Understanding the Importance of Musical and Visual Factors in Creating Mood in Animated Films

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http://www.accad.ohio-state.edu/~efarrar/thesis/process.htm

Abstract

This paper proposes a study to investigate the differences between musical soundtracks and visual graphics when used as devices for creating mood in animated films. An experimental animation of approximately 30 seconds in length will be created and presented in ten different variations; the original “neutral” film with no soundtrack, three versions with contrasting musical soundtracks, three versions with contrasting graphical treatments, and three versions that combine the musical soundtracks with the graphical treatments. Subjects will be asked to rate each film on a scale designed to measure mood. Expected results are that significant differences will be observed between the use of music alone, visual treatments alone and the combination of both. Implications for how best to utilize music in combination with visuals will be posited based on the results of the study.

Introduction

Music and film are both emotionally rich mediums. Individually, each art-form is capable of conveying a seemingly limitless range of human emotion. When the two are combined however, the impact of the emotional qualities of each can become far greater still. In addition to adding to the aesthetic of a film, music can serve a number of functions that create a deeper, more emotionally rich experience. Among these functions are providing continuity between shots, directing attention to important features on the screen, establishing mood, furthering narrative, enabling the symbolization of past and future events through the use of reoccurring themes, and heightening the sense of reality in a film [1]. This paper seeks to investigate how both musical and graphical elements work to create mood in an animated film. Specifically, it asks the following questions: 1. What is more important in conveying mood in an animated film, musical elements or visual elements? 2. Are there ways of combining musical and visual elements that are more or less effective for establishing different moods? An experiment will be conducted that will compare the effectiveness of music with the effectiveness of graphical elements in creating mood.

Numerous studies have investigated specific factors both in music and in graphic design that contribute to the listener or viewer attributing an emotional quality to a piece. Little research has been conducted however, that looks at the interaction between visual and musical factors and how the combination of the two effects things like emotion.

In an article by Carol Krumhansl titled “Music: A Link Between Cognition and Emotion,” Krumhansl sites a study in which she finds a direct link between music analysis and what listeners identified as emotion in music. Structural sections or musical “topics” were identified using traditional music theory and then connections were shown to exist with
listeners’ perception of memorability, degree of openness (whether a melody sounded “complete” or whether there was more to come) and the amount of emotion. A direct relationship between theoretical musical analysis of tonal descriptions and emotional effect based on tension was found to exist. The study also suggests that there are variations in tension that are related to the structure of a musical piece [2]. Using this type of theoretical analysis of the music will allow for the collection of data that relates to much broader ideas of musical emotion.

Qualities of animation that contribute to the mood of a scene can largely be derived from the principles of film and video production. In their book *The Art of Technique: An Aesthetic Approach to Film and Video Production*, John Douglass and Glenn Harnden break the elicitation of mood down into a number of discreet elements including the following: color, texture, design (use of line, mass and pattern), lighting, camera framing, camera angles and movement and lens focal length [3]. By defining these elements and creating links between them and the mood eliciting elements of music, we can begin to identify patterns and principles that can be utilized for the most effective combination of music and animation.

**Understanding and Measuring Mood**

The majority of studies on emotions have utilized a two dimensional measuring system for explaining the variations between possible emotions. While the various studies may use slightly different terms to describe their measurement systems, they can all be distilled down to the dimensions of pleasure and activity. Using these two measures as perpendicular axis as seen in fig. 1, emotion terms can be plotted on a graph. These dimensions have also been used in a conical configuration as seen in fig. 2 created by Russell [4]. This arrangement is very similar to that of Hevner that is discussed in the Understanding Emotional Factors in Music section of this paper.

This two dimensional system is somewhat lacking in its ability to differentiate between different emotions that fall in the same region of the graph.
Anger and fear for example fall very close together on the chart, but are two distinctly different emotions [5]. However, this method does create a clear and understandable relationship between emotions, particularly those that are in high contrast to one another. This method also allows for the inclusion of both high-activity emotions and low-activity emotions like serenity and tenderness. This is an important consideration when examining emotions that are pertinent for describing music and visual arts.

**Understanding Emotional Factors in Music**

There are numerous studies that have looked at elements of musical composition as they relate to expressing specific emotions. One well known series of studies is that of Kate Hevner conducted from 1935 to 1937 [6]. For her experiments she arranged emotional terms into clusters of similar meaning and arranged them in a circular pattern (fig. 3). Each cluster of emotional adjectives deviates slightly from its adjacent cluster continuing progressively until the contrasting emotion is described in the opposite position of the circle.

This ‘adjective circle’ was then used by participants who were asked to listen to different musical examples and circle the terms that most accurately described the mood of each. Musical examples were selected and then a variation was created that differed in one of a number of elements such as mode (major or minor), melodic direction (ascending or descending), harmony (simple or complex) or rhythm (firm or flowing). By comparing responses of listeners between the two versions of a piece, she was able to isolate which musical element was responsible for a particular emotional response. Hevner was able to conclude that the elements that had the greatest impact on emotional content were tempo and musical mode (i.e. major or minor key). Other elements that proved to effect emotion to a lesser degree were pitch level, harmony and rhythm. Melodic direction was found to have little effect. Table 1 shows her conclusions. The numbers in the table indicate an importance weighting for each of the musical factors. For example, in the case of sad/heavy music the most important musical factor is that of the minor key, followed by low pitch and slow tempo. In contrast, for Serene/gentle music, the most important element is the slow tempo.
fig. 3 Hevner’s Adjective Circle. Adjectives are listed in each cluster alphabetically with the terms that Hevner used to describe each cluster in bold [7].

table 1. Hevner’s summary of results

<table>
<thead>
<tr>
<th>Musical Factor</th>
<th>Dignified/solemn</th>
<th>Sad/heavy</th>
<th>Dreamy/sentimental</th>
<th>Serene/gentle</th>
<th>Graceful/sparkling</th>
<th>Happy/bright</th>
<th>Exciting/elated</th>
<th>Vigorous/majestic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>Minor 4</td>
<td>Minor 20</td>
<td>Minor 12</td>
<td>Major 3</td>
<td>Major 21</td>
<td>Major 24</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Tempo</td>
<td>Slow 14</td>
<td>Slow 12</td>
<td>Slow 16</td>
<td>Slow 20</td>
<td>Fast 6</td>
<td>Fast 20</td>
<td>Fast 21</td>
<td>Fast 6</td>
</tr>
<tr>
<td>Pitch</td>
<td>Low 10</td>
<td>Low 19</td>
<td>High 6</td>
<td>High 8</td>
<td>High 16</td>
<td>High 6</td>
<td>Low 9</td>
<td>Low 13</td>
</tr>
<tr>
<td>Rhythm</td>
<td>Firm 18</td>
<td>Firm 3</td>
<td>Flowing 9</td>
<td>Flowing 2</td>
<td>Flowing 8</td>
<td>Flowing 10</td>
<td>Firm 2</td>
<td>Firm 10</td>
</tr>
<tr>
<td>Harmony</td>
<td>Simple 3</td>
<td>Complex 7</td>
<td>Simple 4</td>
<td>Simple 10</td>
<td>Simple 12</td>
<td>Simple 16</td>
<td>Complex 14</td>
<td>Complex 8</td>
</tr>
<tr>
<td>Melody</td>
<td>Ascend 4</td>
<td>--</td>
<td>--</td>
<td>Ascend 3</td>
<td>Descend 3</td>
<td>--</td>
<td>Descend 7</td>
<td>Descend 8</td>
</tr>
</tbody>
</table>

The numbers indicate the relative weight of each musical factor (left column) for each emotion cluster.
Studies conducted since those of Hevner have expanded on her conclusions and helped to define in even greater detail those compositional elements that produce emotion in music. Alf Gabrielsson and Erik Lindström summarized a large number of these studies, along with those of Hevner, and came up with their own list of musical factors [8]. Individual elements include tempo, mode, loudness, pitch, intervals between notes, melody, harmony, rhythm, timbre, articulation, and the interaction between factors. This list is by no means all-inclusive and it should be noted that a number of these aspects remain relatively unstudied at present. Aspects such as intervals, timbre and particularly the interaction between factors have been researched only rudimentarily if at all [9]. This list of factors does provide a good starting point however, for isolating musical characteristics that can be applied to animation.

**Tempo** refers to the speed of the pulse or beat of a piece of music and is generally considered to be one of the most important factors in affecting emotion. Fast tempos can signify activity, excitement, happiness, joy, pleasantness, potency, surprise, anger and fear. Slow tempos are more indicative of calmness, serenity, dignity, solemnity, sadness, tenderness, boredom and disgust.

**Mode** is the musical description for the type of musical key in which a piece is written, such as major or minor. Major modes tend to suggest happiness, joy, gracefulness, serenity and solemnity while minor modes are sad, dreamy, dignified and can indicate tension, disgust and anger. An important aspect of mode (and actually of all of the factors listed) is that it is very dependent on the musical context. For example, a piece that is in a minor mode might not necessarily be sad if it has a fast tempo and complex rhythms. It is important to take all of the factors into consideration when determining mood.

**Loudness** has a number of variables to be considered. Loud music in associated with intensity, power, tension, anger and joy; soft with softness, tenderness, sadness, solemnity and fear. Large variations in loudness can indicate fear while small variations can be happy or indicate activity. Rapid changes in volume can be pleading or playful and pieces with no changes can indicate sadness, peace and dignity.

**Pitch** also has multiple variables that relate to the expression of mood. High pitched pieces can be happy, graceful, serene, dreamy, exciting as well as express surprise, potency, anger, fear and activity. Music that is in lower registers expresses sadness, dignity, solemnity, vigor, excitement, boredom and pleasantness. Large variations in pitch within a piece are indicative of happiness, pleasantness, activity and surprise while smaller variations can express disgust, anger, fear and boredom.

**Intervals** are a way of measuring the variations in pitch mentioned above by counting the number of ‘steps’ along a musical scale between notes. For example, there are five steps in a C-Major scale from the note C to G, so this interval is called a perfect fifth. While little research has specifically addressed intervals a few general observations have been made. Large intervals tend to be more powerful sounding than small ones. A minor second (the smallest interval in traditional western music) is the saddest. A perfect octave is positive and strong.
Melody can be thought of as a sequence of single notes strung together to form a tune. It is
the leading part of a piece of music or the part that you would be inclined to sing if asked to
recall a particular song. Melodies that cover a wide range of notes, going from very low to
very high or vise versa, can express joy, whimsicality and uneasiness. Melodies with a
narrower range are sad, dignified, sentimental, tranquil, delicate and triumphant.
Ascending melodies convey dignity, serenity, tension, happiness, fear, surprise, anger and
potency while descending can be exciting, graceful, vigorous, sad, boring and pleasant.

Harmony occurs when two or more notes are played at once forming a musical chord.
Harmony can be consonant, which is generally thought of as pleasing to the ear, or
dissonant which is much less pleasant. Further, consonant harmonies can be happy,
relaxed, graceful, serene, dreamy, dignified and majestic. Dissonant harmonies can express
excitement, tension, vigor, anger, sadness and unpleasantness.

Rhythm terminology has been inconsistent among researchers resulting in some difficulty
in making comparisons, but some general ideas included here. Regular or smooth rhythmic
patterns are more indicative of happiness, dignity, majesty and peace while irregular or
rough rhythms can be amusing, uneasy and angry. Widely varied rhythms can express joy.
Firm rhythms can display sadness, dignity and vigor while flowing and fluent rhythms can
be happy, graceful, dreamy and serene.

Timber refers to the quality of sound that helps distinguish it from other sounds. For
example, a violin has a very different timbre than a flute or a tuba. This is due to the fact
that musical instruments project specific harmonics or overtones when they produce a
sound that make them sound different from other instruments. The example of a violin
produces a sound with a large number of high harmonics while the flute has relatively few
harmonics that are much lower in frequency [not sure about the accuracy of this sentence,
need to research]. As mentioned earlier, there has been little research into the area of
timber and how it effects the expression of emotion in music. What has been observed,
however, is that instruments with many harmonics can be used to express potency, anger,
disgust, fear, activity and surprise. Examples of instruments with many harmonics are [blank], [blank] and [blank]. Instruments with amplified higher harmonics, such as the
[blank] are good for expressing anger. Smaller numbers of harmonics in the lower registers
such as in the [blank] can portray happiness, sadness, pleasantness and boredom.
Suppressed higher harmonics indicative of the [blank] are good for tenderness and sadness.

Articulation refers to the way that a sound is produced on an instrument. Staccato notes
are very short and crisp and can express gaiety, energy, activity, fear and anger. Legato
notes are long and connected and can convey sadness, tenderness, solemnity and softness.

Interaction between factors is perhaps the most important and least researched
component of expressing emotion in music. Every emotion mentioned in the above
paragraphs is created only through the combination of multiple musical factors and no
single factor can express any emotion all by itself. The impact of any one factor is highly
dependent on how it is combined with other factors. This simple fact can account for what may appear to be discrepancies among the assignment of emotions.

**Understanding Emotional Factors in Animation**

In the same way that there are distinct musical factors that contribute to the mood of a musical piece, there are visual factors that can contribute to the mood of an animated film. In their book, *The Art of Technique*, John Douglass and Glenn Harnden spell out how many of the following attributes of a scene contribute to the creation of mood [10].

**Color** affects mood along two dimensions; color temperature (warm to cool colors) and color saturation. Colors may be applied to a scene as textures of objects in the scene or through the use of lighting. Visual frames that are dominated by warm colors can feel enclosed, connote richness, suggest anger (red), eroticism, high emotional arousal, physical warmth and degeneracy. Frames dominated by cool colors at the other end of the spectrum can feel cold, austere, emotionless, cruel, free, liberated, ethereal, spiritual, calm or peaceful.

**Texture** of elements within a scene can also contribute to the overall mood. Frames that contain a great deal of detail in their textures can help to create a sense of reality to a scene. Less detail or smoother textures can contribute to softer more soothing moods and can aid in focusing attention on a specific element within the frame.

**Line, mass and pattern** work independently and in conjunction to create very different feelings. Jagged broken lines can express tension, chaos, nervousness or anger while long, curvilinear, flowing lines can create scenes of harmony, calm, equilibrium, flight or liberation. Similarly, shapes that are hard edged and geometric can create a sense of danger or tension while organic shapes can be much more soothing and peaceful. Affecting mood along the same dimension are tight, complex patterns verses broad, simple ones. Strong vertical elements can be suggestive of high drama and of tension while horizontal elements are much more peaceful and calming.

**Lighting** is perhaps the most influential visual factor for creating a specific mood or feeling. Lighting techniques can be grouped into one of two categories, low key lighting and high key lighting. Low key lighting refers to a technique whereby the majority of the frame is dominated by deep shadow. An example of lighting with this technique might be having a background that is almost entirely black with the subject lit very brightly from the front. Another example could be a black background with a strong backlight presenting a subject in silhouette. Frames shot with this lighting technique are suggestive of mystery, suspense, loneliness, romance or psychological release.

In contrast, high key lighting distributes light relatively equally throughout the frame such as in an exterior daylight scene. Scenes shot in this type of lighting can cover a wide range of moods and are appropriate for different film genre from comedy to human interest drama or light hearted adventure. Variations in mood may be achieved through the use of several high key lighting techniques. Hot backlighting on subjects and glaring
backgrounds can be disturbing, compressed, over-heated or create an oppressive sense of reality. Hot backlighting with more subdued lighting on backgrounds can create a feeling of warmth or glamour. Eliminating the backlight, which serves to separate characters and objects from the background, can create a scene that seems cold, sterile and inhumane. Of course there are infinite degrees of lighting between low key and high key lighting, but as a general rule the deeper the mood, the more shaded the frame should become and the deeper the shadows. Gray tone lighting that is neither high key nor low key, similar to a dreary, cloudy day, can contribute to feelings of dismal misery.

Camera framing and angle are factors that do not necessarily convey emotion by themselves, but in conjunction with other factors help to create a stronger sense of mood. Wide shots can create a sense of detachment or withdrawal and emphasize the immensity of nature. A human figure, surrounded by the environment in a wide shot can convey vulnerability or isolation. High angle camera shots help to emphasize scale and magnitude and can serve to detach the viewer from the story. These are often used at the end of films. Medium shots bracket action and interaction. A series of progressively closer shots can complement growing tension in a scene. They can also create a feeling of confinement. They are good for relating two objects to each other, for example, a foreground/background relationship between two objects. For capturing facial expression of mood the close up shot is crucial.

Perhaps even more suggestive of mood are camera angles. Camera angles that are slightly low can create a subject that is somewhat dominant, but not threatening. Extreme low angles create looming, threatening subjects. Slightly high angles suggest a subject that is somewhat yielding, but not endangered or subjugated while extremely high angles can create a subject that is in utter defeat.

Camera movements can also contribute to a sense of mood in a scene. Camera pans, tilts and dollies can create a sense of uneasiness. These movements can also be short and jerky, creating a highly agitated feeling or smooth and slow which might serve to draw a viewer into a scene.

Camera focal length can be used as a tool for achieving some of the effects listed above as well as creating some interesting perspective effects. Shorter focal lengths lend themselves to showing a subject in a surrounding with great detail because they inherently show both foreground and background in clear focus. As the focal length increases the detail of the surroundings gradually becomes less clear and the light around the subject becomes more diffuse. Longer focal lengths also flatten perspective which can be used to make rooms look smaller and more compressed. Conversely, short focal lengths can exaggerate the apparent depth of space. The length of a hallway can be accentuated for example. Apparent speed can also be affected by shorter focal lengths. Objects traveling toward the camera appear to be traveling faster when viewed through a short focal length lens. The apparent speed of camera movements, especially forward motion, can be increased this way as well.
The Experiment

In seeking to learn more about which set of variable factors, musical or visual, is more effective in creating emotion in an animated film the following experiment has been designed.

A short animated film of approximately 30 seconds in length will be created and used as a baseline for observing and comparing the sets of factors. The film will be constructed using visual attributes that are non-extreme and not conducive to any specific emotion or mood. It will consist of a very simple narrative and contain no accompanying musical soundtrack. This will be referred to as the neutral film. Three sets of variations of this film will then be created. The first set of four variations will consist of the neutral film, accompanied by four different musical soundtracks, each conveying a contrasting mood. The second set of variations will consist of the neutral film modified visually through the use of the visual factors mentioned earlier to create four distinctly different moods. The last set of variations will combine the soundtracks from the first set with the visually modified films of the second set to create four additional variations, each using both music and visual factors to establish a mood. The total collection of films will consist of one (1) neutral film (no music), four (4) musically emotive films, four (4) visually emotive films (no music), and four (4) combination films.

The films will be shown in one of 12 experiment sessions. The neutral film will always be presented first and then the subsequent variations presented in a randomized order to eliminate the affect of the mood of one film affecting the mood of a subsequent film. Using the following 12 unique numbered sequences to show the variation films will allow for no two film variations to ever be shown in the same order twice.

12 Unique sequences for showing films

1  2  3  4  5  6  7  8  9  10  11  12
2  4  6  8 10 12  1  3  5  7  9  11
3  6  9  12  2  5  8 11  1  4  7  10
4  8 12  3  7 11  2  6 10  1  5  9
5 10  2  7 12  4  9  1  6 11  3  8
6 12  5 11  4 10  3  9  2  8  1  7
7  1  8  2  9  3 10  4 11  5 12  6
8  3 11  6  1  9  4 12  7  2 10  5
9  5  1 10  6  2 11  7  3 12  8  4
10  7  4  1 11  8  5 12  9  6  3
11  9  7  5  3  1 12  10  8  6  4  2
12 11 10  9  8  7  6  5  4  3  2  1
In order to keep the distinction between selected moods as clear as possible, the graph shown in fig. 4 has been devised by combining several of the emotion term charts described earlier. Descriptive terms that relate most closely to describing mood in music and in visual art have been selected and grouped together around the typical pleasant/unpleasant and active/inactive matrix. The eight sets of descriptive terms have then been paired together to create four distinct and contrasting “mood centers.” While there may be terms within these mood centers that seem to conflict with one another, the overall idea of pleasant/unpleasant or active/inactive is clearly represented between the groups. The “emotion centers” that will be replicated in the various film variations will be Happy/Excited, Quiet/Serene, Sad/Lonely and Intense/Active.

Pilot Studies
Two pilot studies will be conducted to establish the neutrality of the neutral film and the efficacy of the music sound tracks used in the variations of the music group to ensure that the desired mood centers are being represented.

The neutral film will be presented to a group of six to eight subjects and each asked to complete a semantic differential using the terms from the revised mood chart above. In cases where subjects feel that the film expresses one particularly mood or emotion strongly, they will be asked to identify the reason why they think that mood is present. Modifications and adjustments will be made as necessary based on subject feedback to try to create a film that is as close to the center of each of the pleasant/unpleasant and active/inactive scales.

Twelve to fifteen different music selections of approximately 30 seconds in length will be gathered from existing music sources. Selections will be gathered based on the musical factors mentioned earlier so that at each mood center is represented by 4 or 5 music samples. Music selections will also be analyzed and modified slightly, if necessary, so that the timing of accents, phrases, pauses, or themes coincides with camera cuts or character movements in the neutral film. Six to eight subjects will be asked to listen to and rate each
musical selection based on a semantic differential that will indicate into which mood center each selection belongs. The selections that most strongly express the mood(s) in each of the four mood centers, based on the feedback from the subjects, will be selected for use as soundtracks for each of the film variations in the music group.

Subjects
Approximately 100 – 120 subjects will be selected to participate in the experiment (12 experiment sessions with 8 – 10 participants each). For convenience sake, subjects will be selected from the general student population at Ohio State University with an equal distribution of males and females. An attempt will be made to recruit subjects from a wide range of study areas so as to not have a concentration of subjects with an extensive experience or background in art or music.

Questionnaire
A questionnaire consisting of three parts will be given to the subjects. The first part will consist of personal information such as sex, age, education, area of study. Questions pertaining to present mood, present level of stress, etc., will also be included. The second part of the questionnaire will contain specific questions pertaining to the film samples that the participants will be shown. Fig. 5 shows and example of a semantic differential graph that will be included in this part of the survey. The third part of the survey will ask questions about past musical, art and film experience, such as training on a musical instrument or in another branch of fine arts, frequency in listening to music or viewing animated films, etc. A few open ended questions will also be included such as a. Why is the character in this environment? b. Is the object found by the character a good thing or a bad thing? c. What might happen next in the film? d. Did you like the film? Questions like these might provide some insight into what mood subjects think each film is portraying.

In addition to the mood related questionnaire that will be completed after viewing each film, subjects will be asked to complete a series of unrelated “palette cleansing” tasks before being shown the next film. These simple activities will serve to interrupt the
thought patterns and feelings that may have been triggered by the preceding film. It is hoped that by doing this, responses to the films will remain consistent over the course of the experiment. The activities will be timed and presented in such a way so that the subjects can not tell whether the actual experiment is looking at their responses to the films or looking at their ability to complete these palette cleansing tasks. Activities have been selected that will require subjects to use more logical, problem solving thought processes (left brain) verses the emotional, feeling based thought processes (right brain) for analyzing the films.

Procedure

The experiment will take place in an environment with a large, centralized screen for viewing the films as well as a central audio system for projecting hi-fi sound. Each subject will be seated at a desk or table on which they will complete their questionnaires. The entire experiment will consist of 12 sessions with 8-10 subjects in each. Sessions will last for approximately 45 minutes.

1. Subjects will be given a brief verbal introduction to the experiment explaining that they will be viewing a series of films and answering questions related to those films, and then completing a series of timed tests. Each subject will be given the entire survey as a stapled packet of papers. The packet will include the general information survey, survey questions to follow each film, palette cleansing activity pages as well as an exit survey. Pages will be placed in the appropriate order so that subjects will be able to go straight through the questionnaire from one page to the next. They will be instructed to complete only one page at a time and to stop and wait for instructions at the end of each page. They will then be asked to complete the first part of the survey consisting of personal information.

2. Subjects will be shown the neutral film. At the end of this film they will be instructed to complete the appropriate page of the questionnaire and will complete a series of questions relating to the mood of the film.

3. When all subjects have completed that portion of the questionnaire, they will be instructed to complete the first palette cleansing activity. This will be a timed event and subjects will be told when to start and when to stop.

4. This process of viewing a film, completing a survey and completing some timed palette cleansing activity will be repeated for all 12 film variations.

5. Subjects will be asked to complete the final portion of the questionnaire pertaining to previous experience in music and art.

Analysis and Conclusions

Results from the questionnaires will be analyzed in the following manner. First a comparison between the results for the neutral film and the results for the films in the music group will be made. Similarly, a comparison between the results for the neutral film and the results for the films in the visual group and the films in the combined group will be made. By looking at the difference in variances between the music group, the visual group, and the combined group conclusions will be drawn as to which group is most effective in
creating emotion. Current expectations are that there will be a marked difference in responses between the neutral film and each of the variations. Differences in responses to the films in the music group are expected to be more dramatic than for those in the visual group. Similarly, responses to the films in the combined group should be even more dramatic than for those in the music group.


10. Douglass [3]:73-84.