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Psychological Induction in Music Production: A Cross-Disciplinary Framework for Emotional Perception

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Abstract: I know that music has been a powerful thing to convey feelings since ancient times. However, making good use of psychological rules when making music has not been well studied. This paper puts forward the practice of transcending the field. This method combines the psychological model of emotion, especially Russell's Valence-Arousal (V-A) model, with the traditional composition law and modern music creation law, and analyzes how to produce emotional acceptance in music. This method makes the listener's response to music elements such as rhythm, texture, harmony, strength change, frequency balance and space design correspond to the emotional space of two-dimensional V-A. Investigate whether the meaning of music is the same from the existing meta-research results. By analyzing two comparative examples: Mars by Gustav Holst, the bringer of war (1914-1917) and Discreet Music by Brian Eno (1975), it is shown that this method can be used in practice. The results show that the emotion felt in modern music is produced by the choice of composition and the decision of intentional creation, which provides a complete way for the composer to create intentional emotion.

Keywords: Music Production; Emotional Perception; Valence-Arousal Model; Psychological Induction; Musical Parameters

1. Introduction

Music can always arouse feelings in people's hearts, which is one of the characteristics that we can always see in human life. However, it is very difficult to deliberately use psychological law when making music. That's where artistic intuition meets cognitive science. In this era, actually knowing how the elements of sound become feelings is essential for making a well-planned sound design. With the progress of audio technology, especially the wide use of Digital Audio Workstations (DAWs), the way of making music has changed greatly. Up to now, only live performances have been recorded, and now the whole "musical experiences" have been carefully made [1]. As a result, today's producers are like architects who plan to produce people's feelings. Rosen [2] said so. It is very easy to understand how to convey feelings with music, and listeners can often distinguish between grief and elation, aggression and solemnity intuitively. He added that he thought music was more accurate than language in expressing and evoking emotional states. This idea shows that human beings are born with the ability to receive emotions from music, but the existing framework of psychology can better explain how these reactions are adjusted structurally. Therefore, in this essay, firstly, the main theoretical models for explaining and measuring musical feelings are briefly summarized, and then how the specific composition and production choices in mixing and arrangement shape the audience's affective experience are studied.

Before advancing this paper, it is necessary to clarify three related but different words that often appear. Expression or conveyance is a composer who composes music or a producer who makes sound, trying to convey the mood of a specific mood by means of selected music or sound. Induction is a structure in which musical stimulation can naturally arouse a certain mood in the listener's mind. This structure sometimes has nothing to do with the conscious goal of the producer. Perception, on the contrary, refers to the subjective feelings and reactions that listeners feel in their own hearts when they are exposed to songs. These three points are consistent sometimes, but not necessarily in all cases. In this paper, we focus on psychological induction. However, induction can't be seen directly, so the analysis is carried out through the feelings people feel. In other words, we will investigate the structure of induction with the content of "having such feelings" as the main evidence.

2. Emotional Parameters

In this story, the most fundamental question is whether we can simply distinguish the types of feelings and express them in language. In 1980, American psychologist Robert Plutchik put forward a theoretical model that divided human emotions into four groups of opposite states [3]: Fear versus Anger, Joy versus Sadness, Acceptance versus Disgust, and Expectation versus Surprise. On this basis, Paul Ekman later established six emotional frameworks, which kept most of Plutchik's central classifications [3]. But Ekman removed Acceptance and Expectation with the standard of finding his own basic feelings. Its standard is that every basic emotion has a completely different brain working mode with limited time, which is the difference between personality and usual characteristics.

James Russell's Valence-Arousal model [3] shows a completely different idea. In this idea, the feelings found by Plutchik and Ekman cannot be treated as fixed different kinds. Instead, it can be placed in the emotional place of two connected directions. Under this idea, only one kind of emotion will not exist completely separately. Each kind of emotion is located on the connected gradual change, and the emotional state will affect each other. In the direction of "valence", states like Anger and Tiredness are on the negative edge, while Happiness and Calmness are on the positive edge. In the direction of arousal, Anger and Happiness are related to the state of high activity, and Tiredness and Calmness correspond to the state of low arousal.

Such a continuous classification mechanism is very useful in analyzing music from the emotional point of view. If the parameters of various sounds and the parameters of making music are treated as variables to change the listener's emotional response, it can roughly indicate where the specific music is. This general orientation roughly reflects the emotional characteristics of the tune felt by the listener (Fig.1). In addition, composer and producer can get practical tools to guide listeners to the target emotional state by making a rough list of songs' feelings.



Figure 1. Conceptual Framework Illustrating the Mapping from Musical Parameters to Perceived Emotional Features, and Their Subsequent Projection onto the Valence–Arousal Space

3. The Universality of Musical Semantics

As written before this essay, Rosen [2] said: "emotion from music is generally easy to understand and communicate with people who listen." From this proposition, a deeper question will naturally arise: how well do a group of listeners know the emotion content in a piece of music? More specifically, when listening to the same music, do people really choose the same emotion language? It is worth investigating. Simply put, the question is this: in the emotion of music, is there the same semantic meaning everywhere?

Relevant evidence can be found in the published study [4]. This study supports the view that there is a meaningful relationship between the characteristics of specific audio, the parameter settings of audio effect and the description language used by listeners. Semantic music production: in a meta-study, the researchers summarized the research on semantics of audio processing so far, which is summarised in a table titled "An overview of studies of semantics describing audio effects." In these studies, participants heard examples of audio. People who are asked to explain in their own language the changes that have taken place when adjusting various effect parameters (such as compression, equalisation, gain and reverb) are not introduced into a fixed language, but are free to improvise their feelings.

After collecting a number of studies and analyzing the data obtained by many participants, the researchers found that there are a wide range of languages used. When all the answers are

summarized and classified, the most common words are "Warm" and "Bright", which are used 2498 times in total. From this discovery, it can be said that listeners occasionally use the same language in response to sound changes, but it is necessary to consider it from the overall situation. There are 40,411 phonograms and 7,221 different words in the data set. This set of words consists of many different words, which are distributed in various audiences and situations. There are so many different words, which shows that even if a word appears frequently to a certain extent, there is no consensus that can be expressed stably and widely. As Moffat finally concluded, "The type of audio processing will greatly impact the use of different semantic terms, and there is no universal semantic language for describing audio production" [4]. That is to say, this study shows that in order to express the results of the technology often used in music mixing in today's era, the common expression framework between listeners has not been fixed. Therefore, there is still ambiguity about how sound is produced and how it feels.

In light of the discussion above, the question of whether listeners can organically develop a mutually intelligible set of terms to describe different sonic qualities remains one that resists easy resolution. Reconciling the apparently conflicting positions outlined here is therefore a challenge that falls beyond the scope of this essay.

4. Parameters of Music

Language has obvious limitations in completely capturing and conveying abstract and subjective emotional experiences. As the diversity of meaning said before. Nevertheless, language is the most accessible and actually available means to write down the feelings. Therefore, language is used as an intermediary tool here.

The method proposed here, in principle, is to sort out the utterance reactions usually expressed by the listener into prescribed basic emotional categories. In this way, the influence of parameter changes on feelings can be classified in order. The six basic emotions used are Fear, Anger, Joy, Sadness, Disgust and Surprise [3]. By doing so, although the scope is really wide, it will become a unified mechanism for sorting out emotional data. In this framework, language description is not treated as the truth of fixed meaning, but as most signs of feeling experience.

Through this proposed mapping procedure, we can show the conceptual pathway in order to understand the emotional perception in music production more systematically. But before entering the practical application, there is still a problem that must be clarified. which specific musical parameters ought to be included in this analysis?

The parameters considered are roughly divided into two groups. The first group includes elements usually related to musical structure, namely tempo, texture and harmony. In the fields of music theory and psychiology, all these are the core factors of emotional expression. The second group comes from the field of modern music products and covers the parameters that directly determine the sonic character of the song. This group includes Dynamics (about the change of loudness with time), spectral balance (explaining how the energy in the whole frequency spectrum is divided) and Spatial Parameters, typically manipulated through techniques such as reverberation, delay, and spatial filtering.

4.1 Traditional Musical Parameters

Tempo, texture and harmony, which are deeply rooted in the composition tradition, are often said to seriously affect people's feelings of listening to music, and each of them is a meaningful position in the valence-arousal framework. These factors are rooted in the music itself and determine how the listener receives energy, tension and mood. Among them, Tempo is probably the easiest to understand. Mainly working in arousal, a fast Tempo will generally become active physically and emotionally, while a slow Tempo will make the listener more calm and calm. Therefore, the change of Tempo can be understood as an action along the axis of arousal in the mood space.

Texture-the density of sound and the overlapping degree of sound emitted at the same time-not only affects our high mood, but also affects our comfort. When the Texture is vague, there will be a clear feeling of closeness and it is easy to open up. This is the effect of making the mood better. On the contrary, closely overlapping Texture will enhance the intensity of sound and produce tension. The comfort of the listener is reduced and the mood is constantly rising. On the other hand, Harmony has a lot to do with good mood. Many people will find consonnant's voice forward way and stable tonal centre very comfortable and calm. Dissonance and tonal's instability will produce restless, sad and annoying emotions. Together, these key points of composition form the initial emotional form of music. This existed before any

changes were made in production processing [5].

4.2 Production-Related Parameters

Music itself is the basis of conveying mood, but the parameters of the production process have the same influence on the listener's final feeling of sound. Dynamics, in particular, determines the distribution of sound in time, which is directly related to the intensity and anxious feeling in the music. If there are obvious differences within the scope of Dynamics, it can strengthen the influence of feelings and create dramatic tension. On the other hand, a tune that is strongly compressed and transiently becomes bigger and flatter feels more direct, stronger and sometimes aggressive. Although this adjustment will not change the original music itself, it will greatly change how many hearts music can capture and how many people feel overwhelmed.

The emotional characteristics of the song will also be adjusted in spectral balance. Spectral balance determines where it is obvious in different frequency ranges. High-frequency sound with rich energy will generally make people feel bright and vivid, and the feeling of excitement will also become higher. On the other hand, if energy is concentrated in a low range, it will often feel warm, firm and close. Such timbre adjustment works without changing the music content itself, which is small but effective and can guide the listener's feelings.

Spatial parameters-including reverberation, delay and stereo width-create listeners' feelings about sound distance and stereo sense. The narrow and dry sound environment sometimes produces close and uneasy feelings. On the other hand, the long reverb tail and the wide stereo field are easy to arouse the feeling of unfolding, indifference and quiet thinking. Through this kind of space shaping, the choice of creation can change the position on the emotional map of the work, and finally decide how wrapped and distant your listening experience will be. Generally speaking, the music parameters and production parameters investigated above will become a unified framework for understanding the mechanism of intentionally guiding mood perception. Explaining the listener's reaction from the perspective of valence-arousal model, we can think that the adjustment of each parameter is the action of setting goals in the mood space. This idea is the basis of the concept of case study in the next section.

5. Case Studies

So far, the analytical framework is to locate music works intuitively along the axis of valence-arousal. In order to make it easier to understand and use in practice, we will try methods using existing musicians. We chose two songs as case studies. One is mars (1914-1917) in Gustav Holst's orchestral suite The Planets, and the other is the theme song Discreet Music (1975) of Brian Eno's album of the same name. These works were chosen because the musical characteristics of the two pieces are obviously different. These songs, created in different times and through different cultures and aesthetic habits, fully embody various types of music and production characteristics. The nature of sound is relatively complete and easy to record, so it is very suitable for the next analysis.

Before comparison, you need to determine the words and scope to be measured. This research is not aimed at conducting large-scale experiments. I only pay attention to the feeling side of the problem musical works. In addition, the analysis should only be carried out within the scope of the method determined in the previous section, and the same classification and parameters should be used for both pieces. In this way, we can use the previously formulated framework to sort out the emotional nature of sound that has not been captured so far into a meaningful form to explain.

5.1 Mars, the Bringer of War (Holst, 1914–1917)

In Mars, the Bringer of War, the mood is mostly produced by ordinary composing methods. Because it was finished before the digital age, Mars was not produced in the current production environment. The characteristics of sound come from the natural sound properties of orchestral instruments, rather than editing them later. The version of this survey is the recording of London Philharmonic Orchestra conducted by Jurowski in 2010 [6]. The rhythm of this piece of music has been very fast, and the repeated sound patterns remain in an exciting state, firmly placed in a "highly awake" place in the emotional space. What produces this effect is the overlapping way of heavy orchestras, the characteristic 5/4 beat that makes the rhythm unstable, and the powerful and aggressive rhythm repeated many times in the whole piece. All these elements are gathered together, which increases the sense of tension and produces an approaching sense of burden. The unstable state of dissonance and harmony is

widely used in harmony, and the feeling will develop in a negative direction.

What is particularly important in Mars is the role of dynamic contrast. Orchestra has a spacious dynamic range-especially where the volume suddenly increases and the beat increases obviously, which strengthens the aggressive and impatient atmosphere of this piece. This extreme performance is not electronic manipulation, but is made purely by audio method, which is different from the current recording after a lot of processing. Similarly, the sound characteristics and spatial impression of this song mainly depend on the choice of orchestration, the natural reflection nature of the performance place and the placement of microphone during recording. If these related factors are considered together, from the quality evaluation of the project just discussed, Mars is widely located in Russell's valence-the upper left valence-arousal space-the field of negative Valence in the higher arousal.

5.2 Discreet Music (Eno, 1975)

Brian Eno's Discreet Music [7] is a very different kind of music. In this kind of music, it is not the ordinary music production method that changes the mood of the audience. Determined by electronic sound sources and the idea of sound production as the center. Tempo doesn't feel forward. He hardly knows. So there is a floating sound space. It is closer to a still photo than a story that goes forward in sequence. The overlapping way of sounds avoids deliberately nervous and relaxed flow. Instead, repeat the same thing, or change it slowly and little by little. The overlapping degree of sound is also very weak, and the change is very slow. All these add up to reduce the amount of information input, and this piece clearly enters the field of music with little stimulation.

However, it is the parameters of the sound production method that strongly determine the mood of Discreet Music. Using electronic sound sources, you can make the correct sound size that acoustic players can't make. As a result, there is almost no change in the volume of the sound, and there is almost no sound that suddenly becomes louder. If you pay attention to adjust the color of the sound, it will become a smooth and evenly separated frequency shape, and there will be no pain in the ear at high frequencies. In space, the extensive use of reverberation and signal diffusion will produce a sense of remoteness as if surrounded, and there is almost no difference between active listening and being listened to. The stereo design of this work is also well thought out: sound sources is mainly located in the outermost layer of stereo field, creating a sense of immersible space far beyond the boundaries of ordinary acoustic experience. Eno called what he finished "modal, evenly textured and sonically warm" [8]-this explanation, in valence-arousal space, this work wrote: "Less heart."

6. Conclusion

In this study, we made a method, which can simultaneously put the method of composing music and the parameters related to music production in the two-dimensional emotional model made by Valence and Arousal. This mixed structure of music and psychology tries to find out how the feelings felt by people listening to music will change and its structure if the structure of composition and the subtle parts of sound are adjusted. In this way, people who make modern music can make a set of easy-to-use rules in a planned way to express the feelings of listeners.

The evidence collected by this study strongly believes that it is not only the skill of composing music that can impress others' mood, but also the choice of producers and audio engineers. Before digital age, this kind of thing mainly depended on the advantages of live performance, the choice of musical instruments and the sound in the actual room. Thanks to digital audio processing, producers have developed tools that can adjust transients, move sound sources in virtual environments, and adjust frequency spectrum very finely. Combined with the methods described here to associate daily language with specific sound parameters, due to the progress of these technologies, many creative methods can be made to express feelings that were absolutely unexpected before.

This study also has limitations that must be honestly acknowledged. This analytical framework is mainly based on theoretical mapping and explanatory reasoning, which has not been confirmed in the controlled perceptual experience. Therefore, the position of any parameter in valence-arousal space is not 100% correct empirically, so please understand it as an explanation after careful consideration. This explanation may vary greatly between different cultural backgrounds and people who have listened to music. In addition, transforming the natural language description into different basic emotional categories may contain a certain degree

of abstraction in any case, thus simplifying the complexity of everyone's real emotional response. Although the case study investigated here is helpful to explain, it only shows a small part of music practice. Future research will help to improve the framework proposed here more strongly and carefully by expanding the experiment foundation and cultural scope of this method.

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