

MUSIC AS A SOURCE OF EMOTION IN FILM

ANNABEL J. COHEN

Emotion characterizes the experience of film, as it does the experience of music. Because music almost always accompanies film, we may well ask what contribution music makes to the emotional aspects of film. The present chapter addresses this question.

It should be said at the outset that in spite of the integral role of music for film, film music has been largely neglected by the disciplines of both musicology and music psychology until the last decade (e.g. Cohen 1994; Marks 1998; Prendergast 1991). The reasons for the neglect are complex, arising from social, technological, economic, historical, and cultural factors. Some of these factors also account for a parallel neglect by psychology of the study of film perception (Hochberg & Brooks 1996*a*, 1996*b*). Moreover, unlike other types of popular or art music, much music for film has been composed with the understanding that it will not be consciously attended to. Countering this neglect, the present chapter takes a psychological perspective on the sublime and remarkable emotional phenomena produced by music in the context of film. This chapter has the joint intent of supporting the argument that music is one of the strongest sources of emotion in film and of opening doors to further empirical work that explains why this is so.

The chapter is divided into five sections. The first section briefly establishes a context for discussing emotion in music and film. Section 11.2 focuses on music in film, first establishing a historical perspective and then examining the role of music at the interface of the fictional and non-fictional elements of film. It continues with empirical studies of music as a source of inference and then summarizes the functions that music serves for film. Section 11.3 presents a cognitive framework for understanding musical soundtrack phenomena previously described. Section 11.4 considers the role of the composer as the origin of the source of musical emotion for film, whilst conclusions are drawn in the final section.

11.1 Emotion: definitions in music and film contexts

In the present chapter, the term film refers to the narrative dramas characteristic of movie theatres, television, and video with which most people are familiar as a source of entertainment. Music typically accompanies a considerable proportion of the duration of such films. Because of the relative novelty of the empirical study of film music in general, let alone the study of the emotional contribution of music in film, it would be

premature to advocate a particular way of considering emotion in the present chapter. What is more important is to show how various 'music-alone' perspectives on emotion translate in the film context. These perspectives include the contribution of music to emotional meaning (Juslin 1997; Levi 1982), the establishment of general mood (Pignatiello *et al.* 1986), and the experience of genuine, deep emotions (Gabrielsson 1998; Gabrielsson & Lindström 1993; Sloboda 1985, 1992; see also Gabrielsson, this volume).

The film context sometimes permits greater terminological clarity than the music-alone situation. For example, consider the terms 'mood' and 'emotion' which are often differentiated with respect to the presence of an object (e.g. Barrett & Russell 1999; Tan 1996). Whereas both moods and emotions may be regarded as dispositions toward appraising emotional meaning structures and a readiness to respond in a certain manner, moods do not have objects; emotions do. For example, experiencing the emotion of relief requires an object of that emotion, such as a safe arrival after a treacherous journey. Objects are not as evident in music-alone contexts, but, as argued by musicologist Nicholas Cook (1998), in a multimedia context music readily finds an object. The emotional associations generated by music attach themselves automatically to the visual focus of attention or the implied topic of the narrative. Because film content provides the object of emotion generated by music, the film helps to control the definition of the object of the emotion experienced during the presence of music.

Considering music and emotion within the context of film also has the advantage of bringing knowledge from psychological studies of film to bear on questions regarding music and emotion. Based on the emotion theorist Frijda (1986), Tan (1996), for example, addresses the question of the genuine nature of emotions in film, a topic that will be addressed later in this chapter. Thus, research on music and emotion in the film context may benefit from research insights derived from studies of film and emotion. Conversely, our understanding of emotion associated with autonomous music may shed light on emotional processes that occur in the film context. All of this information may contribute to the understanding of both the unique accomplishment of composing music for film and the extent to which music provides an important source of emotion in film.

11.2 Music and cinema

11.2.1 Historical background

Beginnings

From the earliest days of film, music played a part. When silent film was first introduced at the turn of the century, the film projector was anything but silent. Music was therefore enlisted to mask the extraneous noise. While serving the masking function, music also was exploited to illustrate and explain the action (Palmer 1980, p. 549). Kracauer (1960, p. 133) emphasizes that the noise problem of the film projection was relatively shortlived, and yet the importance of music remained. An entire music-for-the-silent-film industry developed to support this function of music (Limbacher 1974; Thomas

1997, pp. 37–40). It included the publication of anthologies of music to represent various emotional settings, an increased demand for pianos in the thousands by small movie theatres that sprang up, and architectural plans for movie theatres that included places for pianists and sometimes other musicians.

Hugo Münsterberg

The first psychologist to direct attention to the new phenomena of film was Hugo Münsterberg at Harvard University (Fig. 11.1). Between 1899 and 1916, he wrote 24 books, one of the last of which was *The photoplay: A psychological study*. In what is regarded as the first book on film theory (Anderson 1997), Münsterberg's views are enlightening. His experience of film was as fresh as a child's although acquired as a highly intelligent adult. His understanding of both introspection and scientific method encourage our confidence in his record of, and insight into, film at that time.

Yes, it is a new art—and this is why it has such fascination for the psychologist who in a world of ready-made arts, each with a history of many centuries, suddenly finds a new form still undeveloped and hardly understood. For the first time the psychologist can observe the starting of an entirely new esthetic development, a new form of true beauty in the turmoil of a technical age, created by its very technique and yet more than any other art destined to overcome outer nature by the free and joyful play of the mind (Münsterberg 1970, pp. 232–3).

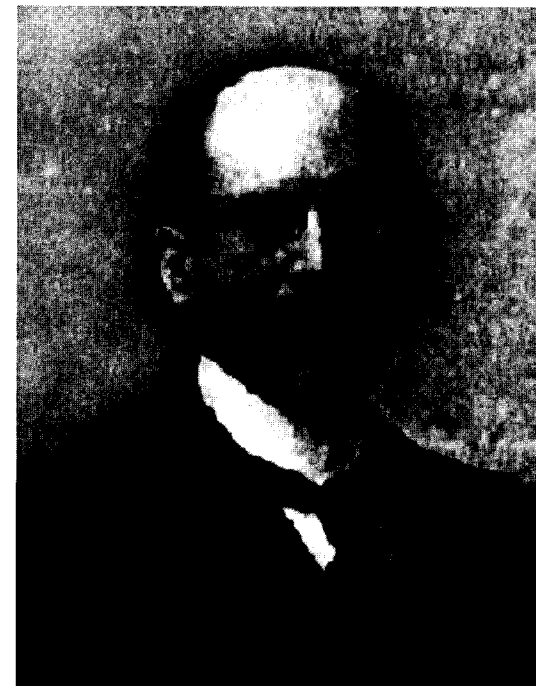


Figure 11.1 Hugo Münsterberg.

He did not live to experience the talking film, but his film experience was not lacking in sound. There were sound effects—he describes a machine, the allefex, ‘which can produce over fifty distinctive noises, fit for any photoplay emergency’ (Münsterberg 1970, p. 205)—and there was music. In his view, music relieved tension, maintained interest (‘keeps the attention awake’), provided comfort, reinforced emotion, and contributed to the aesthetic experience (pp. 204–5).

Münsterberg also used musical metaphor in describing the film experience (e.g. pp. 120 and 128–9). For example, he recounts a narrative cliché of the period, a rapid alternation between three scenes: a jovial boss and his secretary enjoying a private after-hours party in the office, the dismal parents of the secretary awaiting their daughter’s return, and the lonely wife awaiting her husband’s attention. ‘It is as if we saw one through another, as if three tones blended into one chord . . . The photoplay alone gives us our chance for such omnipresence’ (p. 105). Yet, to extend his metaphor of the musical chord, it is also music that can represent in rapid succession and perhaps simultaneously the ‘emotional polyphony’ of these multiple messages.

Possibly because he never experienced the sound film (‘talkies’), Münsterberg directed attention to the importance of music within the film and to music as a means of understanding the psychological processes underlying film. He suggested that cinema is more similar to music than to photography and drama, which on the surface are arts that bear a more striking resemblance:

. . . we come nearer to the understanding of its [film’s] true position in the esthetic world, if we think at the same time of . . . the art of the musical tones. They have overcome the outer world and social world entirely, they unfold our inner life, our mental play, with its feelings and emotions, its memories and fancies, in a material which seems exempt from the laws of the world of substance and material, tones which are fluttering and fleeting like our own mental states. (Münsterberg 1970, p. 168–9)

Münsterberg’s untimely death (the year of his publication of *The photoplay*) and the coincident advent of behaviourism, focusing as it did on only objectively observable behaviour, may account for the failure of psychological research in film and music to run in parallel with the technological developments associated with these media. Instead, technology developed and its psychological study lagged far behind in spite of having got off to a good start.

The sound film

In 1927, approximately 10 years after the death of Münsterberg, *The Jazz Singer* signaled the advent of the ‘talkies’ and the demise of the film-music industry. With real voices and sound effects, music would no longer be needed to establish mood and emotional context . . . or would it? To the surprise of many, something was missing without music (Kracauer 1960, p. 138). The screen had lost part of its vitality. As Kalinak (1992, p. 45) says ‘when the possibility of synchronized speech and sound effects released sound film from its reliance upon continuous musical accompaniment, it initially rejected music entirely. But the life span of the all-talking picture was brief, the need that music filled quickly reasserting itself’.

Several theorists have commented that music adds a third dimension to the two-dimensional film screen (Palmer 1990; Rosar 1994). Composers also shared this view.

Aaron Copland (1941) stated ‘the screen is a pretty cold proposition’. Film composer David Raksin (in Brown 1994, p. 282) referred to Nietzsche’s idea ‘without music, life would not be worth living’. His statement is extreme (deaf people live worthwhile lives) but paraphrasing the maxim, few hearing people would deny that music contributes to their experience of film.

Since the early days of film, directors have recognized the contribution that film-editing made to the viewer, often referred to as montage. Viewers are typically unaware of the rapid changes in camera angle, the move from close-up to long-shot or from one part of the scene to another and back again. None the less, viewers make sense of the world depicted by these juxtaposed shots. Theories of montage concern the audience’s synthesis of juxtaposed information in the film. With the advent of the sound film, Russian director Sergej Eisenstein was among the first to extend the notion of visual montage to sound, and suggested that the listener incorporates the same synthetic process in making sense of the entire audiovisual cinematic presentation.

11.2.2 Music and the diegesis and the non-diegesis

Film theory commonly refers to the fictional, imagined, narrative world of the film as the *diegesis*. In contrast, the *non-diegesis* refers to the objective world of the audience, the world of artefact, of film screens, projectors, proficiency of actors, and technical aspects of the film. In terms of physical reality, music as acoustic vibrations belongs to the non-diegesis. Logically—unless such sound were part of a scene portrayed in a film, as in a film about a musical instrument or the life of a great composer—these sounds of music should *detract from* rather than *add to* the sense of reality of the film. This point was well made in Mel Brooks’ comedy *Blazing Saddles* (1974). A sheriff rides out on the desert—with seemingly appropriate music in the background—and meets face to face with the Count Basie Band performing the now inappropriate music *Paris in the Spring*. The fictional (diegetic) and the non-fictional (non-diegetic) realities collide and add to the humour of the scene. It is probably not coincidental that Brooks, the director and screen writer of the film, is also a composer of music, including some film scores, and so he would have been particularly sensitive to this film-score convention.

Thus, the audience selectively attends to only the part of the music that makes sense with the narrative. Selective attention is a common perceptual-cognitive operation. The recently discovered phenomena of ‘inattention blindness’ is another example of it in the visual domain of film. Here it has been shown that people rarely noticed or were distracted by impossible visual aspects represented in either a film or in their real-world experience. For example, viewers did not notice that a woman in a film clip began the short scene with a scarf and ended the scene without it (Levin & Simons, 2000). In another study (Levin & Simon, 1998), an experimenter positioned on a college campus solicited directions from unsuspecting subjects. Their conversation was interrupted by two confederates carrying a door. One of the confederates changed position with the experimenter who had initially asked for directions. The conversation about directions then continued. The subject rarely realizes that there were two different people to whom he or she has been conversing. Two facts are important here. First, the visual system is blind to much available information, and this inattention blindness (cf. Mack & Rock 1998) is equally characteristic of vision in the real and in the film world. Thus, the fact

that audiences extract the emotional information in music and fail to attend to the acoustical aspects might be described as a case of inattentional deafness, a byproduct of the fact that awareness depends on attention, and attentional capacity is limited. A better parallel can be drawn to the role of prosody in speech perception, which shares with music a greater syntactic similarity than the visual examples given. Here patterns of intensity and frequency from intonation systematically provide emotional meaning to a listener, yet the listener focuses on the meaning and is unconscious of this source of information (e.g. Banse & Scherer 1996; Murray & Arnott 1993).

A good example of the role of music as a source of emotion in the narrative is illustrated in the film *Witness*. Here, a young Amish boy is the sole observer of a violent murder in a train station. He is directed to a noisy police station in order to search through a book of photographs of suspects for a match of his memory to the actual perpetrator of the crime. While left unattended momentarily, he wanders toward a display cabinet that holds a photograph of an honoured senior officer in the force. As he views the photograph, Maurice Jarre's music replaces the background sound effects of the police station. The audience realizes that the boy becomes awestruck with the sudden recognition that the photograph of the police officer depicts the person who he saw commit the crime. The audience takes interest in this scene and is concerned now about the implications for the safety of the boy. This is one of the most critical points in the film; without it there would be no further plot. The criminal within the police force would remain unknown and the boy could continue on his trip without a care. Yet it is this crucial moment, a moment that must be comprehended by the audience, to which the unrealistic music is not merely added but is added at the expense of the more realistic, diegetic sound effects. But the audience, caught up in the drama, is unlikely to have noted this departure from reality.

Film-music scholar Claudia Gorbman (1987) has addressed the unconscious perception of music in her book *Unheard melodies: Narrative film music*. Gorbman's perspective is well captured by Jeff Smith (1996, p. 234): 'By veiling the lacks and deficiencies of other discursive structures, film music, according to Gorbman, lubricates the various cogs and pistons of the cinematic pleasure machine'. If anything, departures from reality via music makes an episode 'more real', more vivid, more emotionally relevant. To date, experimental research has not focused on the subtle uses of music in film (such as its replacement of realistic sound as in the *Witness* example). A number of studies, however, have concerned the role of music in generating inferences, and often those inferences are associated with emotional meaning.

11.2.3 Music and inference: empirical studies

Music presumably adds to the diegetic realism while providing non-diegetic, acoustical, information that is completely incompatible with that realism. At the interface of the diegetic and non-diegetic worlds, the use of music in this and in most other film situations is paradoxical (Cohen 1990). To escape the paradox, the analysis of the acoustical information must be regarded as a preattentive step that leads the listener to inferences consistent within the diegetic world of the film. From moment to moment, the audience member extracts information from non-diegetic sources to generate the emotional information he or she needs to make a coherent story in the diegesis. The successful

director and film-score composer provide just the right cues to guide the attentional and inferences processes.

One attempt at understanding the phenomenon of diegetic inference comes from the context of psychological situation models described as 'vicarious experiences in narrative comprehension' (Zwaan 1999, p. 15). Zwaan, for example, has focused on how literature enables readers to 'mentally leap into imagined worlds'. The information provided by the text is sufficient to enable a reader to place himself or herself at a spatial, temporal, and psychological vantage point from which events are vicariously experienced. The perspective is termed a deictic centre.

Magliano *et al.* (1996) extended the approach to the study of film. In their study, music was indirectly examined as one of six operationally defined film factors (such as montage) that might contribute to the psychological definition of the situation. In two experiments, they investigated visual, auditory, and discourse conditions that enable viewers to predict future events while viewing a James Bond movie, *Moonraker*. In experiment 1, participants were instructed to generate predictions while watching the movie. In experiment 2, participants provided think-aloud protocols at different locations in the film. In both experiments, the presence of supporting visual and discourse information led to systematic predictions by the participant. Music significantly co-occurred with other cinematic sources of support such as montage and *mise en scène*, which were found to influence inference processes.¹

The study by Magliano *et al.* (1996) was not specifically designed to show the influence of music in the film context. Studies that have been so designed have been successful in showing this influence. Such studies typically require more conditions than do comparable studies in music-alone situations, because it is necessary to determine the effects of music alone, film alone, music judged in the context of film, and film judged in the context of music. The studies to be reported have often involved several, if not all, of these different comparison conditions.

In a study by Bullerjahn and Guldénring (1994), professional composers of film music (including Peer Raben, composer for all the Fassbinder films) created a total of five different backgrounds (e.g. crime, melodrama) for the same 10-minute film segment. Both quantitative and qualitative analysis showed that the different soundtracks led to different judgments of the appropriateness of emotional categories (e.g. sad, thrilling, sentimental, vivid), choice of genre (horror, comedy, thriller, crime, etc.), reasons for the actions of the protagonist, and expectations about the completion of the film. In some cases, these judgments and inferences could be attributed to specific aspects of the film. For example, the authors suggested that the final closure of the major chord of one of the melodramatic soundtracks accounted for the presumed reconciliation between the film characters though it is preceded by an argument.

In a series of experiments, Thompson *et al.* (1994) specifically examined the effects of musical closure on perceived closure of a film. In their first experiment, a closed soundtrack ended with a traditional 'perfect' cadence (dominant chord to tonic chord ending).

¹ When music was entered first into the regression equation, it too was found to be a significant predictor of inference, though accounting for only 6 per cent of the variance (J. P. Magliano, personal communication).

The unclosed soundtrack differed only with respect to the final bar, such that the ending was not on the tonic chord. Subjects viewed a short animation accompanied by one of the soundtracks and were asked to rate the degree of closure represented by the clip. Judgments of closure were significantly higher for the condition in which the closed ending was presented. In a second experiment, a professional composer produced closed and unclosed soundtracks to accompany a short film clip produced by one of the experimenters. Closed soundtracks ended on the tonic chord, in contrast to the unclosed soundtracks. The effect of soundtrack closure was strong for only one of the film clips, suggesting that visual factors may take precedence over musical structure in some cases. In a final study, 12 separate soundtracks were composed for 12 clips from a commercial film, initially chosen for their assumed range in degree of closure. The soundtracks were also composed to represent a range of closure, and the degree of closure need not match that of the clip. Participants in the experiment judged the degree of closure of the soundtracks, the clips alone, and the soundtrack and clips together. The influence of independently judged visual and musical closure on judged closure of the film was shown through regression analysis, with a slightly greater contribution arising from visual than musical information. In addition to demonstrating a robust direct effect of musical structure on the feeling of closure of a film narrative, the authors also reported that the role of music was almost completely implicit. When participants were asked for the basis of their judgments, they almost always attributed their judgments to the visual information.

Boltz *et al.* (1991) examined the role of music on inferences in a study that compared music that foreshadowed an outcome versus music that accompanied an outcome. Participants viewed 20 different 3–4-minute clips from feature films and television dramas. Excerpts were selected that ultimately resolved in a happy (positive) or sad (e.g. tragic) way. Music emotionally consistent or inconsistent with these endings (as determined by music-alone ratings) either preceded (foreshadowed) or accompanied the video excerpt. Thus, in some cases the foreshadowing music correctly predicted the mood of the following video event and the accompanying music was congruent with the mood of the video event, and in other cases the foreshadowing music incorrectly predicted the subsequent event and the accompanying music was incongruent with the event. Music accompanying an episode's outcome led to higher recall when the mood of the music and scene were congruent with each other. Conversely, mood-incongruent relations significantly lowered performance to a level comparable to that of the control condition in which no music had occurred. Foreshadowing, however, revealed the opposite pattern. Here, expectancy violations arising from mood-incongruent relations were significantly more memorable than were mood-congruent episodes in which viewer's expectancies were confirmed (Boltz *et al.* pp. 597–8). Boltz *et al.* (1991, p. 602) concluded that their results supported the notion that viewers rely on the emotional expression of music to either generate expectancies about future scenarios or to direct attention toward corresponding aspects of visual activities.

Marshall and Cohen (1988) also observed the ability of music to alter the interpretation of a simple visual presentation. They studied the effects of two different soundtracks on impressions about three geometric forms, a large and small triangle and a circle, in a short animation developed by Heider and Simmel (1944). In their experiment, subjects

viewed the 2-minute animation with one of two soundtracks or with no soundtrack (control condition). They then provided 12 ratings for the film overall and for the three figures. Other groups of subjects rated the music on these same scales. Each of the 12 scales represented a bipolar adjective pair (e.g. fast–slow, nice–awful) and specifically tapped one of the three dimensions of emotional meaning—activity, evaluation, and potency—comprising the semantic differential (Osgood *et al.* 1957). The activity and evaluation dimensions are understood to represent the motivation (arousal) and appraisal (valence) dimensions associated with two-dimensional theories of emotion on which many emotion theorists (Barrett & Russell 1999; Lang 1995; Storm & Storm 1987; see also Sloboda & Juslin, this volume) and music psychologists (Gregory 1998; Madsen 1997; Schubert 1998; see also Schubert, this volume) converge.

In Marshall and Cohen's (1988) study, two musical soundtracks were judged to have approximately the same activity level (measured by averaging responses on scales of fast–slow, active–passive, agitated–calm, restless–quiet). The relative activity levels of the three 'characters' in the film, however, differed for the two different musical backgrounds. For example, the large triangle was judged as the most active under one soundtrack while the small triangle was judged as the most active in the other. Marshall and Cohen (1988) argued *post hoc* that shared accent patterns in the music and in the motion of the figures operated to focus attention on the temporally congruent part of the visual scene, and subsequently associations of the music were ascribed to this focus (Fig. 11.2). A similar accent-pattern/association breakdown in the processing of film and music was proposed by Lipscomb and Kendall (1994, p. 91).

Cook (1998), in his book *Analyzing musical multimedia*, has suggested the generality of Marshall and Cohen's (1988) theory to other multimedia examples in which musical meaning alters the interpretation of events that are at the focus of visual attention. In advertisements for cars, for example, the car takes on both the vitality and the high cultural associations of the classical music in the background. Music does more than echo or provide a counterpoint to a concept already present in the film. Music can also direct attention to an object on the screen and establish emotionally laden inferences about that object.

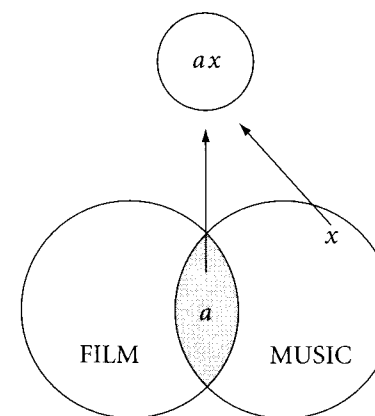


Figure 11.2 Congruence-associationist model based on that depicted by Marshall and Cohen (1988). The total meaning and structure of the music and film are presented by their respective circles. The overlap in music and film is depicted by the intersection of the circles (*a*). Attention is directed to this area of visual overlap in the film. Other associations of the music (*x*) are ascribed to this focus of attention (*ax*). Thus, music alters the meaning of a particular aspect of the film.

Regarding the ability of music to focus attention, Bolivar *et al.* (1994), following Boltz *et al.* (1991), noted that attention to a visual object might arise not only from structural congruencies but also from semantic congruencies. Hypothetically, for example, a soundtrack featuring a lullaby might direct attention to a cradle rather than to a fish-bowl when both objects are simultaneously depicted in a scene. Subsequently, additional associations from the lullaby would be ascribed to the cradle (and conversely for Schubert's *Trout Quintet*, for those familiar with it). Empirical evidence for the ability of music to focus attention is scant and tends to appear with very simple geometric figures, but has not yet been demonstrated with more complex displays (cf. Lipscomb 1999). Part of the difficulty has been in creation of the materials to study the phenomena; however, rapid advances in the affordability of non-linear editing equipment may make such experiments more practical.

11.2.4 Functions of film music

Cohen (1999a) described eight functions of music in a film or multimedia context. First, music masks extraneous noises. Second, it provides continuity between shots, for example, when the camera alternates between close-ups of two people who are presumably looking at each other (cf. Magliano *et al.* 1996, p. 205). Third, as Marshall and Cohen (1988) and Bolivar *et al.* (1994) had argued, and as noted by Münsterberg (1970), it directs attention to important features of the screen through structural or associationist congruence. Fourth, when unassociated with a particular focus it induces mood, as often occurs during the opening credits of a film. The ability of music to induce mood has been supported in several experiments (Pignatiello *et al.* 1986) and is used in music therapy (Albersnagel 1988; Bunt & Pavlicevic, this volume). Fifth, it communicates meaning and furthers the narrative, especially in ambiguous situations (Bullerjahn & Gùldenring 1994; Cohen 1993; Kalinak 1992; Levinson 1996). Sixth, through association in memory, music becomes integrated with the film (Boltz *et al.* 1991) and enables the symbolization of past and future events through the technique of *leitmotiv*. In *leitmotiv*, a particular musical theme is continuously paired with a character or event so that eventually the theme conjures up the concept of the character or event in its absence (Palmer 1980, p. 550). The composer Richard Wagner is typically regarded as the first to exploit this principle in opera. In an insightful article by the composer Saint-Saens (1903, p. 259), entitled 'The composer as psychologist', the author remarks that psychological principles must be responsible for the effectiveness of *leitmotiv*. Mood-dependent memories can also be cued with the emotions established by music (Eich 1995). Seventh, music heightens the sense of reality of or absorption in film, perhaps by augmenting arousal, and increasing attention to the entire film context and inattention to everything else (cf. discussions of reality status by Preston 1999; Qian *et al.* 1999). Finally, music as an art form adds to the aesthetic effect of the film.

11.3 A cognitive framework for understanding musical soundtracks

Many of the functions of film music can be explained via notions of congruence or association, because these represent two primary ways in which the brain operates:

through innate grouping principles (Bregman 1990) and by learned connections (Cohen 1993), respectively. Cohen (1999a, 1999b, 2000) presented a capacity-limited information-processing framework that represented the congruence-associationist concepts in a broad cognitive context (Fig. 11.3).

The framework consists of three parallel channels along the vertical axis, each devoted to one of the significant domains of film: speech, visual information, and music. Each channel is hierarchically organized into four processing levels, with bottom-up levels (A and B) meeting the top-down level (D) at level C, the level of conscious attention and

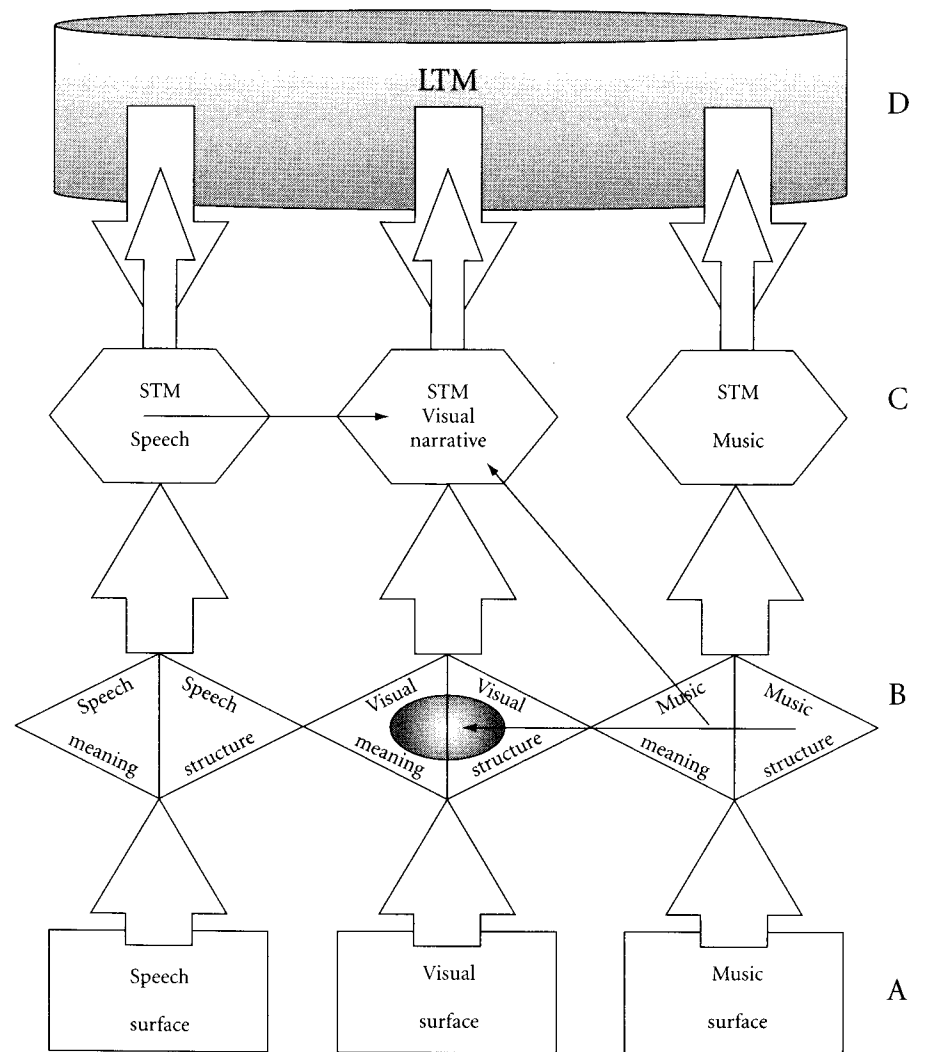


Figure 11.3 Congruence-associationist framework for understanding film-music communication (see text for explanation). LTM, long-term memory; STM, short-term memory.

short-term memory (STM). Environmental sounds (sound effects) have not been included for the sake of simplicity and because of lack of research to date, but their own grammar and complexity calls ultimately for incorporation as a separate channel. Likewise, the visual channel might admit to further breakdowns, for example, animate/inanimate or background/foreground, but this is secondary to the main concepts presented below.

11.3.1 Bottom-up processes: levels A and B

Processing begins at level A with the analysis of physical features of the speech, visual, and musical surfaces into components such as phonemes, lines, and frequencies, respectively. Within each of these domains, at the next level (B), groups of features are subsequently analysed into structural (gestalt-type) and semantic (associationist) information. For music, this means assembly into temporal structures and categorization of cues (e.g. pitch height, tempo, direction) leading to emotional meaning. The outcome of analysis at level B affords the possibility for emergence of cross-modal congruencies, for example, shared accent patterns in audio and visual modalities, to lead preattention to only a portion of the visual information, shown here as the material within the oval in the visual channel.

Cross-modal structural congruence

To further explain the concept of cross-modal congruence, cognitive psychologists have typically applied gestalt principles to visual pattern (e.g. Wertheimer 1939) and later to auditory information (e.g. Bregman 1990; Meyer 1956; Narmour 1991). Rarely are the principles applied to the visual and auditory domains at once. But film music provides the necessity for such application. The simultaneous presentation of music and film automatically elicits bottom-up principles that entail perceptual grouping in both auditory and visual domains. When the auditory information and visual information are structurally congruent (e.g. share temporal accent patterns), the visually congruent information becomes the figure, the visual focus of attention (as originally argued by Marshall & Cohen 1988).

As part of a larger study, Iwamiya (1994, pp. 134–5) showed that judgments of degree of audiovisual matching of four short film clips was lower when the original video and music components were desynchronized by 500 ms (the only delay examined). Thus, gestalt theoretical ideas that are typically applied to visual or auditory domains independently can be applied to conjoint visual and auditory dynamic information. It follows that through innate gestalt grouping processes, music can define the visual figure against the audiovisual background; music can sometimes determine what is the visual focus of attention.

More recently, the gestalt account of the phenomenal sense of ‘belonging together’ has been seen as a forerunner of the current solution to a general problem in cognition, that of consciousness. Lately, cognitive scientists have focused on the concept of ‘binding’ to explain how ‘the unity of conscious perception is brought about by the distributed activities of the central nervous system’ (Revonsuo & Newman 1999, p. 123). It is interesting to note the significance cognitive scientists attach to neural synchronization associated with shared temporal patterning across neural ensembles. Film music that

shares patterns with visual information on the screen, may therefore contribute to attention and consciousness. Indeed, oscillations (cf. accent patterns) below 10 Hz (the typical limit for the film-score composer’s click-track) have been proposed as necessary for information integration and the generation of the stream of consciousness characterizing working memory (cf. Revonsuo & Newman 1999, p. 126).

These notions of congruent patterns in perceptual and cognitive psychology relate to those in the film-music literature on sensitivity to, and effectiveness of, synchronized musical and film structures. Kalinak (1992) suggests that it is this synchronization that contributes to the inaudibility of the music. Synchronization masks the real source of the sound (like ventriloquism):

The vocal track in classical cinema anchors diegetic sound to the image by synchronizing it, masking the actual source of sonic production, the speakers, and fostering the illusion that the diegesis itself produces the sounds. Mickey Mousing [synchronized music and visual accent] duplicates these conventions in terms of nondiegetic sound. Precisely synchronizing diegetic action to its musical accompaniment masks the actual source of sonic production, the offscreen orchestra, and renders the emanation of music natural and consequently inaudible. Musical accompaniment was thus positioned to effect perception, especially the semiconscious, without disrupting narrative credibility. (Kalinak 1992, p. 86)

11.3.2 Short-term memory visual narrative: level C

Returning to the remainder of the framework of Fig. 11.3, information is transferred to STM at level C. Priority of transfer is given to visual information in the gray oval at level B, which has been selected by cross-modal audiovisual congruence. Not all of the visual sensory information that is potentially available reaches the STM. Also, information of musical meaning from B is transferred not only to a music STM but also to the visual STM. Note that visual STM is referred to as the STM visual narrative. This is a unique aspect of the framework: visual STM is construed as the location of consciousness of the film representation. This decision is supported by the evidence for visual primacy and the typical subservience of audio to vision (e.g. ventriloquism, cf. Driver 1997; see also Bolivar *et al.* 1994; Thompson *et al.* 1994). The concept is that of constructing a narrative from the information gleaned simultaneously from visual, music, and speech sources. The present depiction illustrates how music transports various packages of information, be they structural or semantic, meeting the (diegetic and non-diegetic) goals of a film director and film-music composer for the minds of the audience. The term narrative is in recognition of the aim of the visual STM process to make sense of the visual information using whatever information is at hand. Thus, the emotional meaning of the music is directed here because it is useful in determining the meaning of the visual scene. However, consciousness of this meaning arises only through correspondence with information from top-down processes based in long-term memory (LTM).

11.3.3 Top-down processes: level D

During bottom-up processing, some preattended information from all channels proceeds to the LTM at D and begins a top-down inference process with the goal of constructing the narrative of the film. Thus, both bottom-up and top-down processes simultaneously generate information that meets at level C, the STM. In order to achieve

consciousness in the STM of material driven by bottom-up processes, matching of this information by inferences generated from the LTM is necessary. The notion of such a matching process is found in theories of conscious attention (Grossberg's 1995 adaptive resonance theory, ART), comprehension (Kinstch 1998, construction-integration), and consciousness (Baars 1997). These theories assume that preattentive processes are sufficient to initiate the inference processes from LTM.²

Because everyday emotional experience associated with events is stored in the LTM, inferences based on past experience would include emotion (e.g. how a protagonist would feel in a certain situation). These inferences generated by the LTM matching process accommodate the visual and emotional information from a film, but not the acoustical properties of the musical accompaniment that are the source of the emotional information. This explains why the acoustical aspects of the music are not generally attended to: in the context of the rest of the narrative, the acoustical aspects of the music do not make sense to LTM (where is that background music coming from?) and no hypotheses would be generated easily to include it (unless, of course, music were part of the diegesis, e.g. the portrayal in the film of attending a concert or taking a music lesson).

An example of this attentional and inference process is provided by consideration of a portion of the film *Apollo 13*, the drama based on the dangerous technical difficulties within the spacecraft, Apollo 13, that prevented the planned landing on the moon and threatened a safe return to earth. Toward the end of the film, Apollo 13 hovers over the moon—so near and yet so far. The film depicts the fantasy of one of the astronauts, Jim Lovell (played by Tom Hanks) imagining his dream of having landed, taking several weightless steps, and slowly brushing his gloved fingers across the moon's surface. The audience has no trouble in inferring the anguish, awe, and exhilaration that he would have felt. Thanks to the composer, James Horner, the musical basis for such emotional information is carried by the musical soundtrack. On the other hand, the story gives no reason to predict that a full symphony orchestra is performing outside the spacecraft; hence, the acoustical aspect of the music is not transported to the STM. It is encoded by sensory memory but it is not predicted by inferences derived from the LTM and hence it is unattended to.

Thus, the main phenomenal experience at the STM visual narrative is one of a narrative with visual, verbal, and emotional components (but not music *qua* sound). Once attended in STM, the information about the narrative can itself be stored in LTM and form the basis of new inferences. In parallel, acoustical aspects of the music can be processed at a conscious level (see levels C and D in the music column, Fig. 11.3), as it is known that simultaneous tasks can co-occur (Neisser & Becklen 1975), and there is evidence that background music is remembered (Smith 1996). A similar process is envisioned for speech as well, but this is not the focus of the present chapter.

² In Grossberg's (1996) theory, 'when both bottom and top-down signals are simultaneously active, only the bottom-up signals that receive top-down support can remain active . . . Top-down matching hereby generates a focus of attention that can resonate across processing levels, including those that generate the top-down signals. Such a resonance acts as a trigger that activates learning processes within the system. Resonance is also proposed to be a necessary condition for conscious attention.'

11.3.4 Emotion

Emotion cuts through six of the eight functions of film music identified by Cohen (1999a): contributing to the narrative's continuity; emotional meaning of events; induction of mood; creation and activation of memory (state dependence, heightening attention to particular events, providing cues in leitmotiv); maintenance of arousal, global attention, and associated sense of reality; and, finally, aesthetic experience. Hence emotion enters at every level of the proposed framework: analysis of structure and meaning, directing emotional meaning to STM, cuing the inference process of LTM, and the matching of LTM and STM representations.

In regard to the nature of experienced emotions generated by music in the context of film, it is useful to consider six criteria of a genuine emotion that Tan (1996) outlined, based for the most part on Frijda's (1986) laws of emotion.³

1. *Control precedence.* Music controls emotion response (Thayer & Faith 2000; Thayer & Levenson 1983), hence, like other genuine emotions, emotion created by background music exerts control over the audience member. These effects can result simply from bottom-up analysis of the stimuli, although higher-order learned associations may also play a role.
2. *Law of concern: emotion entails identifiable concern.* When music is combined with other media, the music readily finds an object. Cook (1998) provides clear examples of this with respect to advertising. Marshall and Cohen (1988) explained that music directed attention to an object and ascribed its meaning to that object. Attention is required for concern. Music directs such attention (see horizontal arrow from music to vision at level B in Fig. 11.2).
3. *Law of situational meaning (or stimulus specificity).* Each emotion has a particular 'situational meaning structure', a set of critical characteristics of the stimulus. Characteristics of musical stimuli giving rise to particular emotions have been identified by various researchers (e.g. Juslin 1997; Juslin & Madison 1999; Krumhansl 1997; Rigg 1964), and similarities between these characteristics and visually depicted emotions through gait, posture, and speech intonation have also been noted (for a summary, see Boltz *et al.* 1991; see also Juslin, this volume). Some aspects of the emotional meaning of music transfer directly to film (Iwamiya 1994; Sirius & Clarke 1994; Smith 1999).
4. *Law of apparent reality: the stimulus must represent some reality or other* (see also Tan 1996, p. 67). Music contributes to the sense of reality of the narrative (first demonstrated in the 'talkies' in Steiner's score for *King Kong*; cf. Palmer 1990, p. 28). It accentuates important events. The contribution of only the emotional components of the music to the diegesis has been described in Section 11.2 and explained via Fig. 11.3 (see, in particular, the diagonal arrow between levels B and C).
5. *Law of change: emotion responds to changes in the situation* (see also Tan 1996, p. 56). Music creates an everchanging auditory environment that establishes expectations

³ But see Russell and Barrett's (1999) practical guide to assessment of emotion in which they claim that films do not induce true emotion, what they refer to as emotional episodes.

and implications, some of which are realized and some of which are violated. As such it is a fertile source of emotion (see also Meyer 1956).

6. *Law of closure: an emotion tends toward complete realization of its appraisal and action tendency, and is relatively immune to outside influences such as conscious control.* Music commands interest, especially in a darkened film theatre, as described by Münsterberg (1970). The emotion generated by music is governed by the tension and resolution established by the music of which the audience is unaware (cf. Thompson *et al.* 1994) and over which one seems to have little control, although this is a matter for further empirical work. Rehearing music reproduces emotional responses regardless of prior expectations (e.g. Jourdain 1997).

Thus, having satisfied the six constraints described by Tan (1996), it can be concluded that music contributes genuine emotional experience in a film. The congruence-associationist framework has provided a perspective for understanding how different aspects of music contribute to this outcome, although much still remains to be explained.

11.4 Emotion and the film-score composer

It is well to say that music is a source of emotion in film, but the ultimate source is the composer. The average theatre-goer appreciates the emotion established by film music but would be hard pressed to compose this music. Whereas many classical composers have created film scores (e.g. Saint-Saens, Satie, Britten, Honegger, Milhaud, Prokofiev, Shostakovich, Vaughan Williams, Bernstein, Copland, Schuller, and Corigliano), such composition is often regarded as a special talent and preoccupation, exemplified by George Steiner, Miklós Rózsa, Erich Korngold, Bernard Hermann, Dimitri Tiomkin, John Williams, Rachel Portman, and Ennio Morricone among others. Composers known primarily for their film music, have also been recognized for classical music composition, for example, Rózsa and Korngold.

According to film-score composer Victor Young, the film-score composer is characterized by exceptional exactitude, diplomacy, and patience, in addition to musical training (cited in Karlin 1994, p. 310). Music composition for film differs from music composition for its own aesthetic sake. Typically film music is music produced for the sake of the story. It is constrained by the intent of the director, narrative, time, and budget. Working within these constraints, the composer may be regarded as exploiting his or her metacognition of the operations described in the framework of Fig. 11.3. The composer must know how shared audiovisual accent patterns can focus visual attention, how musical information avoids conscious attention, how mood is established, how musical associations provoke inferences through reinforcement or counterpoint, and how inferences are cued and generated via LTM to further the diegesis.

The composer is usually called upon at the end of the film production (Palmer 1980; Rózsa 1982, p. 191; some exceptions being Eisenstein and Hitchcock classics) and may be shown the film for the first time with recorded music already in place, known as temp tracks. The temp tracks indicate the director's wishes for type and placement of music, and therefore can restrict the composer's latitude considerably. In Henry

Mancini's opinion, familiarity with the temp tracks may bias the director against new insights offered by the composer (Brown 1994, p. 301). The composer's job is to replace the temp tracks with new material that must meet some or all of a number of constraints: to time the music cue to a fraction of a second to coincide with the rhythm of the action of a particular frame of the film, to match or create the mood or spirit of the film content, to use affordable orchestration and rehearsal time, to be unheard (unless the music is part of the diegesis) but be memorable, and to never drown out the dialogue (cf. Burt 1994, Chapter 6; Rózsa 1982, pp. 69, 108, and 110). In spite of these constraints, some composers, such as classically trained John Barry, claim that composing for film can be the ultimate freedom. Within these constraints, the composer can do whatever he or she wants and is assured of exposure.

Composing for film is one way of transmitting musical culture (e.g. Rózsa 1982, p. 205), because, as shown in Fig. 11.3, although the film music serves narrative function, it is also encoded in an information-processing channel devoted solely to music. Exposure to new compositional styles can be an added aspect of the film experience. For a recent example, *The Red Violin* may provide one's first exposure to the work of the contemporary composer John Corigliano. Films provide a major source for transmission of a culture's musical conventions. Thus, composing for film is a two-way street: the composer learns to code music to match the visual and emotional information of a narrative; at the same time, the film provides the composer with an opportunity to represent this emotional information in musically novel and creative ways, often to a large audience.

For a feature film, the composer may be given only a month of intensive work to score an hour of music. This pace is faster than that of a composer of 'music alone' but the genre is often, though not necessarily, redundant and characterized by cliché. The music does not have to stand independently, yet the possibility of (recent expectation for) a lucrative soundtrack album may create a challenge to compose music that lives on its own yet hardly reaches consciousness during the film.

Knowledge of the techniques and technology of film scoring can be acquired formally through courses, books, apprenticeships, or trial and error. The art of film music, however, perhaps more than other forms of music, requires 'taking the attitude of the other' (Meyer 1956, Chapter 1). Specific messages must be communicated in an aesthetic package, but the aesthetic goals may be secondary, unlike composing music alone. Like other skills, such as chess, bridge, music performance, or knowledge of a discipline, expertise in film-music composition may follow the 10-year rule of concentrated practice (Ericsson 1996). A young McGill University student composer, Aaron Hanson, in scoring an 8-minute film for a friend, spoke of the many hours of experimentation that were entailed until he achieved the effects he wanted. Presumably, like learning any language late in life, extensive effort is required to master the syntax and vocabulary. But the film-score language differs from languages learned from scratch in that the grammar of the film-music language is already known implicitly from exposure to music and film-music conventions. The film-score composer must turn that implicit knowledge into explicit knowledge and, in other words, must become an expert of the rules.

Research by Lipscomb and Kendall (1994) corroborates the notion that the professional film-score composer has the knowledge to create a score that uniquely matches a portion of the film. Moreover, the explicit knowledge of the composer is implicitly

shared by the audience. Lipscomb and Kendall (1994) asked participants to select the best fitting of five film scores by Leonard Rosenman for a feature film, *Star Trek IV: The Voyage Home*. One of the scores had been originally composed for the excerpt and the remaining selections were by the same composer but drawn from other excerpts in the film. Confirming the effectiveness of Rosenman's music, the most frequent choice of the subjects was the actual score he had composed for the segment, although not every subject made this choice. Similarly, we recall from research previously reviewed by Bullerjahn and Gldenring (1994), that the professional film-score composer can systematically manipulate the inferences generated by the viewer/listener. Likewise, in the study by Thompson *et al.* (1994), the use of musical closure by the professional composer altered the judged closure in the film.

Some composers may be more suited to film-score composition than others in terms of both personality and motivation (which may play more of a role than talent, as is sometimes the case in regular musical achievement; see Sloboda 1996). The film composer must have a dramatic sense (Rzsa, cited in Brown 1994, p. 278), an appreciation of the visual world of film, and a sensitivity to speech nuances. Unlike many other types of composition, the creation of a film score is a collaborative process. Generally, interpersonal intelligence (Gardner 1993) would be necessary on two fronts: appreciation of the demands of socially shared cognition and the accurate assessment of common ground (Krauss & Fussell 1991), and the willingness to cooperate with the film production team (although the film composer Bernard Hermann was known to be irascible, according to Karlin 1994, p. 270). Korngold describes his positive relations with executive producers and others responsible for the film (cited in Carroll 1997, pp. 298–9) and claims that his artistry was not compromised in film composition. Similarly, Franz Waxman felt 'there was always room for fresh musical ideas in writing for the screen' (in Karlin 1994, p. 307).

11.5 Conclusion

Emotion characterizes the primary experience of both music (Sloboda 1985) and film (Mnsterberg 1970; Tan 1996). Music typically plays an integral part of film. Kalinak's (1992, p. 87) argument for the importance of music to the emotional experience in classical narrative film finds support in much of the information presented in this chapter:

Scenes that most typically elicited the accompaniment of music were those that contained emotion. The classical narrative model developed certain conventions to assist expressive acting in portraying the presence of emotion . . . close-up, diffuse lighting and focus, symmetrical mise-en-scene, and heightened vocal intonation. The focal point of this process became the music which externalized these codes through the collective resonance of musical associations. *Music is, arguably, the most efficient of these codes*, [italics added] providing an audible definition of the emotion which the visual apparatus offers . . . Music's dual function of both articulator of screen expression and initiator of spectator response binds the spectator to the screen by resonating affect between them.

Kalinak's statement regarding the role of music as a source of emotion is a strong one. She has claimed that music is 'the most efficient code' for emotional expression in

film. According to Kalinak (1992, p. 87): 'The lush, stringed passages accompanying a love scene are representations not only of the emotions of the diegetic characters but also of the spectator's own response which music prompts and reflects'. She is arguing that the simultaneity of both the representation and the elicitation of feeling is key. Though her analysis seems correct, more empirical research would be welcomed that compared the relative abilities of music and film to represent and elicit emotion.

That music contributes to the emotional expression and experience of film seems logical, yet surprisingly discussions of emotion in film often ignore music (e.g. Tan 1996). However, Mnsterberg (1970) suggested that the psychological processes underlying film were more similar to those of music than to visual art or drama which on the surface might seem more similar. Experimental evidence since then has shown that music influences the interpretation of film narrative and that the music becomes integrated in the memory with the visual information. Music accomplishes other attentional functions through gestalt structural and associationist principles. In addition, the fact that music requires cognitive resources probably plays a role in determining absorption, arousal, and general attention. Music also contributes to the aesthetic experience of the film. More importantly, for present purposes, music in conjunction with film can satisfy Frijda's requirements, as identified by Tan (1996), of a stimulus that can support genuine emotion.

Film-music composition can be regarded as a type of problem solving that exploits knowledge of the musical rules that express and create emotion through specific musical relations. There are many goals that must be satisfied by the film-score composer: providing continuation, directing attention, inducing mood, communicating meaning, cuing memory, creating a sense of reality, and contributing to the aesthetic experience. The ultimate compositional goal is to produce sound patterns that express the emotion consistent with the narrative, the emotion that is jointly recognized and experienced by the audience, binding the spectator to the screen (Kalinak 1992, p. 87). The capacity of music to accomplish the emotional task, arguably far better than the screen itself as Kalinak has suggested, may be based on the ability of music to simultaneously carry many kinds of emotional information in its harmony, rhythm, melody, timbre, and tonality. Real life entails multiple emotions, simultaneously and in succession. Miraculously, yet systematically, these complex relations—this 'emotional polyphony'—can be represented by the musical medium. An example is Korngold's music from the classic film *Sea Hawk* that links romantic love and the spirit of childhood adventure: 'The music for the love scenes still makes an indelible impression with its sweeping heroic lyricism, characterized by arching, repeated rising sevenths that dovetail perfectly with a hypnotic and unforgettable horn call that is redolent of every schoolboy's dream of pirate adventure' (Carroll 1997, p. 254; other examples are provided by Steiner's ability to 'crystallize the essence of a film in a single theme', see Palmer 1990, pp. 29 and 48).

As depicted by the congruence-associationist cognitive framework presented here, and as argued by Cook (1998), music is strong in the representation of emotion in the abstract, and the screen is strong in representing the object to which the emotion is directed. While more research is warranted to further examine the simultaneous contribution of music to emotional meaning, mood, feeling, and absorption, there are sufficient data available now to conclude that music, owing in large part to the explicit

knowledge and skills of the composer, provides one of the strongest sources of emotion in film.⁴

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