

CONNECTIONS: MAKING SENSE OF THE WORLD AROUND US
(THE USE OF MUSIC IN DOCUMENTARY FILMS)

by

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ABSTRACT

Music is often a neglected and undervalued element in documentary films. This thesis looks at music cognition, film cognition, and learning theory to argue for the importance of music in documentary films. Adhering to the theory that the documentary film genre is an educational tool first and foremost, the use of music strengthens a film's potential to engage with and educate an audience. The first portion of this thesis examines brain function as it pertains to music and learning, as well as research in narrative film cognition, looking particularly at how documentary films provide a unique medium to engage an audience in a story of facts, which increases their chances of retaining information presented to them, as well as providing a unique vehicle for repetition and variety in information transmission which contributes to a stronger learning environment. The second portion of this thesis analyses three popular science and nature documentary films in order to more fully understand their use of music, and how that may or may not have contributed to their success.

CONNECTIONS: MAKING SENSE OF THE WORLD AROUND US

Music and storytelling, traditional methods of communication and education, historically employ rhythm to structure their message and capture the attention of their audience in order to convey a message or lesson. Today, film serves a similar function of traditional fairy tales, folk songs, or other oral storytelling traditions, but with a unique ability to combine multiple stimuli into a single and powerful entity. Music, an often neglected and undervalued element in documentary films, can play an important role in a film's overall success. By looking at music cognition, film cognition, and learning theory, we can argue for the importance of music in documentary films. Adhering to the theory of the documentary film genre as an educational tool first and foremost, the use of music can strengthen a film's potential to engage with and educate an audience on an unprecedented and uniquely complex level. If education is the processing of information we find entertaining, then documentary films provide an unprecedented method of educating a large audience by combining multiple entertaining components in a single medium. Analysis of the music, or lack thereof, in three commercially successful documentaries, specifically *Winged Migration*, *Microcosmos* and *An Inconvenient Truth*, sheds light on the role music can play in a documentary and how it may or may not contribute to its success.

In researching the seemingly disparate disciplines of music cognition, film cognition, and educational theory, I sought to gather research from the preeminent scholars in each field while attempting to reconcile them into a single theory regarding music in documentary films. I often found crossover in fields of study, particularly in the area of

music cognition, where many experts came from a background of psychiatry/psychology, such as Oliver Sacks and Anthony Storr, while Marvin Minsky, the commonly accepted ‘father of artificial intelligence’, brought together the fields of psychology, neuroscience, engineering and music to form theories regarding cognition. Minsky applied these theories to his pioneering work in artificial intelligence and the development of robots. Daniel Levitin started his career in the field of music as a musician and record producer and later turned to neuroscience, looking particularly at the impact of music on brain function. His work in cognition, both in general and specific to music, provided crucial insight for my own research. For a more artistic interpretation of music cognition, I used the work of musician and author Robert Jourdain.

Film cognition, a relatively young discipline, has less crossover history between fields of study than music cognition. For current theories in film cognition, I used the work of Torben Grodal, Carl Plantinga, and Ed S. Tan, all professors of film at various universities around the world. For the historical and critical analysis of music in film, I relied on the work of R.M. Prendergast. Several schools of thought abound in the field of education and learning theory, however I found the work of Harvard professor Howard Gardner most relevant and applicable.

FILM AS A LEARNING TOOL

Documentary film provides a unique medium for teaching that allows an audience to engage on many levels while presenting information in multiple ways. Of all the numerous studies in educational theory, most come to a common conclusion: that a single method of instruction does not work for all students. In a large society, accommodating the millions of children and their various ways of learning presents particular difficulties. A single system commonly results, one that relies on regular, uniform testing to assess the abilities and progress of students. This, however, does not account for the multitude of learning styles that exist among people (Gardner, 2006). According to Howard Gardner, a Harvard professor and preeminent scholar on learning and education theory, people have multiple intelligences, and therefore learn in a variety of ways. The intelligences he outlines are: 1. Musical intelligence 2. Bodily-kinesthetic 3. Logical-mathematical 4. Linguistic 5. Spatial 6. Interpersonal 7. Intrapersonal, and possibly 8. Naturalist.

“Inasmuch as nearly every cultural role requires several intelligences, it becomes important to consider individuals as a collection of aptitudes rather than as having a singular problem-solving faculty that can be measured directly through pencil-and-paper tests” (Gardner 2006; 22).

This approach to education creates a challenge: how to accommodate millions of combinations of intelligences into a successful academic system. Perhaps a single system cannot work for everyone, unless that system incorporates a multitude of components and stimuli, providing students with several options of learning within that system. The key to a successful educational system appears to depend on variety in information

transmission. Documentary film presents information in a variety of ways, which allows it to reach more students than other, more conventional, teaching tools.

Film, when it utilizes all of its potential elements, touches on a variety of components that stimulate learning. Recent research in the fledgling discipline of cognitive film theory indicates the potential for films to stimulate brain function and sheds light on how people process films. Torben Grodal, a Professor of Film Studies at the University of Copenhagen, argues the role of emotion and cognition in determining an audience's reaction to, and engagement with, a particular film or film genre. "A single film will contain myriads of pieces of information at many levels; at a given moment of viewing most of the previous pieces will be activated, although not as the focus of conscious attention" (Grodal 1997; 66). When watching a film, viewers process the information they see in a variety of ways, some conscious and some not. Film stimulates several cognitive functions at the same time, making it a powerful medium. In this way, a film can reach many people in different ways. This enables viewers to connect with the information in a way that might vary from person to person, but ultimately resulting in a higher percentage of people learning from a single source.

In addition to enabling viewers to connect to a subject in a variety of ways, films can also present the same material in a variety of ways throughout the film. This opportunity for repetition in an engaging and varying way makes film an excellent medium for conveying information and teaching students. As Professor Gardner points out,

"mastery of a concept or theory requires repeated exposure to that material; one almost never achieves instant understanding. But it is a mistake to present the same content in the same way. Understanding is far more likely to be achieved if the student encounters the material in a variety of guises and contexts. And the best way to bring this about is to draw on all of the

intelligences that are relevant to that topic in as many legitimate ways as possible” (Gardner 2006; 60).

Film possesses an unique ability to present information repeatedly, in various ways.

Documentary film, particularly when utilizing all of its potential sources of stimulation, can create a learning environment conducive to a variety of students, learning styles and interests. On the other hand, a poorly conceived or executed film can repel more interaction than it attracts. Film therefore has the *potential* to act as a useful teaching tool, but does not guarantee success. When combined with music, the cognitive potential of a film increases, not just for the role music plays in a film, but also for the cognitive function of music itself.

MUSIC AS A LEARNING TOOL

Experts debate the evolutionary purpose of music, yet the existence of music, in some form or another, in every single culture throughout time, indicates a longevity borne of certain importance. Furthermore, it is something in which everyone can attain a degree of aptitude. According to musician and author Robert Jourdain, the fact that “[music] is found in every culture in the world, no matter how technologically primitive, indicates that music is something that humans come by fairly easily” (Jourdain 1997; 305). So what function can music serve within a society in which every action requires energy and in which energy is too precious to waste? When looking at ancient societies, anthropologists debate the function of music. Beyond the more obvious function of community engagement and unity, music also functions as a form of communication and potentially as a bridge to higher mental capacity. Daniel Levitin, a musician and former record producer turned cognitive psychologist and neuroscientist, currently teaches at McGill University, where he focuses on music perception and cognition, and the role music plays in memory and learning. “[An] argument in favor of music’s primacy in human (and proto-human) evolution is that music evolved because it promoted cognitive development” (Levitin 2006; 254). Music does this by triggering emotion, long- and short-term memory, and helping to make sense of the chaos surrounding us.

An infinite amount of information exists about the world around us, and without a method of simplifying it, we would easily become overwhelmed and not understand any of it. Music is one way to organize it and make it accessible. Besides the obvious appeal of music, which can grab a listener’s attention and engage them on a variety of sensory

levels, music exists as a method for organizing information. Whether that information is scholarly information, valuable life lessons, or merely musical notes, the patterns help make sense of it. Fairy tales and folk songs are perhaps the oldest form of teaching and conveyance of knowledge. Every society has them, and on some conscious level recognizes the advantage of presenting information within these structures. So what is it about the structure of music, particularly folk music, that proves so engaging and conducive to learning? Oliver Sacks, a Professor of Clinical Psychology and Psychiatry at Columbia University points out that “[m]usic has the power to embed sequences and to do this when other forms of organization (including verbal forms) fail” (Sacks 2007; 237). Fairy tales, folk songs, and rhymes all use devices to aid in memory and recall. The ABC song that every child in America learns provides a classic example of this.

“Every culture has songs and rhymes to help children learn the alphabet, numbers, and other lists. Even as adults, we are limited in our ability to memorize series or to hold them in mind unless we use mnemonic devices or patterns – and the most powerful of these devices are rhyme, meter, and song” (Sacks 2007; 237).

This uniquely human ability to “embed words, skills, or sequences in melody and meter” (Sacks 2007; 239) aids in the recollection of large amounts of information, a particularly useful skill in preliterate societies where music and oral traditions were the only way to impart knowledge and information.

MEMORY IN GENERAL--- HOW DO WE LEARN?

In ancient Greek mythology, the nine Muses were the daughters of Memory (the goddess Mnemosyne). Societies have recognized for over 2000 years that thought derives from memory. “If imagery originates from within, then in some sense it must arise from memory” (Jourdain 1997; 163). Modern science and logical deduction support this idea. Marvin Minsky, Massachusetts Institute of Technology Professor of Media Arts & Sciences and Electrical Engineering & Computer Science, pioneered artificial intelligence, studying neural networks and cognitive psychology, including how the brain remembers external information. Your impression that a chair is a chair rather than an assortment of sticks and boards comes from agents activated directly by your vision, as well as memories those vision-agents activate. Usually we don’t have a conscious sense of this happening, and “we never use words like “memory” or “remembering” when the process works quickly and quietly; instead, we speak of “seeing” or “recognizing” or “knowing” (Minsky 1988; 154). Memories accumulate over time, and the more we have, and the more connections we build between them, the more neural connections are established, and the more we “know”.

New information only makes sense in relation to old information, information which we already know. In other words, we need a point of reference in order to understand unfamiliar information.

“Most scientists and contemporary philosophers believe that the brain and mind are two parts of the same thing, and some believe that the distinction itself is flawed. The dominant view today is that the sum total of your thoughts, beliefs, and experiences is represented in patterns of firings-electrochemical activity- in the brain” (Levitin 2006; 82).

“Knowledge, it turns out, is no more reducible to the firing of a single neural network than complex motions are reducible to the actions of single muscles” (Jourdain 1997; 82, 215). Our body is one giant network, all controlled by neurons firing in the brain.

The brain, through various methods, creates patterns to organize the chaos into coherence; but the brain needs a way to do this. Fortunately, it has several; particularly music, stories and mathematics. Only as we begin to understand neural pathways can we also understand cognitive thought processes. But while increasing our understanding of the individual levels is relevant and important, we cannot lose sight of the big picture: the ultimate function of these individual interactions and how they fit together in increasingly complex ways that ultimately result in human thought and comprehension. It is one thing to understand what causes a particular neuron to fire, it is another to understand *why* it did so, and to what overall function or purpose it led. Memories play an unexpected role in neurochemical activity.

“The strength of a memory is related to how many times the original stimulus has been experienced. Memory strength is also a function of how much we care about the experience... caring leads to attention, and together they lead to measurable neurochemical changes” (Levitin 2006; 193-194).

Memories also provide unique insight into the connectedness within the brain.

“There is strong neurological evidence that particular memory systems are indeed localized in separate parts of the brain... However, the computational environment of the brain is massively parallel and widely distributed. It is likely that a number of processes related to memory are located throughout the brain” (Levitin 2002; 295).

An increasing pool of evidence suggests that the various regions of the brain interact with each other in ways formerly overlooked or misunderstood.

As scientists begin to understand the multiple ways that people learn and think, and they also begin to understand the complexity of the human brain itself. This applies across the board, whether in music cognition or film cognition. Studies in film cognition provide key insight to the role of emotion in learning. "...cognition and emotion are two different aspects of one information system" (Grodal 1997; 81). In order to better understand memory, and therefore cognition, we look to the role of emotion. Emotions, far from "irrational", are connected with input-processing of information and often motivate actions (Grodal 1997; 44, 56). In other words, emotions guide our priorities.

"Affects and emotions play a crucial role in long-term memory, probably because the consciousness does not work according to 'abstract' and disinterested mechanisms: perceptions and cognitive sequences are stored in order to be used to support the future implementation of the living being's preferences, and this support has both cognitive and motivational dimensions" (Grodal 1997; 93).

Emotions play a vital role in helping us remember the things most important and relevant to us as individuals and as a community, saving us from forever relearning past lessons. What may have started as a tool for survival continues to work for recalling our preferences for survival, pleasure, or anything in between.

THE BRAIN AND MUSIC--- HOW MUSIC ACTIVATES THE BRAIN

Music not only provides structure to information, but it also elicits an emotional response. While not necessarily a positive response, an emotional response of some sort can rarely be denied. Whether positive or negative, the emotion associates with the contents of the music and aids in later recollection. That said, people generally learn more while having fun. Think of a song that makes you happy, one that perhaps causes you to move along to the beat of it. Music is often associated with movement, or dancing. Movement, and activity, provides yet another way for the body to interact with the information presented and increases the ability to recall it later. Generations of students, as well as common sense, show that it is easier to remember something you have actually *done* and not merely read about or watched someone else do.

Music provides a gateway for students to engage with material by providing an emotional cue or connection to it. Cognitive science provides a clue as to how the brain accomplishes this, although we are just starting to make the connections between stimuli and brain function. Science has yet to understand the countless ways that the brain's many neural networks combine throughout its many regions. These neural connections "lead to thoughts, decisions, perceptions, and ultimately consciousness" (Levitin 2006; 82), and it is only as we start to understand, with increasingly sophisticated technology, how these neural connections work, that we begin to understand how brains work, and most relevantly, how we think and learn. Many neural networks interact in the brain, creating a multitude of actions and reactions that result in a complex system of neural firings. Any number of stimuli can activate any number of reactions in the brain,

resulting in a cacophony of neural firings that lead to other neural firings, continuing on down the line. Yet to ignore or discount any particular element can dangerously undermine comprehension of the whole. “Neither the state of the world nor that of the mind is ever so simple that it can be expressed in a single, one-dimensional judgment” (Minsky 1988; 94). A look at how music stimulates the brain can clarify how these neural firings and interactions result in conscious thought and action.

In the quest to understand neural connections, particularly how they relate to memory and cognition, music provides valuable insight. Music provides one of the most effective ways for the brain to organize information. It does this in two ways: by creating patterns in the information and by establishing emotional connections with the information.

Music depends on memory because

“...music is based on repetition. Music works because we remember the tones we have just heard and are relating them to the ones that are just now being played. Those groups of tones (phrases) might come up later in the piece in a variation or transposition that tickles our memory system at the same time as it activates our emotional centers” (Levitin 2006; 163).

Musical memory initially falls into the short-term category but facilitates long-term memories as well. As psychiatrist Anthony Storr points out, “[t]hat music facilitates memory has been objectively confirmed by the study of mentally retarded children who can recall more material after it is given to them in a song than after it is read to them as a story” (Storr 1992; 21).

Music increases memory retention by activating brain regions that often coincide with various memory centers. Additionally, people enjoy music and find it pleasurable. You are more likely to remember things that make you happy in order to duplicate that feeling later. Listening to music activates several parts of the brain, including regions that

produce dopamine. “Current neuropsychological theories associate positive mood and affect with increased dopamine levels” (Levitin 2006; 187). This explains *how* music improves people’s moods. One *result* of music can be seen in the amount of gray matter versus white matter in the brain. Gray matter is understood to be responsible for information processing while white matter is responsible for information transmission. As Levitin points out, musicians tend to have an increased concentration of gray matter (Levitin 2006; 221).

Music enables the brain to build numerous interconnections throughout its regions, which engages both short-term and long-term memories, even for non-musicians. “Music listening, performance, and composition engage nearly every area of the brain that we have so far identified, and involve nearly every neural subsystem” (Levitin 2006; 9). Furthermore, “[t]he sensory memory/ short-term memory/ long-term memory distinction appears to have validity at the neural level” (Levitin 2002; 296). Even non-musicians develop a very sophisticated comprehension of music from listening to it throughout their lives. This type of musical expertise reflects cultural and personal preferences. People may not know proper musical terminology, but a lifetime of listening to music, of any preference, gives them an ability to process and comprehend music, often without even realizing it. You don’t have to *be* a musician, or even know how to compose music, in order to benefit neurologically from listening to music.

Music provides anyone and everyone with a tool to organize information about the world around them. People from all social classes and all cultures have a surprisingly high level of music comprehension, making music the most common and accessible tool for information processing (Levitin 2006, Levitin 2002).

“The story of your brain on music is the story of an exquisite orchestration of brain regions, involving both the oldest and newest parts of the human brain, and regions as far apart as the cerebellum in the back of the head and the frontal lobes just behind your eyes. It involves a precision choreography of neurochemical release and uptake between logical prediction systems and emotional reward systems. Your brain on music is all about...connections” (Levitin 2006; 188).

We learn by making such connections, and music aids everyone in this endeavor.

Music is not the only phenomenon that activates brain regions. In fact, music shares many regions of the brain with other processes and senses.

“The degree to which music and speech rely on common neural mechanisms is not clear. There are some separate brain structures, and some shared structures for processing music and speech. The modern view is that memory is distributed throughout various parts of the brain, and that different types of memory engage separate neural structures. Memory for music, just like memory for prose or pictures, probably comprises different cognitive subsystems to encode the various aspects of music” (Levitin 2002; 302, 307).

The traditional idea that music and abstract thought occur in the right brain and language and logical thought occur in the left is not entirely accurate. Science shows that many regions take part in both language and music processing, often with overlap between left and right brains.

People with brain injuries or disease in either left or right brain regions often lose parts of pre-existing language or musical ability, but not all of either. Furthermore, it appears that brain regions can sometimes partially adapt to perform tasks previously performed in other regions when an injury occurs (Levitin, 2006). The language and musical regions of the brain communicate with each other and often overlap with still other regions of the brain. “But the diffuse system [of the various senses] communicates with parts of the cerebral cortex especially concerned with attention, memory, and

learning- all of which are essential to our comprehension of music” (Jourdain 1997; 28).

On its own, music unites brain regions and strengthens communication between them.

Compared to visual perception and language, music often gets relegated to the bottom of the list in importance for brain development. “In a culture dominated by the visual and the verbal, the significance of music is perplexing, and is therefore underestimated” (Storr 1992; *x*). In classical education, music was one of the four basic subjects of higher learning, along with astronomy, arithmetic and geometry. Yet in recent centuries, the perception of music has shifted to that of a frivolous and unimportant art. Society may recognize its aesthetic value, but rarely its scholastic value. Recent trends in scientific research, particularly in the fields of psychology and the neurosciences, provide proof of music’s importance in cognitive development.

Music’s role, while important, becomes even more powerful when combined with visual perception and language, creating a trifecta of intellectual stimulation. Music combined with other stimuli results in a complex system of communication within the brain, where each stimulus adds a layer of strength to the overall system. Music, when combined with vision and language, stimulates the brain more effectively than any of these would alone. This concept does not differ significantly from the premise of experiential education. Experiential education purports the idea that people learn better when they actively participate, because they are maximizing neurological stimulation by utilizing multiple senses. In all practicality, stimulating all the senses while learning is not always feasible, but the more senses engaged, the more a student is likely to initially learn and ultimately remember. The unique platform of film makes activation of multiple senses, and multiple brain regions, feasible. Engaging as many sensors as possible also

maximizes interest, which leads to improved learning. Recognizing music's role in memory, attention, and enjoyment helps to maximize the potential of film, particularly when viewing film as a learning tool.

MEMORY, FILM AND LEARNING

When the brain has the opportunity to engage in many neural activities, the beauty, harmony and wonder of the human brain becomes most evident. “The power of music, especially when combined with other emotive events, can be terrifyingly impressive” (Storr 1992; 46). Nowhere is this more evident than in film. No other medium has the potential of combining so many external stimuli at once.

“The film experience is made up of many activities: our eyes and ears pick up and analyze image and sound, our minds apprehend the story, which resonates in our memory; furthermore, our stomach, heart, and skin are activated in empathy with the story situation” (Grodal 1997; 1).

Film professor Ed S. Tan of the University of Amsterdam agrees with Grodal. “The most important primary motivation [for viewing feature films] lies in the expectation of undergoing a highly specific emotional experience” (Tan 1996; 35). From the time that an orchestra, or at least a single pianist, accompanied silent films, music has served to organize and emphasize the visual components of a filmic experience, to combine with the many other elements in a film to create a single, powerful affair. The audience’s emotional connection with a film is what makes the filmic experience worthwhile and desirable. Just as the brain works by communicating and collaborating between regions, films work by taking many separate entities and combining them into a new and wonderful product, a product that reaches the audience on a number of emotional and physical levels.

Immense power comes from the ability to reach an audience in such a multitude of ways. Music, which already incorporates many regions and processes within the brain,

provides an important tool for films to realize their full educational potential. Films, like music, attempt to organize information in order to make it more accessible to an audience. But film as a medium, while having the ability to pare down relevant information, is “by its very nature continually in danger of falling apart,” says R.M. Prendergast, a film historian and critic (Prendergast 1992; 221). Music provides a unifying element and organizes the information of a film. When audiences connect with a film on several emotional and cognitive levels, they capitalize on multiple senses to create an emotional attachment between themselves and the film. In his work on cognitive theory and film, Professor of Film Studies Carl Plantinga says, “[music’s] primary function is not to assert propositions about the projected world, but to evoke emotion or perceptual activity- to help create the experiential envelope in which the spectator views the film” (Plantinga 1997; 166). An emotional connection between the viewer and the film serves the film on multiple levels, perhaps most importantly by holding the audience’s attention and keeping them invested in the story. “Emotional arousal is often activated during film-viewing, and it may help to focus our attention” (Grodal 1997; 33). Music in films not only organizes the informational components of the film, but also allows the audience to connect emotionally with those components by guiding their response to the pictures, creating additional levels and enhancing existing ones. Music-- appropriate, well-orchestrated music-- is often the difference between a mediocre viewing experience and an inspiring one. Music potentially plays many roles in a film, not just that of sound accompanying pictures. Music helps to organize the pictures and provide a structure to a naturally disjointed medium. Music also creates atmosphere and mood, supports the tone and pace of the film and provides a

psychological reference for events in the film (Prendergast 1992; 213-222). Despite all these functions, often the emotional cues provided by the music ultimately dictate the level of success in information conveyance.

Films and music both utilize emotional responses to convey information to the audience. “The most important primary motivation [for viewing feature films] lies in the expectation of undergoing a highly specific emotional experience” (Tan 1997; 35). These expectations manifest both superficially and cognitively, in that both film and music are ultimately involved in how external stimuli activate various regions of the brain and build neural connections, establishing the importance of an emotional connection for attention, perception and enjoyment. “Watching films is seen as a complicated process of information processing” (Tan 1997; 7). Films capitalize on emotional connections in order to convey information to the audience. Narrative film has long-recognized this connection, as evidenced by the importance placed on the score and the recognition of music’s inherent ability to achieve its own emotional connection with the audience. Documentary films have less of a tradition of utilizing the power of music to connect with the audience. When a film engages all its potential methods for providing an emotional experience, such as an engaging story, interesting and relatable characters, compelling images, and stimulating music, to name a few major ones, film can more fully maximize its reach and impact.

MUSIC IN DOCUMENTARY FILMS: A CASE STUDY

Documentary films use music to varying degrees of success. Looking at some of the most popular and successful documentaries, music typically plays a subtle yet crucial role. Documentaries aim to educate people, and in order to do this they must hold the attention of the audience and engage them in the film's subject matter. An analysis of the use of music in two popularly successful wildlife documentaries can explain one of the primary reasons for their success. The films *Microcosmos* and *Winged Migration* provide insight into the importance of music to create a lasting message among mainstream audiences, and highlight the universal importance of rhythm and music in documentary films. These two wildlife documentary films enjoy unique mainstream commercial success, but also represent a distinct documentary style: the spectacle documentary that particularly relies on music to drive the story.

Both contemporary documentaries, *Microcosmos* (1996) and *Winged Migration*, (2001) use music to underscore imagery. These films are two of the most popular and well-known nature documentaries of the last twenty years. Both employ dramatic music, which serves to complement and enhance the visual picture. Both also utilize narration and sub-titles, but to minimal degrees. *Microcosmos* and *Winged Migration* depend predominantly on stunning pictures and unique visual perspectives to tell the tales of insects and birds, respectively. In both, music links the images and emphasizes their power.

In *Microcosmos*, macro-photography enables the viewer to observe the lives of tiny insects, from ladybugs to ants to beetles, up close and on a level often unavailable to the

naked eye. This allows the audience to essentially watch the subjects at eye-level, and to observe their behavior more fully. *Microcosmos* uses music primarily to accentuate the inherent sounds of nature, building tension between scenes and emphasizing the interactions between species. At the very start of the film, the not oft-used narrator says, “to observe this world, we must fall silent” at which point we hear sounds of nature along with piano notes. But we do not hear actual silence, just the absence of human voice. Music’s supplementary yet foundational role becomes explicit. The music does not dominate, it merely accentuates the natural sounds depicted by the insects and their actions which we observe. It emphasizes the important scenes, such as the ladybug mating scene, the coming storm and the storm’s aftermath, and the beetles fighting. But never does the music overpower the picture, allowing the pictures to tell the story, while serving to underscore the story they tell.

The ladybug-mating scene begins with a single ladybug and no music, allowing the audience an opportunity to appreciate its beauty while hearing only the natural sound of humming insects. After the ladybug snacks and encounters an ant, it approaches another ladybug, and here the music begins, slowly at first as the first ladybug mounts the second and gets into position. As the act of procreation continues, the music picks up speed, but never overpowers the act itself, instead only serving to punctuate it.

Music plays a more prominent role in the approaching storm, as the strains of flutes and violins announce the advent of thunderheads. However, when the wind and rain begin, the music fades away, returning briefly when the sun tries to break through. Once the storm begins in earnest, the music returns to accentuate the menacing storm clouds and powerful raindrops falling on the microscopic insects. The natural sounds of wind,

rain and thunder dominate the scene, but the music enhances the effect of the afternoon thunderstorm on a microscopic community, as raindrops toss a ladybug from its perch on a blade of grass and separate an entourage of ants. When the storm ends, the music smoothes out and gains power over the natural sounds of the post-storm environment.

As the prehistoric looking beetles face off with each other, bass drums and horns announce the pending duel. The strings gradually build momentum as the beetles size each other up, escalating the tension as they engage in fighting. They lock horns and tumble off the branch as the strings disappear and the drums resume their formidable beat. The beetles climb back onto the branch, and as one beetle appears to gain the advantage and makes to toss the other off the branch again, the strings resume, again building momentum as the beetles continue to engage. The music crescendos as the beetles take one final tumble and the loser slinks away. The emotional cues provided by the music turned a potentially mundane encounter into an epic battle.

Similarly to *Microcosmos*, *Winged Migration* relies primarily on the visual picture to tell the story of migrating birds. It does utilize a variety of methods to communicate with the audience, including music, narration and sub-titles, but the images, as underscored by music and natural sounds, are the primary storytelling device. The film only minimally uses narration and sub-titles and primarily uses the music to complement the picture. It is not surprising that Jacques Perrin, the director of *Winged Migration*, also contributed significantly to *Microcosmos*. In both, the music serves as the guide to what the audience sees. *Winged Migration's* composer Bruno Goulais said in an interview in regards to his idea of an ideal soundtrack, that “much like light, it would just reverberate. It wouldn't be manipulated. It would just be there.” (*Winged Migration* featurette) In other words,

he sees the role of music as enhancing the story without interfering in it. In both *Winged Migration* and *Microcosmos*, the music serves to enhance the content, without dictating its message. In so doing, both films utilize music to accentuate and expand upon the visual content, thereby making it more palatable and memorable for the audience. But unlike *Microcosmos*, *Winged Migration* does utilize human voices in some of the music. Even without words, the inclusion of human voices reflects a difference in the message of the film from *Microcosmos*. Humans are a part of the story, not merely observers. The human audience is but one part of the overall community, whether the community of the earth or the community of the musical composition. The success of these two films among mainstream audiences indicates the power of a thoughtful and intentional soundtrack which accentuates the subject without dictating it and provides examples of a successful utilization of music to build an emotional connection between the audience and the film's subject matter.

Both *Microcosmos* and *Winged Migration* utilize natural sounds, often quite dramatically, and use music to complement and enhance these natural sounds. In *Microcosmos*, much of the action happens to music, and the music serves to underscore the action. While music is often used in conjunction with natural sound, the emphasis is typically on one or the other. Either the music dominates or the natural sound dominates. This holds particularly true in wildlife documentaries, which often have rich natural sound with which the director can work. The emphasis on natural sound in nature and wildlife documentaries also allows an opportunity for filmmakers to convey the behavior of their non-human subjects naturally. However, music plays a particularly important role in nature and wildlife documentaries for this same reason. The lack of naturally

occurring human voices and emotions necessitates an alternate way for the audience to connect with the subject matter. Natural sound and music provide a means for this, in addition to emphasizing the action and helping to maintain a rhythmic balance in the film.

In a documentary with virtually no voice-over, the music guides the story, leading the audience from scene to scene and defining the story segments. Music provides a similar function in any film, but has particular importance in nature and wildlife documentaries, especially spectacle documentaries like *Winged Migration* and *Microcosmos*. In scenes without music that rely solely on natural sound, the editor employs harder cuts. For example, the transition from the bugs walking on water to the bullfrog indicates an abrupt scene change without the smoothing effect music might have provided. These two scenes have little music, which makes them feel less connected to each other than scenes in which music carries the audience from one to the next, such as the storm and its aftermath. The music, or lack thereof, does not create tension so much as underscore what is already there while guiding the audience to emotionally connect with the scene. While the presence of music can connect disparate scenes, the lack of it can succinctly take an audience from one scene to another and allow it to easily recognize the transition. Both *Microcosmos* and *Winged Migration* use music in tight collaboration with the pictures to build tension and emotion, but also use it to carefully guide the audience through the scene changes.

In *Winged Migration*, the music plays a more prominent than in *Microcosmos*, although both employ music similarly. *Winged Migration* tells the story of community, not just among migrating birds, but also of humans and the world. *Winged Migration* uses

human voices, although rarely with lyrics, to accentuate the story told by the birds. The human voices, particularly the children's voices, create poignant tension and guide the emotions of the viewer. While not the only musical device employed, the choir is the most dramatic, and is often used during sweeping, majestic scenes of migrating birds. Rarely used at the same time as the voice-over, the music orchestrates emotion rather than convey facts. Once audiences emotionally connect to the story, they are more susceptible to the narrator's presentation of facts. The facts, in conjunction with the moving images and music, impart a particular message to audiences, that of the beauty and community that exists on earth, not just between birds, but also between humans.

The use of music during varying emotional scenes such as the "dance" between the red-crowned crane or the Clarke's grebe, as compared to the tension in the tractor scene, all indicate emotional cues provided by the music. The red-crowned crane scene begins silently as the birds fly over trees during their migration, as identified with sub-titles. The silence continues as two of them land on the snow. As they step into a synchronized dance an elegant waltz begins to play. If you do not already think that the two birds look distinctly like ballet dancers, then the music guides you to this perception. As their dance continues, their birdcalls join the strains of the waltz, accompanied by the chorus of other cranes. As the cacophony of birds gain in power, the music disappears and the cranes look less like ballet dancers and more like long-legged birds jumping around together.

Similar to the scene of the red-crowned crane, the Clark's grebe scene begins with two grebes sitting in the water, looking at each other as we hear the natural sounds of crickets and birds chirping. This continues until two of them push halfway out of the water and swim rapidly, accompanied by a percussive beat. This percussive beat

continues as the grebes appear to dance, zigzagging in the water with chests puffed out proudly. As their dance abruptly ends and they return to sitting peacefully in the water, so too does the music end and we return to natural sounds.

Music also serves to imbue non-avian characters with personalities, as when the three tractors come over the horizon of the field, accompanied by dramatically dire and potentially morbid music. As the tractor blades cut the grass, a sense of foreboding prevails, setting the stage for the inevitable dislodgement of some flock of birds or another that presumably set up camp in the relative safety of the tall grass. Sure enough, we suddenly see a defenseless little chick as the camera pans up to reveal the big bad tractor bearing down on it. The scene ends here, leaving the audience in suspense as to whether the chick escaped or met a gruesome death at the hands of the tractor blades. What could have been a peaceful morning mow presumably turned into a tragedy, as indicated by the musical cues of the scene.

Music similarly underscores the tension of the greater sage grouse in Idaho, elaborating on its intricate territorial battle ritual by providing dramatic bass drums and strings underneath the grouse's distinct cluck. The music emphasizes the tension between the two grouses, without interfering in their unique behavior. Sound is part of the ritual, and the music emphasizes this without distracting from it.

The migrations, as well as the music, help to transition between bird species as well as between geographical locations. Music does not always accompany the migrating birds, nor does it always accompany dramatic scenes, but its thoughtful use emphasizes the ethereal phenomena of migration and community, which the filmmakers sought to convey. The employment of music to garner an emotional connection between audiences

and the story serves to capture their imaginations, leaving them with a well-established interest in the subject matter. Even for people who prior to viewing the films had little or no interest in bugs or birds feel a strong reaction to them, inspired by the amazing cinematography and accompanying score.

Inspiration is the most effective way to educate the public. Without the music, the images, while still beautiful, would have fallen flat. When the sand crabs stalk and then eat the injured bird, there is an emphasis on the natural sound. The sound of the clicking claws of the crabs as they dance around the bird and later devour it do not need music to imbue tension; the tension is evident in the image and natural sounds and made more dramatic by the lack of music. By emphasizing the naturally occurring clicks, the director did not need the artificial construction of music to guide the audience. *Winged Migration* uses music to enhance the natural sounds, without distracting from them or superceding them. What often begins as wings fluttering grows into a more elaborate musical accompaniment as the tension of the scene increases. Human voices, while present, do not dominate the musical landscape but blend with other musical elements. The music underscores the birds without imitating them, complementing them without superceding them. *Winged Migration*, with its combination of cinematography, editing, and *music* creates a rhythmic and emotional portrayal of migrating birds and their communities.

In a rare exception to the rule, *An Inconvenient Truth* (2006) uses little to no music. Essentially a Power Point presentation, *An Inconvenient Truth* still managed to win an Academy Award, led to a Nobel Peace Prize for Al Gore, and remains one of the highest grossing documentaries of the decade, a feat particularly impressive for a science

documentary. However, the success of *An Inconvenient Truth* has less to do with quality filmmaking than with good timing. *An Inconvenient Truth* premiered at Sundance as a fluke (one of its producers formerly worked on the documentary selection committee at Sundance), and met with surprisingly rave reviews. A look at the political climate of the times sheds some light on its unlikely success. In a country disillusioned with its President, the audience, first at Sundance and later around the country and globe, looked to Al Gore with a mixture of frustration and hope. This man could have been our President, and in fact won the popular vote. The disillusionment of the country made it ripe for Gore's dire warning about global warming, despite the dryness of the actual film. With the exception of the final slideshow scene, no music accompanies Al Gore's presentations. Davis Guggenheim uses music solely during Gore's recollections and voiced-over contemplations. This lack of music inadvertently intensifies the gravity of the globe's peril and the dramatic message of the film. Guggenheim uses music in combination with the visual picture and narration to complement the overall message of the film, but merely as an occasional afterthought and never as a storytelling device. The theme song, an original composition by Melissa Etheridge that also won her an Oscar, did not play any part in the actual film and did not drive the story. Despite this, the song, and the film, had a powerful impact on our country and remains a rare commercially successful science documentary.

CONNECTIONS--- SUMMARY & CONCLUSION

Society has long recognized the importance of education and learning and generally accepts them as critical components to achieving success. In a society growing as quickly as ours, and with the advent of the technological era, education needs re-evaluation. Despite the Victorian precedent, entertainment and education are not separate. With so many distractions, and so much information to absorb, we need to maximize the opportunities to learn. Recognizing the interconnectedness of entertainment and education, film, long associated with entertainment, provides a unique tool for education. Music, also associated with entertainment as well as serving as a vehicle to communicate ideas, provides yet another tool. Recent research overwhelmingly shows the role that music plays in cognition, and when combined with other stimuli such as visual images and various oral cues, indicates the importance of combining these elements in a single teaching medium. Emotional engagement is a crucial component in learning, and film has a unique ability to present multiple ways for an audience to connect emotionally with a subject.

In my thesis film, I wanted to show an example of music helping children to learn, as well as the power of engagement in the learning process. *Troubadour: Learning from the Soul* highlights a songwriting and poetry program in a third grade classroom that helps teach literacy and writing skills. In addition to showing an example of music and cognition in a classroom, I wanted to pay particular attention to how I used music in the film itself. I hoped to show that music plays an important role in learning, whether the learning takes place inside a classroom or on a couch.

Together, music and film provide a unique method of condensing and organizing information in a way that engages the audience and helps them learn, often without them even realizing it.

“In all branches of cognitive endeavor, our highest praise is reserved for works that build the deepest hierarchies. When these works are scientific theories, they explain the world more comprehensively than lesser ones. When they are works of scholarship, they trace first causes. And when they are works of art, they show us relations far deeper than we are normally able to perceive” (Jourdain 1997; 133).

Music provides the thread that weaves a film together, as well as the community watching it. We are just beginning to understand how our brains work and how we connect with information around us. While additional work remains to be done in order to more fully understand how we learn, recent research indicates that documentary films have the potential to be a valuable learning tool and are an important step to improving how we learn in a fast-evolving technological era. The key to success is education, and the key to education is engagement. Documentary films, a unique and powerful combination of pictures, music, and information, allow people to learn in an unprecedented manner and perhaps more fully reach their potential. As the kids in *Troubadour: Learning from the Soul* show, people have a strong aptitude for learning. Given the right environment and structure, the possibilities seem endless. Music may not be the only way to inspire and teach, but it is one worth thinking about.

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