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## Well-known and unknown music as an emotionalizing carrier of meaning in film

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### ABSTRACT

For many years, research has been conducted on film music in general and on its potential to convey meaning in particular. Surprisingly, some fundamental research gaps have remained. Does unknown film music express and induce emotions and convey meaning in a way that is equally distinct and predictable, compared with well-known music? Does the same music simultaneously influence more than one of the (as yet mostly individually tested) aspects through which music can convey meaning? This study, with 139 participants and a 2×2 between-subjects design, manipulated the emotional connotation and level of familiarity of an ambiguous film scene's background music. The results provide an empirical basis for the practical knowledge that carefully selected and edited film music can communicate specific emotions, thereby inducing predictable emotions in the recipients. As an instrument of nonverbal communication, a music track influences several aspects through which music can convey meaning: the attributed film genre, the perception of the general film atmosphere, and the protagonists' emotions, social behaviors, and relationships to each other. The genre associated with film music and the music's expressed emotions have a significant impact, whereas whether the music is well-known or unknown to the audience is not crucial, as predicted.

Music is a fundamental component of almost every feature film, but most existing research has reduced film music to its emotionalizing function (Bullerjahn, Braun, & Güldenring, 1993, p. 141; Cohen, 2010). However, in addition to this music's emotional content, it is often possible to determine a film scene's intended interpretation or progression in a purely auditory manner – with eyes closed, solely by listening to the accompanying music (e.g., Boltz, 2001; Tan, Spackman, & Bezdek, 2007). For example, the well-known theme from *Rocky* (1976) leads the audience to immediately expect top athletic performance and triumph, even when this music is played in a different film. Upon hearing the first few notes from *Jaws* (1975), the audience awaits approaching danger, even in the most idyllic scene. Since 1956, the potential of

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music to convey meaning in film has been investigated empirically (Tannenbaum, 1956). Surprisingly, however, some essential questions have remained unanswered, probably because they are considered to have already been intuitively solved in film practice (Herget, 2019). Music with a high degree of familiarity evokes emotions and conveys meaning by reactivating emotional memories or associations linked through prior listening (Hoeckner & Nusbaum, 2013). Thus, it is regarded as a reliable carrier of meaning in different audio-visual media formats such as film or advertising (e.g., Hahn & Hwang, 1999; Park, Park, & Jeon, 2014; Stilwell & Powrie, 2006). However, because of the specific use of musical stereotypes, film music that is unknown to the audience can also trigger supra-individual emotions and associations (Hoeckner & Nusbaum, 2013). Can various unknown film music tracks, compared with well-known film music tracks, express and induce equally distinct specific emotions and convey tangible meanings regarding the perceptions and interpretations of the film content and protagonists in an ambiguous short film? This study aimed to address this empirical research gap by focusing on the distinction between film music known and film music unknown to the audience, in terms of conveying emotion and, especially, meaning – an aspect that has clearly been neglected in previous research.

### How does music convey meaning?

Music itself can convey meaning (e.g., Huovinen & Kaila, 2015; Margulis, 2017; Meyer, 1956). In the context of film, music has even been described as an effective instrument of nonverbal communication (Kepplinger, 2010; Lipscomb & Tolchinsky, 2005; Tagg & Clarida, 2003). How does music convey meaning? A potential explanation is the cognitive schema theory. People are constantly confronted with a vast array of information that they need to process. To simplify the elaboration of information, people do not evaluate a single piece of information independently, but rather group it with other pieces of information and later interpret them according to specific schemata (Matthes, 2004, pp. 546–548). As soon as individuals process something new that can be complemented by their existing knowledge structure, at least one activated schema controls the individual's attention and perception regarding the information to be elaborated. This schema correlates the signals to be processed consistently and relates them to prior knowledge, which may be supplemented or altered (Boltz, 2001, pp. 430–432; Matthes, 2004, p. 547; Shevy, 2008, p. 479). Background music can activate schemata that shape the processing of information (e.g., a film clip; Bullerjahn, 2001, pp. 229–230). These schemata can evoke predictable supra-individual associations (Shevy, 2008, pp. 478–479) that can be projected onto the filmed events, thereby shaping the audience's perception of the film's plot and protagonists (Boltz, 2001; Brosius & Kepplinger, 1991).

### **Schema activation through known and unknown music**

Through episodic memory, background music that is *known* to the recipient conveys schemata by reactivating memories or associations linked through prior listening, for example, in the context of a famous film (Hoeckner & Nusbaum, 2013, pp. 243–248). For instance, when the musical theme, entire passages, or title song from a specific, previously established work are quoted in a new film context, they convey – in addition to their intrinsic message and meaning – the entire context of their original placement (e.g., historical epoch, geographical origin, and social and emotional substance). Additionally, personal feelings, associations, and memories previously linked with the musical quote are activated and integrated into the processing of the entire film scene, the protagonists shown, or the film plot (Merten, 2001, p. 76; Schmidt, 1988, pp. 415–416).

Through a specific kind of semantic memory, *unknown* music expresses its semantic potential in the stereotypical use of canonized musical phrases, specific instrumental clichés, or (film) music genres and thus also triggers associations that elicit predictable perceptual patterns, emotions, and evaluations among the recipients (Hoeckner & Nusbaum, 2013, pp. 248–252; Lastinger, 2011). Wingstedt, Brändström, and Berg (2007) tested the audience's active knowledge regarding music's potential to convey meaning. They asked participants to decide which kind of unknown music to add to three different film scenes. The results showed a sizable consensus regarding the narrative functions of specific musical features, indicating knowledge about musical narrative codes and conventions, although this was influenced by the participant's musical training, gender, and media usage.

Are both known and unknown film music used in current film practice? Most Hollywood movies use unknown music in their soundtracks. Using a new, high-quality musical composition allows an ideal congruence between the music and the film content, and it also prevents a possible disqualification from, for example, the Academy Awards, which require a film score created specifically for the eligible feature-length motion picture (Mera, 2017). Well-known music is often (but not exclusively<sup>1</sup>) used in low-budget productions such as television films and documentaries (Kassabian, 2001, pp. 49–50; Rodman, 2014, p. 550; Stilwell & Powrie, 2006). Usually, this is less expensive than using a new musical composition (e.g., Carlin, 1991, p. 152), and, because of its familiarity, well-known music is often considered to have a reliable effect in terms of transferring the intended emotions and meaning.

Existing empirical studies investigating the potential of music to convey meaning in film have used both known (e.g., Lipscomb & Kendall, 1994) and unknown (e.g., Bullerjahn et al., 1993; Marshall & Cohen, 1988) music stimuli. However, to this point, no empirical evidence has established whether known and unknown music are equally effective for evoking supra-individual

associations and thus conveying meaning in film. The only previous study that has considered this question – Brosius and Kepplinger (1991) – concentrated exclusively on film music's genre as a factor that conveys meaning, ignoring the music's emotional connotation. Hence, these scholars incorrectly assumed that the theme song of *James Bond 007 – Goldfinger* (1964) would convey a negative meaning because of its classification as crime film music. Contrary to their expectation, the participants in their study perceived the emotions expressed by the music not as clearly negative, but rather as ambivalent. Therefore, the study's results were unclear (Brosius & Kepplinger, 1991, p. 181). However, at least for romantic film music, their findings suggested a validation of the anecdotal evidence that film music can convey meaning – irrespective of whether it is well-known or unknown to the audience.

### ***Schema activation through musical affect***

In the context of persuasive communication, affect can be considered further information for evaluating or changing attitudes (Petty, DeSteno, & Rucker, 2001; Storbeck & Clore, 2008). As indicated in Brosius and Kepplinger (1991), music's affective content plays an important role in the schema-activating process by film music. In the simplest coherence, positively or negatively connoted music activates schemata with positive or negative valence, which, in turn, affect the audience's perceptions and interpretations (Costabile & Terman, 2013; Shevy, 2007; Strobin, Hunt, Spencer, & Hunt, 2015). For example, Costabile and Terman (2013) showed that positive and negative music in a short film about the care of older relatives could influence whether this responsibility was perceived as a positive function with personal gain or a burden for the caregivers.

Can different emotionally connoted music only transport schemata of positive and negative valence? Russell (1980) sorted emotions in his two-dimensional *circumplex model*<sup>2</sup> not only by pleasure (i.e., valence) but also by arousal. For example, while happy and relaxed music both transport a positive valence and could activate positive schemata, they differ in their transported high/low arousal. Accordingly, the activated schemata could also vary. Likewise, music with different emotional connotations can lead to these same emotions being transferred to the film context, e.g., as emotions ascribed to the film protagonists (e.g., Tan et al., 2007). In the transportation of musical schemata, not only the valence (positive/negative) of music's expressed emotion is relevant, but its specific connotation.

Of the 24 empirical studies conducted from 1956 to 2018 that investigated the potential of music to convey meaning, 16 considered the music's emotional connotation when selecting the musical stimuli (for a review, see Herget, 2019). However, not all of these studies carefully examined whether the music's expressed emotions were identified by participants in the

intended manner (pretest: e.g., Boltz, 2001; Tan, Spackman, & Wakefield, 2017; stimuli validation based on previous research: e.g., Steffens, 2020; Tan et al., 2007; Van den Stock, Peretz, Grèzes, & de Gelder, 2009). This could explain the partly unclear results of previous studies (e.g., Brosius & Kepplinger, 1991; Vitouch, 2001).

The direct connection between music's expressed and induced emotions (i.e., the locus of emotion) has been emphasized repeatedly in music-psychological research focusing on music and emotions (e.g., Evans & Schubert, 2008). Along with a professionalization of the field, a measurement of both – music's expressed and induced emotions – became more typical (for a review, see Eerola & Vuoskoski, 2013). Surprisingly, no studies investigating the connection between expressed and induced emotions using established comprehensive instruments for measuring emotion have been conducted for music in films (research on solely *perceived* emotions: e.g., Parke, Chew, & Kyriakakis, 2007; *induced* emotions: e.g., Ellis & Simons, 2005; Steffens, 2020). In addition, music-induced emotions may play a role in music's potential to convey meaning (e.g., Hoeckner, Wyatt, Decety, & Nusbaum, 2011; Steffens, 2020).

To what extent does music's familiarity influence its expressed and induced emotions? The recognition of specific emotions expressed by music depends on certain musical parameters (e.g., Gabrielsson & Lindstroem, 2010) or combinations of parameters (e.g., Bruner, 1990). Therefore, music's familiarity does not play a role in its ability to communicate specific emotions. However, to ensure that music's emotional connotation is perceived as planned, the emotions *expressed* by known and unknown music must be measured and checked against expectations (manipulation check).

Although previous experiences connected with well-known music could trigger emotions other than those expressed by the music (Hoeckner & Nusbaum, 2013) and music's familiarity can ease the inducing of emotions (e.g., Pereira et al., 2011; Van den Bosch, Salimpoor, & Zatorre, 2013), most researchers have stated a simple, positive relationship between expressed and induced emotions, even for familiar music (Evans & Schubert, 2008; Gabrielsson, 2002): Sad music induces sad emotions, and happy music makes listeners happier.<sup>3</sup> In line with this notion, well-known and unknown background music with different emotional connotations that is selected to convey specific meanings induces different predictable emotions in film viewers, irrespective of the music's level of familiarity (H1).

### ***Problems in the context of film music and meaning***

Preconditions for the success of the non-verbal communication process through which film music can convey meaning are that the recipient a) can recognize the well-known music or b) is acquainted with typical (film) music genres and instrumental clichés (and their inherent messages), and c) can

decode the music's expressed emotions to decipher its meaning (Jaszoltowski & Riethmüller, 2009, pp. 163–164; Juslin, 1997, p. 387). These reflexive association processes therefore require a certain degree of listening experience and habits. However, because of the much-cited permanent availability and omnipresence of music, especially in film and television (Tagg, 2006), a cultural imprint of these music models is almost impossible to avoid (Bullerjahn, 2001, p. 229; Kendall & Lipscomb, 2013).

There is evidence that music itself has the potential to convey meaning (Kristen & Shevy, 2012; Susino & Schubert, 2019). However, the potential of film music to do this has been tested primarily using ambiguous but realistic film scenes showing interactions between humans or animals, accompanied by various tracks of emotionally connoted film music (e.g., Boltz, 2001; Bolivar, Cohen, & Fentress, 1994; Infante & Berg, 1979; Tan et al., 2007). Interactions between humans or animals already introduce certain interpretative schemata on the visual level and therefore limit the potential range of music-induced associations. A few studies have tried to reduce this limitation by using very abstract stimuli – for example, animated geometric figures performing repetitive movements (Cohen, 1993; Marshall & Cohen, 1988; Sirius & Clarke, 1994). However, abstract stimuli do not offer a rich projection surface for music-induced meaning: Animated, two-dimensional triangles chasing each other remain only two-dimensional triangles in the perception of the audience, even when accompanied by film music that is pregnant with meaning (Sirius & Clarke, 1994). No previous studies using abstract stimulus material have been able to achieve convincing results that fully explore the association spectrum of film music (Herget, 2019). Instead of increasing the level of abstraction, more attention should be paid to the ambiguity of the filmed images (Lipscomb & Tolchinsky, 2005). Ideal stimulus material to explore music's semantic potential can be characterized by two features: First, it should have a high degree of abstraction, to avoid prescribing interpretative schemata on the visual level, but without depriving the music of a projection surface; second, it should have a high degree of ambiguity. This will be considered in the present study's stimulus conception to fully explore music's semantic potential.

### ***How does music shape the perception and interpretation of a film?***

In a systematic review of the 24 studies that can be assigned to this field of research, Herget (2019) indicated that music can influence the perception and interpretation of a film through five key aspects. Film music can (1) contextualize, for example, by influencing to which genre an ambiguous film scene is attributed (e.g., Tan et al., 2017) or by determining the historical, geographical, or cultural location of a film plot. Music can (2) shape the general perception of a film scene and, therefore, potentially change the



audience's attitudes. As a psychological refinement (3), film music can clarify the thoughts and feelings of a film protagonist and thus also his or her relationship to others (e.g., Bolivar et al., 1994; Tan et al., 2007; Van den Stock et al., 2009). It can also (4) influence the perception of the storyline (e.g., Vitouch, 2001), as well as (5) the parasocial interaction between the recipient and the protagonist (e.g., Hoeckner et al., 2011). Because previous studies have mostly examined these aspects separately, the present study aimed to investigate empirically whether the same music can actually convey meaning on different dimensions.

The findings of existing research on the underlying mechanisms through which unknown and known music convey meaning in film (Hoeckner & Nusbaum, 2013), as well as the first empirical attempt in this direction of Brosius and Kepplinger (1991), suggest that film music can influence the perceptions and interpretations of a film scene and its protagonists – irrespective of the music's level of familiarity to the audience (i.e., no main or interaction effect for familiarity – the basis for **H2–H6**).

The spectrum of meaning that the known and unknown film music tracks used in the present study were intended to convey was extensive: Following Bullerjahn et al. (1993) and Strobin et al. (2015), in ambiguous film scenes, the emotional connotation of the music determines the recipient's attribution of film genre (**H2**). It also affects the perception of the general atmosphere of the film (**H3**; cf. e.g., Tan et al., 2017) and of the protagonists' emotions (**H4**; cf. e.g., Hoeckner et al., 2011; Tan et al., 2007). According to Boltz (2001), among others, the emotional connotation of music in ambiguous film scenes also guides the interpretation of the protagonists' relationships (**H5**) and their social behavior (**H6**).

## Method

### *Participants and design*

In a  $2 \times 2$  between-subjects design, the emotional connotation of background music – and hence its conveyed schemata – and the music's level of familiarity were manipulated. Within this study's constructs (music's expressed and induced emotions, music's conveyed meaning), the induced emotions would most likely have the smallest effect size (Schubert, 2013; Tan et al., 2017). Therefore, this effect size was used as basis of our sample size calculation. Following the most recent study on music's potential to convey emotions and meaning (Steffens, 2020) a mean effect size of  $f = .25$  (Cohen, 2013) could be expected for the emotions induced by music (**H1**). G\*Power (Faul, Erdfelder, Lang, & Buchner, 2007) was used to calculate the sample size. A required sample size of  $N = 128$  was indicated (ANOVA: Fixed effects,



special, main effects and interactions,  $\alpha = .05$ ,  $1-\beta = .80$ , numerator  $df = 1$ , number of groups: 4).

Twice the number of experimental stimuli was created to have the possibility to generalize the results more than with a simple set of stimuli would be possible. As a result, twice the required sample size of at least 256 participants was planned.

However, in view of the complexity and individuality of music's effects in audiovisual media, the particularly careful design and testing of stimulus material is very important in a study of this type (e.g., Tan et al., 2017). A great challenge in experiments is to ensure that the created stimuli work as intended. Based on previous experiences with music in experiments, it was taken into account that some stimulus versions would not satisfy the necessarily strict criteria of the stimulus selection process. Therefore, twice the number of stimulus versions was not only nice to have but inevitable so that the stimuli that best represented the experimental conditions could be identified prior to the final data analysis.

The final 299 participants (60.2% female,  $M_{age} = 29$ ,  $SD_{age} = 8.2$ ) in the online experiment (using the online survey software UNIPARK) were randomly assigned to either a control group without music or one of four experimental conditions (each with two stimulus alternatives). To disguise the study's purpose, the participants were initially told that the study's aim was the general assessment of a short film (following Bullerjahn & Güldenring, 1994, p. 107). To minimize the problem that the external conditions of the subjects' participation can be difficult to control in an online experiment, the subjects were asked to complete the experiment on their computers with speakers/headphones in a quiet environment. Following Reips (2002) high hurdle technique to reduce the negative impact of dropout in online experiments, the participants were informed about the study's estimated duration. To personalize the experiment, at the very beginning, they were asked about their sociodemographic characteristics and general film viewing habits (Reips, 2002). Afterward, the subjects watched one of the nine randomly assigned stimulus versions, and then continued with the questionnaire.

## **Materials**

### **Film material**

To isolate especially strong musical effects, this study used a film stimulus created by Brosius and Kepplinger (1991) that is as open to interpretation as possible. In this stop-motion film, a red half-ball and a blue half-ball are identifiable as the main characters among a large number of moving yellow half-balls. The half-ball protagonists progress through a story of meeting each other, interacting strongly, and then parting again. Without realistic

protagonists or theatrical gesture the stimulus is highly ambiguous; however, it enables music-triggered associations to be projected onto the filmed events because of the identifiably interacting protagonists and the outlined film plot. The original stimulus was shortened and adapted to modern viewing habits. The final version was 2:15 min in duration.

### **Selection of music**

To generate sufficiently large differences in the triggered meanings, most researchers have designed stimuli using different pieces of instrumental music that are as emotionally opposed as possible (e.g., the same melody in major and minor keys: Infante & Berg, 1979; positive and negative connotations: Boltz, 2001; Tan et al., 2017; Vitouch, 2001). Other studies have used music of different (film-) genres to convey different meanings (e.g., Bullerjahn & Güldenring, 1994; Hoeckner et al., 2011). Combining these two approaches, in the present study different meanings should be conveyed by romantic instrumental music typical of romantic films and by dramatic instrumental music typical of crime and action films. Accordingly, as in Brosius and Kepplinger (1991) music was used that was typical for love and crime films, while – in contrast to the original study – the emotional connotation of the music was also taken into account.

To operationalize different degrees of familiarity, different romantic and dramatic music tracks that were anticipated to be well-known or unknown to the audience were selected. For the known-music conditions, well-known title melodies were chosen (romantic: *Titanic*, *Chocolat*; dramatic: *Mission Impossible*, *Batman*). For the unknown music conditions, online music libraries were used to identify music tracks labeled as dramatic or romantic and similar in style (e.g., in terms of instrumentation and tempo) to the selected well-known music, without being “sound-alikes.” Based on this specific stimulus description, the previously formulated hypotheses can be further specified (see Table 1).

### **Creation of film and music pairings**

To make the usage of the music in the film stimulus as ecologically valid as possible, the music tracks were cut and added to the film following professional standards and with consideration to the temporal/structural fit of the music and the film (Bullerjahn, 2005, p. 206; Tan, 2017a, p. 366). Previous studies have noted that different musical accents may affect perceptions of the film scene and protagonists (Cohen, 2010; Marshall & Cohen, 1988, p. 110; Tan et al., 2007, p. 140). For this reason, when editing the music, care was taken to set the accents in each stimulus equally (for example, a first highlight in the music accompanying the first meeting of the protagonists), to the extent possible with eight different music tracks. The balance between (1) the greatest possible congruence in the image and sound levels and consistency of all stimuli and (2) the integrity of the original structure of the music

Table 1. Specified hypotheses.

	Film music's familiarity		Film music's connotation	
	Well-known music	Unknown music	Romantic music	Dramatic music
MC: Music's expressed emotions			Expresses more positive emotions	Expresses more negative emotions
H1: Music's induced emotions	No expected main effect or interaction	No expected main effect or interaction	Induces more positive emotions	Induces more negative emotions
H2: Film genre	No expected main effect or interaction	No expected main effect or interaction	Leads to more assignments of "love film"	Leads to more assignments of "crime/action film"
H3: Film atmosphere	No expected main effect or interaction	No expected main effect or interaction	Conveys a harmonic atmosphere	Conveys a conflictual atmosphere
H4: The protagonists' emotions	No expected main effect or interaction	No expected main effect or interaction	Indicates more positive emotions of the protagonists	Indicates more negative emotions of the protagonists
H5: The protagonists' relationship	No expected main effect or interaction	No expected main effect or interaction	Indicates a more positive relationship between the protagonists	Indicates a more negative relationship between the protagonists
H6: The protagonists' social behavior	No expected main effect or interaction	No expected main effect or interaction	Reveals a more social behavior of the protagonists	Reveals a more anti-social behavior of the protagonists

was continuously considered. The final stimuli are available by the author upon request.

## Measurement

To capture the emotions *expressed* by the different types of music, the Geneva Emotional Music Scale (GEMS) were used (Zentner, Grandjean, & Scherer, 2008). Although the GEMS were originally designed to measure emotions *induced* by music, it currently represents the most comprehensive attempt to study the specific emotions related to music (Eerola & Vuoskoski, 2013, p. 318; Zentner & Eerola, 2010, p. 209) and has already been used to capture *perceived* emotions (e.g., Torres-Eliard, Labbé, & Grandjean, 2012). To modify the scale for use in the context of an online experiment, it was necessary to reduce the number of 45 GEMS items (on nine dimensions of musical emotions). Data from 62 subjects (35 women and 27 men) with a mean age of 30.46 years ( $SD_{age} = 10.74$ ) who participated in a between-subjects online pilot study showed that the film stimuli differed significantly on six emotion categories (wonder, tenderness, peacefulness, joyful activation, power, and tension). Therefore, 18 GEMS items (three items for each of the six emotion categories listed above; Cronbach's  $\alpha > .70$ ; see Table 2) scored on a five-point Likert scale were included in the main experiment.

The emotions *induced* by the film stimuli were measured by the Positive And Negative Affect Schedule (PANAS), a common instrument to measure affect induced by media (Lang & Ewoldsen, 2011, p. 83). Similarly to the above explanation for the GEMS, the original 20 PANAS items (Watson, Clark, & Tellegen, 1988) were reduced to 12 items for inclusion in the online experiment. These items were pretested with the stimuli versions in the pilot study. Four positive items (interested, excited, strong, and inspired; Cronbach's  $\alpha = .83$ ) and four negative items (nervous, irritable, upset, and distressed; Cronbach's  $\alpha = .71$ ) scored on a five-point Likert scale were used in the final experiment.

Following Strobin et al. (2015), perceived film genre was quantified through the participants' selection of one of seven possible film genres (crime/action, romance, Western, comedy, science fiction, documentary, and "not classifiable"). The film's overall mood was measured following Tan et al. (2017, harmonic–conflictual). The

**Table 2.** Inter-item reliability of the six Geneva Emotional Music Scale categories used.

Emotion Category	Items	Cronbach's $\alpha$
Wonder	Moved, filled with wonder, allured	.83
Tenderness	Affectionate, mellowed, sensual	.83
Peacefulness	Soothed, meditative, relaxed	.81
Joyful activation	Animated, joyful, bouncy	.81
Power	Strong, heroic, triumphant	.70
Tension	Agitated, nervous, impatient	.72

participants also rated the protagonists' emotions (four items, e.g., very comfortable–very uneasy; Cronbach's  $\alpha = .86$ ), following Tan et al. (2017) and Boltz (2001). Items gauging perceptions of the protagonists' relationship (following Boltz, 2001; five items, e.g., friendly–extremely hostile; Cronbach's  $\alpha = .89$ ) and social behavior (following Boltz, 2001; Shevy, 2007; five items, e.g., generous–selfish; Cronbach's  $\alpha = .90$ ) completed the survey. Five-point semantic differential scales were used.

## Results

In the past, in experiments focusing on the effects of music in different media contexts the complexity of this research object was often underestimated. Because of the double number of stimulus versions in this experiment (eight experimental stimuli in a  $2 \times 2$  design), in the first step of the data analysis, it was possible to check thoroughly which of the stimulus versions fulfilled the requirements of the four experimental conditions best. Then, in a second step, the hypotheses were tested with the collected data, using only the previously identified stimulus versions.

### *Identification of the final stimuli*

The music versions for the four experimental conditions had to fulfill two requirements. First, the selected well-known film music versions had to be recognizable by the participants. Second, the unknown music versions had to be the most similar to the selected well-known music version with the same emotional connotation.

### *Check of familiarity*

To check whether the level of a music track's familiarity was as intended, in a first step, participants were asked whether they already knew the music track of the stimulus. All of the well-known music versions were recognized as familiar, and all of the unknown versions were unfamiliar. In a second step, the participants who reported having previously known the music were asked in which film they thought the music appeared. Correctly naming the film (in a free recall without specified response options) was considered an indicator that the music not only seemed vaguely familiar to the recipients, but was actually placed in the correct semantic context. This methodological approach was identical in the previously mentioned pilot and the main study. In the between-subject pilot study 32 participants watched stimulus versions set to well-known music versions. The music of *Titanic* and *Mission Impossible* was in its familiarity as well-known as planned (seven of eight participants recognized *Titanic*, six of eight participants recognized *Mission Impossible*). Less often than expected, the title music of *Chocolat* (3/7) and

*Batman* (3/9) was identified correctly. Due to the small number of cases per experimental condition in this pilot study, in the main experiment with a larger sample size higher recognition rates could have been possible. Therefore, all four stimulus versions with well-known music were used in the main experiment. Unfortunately a similar pattern occurred. Although most of the participants were able to correctly name *Titanic* (97% correct answers) and *Mission Impossible* (70% correct answers<sup>4</sup>), the rates for *Chocolat* and *Batman* were each less than 10%. Accordingly, in the final data analysis, only the *Titanic* stimulus was included for the well-known romantic music condition, and only the *Mission Impossible* stimulus was included for the well-known dramatic music condition.

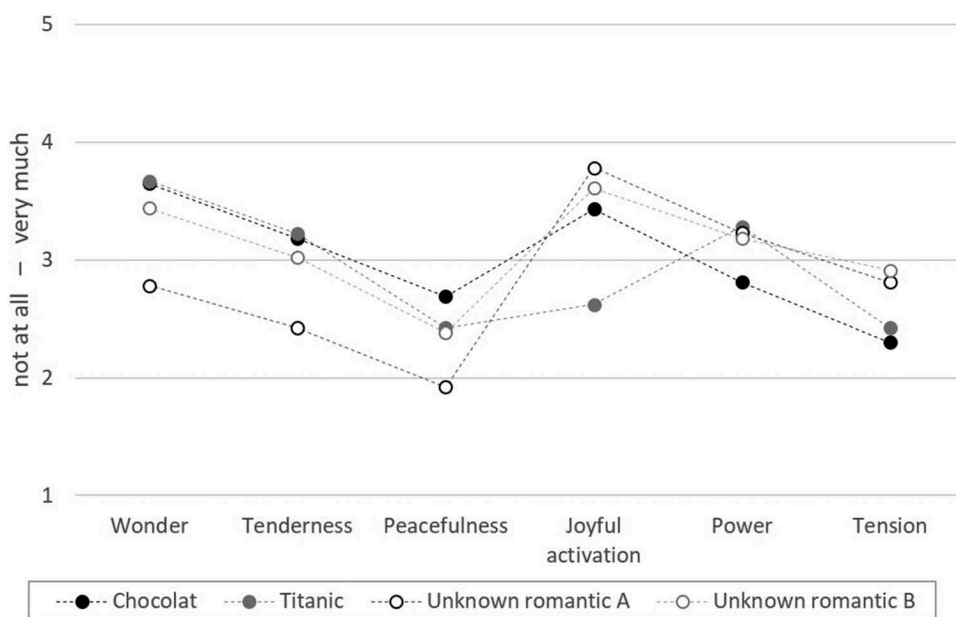
To increase the study's internal validity and reduce possible influences of different musical parameters (e.g., instrumentation, tempo, harmony, and melody) a quasi-experimental operationalization of the music's level of familiarity would also have been possible by choosing music that was known to some of the participants and unknown to others. However, the data indicated that no music was suitable for that approach. Therefore, the influences of the musical differences between the well-known and unknown stimuli with the same emotional connotation had to be checked carefully.

### **Check of similar emotional connotation**

The selected known and unknown stimuli with the same emotional connotation should be perceived as being as emotionally similar as possible. This is because, for example, if the known romantic and unknown romantic stimuli differed not only in their level of familiarity but also in their emotional categorization, differences in the film's interpretation would no longer have been attributable solely to the music's familiarity. Therefore, to the extent possible, significant differences in the perceptions of the stimuli with the same emotional connotation had to be avoided.

Figure 1 shows the arithmetic means in the four romantic stimulus conditions for each of the six GEMS emotion categories. As intended, the participants ascribed similar emotions to the four selected romantic film music tracks.

Among the romantic music tracks, the known romantic music condition (*Titanic*) visibly differed from the others in the category of "joyful activation." The film *Titanic* itself is not a typical romance movie, but rather a romantic drama, so its music's categorization as less joyful made sense and was expected. Because of the emotional connotation attributed to the music, the choice of *Chocolat* for the well-known romantic music condition would have been just as or even more obvious. However, because the music track from *Chocolat* was recognized by only one-tenth of the participants, making an attribution of *Chocolat*-specific associations with this study's film



**Figure 1.** Perceived emotions in all four romantic music conditions. Arithmetic means for the four romantic stimulus versions on the question “Which of the following emotions were expressed by the music you have heard in the short film?” For more statistical details, such as standard deviations and confidence intervals of the means, see Table S1 in the supplemental material.

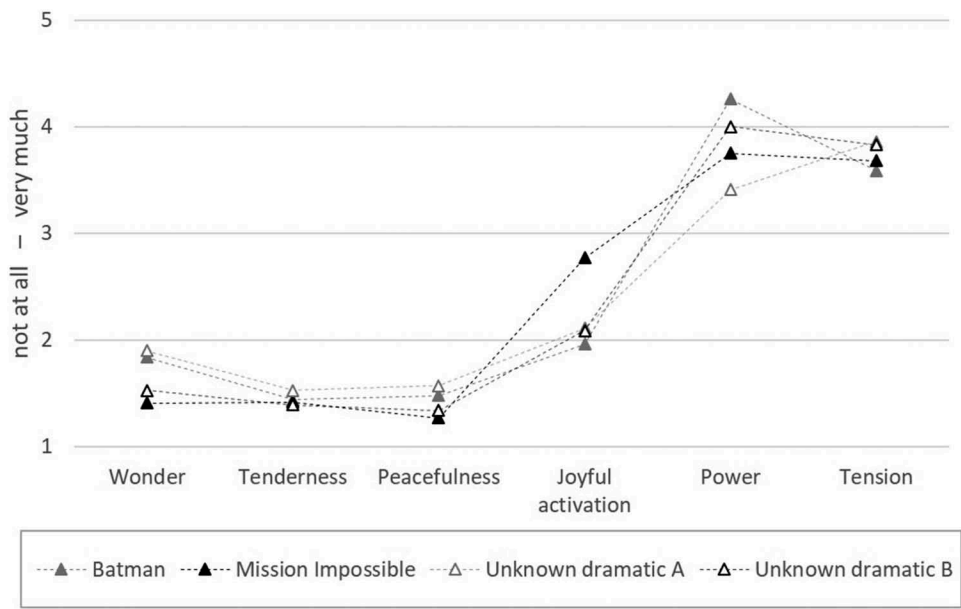
stimulus unlikely, *Titanic* was selected as the stimulus that represented well-known romantic music.

To identify the unknown romantic music version that differed least from *Titanic*, simple planned contrasts were performed for each emotion category. The perception of the *Unknown romantic A* track more frequently differed significantly from the perception of the *Titanic* track (in five of six emotion categories) than did that of the *Unknown romantic B* track (different in two of six emotion categories, see Table S2 in the supplemental material). Thus, *Unknown romantic B* was used in the final data analysis for the unknown romantic stimulus condition.

The arithmetic means in the four dramatic music conditions are displayed in Figure 2. Even more clearly than was the case for the romantic stimuli, the participants attributed similar emotions to the different dramatic music conditions.

To identify the music condition most similar to the previously set well-known dramatic music (*Mission Impossible*), the method described above for the romantic music conditions was applied here as well. Simple planned contrasts between the *Mission Impossible* stimulus and the two unknown dramatic music conditions revealed that, in the emotions attributed by the participants, the *Unknown dramatic A* track differed from the *Mission Impossible* track much more clearly





**Figure 2.** Perceived emotions in all four dramatic music conditions. Arithmetic means for the four dramatic stimulus versions on the question “Which of the following emotions were expressed by the music you have heard in the short film?” For more statistical details, such as standard deviations and confidence intervals of the means, see Table S3 in the supplemental material.

(significantly different in three of six emotion categories) than did the *Unknown dramatic B* track (significantly different only in “joyful activation”, see Table S4 in the supplemental material). Therefore, *Unknown dramatic B* was selected for the final data analysis.

Figure 3 presents an overview of the four music versions that best fulfilled the study design requirements and were used in the final analysis.

**Final data analysis**

**Manipulation check**

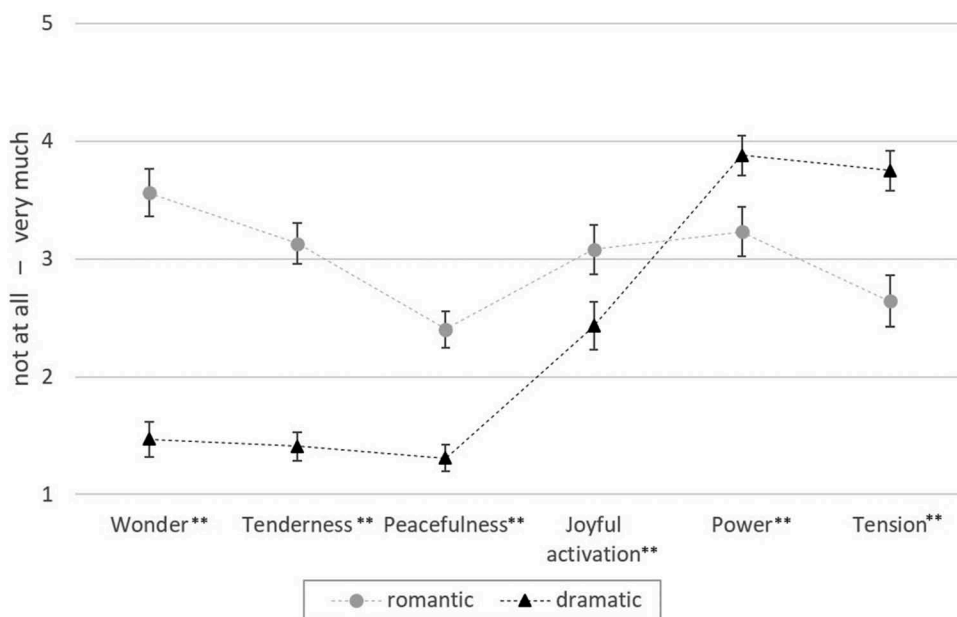
While the successful manipulation of the music’s level of familiarity was ensured by the preliminary analyses, it was necessary to determine whether

Music’s emotional connotation		
Music’s familiarity	Romantic music	Dramatic music
	<b>Well-known music</b> Titanic (n = 38)	Mission Impossible (n = 34)
	<b>Unknown music</b> Unknown romantic B (n = 32)	Unknown dramatic B (n = 35)

**Figure 3.** 2 × 2 factorial design with four final stimulus versions (N = 139) and additional control group without music (n = 32).

the romantic and dramatic music versions used in the stimuli actually expressed significantly different romantic and dramatic emotions. Because whether the music is known or unknown to the audience has been found not to play a role in the communication of emotion (Evans & Schubert, 2008; Gabrielsson, 2002), the data for the two final dramatic stimuli and the two final romantic stimuli were pooled for this part of the analysis so that the analysis distinguished only the different emotional connotations of the music versions (see Figure 4).

Six ANOVAs were conducted, revealing differences with large effect sizes in every emotion category (wonder:  $F(1,137) = 284.18$ ,  $p < .001$ ,  $\eta^2 = .67$ ; tenderness:  $F(1,137) = 266.96$ ,  $p < .001$ ,  $\eta^2 = .66$ ; peacefulness:  $F(1,137) = 98.45$ ,  $p < .001$ ,  $\eta^2 = .42$ ; joyful activation:  $F(1,137) = 18.42$ ,  $p < .001$ ,  $\eta^2 = .12$ ; power:  $F(1,137) = 24.77$ ,  $p < .001$ ,  $\eta^2 = .15$ ; tension:  $F(1,137) = 68.30$ ,  $p < .001$ ,  $\eta^2 = .33$ ). The romantic music was rated as significantly more intensive, compared with the dramatic music, on the four positive emotion categories employed (wonder, tenderness, peacefulness, and joyful activation), whereas the converse was true on the two negative emotion categories (power and tension). The music selected as romantic or dramatic was perceived as expected.



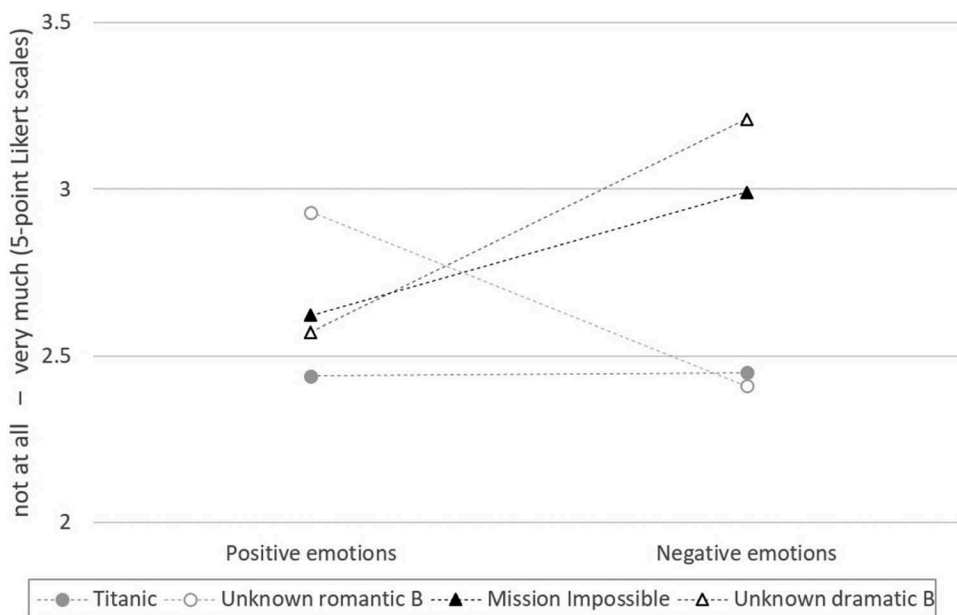
**Figure 4.** Perceived emotions in the romantic and dramatic music conditions. Arithmetic means for the romantic and dramatic stimulus versions on the question “Which of the following emotions were expressed by the music you have heard in the short film?” The error bars represent the 95% confidence interval for each mean. For more statistical details on the ANOVAs conducted, see Table S5 in the supplemental material. \*\* indicates a significant difference.

### Analysis of induced emotions

While the emotions communicated by the music could only be measured in the experimental conditions with music (“Which of the following emotions were expressed by the music you have heard in the short film?”), the induced emotions were measured more generally (“Which of the following emotions did you feel while watching the short film?”). This allowed a comparison between data of the four experimental conditions with music and the additional control group without music. The control group without music elicited less positive emotions ( $M = 1.98$ ,  $SD = 0.84$ ) than the stimuli with music. This could be explained by the specific structure of the ambiguous stop-motion film. The identifiably interacting protagonists and the outlined film plot created a kind of light suspense that could be perceived even without music. However, the control group could still be considered neutral regarding the induced negative emotions: The control stimulus ( $M = 2.66$ ,  $SD = 0.78$ ) evoked more negative emotions than the romantic music conditions, but less negative emotions than the dramatic stimulus versions (for more statistical details, see Table S6).

To test the specific effects of well-known and unknown music with different connotations on the participants’ felt emotions (**H1**), two two-way ANOVAs were conducted – one for positive emotions and one for negative emotions. Contrary to what was expected, the two different emotional connotations of the four stimulus versions did not differ significantly in the level of induced positive emotions,  $F(1,135) = 0.38$ ,  $p = .538$ ,  $\eta^2 = .003$ . However, there were significant differences between the two emotional connotations in terms of the negative emotions induced,  $F(1,135) = 31.53$ ,  $p < .001$ ,  $\eta^2 = .189$ . The dramatic music in the short films triggered more negative emotions than did the romantic music (see Figure 5).

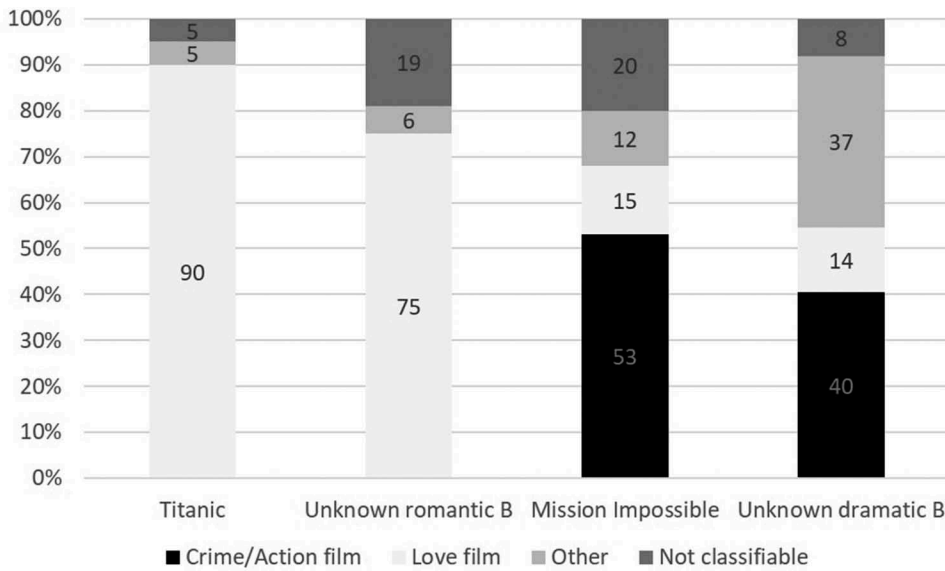
As expected, the music with the same connotation but different degrees of familiarity did not induce significantly different positive emotions (familiarity:  $F(1,135) = 2.27$ ,  $p = .134$ ,  $\eta^2 = .017$ ; interaction:  $F(1,135) = 3.32$ ,  $p = .071$ ,  $\eta^2 = .024$ ). The same was true for negative emotions (familiarity:  $F(1,135) = 0.67$ ,  $p = .413$ ,  $\eta^2 = .005$ ; interaction:  $F(1,135) = 1.21$ ,  $p = .273$ ,  $\eta^2 = .009$ ). There was also no interaction effect. One possible reason why the different emotional connotations of the music versions manifested only in the case of negative – and not positive – emotions could be the particularity of the *Titanic* track’s emotional connotation as described before. In addition, a generally weaker effect in the emotions induced by music compared with the emotions expressed by music has been observed in previous studies and, therefore, can be considered typical (e.g., Schubert, 2007, 2013). **H1** is not rejected, at least with regard to negative induced emotions.



**Figure 5.** Induced positive and negative emotions of the four final stimulus versions. Arithmetic means for the romantic and dramatic stimulus versions on the question “Which of the following emotions did you feel while watching the short film?” For more statistical details (including data of the control group), see Tables S6 and S7 in the supplemental material.

### *Analysis of conveyed meaning*

Because of their specific expressed and induced emotions, music versions with different connotations in film stimuli should also influence the perceptions and interpretations of the film plot and its protagonists, irrespective of whether the music is well-known or unknown to the audience. What is particularly interesting is whether the selected dramatic and romantic music tracks could actually convey meaning on more than one dimension. Depending on the music’s connotation, participants categorized the film stimuli clearly into different film genres (**H2**:  $\chi^2(9, N = 139) = 87.87$ ,  $p < .001$ , Cramer’s  $V = .46$ ). Although almost all subjects exposed to romantic music selected the expected genre of “romantic film”, the genres assigned to the dramatic stimuli had more variance. However, a large proportion of participants chose the genre of “crime/action film,” as is shown in Figure 6. More often than in the condition with romantic music, western, science fiction or documentary were suggested as possible film genre (for more statistical details, see Table S8 in the supplemental material). Figure 6 also indicates that, for the known-music stimuli, the expected genres were mentioned slightly more frequently than was the case for the unknown-music stimuli. To test whether this influence of music’s familiarity was significant (contrary to expectations), two more cross-tabulations were conducted: one with the dramatic well-known and unknown stimulus conditions, and one

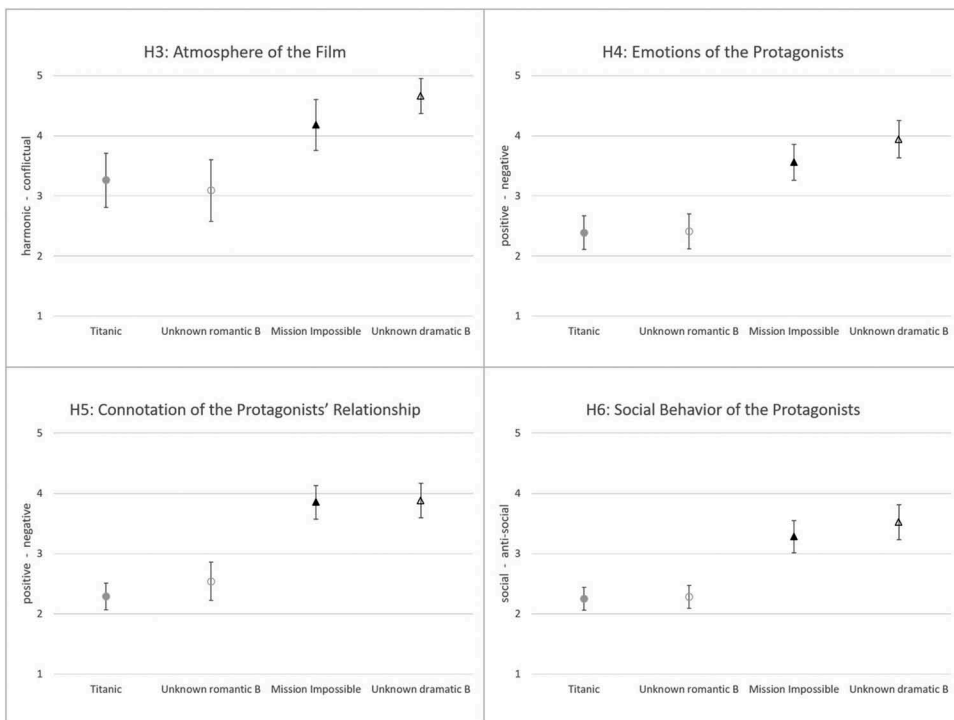


**Figure 6.** Assignment of different film genres. Assignment of the four stimulus conditions to different film genres. For a simplified representation, options that were chosen less often (“Western,” “comedy,” “science fiction,” and “documentary”) were subsumed in the “other” category. For more statistical details (including data of the control group), see Table S8 in the supplemental material.

with the romantic well-known and unknown stimulus conditions. The differences between the music versions with the same connotation but varying degrees of familiarity were not significant, as expected (romantic:  $\chi^2$  (2,  $N = 70$ ) = 3.23,  $p = .199$ , Cramer’s  $V = .22$ , after Bonferroni correction  $p = .398$ ; dramatic:  $\chi^2$  (2,  $N = 69$ ) = 6.85,  $p = .077$ , Cramer’s  $V = .32$ , after Bonferroni correction  $p = .231$ ).

If the experimental conditions with music were compared with the control group without music, it was noticeable that recipients could classify the genre of the ambiguous stimulus less confidently than with the versions with music (30% not classifiable, see Table S8). This further supports the hypothesis that specific connoted music can help to convey the film genre.

The film’s general atmosphere was characterized differently by the participants, depending on the emotional connotation of the music: It was characterized as basically neutral in the romantic music conditions and as highly conflictual when the film stimulus was accompanied by dramatic music (**H3**), connotation:  $F(1,135) = 35.32$ ,  $p < .001$ ,  $\eta^2 = .207$ ; familiarity:  $F(1,135) = 0.56$ ,  $p = .456$ ,  $\eta^2 = .004$ ; interaction:  $F(1,135) = 2.43$ ,  $p = .121$ ,  $\eta^2 = .018$  (see Figure 7). Whereas one film protagonist was perceived as more comfortable, relaxed, and happy with romantic background music, with dramatic music, the same protagonist appeared more uncomfortable, stressed, and vicious (**H4**), connotation:  $F(1,135) = 84.88$ ,  $p < .001$ ,  $\eta^2 = .386$ ; familiarity:  $F(1,135) = 1.96$ ,  $p = .164$ ,  $\eta^2 = .014$ ; interaction:  $F(1,135) = 1.49$ ,  $p = .224$ ,  $\eta^2 = .011$  (see Figure 7).



**Figure 7.** Perceptions and interpretations of the film plot and protagonists. Arithmetic means on the perception of the film's atmosphere and the protagonists' emotions, relationship, and social behavior. For more statistical details (including data of the control group), see Table S9 in the supplemental material.

Compared with the conditions with dramatic background music, the protagonists in the romantic music conditions were even experienced as more social (**H6**: connotation:  $F(1,135) = 90.42$ ,  $p < .001$ ,  $\eta^2 = .401$ ; familiarity:  $F(1,135) = 1.18$ ,  $p = .279$ ,  $\eta^2 = .009$ ; interaction:  $F(1,135) = 0.81$ ,  $p = .370$ ,  $\eta^2 = .006$ ; see Figure 7) and their relationship to one another was perceived as more positive (**H5**: connotation:  $F(1,135) = 113.50$ ,  $p < .001$ ,  $\eta^2 = .478$ ; familiarity:  $F(1,135) = 1.08$ ,  $p = .300$ ,  $\eta^2 = .009$ ; interaction:  $F(1,135) = 0.71$ ,  $p = .402$ ,  $\eta^2 = .006$ ; see Figure 7).

Background music with different emotional connotations triggered specific associations on more than one dimension, guiding the perceptions and interpretations of the film's plot and its protagonists, as was hypothesized. As has already been described, and as expected, the two-way ANOVAs showed significant differences for music's emotional connotation but no main or interaction effects for the music's familiarity.

One of the challenges of this study was to create the visual stimulus. It should combine a high degree of ambiguity with a high degree of abstraction, to avoid prescribing interpretative schemata on the visual level, but without depriving the music of a projection surface. As expected, the stimuli with

dramatic music conveyed the most negative meaning and the romantic stimuli the most positive. In the stimulus version without music the four categories described before (the atmosphere of the film, the emotions of the protagonists, their relationship to each other and their social behavior) were perceived somewhat less negatively than in the dramatic stimuli and somewhat less positively than in the romantic stimuli (for more statistical details, see Table S9). Therefore, the creation of stimulus material that was relatively neutral but could still be enriched with meaning was successful.

## Discussion

### *Conclusions and implications*

This study's results underscore two facts that were already well known through film practice but that, surprisingly, had not previously been empirically investigated. Background music in ambiguous film sequences – as an instrument of non-verbal communication – conveyed predictable expressed and induced emotions, as well as content-related information. These influenced the perceptions of the film's content and its protagonists in different aspects of meaning. Whereas the film genre associated with the music and the music's expressed emotions significantly affected the meaning the music triggered and the emotions it induced, whether the music was well-known or unknown to the audience played no role, as predicted.

In the experiment, three of the five key aspects through which music can convey meaning in films (Herget, 2019) were successfully operationalized. Music in an ambiguous film stimulus conveyed a certain film genre (“contextualization”), although the romantically connoted music transported the genre of love film much more clearly than the dramatic music indicated an action or crime film. Music clarified the emotions of the protagonists and the relationship between them (“psychological refinements”), and elucidated their social behavior (“general perception and change of attitude”).

In addition, the study revealed the importance of carefully examining the emotional connotation of film music used to ensure that it induces the intended emotions as predictably and as precisely as possible. In the past, in experiments using music stimuli the complexity of this research object was often underestimated. For example, an intuitive categorization as “dramatic” or “romantic” is not sufficient to conclude a uniform dramatic or romantic effect of a music version (e.g., problematic in Brosius & Kepplinger, 1991; Vitouch, 2001). This study offers a precise description of a systematic methodological approach to ensure that the music stimulus material works as planned.

In view of the methodological problems of previous studies, the significance of specific characteristics of the context the film music is used in also



became apparent: The ambiguous, but not too abstract, stimulus material proved an adequate projection surface for the emotions and meaning conveyed by the music.

In film and television practice, it is not advisable to use the same well-known (film) music repeatedly to guide the audience's perceptions and interpretations of a film or documentary in a specific direction, because this can lead to wear-out effects and audience reactance (Goldberg, Chattopadhyay, Gorn, & Rosenblatt, 1993; Hoeckner & Nusbaum, 2013, p. 246; Russell, 1987). The present study highlights that carefully and competently selected unknown background music can be used just as effectively as well-known music to communicate emotions and meaning. Further studies with more realistic audio-visual stimulus material should test whether well-known and unknown music can convey meaning to the same extent in realistic contexts and in persuasive communication, such as documentaries or even advertising. However, studies that varied the degree of realism of their stimulus material have already suggested that music can be a carrier of meaning in both moderately abstract and more realistic contexts (Cohen, 1993; Thompson, Russo, & Sinclair, 1994), as long as the film sequence remains ambiguous (Herget, 2019).

### ***Study limitations and future research***

This study should be repeated in the more controlled experimental environment of a laboratory to avoid the problems typical of online experiments (Reips, 2002). Such future studies should also include participants who are more diverse than the sample recruited for this study. Additionally, the reduction of previously established scales (i.e., the PANAS and the GEMS), which is problematic but typical of online experiments and was justified by a pilot study and reliability tests, would be unnecessary in a laboratory setting.

Because of the structure of the stimulus (depersonalized, moving half-balls in a film scene that was not open-ended), two aspects through which music can convey meaning ("perception of the storyline" and "parasocial interaction of the recipient and the protagonist") could not be operationalized. It remains to be seen whether a single music track can actually influence all of the aspects that have been described.

Based on the careful control procedures used in this study, four experimental conditions were excluded in the final data analysis. In part, this was inevitable and important to ensure that the well-known and unknown music versions were as identical as possible in their expressed romantic/dramatic emotions. However, a more extensive pretest of the actual familiarity of the well-known stimulus versions might have prevented two of the four stimulus versions from being excluded in the final data analysis. Due to music's

complexity, pretests of the stimulus versions are particularly important in studies investigating the effect of music (Tan et al., 2017).

Four specific music tracks were used to operationalize music's different emotional connotations and levels of familiarity. Despite the careful control procedures used, the cause of the observed effects cannot be attributed with absolute certainty to the manipulated factors, because diverse realistic music tracks (even if carefully selected) naturally differ to a certain degree in their musical parameters. Repeating this experiment with film music that is known to some of the participants and unknown to others could increase the internal validity.

Changing the selected music to operationalize the romantic/dramatic as well as the well-known/unknown conditions could also eliminate the potential effects of the specific music tracks used in the study (e.g., the particular characteristics of *Titanic*, which were addressed above). To further explore the question of how music can convey meaning, a broader focus in the music stimuli used might also provide new insights. Other emotional connotations than dramatic and romantic could be interesting, especially if not only positive/negative schemata are to be triggered. Investigating music's potential to convey meaning, so far only Holicki and Brosius (1988), as well as Tan et al. (2007), used music expressing more than two opposing emotions to test how distinctly these differing versions influence, for example, the emotions ascribed to the film protagonists. A broader spectrum of musically transported emotions could offer the potential to investigate not only the role of music's valence in schema activation, but also the potential of music's expressed arousal (Russell, 1980). The schema activation potential of music of other typical film (music) genres such as science fiction, western, horror, fantasy, and comedy should also be investigated in future studies.

Although the potential of music to convey meaning in film contexts has been explored since 1956, many questions remain open (Herget, 2019). As the legendary sound editor, Walter Munch, concluded, so far, “you can't predict what's going to work. We don't know enough” (as cited in Tan, 2017b, p. 528).

## Notes

1. Some films have utilized the referential function of well-known music. For example, *Birdman* (2014) featured a large amount of preexisting classical music, and *The Artist* (2011) prominently used the love theme from *Vertigo* (1958), prompting Kim Novak to publicly express her indignation about this musical recycling of – in her opinion – one of the most important love scenes in motion picture history (Mera, 2017). Additionally, some very successful directors (e.g., Kubrick, Malle, and Scorsese) classified the use of well-known music as a dramaturgical enrichment of their films and made it one of their trademarks (Merten, 2001, p. 1; Powrie & Stilwell, 2006).

2. Within the dimensional theories, emotions are categorized in broad affective dimensions. Although there are also one- and three-dimensional approaches, Russell's two-dimensional *circumplex model* (Russell, 1980) is considered the most influential (Sloboda & Juslin, 2010, p. 78).
3. Particularly research focusing on the locus of emotion addressed the different types of relationships of music's expressed and induced emotions (Gabrielsson, 2002). Possible is a positive relationship (e.g., happy music makes listeners happy), a negative relationship (e.g., happy music makes listeners sad), an unsystematic relationship (e.g., happy music has no effect at all) or no relationship at all. What determines the connotation of the relationship? Sometimes well-known music could induce emotions other than those expressed by the music, for example, by evoking memories of a contrary emotion (Schubert, 2013). Likewise research on sad music indicated that music expressing sad emotions can make listeners feel more positive, for example by being relaxing or cathartic (Sachs, Damasio, & Habibi, 2015; Van den Tol, 2016). However, general research on music's expressed and induced emotions found a positive relationship in the majority of cases, even for familiar music (Evans & Schubert, 2008).
4. Although the film was not always correctly named in the case of *Mission Impossible* (correctly named in 24 out of 34 cases), the other films mentioned also belonged to the action/crime context and, therefore, conveyed the same meaning (e.g., *James Bond*), which is why the somewhat lower recognition rate was not considered problematic.

## Disclosure statement

No potential conflict of interest was reported by the author.

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