

**What Just Happened? How Complex Film Plots Shape Cognitive Empathy in
Extraverts**

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Abstract

Film-watching is a social activity that not only entertains but also promotes critical thinking, increases attention span, and has potential therapeutic effects. Despite the rise in film consumption, little research has explored the role of films in promoting empathy or how personality traits, like extraversion, impact this experience. Moreover, few studies have focused on examining the influence of different film narrative modes, such as linear and complex narratives, on cognitive empathy. The current study examines the relationship between narrative complexity, extraversion, and cognitive empathy, addressing gaps in the existing literature. Specifically, it investigates whether the relationship between extraversion and cognitive empathy is moderated by a third variable, narrative complexity. A factorial repeated-measures design was used to assess these relationships among 34 participants. The results showed that the interactions among narrative complexity and extraversion do not significantly affect cognitive empathy scores. Therefore, narrative complexity was not found to be a moderator of the relationship between the other two variables. Although rejecting my initial predictions, this finding contributes to understanding how personality and narrative complexity influence film-watching experiences.

Keywords: film-watching, narrative complexity, extraversion, cognitive empathy, personality traits

What Just Happened? How Complex Film Plots Shape Cognitive Empathy in Extraverts

Film-watching is an important social act, contributing to the expression of cultural values and strengthening interpersonal relationships (Corbet, 1999). As a hobby, film-watching provides not only entertainment but also promotes critical thinking (Lee, 2019), increases attention span (Lee, 2019), and has potential therapeutic effects (Schulenberg, 2003).

Despite an increase in film consumption generated by technological advancements and easier access to content, the act of watching films remains relatively understudied (Aveyard, 2016). Little attention has been paid to the role of films in promoting empathy (Zeng et al., 2023), a key element of the cinematic experience (Lankhuizen et al., 2022), or how viewer's personality traits might impact this experience. Moreover, while a link has been established between film narrative mode and viewers' emotional responses (Keating, 2006), most research has focused on responses generated by linear narratives (Verona & Hruza, 2023) to the detriment of complex narratives.

In this study, I aim to examine the relationship between narrative complexity, viewers' personality traits, and empathy, thus helping to fill a gap in the existing literature. The personality trait chosen for this study is that of extraversion, based on articles suggesting a positive correlation between this trait and empathy levels (Neumann et al., 2016; Richendoller & Weaver, 1994; Verona & Hruza, 2023). Ideally, this analysis will lead to a more comprehensive perspective of viewer's film-watching experiences and the variables influencing them.

Extraversion and Empathy

Extraversion is a fundamental aspect of personality rooted in the principles of cortical arousal (Neumann et al., 2016). Individuals with higher extraversion levels are believed to

have a lower level of cortical arousal compared to less extraverted individuals, leading them to seek out external stimulation to elevate these levels (Neumann et al., 2016). The trait encompasses an individual's level of sociability, adaptability, and positive self-esteem (Richendoller & Weaver, 1994), as well as tendencies toward dominance and sensation-seeking (Neumann et al., 2016). An individual's level of sociability is greatly influenced by empathy (Eisenberg & Miller, 1987), which can be defined as the capacity to share and understand other's emotions, serving as a driving force behind prosocial behavior while simultaneously inhibiting aggression (Verona & Hruza, 2023). Based on the arguments that "empathy plays a role in the need for social interaction" (Neumann et al., 2016, p.245) and extraverts "might evidence empathic response styles that are consistent with their desire to be seen as sociable, outgoing and affiliated with others" (Richendoller & Weaver, 1994, p.305), extraversion was consequently found to be positively correlated with empathic responses (Neumann et al., 2016; Richendoller & Weaver, 1994; Verona & Hruza, 2023).

The above-mentioned empathic responses can be categorized along two dimensions: cognitive-affective and state-trait. Cognitive empathy, which will be the focus of this study, refers to recognizing, understanding, and adopting another's point of view (Shen, 2010). In contrast, affective empathy also involves sharing one's emotions (Verona and Hruza, 2023). While distinct from one another, cognitive and affective empathy might be closely related or intertwined (Shen, 2010). A particular aspect of cognitive empathy, namely perspective-taking, appears to be positively associated with extraversion (Richendoller & Weaver, 1994; Verona & Hruza, 2023) and will be used as a measure of cognitive empathy in this study.

When it comes to the second dimension, cognitive empathy results from the interaction between a state, the transient reaction elicited by specific situations, and trait influence, a stable tendency to be empathic (Lyu et al., 2022). What this entails is that state empathy depends more on the characteristics of a situation, while the second depends more on

the characteristics of a person. The relationship between the two is positive, with trait empathy being able to predict state empathy (Shen, 2010), for instance in the context of film. Previous studies have found film clips to be one of the most powerful ways of eliciting empathy in a laboratory setting (Verona & Hruza, 2023), enabling viewers to identify with the presented characters and situations (Orjuela-Jongbloed & Gómez, 2021). Thus, if prior research found that extraverted individuals have a higher stable tendency to be empathic, this effect should also apply to a specific experimental condition, like the one presented in the current study. Therefore, I propose that, based on previously presented research, extraversion is positively correlated with state cognitive empathy.

Hypothesis 1. Extraversion is positively correlated with cognitive empathy.

Narrative Complexity and Empathy

Unlike classical and well-known linear film narratives, complex narrative films utilize time loops, fragmented realities, and causal non-linearity (Hven, 2017) to temporarily confuse the viewers and capitalize on their sense of competence (Kiss & Willemsen, 2017). This temporary confusion can result in what Kiss and Willemsen (2017) describe as "cognitive puzzlement" (p. 26), a state that obstructs the viewer's understanding of the story. In contrast, linear narratives are characterized by easy-to-access, classical, and transparent narratives, causing little to no confusion in their viewers (Kiss and Willemsen, 2017). Drawing from the presented definitions, when choosing the experimental stimuli, I considered linear narrative films to be those that do not need additional information to clarify the plot, unlike complex narrative films which do.

Yet, no matter the type of narrative, a central aspect of the cinematic experience is the empathic bonds created between viewers and fictional characters (Grodal and Kramer, 2010). This bond is created through the feeling of a shared experience, with viewers being invited to share the character's emotions, goals, situations, and environments. Filmmakers are aware of

this core aspect of film-viewing, with genres such as comedy and romance being based on the care and empathy viewers feel towards the characters (Grodal & Kramer, 2010). Such bonds are strengthened by observer-target similarity, viewers' level of cognitive load, stylistic film properties, and feelings of reality (Lyu et al., 2022; Shen, 2010). Recognizing and understanding a character's mental state through empathy facilitates narrative comprehension, helping viewers latch on to the plot of the film (Lankhuizen et al., 2022).

Given that complex narratives are defined by decreased narrative comprehension (Kiss & Willemsen, 2017), I hypothesize that the empathic bonds between viewers and fictional characters are weakened, if not entirely broken. This effect might result from lessened identification with the main characters, unrealistic scenarios, high cognitive load, or suspicion of character unreliability (van Lissa et al., 2016). Therefore, I propose that narrative complexity influences cognitive empathy levels, with viewers experiencing lower levels of cognitive empathy in the complex narrative condition than in the linear narrative condition.

Hypothesis 2. Narrative complexity influences cognitive empathy levels.

Extraversion, Narrative Complexity, and Empathy

In exploring how different films affect viewer cognitive empathy, specifically among extraverts, the complexity of the narrative plays a key role (Lankhuizen et al., 2022). As previously stated, complex narratives, with their twisted timelines and intricate plots, might not only make it harder for viewers to follow along but also affect whether viewers can put themselves in the shoes of the characters (Simons, 2008). Extraverts, who are naturally more outgoing and empathetic (Richendoller & Weaver, 1994), might find it easier to connect with characters from simple linear films since such narratives tend to mimic real-life scenarios in which extraverts thrive (Pamerleau, 2009). Based on this, I expect that more extraverted individuals will score higher in cognitive empathy in the linear film condition compared to the

complex condition, but these scores will still be higher than those of less extraverted people in both conditions. Thus, I hypothesize that narrative complexity acts as a moderator of the relationship between extraversion and cognitive empathy, with participants experiencing higher levels of cognitive empathy in the linear condition compared to the complex condition.

Hypothesis 3. Narrative complexity moderates the relationship between extraversion and cognitive empathy.

Methods

Participants

Participants were recruited via personal networks and advertisements on the SONA website. Inclusion criteria were participants being enrolled in a Bachelor (BA)/Master (MA) at the University of Groningen or the Hanze University of Applied Sciences. The original sample consisted of 35 participants, from which one participant's data was discarded for not satisfying the inclusion criteria. Consequently, the study included a number of 34 students (13 males and 21 females; $M_{age} = 21.235$, $SD = 2.175$). The programmes followed by the student were BAs (91.2%) in Psychology (87.1%), Arts, Culture, and Media (3.2%) or other (9.7%), and MAs (8.8%) in Psychology (66.7%), or other (33.3%), with 32 (94.2%) participants attending the University of Groningen and two (5.8%) attending the Hanze University of Applied Sciences.

Design

This study is part of a larger one assessing a variety of variables and relationships forming between them (for an overview of all, check Appendix A). My study uses a factorial repeated-measures design. The factor has two levels based on narrative complexity being linear and complex. With this design, I explored in each participant how the two levels of

narrative complexity influence the outcome variable of cognitive empathy. Next to narrative complexity, the interaction between personality (extraversion) as an independent variable and cognitive empathy will be researched as well. The variable of extraversion is a between-subject factor while the variables of cognitive empathy and narrative complexity are within-subject factors.

Procedure

This study was conducted with the approval of the Ethics Committee of the Faculty of Behavioural and Social Sciences at the University of Groningen (EC-BSS), the Psychology subcommittee. As previously mentioned, participants were recruited via personal networks and targeted advertisements on the SONA website. As compensation, participants could choose between SONA credits or 10€ PIM vouchers. The data was collected at the Heymans building from 22.04.2024 until 10.04.2024 and every session took up approximately 90 minutes per participant. After registering for the study, the participants had to select one of these time slots available, until the maximum capacity of one participant per time slot was reached. One or two team members were present throughout the whole experiment.

Upon their arrival at the Heymans building laboratory, participants provided their written consent for participation. Subsequently, participants were asked to sit in front of a large screen, placed 210 cm from the chair, and a camera was set up to capture their bodies for the Movement Energy (ME) analysis. The recording was set to start right before the first short film and end after the last film. Once participants were seated and the equipment was properly set up, they watched all six short films, with the opportunity to take a 5-minute break halfway through. The order in which the short films were presented was randomized for each participant.

All participants completed the same questionnaire after each short film, on a tablet provided to them. After the sixth short film and subsequent questionnaire, participants were instructed to hold onto their tablets and complete two more general questionnaires about background information and personality.

Measurements

As previously mentioned, my study is part of a larger one, assessing a multitude of independent and outcome variables. For clarity purposes, I will only describe in depth my measurements of interest (for all items used, see Appendix B).

After each short film, participants rated two items out of the four items included in the Empathy State Scale (Shen, 2010), assessing cognitive empathy levels. The two items specifically addressed the dimension of perspective-taking of cognitive empathy. After watching all short films, participants provided some background information and rated two items of the Ten-Item Personality Inventory (Gosling et al., 2003) assessing extraversion levels. The background information collected was: age (one item), study background (one item), sex assigned at birth (one item: male/female/prefer to specify), gender identity (one item: female/male/prefer not to say/prefer to specify), gender expression (two items: femininity, masculinity), and film viewing behavior (two items: frequency and preferences). The questionnaires could only be completed in English.

Short films

For this study, six short films were picked (See Table 1). When selecting them, I controlled for their duration (5 to 15 minutes) and their genre (Horror, Thriller, Sci-Fi). In addition, I balanced the number of animation and live-action films by using two animations and four live-actions. Lastly, I balanced heavily language-based and moderately language-

based short films and chose short films that focused on only one main character and were spoken in English.

Table 1

Title, narrative type, film style, genre, length, and year of release of short films

| Title | Narrative Type | Film Style | Genre | Length (min) | Year |
|--|----------------|-------------|----------------|--------------|------|
| <u>Alma</u> | Linear | Animation | Horror | 05:30 | 2009 |
| <u>Mouse X</u> | Complex | Live-action | Mystery/Sci-Fi | 15:05 | 2014 |
| <u>OPAL</u> | Complex | Animation | Horror | 12:30 | 2020 |
| <u>The Ballerina</u> | Linear | Live-action | Thriller | 07:45 | 2021 |
| <u>The Interview</u> | Complex | Live-action | Thriller | 09:34 | 2020 |
| <u>Dirty Machines - “The End of History”</u> | Linear | Live-action | Mystery/Sci-Fi | 13:33 | 2020 |

Extraversion

The extraversion scale consisted of two items assessing participants' self-perception. Students rated the items "I see myself as extraverted, enthusiastic." and "I see myself as reserved, quiet." on a 7-point Likert scale (1= disagree strongly, to 7= agree strongly). The reliability of the two items is good ($\alpha = 0.865$). Since the second statement is inversed, its scoring was recoded. Subsequently, an average score was obtained by adding the scores of the first and second (recoded) items and dividing by two. This score represents the overall level of extraversion.

Cognitive empathy

The cognitive empathy scale consisted of two items assessing perspective-taking. Students rated the items "I can see the character's point of view." and "The character's reactions to the situation are understandable." on a 7-point Likert scale (1= disagree strongly, to 7= agree strongly). The reliability of the two items is moderate ($\alpha = 0.652$). Subsequently, the scores were either aggregated into a global empathy score per participant or into one score per film, resulting in six scores per participant.

Statistical analysis

Statistical analyses for testing the three hypotheses were conducted with SPSS version 28 (IBM Corp., 2021). The hypothesis that extraversion is positively correlated with cognitive empathy (H1) was tested using Pearson's bivariate correlation. To test the first hypothesis, the six cognitive empathy scores obtained per participant were further averaged to obtain a global score. Then, this global cognitive empathy score was correlated with each participant's extraversion score.

The hypotheses that narrative complexity influences cognitive empathy levels (H2) and that the relationship between extraversion and cognitive empathy is moderated by narrative complexity (H3) were both tested with a two x three Repeated-Measures Analysis of

Variance (RM ANOVA) analysis using the same program. For the RM ANOVA analysis, cognitive empathy was the outcome variable, extraversion was the predictor variable and narrative complexity was the moderator. To test these hypotheses, cognitive empathy scores were averaged per film, thus each participant having six empathy scores. These six scores represented the factors of the analysis (two film conditions x three films/condition), while the global extraversion score, one per participant, was used as the covariate. Lastly, I only analyzed complete data sets for each participant, discarding incomplete ones.

Results

Descriptive Statistics and Assumption Checks

Table 2 illustrates the descriptive statistics of my variables of interest global extraversion, global cognitive empathy, and cognitive empathy scores per film, named after their corresponding narrative mode (complex/linear).

Table 2

Descriptives

| | M | SD |
|--------------------|-------|-------|
| GlobalExtraversion | 4.191 | 1.451 |
| GlobalEmpathy | 5.052 | 0.697 |
| Complex1 | 5.647 | 1.105 |
| Complex2 | 4.911 | 1.549 |
| Complex3 | 5.206 | 1.332 |

| | | |
|---------|-------|-------|
| Linear1 | 4.956 | 1.322 |
| Linear2 | 4.326 | 1.556 |
| Linear3 | 5.265 | 1.096 |

Note: N=34; M: Mean; SD: Standard Deviation

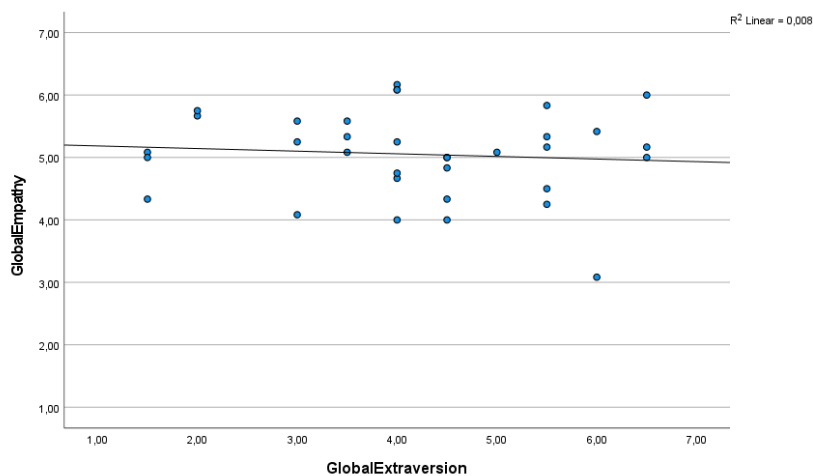
The assumptions of the data analysis were all met. Firstly, the observations are independent of one another. Furthermore, the residual by predicted plot illustrated a linear relationship between variables and heteroscedasticity, while the residual plot showed the normality of the residuals. There are no clear outliers that should be taken care of and the VIF values are all under 4, which proves that multicollinearity between variables is not an issue. Mauchly's Test of Sphericity was conducted to test the assumption of sphericity for the within-subjects factors. The test indicated that the assumption of sphericity was met for the main effects and interactions. For narrative complexity, $\chi^2(0) = 0.000$, $p = .$ For film conditions, $\chi^2(2) = 2.144$, $p = 0.342$. For the interaction between narrative complexity and film conditions, $\chi^2(2) = 2.938$, $p = 0.230$.

The correlation between extraversion and cognitive empathy

My first hypothesis is that extraversion is positively correlated with cognitive empathy. Figure 1 illustrates the relationship between global extraversion and global empathy scores. The p-value ($p=0.623$) of the analysis indicates that the correlation is not statistically significant, thus I cannot conclude that a relationship between extraversion and cognitive empathy exists in the population from which this sample was drawn, contradicting my prediction.

Figure 1

Correlation between GlobalExtraversion and GlobalEmpathy



The influence of narrative complexity on cognitive empathy levels

My second hypothesis is that narrative complexity influences cognitive empathy scores. The results on the RM ANOVA indicate that the main effect of narrative complexity was not significant, $F(1, 32) = 1.272, p = 0.268$. This indicates that narrative complexity did not have a significant effect on cognitive empathy scores.

Narrative complexity as the moderator between extraversion and cognitive empathy

My third hypothesis is that narrative complexity moderates the relationship between extraversion and cognitive empathy. I included individual films as an effect to account for the unique influence of specific films. The results of the moderation analysis are as follows. The main effect of film conditions was not significant, $F(2, 64) = 0.308, p = 0.736$. This suggests that the different film conditions did not significantly affect cognitive empathy scores. The interaction between narrative complexity and global extraversion also was not significant, $F(1, 32) = 0.102, p = 0.751$. This indicates that the effect of narrative complexity on cognitive empathy does not depend on levels of extraversion. The interaction between film conditions and global extraversion was not significant, $F(2, 64) = 1.012, p = 0.369$, suggesting that the

different film conditions do not interact with extraversion to affect cognitive empathy scores. The interaction between narrative complexity and film conditions was not significant, $F(2, 64) = 1.046, p = 0.357$. Lastly, the three-way interaction between narrative complexity, film conditions, and global extraversion was not significant, $F(2, 64) = 0.617, p = 0.543$. This indicates that narrative complexity and film conditions combined do not affect the relationship between extraversion and cognitive empathy scores.

The results of the two x three RM ANOVA indicate that neither the main effects nor the interactions among narrative complexity, film conditions, and extraversion significantly affect cognitive empathy scores. This suggests that narrative complexity does not moderate the relationship between extraversion and cognitive empathy within the context of this study.

Discussion

The purpose of this study was to investigate how different types of film narratives, linear or complex, promote cognitive empathy and how the viewer's trait of extraversion might shape this experience. My initial prediction was that extraverts would experience higher levels of cognitive empathy, based on past research (Neumann et al., 2016; Richendoller & Weaver, 1994; Verona & Hruza, 2023) which hypothesized that extraverts' increased need for affiliation might drive them to be more empathic. Subsequently, these studies found a positive correlation between the two variables. In opposition to my prediction and past research, the results of the data analysis indicate that there is an insignificant relationship between extraversion and cognitive empathy levels. However, there are a few studies that drew a similar conclusion. Eysenck and Eysenck (1980) and Eysenck and McGurk (1980) found them to be unrelated, while Jolliffe and Farrington (2007) and van der Hiele et al. (2020) found a correlation in specific contexts. For example, they found a correlation only in males, or too low of a correlation to indicate a general relationship between extraversion and

cognitive empathy. Furthermore, although Verona and Hruza (2023) have previously found film clips to be an effective way to evoke empathy through identification with the film characters (Orjuela-Jongbloed & Gómez, 2021), this might not be the case for all film genres. The movie genres selected horror/thriller/sci-fi, might not be particularly effective at eliciting cognitive empathy, since these genres mainly target fear responses from their viewers (Long, 2020) and do not foster character identification (Simonyi, 2022).

My second prediction was that narrative complexity influences cognitive empathy levels. Specifically, I assumed that complex narratives, in comparison to linear narratives, will result in less cognitive empathy, since such narratives are characterized by decreased narrative comprehension (Kiss & Willemsen, 2017), reduced identification with the main characters, and higher cognitive load (van Lissa et al., 2016). The data analysis shed light on an insignificant relationship between the variables, with narrative complexity not influencing cognitive empathy scores. A number of past studies have observed a similar pattern. Walkington, Wigman, and Bowles (2020) have found that while narratives can influence empathy, this only takes place in certain contexts. Thus, the genres chosen might again impact this relationship. Multiple studies (Vignemont & Singer, 2006; Koopman, 2015; Zillman & Knobloch, 2001) indicated that on top of contextual information, personal factors and pre-existing dispositions greatly influence empathic responses. The hypothesis that personal factors might influence empathy was previously tested using extraversion, but my student sample might lack other characteristics that increase cognitive empathy levels. Some characteristics tied to increased cognitive empathy levels include emotional stability, conscientiousness (Airagnes et al., 2021), positive self-evaluation (Antinienė & Lekavičienė, 2015), and emotional intelligence (Banissy et al., 2012). Research focusing on young people around the age of my student sample ($M = 21.235$, $SD = 2.175$) has generally found lower

levels of the above-mentioned traits (Calero, Barreyro, & Injoque-Ricle, 2018; Khan et al., 2015).

My third and last prediction was that narrative complexity moderates the relationship between extraversion and cognitive empathy, with extraverted viewers experiencing higher levels of cognitive empathy in the linear condition than in the complex condition. My hypothesis was based on the idea that extraverts might find it easier to connect with characters from linear films, since linear films present real-life scenarios in which extraverts generally show higher levels of cognitive empathy (Richendoller & Weaver, 1994). The data analysis indicates that narrative complexity does not act as a moderator of the relationship between extraversion and cognitive empathy. This analysis is supported by the findings that, on average, participants experienced the complex film as more complex than the linear films. The average perceived complexity for the complex condition was $M=62.4$, while the average perceived complexity for the linear condition was $M=39.99$. The moderation analysis could have been impacted by the initial finding that there is an insignificant relationship between extraversion and cognitive empathy or could indicate that another type of relationship is present.

The study has a few limitations that need to be addressed. Firstly, the study was restricted by using a small, predominately female sample ($N=34$, of which 21 are female). Furthermore, most participants were undergraduate students ($N=31$) from the University of Groningen or Hanze University of Applied Sciences. These aspects limit the generalizability of the findings. A larger sample could provide more robust results and a better representation of the population. Secondly, the usage of self-report measures can be affected by the social desirability bias and require some insight from participants. Since cognitive empathy is considered a complex emotion (Verona & Hruza, 2023), it may require greater insight than basic emotions that develop earlier in life (e.g., fear, sadness, disgust) (Verona & Hruza,

2023). Thus, future research should consider using additional instruments to measure this concept, such as physiological responses to the films (e.g., EEG, EMG) since they offer a more objective, real-time, and detailed assessment of cognitive empathy (Alimardani et al., 2020). Lastly, the usage of only two items from the TIPI (Gosling et al., 2003) and two from the Empathy State Scale (Shen, 2010) may not have been sensitive enough to pick up on the individual variance in the experience of extraversion and cognitive empathy, thus lowering the reliability of the measures. In particular, the two items assessing cognitive empathy present moderate reliability ($\alpha = 0.652$), which suggests potential limitations in the precision of this measurement. The reliability might be lower because each item addresses a slightly different facet of cognitive empathy. While the first item ("I can see the character's point of view.") addresses understanding the characters' mental processes, the second item ("The character's reactions to the situation are understandable.") also addresses understanding the characters' behaviors. Thus, future research should consider utilizing more items of the same conceptual facet.

Despite its limitations, the present study has the strength of being one of the first to address the relationship between extraversion, narrative complexity, and cognitive empathy, filling a gap in the existing literature in the domain of psychology and film studies. Moreover, the usage of a factorial repeated-measures design allowed for an in-depth analysis of the interaction between the three variables within the same participant pool, reducing variability and increasing the reliability of the findings. The finding that there is no relationship between extraversion and cognitive empathy challenges existing theories and suggests the need for further research. Thus, further research should consider exploring other film genres and utilizing a larger male sample to test whether a correlation exists when it comes to males, but not females. The finding that narrative complexity does not influence cognitive empathy scores highlights once again the importance of contextual information such as film genre and

how certain personal factors might facilitate the effect of narrative complexity on cognitive empathy levels. Thus, future research should consider assessing an older age group than in the current study, since such a sample might possess empathy-increasing characteristics, such as conscientiousness or emotional stability. The finding that narrative complexity is not the moderator of the relationship between extraversion and cognitive empathy highlights the need for a better understanding of how personality traits interact with film narratives. Thus, future research should consider exploring other potential moderators or mediators that might influence the relationship between extraversion and cognitive empathy. Based on these findings, it seems that personality, narrative complexity, and cognitive empathy are highly interposed. In particular, personality traits seem to influence how narrative complexity is perceived and whether it will lead to responses such as cognitive empathy. This highlights the complex relationship between individual factors and narrative modes, suggesting that personality traits play a big role in the impact of film narratives on cognitive empathy. This finding opens new avenues for future research and emphasizes the necessity of assessing a broader range of variables and a diverse participant sample. Addressing these factors will enhance our understanding of the mechanisms facilitating cognitive empathy, potentially leading to the development of more effective empathy-building interventions and educational programs.

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Appendix A

| Variable | Between-subject or Within-subject Factor | Material | Description |
|-----------------------|--|---|---|
| Movement Energy (ME) | Within-subject | Movement Energy Analysis (Tschacher et al., 2018, Ramseyer, 2019) | A frame-differentiating method is applied to the raw data to generate a time series for each short film. |
| Immersion | Within-subject | Narrative Engagement Scale (Busselle & Bilandzic, 2009) | 2 items from the Attentional Focus subscale rated on a 7-point Likert scale from strongly disagree to strongly agree |
| Cognitive Stimulation | Within-subject | Scale of Aesthetic Appreciation of Film (Doicaru, 2016) | 2 items from the Cognitive Stimulation scale rated on a 7-point Likert scale from strongly disagree to strongly agree |
| Emotional Resonance | Within-subject | Geneva Emotion Wheel (Tinio & Gartus, 2018) | Participants select from 20 emotion types and rate the emotion with regard to five intensity levels. |

| | | | |
|---------------------------------|-----------------|---|--|
| Bodily Sensations | Within-subject | Bodily Sensation Map (Schino et al., 2021, 2022) | Participants visually identify body areas that are activated during emotional arousal. |
| Affective and Cognitive Empathy | Within-subject | Empathy State Scale (Shen, 2010) | 2 items from the Affective Empathy subscale and 2 items from the Cognitive Empathy subscale rated on a 7-point Likert scale from strongly disagree to strongly agree |
| Artistic Experience | Within-subject | Thematic Analysis | Participants write initial thoughts about their film-viewing experience and their words are organized into clusters based on emerging themes (e.g. appreciation and enjoyment) |
| Personality | Between-subject | Ten-Item Personality Inventory (Gosling et al., 2003) | 2 Items from the Extraversion Scale on a 7-point Likert Scale from strongly disagree to strongly agree |

*combined average of the Affective Empathy and Cognitive Empathy subscales

Appendix B

Demographic Questionnaire

1. Which film genres do you prefer to watch? You can pick and rank up to 5 genres that you prefer most: Action, adventure, animation, arthouse, comedy, documentary, drama, experimental, fantasy, horror, musical, romance, science fiction, thriller, western.
2. In the past three months, how often have you watched a film?: More than 4 times a week, 2-3 times a week, once a week, 1-2 times a month, less than once a month, I did not watch a film in the past three months.
3. What is your age?
4. I am currently enrolled in: BA/MA Arts, Culture, and Media; BA/MA Psychology; BA/MA other.
5. What is your gender?: Male, female, non-binary/third gender, prefer not to say.
6. On a scale from 0 to 100, how feminine or masculine would you describe yourself?

By masculinity and femininity, we refer to the relatively enduring characteristics encompassing traits, appearances, interests, and behaviors that have traditionally been considered relatively more typical of women and men, respectively.

7. I see myself as

Here are a number of personality traits that may or may not apply to you. Please rate how much these statements describe you on a scale from 1 to 7 to indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

...Extraverted, enthusiastic.

...Critical, quarrelsome.

- ...Dependable, self-disciplined.
- ...Anxious, easily upset.
- ...Open to new experiences, complex.
- ...Reserved, quiet.
- ...Sympathetic, warm.
- ...Disorganized, careless.
- ...Calm, emotionally stable.
- ...Conventional, uncreative.

Post-Film Questionnaire

Immersion (Narrative Engagement scale; Busselle & Bilandzic, 2009)

Please rate how much you (dis)agree with these statements while watching the short film (1 = strongly disagree to 7 = strongly agree):

1. While viewing I was completely immersed in the world created by the film
2. While viewing I found myself thinking about other things

Cognitive stimulation (Scale of Aesthetic Appreciation of Film; Doicaru, 2016)

Please rate how much you (dis)agree with these statements while watching the short film (1 = strongly disagree to 7 = strongly agree):

1. It is stimulating to make sense of this film
2. While watching this film, I felt curious at times

Check 1

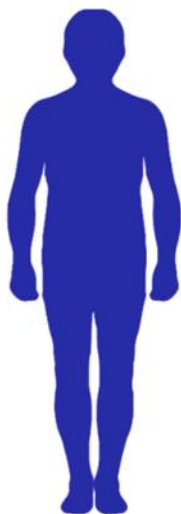
How complex would you rate the narrative of this short film?: 0 = not complex at all (linear), to 100 = very complex (puzzling).

Bodily sensations (Bodily Sensation Maps; Schino et al., 2021, 2022)

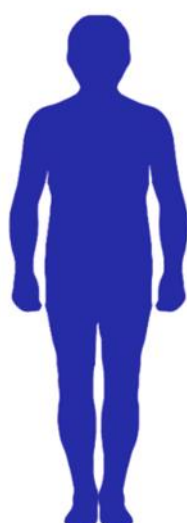
You will be displayed with two body silhouettes. On the left body silhouette, please, indicate where in the body you feel stronger, that is with more energy (e.g.: muscles tensing, flushed

face, pounding heart, etc.) when experiencing the artwork in front of you. On the right body silhouette indicates where in the body you feel weaker, that is with less energy (e.g.: woozy body parts, lightheadedness, numbness in the extremities, etc.) when experiencing the artwork in front of you. For both silhouettes, you can click up to 10 times. Try to be as accurate as possible. If necessary, use more clicks to stress a particular zone where the feeling is more intense. You can point to any region of the body you feel appropriate, from the head to the toes. If you made a mistake, drag the dot to move it somewhere else; or just press on the dot you want to remove.

Deactivations



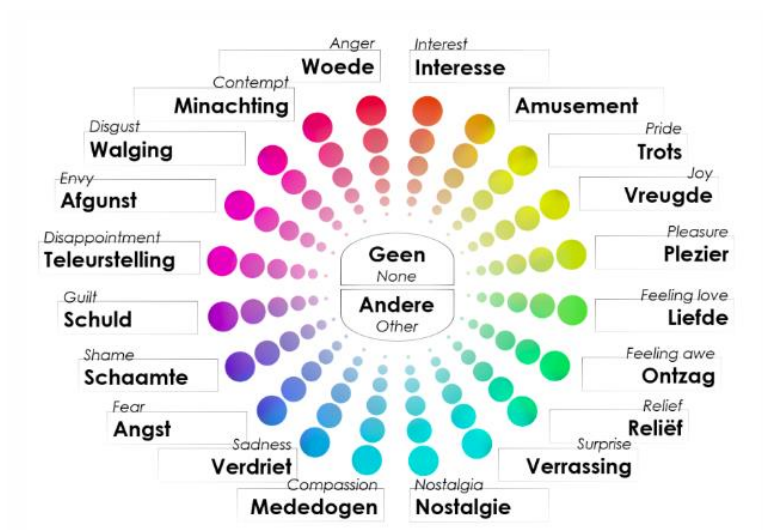
Activations



Emotional resonance (Geneva Emotion Wheel; Tinio & Garts, 2018)

1. Which emotion(s) did you feel while viewing the film clip?

Choose up to two emotions in the wheel that you feel (indicated by a particular spoke) and their intensity (the further away from the center the more intense the emotion).



Affective and Cognitive Empathy (Empathy State Scale; Shen, 2010)

Please rate how much you (dis)agree with these statements while watching the short film ((1 = strongly disagree to 7 = strongly agree):

1. I experienced the same emotions as the character when watching this film
2. I can feel the character's emotions
3. I can see the character's point of view
4. The character's reactions to the situation are understandable

Check 2

Have you seen this short film before?: Not sure, no, partly, yes.