

## UNDERSTANDING MUSICAL SOUNDTRACKS

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### ABSTRACT

Musical soundtracks concern two art forms, music and cinema, and two sensory modalities, auditory and visual. As such, they touch many aspects of psychology and provide a fertile and challenging domain for investigation. The present article advocates that a framework for exploring the psychological effects of musical soundtracks should focus on meaning, structure, memory, awareness, and experimental aesthetics. Research representing these topics is reviewed and suggestions for new research are made. As well, it is proposed that the historically significant associationist approach is applicable to a number of these contemporary issues.

Music typically accompanies film, video, and television productions. It serves a variety of general and specific psychological functions, from increasing attention to providing commentary. By intuition and training, directors, producers, composers and sound recordists know how to obtain such effects. Missing, however, is a comprehensive psychological theory to account for these phenomena. This article suggests that implicit knowledge underlying appropriate use of musical soundtracks can be made explicit through application of psychological research in perception, memory, and aesthetics. It is argued that this is a new key area for empirical work.

### BACKGROUND

#### **Music for film**

The application of music to film has origins that go back at least to Ancient Greece when music was used to accompany drama. In more recent times, music has provided background for theatre performance and has been a mainstay for

opera and ballet. Therefore, the use of music for film is neither new nor surprising, but its significance as compared to that for drama, for example, is unprecedented. From its inception, film employed music [1]. It did so for aesthetic as well as practical reasons (e.g., masking noise of the early film projectors [2-3]). For the silent movies, the contribution of music was clear and an entire industry developed around it. The advent of the talking film forecast the demise of film music: background music was expected to confuse an audience now confronted with a realistic source of sound [4]. But when the music was removed, something was found missing; music enhanced rather than detracted from the film experience. It was necessary.

Because the aesthetics and techniques of film music have been much neglected [5-6], little research has been conducted to explain how soundtracks communicate [7]. It is the goal of the present paper to provide a framework for addressing these issues which touch many aspects of experimental psychology. Before proceeding with this task, foundations in the psychology of music and of film will be addressed briefly.

### **Music Perception and Cognition**

The past decade has witnessed a burgeoning of research in the field of music cognition in new specialized journals such as *Music Perception* and *Psychomusicology*, in traditional psychological journals of perception, cognition, and aesthetics and in new books [8, 9]. Progress has been made in accounts of musical tonality [10-11], and temporal processing [12] and in precise models of how musical relations are mentally represented [13,14]. Issues surrounding the meaning [15-19] and aesthetics of music [20] have been addressed. Thus, considerable groundwork in the psychology of music lays a foundation for research on the effects of musical soundtracks.

### **Film Perception and Cognition**

In contrast to the psychology of music, the psychology of film perception has been dormant. Perhaps this results from the relative recency of the development of cinema as compared to music. As well, film as a stimulus may pose more formidable methodological and technical problems than music and this is not without reason: the amount of information in a video signal is at least three orders of magnitude greater than that for an audio signal of the same duration. Much of experimental psychology in perception and information processing has focused on visual stimuli, some of which are dynamic displays or sequential presentations. Some researchers have made connections between this knowledge and film perception [21]. Psycholinguistic approaches inspired by the frequent metaphor "film as language" have also met with success [cf., 22-23]. It is surprising that in spite of these excellent advances, the domain has remained almost completely ignored.

## PSYCHOLOGICAL PERSPECTIVES FOR RESEARCH ON FILM MUSIC

Because of the interaction of musical and visual experience in film soundtrack phenomena and the fact that music and film are art forms which require perceptual and cognitive processing, the domain of musical soundtrack research is vast indeed. In an attempt to provide order among the rich diversity, four perspectives for research on film soundtracks are presented. In brief they concern an associationist approach to musical meaning, the spontaneous organization or structure of musical and visual material, memory and awareness for film and film music, and finally, aesthetic experience.

### Meaning and Associationism

A useful approach to the problem of musical meaning in film is that of associationism. Associationism is characterized as a connectionist and reductionist approach to the understanding of perception and learning [cf., 24]. A basic tenet of associationism is that one idea commonly accompanied by another can independently evoke the other in its absence. Consistent with this notion is the prediction that music which has been previously aligned with a particular experience can evoke a representation of this experience when used during the film.

According to some writers on soundtrack, this rationale is often employed [4, 25]. For example, in Billy Wilder's "the Lost Weekend" (1946), Rozsa uses a motif that expresses a recurring psychological state of craving for alcohol [5]. The motif is initially paired with clear indications of the protagonist's desire and subsequently takes on meaning in the absence of the protagonist. As another example, the famous dum da dum dum theme of *Dragnet*, initially used in "the Killers" to signify a mood of ominous mystery and suspense [26], continues to maintain this meaning through contiguity with similar incidents. This signification by music of an event or character through temporal contiguity is the principle of the leitmotif commonly used in Wagnerian opera [5-6]. Alteration of a leitmotif can add information about the emotional state of the character and in this way, music serves a narrative role providing material not otherwise in the film.

In contemporary psychology, the concepts of associationism are reflected in theories of spreading activation, connectionist models, and semantic networks which are commonly applied to almost every cognitive domain, music being no exception [e.g., 13]. For example, representations of tones relevant to a particular key will spread activation to other tones in that key but not to non-diatonic (non-key) tones. Tones prime representations of associated tones; words prime words with similar meanings; a particular mood increases sensitivity to material related to that mood rather than to other moods. Similar phenomena result from exposure to musical soundtracks. For example, subjects exposed to sad classical music produced word associations and Thematic Apperception Test scores which

were rated as significantly sadder than those produced by subjects exposed to happier music [27]. Pleasant background music can enhance judgement of personality characteristics of photographed figures [28] and contrasting background music can alter the interpretation of the wife-grandmother ambiguous figure [29]. In all of these examples, associations generated by music influence the interpretations of the subject.

Associationism can account for origins of meanings which otherwise might be thought innate. The finding that judged happiness of music increases with musical tempo and pitch [30-31] is consistent with an associationist theory of the body language of the emotions [19]. By this hypothesis, relations between voice quality and emotive states are learned early in life; that is, happiness leads to higher voice and more rapid rate of movement; thus, high fast music would be associated with happiness.

The influence of musical associations on visual interpretation has been demonstrated by varying spatial and temporal dimensions of simple computer-generated visual displays and auditory accompaniments [32]. In this series of studies the bounce of a ball varied in height and speed and the sound varied in pitch (highness/lowness) and tempo. The idea was first to determine how visual and auditory modalities independently affect sadness/happiness ratings and then to compare the same emotional ratings of the visual modality when the auditory modality was added. Independently judged happiness of the auditory pattern varied directly with rate and pitch, and judged happiness of the bouncing ball varied with height and rate of the bounce. When auditory and visual information were presented together, the auditory parameters systematically influenced judgments about the visual modality. For example, the happiness associated with a high fast bounce was partially cancelled by an accompanying low slow melody. Furthermore, when the melody of the soundtrack was based on a major triad, typically associated with happiness, the happiness judgments of the ball were higher than when the melody was minor. Such studies demonstrate direct, specific effects of musical associations on the meaning of a dynamic visual display.

The studies just described used one bipolar adjective pair, happy/sad. Also within the associationist tradition is the semantic differential technique for measuring emotional meaning. It involves ratings on many bipolar adjective pairs representing three dimensions of affective meaning: evaluative, potency, and activity [33]. Tannenbaum [34], one of the founders of the semantic differential technique, showed that a stage and television dramatic production were judged more active and powerful with a musical background than without. Marshall and Cohen [35] studied the effects of music on semantic differential judgments of the classic short animation developed by Heider and Simmel [36]. As in Tannenbaum's study [34], direct effects on overall potency and activity ratings of the film were observed. Ratings for the individual characters in the film (the small and large triangle and the circle) were altered differentially by the musical

background. For example, one musical background significantly increased the activity rating of the small triangle relative to the activity of the other two figures.

Some music leads to highly specific associations, for example, the Wedding March, Christmas carols, the 1812 overture [cf., 37]. For the majority of film music, denotations are not as obvious. To examine the degree of consensus on denotative and affective meanings of film music, Cohen selected four short excerpts of commercially available music composed for use in film or video [38]. The selections chosen for the study were entitled (on the record jacket) "Say hello to love," "Give me time," "Alone," and "Conflict."

In the first part of the study, groups of subjects ( $N > 60$ ), who had no prior exposure to the recording, rated the appropriateness of each of the four titles for each of the four excerpts. Listeners were unaware of the "correct" title of the excerpt. Agreement on titles for three of the music selections was marked and corresponded with the given title. For the fourth selection, listeners unanimously agreed that one of the four titles was completely inappropriate. Thus, such music written for film soundtracks brings denotative meanings to mind quite systematically. Semantic differential ratings, based on twelve bipolar adjective scales, obtained for the four selections also showed high consensus.

In the second part of the study, two of the musical excerpts were used as accompaniments for two short excerpts of a film. Title appropriateness and semantic differential judgments of the film excerpts were obtained from groups of subjects ( $N > 30$ ) who saw the films with one of the two soundtracks. Changes in title and semantic differential judgments were consistent with the measures independently obtained for the respective background music. This indicated that associations of the music influenced both denotative (titles) and affective meaning of the film.

Meyer, following Suzanne Langer, has claimed that music gives rise to a connotative complex, consisting of many overlapping associations; perhaps more easily characterized by what it excludes rather than what it includes [39]. Therefore, some of the many associations that are brought to mind by a soundtrack overlap with associations brought to mind by the film. This overlap may allow the particular portion of the film to be interpreted in terms of the entire connotative complex.

Going one step further, this provision of context may operate in much the same way as does a metaphor. Accounts of metaphor [40] suggest that salient associations of the vehicle which in part overlap with aspects of the topic illuminate the topic. Take, for example, the metaphor, John is a lion; because some associations of the vehicle, lion, (e.g., fierceness) overlap with a quality of the topic, John, therefore the concept of a lion is a vehicle that illuminates the topic John. Similarly, a background score that shares meaning with a film can act to illuminate the film through the provision of additional context. One aspect of metaphor is the asymmetrical relation between topic and vehicle. Some research has provided evidence for an asymmetry in which music modifies the visual but

visual information does not modify the musical meaning [38, 41]. Cohen observed that such an asymmetry was more prominent for affective than denotative meaning. In other words, affective meaning of film did not influence affective meaning of music as greatly as did denotative meaning of film influence denotative meaning of music [38]. A metaphorical function of musical soundtracks has also been alluded to by Gaver and Mandler [42].

## Structure and Organization

The associationist perspective draws attention to the semantics rather than the structural functions of film soundtrack. Another aspect of film and music concerns the structural relations both within the elements of the same medium and between patterns of elements of the two media. A parallel to the early origins for associationist theory is found in Gestalt psychology's emphasis on structure [43], and a concern with the syntax of perception, as opposed to the semantics [44]. Gestalt psychologists pointed to proximity, good continuation, small area, similarity and common movement of discrete elements as determinants of the grouping of elements. Although generally discussed with respect to visual patterns, grouping principles also apply to music [cf., 45].

Grouping is an important consideration in the establishment of focus of attention [cf., 46, 47] and in accordance with the law of similarity or of common movement, one might expect that auditory and visual patterns which change in the same way would be perceived as a "figure" against the remaining "background" information. In support of this, auditory-visual congruence facilitates elementary information-processing tasks [e.g., 47, 48], appears to control attention in early years [e.g., 49, 50] and reduces the threshold of apparent visual motion [51].

Audiovisual congruence is a particularly common technique in animation. Mickey-Mousing, as it is sometimes called, involves mimicking the visual dynamic elements with sound [1, 5, 25, 52]. Prendergast quotes an animator who used the Gestalt pictorial demonstrations of the words Takety and Galoomb to show that the same form can be represented auditorially and visually [5]. For the film or music soundtrack critic, Mickey-Mousing may be banal; for the psychologist, empirical evidence of the perceiver's sensitivity to these crossmodal regularities would be a significant contribution to an understanding of the film soundtrack.

The establishment of other types of audiovisual equivalences has been attempted through representations of visual tensions by the animator John Whitney as described in his "Digital Harmony: On the complementarity of music and visual art" [53]. Tests of the perceptibility of these audiovisual correspondences are in order. Finally, the relation between structure of music and other higher-order structural features of the film such as cutting rate is a significant aspect of the film. Spottiswoode in his book *A Grammar of the Film* refers to this

as the dynamic function of music [6]. Presumably, congruent musical and cutting structure strengthens the impression of cutting rate and of film action, [cf., 22].

### **Memory and Awareness**

The associationist and structural perspectives subsume many of the phenomena of film soundtracks, but not all. When one perceives a film, one is typically unaware of the musical background some of the time [25, 54]. Judging from the popularity of film soundtrack recordings, at least some of the music is remembered. The appeal of these recordings may be in part the chance they provide to reexperience both the film content and the enjoyment of the film. Thus, in spite of the phenomenal lack of awareness of music in a film, the music may play an important part in memory for film.

Theories of memory argue that information is better retained if it is encoded with elaborate associations [55], and if it is encoded vividly or concretely [56]. Consistent with these ideas, soundtracks that provide relevant context, may facilitate encoding of the film. Soundtracks that fail to produce associations that overlap the meaning of the film might prevent elaborated and vivid encoding and lead to poorer memory of the film.

Another role of music in enhancing memory is suggested by the work of Wright and Huston [57] who have explored the role of formal features (i.e., non-content material) on memory for television content, particularly in children. Although they have shown that formal features may alter attention and result in better memory, they have not analyzed the role of music in detail. In a study of music alone, Hiraoka and Umemoto, however, showed that music which had been given concrete appropriate titles was subsequently more easily recognized than music that was given either abstract or concrete inappropriate titles [58]. If vivid imagery can be associated with music and can foster its recall, then vivid imagery generated by music might benefit recall of the film it accompanies.

In an experiment on the role of music on visual and verbal memory, high school students were presented with an 8-minute slide presentation about a college campus [59]. For one half of the students, the presentation was accompanied by a musical soundtrack. Subsequently, all students answered forty recall or recognition questions testing memory for information in the slide or script. Music heightened memory for visual information, particularly at the beginning and end of the presentation. Effects were not pronounced for memory of the script. Similar results were observed in a follow-up experiment. It was suggested that the advantages of music for visual over script memory might have resulted in part from masking by music of the spoken information.

Another series of studies investigated the integration in memory of musical soundtracks and film [60]. After presentation of a 20-minute Buster Keaton film with musical accompaniment, subjects received five examples of recognition excerpts in each of the following conditions: old film/old music (matched), old

film/old music (mismatched), old film/new music, new film/old music, and new film/new music. If music and film are integrated in memory, recognition of a film excerpt should be higher with its original musical accompaniment than with a novel musical accompaniment and should be higher for matched over mismatched audio and visual excerpts [61]. Consistent with the hypothesis, there were higher visual false alarms when auditory material was old rather than new. However, visual memory for old material was so accurate that there was little opportunity for influence from accompanying music. Comparisons with conditions when only visual or soundtrack information had been initially presented also revealed that in bimodal presentations, visual information did not interfere with auditory processing, and vice versa.

It was characteristic of the above studies, that subjects were reluctant to admit that a test musical excerpt had *not* accompanied the original film. This was in contrast to correct rejections of visual material. It underscores the fact that conscious awareness of background music is vague and it is consistent with the paradoxical role of musical soundtracks in the appreciation of film. Typically, the musical soundtrack is not literally part of the drama, yet the music enhances the sense of reality of the film. For example, the film composer Miklos Rozsa [24, p. 203] stated that "Music is especially important in fantasy films on account of the dimension of reality it provides." This is the paradox: music makes the film more real but the very presence of the music contradicts reality. It seems that the listener must be unaware of the music at some level in order for this sense of reality to occur. Why might it be true that the addition of music makes fantasy creatures like Batman in film seem more real? A plausible explanation is that erroneous connections are made between information arising from the musical and visual sources. For example, the viewer may reason as follows. I have a feeling of fear (the fact that this feeling is derived from music is irrelevant and ignored) at the same time as I see the picture of the monster. If this were a real monster I would be afraid. It is consistent with my present fear that the monster caused the fear. Therefore, the monster is a real monster. This explanation seems to be in line with discussions of the cognitive appraisal of physiological responses underlying emotions [62] (see also [21, p. 292] on attribution theory). The influence of complex events which are perceived but not noticed finds support in studies of visual information processing [63, 64], dichotic listening [65], psychotherapy [66, 67], and cognitive theories of consciousness [68]. The ability to bypass first-order consciousness and still affect second-order consciousness may characterize good film music.

The unconscious level of processing of musical soundtracks may also in part account for the neglect of soundtracks as an area of psychological inquiry. In other words, that soundtracks receive little attention in film experience itself seems to carry through to experimental psychology. Nevertheless, it is through film that much new music is exposed to the public, and new musical tastes are acquired [1]. What is also of interest psychologically, is the shifting of levels of

conscious awareness to the music in interaction with awareness of the dramatic action. It may appear that music is neither registered nor remembered but this may result from the greater difficulty of talking about music than about visual aspects of the film.

The psychological dimension of salience must also be considered in the determination of the integration of music and film and the levels of consciousness reached. Salience as a property which governs general attention may relate to a number of factors such as meaningfulness and prototypicality as well as to physical parameters such as intensity and frequency range. If a soundtrack has low salience, little attention will be paid to it and this may determine the level of consciousness at which it is processed. Since the property of salience applies also to film, the notion of relative salience of the two modalities must be considered.

### **Experimental Aesthetics**

Film and music are art forms and thus to understand musical soundtracks it is necessary to consider experimental aesthetics. In traditional aesthetics, one accepted principle for aesthetic value is "unity in variety" [cf. 69]. Unity and variety may be provided by film soundtracks through associations and through structure. For a straightforward example, the meaning of the soundtrack may reflect the same meaning depicted visually by the film and the musical rhythm may echo the temporal structure of visual activity.

Presumably, films with soundtracks are preferred to those without [cf. 59]. But what makes a good soundtrack? Clearly, the quality of the music itself is not the only question. The balance between the film and music with respect to unity and variety is critical. For example, Mickey-Mousing is thought to lack aesthetic quality because it is too similar to the film. Other aesthetic issues may involve psychophysical problems such as masking phenomena. For example, competition between voice and musical soundtrack is a practical and aesthetic problem for the director, producer, composer, and sound technician. Rozsa describes his "novice howler" of scoring for full orchestra an energetic passage to accompany an animated discussion of an English family taking tea [26, p. 66]. He was informed by the director that in order to hear the dialogue, the music would need to be dubbed at such a low level that only some irritating high frequencies would remain. More pleasing results are often obtained when voice and musical soundtrack are not simultaneous. Again, these aesthetic questions about masking by music are admissible to straightforward empirical enquiry.

The notion of salience described in the previous section brings to mind the collative stimulus properties such as novelty and complexity that have been described by Berlyne [70] as dependent on a variety of lower order stimulus properties. Consistent with Berlyne's belief in the Wundt curve, musical

soundtracks may increase arousal to an optimum allowing more information to be encoded while at the same time heightening enjoyment. Studies in which memory for slides was enhanced in the presence of an appropriate musical soundtrack are consistent with this notion [59]. Shapiro and Lim have shown that arousing musical background can direct visual attention to peripheral events in a Stroop task [71]. It is possible that the general arousal value of music can influence visual processing of and interest in the film.

More recently, however, Martindale and Moore have suggested that preference for music is directly dependent on meaningfulness and prototypicality [20]. According to their cognitive theory, aesthetic preference is a monotonic function of the degree of activation of cognitive units. They hypothesize that more prototypical stimuli are coded by stronger cognitive units thus leading to higher preference ratings. It follows that film music that increases the depth of processing of visual information and is cognitively congruent with the film could lead to heightened aesthetic experience.

Tradeoffs between aesthetic appreciation and memory will also have to be addressed. Research on the role of music in educational television [summarized by 72] revealed that some appealing musical selections decreased memory for content. The aesthetics of film soundtracks is therefore yet another area, more complex than any of the foregoing, where all effects previously described must be considered for their impact on preference and aesthetic appreciation. However, by addressing the cognitive issues of associationism, structure, memory and consciousness, answers to aesthetic questions may also emerge.

## **Conclusion**

In summary, film soundtracks provide a significant dimension of human experience which requires psychological explanation. There is already a solid research area in musical psychology, but the many issues of film music have not been addressed. To tackle these issues, a suitable framework would include the following perspectives on mental representation of the audio and visual images: meaning/associationism, structure/organization, memory/awareness, and experimental aesthetics.

These categories are not mutually exclusive, nor does the present framework exhaust all the issues in the psychology of musical soundtracks. Other areas to address concern individual differences, for example, the role of experience with film and music, personality, etc. As well, these questions may be examined from a developmental viewpoint. Children respond to musical backgrounds, but what aspects are salient for them, meanings, structural features, or both? Elderly people on the other hand sometimes complain about the distraction created by "loud" background music [73]. Finally, the four perspectives outlined clearly overlap but allow one to take a point of view while remaining cognizant of the fact that there are many others.

Monaco [74] in his *How to Read a Film*, claims that "ideally, sound should be the equal of image in the cinematic equation, not subservient, as it is now. In short, film has only begun to respond to the influence of the art of music." It is hoped that the present paper has convinced the reader that even without taking a greater role in cinema, effects of musical soundtracks deserve empirical study along some of the lines suggested.

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### REFERENCES

1. C. Palmer, *Film Music*, *New Groves Dictionary of Music and Musicians*, S. Sadre (ed.), MacMillan, Washington, D.C., pp. 549-566, 1980.
2. C. M. Berg, *An Investigation of the Motives for and Realization of Music to Accompany the American Silent Film*, Arno, New York, 1976.
3. H. Eisler, *Composing for the Films*, Dennis Dobson, London, 1962.
4. R. D. Larson, *Musique Fantastique: A Survey of Film Music in the Fantastic Cinema*, Scarecrow, Metuchen, 1985.
5. R. M. Prendergast, *Film Music: A Neglected Art*, New York University Press, New York, 1977.
6. R. Spottiswoode, *A Grammar of the Film*, University of California Press, Berkeley, 1967.
7. I. K. Atkins, *Source Music in Motion Pictures*, Fairleigh Dickenson, Teaneck, New Jersey, 1983.
8. D. J. Hargreaves, *The Developmental Psychology of Music*, Cambridge University Press, New York, 1986.
9. M. L. Serafine, *Music as Cognition: The Development of Thought in Sound*, Columbia University Press, New York, 1988.
10. A. J. Cohen, Exploring the Sensitivity to Structure in Music, *Canadian University Music Review*, 3, pp. 15-30, 1982.
11. L. L. Cuddy, A. J. Cohen, and D. J. K. Mewhort, Perception of Structure in Short Melodic Sequences, *Journal Of Experimental Psychology: Human Perception and Performance* 7, pp. 869-883, 1981.
12. M. R. Jones, M. Boltz, and G. R. Kidd, Controlled Attending as a Function of Melodic and Temporal Context, *Perception and Psychophysics*, 32, pp. 211-218, 1978.
13. J. Bharucha, Music Cognition and Perceptual Facilitation: A Connectionist Framework, *Music Perception*, 5, pp. 1-30, 1987.
14. C. Krumhansl, Perceptual Structures for Tonal Music, *Music Perception*, 1, pp. 28-62, 1983.
15. M. Clynes and N. Nettheim, The Living Quality of Music: Neurobiologic Basis of Communicating Feeling, *Music, Mind and Brain*, M. Clynes, (ed.), Plenum, New York, 1982.

16. R. G. Crowder, Perception of the Major/Minor Distinction: I. Historical and Theoretical Foundations, *Psychomusicology*, 4, pp. 3-10, 1984.
17. D. S. Levi, The Structural Determinants of Melodic Expressive Properties, *Journal of Phenomenological Psychology*, 13, pp. 19-44, 1982.
18. S. Makeig, Affective versus Analytic Perception of Musical Intervals, *Music, Mind and Brain: The Neuropsychology of Music*, M. Clynes, (ed.), Plenum, New York, pp. 227-258, 1982.
19. J. Sundburg, Speech, Song and Emotions, *Music, Mind and Brain*, M. Clynes, (ed.), Plenum, New York, pp. 137-150, 1982.
20. C. Martindale and K. Moore, Relationship of Musical Preference to Collative, Ecological and Psychophysical variables, *Music Perception*, 6, pp. 431-445, 1989.
21. J. A. Hochberg and V. Brooks, The Perception of Motion Pictures, *The Handbook of Perception*, 10, E. C. Carterette and M. Friedman, (eds.), Academic, New York, pp. 259-304, 1978.
22. J. M. Carroll, *Toward a Structural Psychology of Cinema*, Mouton, New York, 1980.
23. J. M. Carroll, The Film Experience as Cognitive Structure, *Empirical Studies of the Arts*, 2, pp. 1-16, 1984.
24. J. R. Anderson and G. H. Bower, *Human Associative Memory*, Holt Rinehardt Winston, Washington, 1973.
25. C. Gorbman, *Unheard Melodies: Narrative Film Music*, BFI Publishing, London, 1987.
26. M. Rozsa, *Double Life*, Hippocrene Books, Inc., New York, 1982.
27. G. H. Bower, Mood and Memory, *American Psychologist*, 36, pp. 129-148, 1981.
28. J. L. May and P. A. Hamilton, Effects of Musically Evoked Affect on Women's Interpersonal Attraction toward and Perceptual Attractiveness of Men, *Motivation and Emotion*, 4, pp. 217-228, 1980.
29. A. Liu, Cross-Modality Set Effect on the Perception of Ambiguous Pictures, *Bulletin of the Psychonomic Society*, 7, pp. 331-333, 1976.
30. M. G. Riggs, The Mood Effect of Music: A Comparison of Data from Four Investigators, *Journal of Psychology*, 58, pp. 427-438, 1964.
31. S. E. Trehub, A. J. Cohen and L. Guerriero, Development of Emotional Sensitivity to Music, *Proceedings of the Twelfth International Congress on Acoustics*, 3, (Toronto), pp. KS-2, 1986.
32. A. J. Cohen, Effects of Music on the Interpretation of Dynamic Visual Displays, in A. J. Cohen (chair), Symposium on Recent Developments in Music Cognition: Processing of Internal and External Structure, *Canadian Psychology*, 30, p. 343 (Abstract), 1989.
33. C. E. Osgood, G. J. Suci and P. H. Tannenbaum, *The Measurement of Meaning*, University of Illinois Press, Urbana, 1957.
34. P. H. Tannenbaum, Music Background in the Judgement of Stage and Television Drama, *Audio-Visual Communication Review*, pp. 92-102, 1956.
35. S. Marshall and A. J. Cohen, Effects of Musical Soundtracks on Attitudes toward Animated Geometric Figures, *Music Perception*, 6, pp. 95-112, 1988.
36. F. Heider and M. Simmel, An Experimental Study of Apparent Behavior, *American Journal of Psychology*, 57, pp. 243-259, 1947.

37. H. Gardner, J. Silverman, G. Denes, C. Semenza, and A. Rosenstiel, Sensitivity to Musical Denotation and Connotation in Organic Patients, *Cortex*, pp. 242-256, 1977.
38. A. J. Cohen, Effects of Music on the Interpretation of Film: Affective and Referential Information. Unpublished Manuscript.
39. L. Meyer, *Emotion and Meaning in Music*, University of Chicago Press, Chicago, 1956.
40. R. P. Honeck and R. R. Hoffman, *Cognition and Figurative Language*, Erlbaum, Hillsdale, New Jersey, 1980.
41. A. C. Parrott, Effects of Paintings and Music, Both Alone and in Combination, on Emotional Judgments, *Perception and Motor Skills*, 54, pp. 635-641, 1982.
42. W. W. Gaver and G. Mandler, Play It Again, Sam: On Liking Music, *Cognition and Emotion*, 1, pp. 259-282, 1987.
43. W. Kohler, *Gestalt Psychology*, Liveright, New York, 1947.
44. W. Epstein, Has the Time Come to Rehabilitate Gestalt Theory, *Psychological Research*, 50, pp. 2-6, 1988.
45. D. Deutsch, Grouping Mechanisms in Music. In *Psychology of Music*, D. Deutsch, (ed.), pp. 99-134, Academic, New York, 1982.
46. D. Kahneman, *Attention and Effort*, Prentice-Hall, Englewood Cliffs, New Jersey, 1973.
47. R. D. Melara and T. P. O'Brien, Interaction between Synesthetically Corresponding Dimensions, *Journal of Experimental Psychology: General*, 116, pp. 323-336, 1987.
48. L. Marks, On Cross-Modal Similarity: Perceiving Temporal Patterns by Hearing, Touch, and Vision, *Perception and Psychophysics*, 42, pp. 250-256, 1987.
49. E. S. Spelke, Exploring Audible and Visible Events in Infancy, *Perception and Its Development: A Tribute to Eleanor J. Gibson*, A. D. Pick, (ed.), Erlbaum, Hillsdale, New Jersey, 1979.
50. T. M. Williams and L. Aiken, Auditory Pattern Classification: Continuity of Prototype Use with Development, *Developmental Psychology*, 11, pp. 715-723, 1975.
51. H. E. Staal and D. C. Donderi, The Effect of Sound on Visual Apparent Movement, *American Journal of Psychology*, 96, pp. 95-105, 1983.
52. C. Palmer, *Miklos Rozsa*, Breitkopf, London, 1974.
53. J. Whitney, *Digital Harmony: On the Complementarity of Music and Visual Art*, McGraw-Hill, Peterborough, New Hampshire, 1980.
54. S. Bobrow, Music? What Music?, *Ear: The Composer and the Moving Image*, 9, p. 16, 1985.
55. F. I. M. Craik, Human Memory, *Annual Review of Psychology*, 30, pp. 63-102, 1979.
56. A. Paivio, *Imagery and Verbal Processes*, Holt, Reinhart and Winston, New York, 1971.
57. J. C. Wright and A. C. Huston, A Matter of Form: Potentials of Television for Young Viewers, *American Psychologist*, 38, pp. 835-843, 1983.
58. I. Hiraoka and T. Umemoto, The Effect of Titles on Memory for Music, *Acta Psychologica*, 24, pp. 228-234, 1981.
59. A. J. Cohen, Effects of Musical Soundtracks on a Slide Presentation: Visual Enhancement and Acoustical Masking, *Proceedings of the Annual Meeting of the Canadian Acoustical Association*, (abstract), p. 178, 1987.

60. A. J. Cohen and D. Dunphy, Musical and Visual Processing in Film, (abstract), *Canadian Psychology*, 31, p. 220, 1990.
61. M. L. Serafine, R. G. Crowder, and B. H. Repp, Integration of Melody and Text in Memory for Songs, *Cognition*, 16, pp. 285-303, 1984.
62. G. Mandler, *Mind and Emotion*, Wiley, New York, 1975.
63. R. B. Zajonc, Feeling and Thinking: Preferences Need no Inferences, *American Psychologist*, 35, pp. 151-175, 1980.
64. R. B. Zajonc, The Primacy of Affect, *Approaches to Emotion*, K. R. Scherer and P. Ekman, (eds.), Erlbaum, Hillsdale, New Jersey, pp. 259-270, 1984.
65. W. R. Wilson, Feeling More than We Know, Exposure Effects without Learning, *Journal of Personality and Social Psychology*, 37, pp. 811-821, 1979.
66. K. S. Bowers, Revisioning the Unconscious, *Canadian Psychology*, 28, pp. 93-104, 1987.
67. J. F. Kihlstrom, The Cognitive Unconscious, *Science*, 237, pp. 1446-1452, 1987.
68. B. J. Baars, *A Cognitive Theory of Consciousness*, Cambridge University Press, Cambridge, 1988.
69. G. Stiny, Generating and Measuring Aesthetic Forms, *Handbook of Perception*, X, E.C. Carterette and M. P. Friedman, (eds.), Academic, New York, pp. 133-152, 1978.
70. D. Berlyne, *Aesthetics and Psychobiology*, Appleton-Century-Crofts, New York, 1971.
71. L. K. Shapiro and A. Lim, The Impact of Anxiety on Visual Attention to Central and Peripheral Events, *Behavioral Research and Therapy*, 27, pp. 345-351, 1989.
72. J. Wakshlag, R. Reitz, and D. Zillman, Selective Exposure and Acquisition of Information from Educational Television Programs as a Function of Appeal and Tempo of Background Music. *Journal of Educational Psychology*, 74, pp. 666-677, 1982.
73. G. T. Fouts, Television Use by the Elderly, *Canadian Psychology*, 30, pp. 568-577, 1989.
74. J. Monaco, *How to Read a Film*, Oxford University Press, New York, 1981.

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