# Rational music or Empirical music: The relationship between Rationalism, Empiricism and Music

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**Abstract.** This article explains the debate between rationalism versus empiricism, discusses the reasons why rationalism and empiricism must be used side by side, and explores whether music is more rationalistic or empirical.

**Keywords:** Philosophy of mind; music cognition.

## 1. Introduction

As two of the most important schools of philosophy in European history, empiricism and rationalism are competing theories about how knowledge is acquired. As an art form that can soothe people's souls, music has been closely related to human life since ancient times. But is the process of human creation and perception of music more rational or empirical?

## 2. Rationalism or Empiricism

Before discussing this question, it is necessary to understand the concepts of rationalism and empiricism and the debate between them. While empiricism in its most extreme form holds that true knowledge only comes from sensory experience, rationalism in its most extreme form holds that true knowledge only comes from unaided reason.[1] Both empiricism and rationalism offer crucial insight into how humans learn.

Although there is no pure rationalist or empiricist that fits the above extreme definition, each school has its own representatives. Pythagoras the Samian, Socrates, René Descartes are all examples of philosophers who are often defined as rationalists, and the philosophers of the different periods often classified as rationalists more or less each held some of the doctrines that are classified as rationalism, such as people can attain certain knowledge through using reason alone; People have some innate knowledge, knowledge that people are born with; and knowledge that comes from reasoning is superior than that comes from sense. Similarly, John Locke, George Berkeley and David Hume are often classified as the British Empiricists. For some empiricists, they do not believe that human beings have innate knowledge, but they think that the human mind is a blank slate, and all human knowledge that comes from the mind through acquired experience.

As someone who leans towards empiricism but does not fully subscribe to it, I believe that most knowledge is gained through experience, though there are exceptions–like mathematical truths–which are necessarily a priori.

To begin with, experience provides us with a wider range of information about the world than reason, and is needed to ensure that what we know is actually real. First, as David Hume once said, there can be little knowledge without experience, [2] and the exception that proves the rule is René Descartes. As a rationalist, Descartes believed that the best way to acquire knowledge was to cut himself off from the world and to think by himself. He also believed that everyone had the ability to reason and to distinguish between right and wrong, and he sought to apply this ability to judge what was true and what was false while refusing to accept anything he didn't know for sure. [3] Unfortunately, however, this approach turned out to have its own shortcomings, and when he wanted to eliminate all doubts about a thing through reasoning alone, he first had to meticulously break it down and then consider the various components, all of which required an enormous amount of time and effort.[4] Descartes' experience shows us that rationalism can only provide a limited amount of

knowledge, unlike empiricism, which offers immediate knowledge to the senses in a wide range of areas without requiring countless hours of interpretation.

Second, even things which appear to be a priori require experience in order to be verified. For instance, a baby may have an instinct not to jump off a building, but statistics show that in April 2018 alone, the emergency room of Children's Hospital of Zhejiang University treated 34 children who had fallen from buildings. [5] According to experts, the reason why these accidents happen so frequently is that infants and young children are unable to control their curiosity and hyperactivity even though they may have some awareness of the danger. In this case, babies can't really understand why jumping off a building is a bad idea until they've actually seen an object fall and smash on the ground. [6] So things that seem like they must be a priori – like the dangers of falling off a building – are not in fact true beliefs until they are verified by experience.

At the same time, however, some knowledge can only be acquired with the help of reason. First, an understanding of certain concepts requires abstract thinking and some truths can only be arrived at through reason. Descartes' experiment with wax blocks is a good example. While a wax block can vary in color, shape, smell and firmness, we still think of it as a block of wax as opposed to something else. Here, differences in color, shape, odor and firmness are all things that we perceive, yet the fact that we can still identify the wax for what it is when these things change suggests that our knowledge is not based on perception alone. We recognize the wax block because we apply rational judgment to gain an understanding of its essence. [7]

Second, our grasp of certain mathematical theorems and laws is not based on experience, but on our inability to reason out any alternatives. Take the discovery of the Pythagorean Theorem, for example. As Pythagoras waited for dinner to be served, he began to admire the tiles on the floor and think about their relationship to numbers. He took a tile and drew a square along its diagonal, and found that the square area was exactly the same as the sum of the areas of the two tiles. This in turn led him to boldly conclude that the square of the hypotenuse of any right triangle is equivalent to the sum of the squares of the other two sides. [8] The Pythagorean Theorem was thereby discovered as a mathematical truth arrived at by engaging in abstract reasoning and making bold assumptions without the benefit of experience.

Even though it is clear now that both empiricism and rationalism are both necessary to explain the process by which knowledge is acquired, many enlightenment philosophers throughout history have debated it for thousands of years. On the one hand, as is said before, some British empiricists claimed that observation and perception are the only valid sources of knowledge, and that a priori knowledge is a mere illusion. Hume, for example, cast doubt on the rationalist principle that everything in existence must have a reason for being. He did not believe that the sun actually warms the stone; people only saw the sun and then felt the heat of the stone without discerning the sun as the cause and the heat as the effect. Instead, the reason people think that rocks get hot in the sun is because they have previously experienced the phenomenon themselves. [9] According to Hume, therefore, the basis of causality is not reason but experience, with cause referring to the meeting of things and effect the association or inference of the mind based on habitual experience, and so-called 'a priori knowledge' is in fact nothing more than knowledge gained through experience.

On the other hand, once again, Continental Rationalists emphasized that reliable knowledge can only be obtained through reason, and that reason is above and independent of sensory perception. Using Descartes as an example, he believed that we shouldn't rely on sensory experience because the senses can deceive us. When dreaming that he was sitting by a fire, for instance, he couldn't tell for sure whether it was just a dream and was therefore unable to rely on his senses to distinguish between sleep and wakefulness in order to acquire knowledge. Yet things which can be discerned through reason have already been analyzed and clearly thought out, and must therefore be true. [10]

While the British Empiricists and Continental rationalists tried their best to justify their respective positions, I have always held firmly that true knowledge can only be acquired through a combination of the two. As Immanuel Kant once said, the knowledge of reason alone may be incontrovertible, but it has little to say about the forms of the world; although empirical knowledge focuses on world reality,

it pays the price of sacrificing knowledge certainty. Anything that is further understood by the senses has been processed by the senses after it has been felt. The sensory organs act as mediators, imposing on our experience a characteristic that is not itself an intrinsic part of what we perceive. [11]

## 3. Rationalistic or Empirical Music?

In effect, only by combining rationalism and empiricism can the advantages of both be realized and the truth be obtained. But does this also apply to the human process with music? My answer is YES!

There is a debate over the definition of music itself. I personally believe that music itself has no emotion, it's just a melody made up of rhythmic, regular sound waves, and it is the people who give it emotion. I think that from the moment humans create music, music itself is infused with human emotion, so I consider that one of the important factors in the definition of music is the representation of emotion, which is an important criterion for distinguishing between sounds made by ordinary objects and music.

According to this definition, it seems like emotion g*rounds* the music. And whether generating and expressing emotions or feeling and matching them, both require specific experiences, from which it can be further deduced that the perception of music is more in line with empiricism. And there is evidence that can support the idea that perceiving music is more in line with empiricism.

Firstly, different people listening to the same piece of music will have subtly different emotions, and may even recognize emotions that the composer himself/herself did not include when he or she composed it; also, the same person listening to the same piece of music in different states of mind may have different emotional experiences. There are even times when we are new to a style of music and don't recognize any of the emotions it expresses. For example, I've always listened to Schumann, but when I'm suddenly introduced to Bach or Rachmaninoff, I'm confused and at a loss for words. After I read an interpretation of Bach's equal temperament or Rachmaninoff's Piano Concerto No. 2, I was able to better understand the themes and emotions expressed when I was introduced to the music of these two composers again.

Second, psychologically speaking, sad or happy melodies are converted from physical to electrical signals through the ear, and are neurotransmitted into the temporal lobe of the brain or other brain regions. Melodies heard that are similar to those remembered are grouped together in the same category. People're more sensitive to a particular phrase in the melody, and they highlight the emotion of that phrase, going on to comprehend the phrases with a preconceived impression. [12]

Some may argue that people who have studied music theory systematically at might break down melodies when listening a music, knowing that different directions and chord compositions can express different mood, thus using reason; [13] but this is also based on experienced knowledge.

Third, some musical preferences that seem to be genetically predetermined are actually dependent on experience. Cultural traditions can be counted as a kind of experience. In Northern Europe and the United States, most sad lyrics are sung in a minor key, such as the famous jazz song Cry Me a River, while happy lyrics tend to be sung in a major key, such as the Beatles' Here Comes the Sun. People who grow up in these societies have a tendency to anticipate such connections. In the Science of Good Music II, John Bowell, classically trained musician and physicist, explains that culture is also a factor in our sad impression of the minor key. [14] In addition to major and minor, an important concept in Western music theory is consonant and dissonant: consonant tones are pleasant to listen to, while dissonant tones are unpleasant to listen to. [15] Some believe it is determined by basic physical principles or mathematics, but others believe it is because of the tradition of Western music and has to do with culture. In the experiment, anthropologists found a group of humans who had never been exposed to Western music - the Tsimane of the Amazonian forest. The researchers went to the Tsimane tribe and gave the tribesmen the opportunity to listen to consonant or dissonant music, and found that the natives of the Tsimane tribe were equally attracted to consonant or dissonant music. The Tismanians also had their own music, but did not develop a preference for consonance. [16]

Music psychologists David Huron and Matthew Davies have discovered another possible reason for the link between minor keys and melancholy. In their extensive research on major and minor key pieces, they showed that the rise and fall between tones in minor key melodies is, on average, smaller than in major keys. When we are happy, the pitch of our speech rises and falls more. For example, in the sentence "Hi! I'm glad you're here. How are you?" the drop in pitch between "Hi" and "I'm glad" can be quite large; immediately afterward, the sound jumps back to a high pitch when saying "How are you?". On the contrary, when we are unhappy, we have less pitch fluctuation. For example, in the sentence "I heard about your mother, are you okay?" there is only a small drop between pitches. Even if we don't understand someone's language at all, we can tell how they are feeling by the difference in pitch. [17] And this is what we judge through experience. So, the reason that the lower pitch of a minor tune corresponds to the pitch of a person speaking when they're sad makes people see the minor key as a sad situation is also dependent on our life experience.

However, with the development of time, many melodies without emotion are called music. I think that in modern society the presence of emotion doesn't seem to be as necessary in creating and feeling music. For example, alpha brainwave music, a type of music transformed by Electroencephalograph and functional magnetic resonance imaging, [18] can be said to be almost without any emotion. Not only is there no emotion in the creation process of it, but it is also difficult for people listening to alpha brainwave music to recognize the emotion and style. It is worth noting that listening to Alpha Brainwave music can cause the human brain to secrete alpha waves that produce dopamine, which means that people experience peace of mind and relaxation. This stimulation has nothing to do with experience and is more due to the innate physiological makeup of humans. From this, we can see that experience is not the entire reason we perceive music, and that musical sounds themselves possess different qualities. A person who hears very noisy music may stimulate the brain and, out of self-preservation, may find it disgusting. Softer music, on the other hand, lowers the heart rate, calms the mind and creates a favorable emotional experience. [19]

Thus, I think that, now, while the process of perceiving music is more in line with empiricism, the process of composing music is more in line with rationalism. I will mention some evidence to support my point that composing music fits more in rationalism.

First, although composers have emotions to express when composing music, they need to use music theory knowledge when writing scores. Although music theory is knowledge that humans have learned through practice, music theory is also a theory of music based on certain mathematical and symbolic models, [20] which requires a great deal of reasoning.

Second, even for people in societies heavily influenced by Western music theory, the link between major keys for joy and minor keys for sadness is not an ironclad rule. It is possible to write happy songs in a minor key (e.g., English composer Purcell's "Round O" in D minor) and sad songs in a major key (e.g., Canadian poet and singer-songwriter Leonard Cohen's "Hallelujah"). [21] This shows that not all composers compose based on social experience, and that it is possible to break the mold through reasoning and innovation.

Third, composing music by AI technology such as Chat GPT has become popular. Whether or not robots and AI have emotions themselves has always been a controversial topic, so even though some people think AI is capable of creating music with real emotion, we can't confirm whether or not it creates music with emotion. According to current technology, AI automatically generates new pieces of music by analyzing large amounts of music data. [22] I think this medium intelligence algorithm is more in line with rationalism of reasoning and analysis than empiricism.

We create music with our minds, listen to it with our ears, and feel it with our hearts. To create music, we have to use reasoning; while to perceive music, we need to use experience.

## 4. Conclusion

We learn knowledge both through Rationalism and Empiricism together, and the same thing happens when we interact with music. It is almost clear that we use reason more to compose music,

and use senses and experiences to feel music. Nevertheless, it's interesting to us whether people have innate knowledge about music emotion. Indeed, there is several evidence that is able to refute the fact that perception of music is more in line with empiricism.

Some people, like Chinese piano expert Guo Zheng, believe the ability to perceive music and sound is innate in humans, and infants are capable of perceiving and responding to music to varying degrees before they even leave their mother's womb.[23] Moreover, there are scholars doing experiments to prove the belief. U.S. researchers found that infants can recognize cheerful music from a group of music when they are five months old; by the time they are nine months old, they will be able to "pick out" sad music. Researchers at Brigham Young University in the United States showed a 5-month-old baby an expressionless face while sad music was played. When the baby's attention shifted and took his eyes off the face, the researchers stopped the music and switched to a different piece. The study found that when the fourth movement of Beethoven's Ninth Symphony, "Ode to Joy," played, the infant's gaze stayed on the face for three to four seconds longer than when other pieces were played, suggesting that he or she was aware of a shift in the tone of the piece, and that the 9-month-olds were able to recognize the mournful melody of Beethoven's Seventh Symphony in a group of pieces. Ross Fromm, a professor of psychology at Brigham Young University, said the discovery could help people understand how babies perceive the world before they learn to speak. He says one of the first things babies understand is emotion, and for them, a melody is a message [24]

In the future, it's important to study if people's innate knowledge about emotion of music exists. Is it? Let's wait and see.

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