduce three theories that could serve as important building blocks of such a framework for the studies of emotion in visual narratives when sufficient empirical evidence is at hand.

The event-indexing model stresses the role of mental models in narrative comprehension (Zwaan et al. 1995). When people read or watch a story, they automatically construct a dynamic and constantly updating 'mental model' of the narrative. The mental model is a representation

that includes the temporal, spatial, causal, and intentional information presented in the story events (Zwaan et al. 1995). The event-indexing model has been effectively applied to visual narratives (Magliano et al. 2001; Busselle and Bilandzic 2008; Cutting and Iricinschi 2015). For example, Busselle and Bilandzic (2008) claim that the ease and smoothness with which a story can be represented in such a model influences the level of narrative engagement viewers experience with the story. In this account, narrative engagement occurs via mental modeling. Based on previous findings it can be assumed that formal features have a crucial role in facilitating viewers' recognition of event boundaries, which makes mental modeling more effective (Brunick et al. 2013).

The landscape view theory of text comprehension emphasizes the dynamic nature of mental models (Van Den Broek 1996). Readers' allocate fluctuating amounts of attention to concepts as the story unfolds during reading (Van Den Broek 1996). Importantly, this theory claims that the attentional fluctuation is governed by formal characteristics of the text; for example, those concepts that are mentioned frequently will get more attention (i.e., activation) than others. By this account, the emerging memory of a story reflects the 'landscape of activation'; that is, content that attracted more attention during reading will be more available in a free recall after reading. Findings from other disciplines also suggest that visual features have a strong potential to determine which content attracts more attention and, in turn, will shape the emotional and cognitive experience of the story.

A particularly influential theory on the role of formal features in communication sciences is the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP, Lang 2000). According to this, viewers only have a limited cognitive capacity that they can allocate to the processing of different parts of the mediated message. Viewers allocate attentional resources to process information, and the more they use on one aspect, the less they have available to process another at the same time. The allocation of 'extra' cognitive resources to some element of the message raises the probability that that element becomes part of the mental representation. Through underlying motivational systems, the allocation of attentional resources shapes the valence and the intensity of the emotional response to the message.

The LC4MP states that viewers can decide which part of the message they wish to process; however, non-content features have a strong potential to evoke automatic allocation of cognitive resources to message processing. Hence, varying the type and number of structural features in a message influences the extent of motivational activation and the way the message is processed. A growing body of empirical studies has supported this idea (Lang 2000; Morgan et al. 2003; Detenber and Lang 2010). For example, audiovisual formal features of films can synchronize viewers' attention (Mital et al. 2011) as well as brain activity

(Hasson et al. 2008); that is, when people watch the same professionally composed film scene they look at similar parts of the image for similar amount of time (Smith and Henderson 2008). This synchronicity has been dubbed by some researchers as the “*Tyranny of Film*” (Loschky et al. 2015) and suggests that creative designers can regulate the depth and source of information processing (Smith 2013).

But how do they do it? In this chapter, we propose that one of the most powerful ways that storytellers can regulate cognition and emotion is through the formal features they use to tell the story. In the following, we will focus on the way in which shot scale can be used as a powerful tool in animation to shape viewer engagement.

### **Shot Scale and Close-Ups**

Shot scale, defined as the apparent spatial distance of the camera from the main subject of the shot as well as the relative proportion of the figure of the character and the background (e.g., close-up, medium shot, long shot) (Salt 1992; Bowen and Thompson 2013), is one of the most salient stylistic feature of audiovisual messages (Kovács 2014). When describing shot scale, shots are generally considered to fall within one of the categories of long shot, medium shot, or close-up shot. Long shots typically portray the character from a distance where they occupy a small area of the scene and are surrounded by a larger space or environment. The medium shot depicts the human figure from what seems to be about 3–5 feet away, so usually they can be seen from the waist up. The close-up shot typically shows the character’s face (or some element of the story) in detail, usually from the upper shoulder and including their entire head and face (Bowen and Thompson 2013). From these descriptions, it is clear that varying shot scale is an effective tool to arrange film content according to its saliency (Carroll and Seeley 2013), and regulate the relative size and visibility of the image on the screen.

Shot scale influences cognitive and affective processing of the image. Larger images increase automatic allocation of cognitive capacity (Lang et al. 2006), most importantly attention (Reeves et al. 1999; Franconeri and Simons 2003), and in return, they are recalled better (Mutz 2007). Other studies showed that larger images increase the intensity of viewers’ reactions (Lombard 1995; Reeves and Nass 1996). Shot scale operates through similar perceptual mechanisms to viewing distance. Viewing at a shorter distance from the screen increases complex attention-related narrative responses, such as immersion (Baranowski and Hecht 2014) and presence (Lombard et al. 1997, 2000; Hou et al. 2012).

Shot scale is also an effective tool to influence the intensity of affective responding. Specifically, closer shots increase the intensity of emotions (De Cesarei and Codispoti 2006, 2008), physiological arousal (Codispoti and De Cesarei 2007; Mühlberger et al. 2008; De Cesarei and Codispoti

2010), and self-reported arousal in viewers (Codispoti and De Cesarei 2007; Canini et al. 2011). It seems that closer shots increase the intensity of emotional responses in general.

One of the most theorized shot scales in film and media studies is the close-up shot. The close-up is a shot with a smaller scale, showing the object of the shot from a short distance in a relatively large size (Zettl 2013). The central importance of shot scale, and close-ups specifically, especially those presenting human faces, has been recognized already in early film theory, linking close-ups with attention (Münsterberg 2013), emotion (Balázs and Carter 2013), and interpretation of context by the famous Kuleshov effect, recently replicated by Calbi et al. (2017). Contemporary film scholars agree also that when presenting faces and facial expressions, close-ups can effectively communicate the emotional experience of the character and powerfully elicit cognitive and affective responding in viewers (Carroll 1993; Plantinga 1999; Tan 2005). Close-up shots can have powerful effects on viewers because they make the emotional expression of characters visually accessible (Plantinga 1999). Empirical studies have provided some explanation of the underlying mechanisms. For example, studies have found that close-ups make person and emotion recognition faster (Loftus and Harley 2005; Cutting and Armstrong 2016) and more accurate (Lampinen et al. 2014). This suggests that viewers can probably arrive at an emotional understanding of characters much quicker when they are presented in close-ups.

The emotional power of close-up shots is reflected in van Kleef's (2009) Emotions as Social Information (EASI) model. This theory proposes both inferential and affective reactions as the mechanism that connects emotional expression and the observers' response. Specific emotional expressions such as disgust or misery communicate social information that is key to narrative engagement (Parkinson 1999, 2001; Hareli and Hess 2010). Research within this framework has demonstrated how emotional expressions affect viewers' judgments about the characters (Hareli and Hess 2010), on viewer attributions (van Doorn et al. 2015), and viewer inferences about character intentions (van Kleef et al. 2004; de Melo et al. 2014).

### **Close-Ups and Theory-of-Mind**

Close-ups make the emotional expression of the character more visible, and in doing so, they can facilitate an important psychological process in viewers called 'theory-of-mind'. Theory-of-mind is a social cognition process that refers to the awareness and understanding of mental states in others, both real (Premack and Woodruff 1978; Baron-Cohen 2001) and mediated others (Black and Barnes 2015). Theory-of-mind, sometimes referred to as cognitive empathy, is different from the affective component of social cognition, called embodied simulation, which is

the involuntary process in which one physiologically resonates with affective bodily states of the observed person (Decety and Jackson 2004; Gallese 2007; Lieberman 2007). Previous findings suggest that theory-of-mind and embodied simulation processes are connected to disparate neural systems (Zaki and Ochsner 2012) and function independently when people read or watch stories (Dziobek et al. 2008; Wallentin et al. 2013). It is assumed that cognitive and affective empathy are triggered by different cues (Raz et al. 2014). For example, cognitive empathy is more sensitive to external situational information, whereas affective empathy is to signals coming from the own body of the individual, for example, to the level of arousal or distress (Lieberman 2007; Raz and Hendler 2014).

Once activated, theory-of-mind is closely associated with empathic care; the more people understand the perspective of another person, the more willing they are to help that person. One study suggests that shot scale can facilitate this connection: Cao (2013) presented public service announcements to viewers in a medium shot or a close-up shot version and found that viewers – especially female viewers – of the close-up shot version were more willing to donate for the cause presented in the PSA. It is most probable that close-ups exert their effect on empathic care via activating theory-of-mind responses towards characters and intensifying emotional reactions to the image. While Cao's research used live-action videos, research findings in this area have been derived from work using a range of different narrative media with various formal features.

In the past few years, there has been an increased interest in how fictional narratives can improve theory-of-mind responses in readers and viewers. A growing body of evidence indicates a close association between the processing of visual dramas (e.g., Black and Barnes 2015) and printed literary narratives (see Mumper and Gerrig 2017) and theory-of-mind responding. It seems that exposure to literary narratives and film dramas can improve theory-of-mind ability. Despite the social relevance of this statement, there is a very limited understanding of the underlying narrative mechanism – in other words, we do not know yet what the important media-specific features are that make one visual narrative more effective than others. One of the main assumptions of our research project is that those formal features that regulate the visibility of socially relevant cues may be crucial in the theory-of-mind enhancing effect of movies. In the rest of this chapter, we review the findings of a series of experiments on the effect of various aspects of close-ups on theory-of-mind responding in viewers of animated films.

### **Experiment 1: Average Shot Scale Distribution and Theory-of-Mind**

In the first experiment (Bálint et al. 2016), we showed four animated short films to viewers: *Father and Daughter* (de Wit 2001), *Invention*

of *Love* (Shuskhov 2010), *Lavatory – Lovestory* (Bronzit 2007), and *Lettin' Go* (Whitaker 2008). We selected these movies because they represented different levels of average shot scale distribution. If we observed differences between the films, we wanted to be confident that it was related to shot scale rather than any other major differences between the films. This is difficult to achieve but it is an important consideration for our first study. For this reason, we selected films that were similar on many other features. Specifically, each of the chosen films featured a self-contained fictional narrative with a linear narrative structure. They were each relatively short 2D animations. We also selected films that had continuous music along the story without lyrics, and without any verbal information (e.g., dialogue, voice-over narration, textual inserts). This allowed for removing any problems with differences of voice or intonation of speech. In addition to the formal and visual features, the selected films also shared thematic and content features. Each one showed only two anthropomorphic protagonists (a female focal character and a male character) and each centered around a theme of separation from, and reunion with, a beloved person. This theme requires a viewer to use theory-of-mind in order to fully appreciate the content of the film.

Confirming our main hypothesis, the average shot scale distribution of the movie influenced theory-of-mind responding in viewers. More specifically, the story of the films with closer shots were retold with a higher frequency of mental state references. This result suggests that apparent spatial distance can influence the extent to which the viewers' mental models of the narrative included the characters' mental states. In other words, seeing the story with a closer visual-spatial proximity to the characters (more close-ups) brings the mind and consciousness of the characters into the foreground of the narrative experience (Bruner 1986). The findings also make an important contribution to our understanding of theory-of-mind by suggesting that it is more than just a stable trait-like capacity of the viewer; rather, it can be evoked and fostered by features of the narrative. By designing visual narratives, directors are regulating the extent to which audiences ascribe mental states to characters beyond the viewers' usual tendency to do so. This is in line with previous findings (Bálint et al. 2014; Meins et al. 2014).

One of the main limitations of the aforementioned experiment is that we used four different movies for manipulating shot scale. Despite our efforts to include very similar movies, we could not totally exclude the possibility that the differences in theory-of-mind response were caused by some other feature of the films. To address this problem, we conducted a series of experiments showing the manipulated versions of the same animated film to viewers. These aim to hold everything about the film constant, except the one thing we are interested in: shot scale.



## Experiment 2: Close-Up and Facial Expression

For our research purposes, we selected Dudok de Wit's animated film entitled *Father and Daughter*, discussed at the opening of this chapter. The same movie has been already used in research of emotional responses (Suckfüll 2010). The film tells the life story of a woman who lost her father at a young age, showing ten sequences from ten different life stages of the female protagonist. In the first sequence, she is a little girl, riding a bicycle with her father. They stop at a tree at a lake; the father walks down to a boat on the water, and after hugging his daughter, the father rows away with the boat. The little girl stays there, watching the man row away. In the next eight sequences, the same female protagonist (in eight consecutive stages of her life) comes back to the same spot and looks at the lake. In the last sequence, she is a very old woman; she comes alone, stops at the same tree, and looks at the water. She walks into the dried-up lake and, in an imaginary scene, unites with her long-lost father again.

The most important visual characteristics of this animation are that it is a two-dimensional, hand-drawn film created in a simplistic style with a very limited color palette and simple, clean lines. It is accompanied by instrumental music (the waltz melody of "Waves of the Danube") that creates a special atmosphere in the film. It was important for our purposes that the film tells its story in a linear narrative, so viewers did not have to make an effort to understand the general causal structure of the story. Another reason why we chose this animated film was that it contains no dialogue or lyrics; therefore the most important source for viewers' emotional understanding of the character was the visuals.

The animated film has a clear visual structure. Each sequence consists of a point-of-view shot presenting the female protagonist as she looks at the water where she has seen her father for the last time. Conventionally, point-of-view shots comprise a gaze shot (depicting a person who is looking at something) and an object shot (depicting the object of the looking) (Branigan 1984). In the original version of the film, the gaze shots are long shots; that is, the protagonist is far away and her face is not visible.

In order to investigate the effect of close-ups on viewers' responses in a true experimental setting, we manipulated this animation. Our aim was not to test any kind of artistic qualities; rather, we aimed to dissect 'mechanisms' in the visualization of the animation. In the manipulated versions of the film, we replaced the long shot of the gaze shot by a close-up with either a sad or a neutral facial expression in one of the sequences (see Figure 9.1). In order to keep the style of the film intact, we worked with professional animation designers, who created and edited these reposition shots into the film in a way that they were a perfect fit to the style of the original artwork. The length

of the gaze shots (two seconds each), as well as the length of the versions, were kept constant.

In this second experiment (Rooney and Bálint 2018), we used three versions of the first two sequences of *Father and Daughter*: (a) the original version with long shots; (b) the manipulated version with two close-ups presenting sad facial expressions; and (c) the manipulated version with two close-ups presenting neutral facial expressions. Participants watched one of the three versions and were asked to describe the story of the film and their own experiences with the movie. Just as in the previous experiment, we examined the mental state references in these story descriptions. Our findings demonstrated that shot scale and facial expression did affect theory-of-mind responses. Specifically, we observed that the close-ups of sad faces produced a significantly higher frequency of mental state references than other conditions, and that the use of a neutral close-up produced no more mental state references than the long-shot version. This suggests that the increase in mental state references was not driven by merely presenting the character's face larger in the frame (i.e., at a smaller spatial distance from the viewer); rather, it is the social and emotional information carried by the face.

We also examined the nature of the mental state that viewers referred to in their story descriptions. We found that close-ups primarily increased references to the characters' affective mental states, rather than their cognition or intention. In line with our previous results, these findings indicate that depiction of the character can direct attentional focus towards their mental states, making them more accessible to the viewer and thus increasing viewers' tendency to use those mental states in a representation of the narrative.

In addition to others' mental states, theory-of-mind includes understanding and attribution of mental states to the self. In this study, our findings also demonstrated that our manipulation of character depiction affected how much the participants referred to their own mental states. Specifically, showing the character close up with a sad facial expression was associated with more references to participants' own mental states than other conditions. This was followed by the neutral close-up condition; the long-shot condition was associated with the least reference to one's own mental states. Altogether, the findings of this study show that the way the character's face is depicted in a shot is a powerful tool for eliciting theory-of-mind, that is, for prompting viewers to represent the mental states of characters and self as part of their mental models.

### **Experiment 3 and 4: Close-Up Frequency**

In the third experiment (Bálint et al. forthcoming), we used the entire *Father and Daughter* animation to examine the effect of close-up frequency on theory-of-mind responding in viewers. We created different

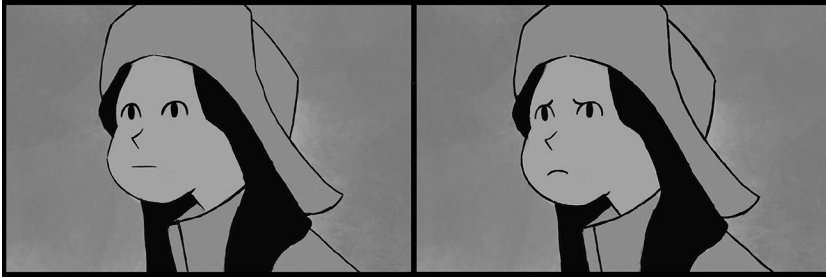


Figure 9.1 Two levels of facial expression intensity: neutral facial expression (left), sad facial expression (right).

versions of the film varying the number of close-ups inserted into the movie. Next to the original version (zero close-ups), we had versions with one, two, three, four, five, and ten close-ups with either neutral or sad facial expressions. Participants watched one version of the movie and were asked to freely describe the story of the film, the perspective of the protagonist, and their own feelings. In these free responses, theory-of-mind responding was measured by a quantitative content analytic method, where independent coders assessed the frequency and complexity of cognitive and affective mental state reasoning and attribution of intention. The results showed that close-up frequency had an effect on affective mental state references. Interestingly, we did not observe a linear relationship between the frequency of close-ups and theory-of-mind responding. Instead, the relationship appeared to have an inverse U-shape. That is, viewers' theory-of-mind responding did increase in a linear fashion until the insertion of three close-ups; beyond that, the frequency of theory-of-mind responding decreased. This suggests that there may be an optimal distribution of shot scale for prompting theory-of-mind responses, and designers need to consider the increased cognitive load close-ups may put on the recipients, which may decrease the capacity for social cognition.

In a related experiment (Bálint et al. 2017), we extended the investigation of close-up frequency to several responses in viewers, including 'approach motivation' (measured by electrophysiological correlates and explained further in the following text), narrative engagement, enjoyment and emotional impact. We also administered viewers' general trait empathy in order to test if individual differences moderate viewers' responses. This study employed three versions of the film *Father and Daughter*, containing zero, five, or 10 close-up shots of the protagonist. Other parts of the movies were identical across conditions. After filling out an empathy questionnaire, 102 participants watched one of the three movies at random in an individual setting while their brainwaves were recorded. After watching the movie, participants' emotions, narrative

engagement, and enjoyment were assessed. This study used a technique exploring EEG frontal asymmetry, which serves as an indicator of approach motivation, that is, how appealing or engaged the participant is by the stimulus. In this study, frontal asymmetry averages were calculated for the two-second intervals during the close-up shots, and the previous two seconds (to serve as a baseline). Preliminary results revealed a complex interaction between shot scale and trait empathy on audiences' responses to the narrative. We found that a higher frequency of close-ups increased narrative engagement, emotional impact, and enjoyment. Importantly, these main effects were more pronounced in the case of viewers with high levels of trait empathy. The participants who were more empathic (higher levels of trait empathy), enjoyed all the versions of the movies more than others. However, inserting 10 close-up shots also made the movie more enjoyable for those with lower empathy. More empathetic participants experienced a larger variability in approach motivation as a function of close-up shots, which suggests that they are more responsive to shot scale changes on screen. These findings indicate that the right use of shot scale can be an effective tool to increase emotional intensity, approach motivation, and enjoyment in viewers with varying levels of empathy.

### **Experiment 5: Serial Sequential Order of Close-Ups and Theory-of-Mind**

In these aforementioned studies, we explored the way in which the presence and number of close-ups might elicit theory-of-mind response in viewers. The findings thus far have demonstrated that close-ups can elicit theory-of-mind, but also that there is some nuance to the effect, namely, that there may be an optimal ratio of shot scale, and that individual differences in viewers also play a role. In the fifth experiment, we were interested to explore how the point in the film at which the close-up appears may have an effect. In the previous studies, we were careful to control for the serial order of the close-ups, but we did not investigate its effect. *Serial* sequential order effect can be defined as the point in time (e.g., beginning, middle, ending) when a close-up (i.e., the face of the character) appears in a visual narrative. Based on prior findings, it can be assumed that *serial* sequential order of a close-up shot in a narrative influences theory-of-mind responding in viewers.

Exploring the *serial* sequential order of close-ups is important as it speaks to the role of context in the interpretation of close-ups. Recently, a series of experiments have empirically demonstrated a phenomenon known in film theory as the Kuleshov effect (Barratt et al. 2016; Calbi et al. 2017). This occurs when a close-up shot is interpreted differently depending on the content of the preceding shot. For example, an ambiguous facial expression presented in a close-up may be interpreted

differently if the shot immediately before it was the appearance of a love interest smiling and waving (positive) or the appearance of a love interest in a coffin (negative). The findings from these studies demonstrate that viewers automatically contextualize the information from the facial expression with the preceding information (see Wieser and Brosch 2012). Consequently, the information preceding the close-up in the narrative can determine the semantic context of the close-up.

For our fifth experiment, we created ten different versions of the animated film *Father and Daughter*. We inserted one close-up, either with a sad or neutral facial expression, into five different sequences of the film, that is, into the first, fourth, sixth, eighth, and tenth (last) sequences. Participants watched one version of the film, and afterward they were asked to write down the story from the perspective of the female protagonist. In line with our hypothesis, we found that the ~~serial~~ sequential order of close-ups did indeed influence theory-of-mind responding in viewers. Inserting a close-up shot into one of the ~~last~~ last two sequences of the animation produced a significantly higher level of theory-of-mind response compared to other conditions. Interestingly, the use of neutral and sad facial expressions did not influence these results. This finding suggests that it is not only the presence or absence of a close-up shot that drives processing of animation narratives but rather the narrative context by which the close-up is surrounded. This study demonstrated that the decision about when to present a character's face in a narrative has important consequences on viewers' story processing of an animated film.

## Conclusion

To gain a deeper understanding of the role of close-ups in expressing characters' emotional and cognitive states in animated narratives, this chapter presents experiments conducted with Dudok de Wit's Academy Award-winning animated film *Father and Daughter*. Together, our findings demonstrate that the content, the frequency, the ~~sequential se-~~ ~~rial~~ position of the close-up and individual differences in empathy can all contribute to how effective a close-up can be in expressing emotional and cognitive states of animated characters. More specifically, we found that close-ups activate viewers' willingness to understand the protagonist's mental states; however, this willingness decreases when close-ups are overused. Inserting only one or two close-ups in a short animated narrative can result in the strongest effect. The findings indicate that close-ups of the animated character's face toward the end of the narrative can elicit theory-of-mind responding more effectively. These results are of great importance for offering animation designers targeted practice to manipulate (up or down) the extent to which the characters' mental states are salient components within the viewers' mental model.

Together, our findings suggest that the function of close-ups of animated characters operate through three essential features: they show (1) a large sized image of (2) a face that belongs to (3) a character in a story. Studies have shown that large image size increases activation, motivational relevance, and allocated cognitive resources in viewers. In case of close-ups on characters, these resources are directed toward the processing of a highly relevant source of information, the human(like) face (as opposed to, for example, the close-up of a gun). When viewers are presented with a face, they can quickly identify the character as well as the type of facial expression (whether the character is sad or angry, for example). Therefore, the rest of their capacity can be allocated to narrative processing. This latter point brings us to the third aspect of close-ups. All pieces of information that viewers extract while looking at the character face, are important building blocks of mental modeling. It means that viewers do not simply comprehend the emotional reaction of the character, but that they also integrate this information into their mental model of the narrative. In other words, viewers need to think about the function of the emotional reaction in the causal chain of the story. They may wonder what made the characters feel this specific way and how this emotion may explain other actions of the character. When viewers see facial expressions onscreen, they become more aware of how the character judges, understands, and responds to the fictional situation. This raises the probability that the characters' mental states become part of the viewers' mental representation of the story and facilitates viewers' own understanding of the narrative. Closer shots can effectively activate this whole process. However, we have also shown that the prediction is not simple and linear; the overuse of close-ups in a short animated film can hinder viewers' emotional understanding.

The empirical approach used to explore how formal features relate to character engagement is important for building upon the tacit expertise of creative designers and identifying the psychological, perceptual, and neural mechanisms that link these qualities. Previous research has argued that certain narrative forms such as literary fiction and award-winning drama are associated with higher levels of theory-of-mind. Our research suggests that the way in which these stories are presented may be the active component in prompting social cognition and character engagement. Future research may even establish the importance of formal features over other possible mechanisms such as the outcome of the story or the cultural appetite for the genre.

Further to this, employing close-ups effectively in animated narratives offers the opportunity to embed catalysts for positive change within the story. Consider, for example, an animated narrative that can prompt empathy in viewers for particular characters with minority backgrounds or disabilities or one created to be accessible to those with social cognition deficits or related vulnerabilities. Socially accessible animated narratives

could be designed for viewers with autism and or social cognition deficits, who may have been alienated by the subtle, more sophisticated ways that traditional audiovisual narratives might present social interactions. Technological developments may even facilitate animated narratives with interactive formal features that could be adjusted to suit the needs of the viewer. We suggest that findings from studies like ours that explore such social cognition can contribute to a society that fosters such empathy in all its citizens.

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### *Films*

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