Chapter 1

Introduction: The psychology of music in multimedia

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The term ‘multimedia’ commonly refers to audiovisual presentations in film, television, video, interactive gaming, computer interfaces, and on the Internet. Such multimedia forms are typically created collaboratively by artists and technicians. Multimedia presentations often have the power to engage audiences thoroughly, be it in a narrative, a game, or an advertisement. These spectator-listeners typically take for granted the role played by music and audio; although, if asked, most would agree that the music and sound contribute to the entertainment value, communication function, aesthetic pleasure, or educational purpose that multimedia can provide. In contrast to audiences, however, some researchers across numerous academic disciplines are directing attention to the role of music and sound in the multimedia experience. The present volume gathers the work of leading scholars from these diverse disciplines to inform our understanding of the role of music in the experiences and functions of multimedia.

The primary focus of this book is on the growing body of empirical research investigating the cognition of musical multimedia. The term empirical refers to the process of collecting data from human participants via systematically designed experiments. The results of such empirical research provide a framework for understanding the relationships between music, sound, and image in multimedia contexts. The empirical approach can ultimately facilitate the acquisition of knowledge to support or refute insightful speculation proposed in comprehensive theoretical works (e.g., Chion, 1990/1994; Cook, 1998; Gorbman, 1987). Such information is of particular value due to the increasing impact of multimedia in contemporary global wired society. A major goal of the present volume is to demonstrate many aspects of the empirical approach to the study of music and media and to highlight the promise of the empirical approach as an avenue for future research.

The impetus for this book arose independently among the co-editors Siu-Lan Tan and Annabel Cohen from psychology and Scott Lipscomb and Roger Kendall from music. Cohen, Kendall, and Lipscomb had been empirically exploring the functions of film music since the 1980s. The three met for the first time in 1990 at a small symposium on the psychology of film music organized by William Rosar at the University of Southern California. At the time, Lipscomb was initiating his graduate research under the direction of Kendall. Part of this work appeared in a volume of the journal Psychomusicology
dedicated to the psychology of film music and edited by Cohen (1994). About a decade later, Kendall co-edited a volume of Selected Reports in Ethnomusicology (Kendall & Savage, 2005) that also highlighted research in film music.

Cohen, Kendall, Lipscomb, and a growing number of colleagues in the field continued to organize symposia and present their research on the topic of music and film at meetings of the International Conference on Music Perception and Cognition (ICMPC) held in Bologna, Italy (2006), Sapporo, Japan (2008), and Seattle, Washington (2010) and numerous biennial meetings of the Society for Music Perception and Cognition (SMPC). Siu-Lan Tan had written an important paper on film music, and Cohen introduced her to Lipscomb and Kendall at the SMPC meeting in Montreal, Canada, in 2007. As Tan became increasingly intrigued by the topic of film music and began to explore the role of music in video games, while also completing a co-authored text on music psychology (Tan, Pfordresher, & Harré, 2010), she approached Cohen about the possibility of developing a book about music and multimedia. Cohen remembered past conversations with Kendall about a similar idea and suggested that Kendall and Lipscomb be invited to join the endeavor, establishing this long-term project as an interdisciplinary venture from the outset.

Luckily the foursome were attending the 2008 ICMPC meeting in Sapporo, Japan, and, with Tan at the helm, the feasibility and plans for the book were discussed. The following year, SMPC in Indianapolis, Indiana, provided the opportunity to review the prospectus completed under the leadership of Lipscomb, which culminated in the successful acquisition of a book contract from Oxford University Press, UK. The editors were pleased to meet with Martin Baum, Senior Commissioning Editor for Oxford University Press in the areas of Psychology, Psychiatry, and Neuroscience, at the ICMPC meeting in Seattle, Washington (2010). Tan continued to keep the team on track, including planning for a two-day editors’ meeting preceding SMPC in Rochester, New York (2011). The outcome of this series of meetings—and many, many rounds of communication in between—is the volume before you.

Multimedia

Combinations of media are common worldwide and have also been prevalent historically. Dance forms, incorporating temporally organized sound and visuals, are ubiquitous. In fact, music without visuals is mostly an artifact of technology; sound recording effectively removes the multisensory aspects of live concerts. Sometimes the term *multimedia* implies a technological combination of sensory art forms, and, even before the term was coined, combinations of music and visual patterns were explored. Light or color keyboards were combined with compositions since at least the 18th century (Cook, 1998, chapter 1; see also the Center for Visual Music library for extensive historical descriptions, <http://www.centerforvisualmusic.org>). Scriabin’s 1910 composition *Prometheus* (op. 60) includes a notated light organ part. Such ideas extend themselves to the present day, with both Windows and Macintosh computers offering ‘visualization’ modes in their media players, producing algorithmic visual patterns to accompany any music selection being played. Multimedia is not of course limited to sound and visuals. It can be easily argued that a book is in fact a multisensory experience
involving text, paper texture, illustrations, and the smell of the book itself. The focus of the present book, however, is on music in multimedia.

The term multimedia (possibly first spelled multi-media) is attributed to Bobb Golsteinn (who has worked in many facets of the entertainment industry) in his description of the show ‘LightWorks at L’Oursin,’ which integrated music, lights, and film among other mediums (Albarino, 1966). Definitions of the term multimedia are legion. Maras (1996), for example, discusses ten different definitions of the term including multiple media and describes mixed media as performance art that includes installations of films, videos, actors, and other elements; this construct he calls a hybrid definition. He also discusses megamedium, a combination of different media into an integrated, unified, or colonized form. Film theorist Monaco (1999) stated that academicians began using the term ‘mediums’ as a super-intensive plural.

From the field of educational psychology, Mayer (2009) proposed a three-part taxonomy to define the attributes of multimedia. First, the delivery medium involves two or more devices, such as a computer screen and amplified speakers. Second, the presentation mode combines two or more modes, such as printed text and illustrations or on-screen text and animations. Third, two or more sensory modalities are involved. Clearly there are many overlaps among these categories, since a presentation mode involves multiple delivery media and sensory modalities.

This book focuses on a psychological frame of reference in defining multimedia. A primary focus is on cognitive integration in multisensory contexts, with a particular emphasis on temporally organized auditory and visual structures. The specific elements and the properties of temporal structure and cognitive integration rely on the operational definitions of the individual authors, and the rules of measurement in each domain, rather than descriptive, dictionary definitions. This forms the basis for the process of empirical investigation which informs the research approach of the authors.

**Empirical approach**

The authors contributing to the volume align themselves with a variety of disciplines—many identifying with multiple disciplines—including musicology, music technology, education, film studies, communication studies, advertising, and several branches of psychology including developmental, cognitive, educational, physiological, and social. However, as the title of the book suggests, the chapter authors all embrace the principles of psychology and value the conducting of experiments as a means of testing theories and assumptions about how music functions in multimedia contexts. In a general sense, psychology is the science of mental life (Miller, 1962), the scientific study of mind and behavior (Doyle, 2000; Schacter, Gilbert, & Wegner, 2011). Knowledge in psychology has progressed by means of the experimental method. More specifically, in experiments, data from humans or animals are gathered under controlled conditions for the purpose of addressing specific questions. Answers to those questions advance the discipline.

For researchers outside the field of psychology, particularly those who are in the fields of music and film studies, connection with the scientific approach can be a challenge
from both conceptual and practical standpoints. A few words, then, may be in order to introduce the concept of ‘experiment’ and its role in the empirical approach, although for more detailed information, there are many sources that might be consulted (e.g., Elmes, Kantowitz, & Roediger, 2005; Harris 2012; McKnight, McKnight, Sidani, & Figueredo, 2007; Vogt, Gardner, & Haefele, 2012).

An experiment is executed for the purpose of testing a hypothesis, that is, a predicted outcome often of the effect of one independent variable on a dependent variable. For example, in the field of multimedia psychology, potential hypotheses might include: (1) that the emotional meaning of TV music influences the audience member’s plot expectations for that scene, (2) that the tempo of music can influence the sense of immersion in a video game environment, or (3) that music aids memory for visual, dramatic, or spoken facts in multimedia advertising or educational content delivery. In these examples, the behavior of interest—audience plot expectations, sense of immersion, and memory for facts, respectively—comprises the dependent variable, that which is measured in the study. The possible causes of that behavior—the meaning of the music, tempo of the music, or the very presence of music compared with none at all, respectively—are under experimental control and individually referred to as the independent variable.

Experiments require measures of operational variables that represent the question(s) of interest. For example, ‘attention’ in a multimedia context could be operationally defined as self-reports of interest in particular sections of a multimedia presentation. ‘Memory’ for multimedia events could be operationally defined as the number of discrete concepts accurately recalled after viewing an educational video under a variety of test conditions (e.g., presented with director-intended music, with alternative music selections, or without music). Or ‘emotional meaning’ in a multimedia context could be operationally defined as the most frequent choice from a closed set of categories (e.g., happy, neutral, sad) to describe the emotion that a particular musical excerpt conveys to individuals in a study. The judged mood of a character could be operationally defined as a word or phrase offered by the participant to describe the character’s mood, a choice from any number of mood adjectives offered to the participant, or a judgment on a rating scale or series of rating scales for happy (where 1 = not happy . . . 5 = happy) or loneliness (where 1 = not lonely . . . 5 = lonely), or whatever the experimenter decides.

Based on previous research and sometimes also on introspection, the experimenter generally has some intuition about the outcome of the study that is formally stated as a hypothesis, as previously mentioned. Consider the example of a hypothesis that audiences can systematically judge the ‘goodness of fit’ between musical soundtracks and video excerpts. To test the hypothesis, participants could be asked to rate the goodness of fit of various combinations of music and video excerpts. Judgments of how well a selection of music fits a scene could be measured by participants on a 10-point scale where 1 represents a very poor fit and 10 represents a perfect fit. Suppose participant ratings of appropriateness for an audiovisual combination are higher for one pairing with a musical soundtrack than with another. This finding would support the original hypothesis. However, a more detailed hypothesis of cause and effect would be needed to account for the fact that certain combinations of music and video lead to higher ratings of goodness of fit while others lead to lower ratings.
Sometimes, the results of experiments are quite different than expected. Experimenters may initially be dejected and discouraged when an experiment does not result in the predicted outcome. The experimenter may think that the experiment failed to support the hypothesis; that months of time and costs of testing and analysis have all been wasted; or that the underlying ideas or the methods employed were all wrong. In reality, however, every such ‘failure’ constitutes a step forward in advancing current understanding. If the meaning of a multimedia event does not change under contrasting musical conditions, or if the accuracy of memory is unaffected by the presence of music, the experimenter may realize that film music has an influence only when visual information is ambiguous or that visual memory may override any influence that music might have in certain situations.

Thus, the experimental method entails an iterative process in which controlled conditions are established in order to test the researcher’s hypothesis, and responses from human participants are obtained and analyzed. On the basis of the data, conclusions may be drawn regarding the success or failure in supporting the hypothesis. The process often does not end there for the conscientious researcher. If the hypothesis is supported by the study, a useful next step is to repeat the study to make absolutely sure that the same results will be obtained under the original conditions, because the first set of results may have happened by chance (although statistical analysis usually is sufficient to rule out that possibility); a replication of these results will assure that the new finding is a real one.

Clear results that support the hypothesis would normally be disseminated to the research community through journal articles and other types of scholarly publications. If the data show that under one condition the audience behaves in one way as predicted and under another condition the audience behaves in a different way, as predicted, the results are of interest. Alternatively, if results reliably show that in fact the opposite happens and the controlled conditions lead to different effects but not the predicted ones, then again, the result is of interest and would be disseminated. However, if there is no difference in the results arising from the different conditions, the results are generally not publishable, because the null findings cannot be related to the variable that was controlled in the study. A null finding encourages great care in the follow-up study and possible re-evaluation of the original method and rationale for the study.

Publication is one of the key goals of research. A new finding deserves to be made accessible to as large an audience as possible so that others can join in moving the research to the next step. Even if they are not conducting research themselves, readers of publications can gain an enhanced understanding of phenomena of interest.

Scope and organization of the book
Multimedia in its many forms (film, animation, TV, video games, the Internet, etc.) has psychological, sociological, and economic significance to contemporary society. According to the Motion Picture Association of America (2013), for example, global box office sales for 2012 totaled $43.7 billion, constituting a rise of 6 percent from the previous year, representing a continuing rise in economic and sociological relevance. It is important to understand the impact of such multimedia exposure...
on society. On the surface, the role of music and other aspects of audio may seem like ‘frills’ that are of little consequence; however, understanding the impact of multimedia cannot be complete without understanding the role of music within that context.

Audiences may encounter music and sound in multimedia contexts in an enormous number of ways. To accommodate this variety of settings and situations, the scope of the present volume is intentionally broad, dealing with multiple forms of multimedia, that is, varying combinations of sound, image, tactile stimulation, and/or other elements. However, as stated in the opening of this first chapter, the primary emphasis is on perceptual and cognitive integration of sound and image.

The intended audience for this book are those enrolled in undergraduate and graduate music psychology-related courses in institutions of higher learning, primarily within music and psychology departments, but also in departments of film, fine arts, media, and communications. In addition, we hope that our colleagues and other researchers will find the book to serve as a useful reference. Finally, the book is written so as to be accessible to the informed layperson; technical terms related to psychology, music, and/or multimedia are typically defined upon their first appearance, so that the content should be readily understandable to readers with expertise in any of a variety of scholarly disciplines.

Chapters are written by researchers authoritative in their fields—individuals who are actively engaged in research related to their chapter topic. The international collection of authors represents eight countries, consistent with our global village on the one hand but also providing data on similar issues gathered from persons from different cultures and nations. The body of the text is grounded in empirical work, providing a summary of current knowledge based on this past and ongoing research; each chapter constitutes an organized secondary source providing the most current research findings and specifying how they inform our understanding. Every chapter includes a comprehensive literature review on the focused topic and, where appropriate, identifies exemplary models that can be empirically tested.

The organization of the book proceeds logically with coverage that is deep as well as broad, encompassing both cognitive and emotional processes. It begins with chapters that represent contrasting, empirically based, theoretical approaches from cognitive psychology, philosophy, semiotics, communications, musicology, and neuroscience. The early chapters (Part I) elucidate principles underlying the role of music in multimedia. Part II reviews research on the structural aspects of music and multimedia with less emphasis on semantic meaning, and Part III focuses on research that examines the role of music in determining the meaning and interpretation of media to some extent independent of (or with less emphasis on) the structural aspect. Part IV explores applications of music in media including multimedia for children, video games, advertising, auditory displays of information, and the impact of surround sound, showing how theory and principle intertwine in various examples of multimedia in practice. A final chapter considers the entire volume from the perspective of future directions for the psychology of music in multimedia. Right now, however, a brief précis of each chapter, introduced in the immediately following paragraphs, provides an overview of the content of the book.
Part I
Models and multidisciplinary perspectives

The model described in the opening chapter by Annabel Cohen (Canada) entitled ‘Congruence-Association Model of music and multimedia: Origin and evolution’ joins associationist and Gestalt theoretical psychological perspectives in the Congruence-Association Model (CAM) to accommodate two aspects of media cognition: the structural aspect (often connected to a Gestalt perspective) and meaning (often associationist in nature). This approach paves the way for later sections of the volume that focus primarily on structural aspects (Part II) or on meaning (Part III).

To accommodate the narrative element of multimedia, the notion of a conscious working narrative arises from the best match between bottom-up processing of sensory information of the film and top-down contextual information based on past experience represented in long-term memory. The chapter also describes Cohen’s transition from the original 1988 dichotomy of music and film to six differentiated categories of sensory surface information in the model, as represented in a recent revision of the CAM: music, visual scenes, text, sound effects, speech, and bodily kinesthetic information.

In the next chapter, ‘Experimental semiotics applied to visual, sound, and musical structures,’ Roger Kendall (USA) and Scott Lipscomb (USA), influenced by the philosopher Charles Peirce and a semiotic theoretical perspective, take a different approach in thinking of structure/meaning as a continuum, rather than a dichotomy. They provide compelling audiovisual examples that fall at various locations along this proposed continuum of referentiality. It is one thing to demonstrate the feasibility of this scheme but another to provide empirical support for it. This they do by showing how music students are able to systematically categorize music and visual interactions in accordance with this continuum.

Audiences are affected by musical multimedia, but they also affect the development of multimedia. In his chapter entitled ‘Integrating media effects research and music psychology,’ Mark Shevy (USA) introduces the perspectives of communication theory and media studies, both of which aim to determine the effects of media on audiences and the processes underlying audience demand and preference for certain kinds of media. Music plays an important part in such media, and yet, as Shevy emphasizes, the research in this area typically ignores music as an independent component. Shevy reviews theories of communication, social behavior, and personality that are relevant to all audience reaction to, and demand for, music in multimedia.

Logically, the challenge of discovering the psychological processes underlying the role of music in multimedia should benefit from an understanding of the music itself. The fields of music theory and musicology are best suited to provide this knowledge. What does a researcher need to know about music in general when embarking on a study of music in multimedia, and what should or can be known about the particular musical material of interest in a research study? David Bashwiner (USA) introduces this perspective in his chapter ‘Musical analysis for multimedia: A perspective from music theory.’ He describes several levels of analysis that can apply to complex scenes from mainstream motion pictures; specifically, he provides concurrent analyses of the
textual, musical, and visual aspects of a scene. The usefulness of this multilevel analysis is demonstrated by means of a wonderfully original analysis of the climactic scene from the film *The King’s Speech*. In his speech, the king refers to the challenges ahead, and Bashwiner extends that same challenge to those who would explain the role of music in film: they must, he contends, first properly analyze the music.

Finally, attention is directed to the field of neuroscience. Whereas information about brain function at one time relied on autopsy results to determine the location of brain lesions or on rare studies of electrical stimulation of human brain cells exposed for brain surgery, technological advances have provided the opportunity to non-invasively capture images of the activity of the brain during various controlled conditions. Lars Kuchinke (Germany) studies many aspects of emotion, Hermann Kappelhoff (Germany) is a well-known film theorist, and Stefan Koelsch (Germany) is a primary contributor to the understanding of brain imaging and music. Together, in their chapter, ‘Emotion and music in narrative films: A neuroscientific perspective,’ they review current knowledge about the neural mechanisms for processing visual and auditory/musical information. They set the stage with a review of film-theoretic approaches to the issue of visual-musical integration. Just as an appreciation of music theory is crucial to understanding the psychology of music in multimedia, so is an appreciation of film theory. The chapter thus provides a wealth of reference material from the two quite different sources of film theory and neuroscience.

**Part II**

**Cross-modal relations in multimedia**

The next three chapters, comprising Part II, focus primarily on the structural aspects of multimedia, in essence, how sound, images, and other stimuli shape the viewer experience. In his chapter entitled ‘Perceived congruence between auditory and visual elements in multimedia,’ Shin-Ichiro Iwamiya (Japan) reviews the sizeable body of research with a focus on studies conducted in his country. Here, the interest is on the judged meanings of audiovisual composites that arise as a result of the manner in which the auditory and visual components of empirical stimuli are considered to be congruent (i.e., appropriately matched formally or semantically). Iwamiya then moves on to consider the dynamic relationship between changing patterns in the audio and visual domains as well as the role of cultural differences among participants related to perceived congruence. Of particular importance to Western readers interested in this topic are the clear descriptions of numerous studies published in Japanese.

In the chapter entitled ‘How pitch and loudness shape musical space and motion,’ Zohar Eitan (Israel) investigates the relationship between basic features of sound—specifically, musical sound—and aspects of physical space and motion. Such cross-modal research is crucial to understanding the multimedia context and the human cognitive processes involved in its perception. Eitan begins by presenting a general introduction to cross-domain feature correspondence, and then, based on results of empirical research, delves deeper into specific relationships: pitch height (correlated with spatial height, lateral position in space, distance, speed, and physical size) and loudness
(correlated with distance, spatial height, speed, and physical size). He addresses an area that has been largely ignored: how these relationships function when perceiving dynamic (i.e., time-varying) stimuli.

Scott Lipscomb (USA), in his chapter entitled ‘Cross-modal alignment of accent structures in multimedia,’ addresses the synchronization of important events across the aural and visual sensory modalities. On the basis of past research, he identifies specific determinants of ‘accent’ (salient moments) within each perceptual domain, presenting a tripartite model of accent structure alignment (Yeston, 1976) as a means of systematizing the study of temporal–structural relationships in multimedia contexts. Very few studies have addressed the issue of cross-modal accent structure alignment; even fewer have focused specifically on the empirical bases for determining our current understanding. Lipscomb uniquely reviews perceptual studies of multimedia stimuli that represent varying levels of complexity, some approaching the complexity level of real-world multimedia experiences.

**Part III**

**Interpretation and meaning**

Part III includes two chapters that directly address the meaning of multimedia as interpreted by listener-viewers. Marilyn Boltz (USA) presents a chapter entitled ‘Music videos and visual influences on music perception and appreciation: Should you want your MTV?’ As evident in a number of the previous chapters, a fair amount of research has addressed the ways in which music may influence the cognitive processing of visual information. Boltz’s chapter reverses the question by asking: How might visual information influence our perception and appreciation of musical stimuli? This focus is particularly relevant to the music video context in which music is the driving force with video seemingly—and somewhat unusually—in a supportive role. Based on past research, Boltz addresses a number of relevant contexts: the role of the visual component in music learning and in the evaluation of musical performances, the impact of physical appearance on assessments of musical ability, and interrelationships between physical gestures of performers and perception of the musical performance by the audience. After a brief discussion of issues related to the coordination amongst members of performing ensembles, Boltz proceeds to investigate what we know about the experience of music videos for the purpose of artistic expression. She then reviews theoretical foundations relevant to audiovisual interactions, revealing the influence one modality can have on perception in another and the ability for cross-modal information to ‘fill in’ missing information in another modality to complete an affective response.

In their chapter entitled ‘Music and memory in film and other multimedia: The Casablanca effect,’ Berthold Hoeckner (USA) and Howard Nusbaum (USA) consider whether music might be a more effective means of cuing visual recall than visual images are for cuing recall of musical sound. Using *Casablanca* (and Max Steiner’s well-known musical score for this classic film) as a point of departure, the authors delve into a discussion of films in which memory plays a significant role within the film narrative itself (e.g., Hitchcock’s *Spellbound* and Gondry’s *Eternal Sunshine of the Spotless Mind*).
Building on the pioneering work of Hugo Münsterberg (1916/1970), they also describe how evolving cinematic techniques that allow film narratives to move freely across time and space (such as cuts and flashbacks) enable film-makers to represent memory in ways that reflect our experiences. Film depictions of memory processes, in turn, have influenced popular notions of how memory works. Hoeckner and Nusbaum then turn to a discussion of the role of different types of memory in processing sound and image in film and other multimedia, including episodic (and autobiographical) memory, semantic memory, and implicit memory. The chapter concludes by revisiting some of the main questions emerging from the empirical studies reviewed.

**Part IV**

**Applications: Music and sound in multimedia**

The final section of the book comprises five chapters that present specific applications of multimedia in a variety of contexts. The chapters address topics related to media for children, video games, advertising, and informational displays and surround-sound. The chapter by Sandra Calvert (USA) entitled ‘Children’s media: The role of music and audio features,’ examines the impact of musical multimedia upon infants, children, and adolescents. Young children rarely gaze at the television for extended periods; they play with toys and look only intermittently at the screen. Sound plays an important role in capturing their attention. Calvert’s chapter identifies specific auditory formal features that direct children’s attention to the screen at important plot points to support comprehension of the story line. The chapter also explores the functions of music in multimedia for infants, children, and adolescents—including effects of background music, sung versus spoken text, and actively singing lyrics—on attention, comprehension, and memory of information presented. Finally, Calvert discusses the creative opportunities available to these ‘digital natives’ (Prensky, 2001) via a new generation of multimedia authoring tools.

Mark Grimshaw (Denmark), Siu-Lan Tan (USA), and Scott Lipscomb (USA) address the role of the auditory component in computer and video games in a chapter entitled ‘Playing with sound: The role of music and sound effects in gaming.’ Atari’s *Pong* (Alcorn, 1972) was the first game to feature sound, and it is surprising to see just how far game audio has come. No longer consisting of ‘bleeps’ and ‘blips’ and trivial melodies, computer and video game music is now frequently compared to orchestral film scores and sound effects are increasingly elaborate and realistic. After a brief description of evolving technological developments and their direct impact on sound design for computer and video games, the authors explore the variety of roles fulfilled by music and sound effects in interactive games. Grimshaw et al. then provide a thorough review of empirical research related to the sonic component of gaming, including the effects of the presence of sound on player performance, subjective aspects of the gaming experience, and players’ physiological responses.

In the chapter entitled ‘Music in television advertising and other persuasive media,’ Mark Shevy (USA) and Kineta Hung (Hong Kong) review empirical research on the role of music in media with the specific intent to influence behavior. Music is prevalent in
advertising, but its effects are not always easy to predict. Some studies show that music can sharpen attention and memory for an advertisement and strengthen its persuasive message. However, music can also interfere with efficient processing of information and even weaken the impact of an advertisement. Many variables may interact with listener-viewers’ individual traits to ultimately determine how a person will respond to the music in an advertisement. Shevy and Hung’s chapter provides the groundwork to understand the complex and often nuanced effects that music may have in persuasive multimedia contexts (e.g., musical preference and familiarity, how well the music seems to fit the product or service being endorsed, and conscious and unconscious associations one has formed for the music).

Agnieszka Roginska (USA) explores the uses and functions of auditory displays in the chapter entitled ‘Auditory icons, earcons, and displays: Information and expression through sound.’ She begins by presenting a brief history of these phenomena, extending back to the Ancient Greek era. Roginska then provides a detailed discussion of the various types of auditory display, including earcons, auditory icons, spatial auditory displays, and speech-based auditory displays. The author then turns to the sonification of complex data sets in order to facilitate the discovery of patterns as a result of the identification of auditory signatures, a discussion that is complemented by a following section focused on data mapping. The chapter concludes with a set of specific applications within multimedia contexts, including the use of auditory displays for interaction and feedback, alerting, monitoring, navigation, and the augmentation of reality.

In the final chapter of this section, ‘Understanding the impact of surround sound in multimedia,’ Mark Kerins (USA) investigates the role of multichannel audio playback when experiencing multimedia. Focusing specifically on motion pictures, because this is the medium in which most relevant technological advances occurred, Kerins provides a brief history of the evolution of sound in multimedia. The author then reviews dozens of empirical studies that have informed us about the effect of auditory presentation mode on audience perceptions of the multimedia experience. The author then dissects the manner in which multichannel sound directly impacts the experience, including factors such as presentation context and content of the various multisensory components comprising multimedia. Bringing the chapter to a close, Kerins proposes the existence of what he calls the ‘digital surround style,’ in which the content of the auditory track and visual images in isolation becomes subordinate to the audiovisual experience as a whole, in essence, the image–sound interrelationship.

Final remarks

From the time of the early Greek dramas through Wagner’s Gesamtkunstwerke in the 19th century, music performance was a visual-musical experience. The development of sound recording in the 19th century changed this. Music could be presented independently of other modalities, sharing this privilege previously held by visual images that could stand alone as sole objects of appreciation. Now in the digital age, presentation of visual still and moving images increasingly includes music and audio soundtracks. The growing prevalence of multimedia fully justifies both the burgeoning interest in film-music studies and academic programs focusing on multimedia. These and related
activities have been on the increase since the 1990s in line with developments in digital technology, but much of this work has been theoretical or practical in orientation rather than empirical.

The collection of chapters in the present volume is the first to gather in one place the body of empirical research in the field of psychology and across numerous other disciplines that refer in one way or another to the impact of music and audio on the experience of multimedia. Our hope is that this volume will fill a gap for the growing numbers of students, scholars, and artists who are intrigued by this field. One of our aspirations is that the book will provide the foundation for future discoveries, discoveries that will elucidate the role of music and sound in multimedia, increase the effectiveness of the auditory component of multimedia, and contribute to our general understanding of the human mind in perceptual, cognitive, emotional, and narrative processes.

Applying the empirical approach to multimedia, as advocated throughout the book, requires much knowledge: knowledge to create multimedia stimuli having particular features, knowledge to measure and analyze listener-viewer responses, knowledge to develop hypotheses based on various disciplinary theories, and knowledge to interpret data in terms of such theories. Such diverse knowledge is more easily found in a research team than in a single researcher. Each member of such a research team offers different areas of expertise across disciplinary boundaries. For success, however, the team members must share a common language. It is our hope that the present volume may help to establish such common ground so as to advance our understanding of the psychology of music in multimedia.

Notes

1. Hypothesis testing, data collection in controlled experimental designs, statistical analysis, and the belief in objective science reflect a particular approach to research and one that is increasingly contrasted with qualitative research methodology. Qualitative methods are equally valid empirical methods for determining the nature of a situation and of gaining knowledge. Focus groups, semi-structured interviews, analysis of diaries and documents are some examples and these methods could be applied to questions about the role of music in multimedia. This is not to suggest necessarily a clearcut distinction between quantitative and qualitative research.

2. MTV is an acronym for ‘music television,’ a music channel established in the USA in 1981. In its early years, the channel played music videos almost exclusively, interrupted periodically by brief segments of spoken dialogue by video jockeys (VJs) and commercials.

References


