The Effect of Motion Dynamics and POV shots on Film Viewers' Narrative Engagement, Empathy and Arousal

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Abstract

Previous research has indicated that formal features of films can affect film viewers' cognition and emotion. This study explores the effect of motion dynamics and point of view shots on narrative engagement, empathy and arousal in film viewers. To test these effects, an online experiment with a between-subject design was conducted among 194 respondents. Participants viewed one of 14 different scenes from Quentin Tarantino films. After viewing one of the scenes, participants answered items on narrative engagement, state empathy and arousal. Levels of motion dynamics and point of view shots were extracted from the film scene through computational analysis. Results show that higher levels of point of view shots increase film viewers' emotional engagement but also decrease their narrative understanding. However motion dynamics and point of view shots did not significantly affect viewers' narrative engagement, state empathy or arousal. These findings accentuate the effects of formal features on film viewers' cognitive and emotional responses found in earlier studies. However, results also imply that these effects may be more limited than previously thought.

Keywords: motion dynamics, point of view shots, narrative engagement, state empathy, arousal, film scenes, formal features

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Over the past 80 years, Hollywood film has been going through various changes. Individual shots have become shorter, frames contain more motion and movement and films have become darker over time (DeLong, Brunick, & Cutting, 2010; Cutting, Brunick, DeLong, Iricinschi, and Candan, 2011). Visual, temporal and audio attributes such as these, are referred to as formal features of films. Geiger and Reeves (1993) have defined these formal features as the visual and audio structure of a medium, comparable to a grammatical syntax. As indicated, directors’ use of formal features like motion and movement has increased over the past decades. Despite this significance of formal features in contemporary film, knowledge on these features is still in its infancy, as research on the effects of formal features on film viewers’ cognition and emotion has been somewhat neglected (see Detenber & Lang, 2010). Instead, studies have focused more on audience related features like gender differences (Barnett & Cerf, 2015) and familiarity with story content (Green, 2004). However, previous studies have identified that formal features are able to affect film viewers. Ravaja (2014) found that high levels of motion in films increased viewers’ self-reported arousal and pleasure. Additionally, Lassiter, Geers, Handley, Weiland, and Munhall (2002) have found that point of view shots are able to influence viewers’ assessment of on-screen characters. These findings imply that formal features of media and their effects on cognition and emotion should be investigated more thoroughly. Moreover, such research could lead to a more systematic understanding of how people experience media (see Detenber & Lang, 2010). To address this issue, the present study will focus on the effects of two formal features: motion dynamics and POV shots.

Motion dynamics or visual activity (Brunick, Cutting, & DeLong, 2013), is the combination of object motion and camera movement which, apart from sound, distinguishes films from photographs (Cutting, DeLong, & Brunick, 2011). Simons, Detenber, Roedema, and Reiss (1999) found that motion (as opposed to still images) sustains respondents’ attention to the image and increases physiological and self-reported arousal. This suggests that knowledge on the effects of motion dynamics in films is a worthwhile goal, for directors as well as other video content creators.

POV shots portray the events in a film scene from the optical perspective of one of the characters in the scene as opposed to an objective camera angle which depicts the characters from an external viewpoint. POV shots have been described as subjective camera angles (Cummins, 2009) and first-person perspectives (camera perspectives used in video games, in which players view the video game environment 'through the eyes' of the playable character). Cummins (2009) found that POV shots elicited a significantly greater sense of spatial presence and engagement than objective camera angles. However, Black (2017) suggests that POV shots are not necessarily more immersive than objective camera angles. The author explains that some of the most successful video games in the industry use a so-called third-person perspective (an alternative to the first-person perspective), in which players are able to see the character that they are playing in the video game environment. Therefore, the author clarifies, the experience of playing video games with a third-person perspective is not inferior to the experience of playing games through POV shots. The contrasting results of these studies on the effect of POV shots implicate the importance of further research in this domain.

It is evident that formal features are able to affect audience members cognitively and emotionally. A term that is often used to describe to what extent people are immersed in a filmic narrative is *narrative engagement*. Narrative engagement is the immersion into the narrative world represented by the ease of comprehending the narrative, the attention to the narrative world, the extent to which people feel for characters and the sensation of entering the narrative world (Busselle & Bilandzic, 2009). Through the implementation of these various characteristics, narrative engagement covers a broad spectrum of variables that are related to film viewers' engagement. Therefore, it is a key concept when it comes to understanding the different aspects of film viewers' immersion into a filmic narrative. However, research on the effects of motion dynamics and POV shots on narrative engagement is still scarce. Currently, Bálint, Svanera, Schoft, Benini, & Rooney (forthcoming) has been one of the only studies to investigate the direct effects of motion dynamics and POV shots on film viewers' narrative engagement, finding that higher motion dynamics increase film viewers' narrative engagement and POV shots do not affect narrative engagement. No other studies have tried to replicate these findings. Therefore, further research on the effects of motion dynamics and POV shots is necessary to expand the current body of research.

Narrative engagement is closely related to empathy, because the emotional engagement characteristic of narrative engagement concerns the emotions that viewers have regarding characters. This dimension of narrative engagement defines how people feel the characters' emotions and how they feel for the characters, which is similar to how empathy has been characterized traditionally. Empathy can be defined as a process in which we understand others that occurs when the perception of a character's state activates the viewer's representation of this state (Shen, 2010). Since empathy is so closely related to narrative engagement, it is likely that people who are more empathic with the character's in a narrative are also more engaged with the narrative. The effect of motion dynamics and POV shots on film viewers' empathy in films is yet to be researched directly. This gap in current research indicates the importance of further exploration on the effects of these formal features on empathy. Especially since there is evidence for a connection between formal features and empathy in contemporary literature. Bálint et al. (forthcoming) has found that both higher motion dynamics and a higher level of POV shots increased film viewers' emotional engagement. Although there seems to be a relation between formal features and viewers' empathy, this link is not yet scientifically confirmed. Thus, more insights on the effect of these formal features on empathy are certainly valuable.

Lastly, formal features of films could affect the audience's arousal. Simons et al. (1999) have already found that motion dynamics can increase physiological and self-reported arousal. Additionally, Cummins, Keene, and Nutting (2012) have shown that POV shots elicit more frequent arousal responses from viewers. However, Krcmar and Farrar (2009) have found that players of a video game with a third-person perspective show higher levels of aggression (a concept related to arousal) compared to players of a game with a POV perspective. Further investigation on these contrasting results is necessary.

To address the gaps and contrasting results in current film research on formal features, this study will research the effect of two formal features (motion dynamics and POV shots) on narrative engagement, empathy and arousal in film scenes. These scenes were extracted from films by the same director (Quentin Tarantino) and have been used in earlier research on formal features in film (Bálint, et al., forthcoming). The broad research question for this study is: *what is the effect of formal features in films on viewers' narrative engagement, empathy and arousal?*

Theoretical Framework

Limited Capacity Model of Motivated Mediated Message Processing

Formal features refer to the elements that concern the visuals, the audio and the time features of a film. Geiger and Reeves (1993) have defined these formal features as non-content features: the visual and audio structure of a medium, comparable to a grammatical syntax. Examples of these features are for example: edits, pacing, camera angles, and image size. The opposite of non-content features are defined as content features. This includes the story or the narrative, the characters and the actions of the film. Formal features have also been referred to as low level features (Brunick et al., 2013): the visual, auditory and temporal characteristics of a film.

Directors have shown interest in the dynamic use of formal features over the past decades. Individual shots have become shorter and motion and movement in films has increased over time (Cutting, Brunick, et al., 2011). Even though formal features are evidently regarded as an important element of contemporary film, Detenber and Lang (2010) have indicated that research on the effects of formal features on viewers' psychological responses has been largely neglected while research on content related features have received a considerable amount of attention. Nonetheless, a number of studies have investigated the effects of formal features in films, finding that they can affect viewers' attention, arousal (Simons et al., 1999), spatial presence (Cummins, 2009) emotional engagement and narrative engagement (Bálint et al., forthcoming).

A framework that is able to explain these cognitive and emotional effects of formal features, is the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP), developed by Lang (2000). The model states that formal features elicit the allocation of cognitive resources when a message is being processed. According to this model, formal features are able to activate attentional and motivational systems. When activated, these systems are able to influence emotional and cognitive responses to a message. For example the encoding process (a process of creating a representation of a message for processing and storing this message) of a message can be affected (see Detenber & Lang, 2010). This means that by adjusting the formal features in a message, a producer can influence which parts of the message are encoded. This implicates that knowledge on formal features is an important goal for directors.

Multiple studies have confirmed that formal features of media are indeed able to affect audience members both cognitively and emotionally. Geiger and Reeves (1993) have found that cutting-rate can influence viewers' attention. Furthermore, Lang, Schwartz, Lee, and Angelini (2007), using a predecessor of the LC4MP, found that pacing is able to increase arousal. Research has also shown that formal features of media are able to enhance the ability of a message to elicit affective, arousal and sensory responses (defined as the sensation value of a message; Morgan, Palmgreen, Stephenson, Hoyle, & Lorch, 2003). It was found that intense images, sound saturation, music and an unexpected format are able to increase this perceived message sensation value.

Responses in Film Viewers

Formal features of films are able to elicit varying psychological responses in viewers. Research has shown that these features are able to influence, among others, arousal, empathy and narrative engagement. The following sections will define these concepts and outline related research findings.

Arousal. Arousal is the physical and mental state of being excited or awoken. Arousal levels are typically measured through either self-report measures or physiological measures. Arousal is strongly related to attention (Babkoff, Caspy, & Mikulincer, 1991; Das, Naglieri, & Kirby 1994; Bolls, Potter, & Lang, 2001). Simons et al. (2003) have even found that motion-induced increases in attention are significantly related to self-reported arousal. According to Busselle and Bilandzic (2009), attention is an important factor of viewers' engagement with a narrative. The authors have also mentioned attentional focus as a subdimension of narrative engagement. This implies that there is an association between arousal and narrative engagement. Audience members who are aroused by a message are likely to sustain more attention to this message. In turn, when audience members' attention is increased, they will likely be more engaged with the narrative. Therefore, research on the effects of formal features on arousal is certainly valuable.

Empathy. In addition to arousal, another traditional concept that can be affected by formal features in films is empathy. Empathy has classically been defined as the reaction of a person to the observed experiences of another person (Davis, 1983). Empathy can be categorized in two dimensions: trait empathy versus state empathy and empathy in message production versus empathy in message processing (Shen, 2010). Trait empathy is the tendency to show empathic behavior as a trait-like characteristic in terms of stable intrapersonal factors (Smallbone, Wheaton, & Hourigan, 2003). State empathy refers to the process that occurs when the perception of a character's state automatically activates the perceiver's experience of this state, situation and person (Shen, 2010). Essentially, this means that viewers are empathic when they can automatically feel the characters' emotions and situation, just by viewing these characters. Considering that film scenes will be used as stimuli for this research, the current study will investigate state empathy in message processing.

Shen (2010) has suggested a description of state empathy through three separate subdimensions: affective empathy, cognitive empathy and associative empathy. Affective empathy refers to the understanding and feeling of others' emotions. This occurs when people react affectively to other people's emotions and expressions. Cognitive empathy is about taking the perspective of someone else. It involves the recognition, comprehension and adoption of others' point of view. Lastly, associative empathy concerns the viewer's experience of what the characters in the story world are experiencing.

This last dimension of empathy is related identification (Campbell & Babrow, 2004). Identification refers to the experience of shifting identities after being exposed to a story (Tal-Or & Cohen, 2010). This experience occurs when people are taken in by a story and begin to care deeply about certain characters. When this happens, they may experience identical emotional or physical states to those of the characters. For example, audience members might feel joy or happiness after positive story events and they might cry after sad events. Identification is suggested to be closely related to film viewers' narrative engagement. This is supported by (Busselle & Bilandzic, 2009), finding that identification is highly correlated to the emotional engagement subdimension of narrative engagement. This implies that audience members who show more empathy will likely be more engaged with the narrative of a film. Therefore, knowledge on the effects of formal features on empathy could allow film directors to influence viewers' engagement and should be an important research goal. Additionally, Quintero Johnson and Sangalang (2017) have found that emotional engagement with a program is positively associated with both perceived relevance of the program and enjoyment of the program. Considering that emotional engagement is similar to the concept of empathy in many ways, these findings suggest that research on empathy in films is worthwhile, since video content creators may be able to manipulate perceived relevance and enjoyment of the program by influencing film viewers empathy.

Narrative engagement. Unlike arousal and empathy, narrative engagement has been introduced more recently. It is often used as a concept to describe viewers' immersion in a filmic narrative is narrative engagement. Narrative engagement can be defined as the immersion into the story world, characterized by the ease of comprehending the plot, the focused attention to the narrative world, the extent to which people feel for characters and the loss of self-awareness when entering the narrative world (Busselle & Bilandzic, 2009). Narrative engagement is similar to terms and concepts that have been used to describe viewers' immersion into the story world. For example, flow (Csikszentmihalyi & Mihaly, 2000) identification (Tal-Or & Cohen, 2010) and transportation (Green & Brock, 2000). Flow is defined as a viewer's peak of enjoyment, energetic focus, and creative concentration (Csikszentmihalyi & Mihaly, 2000). Identification occurs when viewers experience emotions and physical states similar to those of the characters in the narrative (Tal-Or & Cohen, 2010).

Lastly, transportation has been defined as the absorption into a story, characterized by imagery, emotional responses, and attentional focus (Green & Brock, 2000).

The concept of narrative engagement includes all these different aspects of audience engagement in four separate subdimensions: narrative understanding, attentional focus, narrative presence and emotional engagement (Busselle & Bilandzic, 2009). Narrative understanding indicates the viewers' ease of comprehending and processing the narrative. Attentional focus identifies whether a viewer is engaged with the narrative and thus, unaware of focused attention. Attentional focus also concerns the lack of distraction from the program while watching. These aspects of attention are identified as important contributors to narrative engagement. Narrative presence refers to the transition from the real world to the narrative world. This experience is composed of two aspects. Firstly, extreme focus and the loss of self-awareness and surroundings. Secondly, the experience of entering another space and time Emotional engagement concerns the viewers' emotions regarding characters. This entails feeling the characters' emotions (empathy) and feeling for the characters (sympathy). It is important to note the difference between empathy and sympathy. When experiencing sympathy, viewers do not feel the same emotions as the character, while viewers do feel these emotions when experiencing empathy.

Through the implementation of these four subdimensions, narrative engagement becomes an important and overarching concept regarding the cognitive and emotional immersion of the audience, as it is able to capture data on a wide spectrum of variables related to engagement with the story world. Furthermore, Quintero Johnson and Sangalang (2017) have found that narrative engagement positively correlates with enjoyment. Higher levels of narrative engagement resulted in more program enjoyment among viewers. These findings indicate that a high level of narrative engagement among audience members is desirable for directors and other video content creators.

Formal Features

Both motion dynamics and POV shots are able to affect film viewers emotionally and cognitively. The following section will outline these formal features and their effects on film viewers' arousal, empathy and narrative engagement.

Motion dynamics. Motion dynamics, or visual activity, is defined as the combination of motion and movement which, apart from sound, distinguishes films from photographs (Cutting, DeLong, et al., 2011). In this definition, motion refers to the positional change of actors and objects in a static frame. Movement represents all the visual changes as a result of camera motion, lens change (e.g., pans, tilts, zooms) and their combinations. Motion dynamics and its effects on viewers has been a widely studied topic among communication scholars (see Detenber & Lang, 2010). Over time, the visual activity of individual frames in Hollywood film has increased, which indicates that frames contain more motion and movement. (DeLong et al., 2010). This finding is supported by Cutting, Brunick, et al. (2011), finding that usage of motion dynamics has increased over the last 80 years. Furthermore, Cutting, DeLong, et al. (2011) have developed a Visual Activity Index (VAI), which captures the amount of motion dynamics in film. An analysis of this index for 150 films from 1935 to 2005 showed an increase in the use of motion dynamics. Interestingly, the largest increase in motion dynamics was found in action and adventure films, while there was only a small increase of motion dynamics in drama films. These findings implicate that motion dynamics is an important formal feature and that research on its effect on film viewers is useful.

Motion dynamics can affect film viewers' cognition and emotion. For example, Visch and Tan (2009) have found that viewers attribute negative emotions to slow, low-fluent motions and positive emotions to faster, more fluent motions. Mital, Smith, Hill, and Henderson (2011) showed that motion is able to predict the location of viewers' gaze. On top of that, it was found that motion can predict moments in which all viewers gaze in the same location. Motion dynamics can also affect judgement of others' intentions (Barrett, Todd, Miller, & Blythe, 2005). This study found that people can accurately judge others' intentions based solely on motion patterns. Lastly, Zacks, Swallow, Vettel, and McAvoy (2006) showed that motion dynamics are related to viewers' segmentation of narrative events. These results indicate that motion dynamics are able to affect film viewers on cognitive and emotional levels. The following sections will discuss the effects of motion dynamics on arousal, empathy and narrative engagement.

As mentioned earlier, arousal is strongly related to attention (Babkoff, Caspy, & Mikulincer, 1991; Das, Naglieri, & Kirby 1994; Bolls, Potter, & Lang, 2001). Research on the effect of motion dynamics on film viewers' arousal and attention have generated mostly consistent findings. Motion dynamics can increase self-reported and physiological arousal, Additionally, it captures and sustains viewers' attention (Simons et al., 1999). Ravaja (2004) also found that motion dynamics were associated with high levels of self-reported arousal as well as high levels of self-reported pleasure. However, this effect was not found for physiological arousal. Furthermore, motion dynamics induced attentional engagement and improved memory for positive messages. Bálint et al. (forthcoming) have also found that higher motion dynamics increase attentional engagement. In addition, Simons, Detenber, Cuthbert, Schwarz, and Reiss (2003) found that motion dynamics elicited greater sustain in attention (as opposed to still images). This effect was found for both positive and negative messages. The authors explain that their results suggest that motion dynamics are able to regulate the emotional response of viewers, largely by increasing arousal.

Lastly, considering that motion dynamics can increase viewers' arousal and attention, studies have also found that motion dynamics can enhance viewers' recall and memory. Firstly, Niederdeppe, Davis, Farrelly, and Yarsevich (2007) have found that transitions to new camera shots (edits) increased viewers' recall of television ads. Moreover, Li and Bukovac

(1999) have shown that banner ads with motion dynamics result in a quicker response from viewers and better recall than non-motion banner ads. Banner ads with motion dynamics were clicked faster after they had appeared and participants were able to memorize these ads better than non-animated ads.

The direct effect of motion dynamics on empathy has not received notable scientific attention. However, Bálint et al. (forthcoming) have found that higher motion dynamics resulted in increased emotional engagement in film viewers Additionally, earlier studies have identified a relationship between motion and empathy. Firstly, Sevdalis and Keller (2012) found that empathy is related to high performance on motion intensity judgement tasks. In this study, participants had to judge the intensity of the motion of a dancing character depicting dance in point-light displays. People with more tendency to empathize scored were more accurate in judging the motion of the point-light characters. Matsumoto, Takahashi, Murai, and Takahashi (2015) have found somewhat contrasting results. In an experiment, participants had to judge the biological movement of an object quickly after observing it. A significant correlation was found between accuracy of indicating the direction of the target’s movement (the biological movement) and affective empathy. However, this relationship was only found for patients with schizophrenia and not for healthy controls. Lastly, Bamford, and Davidson (2017) found a relationship between empathy and people’s performance on a movement to music entrainment task. More empathic people were better at spontaneously adapting their motion and movement to music. The authors have even suggested that empathy and rhythmic motion entrainment may utilize similar brain regions.

Bálint et al. (forthcoming) is one of the only studies that has investigated the effect of motion dynamics on film viewers’ narrative engagement. This study found that higher motion dynamics increased film viewers’ narrative engagement, mainly through the enhancement of viewers’ attentional focus but also through the enhancement of viewers’ emotional engagement. Investigation on whether these results can be replicated in the current study will be of great use.

POV shots. A POV shot is a specific type of shot in which the events of a film are portrayed through the optical perspective of one of the characters in the scene as opposed to an objective camera angle which depicts the characters from an external viewpoint. Figure 1 shows an illustration of a POV shot. POV shots have been described as shots from a subjective camera angle (Cummins, 2009) or first-person perspectives. The latter term is often used in research regarding video games (i.e., Black, 2017). In a first-person perspective, players view the video game environment ‘through the eyes’ of the playable character. The opposite of such a first-person perspective in video games is the third-person perspective. In this perspective, players are able to see the character that they are playing in the video game environment from behind. The opposite of a subjective camera angle is referred to as an objective camera angle, which depicts the characters in a scene from an external point of view.

Figure 1. Example of a POV shot from Pulp Fiction (1994)

POV shots are able to affect viewers' cognitive and emotional responses. For example, Cummins (2009) found that POV shots induced a significantly greater sense of spatial presence and engagement than objective shots. Furthermore, Cummins et al. (2012) found that POV shots elicited a greater sense of presence than objective shots. Lastly, Lassiter et al. (2002) have shown that POV shots are able to influence viewers' assessment of on-screen characters. When viewing videotaped confessions from a suspect's POV (as opposed to viewing the confessions from an objective camera angle), participants' assessed the suspects to be guilty significantly more often. Clearly, POV shots can affect audience members' cognition and emotion.

Few studies have investigated the effect of POV shots on arousal. However, a considerable amount of research has investigated the relation between POV shots and arousal-related concepts like attention, focus, involvement and aggression. Firstly, Cummins et al. (2012) found that POV shots elicited more frequent arousal responses. Contrastingly, Bálint et al. (forthcoming) found no effect of POV shots on attentional focus. Moreover, Krcmar and Farrar (2009) found that playing video games in a third-person perspective resulted in higher levels of aggression than playing in a POV perspective. The authors argue that, although recent successful games (especially first-person shooters) have used POV perspectives and although players might identify more with the character and the in-game events in a POV perspective, empirical studies show different results. Farrar, Krcmar, and Nowak (2006) also found that players in a third person perspective were significantly more focused than players in a POV perspective. Additionally, females were more involved in the game when they played in a third-person perspective (rather than a POV perspective). This effect was not found for male players. In conclusion, research on the effect of POV shots on arousal and related concepts shows varying results.

Current literature has not directly studied the effect of POV shots on empathy. However, Bálint et al. (forthcoming) have found that a higher level of POV shots increased film viewers' emotional engagement. The authors have also noted that POV shots seem to aid in film viewers' psychological bonding with characters. These findings support the theory of Carrol (1993) that POV shots can communicate emotion effectively. Moreover, Shapiro, Rucker, Boker and Lie (2006) have found that point-of-view writing results in more and better expression of empathy (as opposed to clinical reasoning writing).

Literature on the effects of POV shots on empathy is rather scarce. However, research has identified a relationship between empathy and the formal feature shot scale. This feature bears resemblance to POV shots, as it is also a camera-related formal feature. Findings on the effects of shot scales in films may provide implications for the effects of POV shots in film. There is evidence that different shot scales can impact empathy-related concepts like Theory of Mind (ToM). Theory of Mind refers to the awareness of mental states in other people through attribution of intentions, feelings, and thoughts to those people (Gallagher & Frith, 2003). Bálint, Klausch, and Pólya (2016) found that film shots with increased proximity to the character elicited more ToM-responses. In this study, participants retold the story of a film that they had watched. Films with shots that increased proximity to the character elicited more mental state references in participants' story descriptions. Rooney and Bálint (2018) found similar results for Theory of Mind-tendency. Theory of mind-tendency is the tendency to pay attention or care about the mind of others to understand their mental states (Apperly, 2012). It was found that close-up shots (as opposed to longer shots) of a character resulted in higher levels of Theory of Mind-tendency. However, this association was only found when the character's facial expression was sad, not when it was neutral.

Furthermore, Cao (2013) found that close-up portrayals of human suffering can induce greater empathy among viewers. Close-up framing of a victim (as opposed to a medium camera perspective) resulted in greater empathy among female viewers but reduced empathy among male viewers. It is a worthwhile goal to investigate whether these effects of shot scaling on empathy also exist for POV shots. Lastly, Andringa, van Horssen, Jacobs, and Tan (2001) have found that subjective voice-over in film (as opposed to an objective narrator) did not result in increased more empathy levels among viewers. Instead, viewers rated the main character as more odd in subjectively narrated film scenes. However, viewers did report that subjective voice-over scenes were more comprehensible. Again, research on whether these findings of narrated point of view translate over to visual point of view manipulations will certainly be valuable.

Currently, Bálint et al. (forthcoming) is one of the only studies that have investigated the effects of POV shots on narrative engagement directly. In this study, it was found that POV shots did not affect film viewers' narrative engagement. Further investigation on the effect of POV shots on narrative engagement is necessary to generate a more conclusive body of research on this topic.

Hypotheses and Research Questions

Given the prior literature, this study sets out to investigate the effects of motion dynamics and POV shots on film viewers' narrative engagement, empathy and arousal by conducting an online questionnaire. In this survey, participants will view one scene from a Quentin Tarantino film and afterwards, answer questions regarding their narrative engagement, empathy and arousal. Motion dynamics and POV shots in the films scenes are measured through the use of computational methods. Based on the literature review, the following hypotheses are proposed:

H1: Motion dynamics will affect narrative engagement with the film scenes, such that higher motion dynamics will increase narrative engagement.

H2: Motion dynamics will affect empathy with characters in the film scenes, such that higher motion dynamics will increase empathy with characters.

H3: Motion dynamics will affect audience members' arousal, such that higher motion dynamics will increase audience members' arousal.

H4: POV shots will affect empathy with characters in the film scenes, such that higher levels of POV shots will increase empathy with characters.

H5: POV shots will affect audience members' arousal, such that higher levels of POV shots will decrease audience members' arousal.

The effect of POV shots on narrative engagement has not received thorough attention in contemporary literature and although there is no expected effect of POV shots on narrative engagement (based on Bálint et al., forthcoming), this effect will still be investigated in research question 1 (RQ1) along with the following research questions:

RQs: To what extent can motion dynamics and POV shots predict narrative engagement (RQ1), its sub-dimensions (RQ1.1-RQ1.4), state empathy (RQ2), its sub-dimensions (RQ2.1-RQ2.3) and arousal (RQ3) in viewers of film scenes?

Method

Design

To test the hypotheses, an online survey with a between-subject design was conducted. This study was carried out in the context of a bachelor thesis at Tilburg University. Participants watched one randomly assigned scene of 14 violent film scenes from Quentin Tarantino films and answered corresponding questions afterwards. Each film scene was randomly distributed in the survey so that all scenes would be viewed by roughly the same amount of participants. Precisely, each film scene was viewed by 11-16 participants. The survey was distributed via Qualtrics, an online questionnaire platform. The independent variables in this experiment were two formal features of the film scenes: motion dynamics and point of view shot. The dependent variables were narrative engagement, empathy and arousal.

Participants

A power analysis (GPower 3.1) suggested a sample size of 118 participants to obtain necessary power (0.8 α =.05) to detect a medium effect size for 11 predictors (motion dynamics and POV shots including 9 controls). The sample was collected by three bachelor students that collaborated in a thesis group for data collection. Convenience sampling via word of mouth, social media posts and film forums was used to gather participants initially. Furthermore, snowball sampling was used to accumulate more participants. In total 284 participants filled in the survey. During the data cleaning process, 90 participants were excluded from analysis because they failed to complete at least 85% of the survey (these participants did not complete the items on narrative engagement and/or empathy and/or arousal). All participants were Dutch natives and were required to be 18 or older to participate in the survey. After exclusion of participants, the final sample size consisted of 194 participants. 106 participants were male and 88 participants were female. Two participants reported a non-binary gender. The first participant, who reported to be a trans man, was assigned to the male gender. The second respondent, who reported to be transgender, was randomly assigned to a gender. The minimum age in the sample size was 18 and the maximum age was 77 (M = 33.51 years, SD = 14.79 years). 144 participants reported that they had either finished or were still following a university education. 50 participants had finished or were following an education below university level.

Materials

14 violent film scenes from Tarantino films were used as stimuli. These film scenes have been used in earlier research by Bálint et al. (forthcoming). Film scenes from Tarantino films were selected because these films are generally regarded as high quality films that contain a considerable amount of violence. Selecting these film scenes allowed for a thematically and quality wise homogeneous sample. Furthermore, the use of film scenes from the same director allowed for analysis of variances in motion dynamics and POV shots while still retaining similarities in the scenes for a valid comparison. In total, film scenes from five Tarantino films were used: two scenes from Pulp Fiction (1994), two scenes from Kill Bill: Volume 1 (2003), three scenes from Inglourious Basterds (2009), four scenes from Django Unchained (2012) and three scenes from The Hateful Eight (2015). Table 1 shows the timestamps for all the scenes and their respective films. The film scenes were displayed in a 1280 by 720 (standard HD) resolution. The shortest film scenes lasted one minute and 26 seconds, the longest film scene lasted six minutes and three seconds. All film scenes were presented with original English speech and Dutch subtitles.

Table 1

Timestamps for all the film scenes and their respective films

Film Scene	Start Time	End Time	Duration	Code
Django Unchained scene 1	0:18:30	0:19:56	1:26	DU1
Django Unchained scene 2	0:32:12	0:38:15	6:03	DU2
Django Unchained scene 3	1:02:56	1:07:06	4:10	DU3
Django Unchained scene 4	2:09:02	2:14:13	5:11	DU4
The Hateful Eight scene 1	0:16:10	0:20:38	4:28	HE1
The Hateful Eight scene 2	1:55:09	1:59:30	4:21	HE2
The Hateful Eight scene 3	2:08:27	2:13:25	4:58	HE3
Kill Bill: Volume 1 scene 1	0:05:19	0:09:49	4:30	KB1
Kill Bill: Volume 1 scene 2	1:12:08	1:17:12	5:04	KB2
Inglourious Basterds scene 1	1:27:21	1:33:00	5:39	IB1
Inglourious Basterds scene 2	1:57:45	1:02:00	4:15	IB2
Inglourious Basterds scene 3	2:21:48	2:25:46	3:58	IB3
Pulp Fiction scene 1	1:34:12	1:37:33	3:21	PF1
Pulp Fiction scene 2	1:51:38	1:56:41	5:03	PF2

Note. The timestamps indicate hours, minutes and seconds respectively. The duration of the scenes is noted in minutes.

Procedure

Participants were directed to the online survey by a hyperlink that was shared on multiple platforms. Upon entering the survey, participants were greeted with an introduction message that explained the general purpose of the study. Participants agreed to a consent form and stated that they were 18 years or older before proceeding. After this, participants reported data on their age, gender and highest level of education. Participants would then be presented with one of the 14 film scenes. Participants were encouraged to use the full screen option in order to view the scene optimally. After watching the scene, participants were asked if they had viewed the scene in its entirety. Next, respondents answered the items that measured narrative engagement, empathy and arousal. Lastly, participants would rate the intensity of the violence in the film scene, report whether they had watched the scene before, how much time they spend on violent entertainment on average and on which device they had completed the questionnaire. Additionally, a browser information tracker that was not displayed to the participants was used to retrieve the screen resolution that participants had used. Finally, participants were thanked for their participation and the data was stored. Data was exported and analyzed in IBM SPSS 25.

Measures

Motion dynamics. Motion dynamics were measured through the use of motion maps. These motions maps described the camera movements and object movements in the film scenes. Motion maps were constructed by an adaptation of an algorithm by Barnich and Van Droogenbroeck (2011). Additionally, a second motion map was composed by calculating the ratio between the motion area and the total frame area for each motion map, averaged for each film scene.

POV shots. POV shots were manually extracted from the film scenes. Each shot in the scenes was coded as either POV or non-POV. A shot was coded as POV when the shot clearly displayed the optical viewpoint of a character in the scene. All shots were coded by an independent coder. A second independent coder categorized all shots from three separate film scenes in order to examine inter-coder reliability, using Cohen’s Kappa. Table 2 shows the inter-coder reliability of the shot codings (N = 204). The Kappa value is substantial for The Hateful Eight scene 2 (Kappa = 0.78) as well as for Kill Bill: Volume 1 scene 1 (Kappa = 0.78). The Kappa value for Pulp Fiction scene 2 is moderate. For each film scene, the duration of all POV shots was computed and expressed in a percentage of the total duration of the scene. Therefore, higher values on this scale indicate a higher percentage of POV shots in the film scene.

Table 2

Kappa and Kappa/Kappa max for the scenes tested on inter-coder reliability (based on N = 204*)*

	Kappa	Kappa/Kappa max
The Hateful Eight scene 2 (*N* = 45)	0.78	0.85
Kill Bill: Volume 1 scene 1 (*N* = 108)	0.78	0.84
Pulp Fiction scene 2 (*N* = 51)	0.48	0.52

Narrative engagement. Narrative engagement was measured using a scale that was developed by Busselle and Bilandzic (2009). The items for this scale were translated from English to Dutch by three independent translators. These three translators composed a finalized Dutch translation of the items in consultation with each other. The finalized Dutch translation was translated back to English by a native English speaker which validated correspondence to the original English items. In total, the narrative engagement scale consisted of 12 items. The scale has four subdimensions which consist of three items each: narrative understanding (e.g., “At points, I had a hard time making sense of what was going on in the program”), attentional focus (e.g., “I found my mind wandering while the program was on”), narrative presence (e.g., “During the program, my body was in the room, but my mind was inside the world created by the story”) and emotional engagement (e.g., “The story affected me emotionally”). Participants reported the extent to which they agreed with the items on a 7-point Likert-scale from 1 (strongly disagree) to 7 (strongly agree). Some items in the scale were reversed to prevent participants’ response bias.

To check the reliability of the scale, Cronbach's Alpha was calculated for the entire scale and for each subdimension. For the narrative engagement scale: $\alpha = .73$, $M = 4.24$, $SD = .92$. For the narrative understanding subdimension: $\alpha = .87$, $M = 4.99$, $SD = 1.78$. For the attentional focus subdimension: $\alpha = .80$, $M = 5.31$, $SD = 1.40$. For the narrative presence subdimension: $\alpha = .75$, $M = 3.48$, $SD = 1.47$. For the emotional engagement subdimension: $\alpha = .68$, $M = 3.18$, $SD = 1.41$.

Empathy. Empathy was measured by the State Empathy Scale (Shen, 2010). The translation procedure of the empathy items was identical to that of the narrative engagement items. In total, the empathy scale consisted of 12 items. The scale has three subdimensions which consist of four items each: affective empathy (e.g., "The character's emotions are genuine"), cognitive empathy (e.g., "I can see the character's point of view") and associative empathy (e.g., "When watching the message, I was fully absorbed"). Participants reported the extent to which they agreed with the items on a 5-point Likert-scale from 1 (not at all) to 5 (completely). Due to a technical error, item 4 of the affective empathy scale ("I can feel the character's emotions") was not included in the scale.

To check the reliability of the scale, Cronbach's Alpha was calculated for the entire scale and for each subdimension. For the empathy scale: $\alpha = .86$, $M = 2.71$, $SD = 0.77$. For the affective empathy subdimension: $\alpha = 0.62$, $M = 2.68$, $SD = .84$. For the cognitive empathy subdimension: $\alpha = .70$, $M = 2.94$, $SD = .89$. For the associative empathy subdimension: $\alpha = .71$, $M = 2.51$, $SD = .89$.

Arousal. Arousal was measured through the use of the Self-Assessment-Manikin (SAM; Lang, 1980). Participants reported their state of arousal by selecting one of seven manikins that represented their emotional state the closest. Figure 2 shows all seven manikins that were presented in order from 1 (calm) to 7 (excited). Participants' mean value on the arousal scale was 3.17 ($SD = 1.55$).

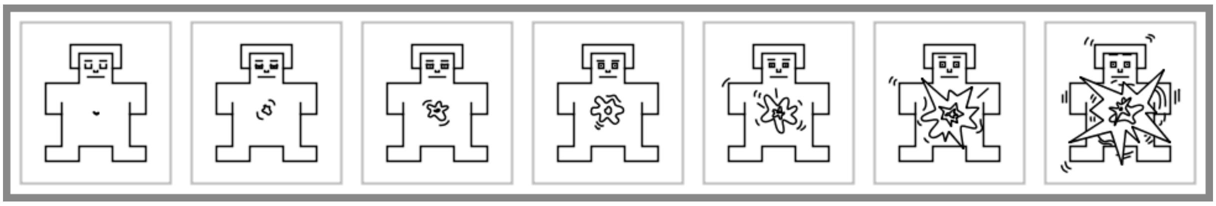

Figure 2. The 7-point SAM-scale that was used to measure participants' arousal

Controls. A number of variables were added to analysis as control variables. Among these control variables were: participants' gender, age and level of education, participants' exposure to violent entertainment, the duration of the scene, the source film of the scene, the type of device that was used to complete the survey and whether participants had seen the film scene before. Additionally, to control for the intensity of violence in the scenes, a single 7-point item on the perceived level of violence was added as a control variable. These control variables were used as independent variables in the regression analysis if their effect on the dependent variables was found to be significant.

Analysis

Data was statistically analyzed in IBM SPSS 25. To test the effect of motion dynamics and POV shots on narrative engagement, empathy and arousal individually, separate multiple linear regressions were executed. Each regression tested either motion dynamics or POV shots combined with the film titles, the perceived intensity of violence and the preference for violent entertainment as independent control variables.

Results

Firstly, an exploratory analysis was executed. Table 3 shows the descriptives of all variables for each film scene.

Table 3

Descriptives (mean, standard deviation) of formal features and dependent variables

	Duration (s)	Narrative Engagement	Empathy	Arousal	Motion Dynamics	POV shots (%)
DU1	86	4.15 (0.79)	2.43 (0.94)	2.31 (1.30)	20.87 (8.74)	0.00
DU2	363	5.17 (1.05)	3.42 (0.59)	3.57 (2.10)	35.48 (9.92)	17.38
DU3	250	4.18 (0.85)	2.74 (0.90)	4.00 (1.00)	11.19 (8.92)	7.25
DU4	311	4.15 (0.60)	2.84 (0.72)	3.64 (1.21)	20.06 (17.34)	5.36
HE1	268	4.39 (0.84)	3.01 (0.65)	2.62 (1.04)	16.91 (8.32)	0.00
HE2	261	3.94 (0.97)	2.30 (0.76)	3.25 (1.84)	6.95 (11.39)	3.26
HE3	298	3.86 (1.06)	2.64 (1.01)	3.07 (1.39)	18.55 (9.16)	17.54
KB1	270	4.36 (0.94)	2.58 (0.86)	2.56 (1.37)	36.76 (14.80)	14.89
KB2	304	3.66 (0.82)	2.30 (0.59)	3.08 (1.44)	31.68 (18.25)	4.74
IB1	339	4.28 (0.78)	2.78 (0.57)	3.44 (1.83)	9.14 (13.74)	1.37
IB2	255	4.41 (0.88)	2.82 (0.54)	3.43 (1.34)	16.23 (14.34)	2.53
IB3	238	4.48 (0.87)	2.99 (0.57)	4.29 (1.07)	25.73 (11.22)	3.30
PF1	201	3.85 (0.88)	2.33 (0.75)	2.71 (1.94)	30.79 (8.53)	15.88
PF2	303	4.40 (0.81)	2.93 (0.50)	2.55 (1.21)	18.65 (13.42)	8.14
Total	264.96 (67.53)	4.24 (0.92)	2.71 (0.77)	3.17 (1.55)	72.25 (3.22)	7.26 (6.24)

Note. The abbreviations for the film scenes are identical to those of Table 1. Formal features: *Motion Dynamics* is the ratio between motion area and total area of the frame (dimensionless, range [1-100]); *POV shots* is the duration of all POV shots in the scene expressed in a percentage of the total duration of the scene.

Controls

Secondly, a preliminary analysis was performed. The relationship between all control variables and the dependent variables was examined before executing the main analysis. To investigate the relationship between the dependent variables and age, three linear regression analyses were conducted. The first regression analysis showed that age does not significantly predict participants' narrative engagement b = 0.001, β = .02, t(193) = 0.77, p = .78. Consequently, the proportion of explained variance is extremely small R^2 = .00, F (1, 192) = 0.08, p = .78. The second regression analysis showed that age does not significantly predict participants' empathy b = 0.000, β = .01, t(193) = 0.08, p = .94. Consequently, the proportion of explained variance is extremely small R^2 = .00, F (1, 192) = 0.01, p = .94. The last regression analysis showed that participants' arousal can be predicted by age b = -0.03, β = -.26, t(193) = -3.77, p < .001. The model explains 7% of the variance in arousal R^2 = .07, F (1, 192) = 14.18, p < .001. The residuals showed significant kurtosis (z-score kurtosis = -2.03) and deviate significantly from normal (D (194) = .10, p < .001). To assess whether the model is sensitive to these violations of assumptions, bootstrapping was performed. The bootstrapped coefficients showed a similar picture as the previous analysis b = -0.03, p = .001, 95% CI [-0.04, -0.02]. Importantly, the bootstrapped 95% confidence interval does not cross zero, indicating that the model generalizes to the population.

To investigate the relationship between the dependent variables and scene duration, three linear regression analyses were conducted. Scene duration does not significantly predict participants' narrative engagement (b = 0.002, β = .12, t(193) = 1.67, p = .10, R^2 = .01, F (1, 192) = 2.80, p = .10). However, empathy can be predicted by scene duration (b = 0.002, β = .20, t(193) = 2.83, p = .005, R^2 = .04, F (1, 192) = 8.02, p = .005). Additionally, arousal can be predicted by scene duration (b = 0.003, β = .15, t(193) = 2.03, p = .04, R^2 = .02, F (1, 192) = 4.12, p = .04). The residuals showed significant kurtosis (z-score kurtosis = -2.68) and deviate significantly from normal (*D* (194) = .13, $p < .001$). To assess whether the model is sensitive to these violations of assumptions, bootstrapping was performed. The bootstrapped coefficients show a slightly significant relation $b = 0.003$, $p = .049$, 95% CI [-0.00, 0.01].

To investigate the relationship between the dependent variables and perceived intensity of violence, three linear regression analyses were conducted. Perceived intensity of violence does not significantly predict participants' narrative engagement ($b = -0.01$, $\beta = -.01$, $t(193) = -0.15$, $p = .88$, $R^2 = .00$, $F\ (1, 192) = 0.02$, $p = .88$). Perceived intensity of violence does also not significantly predict empathy ($b = -0.01$, $\beta = -.01$, $t(193) = -0.19$, $p = .85$, $R^2 = .00$, $F\ (1, 192) = 0.04$, $p = .85$). However, arousal can be predicted by perceived intensity of violence ($b = 0.45$, $\beta = .37$, $t(193) = 5.59$, $p < .001$, $R^2 = .14$, $F\ (1, 192) = 31.26$, $p < .001$). The residuals showed significant kurtosis (z-score kurtosis = -2.04) and deviate significantly from normal (*D* (194) = .10, $p < .001$). To assess whether the model is sensitive to these violations of assumptions, bootstrapping was performed. The bootstrapped coefficients show similar results $b = 0.45$, $p = .001$, 95% CI [0.30, 0.58].

To investigate the relationship between the dependent variables and exposure to violence, three linear regression analyses were conducted. Exposure to violence does not significantly predict participants' narrative engagement ($b = -0.004$, $\beta = -.01$, $t(192) = -0.10$, $p = .92$, $R^2 = .00$, $F\ (1, 191) = 0.01$, $p = .92$). Exposure to violence does also not significantly predict empathy ($b = 0.06$, $\beta = .13$, $t(192) = 1.84$, $p = .07$, $R^2 = .02$, $F\ (1, 191) = 3.39$, $p = .07$). Lastly, exposure to violence does not significantly predict arousal ($b = 0.10$, $\beta = .11$, $t(192) = 1.54$, $p = .13$, $R^2 = .01$, $F\ (1, 191) = 2.38$, $p = .13$). The residuals showed significant kurtosis (z-score kurtosis = -2.17) and deviate significantly from normal (*D* (193) = .11, $p < .001$). To assess whether the model is sensitive to these violations of assumptions, bootstrapping was performed. The bootstrapped coefficients show similar results $b = 0.10$, $p = .12$, 95% CI [-0.04, 0.23].

To test the effect of gender on the dependent variables, three independent sample(s) t-tests were performed. There is no significant difference between men's narrative engagement (*M* = 4.23, *SD* = 0.90) and women's narrative engagement (*M* = 4.25, *SD* = 0.95) *Mdif* = -0.01, *t*(192) = -0.11, *p* = .91. There is also no significant difference between men's empathy (*M* = 2.75, *SD* = 0.81) and women's empathy (*M* = 2.66, *SD* = 0.74) *Mdif* = -0.00, *t*(192) = 0.78, *p* = .44. Lastly, an independent sample(s) t-test was performed to test the effect of gender on arousal. There was significant kurtosis in the men's arousal scores (z-score kurtosis = -2.70). Therefore the p-value may not be reliable and more weight should be placed on the bootstrapped 95% confidence interval that will be provided. There is no significant difference between men's arousal (*M* = 3.02, *SD* = 1.52) and women's arousal (*M* = 3.35, *SD* = 1.57) *Mdif* = -0.33, *t*(192) = -1.50, *p* = .14, 95% CI (-0.77, 0.11).

To test whether participants that had viewed the film scene before reported higher narrative engagement, empathy or arousal, three independent sample(s) t-tests were conducted. On average, participants who had viewed the scene before (*M* = 4.47, *SD* = 0.89) reported higher narrative engagement than participants that had not (*M* = 4.13, *SD* = 0.92). This difference is significant *Mdif* = 0.34, *t*(191) = 2.43, *p* = .016, *d* = 0.38. Additionally, participants who had viewed the scene before (*M* = 2.94, *SD* = 0.72) reported higher empathy than participants that had not (*M* = 2.60, *SD* = 0.78). This difference is significant *Mdif* = 0.35, *t*(191) = 2.97, *p* = .003, *d* = 0.45. Lastly, an independent sample(s) t-test was performed to test the effect of having viewed the scene before on arousal. There was significant kurtosis in the arousal scores of participants that had viewed the scene before (z-score kurtosis = -2.12). Therefore the p-value may not be reliable and more weight should be placed on the bootstrapped 95% confidence interval that will be provided. There is no significant difference between the arousal scores of participants that had viewed the scene before (*M* = 2.95, *SD* =

1.50) and the arousal score of participants that had not (*M* = 3.28, *SD* = 1.58) *Mdif* = -0.33, *t*(191) = -1.40, *p* = .16, 95% CI (-0.80, 0.14).

To test whether the dependent variables were affected by the type of device on which the survey was conducted, three ANOVA analyses were performed. There was no effect of device type on participants' narrative engagement *F*(2, 190) = 2.31, *p* = .10. Furthermore, there was no effect of device type on empathy *F*(2, 190) = 2.12, *p* = .12. Lastly, an ANOVA was performed to investigate the effect of device type on arousal. There was significant kurtosis in the distribution of the arousal scores of laptop/desktop users (z-score kurtosis = -2.29), which indicates that the assumption of normality was not met. Levene's test (*F* (2, 190) = 4.02, *p* = .02) showed that there were significant differences in the variances of the three groups, which means the assumption of homogeneity of variance is not met. For this reason the bootstrapped confidence intervals of the difference scores and the Welch statistic will be reported. There was no effect of device type on arousal *Welch's F* (2, 63.05) = 0.76, *p* = .47. A Games-Howell post-hoc test was performed to obtain the bootstrapped confidence intervals of the differences between groups: Smartphone versus tablet users: Mdif = 0.10, 95% CI [-0.54, 0.75], smartphone versus laptop/desktop users: Mdif = -0.22, 95% CI [-0.73, 0.31], tablet versus laptop/desktop users: Mdif = -0.32, 95% CI [-0.88, 0.22].

To test the effect of participants' education level on the dependent variables, three ANOVA analyses were performed. Firstly, education level did not significantly affect participants narrative engagement *F*(5, 188) = 0.65, *p* = .66. Education level did also not significantly affect empathy *F*(5, 188) = 1.52, *p* = .18. Lastly, education level did not significantly affect arousal *F*(5, 188) = 0.42, *p* = .84.

To test the effect of the source of the film scene on the dependent variables, three ANOVA analyses were conducted. Firstly, the source of the scene did not significantly affect participants' narrative engagement *F*(4, 189) = 1.70, *p* = .15. Additionally, the source of the scene did not affect empathy. Levene's test (*F* (4, 189) = 2.93, *p* = .02) showed that there were significant differences in the variances of the five groups, which means the assumption of homogeneity of variance is not met. For this reason the Welch statistic will be reported *Welch's F* (4, 82.39) = 2.07, *p* = .09. Finally, the source of the scene significantly affected participants' arousal *F*(4, 189) = 2.82, *p* = .03.

Preliminary Analysis

Preliminary analysis showed that the residuals for the narrative engagement scale were normally distributed (*D* (193) = 0.05, *p* = .20) and the requirement of homogeneity of variance was met (Levene Statistic (13, 180) = 0.46, *p* = 0.94). Durbin-Watson, VIF and tolerance values as well as Cook's distance values were appropriate.

The residuals for the empathy scale were normally distributed (*D* (193) = 0.05, *p* = .20) but the requirement of homogeneity of variance was not met (Levene Statistic (13, 180) = 1.83, *p* = 0.04). Durbin-Watson, VIF and tolerance values as well as Cook's distance values were appropriate. The bootstrapped confidence intervals will be reported because the requirement of homogeneity was not met.

The residuals for the arousal scale were normally distributed (*D* (194) = 0.06, *p* = .20) but the requirement of homogeneity of variance was not met (Levene Statistic (13, 180) = 3.17, *p* < .001). Durbin-Watson, VIF and tolerance values as well as Cook's distance values were appropriate. The bootstrapped confidence intervals will be reported because the requirement of homogeneity was not met.

Motion Dynamics and POV Shots in Relation to Narrative Engagement

A multiple linear regression analysis was used to test the effect of motion dynamics and POV shots on narrative engagement (RQ1). Contrary to H1, motion dynamics did not significantly affect viewers' narrative engagement (*b* = 0.01, *SE b* = 0.01, β = .10, *p* = 0.25, 95% *CIs* β [-0.01, 0.03]). Additionally, POV shots did not significantly affect viewers' narrative engagement (*b* = 0.00, *SE b* = 0.01, *β* = .002, *p* = 0.98, 95% *CIs β* [-0.03, 0.03]). As a result, H1 was discarded.

Furthermore, the individual effects of motion dynamics and POV shots on the subdimensions of narrative engagement were investigated. Motion dynamics did not affect narrative understanding (RQ1.1, *b* = 0.03, *SE b* = 0.02, *β* = .13, *p* = 0.10, 95% *CIs β* [-0.01, 0.06]), attentional focus (RQ1.2, *b* = 0.10, *SE b* = 0.01, *β* = .07, *p* = 0.50, 95% *CIs β* [-0.02, 0.04]), narrative presence (RQ1.3, *b* = 0.01, *SE b* = 0.01, *β* = .04, *p* = 0.69, 95% *CIs β* [-0.02, 0.03]) and emotional engagement (RQ1.4, *b* = -0.001, *SE b* = 0.01, *β* = -.01, *p* = 0.96, 95% *CIs β* [-0.03, 0.03]). POV shots significantly affected participants' narrative understanding (RQ1.1, *b* = -0.05, *SE b* = 0.02, *β* = -.17, *p* = 0.04, 95% *CIs β* [-0.09, -0.002]) and participants' emotional engagement (RQ1.4, *b* = 0.05, *SE b* = 0.02, *β* = .24, *p* = 0.01, 95% *CIs β* [0.01, 0.09]). POV shots did not affect attentional focus (RQ1.2, *b* = -0.01, *SE b* = 0.02, *β* = -.05, *p* = 0.60, 95% *CIs β* [-0.05, 0.03]) and narrative presence (RQ1.3, *b* = 0.01, *SE b* = 0.02, *β* = .03, *p* = 0.74, 95% *CIs β* [-0.04, 0.05]).

Motion Dynamics and POV Shots in Relation to Empathy

A multiple linear regression analysis was conducted to test the effects of motion dynamics and POV shots on empathy(RQ2). Contrary to H2, motion dynamics did not affect viewers' empathy (*b* = 0.01, *SE b* = 0.01, *β* = .09, *p* = 0.38, 95% *CIs β* [-0.01, 0.02]). Contrary to H4, POV shots did not affect viewers' empathy (*b* = -0.01, *SE b* = 0.01, *β* = -.06, *p* = 0.61, 95% *CIs β* [-0.03, 0.02]). Therefore, H2 and H4 were discarded.

Additionally, the effects of motion dynamics and POV shots on the subdimensions of empathy were analyzed. Motion dynamics did not affect participants' affective empathy (RQ2.1, *b* = 0.01, *SE b* = 0.01, *β* = .15, *p* = 0.12, 95% *CIs β* [-0.003, 0.03]), cognitive empathy (RQ2.2, *b* = 0.01, *SE b* = 0.01, *β* = .07, *p* = .52, 95% *CIs β* [-0.01, 0.03]) and associative empathy (RQ2.3, *b* = 0.003, *SE b* = 0.01, *β* = .04, *p* = 0.69, 95% *CIs β* [-0.01, 0.02]). POV shots did not affect participants' affective empathy (RQ2.1, $b = -0.01$, $SE\ b = 0.01$, $\beta = -.10$, $p = 0.34$, 95% *CIs* β [-0.04, 0.01]), cognitive empathy (RQ2.2, $b = -0.01$, $SE\ b = 0.02$, $\beta = -.05$, $p = 0.64$, 95% *CIs* β [-0.04, 0.02]) and associative empathy (RQ2.3, $b = 0.00$, $SE\ b = 0.01$, $\beta = -.002$, $p = 0.98$, 95% *CIs* β [-0.03, 0.03]).

Motion Dynamics and POV Shots in Relation to Arousal

A multiple linear regression was performed to test the effect of motion dynamics and POV shots on arousal (RQ3). Contrary to H3, motion dynamics did not affect viewers' empathy ($b = -0.02$, $SE\ b = 0.02$, $\beta = -.09$, $p = 0.33$, 95% *CIs* β [-0.04, 0.02]). Contrary to H5, POV shots did not affect viewers' empathy ($b = -0.003$, $SE\ b = 0.02$, $\beta = -.01$, $p = 0.87$, 95% *CIs* β [-0.04, 0.04]). Consequently, H3 and H5 were discarded.

Discussion

In this study, the effect of motion dynamics and POV shots on film viewers' narrative engagement, state empathy and arousal was investigated. Additionally, the effects of these formal features on the subdimensions of narrative engagement and state empathy was researched. To investigate these effects, an online survey among 194 respondents was conducted. Participants viewed one of 14 different film scenes from Quentin Tarantino films. Afterwards, participants answered questions on narrative engagement, empathy and arousal.

The Effect of Motion Dynamics

Results showed that motion dynamics did not have a significant effect on narrative engagement or any of its subdimension. These results are in contrast with Bálint et al. (forthcoming) finding that motion dynamics increase film viewers' narrative engagement through the enhancement of attentional focus. However, the authors indicated that motion dynamics correlated strongly with the formal feature color brightness. As a result, the true source of the effects that were found in this study could not be determined. The results of the current study indicate that motion dynamics may in fact not be able to influence film viewers' narrative engagement. Instead, color brightness might be able to do so. Further research on the individual effect of this formal feature is desirable to gain more conclusive knowledge on the effects of both motion dynamics and color brightness.

Motion dynamics did not affect empathy or any of its subdimensions. Currently, the direct effect of motion dynamics on empathy in film has not been investigated in other studies. The results of the current study may set a benchmark for further investigation on formal features and empathy in film. Moreover, the results of the current study support Matsumoto et al. (2015) finding that there is no relation between (judgement of) motion and empathy.

Lastly motion dynamics did not affect respondents' arousal. These results are not in line with earlier studies investigating the effect of motion dynamics on arousal, finding that motion dynamics affected participants' self-reported and physiological arousal (Simons et al., 1999; Ravaja, 2004). A possible explanation for these contrasting results may be found in the fact that earlier studies on the relation between motion dynamics and arousal have compared moving images to static images. Film scenes are never completely static and will always contain some degree of motion, whereas separate images can be fully static. Consequently, the difference between static versus moving images may be more noticeable than the difference between film scenes with low motion dynamics versus scenes with high motion dynamics. Therefore, the effect of motion found in earlier research may be more significant than the effect of motion dynamics in film scenes such as in the current study.

The Effect of POV Shots

POV shots did not affect respondents' narrative engagement. This result is in line with Bálint et al. (forthcoming), also finding that POV shots had no effect on narrative engagement. Furthermore, POV shots affected the emotional engagement subdimension of narrative engagement. Film scenes with higher levels of POV shots elicited more emotional engagement in film viewers. These results are consistent with previous research that also found a positive relation between POV shots on emotional engagement (Bálint et al., forthcoming). Additionally, these findings support Carrol (1993), showing that POV shots can communicate emotion effectively. Interestingly, results of the current study also showed an effect of POV shots on respondents' narrative understanding. Higher levels of POV shots decreased film viewers' narrative understanding. This result is in contrast with Cummins (2009), finding that POV shots can induce greater sense of spatial presence and engagement than objective shots. The results of the current study show that even though POV shots can increase engagement with film scenes emotionally, they are also able to reduce film viewers' comprehension of the narrative. This implicates that the use of formal features in films can be a double-edge sword.

Results showed no effect of POV shots on empathy or any of its subdimensions. Earlier studies have not investigated the direct effect of POV shots on empathy. However, the results of the current study are in line with Andringa et al. (2001), finding that subjective framing in film (as opposed to objective framing) has no effect on empathy in film viewers. More importantly, findings of the current study suggest that empathy and emotional engagement in film are two clearly distinct variables. These two concepts seem rather similar on first sight. For example, items of the empathy scale (e.g. "I experienced the same emotions as the character when watching this message.") bear resemblance to items of the emotional engagement subdimension (e.g. "During the program, when a main character succeeded, I felt happy, and when they suffered in some way, I felt sad."). However, results showed that POV shots significantly affected viewers' emotional engagement, whereas POV shots had no effect on empathy. This discovery provides implications for future research on emotional behavior in films.

Lastly, POV shots did not affect film viewers' arousal. This outcome supports Bálint et al. (forthcoming), finding that POV shots do not affect film viewers' attentional focus, an arousal-related concept. Furthermore, the findings of the current study are consistent with Cummins et al. (2012). This study found that POV shots do not affect self-reported arousal. However, results of this study did show an effect of POV shots on physiological arousal. It is worth nothing that similar to the current study, Cummins et al. (2012) used the Self-Assessment-Manikin (Lang, 1980) to measure self-reported arousal. The authors used skin conductance measures to assess physiological arousal. In combination with these results, the findings of the current study suggest that self-reported arousal measures may not be as effective as physiological measures of arousal.

Implications for Limited Capacity Model of Motivated Mediated Message Processing

Results of the current study provide important implications for the Limited Capacity Model of Motivated Mediated Message Processing (Lang, 2000). This framework states that formal features elicit the allocation of cognitive resources when a message is being processed. Namely, through activation of the attentional and motivational systems. When activated, these systems are able to influence emotional and cognitive responses to a message. As a result, the encoding process of a message can be affected (see Detenber & Lang, 2010). This is the process of creating a representation of a message for processing and storing the message. Consequently, the LC4MP explains that the use of formal features can affect which parts of a message are encoded.

To a certain extent, findings of this study support the assumption of the LC4MP that formal features can affect emotional and cognitive responses to a message. Most importantly, the current study found that POV shots can increase film viewers' emotional engagement. However, the results also implicate that formal features should be applied with caution as POV shots were found to decrease viewers' understanding of the narrative. Moreover, motion dynamics and POV shots did not significantly affect viewers' narrative engagement, empathy and arousal. Although formal features can affect film viewers' cognition and emotion in a positive manner, the findings of the current study suggest that these effects may be more limited than previously found (Bálint et al., forthcoming).

Methodological Considerations

Although the current study provides new insights into the effect of formal features on film viewers' responses, there are some remarks that need to be outlined regarding the methodology of the utilized approach. Firstly, it should be noted that the stimuli that were used in the current study were all scenes from Quentin Tarantino films with a violent nature. This was a conscious decision to ensure a thematically and quality wise homogeneous sample. Additionally, the use of these film scenes allowed for analysis of variances in motion dynamics and POV shots while still retaining similarities in the scenes for a valid comparison. However, this decision may harm the generalizability of the current findings. Results of the current study may not be applicable to thematically different film scenes or scenes from a different director. Future research should aim to investigate the effect of formal features on non-violent scenes from various directors to explore the generalizability of the current findings.

Furthermore, it is important to note that, due to a technical error, item 4 of the affective empathy scale ("I can feel the character's emotions") was not included in the scale. As a result the reliability of the affective empathy subdimension was relatively low ($\alpha = 0.62$). The reliability of the state empathy scale as a whole remained relatively high ($\alpha = .86$) and results on this scale were most likely not affected. However, the omission of item 4 of the affective empathy scale may have affected the results on this subdimension specifically.

Another methodological consideration is the fact that arousal was measured by a single-item self-report scale. As discussed earlier, self-report measures of arousal may not find effects of formal features in film that can be found through the use of physiological arousal measures (Cummins et al., 2012). Future studies should try to implement a measure of both self-reported and physiological arousal to further explore the significance of the difference between these two measures in film research.

Additionally, it should be noted that the film scenes in the current study were presented with Dutch subtitles. Some participants may prefer subtitles while others may find them intrusive or distracting. The current study did not control for this possible effect of the presence of subtitles on narrative engagement, empathy or arousal. Therefore, results may have been slightly impacted.

Lastly, it should be mentioned that the majority of the sample was relatively young and consisted of mostly university students. Participants between 18 and 26 years old made up 50% of the entire sample and 74% of the sample was a university student. This indicates that the results of the current study might not be fully generalizable to the real population. Future studies should aim to gather a more ecologically valid sample.

Conclusion

This study provides evidence for the effect of formal features on film viewers' cognitive and emotional responses. Results showed that higher levels of POV shots increased viewers' emotional engagement with the film scene. However, current findings also suggest that the use of formal features can evoke undesirable effects. Namely, higher levels of POV shots also decreased viewers' narrative understanding. Moreover, motion dynamics and POV shots did not significantly affect viewers' narrative engagement, empathy or arousal. In conclusion, findings of the current study implicate that directors' use of stylistic features can affect film viewers' responses. However, these effects may be more limited than previously found and the use of such features can turn out to be a double-edged sword.

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