

# Affective Responses to Music: An Affective Science Perspective

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**Abstract:** Music has strong emotional powers. How are we to understand affective responses to music? What does music teach us about emotions? Why are musical emotions important? Despite the rich literature in philosophy and the empirical sciences, particularly psychology and neuroscience, little attention has been paid to integrating these approaches. This extensive review aims to redress this imbalance and establish a mutual dialogue between philosophy and the empirical sciences by presenting the main philosophical puzzles from an affective science perspective. The chief problem is contagion. Sometimes, listeners perceive music as expressing some emotion and this elicits the same emotion in them. Contagion is perplexing because it collides with the leading theory of emotions as experiences of values. This article mostly revolves around the critical presentation of the philosophical solutions to this problem in light of recent developments in emotion theory and affective science. It also highlights practical issues, particularly the role of musical emotions in well-being and health, by tackling the paradox of sad music, i.e., the question of why people enjoy sad music. It thus bridges an important gap between theoretical and real-life issues as well as between philosophical and empirical investigations on affective responses to music.

**Keywords:** emotion; music; musical emotions; contagion; mood; being moved; sad music; emotion regulation; well-being



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Music can induce strong emotions. One may feel delight in listening to Vivaldi's *Four Seasons*, feel happy while being invigorated by funk music, be amused by Los del Rio's *Macarena*, feel intrigued by atonal music, adore Max Richter's music, feel ecstatic at a techno party, be deeply moved by Andrea Bocelli's poignant interpretation of *Amazing Grace*, or be in awe of a sublime bossa nova performance. Music may even move us to tears, take our breath away, or trigger frissons, chills, or goosebumps. Of course, affective responses to music are not limited to positive emotions. One may feel anguish when listening to a flamenco piece, anger in response to a heavy metal song, irritation in response to violent extreme music, boredom towards reggae music, and even disgust towards hate music. Interestingly, music often elicits mixed feelings, such as when we feel nostalgia because a song reminds us of a deceased loved one, or when we experience the pangs and thrills of melancholic fado. Sad music often elicits a blend of sadness and delight that at times explains why we enjoy it so much. One may even have guilty musical pleasures: I secretly like Lady Gaga, but I'm ashamed of this.

It is worth observing that not everybody likes music: people with musical anhedonia do not enjoy music, and people with amusia sometimes describe music as unpleasant or annoying noise. Nonetheless, the emotional power of music is considered to be the main motivation for why individuals and cultures engage in musical activities [1]. In addition to the reception of music, music's emotional power also pertains to music production (composition and performance), although this dimension is not at the center of the philosophical debate. Call the emotions felt in response to music "musical emotions".

How are we to understand affective responses to music? What does music teach us about emotion? Why are musical emotions important in our lives? These chief questions give rise to various fascinating questions such as: How does music induce emotions? Which emotions does music arouse? Are these emotions relevant for aesthetic appreciation? In fact, does music trigger *bona fide* emotions?

Musical emotions have fascinated philosophers since Antiquity [2]. Plato and Aristotle observed that music shapes moral character through its link with emotions (for the worst and for the best). Controversies about musical emotions culminated during Romanticism. Wagner famously championed the importance of emotions for the nature and value of music [3]. As the language of emotions, music aims at representing and communicating emotions. By contrast, Stravinsky and the formalists argued that emotions—at least garden-variety emotions—distract us from the intrinsic appreciation of music [4,5]. In the last decades, neuroscientific and psychological studies on musical emotions exploded [6–10]. Musical emotion is now a hot topic in psychology and neuroscience. Alas, despite the rich literature in philosophy and the empirical sciences, little attention has been paid to integrating these approaches. Philosophers have failed to consider empirical findings in detail, whereas psychologists and neuroscientists have not addressed major philosophical issues raised by affective responses to music. This review aims to redress this imbalance and establish a mutual dialogue between philosophy and the empirical sciences around the topic of musical emotions. It presents the main philosophical puzzles from an interdisciplinary perspective and by taking into consideration recent developments in emotion theory and affective science.

In addition, philosophers have tended to neglect more practical issues, such as the role of musical emotions for well-being, emotion regulation, and health (see, however, [11]). Given the large empirical evidence on the practical significance of musical emotions, a philosophical investigation that tackles theoretical and real-life issues would fill an important gap in the literature, as this review proposes.

In fact, the emotional power of music pervades our social life. Music accompanies many rituals such as funerals, weddings, or celebrations: the emotions induced by music play an important role in explaining this. During the COVID-19 pandemic, people described how collective musical activities elicited a sense of solidarity, communion, and hope, which is also partly explained by the emotions aroused by music [12]. Musical emotions also play a critical role in political endeavors, such as the use of “angry music” in political protests or that of “hate music” to promote racist ideologies [13]. Or consider the inspiring function of march music in war or the resort to metal music and forced singing in torture [14]. Studies in marketing even show that music surreptitiously affects shopping behavior [15]; what you buy may depend on the emotional nudges of music. Music-induced emotions can even impact moral judgments and vision [16,17]. The emotional power of music is ubiquitous.

Moreover, musical emotions play a fundamental role in well-being. People mostly use music to regulate their emotions [18]. When feeling anxious, you may seek calm music to relax. When feeling sad, you may listen to happy music to cheer yourself up, although many people would prefer to listen to sad music [19] (Section 4). In mental health care, musical emotions offer powerful strategies to treat affective disorders, such as depression, anxiety disorders, and autism [20–22]. Musical emotions also matter for physical health. Thanks to the emotions it elicits, music is used for pain management and the treatment of cardiovascular diseases [23,24]. Through its strong link with memory and emotions, music can even sometimes revive memories in patients with Alzheimer’s disease [25]. Musical emotions are powerful. Understanding them is thus important.

This review proceeds in four steps. As a preliminary, Section 1 presents the two chief philosophical problems raised by musical emotions and that will be my main focus here, namely the infectious power of music and people’s attraction to sad music. Section 2 sketches key empirical findings that are relevant to address philosophical issues. In light of these data, Section 3 explores so-called musical contagion and its implications for the nature of emotion. Section 4 tackles the main practical issue addressed by philosophers, namely our perplexing love for sad music. Let me start by presenting our puzzles in more detail.

## 1. Affective Responses to Music: Two Chief Puzzles

The most important and discussed philosophical issue concerns the power of music to contaminate listeners. Just like other people may infect us with their emotions (for

instance, a friend's anxious tone of voice may make one feel anxious [26]), music can induce emotions via contagion. Like we catch other people's emotions through the perception of emotional expressions (for instance, facial, vocal, or postural expressions), music infects us because we perceive it as expressing some emotion.

Indeed, people do not only *feel* emotions while listening to music, they also *perceive* emotions in music. For instance, one may perceive an Irish lament as sad, whereas Vivaldi's *Spring* sounds merry. Listeners typically experience Mussorgsky's *Night on Bald Mountain* as anxious [27]. Ambient music is often perceived as calm, whereas death metal can sound angry. Whether music can literally be characterized as, say, sad, anxious, or angry is a matter of dispute [28,29]. After all, music is not sentient and thus neither feels nor expresses emotions. It may be more accurate to say that listeners experience music as *expressive* of emotion. Sad music may not be literally sad, yet it sounds sad: it is expressive of sadness. This is the vexed puzzle of emotional expressiveness.

Intuitively, the perception of emotions in music differs from felt emotions. As observed by Tormey [30], Meyer [31], and especially Kivy [4,32], one may perceive some music as expressive of some emotion without thereby feeling the same emotion or any emotion whatsoever (Section 3.4; *pace* arousal theorists, see below). For instance, music that is poorly composed or performed may be perceived as expressing joy but may fail to move one to feel joy because of its mediocre character [32]. This piece may leave one cold or make one feel bored. More recently, in the empirical literature, Gabrielsson's seminal study initiated a tradition on the "locus of emotion" in music: the internal locus is the emotion felt, while the external locus is the emotion perceived [33]. In line with Kivy's observation, studies reveal that internal and external loci often do not coincide. Nonetheless, emotion perceived and emotion felt do sometimes coincide. This is when the magic of contagion happens. Listeners perceive an emotion in music, and this elicits the same emotion in them. Music contaminates them. Perceiving a requiem as sad may fill you with sadness. Perceiving Looney Tunes theme music as happy may make you feel happy. Horror music may trigger anxiety, and so on.

How does music infect us? And what does this teach us about emotion? Contagion is a philosophical riddle for it does not square well with standard and widely accepted features of emotions. In this respect, it is more philosophically puzzling than other kinds of musical emotions. What is worse, it threatens the leading theory of emotion, according to which emotions essentially are or involve cognitive evaluations (Section 3.1). Hence this review will be mostly devoted to contagion and its wide-ranging implications on the nature of emotion (Section 3). Because contagion sheds doubt on what are taken to be the orthodox features of emotion, this debate bears some similarities to the so-called paradox of emotional responses to fiction, although it differs from the latter (Section 3.2).

In addition to this philosophical problem, musical contagion also raises important empirical puzzles. It is puzzling that music—"pure sound" so to speak—could elicit emotions in listeners. In this respect, being infected by music is more perplexing than mirroring responses to other people's emotions ("social contagion") or to the affective tone of the environment ("physiognomic contagion"). Although social contagion raises many interesting issues (Sections 3.7 and 3.8), the phenomenon is readily explained, at least partly, by the perception of emotional expressions in other people (for instance, another person's anxious tone of voice or posture). Now, in the case of music, it is not clear that a similar explanation is available, since musical pieces are not persons expressing emotions (see, however, Section 2). Likewise, physiognomic contagion (for instance, when dark weather makes one feel gloomy) is readily explained, at least partly, by associations and co-variation between features of the environment (e.g., somber weather) and affective states (e.g., melancholic mood). However, it is an open and largely empirical question whether musical contagion can be explained by similar associations. Thus, even when the main philosophical conundrum is solved or dispelled, the mechanisms by which music contaminates listeners raise many interesting puzzles that only meticulous empirical studies can address. I return to this issue in Sections 2 and 3.4.

The review will also briefly present the second main debate pertaining to musical emotions, as it reveals the practical ramifications of the topic. Except in pathological cases, people usually avoid sad situations and feel aversion towards sadness. After all, sadness is unpleasant and arises when subjects assess some situation as unfortunate or as bad news. The problem is that people often love sad music: they enjoy it, seek it out, and value it. Studies even reveal that people listen to sad music, especially when they feel sad, and that sad music intensifies sadness. So why do we enjoy sad music? Why do we value sadness when it comes to music? This is the “paradox of sad music”. As sad music is one instance of so-called negative art (art that portrays and elicits negative emotions, including genres such as tragedy, horror, or macabre), the issue bears important similarities with the paradox of negative emotions in art, although it differs from it (Section 4). The paradox of sad music is the most discussed example of the importance of musical emotions for emotion regulation and thus for well-being and health.

Let me close this section by outlining the wide philosophical import of the topic of this review.

Understanding musical emotions matters for five central debates in aesthetics and the philosophy of art.

**1. Musical experience:** Musical emotions are an important dimension of musical and aesthetic experience. One may even contend that musical experience (*qua* aesthetic experience) is inherently emotional [34]. Importantly, the emotional power of music extends to multi-modal art forms, such as cinematic art, dance, and poetry. One well-documented example is the role of music in our appreciation of movies or TV shows: by inducing emotions in viewers, music can guide and intensify aesthetic experiences, even subconsciously (consider how Herrmann’s theme in Hitchcock’s *Psycho* sets the tone of the movie or how Max’s Richter music in *My Brilliant Friend* exacerbates the suspense). Similarly, dance is often modulated by the emotional tones of the rhythm of music, for instance. Through its reliance on emotions evoked by rhythm, poetry is another case at hand.

**2. Musical expressiveness:** Although musical emotion differs from emotion perception in music (expressiveness), some philosophers have analyzed the latter in terms of the former. Defenders of arousal theory argue that perceiving music as expressive of emotion consists of the music arousing bodily feelings or emotions [21,35,36]. In this view, affective responses are central to understanding the emotional meaning of music.

**3. Musical understanding and value:** There are debates on whether and which musical emotions are necessary and/or relevant to musical understanding [36,37]. Feeling sadness in listening to a requiem may be *the* appropriate response: it may be inherent to understanding the piece. Formalists such as Hanslick disagree: emotions play no role in understanding [38]. Formalists such as Kivy allow a role for different kinds of emotions in understanding, namely the emotions of appreciation directed at the music *alone* [32], (Section 3.4). Recently, Ravasio has offered a criterion for the artistic relevance of music-induced emotions that emphasizes, *inter alia*, the causal relation between the listener’s emotion and the artistic features of the music, the listener’s expertise and familiarity with the musical genre, as well as the proper attentional involvement with the piece and its development [39] (see also Levinson on musical literacy [40]). More recently, Cochrane has argued that the emotions induced in contagion are compatible with the proper appreciation of the music alone (*pace* Kivy) [22]. These issues impact the question of the relevance of emotions for the value of music [41].

**4. Aesthetic experience, aesthetic appreciation, and aesthetic emotion:** The topic relates to controversies regarding the nature of aesthetic experience and, more recently, of aesthetic appreciation and aesthetic emotions [34,42,43]. The very possibility of musical emotion is puzzling for traditional views of aesthetic experience as disinterested [44], (Section 3.2).

**5. The nature of music:** The role of musical emotions in aesthetic experience has ramifications for the definition of music, provided one thinks that the nature of music

consists (at least partly) of eliciting aesthetic experiences or aesthetic appreciation understood as affective phenomena [45,46]. Muzak or elevator music that is used to induce moods is also relevant for definitions of music in terms of aesthetic appreciation [45,46]. Following Tolstoy and Romanticism [47], one may conceive of music as the expression and communication of emotion. Popular theories in evolutionary psychology trace the origin of music to vocal expressions of emotions [48,49].

In the philosophy of mind, the main locus of significance pertains to issues in the philosophy of emotion, such as the nature of emotion (Sections 3.1 and 3.2), the content of emotion, the relationship between emotions and moods (Section 3.3), the phenomenal character of emotions, the role of imagination and imagery in emotion (Section 3.5), the epistemic value of emotions, and the importance of emotion for well-being (Section 4).

Before diving into the philosophical proposals, let me start by sketching the empirical results that are the most relevant for the philosophical disputes. There is currently vast empirical evidence available that can be used to put philosophical theories into perspective and to circumscribe the main philosophical issue.

## 2. Empirical Results and Types of Musical Emotions

There is overwhelming evidence that music induces emotions [50]. The evidence spans from verbal or non-verbal self-reports to physiological measures (e.g., heart rate, respiration rate, skin conductance, startle response, blood pressure, muscle tension, etc.). It extends to motor expressions of emotions (e.g., facial expressions, vocalizations, and body language) as well as overt or covert action tendencies (e.g., dancing, singing, foot tapping, walking speed, and even helping behavior). Music can thus affect all the typical reaction components of emotion. At the neurobiological level, music elicits activity in brain structures that are known to be crucial to emotion (e.g., the amygdala, nucleus accumbens, hypothalamus, hippocampus, insula, cingulate cortex, orbitofrontal cortex, etc.), and at a very young age [51–53]. Music-induced emotions are characterized by discriminable physiological, expressive, and neural patterns for emotions that are sufficiently distinct from each other, such as sadness, happiness, and anger [51,54,55]. This will play an important role later (Section 3.4).

The most frequently reported emotions are calm–relaxation, happiness–joy, nostalgia–longing, interest–expectancy, pleasure–enjoyment, and sadness–melancholy [56]. Recently, a new approach aimed to investigate music-induced emotions by going beyond general models of emotions that have been developed independently of music and that appeal to discrete emotions of the kind mentioned. These models fail to capture the richness of music’s emotional power and raise important theoretical difficulties, notably because musical emotions do not involve cognitive evaluations (e.g., in terms of threats and losses) like prototypical discrete emotions do. I will come back to this issue, as it is the main philosophical puzzle (Sections 3.1 and 3.2). Hence, psychologists have developed new scales in terms of affective themes such as wonder, transcendence, tenderness, nostalgia, peacefulness, power, joyful activation, tension, and sadness [57]. These affective themes correspond better to the emotions felt in response to music. It appears that music elicits mostly positive emotions although sadness, melancholia, and bittersweet nostalgia are frequent.

Emotions induced by music depend on three major factors: the *music* (structural and performance features), the *listener*, and the *context* [58]. For instance, sad music is characterized by low pitch, low sound level, slow tempo, dark timbre, narrow pitch range, descendant intonations, minor mode, and legato articulations, among other features. By contrast, happy music typically involves high pitch, high volume, fast tempo, high pitch range, ascendant intonations, major mode, and staccato articulations, *inter alia* [1]. Being contaminated by sad or happy music partly depends on these musical features. Similarly, information about the performer’s identity and ability (e.g., physical appearance, expressive power) impacts felt emotions. Listeners’ musical expertise (familiarity, musical expectations, training, etc.), and stable dispositions (age, gender, personality, socio-cultural factors, etc.),



also play an important role. And context matters. Whether one listens to music in say, a concert hall, a church, or at a street party may explain differences in felt emotions.

What is more relevant for the main philosophical debate are the mechanisms by which music induces emotions. The most influential model—“BRECHEMA”—describes eight mechanisms of emotion induction, i.e., information-processing devices that are based on various brain functions and that developed gradually [56,59].

1. *Brainstem Reflex*: The emotion is induced because the brainstem takes acoustic features as signaling a potentially important and urgent event. For instance, sudden, loud, or dissonant sounds may trigger startle responses, fear, surprise, or unpleasant feelings. This is a quick, automatic, and unlearned process. I come back to this mechanism in Sections 3.5 and 3.6.

2. *Rhythmic Entrainment*: The listener’s internal body rhythm synchronizes with the musical rhythm, and this elicits feelings through proprioceptive feedback. For instance, a lullaby soothes a newborn as the infant’s breathing patterns synchronize with the rhythm, or you may feel invigorated as your heart rate synchronizes with a groove. This mechanism is common in techno, march music, and film music. It is one key explanation of our tendency to move (say, our legs or head) in synchrony with rhythm. I come back to rhythmic entrainment in Sections 3.5 and 3.6.

3. *Evaluative Conditioning*: The music is associated with positive or negative stimuli which induce emotions. For instance, in post-traumatic stress disorder, music can induce panic attacks through the association between music and distressing events. Wagner’s *Leitmotiv* is another example.

4. *Contagion*: An emotion is induced because the listener perceives the same emotion in the music (musical expressiveness). For instance, you may perceive the Largo movement of Shostakovich’s *Symphony No. 5* as expressive of anxiety, and this may elicit anxiety in you. Or you may feel nervous and listen to calm music: contagion happens if the music calms you. I examine contagion in detail in the next section (Section 3).

5. *Visual Imagery*: The emotion is induced because listeners conjure and combine visual images while listening to music. This mechanism exploits the mapping between music and “image-schemata”. For instance, you feel awe while listening to music because you imagine a golden mountain or a magic forest. This can elicit pleasure, deep relaxation, and all kinds of emotions. I return to this mechanism in Section 3.5.

6. *Episodic Memory*: The music evokes a specific memory which elicits an emotion. For instance, I feel tenderness because I hear the song that was playing at my first date with my partner (“this is our song” phenomenon). As observed, music is one of the most powerful cues to revive emotional memories [60]. This is partly because of music’s significance in social events (weddings, funerals, festivities, etc.).

7. *Musical expectancy*: A feeling is induced because the music violates, delays, or confirms the listener’s musical expectations. Meyer’s pioneering theory emphasizes feelings of tension and relief in response to music [61]. Expectations typically trigger anxiety, surprise, or disappointment. They are the main predictor of musical frissons: chills are correlated with a piloerection response elicited by “unexpected” musical changes [62]. I return to this mechanism in Section 3.6.

8. *Cognitive Appraisal*: The music is appraised in light of one’s practical goals which elicits an emotion. For instance, you are annoyed at a party because you appraise the music as boring, or you feel satisfied because you find the music beautiful.

Various factors contribute to distinguishing between these mechanisms, namely evolutionary order, key brain regions, cultural impact and learning, ontogenetic development, induced affect, induction speed, and degree of volitional influence. This typology raises many interesting issues (see [56]) but what matters most for our purposes is the distinctiveness of contagion. Let us examine it in detail.

### 3. Musical Contagion

In contagion the emotion felt mirrors the emotion perceived in music: listeners feel the same emotion as the emotion they perceive in music. Or, if one prefers, the emotion felt corresponds to the emotion *expressed* by the music. Or—and this is another formulation of the same idea—listeners feel some emotion because they perceive the music as *expressive* of this emotion.

Importantly, contagion is not limited to music with lyrics (e.g., songs) nor to programmatic music. It also happens with absolute or pure music, i.e., non-representational music. It is in this case that the phenomenon is the most perplexing. In the case of songs, for instance, lyrics often portray emotions or situations, like fictions or narratives do. Consider how many sad songs are about heartache and separation. Such lyrics readily explain why we perceive sad songs as expressive of sadness, and why this may make us feel sad. Heartaches and separation, for instance, are unfortunate and tragic things. But the case of pure music is different. How can *pure* sound be, say, expressive of sadness and make us feel sad? Why would *pure* music—just sounds—make us feel sad, happy, or anxious? How and why can pure music contaminate us? Just like for musical expressiveness, the troublemaker for contagion is pure music.

As observed, contagion hinges on the perception of emotion or of emotional expressiveness in music. Although emotion perception and emotion induction differ, empirical studies on emotion perception in psychology and neuroscience offer interesting insights into contagion. To summarize numerous experiments very roughly, it appears that there is a significant degree of invariance between individuals, age, and culture in the perception of emotions in music, at least for basic emotions such as sadness, joy, fear, anger, and tenderness [63]. The recognition of basic emotions in music seems effortless. For instance, adult listeners recognize emotions in music in less than a quarter of a second, and their judgments are only marginally affected by musical competence [64,65]. Developmentally speaking, some non-verbal manifestations of the recognition of happy vs. sad music have been observed in 4 months old infants [66]. At 4 years of age, children are able to articulate judgements about basic emotions perceived in music [67–69]. Although cross-cultural studies raise challenges and their interpretation is controversial [70], some influential studies report some invariance in expressiveness across different musical cultures. Members of the Mafa tribe in North Cameroon accurately recognized joy, sadness, and fear in Western music to which they have been never exposed [71]. Conversely, Western listeners identified joy, sadness, and anger in excerpts of Hindustani raga [72]. Japanese listeners recognized these emotions in Hindustani music as accurately as they do in Japanese music [73].

For many scholars, these results suggest that there are biological propensities to recognize emotions in music and thus be infected by it [74]. One of the most influential theories explains these data by the correspondence between music and affective prosody or vocalization, i.e., the non-lexical expression of emotion in speech [63,75]. For instance, the acoustic features of sad music are similar to those of sad speech (e.g., low pitch, low volume, slow tempo, dark timbre, low tone movement, descendent intonations, and minor mode [62]). Both importantly contrast with the acoustic profile of cheerful music and the prosody of happiness characterized by high pitch, high volume, fast tempo, high pitch range, ascendant intonations, major mode, and staccato articulations, *inter alia*. Music is thus somehow perceived as a “hyper-expressive” voice as if we were hearing a person vocally expressing their emotions. Indeed, the recognition of vocal and musical emotions involves a shared neural code [76]. As contagion depends on the perception of emotion in music, it is thus partly explained by the mapping between music and vocal expressions of emotions (see, however [77], Section 3.7).

Of course, contagion extends beyond music. People sometimes contaminate us with their emotions, like when we are infected by other passengers’ anxiety on a plane or when we catch joy at the Rio carnival (social contagion). Even the affective tone of the environment and non-sentient beings may infect us (a phenomenon called “physiognomic contagion”). One may perceive a weeping willow as sad, and this in turn may make one feel

sad. Or one may perceive the design of a building as anxious (consider Libeskind's Jewish Museum in Berlin), and this may arouse anxiety. Just like people and the environment, music can infect us. I turn to these other cases of contagion in Section 3.7.

Contagion is central to our experience of music and to our practical uses of music for well-being, health, and socio-political purposes. Most importantly, it raises the fundamental question of the nature of emotion. Let me now turn to this chief issue.

### 3.1. Cognitivism

What are emotions? Emotions involve various features such as bodily feelings, physiological changes, facial expressions, and action tendencies. Yet, according to the dominant theory of emotion in philosophy and empirical disciplines, emotions essentially are representations or cognitions of values, such as threats, losses, bad news, good news, injustice, beauty, cuteness, the comic, the sublime, etc. Call this conception "cognitivism" (the view is also sometimes called "evaluativism" [11,78–82]. Consider—like in Hitchcock's *The Birds*—that Melanie is afraid of ravens flying in her direction. Her heartbeat accelerates. Her breath becomes short. She trembles. She screams and runs away. Yet fundamentally, she is afraid because she evaluates the ravens as a *threat* to her survival. Likewise, feeling sad about a separation is experiencing this event as *unfortunate*.

According to cognitivism, the intentional structure of emotions is twofold. First, emotions have intentional objects or content: Melanie's fear is *about* ravens. Second, emotions involve *evaluations* of their object or content: the ravens are evaluated as *threatening*. Cognitivism offers an elegant way of specifying emotional objects or content: the object or content of some emotion is the situation evaluated. Melanie is afraid of ravens because she evaluates *the ravens* as threatening. Cognitive evaluations can be wrong. Melanie might be afraid of a harmless bird. In that case, the emotion is inappropriate. Cognitivism nicely explains that. Arguably, cognitive evaluations capture the other facets of emotions as well: facial expressions, physiological changes, and action tendencies are adaptive responses to representations of values.

Cognitivism's main competitor is the bodily feelings view *à la* William James [83], or at least, the *pure* bodily feeling view according to which emotions are bodily feelings that do not involve evaluation [84]. The core claim of cognitivism is compatible with some bodily feelings views and some motivational views of emotion, as long as they concede that emotions involve evaluations [85,86]. Cognitivism also contrasts with the recent emphasis put on valence and arousal as core features of emotions, as in conceptual act theory [87]. In this view, affect fundamentally involves valence and arousal; specific emotions result from conceptualizations of the feelings on behalf of the subject in the absence of cognitive evaluations. More generally, non-cognitivism claims that emotions do not involve evaluation. Maybe they do not have intentional objects [88]. Even if they do have intentional objects, this is not explained by cognitive evaluations, as there are not any.

There are different variants of cognitivism. Following the Stoics, Nussbaum argues that emotions are evaluative *judgments* [89]; this is the doxastic variant of cognitivism. By contrast, most scholars conceive of emotion as (analogous to) *perception* of values [78,81,82,85,90,91], while others argue that emotions are *sui generis* evaluative *attitudes* [79,80,92]. The debate about contagion is typically formulated to target the doxastic variant but it extends to all cognitivist views, such as the perceptual or attitudinal variants. Cognitivism is also at the heart of appraisal theory, the leading theory of emotions in psychology [93–95]. According to appraisal theory, emotions are elicited and differentiated by various appraisal checks of situations in light of one's goals, such as novelty, goal relevance, goal congruence, coping potential, etc. In neuroscience, conceiving the amygdala as a "relevance detector" encoding value is a declination of the same thought [96–98].

Cognitivism does justice to the role of emotions in our life. As experiences of values, emotions are an integral dimension of morality, social life, and well-being. Emotions may even justify evaluative judgments and constitute evaluative knowledge or understanding [11,99,100]. Renouncing cognitivism comes at a cost.



### 3.2. The Musical Challenge to Cognitivism

Cognitivism is compatible with all the mechanisms by which music elicits emotions in the BRECVEMA model (Section 2), except one. Cognitivism can account for feeling scared by a loud scream, being surprised by an interval, becoming sad as the music evokes bad memories, being happy while imagining a magic forest, and feeling delighted because the music perfectly suits the activity one is engaged in. These emotions are *about* the music and involve an *evaluation* of the music, or of something the music brings about (such as imaginings or memories of past events). These emotions are no philosophical riddles. The trouble is contagion [70,101].

Imagine that you hear Samuel Barber's *Adagio for Strings*, Op. 11 for the first time. Listening to the music you perceive it as sad, and contagion happens: you feel sad. According to cognitivism, your sadness consists in evaluating the music as unfortunate or as bad news. The theory claims that sadness is experiencing a situation or object as unfortunate/as bad news. For cognitivists, emotions are induced by the appraisal of situations in light of one's practical goals. However, this seems wrong when it comes to musical contagion. In listening to the *Adagio for Strings*, Op. 11, you do not evaluate the music as unfortunate, suffering, or in any negative manner. Nothing bad happened. When listeners are infected by music, they do not appraise the music in light of their practical goals: in the case at hand, music is irrelevant to practical goals [32]. Of course, music is sometimes relevant to our practical goals. One may feel proud of one's daughter's recital, admire a drummer's performance, or feel disgusted by neo-Nazi music. In these cases, the emotion felt is unproblematic because it involves an evaluation of the music in light of practical goals, such as personal, artistic, or political concerns. The problematic case also differs from emotions felt because of some idiosyncratic association between the music and some personal event, like when music fills one with sadness because it reminds one of awful times. In the relevant example, music does not remind you of some unfortunate event: you hear it for the first time. Since the music is not appraised as relevant to one's practical goals, it cannot be the object of the emotion felt. How is it possible that musical contagion induces affective states in listeners then?

As contagion does not involve the evaluation of the music in light of practical goals, it is a counter-example to cognitivism. Call this the *Musical Challenge*. The challenge is not restricted to sad music, and it extends to all instances of musical contagion. Happy music infects you, yet there is no good news. Music makes you anxious, yet the music is harmless. Angry music makes you feel rage, but no injustice happened. There is simply nothing to be sad, happy, anxious, or angry about. The music is irrelevant to the assessment of the fate of our practical goals.

The *Musical Challenge* consists of two related yet distinct challenges.

*The Object Challenge:* Emotions have intentional objects. Yet the emotions elicited by contagion are not *about* the music.

*The Value Challenge:* Emotions involve evaluations of their objects. Yet contagion does not involve evaluation of the music.

Because the object of some emotion is the object evaluated, the *Object Challenge* depends on the *Value Challenge*. You are not sad *about* the music because you do not appraise the music as unfortunate. At least this is so on the cognitivist construal of emotional content or object. It would thus appear that the *Value Challenge* is more fundamental.

Things are more complex, however, and philosophers have not paid sufficient attention to the relation between these two challenges. For instance, proponents of non-cognitivism are not committed to the claim that the content or object of some emotion is the situation evaluated. For they deny that emotions involve evaluations. Yet, thinking of emotions as bodily feelings is compatible with emotions having intentional objects. The object of the emotion would be the object of the feeling. I put aside these details for now and will come back to them when discussing the main solutions to the *Musical Challenge in concreto*.

Here is a rough formulation of the *reductio* of cognitivism.

- (i) Contagion elicits garden-variety emotions (sadness, anxiety, joy, etc.).

- (ii) Cognitivism: Emotions have intentional objects and involve evaluations of their objects.
- (iii) Per (i) and (ii), emotions elicited by contagion are about the music and involve evaluation of the music.
- (iv) *Object Challenge*: Emotions elicited by contagion are not about the music.
- (v) *Value Challenge*: Emotions elicited by contagion do not involve the relevant evaluation of the music.

(C) Cognitivism does not capture contagion.

The *Musical Challenge* differs from the paradox of fiction or the question of why we feel emotions towards fictional characters that we do not believe to be existent. The *Musical Challenge* arises for absolute music and thus does not concern fiction or narratives. However, similar challenges apply to other non-figurative art forms (e.g., abstract paintings, architecture, abstract sculptures) and to physiognomic contagion. But let's focus on music.

What follows from the *Musical Challenge*? Strictly speaking, the conclusion is that cognitivism does not capture contagion (Sections 3.6 and 3.7). Most psychologists and neuroscientists embrace this conclusion [9,63,102–105]. According to the dominant neuroscientific approach, music contaminates us by the means of automatic mimicry or empathy in the absence of cognitive appraisal. This may involve mirror neurons firing, although this hypothesis has not been tested. Listeners' brains automatically mirror the musicians' movements used to communicate emotion [106], or simulate emotional motor structures [24]. Interestingly, happy music activates premotor regions involved in vocal sound production even when listeners are not singing [107].

Yet, the *Musical Challenge* invites one to draw wide-ranging conclusions about the nature of emotion. Scherer argues that cognitivism is true of "utilitarian" emotions as opposed to aesthetic emotions: the latter emotions are disinterested and do not involve appraisals in light of practical goals [108]. Robinson adopts a multi-componential view: emotions are complex processes that involve cognitive appraisal, non-cognitive responses, motor representations, and feelings [109,110]. Some emotions involve all processes, including cognitive appraisal, while other emotions—such as those elicited by contagion—do not. These conceptions are compatible with a grain of truth in cognitivism. But a more dramatic conclusion suggests itself. If cognitivism cannot capture contagion, cognitivism is false [77,84]. In fact, contagion offers support for non-cognitivism: contagion can be characterized as eliciting pure bodily feelings, just like emotions, in general, are on this conception.

Although philosophers have raised and rebutted objections to cognitivism (e.g., the case of recalcitrant emotions or the emotions towards fictional characters [82,99,111,112]), proponents of cognitivism in emotion theory have not addressed the case of music in detail. The main reactions to the challenge have been offered by philosophers of aesthetics before the affective revolution of the philosophy of mind. As the challenge is pressing, it is worth addressing it with the recent tools offered by emotion theory and affective science.

Cognitivists have two options: defuse or rebut the challenge. Defusing the challenge amounts to denying that there is a challenge in the first place. The challenge relies on premise (i): contagion elicits garden-variety emotions (e.g., sadness, happiness, anxiety, anger). This assumption has been denied. Hence, the challenge vanishes (Sections 3.3 and 3.4). The second option for cognitivists is to rebut the challenge: contagion brings about ordinary emotions, yet the challenge fails as contagion does involve evaluation (Section 3.5). Let us examine each option.

### 3.3. Defusing the Challenge: Moods

The challenge assumes that contagion elicits proper emotions such as sadness and anxiety. One way to deny this assumption is to argue that contagion does not bring about *bona fide* emotions but moods [101,113,114].

Like emotions, moods are affective states. There is something it feels like to be in a gloomy, as opposed to a euphoric or irascible mood. Now, music undoubtedly can induce moods [110,115]. Music is among the major mood inducers. This is why we often use music to regulate our moods. Conceiving of contagion as eliciting moods is thus plausible. If

contagion prompts moods rather than emotions, the challenge does not arise: the challenge assumes that contagion results in *emotion* proper and its target is cognitivism about *emotion*. A widely agreed distinction between emotion and moods can substantiate this thought.

It is common to distinguish between emotions and moods by appealing to their intentional content or objects [116]. Emotions have *specific* objects. Melanie is afraid of *the ravens*. By contrast, moods do not have intentional objects [80,117], or at least not *specific* intentional objects. Consider that you are in a depressed mood. Your mood is not about something in particular. If it is directed at something, it is about the world *in general*: the world seems dark, heavy, and depressing to you. By contrast, when we are in an elated mood, the world seems rosy, light, and wonderful. Although moods can be caused by specific events (for instance, the birth of a child), they are not *about* them. If any, moods have global content [118,119]. After all, moods, unlike emotions, have a diffuse phenomenology; moods are free-floating [120].

If contagion elicits moods and if moods do not have specific objects, it follows that moods induced by music are not *about* the music. Although moods are elicited by the music, they are not directed at it, just like drugs elicit feelings without the feelings being about them [121]. As a mood, the affect in contagion is a free-floating experience. Consequently, the *Object Challenge* does not arise. If the mood elicited by contagion is not about the music, the music is *eo ipso* not being evaluated. The *Value Challenge* is defused too. Or so the argument goes.

Let me start by raising an issue about this proposal that has played an important role in the dialectic of the debate and that concerns the *Object Challenge*. The question of the intentionality of moods is debated. While some scholars argue that moods do not have intentional objects at all, it is more common to think that moods simply do not have *specific* intentional objects [116,118,119]. Moods are about *the world in general*. This implies that moods elicited by contagion are about the world in general. However, this seems implausible. When sad music makes one feel sad, one's sadness is not directed at the world in general. If anything, and as problematic as the idea is, the feeling induced by music seems to be directed at the music [122]. For only this tight connection between emotion and music can explain the relevance of contagion for the aesthetic experience of music [123]. Issues about intentional objects thus arise again: replacing emotions with moods deprives the feeling elicited by the music of an intentional object, or it delivers the wrong intentional object. Both options are problematic.

In reply, Robinson has argued that the moods elicited by music clearly are not directed at it [101]. They are non-cognitive feelings that are merely induced by it. The standard intentionalist theory of moods simply does not apply to music. This reply, however, amounts to adopting non-cognitivism about contagion (in fact, Robinson's view is non-cognitivist, Section 3.6). The reply is thus unsatisfying if one aimed at using moods to rescue cognitivism.

Although the discussion has focused on the *Object Challenge*, an interesting future direction for research would be to investigate how this proposal handles the *Value Challenge*. In the recent surge of interest in the intentionality of moods, philosophers have emphasized how moods involve global or at least diffuse evaluations. For instance, Tappolet argues that moods represent evaluative possibilities: moods are about the likely instantiation of evaluative properties [116]. In an anxious mood, one experiences a threat as likely. Kriegel argues that moods represent the world as instantiating some evaluative property [120]. In a euphoric mood, the world is represented as wonderful; in a depressed mood, the world is represented as pointless, etc. Rossi argues that moods represent undetermined objects as instantiating a specific evaluative property. In an anxious mood, we experience something as threatening, although we cannot pick up what exactly [124]. Be that as it may, if moods involve evaluations of this kind, the *Value Challenge* strikes back again. Although listeners may not feel sad *about* the music, they still appraise the situation as instantiating a negative value, albeit in a diffuse way. But this is simply a new variant of the *Value Challenge*; this is

the *Value Challenge* for musical moods. The burden of proof lies on the aficionados of the appeal to moods.

Although contagion can elicit moods, more needs to be said to neutralize the *Musical Challenge*. Let us consider a second way of defusing it.

### 3.4. Defusing the Challenge: Being Moved

For the *Musical Challenge* to stand, contagion should result in garden-variety emotions such as sadness and anxiety. Kivy concedes that contagion elicits emotions and that these emotions have music as their object [4]. However, he denies that contagion prompts garden-variety or ordinary emotions. In contagion, he argues, listeners are *moved* by the music; they feel *excitement* or *enthusiasm*, something he later labels “feelings of appreciation” [122]. Music can move us deeply as we attend to its beauty, complexity, subtlety, and expressive properties. Still, this affective appreciation clearly differs from garden-variety emotions such as sadness, happiness, or anxiety.

Kivy’s main argument rests on cognitivism about emotion. Music simply cannot make us feel sad, happy, or anxious. It is not the kind of thing that we evaluate as a loss, as good news, or as a threat. Music is irrelevant to our practical goals. This is why musical audiences do not act in ways that are typical of sadness, happiness, or anxiety. For instance, unlike Melanie who flees away from the threatening ravens, listeners do not leave the concert hall and flee away from the music when anxious music contaminates them. In other words, the action tendencies involved in musical arousal differ from those of garden-variety emotions. The difference also appears clearly in our appreciation of music expressive of negative emotions, such as sad or anxious music (Section 4). It would be puzzling to seek out and enjoy music expressive of negative emotions if it aroused these emotions in us. Why would one enjoy feeling sad or anxious? Appealing to being moved and emotions of appreciation explains the allure of music expressive of negative emotions in a straightforward manner: one enjoys the aesthetic features of the music.

Of course, Kivy concedes that music may elicit garden-variety emotions, but this is explained by idiosyncratic associations. For instance, some music may remind us of an awful event that may sadden us. But these emotions are not about the music *per se*, and they are irrelevant for its appreciation. As Kivy puts it in his discussion of Beethoven’s *Eroica* [32] (p. 169):

“The listener *recognizes* the quality of mournfulness in the second movement of the *Eroica*. This recognition reminds the listener of all the things she is unhappy about these days; and the contemplation of these things makes her unutterably sad—she cries. In this way the second movement of the *Eroica* succeeds in making the listener sad. But it is not Beethoven’s success; it is the listener’s failure.”

Kivy goes as far as saying that, strictly speaking, feeling sadness in response to sad music is pathological: nothing bad happened! The same line of criticism applies to theories that conceive of musical arousal in terms of moods (Section 3.3, [125] (p. 279):

“I ask the reader to listen, for example, to one of the well-known Romantic symphonies of Schumann or Brahms or Tchaikovsky, lay his hand upon his heart, and swear to me that he has “felt” his way through it, “mood-wise.” A person susceptible to mood swings like that in listening to absolute music is not just an unusually “sensitive” listener. He is a man with a problem.”

This argument is in line with Kivy’s moderate formalism. Unlike Hanslick, Kivy argues that music can express emotions. In fact, Kivy has offered the most influential theory of expressiveness in terms of the perceived resemblance between music and emotional expressions (“contour theory” [70]). Moreover, unlike Hanslick, Kivy claims that expressiveness is relevant to aesthetic appreciation as long as we pay attention to the intrinsic features of the music. Music can even elicit appropriate emotions. However, these are emotions of appreciation. Music does not elicit garden-variety emotions; or if it does, these are inappropriate responses that distract us from the proper appreciation of the music.

If contagion does not elicit the same emotion as the emotion which is perceived in music, the *Value Challenge* does not arise. For instance, listeners do not evaluate sad music as unfortunate, as they do not feel genuine sadness. Moreover, if contagion induces the emotion of being moved, we are moved *by the music* or its aesthetic quality (the same holds for feelings of excitement and appreciation). The music is the unproblematic object of our emotion. This captures the tight link between emotion and music, and it does justice to the importance of emotions in our appreciation of the music. The challenge is dissolved because music simply does not move us to feel garden-variety emotions.

Kivy's view has been extensively criticized [29,126]. From the point of view of the phenomenology of music, the proposal has been considered incredible. Intuitively, contagion elicits garden-variety emotions. Sad music, for instance, makes us feel sad. This is the *explanandum*! When sad music moves us, it does so partly because it makes us feel sad. The proposal does not do justice to our deep affective involvement with music.

In reply to this objection, Kivy has argued that his proposal is compatible with strong emotional involvement with music. In fact, it is designed to accommodate it. Being moved by music can be profound. Nonetheless, the emotions felt in response to music are not of the garden-variety kind. People are simply wrong to think that, say, sad music makes them feel sad. They confuse the emotion *perceived* in music with the emotion felt. They wrongly attribute the emotion they perceive in the music to themselves. They are prone to a misattribution error. After all, misattribution errors happen very often.

However, philosophers have not been convinced by this reply. Many scholars agree that emotion perception importantly differs from emotion induction. A music critic may perceive a musical piece as expressive of sadness without feeling sad or any emotion whatsoever, for instance when the piece is poorly crafted or performed (*pace* arousal theorists). As observed, subsequent to Gabrielsson's seminal experiment [33], the distinction between internal locus (emotion felt) and external locus (emotion perceived) is now well established in the psychology of music. Still, in contagion emotion perception and emotion induction coincide. Sad music can make listeners feel sad, whether this feeling is full-blown sadness or the mere feeling component of sadness. Denying this violates phenomenology. Saving cognitivism at this cost would be a desperate move.

Fortunately, we can avoid this phenomenological battle by considering empirical findings. Empirical findings corroborate the skeptical intuition. Krumhansl realized experiments designed to test Kivy's hypothesis through self-reports and physiological measures [27]. The study used excerpts of absolute music expressive of sadness (e.g., Barber's *Adagio for Strings*), happiness (e.g., Vivaldi's *Spring*), and fear (e.g., Mussorgsky's *Night on Bald Mountain*), *inter alia*. Along with other experiments, results reveal that contagion induces feelings that significantly share features of ordinary emotions in terms of physiological changes, neural bases, facial expressions, and behavior [9,27,127–129]. For instance, contagion with sad music involves changes in electrodermal activity, heart rate, respiration rate, and temperature that are characteristic of sadness. Sad music triggers corrugator muscle activity (as in frowning), while happy music triggers zygomatic muscle activity (as in smiling), just like ordinary sadness and happiness. Contagion with sad music is also accompanied by the typical behavioral and cognitive modifications of sadness, such as walking or talking slowly, increased recognition of sad faces, rumination, etc. At the neurobiological level, it involves neural patterns in limbic and paralimbic structures that are characteristic of ordinary sadness. These empirical results speak against Kivy's proposal [130].

However, Kivy has criticized this interpretation of the findings and argued that they are compatible with his cognitivist theory [131,132]. He mentioned several qualms about the conclusions one may draw from experiments of this kind (particularly Krumhansl's experiment). For one thing, given the misattribution error described earlier, it is an open possibility that participants confused the emotions *perceived* with the emotions *felt* (see also [133]). This tendency may have been exacerbated by the pressure on behalf of the experimenter to report felt emotions. Participants were also forced to choose between



a limited set of discrete emotions, which may have biased their reports. Self-reports thus cannot be trusted. However, this reply is empirically questionable, given the recent emphasis on the distinction between the two loci of emotion. For instance, perceiving emotion in music is more frequent than feeling emotions [33,57,134]. Emotion perception mostly depends on acoustic properties [135], whereas emotion induction depends on many other factors, especially features of the listener such as current mood, musical competence, and preferences [58]. As discussed in detail by Young [41] (pp. 52–54), studies reveal that participants master the distinction between emotion perceived and emotion felt [57,134,136]. This distinction is explicitly emphasized in the instructions of many of the aforementioned experiments. Kivy's error theory is empirically dubious.

A second and more convincing line of criticism offered by Kivy explains the findings in terms of covert associations [131,132]. As observed, Kivy concedes that music can arouse garden-variety emotions through associations. Now, the experiments do not ensure that participants were engaged in the formalist way of listening (that is, seriously paying attention to the music alone). Perhaps participants were engaged in other ways of listening that involve mind-wandering of the kind described earlier or the conjuring of images and narratives. After all, this way of listening is typical of some listeners. In the absence of clear descriptions of what listeners had in mind while listening to the music, the results are simply indecisive. Even if music induced say, sadness in participants, this does not suffice to show that it would affect appropriate listeners in the same way. The garden-variety emotion induced could be explained by associations between music and extra-musical entities prompted by titles or cultural associations, particularly because Krumhansl's study used excerpts of programmatic music [101] (p. 663).

It is difficult to completely rule out this hypothesis. Still, as argued by Young [41], it is worth noting that participants did not recognize the musical excerpts and were not notified of the titles. More importantly, Krumhansl's findings have been replicated by numerous experiments using diverse methodologies. The available empirical evidence is vast and points towards a strong consistency between individuals. Robinson and Young thus consider that it is unlikely that idiosyncratic or cultural associations explain this convergence [101] (p. 663), [41] (p. 56). As observed, it is more common to think that biological propensities explain why we perceive emotions in music and are contaminated by it [74]. See also Konečni for a critical discussion of Krumhansl's conclusions and for different empirical results [133]; see Young for criticisms of this discussion [41].

In a more conciliatory tone, Kivy has conceded that music has the *tendency* to elicit garden-variety emotions [132,137]. Nevertheless, and this is a third line of criticism of the empirical results, it remains to be established that listeners were engaged in the *canonical* way of listening to music. Even if one assumes that experiments show that music induces garden-variety emotions and does so even in listeners who attend to the music alone, this may not correspond to the proper way of listening to music that is relevant for aesthetics. In Kivy [137] (p. 2), he articulates clearly that the stance he is describing consists of paying attention to music and its expressive character alone, as if musical works were pieces of a "sonic museum". The relevant emotion felt, if any, should be elicited *directly* by paying attention to the artwork and its expressive qualities alone. Now, music often indirectly elicits garden-variety emotions. Consider "La Bamba", a song characterized by its bright, exuberant, and catchy Latin beat. Listeners in a discotheque may feel the urge to dance and move in unison with the beat of the music, and only then feel happy [137] (pp. 7–9). In this case, the emotion felt is explained by the context (namely, dancing in a discotheque) rather than by musical expressiveness or artistic features alone. Kivy thus concludes that the catchiness of "La Bamba" is no threat to his proposal that is meant to capture a specific and subtle kind of musical emotion. This touches on the normative question of the aesthetic and artistic relevance of affective responses to expressiveness (see Cochrane [22] and Ravasio [39] for accounts that emphasize the compatibility between mirroring feelings and the formalist stance on musical appreciation).

As it appears, the critical discussion has focused on the *Object Challenge*. Being moved by music is an emotion that is directed at the music; hence, the *Object Challenge* dissolves. However, the proposal has not been examined in detail in light of the *Value Challenge*. Kivy's solution consists in denying that contagion elicits garden-variety emotions that involve evaluations of situations in light of one's goals. Being moved and emotions of appreciation are elicited by the evaluation of the aesthetic qualities of the music, such as its beauty or well-crafted composition. So far so good.

The worry I would like to raise and which relates to recent developments in affective science concerns the emotion of being moved. At times, Kivy uses the expression "being moved" as an umbrella term that is synonymous with "emotions of appreciation". Yet, he acknowledges that music can move us in the *strict* sense of the term. Consider, for instance, his description of *Ave Maria* of Josquin des Prez or of mourning music [32] (p. 158; 161): Kivy confessed being deeply moved by these pieces. In these examples, being moved seems to correspond to the *sui generis* and specific emotion called "being moved". This emotion is typically elicited by reunions, challenging victories, recoveries from bad experiences, the birth of a child, acts of forgiveness, and, most importantly, film and music [138–140]. Its characteristic expressive and physiological signature consists of chills, tears, and sensations of warmth in the chest [141]. Kivy acknowledges that music can deeply move us in this way, and further developments of his position have followed suit. For instance, in a formalist spirit, Konečni argues that being moved (in the strict sense), awe, and chills are the three main emotions elicited by music [142]. This "trinity" is offered to replace our incorrect and confusing descriptions of musical arousal in terms of garden-variety emotions, thus leading to conceptual improvement. In the same vein, Manuel's ethnographic study reveals that people describe the feelings elicited by musical contagion in terms of being moved, as opposed to garden-variety emotions [143]. Lastly, recent investigations on sad music emphasize that sad music does not elicit sadness *per se* but rather the emotion of being moved [144]. For instance, findings suggest that being moved mediates the aesthetic appreciation of sad music [145]. This offers a new solution to the paradox of sad music (Section 4). For the sake of argument, let us thus assume that music does not elicit garden-variety emotions but the *sui generis* emotion of being moved, at least in some cases. This assumption creates potential difficulties when it comes to dispelling the *Value Challenge*. Indeed, being moved seems to involve troublesome cognitive evaluations.

Recently, there has been a surge of interest in being moved [138–140,146]. Scholars have recently proposed that being moved is a *sui generis* emotion, and some consensus emerged. Being moved typically is a bittersweet feeling composed of joy and sadness (and, to a lesser extent, anxiety and anger [140,147]). Consider that you are moved by being reunited with your partner after a long separation. You feel happy; yet, unlike sheer happiness, your experience is tainted with sadness, as you are aware of the separation and struggle you went through. Turning to the *Musical Challenge*, this mixed phenomenal character of being moved can be redescribed in terms of the following cognitivist gloss. Being moved involves a mixed evaluation. When you are moved (say, by a reunion), you appraise the situation as positive, which elicits joy; yet, you also appraise some negative situation (e.g., you were separated). This is why you are moved rather than merely happy or sad. This experience typically involves the appraisal of the victory of positive values over negative values [138], or a positive foreground against a negative background [140]. If so, the *Value Challenge* arises again: this is the *Value Challenge* for being moved by music. When sad music moves us (in the strict sense of the term), as it does often, we should appraise some negative event in the background. But it is unclear whether such an unfortunate event can be found: this was the challenge in the first place. This offers a future direction for research and suffices to switch the burden of proof on the defenders of the appeal to being moved.

For these reasons, the other reactions to the challenge aim at securing the idea that contagion can elicit garden-variety emotions or at least the feelings typical of these emo-

tions. Like Kivy's proposal, they attempt to capture the close relation between contagion and music.

### 3.5. *Rebutting the Challenge: Imagination*

Levinson has offered an influential account of expressiveness that appeals to the imagination [148]. In his "persona theory", we perceive music as expressive of emotions because we imagine a persona feeling and expressing emotions. His account of contagion also relies on imagination. Contagion happens when our imaginative involvement with a persona's emotion elicits the same feeling in us. For instance, music saddens us because we imagine a sad persona and a sad story while listening to it. Our feeling is empathetic. In a way, it is akin to feeling empathy for a sad person: contagion involves the personification of music. The imagining need not be very detailed; vague imaginings of a persona feeling and expressing some emotion suffice. In this view, contagion bears important similarities with emotions felt in response to fiction (like when we feel sad for Anna Karenina). Both involve the imagination of personae and empathetic feelings. Strictly speaking, Levinson argues that the feeling elicited by contagion is not a full-blown emotion, as it does not involve the relevant cognitive evaluation and desires characteristic of everyday emotions. Nonetheless, contagion involves similar feelings as those of garden-variety emotions.

Levinson's proposal has many virtues. As observed, imagination plays an important role in our affective responses to music. Contagion often vividly engages our imagination and music therapy exploits the intimate link between emotion and imagery. Moreover, the proposal is in line with the empirical findings on the perception of emotion in music that emphasize the role of affective voice and thus personification in contagion. Most importantly, unlike the other reactions to the *Musical Challenge* presented, the proposal accommodates the intuition that contagion results in emotional feelings (as opposed to moods) that share the phenomenology of garden-variety emotions (as opposed to feelings of appreciation). This fits our phenomenology.

Although Levinson does not adopt cognitivism about emotion, his proposal can rebut the *Musical Challenge* as follows. On the one hand, the feelings elicited by contagion are not directed at the music but at the content of one's imaginings. The *Object Challenge* is thus rebutted. On the other hand, imagination secures an intimate link between the feeling and the music: the feeling is about the persona imagined in the music. Moreover, the feeling does not involve evaluation of the music *per se*, as the evaluation pertains to the content of the imagining. The *Value Challenge* is rebutted. Cognitivism is safe because being infected by music involves cognitive evaluations mediated by imagination like in emotions felt toward fictional situations.

Still, scholars have doubted that contagion necessarily involves imagination. It is not clear that this proposal captures our phenomenology. We sometimes feel sad when listening to sad music without imagining a sad persona, let alone a sad narrative. At least we do not always engage in conscious imaginings of the kind described by persona theory. Contagion, at least sometimes, is much more primitive. It can be triggered by non-cognitive mechanisms, such as rhythmic entrainment and even brain stem reflex [121]. The sudden, dissonant sounds of anxious music and its fast tempo may automatically trigger anxiety in us. Music often contaminates us by affecting our physiology directly without any cognitive mediation, including that of imagination.

Empirical studies corroborate this intuition. As observed, contagion is a different mechanism than imagery (Section 2). For instance, the key brain regions involved in contagion differ from those involved in musical emotions elicited via imagery (e.g., spatially mapped regions of the occipital cortex, visual association cortex [59] (p. 625). Ontogenetically speaking, contagion is observed during the first year of life: 4-month-old infants display facial expressions characteristic of happiness and sadness in response to happy vs. sad music [66]. By contrast, musical emotions elicited by imagery develop only during preschool years [59] (p. 625). Contagion also differs from emotions elicited via imagery with regard to the degree of volitional control. In contagion, the degree of volitional control

is low—contagion is considered to be automatic. By contrast, emotions elicited by imagery normally involve a high degree of volitional control: listeners typically conjure up, choose, manipulate, and dismiss images while listening to the music. Of course, images can also come unbidden, and contagion may involve involuntary imagery. But this is far from the proposal considered.

Moreover, the appeal to imagination to describe musical arousal potentially suffers from similar problems raised against the persona theory of expressiveness. For instance, one may think that persona theory gets the order of explanation wrong. In persona theory, expressiveness consists of listeners imagining a persona who feels and expresses some emotion. Yet, one may think that listeners imagine a persona feeling a specific emotion *because* they perceive music as expressive of this emotion [149]. In this case, expressiveness *explains* or causes rather than consists of imagining personae. One first perceives expressiveness and only afterward imagines a persona. A similar worry can be raised for the emotion felt in response to expressiveness. In persona theory, the emotion is elicited because one imagines a persona. However, it is intuitive to think that, at least in some cases, listeners imagine, say, a sad persona *because* sad music makes them feel sad, rather than the other way around. The imaginative involvement would be a consequence of the emotion felt rather than its cause or component. Listeners first perceive sadness in music, the music then contaminates them, and only afterward do listeners imagine a sad persona. After all, sadness comes with negative cognitive bias: when feeling sad, one tends to think about sad things and ruminate, recognize and remember sad stimuli better, etc. This is at least an open possibility that merits to be explored.

Lastly, the persona account is partly inspired by our affective responses to fiction. Just like we can emotionally respond to the fate of fictional characters by imagining them, music induces emotions in us via the imagining of a persona. The problem is that affective reactions to fictional characters often are not of the mirroring kind [150]. One typically feels pity or empathy for Anna Karenina rather than sadness. If emotions felt in response to music are similar to emotions felt in response to fiction, they should be more akin to pity or empathy. The explanandum, however, was garden-variety emotions such as sadness and anxiety. Still, it is unclear whether this objection succeeds. As observed, Levinson emphasizes that the imagined persona is often a very minimal one. As such, it is often less detailed than the typical fictional characters we imagine in reading novels or watching movies, for instance. This indeterminacy and minimality may explain why music does not typically arouse non-mirroring emotions such as pity. When the imagined persona is more detailed, music may arouse high-level empathy akin to pity [37]. One may still be skeptical, however. Pity may be elicited by pretty minimal perceptions or imaginings of sad people (or of their sad expressions) in the absence of detailed information. It is thus unclear whether differences in specificity suffice to explain the difference in kind between music-induced emotions and affective responses to fiction. Another way to rebut the objection would be to highlight that fiction also typically elicits mirroring responses, such as vicarious fear or sadness for fictional characters [148]. Conversely, one may observe that music may also elicit pity, for instance when one hears an agonized passage and imagines a person in agony [46] (p. 320), [35]. The objector should clarify what is meant by “typical” responses here, which touches on the vexed issue of the paradox of emotions felt towards fiction.

This is not to deny that imagery plays a significant role in contagion [151]. For instance, Cochrane argues that perceiving expressiveness involves the simulation of the emotion perceived [21,22]. Now, simulation recreates feelings (although the feeling may not be of the same kind as the emotion perceived). Simulation may thus partly explain contagion. However, these appeals to imagery or simulation are openly non-cognitivist: in these views, contagion does not involve cognitive evaluation. Hence this role of imagination in contagion does not rebut the *Musical Challenge*.

If the *Musical Challenge* stands and imagination cannot rescue cognitivism, and in the absence of a suitable alternative theory, one may as well embrace the challenge and conceive

of contagion in non-cognitivist terms: contagion does not involve cognitive evaluations. Let me now present the two main non-cognitivist proposals.

### 3.6. Non-Cognitivism: Primitive Feelings and Moods

Robinson's account is in line with her pluralism about emotion [37,109]. Emotions are processes that involve several components (such as physiological changes, appraisals of values, and action tendencies), and music can elicit emotions by affecting each component. Robinson emphasizes how emotions come with different degrees of complexity. Some emotions, such as unrequited passion, are complex: they require mediation of beliefs and concepts. At the other extreme, many emotions—startle responses and primitive feelings of surprise, tension, or relaxation—are much more basic. They do not require cognitive mediation of beliefs and concepts: they are non-cognitive. Now, as already observed, music elicits primitive feelings of this kind, which may result in contagion. For instance, rhythmic entrainment, brainstem reflex, and musical expectations explain at least some cases of contagion [109]. Contagion may be understood in terms of these non-cognitive feelings of surprise, tension, and relaxation.

The so-called « jazzercise effect » describes the transition from primitive feelings to full-fledged emotion induced by the music [36]. The process starts with music arousing physiological changes in the listener, for instance by means of rhythmic entrainment. Through proprioceptive feedback, the listener feels primitive feelings. These feelings in themselves are non-cognitive, hence they are not directed at the music. Yet they give way to cognitive monitoring of one's situation. In order to make sense of the feeling, listeners look for cues in the environment and respond emotionally to them. Primitive feelings then crystallize into full-fledged emotions. In this view, the feelings elicited by contagion are still not directed at the music. Hence, listeners are not sad about the music, for instance, which is a virtue of the theory. Yet the feelings induced by music may direct one's attention to the music and the source of the feeling. This secures the relation between feelings and music. In contrast with formalists, Robinson emphasizes how these feelings can constitute understanding of the music and of its expressive character as long as listeners are engaged in the appropriate way of listening to the music [36] (see Ravasio [39] for more details).

More recently, Robinson explicitly argues that contagion brings about moods understood as affective experiences that are not directed at music nor involve evaluation of it [101]. She describes how music induces physiological and expressive reactions characteristic of moods. Evidence also includes the effects of music on perception, memory, decision-making, and even altruism, which matches the well-documented impact of mood on cognition. Even if contagion can be regarded as eliciting moods, Robinson emphasizes how music can give rise to emotions in various ways simultaneously, for instance through imagining, cognitive appraisal, or action tendencies. This, she thinks, explains the ineffability of affective experiences of music.

Let me present two lines of criticism that will motivate the second main non-cognitivist account [70]. Robinson's theory of contagion aligns itself with Jamesian approaches to emotion according to which emotions are fundamentally bodily feelings or awareness of bodily changes. One important challenge to this view concerns emotional objects. If emotions are bodily feelings, how do they relate to the features of our environment which are considered to be the intentional objects of emotions? If Melanie's fear is simply a bodily feeling, how does it latch onto the ravens threatening her? The standard response appeals to some kind of indirect relation to emotional content: bodily feelings covary with core relational themes and thus indirectly represent them [85]. The same indirect relation holds in Robinson's jazzercise effect. However, it sounds phenomenologically odd to describe our feelings elicited by music as being bodily feelings that only indirectly latch onto music. One may wish to secure a more direct link between emotion and music or, for that matter, emotions and their intentional objects. For this reason, Davies doubts whether the jazzercise effect is a genuine case of contagion from *music* (rather than some environmental feature) to the listener.



Furthermore, the appeal to primitive feelings rightly emphasizes the various kinds of bodily feelings elicited by music. Yet it seems to lead to an explosion of feelings. When listening to a musical piece, listeners feel myriads of short-term feelings succeeding each other and their emotional state constantly changes. This does not seem to conform to the phenomenology of contagion. Let me turn now to Davies's proposal.

### 3.7. Non-Cognitivism: Primitive Contagion

Davies offers a general theory of contagion that encompasses and goes beyond music [28,29]. We are often affected by the emotional tone of our environment. When people, nature, or non-sentient objects contaminate us, we perceive an emotion or an emotional appearance—and this induces the same emotion in us. One may be contaminated by one's friend's anxiety because one perceives anxiety in her tone of voice. Or one may feel sad because one perceives a tree as presenting the emotional appearance of sadness, for instance, a sad posture. This process involves the transmission of an emotional state or appearance. The display of emotion plays a causal role and must be perceived by the infected subject. However, the emotion felt by the infected person is not *about the emotion perceived*. When my friend contaminates me with her anxiety, my anxiety is not about the emotion perceived: I am not anxious about my friend's anxiety—I'm anxious *tout court*. Contagion also differs from situations where the emotion is about the content of the emotion perceived, such as when you and I are afraid of a lion running over us. Contagion causes an objectless emotion. The emotion has no object because the subject does not have the relevant evaluations or beliefs characteristic of the emotion. We simply catch people's emotions by seeing them.

Similarly, when music infects us, the emotion felt is the same as the emotion perceived. When we resonate with, say, sad music, the emotion felt is sadness. However, the emotion is not *about* the music. We are not sad about the music because we do not believe that the music is suffering or unfortunate. The music is the cause of the emotion, not its object. Still, contagion is thoroughly linked with the music: the music is the object of perception and the attentional focus of the response. Listeners pay close attention to the expressive character of the music, which is why contagion matters for musical understanding.

In this respect, the emotion resulting from the contagion that is central to musical understanding differs from affective experiences prompted by inattentive contagion. Sometimes music infects us even though we do not pay attention to it. For instance, background music in a store may make us feel calm: one may hear the music without actively listening to it and without being aware that the music is the cause of one's feelings. This is more akin to an objectless mood. This feeling differs from the close engagement with music described earlier where music is the attentional focus and is recognized as the cause of the emotion. Arguably, emotions prompted by inattentive contagion are not artistically relevant, in contrast with the emotions induced by attentive listening [39].

This proposal is in line with an influential account of social contagion in psychology [26]. Primitive contagion is the tendency to automatically mimic and synchronize with other people's facial, vocal, and bodily expressions, which results in feeling the same emotion. This process is typically unintentional, uncontrollable, and unconscious. It involves mimicry and physiological feedback. The infected subject unconsciously mimics the facial, vocal, and bodily expressions of the infectious subject's emotion (e.g., one's muscles tense and one's voice trembles in synchrony with one's friend's anxious posture and prosody). Physiological feedback from mimicry then unconsciously induces an emotional feeling in the infected subject (one feels anxious as one feels one's muscles tense). There is no need to appeal to cognitive evaluations. This account is motivated by numerous studies [152]. People tend to smile when surrounded by people who smile, newborns tend to cry when hearing other newborns cry, and laughter is highly contagious. Crowds and political protests are other canonical examples.

Turning to music, it has been argued that contagion involves mimicry [107]: for instance, contagion with sad music comes with corrugator activity (as in frowning), while happy music activates zygomatic activity (as in smiling). Although perceiving emotions

in other people differs from perceiving emotions in music, the emotional expressions in response to music described may qualify as mimicry, because they are triggered by the perception of expressiveness in music, and expressiveness bears close links to emotional expressions. The correspondence between music and affective prosody described earlier may account for mimicry. Most psychologists and neuroscientists conceive of musical contagion in terms of mimicry and primitive contagion.

Davies, however, takes his distance from this psychological account. He emphasizes how the perception of emotion in music relies on the resemblance between music and bodily postures, gestures, or movements characteristic of emotions (e.g., sad music seems to walk slowly, as sad people do). Likewise, mimicry pertains to bodily postures and movement perceived in music, as opposed to, say, facial or explicitly vocal expressions of emotions (music does not have a face and does not explicitly talk). In addition, mimicry clearly cannot account for contagion in response to colors or weather. For instance, dark rainy days are perceived as somber, and this may depress one. But there is strictly no emotional expression to mimic in that case. Nonetheless, the non-cognitivist spirit of the view is the same. Music contaminates us because its emotional appearances transmit emotions to us in the absence of cognitive evaluation.

Davies's account has many virtues. It offers a unified view of contagion that goes beyond the case of music. It captures the idea that contagion elicits full-blown garden-variety emotions (as opposed to moods or being moved). It secures the close link between contagion and music without being committed to the views that the emotions caused by contagion are about the music or about the content of one's imaginings. Nor does it construe contagion as resulting in objectless feelings that are only indirectly linked to the music. The music is the content of the perceptual experience, although the emotion is not directed at it. Of course, the view requires the rejection of cognitivism and even of the claim that emotions have intentional objects. But many examples beyond music, such as physiognomic contagion and contagion by tragic or comic masks, show that these claims are untenable.

Davies's account of contagion has been less extensively discussed than his account of expressiveness. Let me mention three lines of criticism.

Robinson argues that this account is unduly cognitive [36]. It assumes that contagion is caused by the perception of expressiveness, the feeling being a mere consequence of this perception. But we are often first contaminated by music and appreciate expressiveness only at a later stage. Music may infect us prior to our recognition of expressiveness (see Davies [70] for a reply).

Madell has also raised concerns about the objects of emotions elicited by music [84]. In Davies's view, the emotion is still not directed at the music. However, non-cognitivism about contagion is compatible with the idea that the feeling is directed toward the music. This would capture the connection between emotion and music in a more straightforward way.

Lastly, the primitive contagion model has been criticized by psychologists. When Davies offered his account, studies on contagion and emotion transmission were in their infancy. However, recent developments in affective science have described in detail when and why people mimic emotions [153]. Studies reveal that contagion and mimicry are less automatic and more cognitive than was initially assumed. For instance, they do not happen in adversary relationships: seeing that one's enemy struggles does not induce struggle but rather joy. Mimicry and contagion require affiliative bonds and the appraisal of the appropriateness of the emotional expression [153]. For these reasons, there is now a main alternative and cognitivist account of emotion transmission in terms of social appraisal that potentially offers a new way to rebut the *Musical Challenge* (Section 3.8). If musical contagion is not as primitive as scholars assumed, it may as well involve low-level appraisals. Let me develop this hypothesis further.

### 3.8. Future Cognitivist Avenues of Research: Social Appraisal and Cognitive Metaphor

In this section, I present recent developments in the affective science of emotion transmission and of musical expressiveness that offer new cognitivist accounts of musical contagion. The first is social appraisal theory, whereas the second is cognitive metaphor theory. As these theories have not been developed to address the *Musical Challenge*, I shall present the gist of each account to foster future interdisciplinary research.

As observed, primitive contagion is not the only view of emotion transmission. Social appraisal theory is now an influential perspective in the empirical study of emotion transmission, for instance in the study of collective emotions. In this view, emotions are transmitted through indirect appraisals of value [95,154,155]. We perceive the emotional expressions of other people and appraise value through the perception of emotional expressions, which elicits the same emotion. For instance, when a co-worker's anxiety infects me, I perceive her anxious tone of voice and tensed posture. Through this perception of her emotional expression, I appraise the situation as threatening, and this appraisal elicits anxiety. In social appraisal, people integrate information drawn from emotional expressions of other people into their own appraisals of situations, which may elicit the same emotion. This can happen via associations between perceived emotions and appraisals [156], or in a more direct manner [95]. Social appraisal may occur automatically and outside of awareness or in a more intentional and conscious way [157]. The core assumption is that emotions have social functions: emotional expressions inform other people about evaluative significance. Many studies have documented the role of social appraisal, for instance, the influence of angry expressions on appraisals of fairness [158], or the impact of fear expressions on appraisals of risks [159], and so on. Emotional expressions are signals of values: people constantly use emotional expressions to understand situations, coordinate, and act, as studies on social referencing in children suggest [160]. Of course, people do not always integrate other people's expressions into their own appraisals. Social appraisal requires the appraisal of the reliability of emotional expressions (for instance, the trustworthiness and competence of the source of expression [157]). Nonetheless, at least in some cases, emotion transmission takes the route of social appraisal [161].

Turning to music, social appraisal offers a new cognitivist account of contagion: contagion would involve indirect appraisal of value. Just like my co-worker's anxiety may infect me because I appraise value through the perception of her emotional expressions, tense music may infect listeners because they indirectly appraised threats through the perception of emotional expressions in music. This hypothesis thus assumes that perceiving expressiveness is akin (at least to some degree) to perceiving emotional expressions. This assumption may be plausible given the role of affective prosody described earlier. If the experience of music expressive of emotion is similar to the perception of emotional expressions, and if the perception of emotional expressions involves appraisal of value (as *per* social appraisal theory), musical contagion may be elicited by indirect value appraisal. Music would somehow indicate value like other people's emotional expressions sometimes do. As observed, social appraisal can be automatic, hence musical contagion may occur automatically through the tight link between emotional expressions and value appraisals.

In this proposal, the *Value Challenge* is dispelled as follows: being infected by music involves indirect appraisal of value, just like being infected by other people's emotions through social appraisal. Perceiving music as expressive of emotion may (directly or indirectly) involve appraising value. Although sad music is not appraised as unfortunate, it is somehow perceived as an expression of sadness. As such, it indicates unfortunate things or, at least, can be appraised in this manner. Importantly, this proposal implies that the emotions resulting from musical contagion are illusory, as there is no relevant value—this was the challenge in the first place. Whether this is problematic or not is unclear. Prinz argues that the emotions induced by contagion are illusory embodied appraisals that are a by-product of the adaptive emotion system [85]. Perhaps the aesthetic context in which music induces emotions renders this illusion innocuous. However, one may consider the illusory nature of musical arousal problematic [162]. After all, the *Musical Challenge* is based

on the assumption that mirroring emotions can be appropriate responses, in which case their illusory nature would be a fatal flaw for this proposal.

Lastly, it is unclear how this proposal would handle the *Object Challenge*. This depends on how one construes emotional objects in social appraisal, which has not been discussed by philosophers. In some cases, the emotion transmitted through other people's expressions seems to be about one's environment (e.g., one feels threats in the air). In other cases, the emotion transmitted takes a specific object, namely the object of the emotion expressed by the infectious person (e.g., I am now anxious about the exam as I see you being nervous about it). Analogously, musical contagion could then elicit emotions that are about the "musical environment" (e.g., one feels threats in the music). Thanks to lyrics or titles, the emotion could also take specific content (consider songs about heartache). As the *Value Challenge* is the most pressing puzzle, I leave these speculations aside. It suffices to say that recent developments on emotional transmission provide new proposals to rebut the *Musical Challenge*. Philosophers still need to consider this future line of research.

Let me close this section by presenting a last burgeoning tradition on musical cognition that offers another promising direction of research, namely metaphor cognition. Philosophers have argued that musical experience is inherently metaphorical [163]: hearing music is perceiving tones as belonging to an acousmatic space organized by space and time. Likewise, the perception of emotions in music has been conceived in terms of "hearing as" understood in metaphorical terms [164]. Peacocke argues that perceiving music as *expressive* of some emotion is hearing music metaphorically as some emotion [165,166]. This proposal is in line with cognitive metaphor theory: metaphors are not merely poetic or linguistic entities, but primarily are ways of *thinking about* or *experiencing* the world [167,168]. Turning to emotions felt in response to music, psychologists have developed the *Geneva Musical Metaphors Scale* [169]: listeners associate music with metaphors of flow, movement, force, interior, and wandering. Pannese, Rappaz, and Grandjean suggest that metaphor mediates between the perception of emotion in music and contagion [170]. Metaphor cognition can thus offer a new account of contagion.

In fact, metaphor can potentially rescue cognitivism. One interesting hypothesis to be explored is that contagion involves the experience of metaphors for values. Music would not only sound like emotions, say, sadness, but also like values, say, dramas and unfortunate situations. This conception can be motivated in three steps: a minimal account of metaphor experience, empirical studies on expressiveness, and the tight interplay between affective and evaluative concepts. Metaphors—such as "Mary is the sun"—involve an isomorphism or structural similarity between two entities belonging to two domains, such as persons and celestial bodies [165]. Importantly, metaphors are based on the detection of *salient* properties of objects, i.e., features that immediately come into mind when people think about them (e.g., brightness for the sun) or commonplaces about them [171,172]. Crucially, metaphors also involve the transfer of properties from one domain to another: one "sees" Juliet as the sun (e.g., as bright and wonderful). Metaphor experience shares these features. Now, and this is the second step, we have described how listeners associate music with some emotions, for instance through the mechanisms of affective prosody. This suggests that listeners perceive an isomorphism between music and emotion based on salient properties of emotions (such as vocal expressions). Moreover, their experience involves the transfer of salient properties of emotions into music: one hears music as say, sad. As the criteria for metaphor experience are satisfied, one may interpret the findings as follows: when listeners experience expressiveness, they experience the music as a metaphor for emotions [165,166]. The last step consists of emphasizing that our folk concepts of values and emotions are intertwined: emotions are a salient feature of evaluative concepts, and vice versa. For instance, people immediately associate the value of the unfortunate with sadness (and vice versa). As observed, studies on social appraisal also reveal that the perception of emotional expressions is tight to value appraisal. A sad tone of voice is thus a salient property of sadness and of unfortunate things. Because emotions and values are

conceptually interlocked, experiencing music as a metaphor for *emotions* indirectly involves experiencing music as a metaphor for *values*.

In this view, contagion involves the appraisal of values through the veil of metaphor. The *Value Challenge* is thus rebutted. Moreover, the content of the emotion is the music. Indeed, the music itself is experienced as being isomorphic to emotions and values in the manner characteristic of metaphor. The view thus does not fall prey to the objection raised against the jazzercise effect. The *Object Challenge* is thus solved: musical arousal is directed at the music because the music is the object of evaluative cognition. Although the music is not appraised as unfortunate, it sounds like unfortunate things: it is appraised as a metaphor for unfortunate things. Unlike the proposal in terms of social appraisal, the emotion felt is not illusory: the metaphorical nature of the experience turns the emotion into an appropriate response. As for the metaphor account of expressiveness [173], the relation between metaphor and imagination still needs to be spelled out.

#### 4. The Paradox of Sad Music

Except for pathological cases, we usually avoid sad situations. Music is not an exception: people usually prefer to listen to happy music [174]. Yet, we love sad music: we enjoy it, seek it, and value it. By “sad music”, I mean music that we perceive as *expressive* of sadness and that has the power to *induce* sadness. Sad music is considered as among the most profound and beautiful musical experiences [175]. Music portraying sorrow and grief is often regarded as poignant partly because it addresses significant existential themes such as death, love, and social bonds [176].

Curiously, it appears that people listen to sad music especially when they feel sad [177–179]. Sadness and emotional distress are the best predictors for choosing to listen to sad music. Things are even more surprising since sad music often *increases* sadness [20]. Why do we love sad music? Why do people seek *sad* as opposed to, say, joyful music, especially when they feel sad? Are we musical masochists? This is the “paradox of sad music.” It is a paradox in the sense that our appreciation of sad music conflicts with our aversion towards sadness and sad stimuli in ordinary contexts.

It is worth noting that appreciating sad music is not pathological. Clinically depressed people have a strong preference for sad stimuli, including sad music. This often results in cognitive rumination or obsessive thinking about negative situations, which is dysfunctional [180]. However, not all love for sad music is like this. Healthy people are attracted to sad music too. In fact, sad music is used as a means of emotional regulation and thus contributes to well-being [116,176].

The paradox of sad music is an instance of the paradox of negative art, i.e., the task of explaining our appreciation of artworks and art forms that express and induce negative emotions [181], such as tragedy [182–184], and horror [185]. But sad music raises issues on its own. We do not only enjoy sad *songs* but also sad *pure* music. Unlike tragedy, horror, and songs, pure music does not present listeners with a narrative or fiction. For this reason, intuitive solutions to the other paradoxes, such as the idea that some narrations help us to experience or understand tragic or disgusting things [185], do not readily apply in the case of pure music, although they may explain our love for sad songs [186].

Of course, the problem does not arise if sad music does not elicit sadness but some pleasurable emotions such as feelings of appreciation. Yet, we have already raised challenges against this view (Section 3.4). People report feeling sadness, nostalgia, peacefulness, or tenderness when listening to sad music [187,188]. And we have already mentioned how sad music elicits emotions that are similar to sadness regarding physiology, expressions, and neuronal activity [128]. Let us assume that sad music elicits sadness.

Let us also assume that sadness is unpleasant; sadness feels bad. This negative tone is compatible with the idea that sad music can be pleasant. The experience may be a mixed feeling that encompasses sadness and pleasure, such as nostalgia. Still, it seems that the pleasure we feel is intimately related to the presence of sadness. Otherwise, we would seek happy music, as the latter tends to elicit pure pleasure. It seems, then, that we gain



something from feeling sad. What exactly? For reasons of space, let me briefly present the three most influential solutions to the puzzle.

#### 4.1. Emotion Regulation and Catharsis

A traditional idea that traces back to Aristotle is that music-evoked sadness results in a positive state of mind because it purges us from some negative emotion (“catharsis”). This proposal is in line with studies on the role of sad music in emotion regulation [59]. At the neurobiological level, it has been proposed that sad music induces elevated levels of prolactin [102]. Prolactin is a hormone responsible for lactation and modulations of stress responses. It is significantly released during sleep, after an orgasm, and when people feel sad, especially when they cry. It is associated with tranquility, comfort, and well-being—like after a good cry. This consoling and hedonic dimension of sad music sheds light on the pleasurable dimension of sad music.

There are various ways of understanding catharsis. Suppose that purging some negative emotion requires that the listener feels that emotion. This would be too restrictive to solve the paradox [189,190]. We may enjoy grief in music even if we are not currently grieving. Moreover, even when people listen to sad music to vent some negative emotion, the process does not always result in relief or the cessation of negative emotion [191]. Listening to sad music does not necessarily culminate in hedonic states; one may feel even more depressed after listening to sad songs all night long. And even when listening to sad music does result in positive feelings, the appreciation of sadness in music is satisfying in itself—before the relief [189]. Despite that, it is plausible to think that people listen to sad music in order to feel better, whether they succeed in feeling better or not. But this simply redescribes the paradox. Why would people seek out negative feelings as therapeutic means [150]? This remains mysterious. Why do people choose to feel sad when there are brighter means of feeling better, such as happy music? The paradox stands.

#### 4.2. Savoring Emotions

Levinson describes eight rewards offered by sad music [189,190]. His starting point is the idea that sad music does not elicit the full-fledged emotion of sadness but only the *feeling* of sadness. The main reason for this claim is that the feeling aroused by sad music is neither directed at the music nor does it involve the characteristic cognitive and behavioral elements of sadness (such as the belief that one has lost something valuable and the desire to retrieve it). Everyday life sadness indicates a problem to be solved, taints one future with darkness, and comes with action tendencies (one tries to remedy the situation). The feeling aroused by sad music is not like that. Unlike everyday sadness, sad music elicits feelings that are devoid of real-life implications. Hence, listeners are free to focus on the feeling itself. This opens the path for three important rewards.

The first reward is that of *savoring* sadness, just like we savor wine, for instance. Although the feeling of sadness is unpleasant, we can appreciate it because it is not accompanied by the strong unpleasantness of everyday life sadness. The unpleasantness of sadness is mostly due to its cognitive and behavioral elements that are absent in music-elicited sadness. This in turn gives listeners the opportunity to *understand* sadness (second reward) and to feel *self-assured* about their ability to feel strong emotions (third reward).

The other rewards depend on imagination. Music induces sadness via imaginative involvement with a persona (Section 3.5). Hence, the feeling is an empathetic response. This affords the reward of *emotional resolution*: in identifying with a persona, listeners imagine feeling the same emotion while listening to the progress of the music, and this elicits a sense of satisfaction, control, and emotional resolution. Because of this empathetic identification, listeners are also under the impression that they are expressing their own emotions (reward of *expressive potency*). In some cases, listeners may even feel connected with the artist, when they experience the music as the expression of the author or performer’s emotions. This is the reward of *Emotional Communion*.

This proposal is rich and has been empirically tested [187]. People report that they listen to sad music in order to *express* sadness, but also to *savor* it, to *understand* it, and to feel *reassured* about their emotional abilities. These motivations have been summarized as the reward of “no real-life implications”, which is more frequently reported than catharsis and mood enhancement. To a lesser extent, people report that sad music makes them feel connected and less lonely (“misery loves company”). Imaginative involvement is also among the most frequently mentioned motivations, although this holds for happy music as well.

Let me present four problems that nicely contrast this proposal with the second main approach (Section 4.3). The reward of resolution hinges on the idea that sad music results in satisfaction and relief. But as observed, listening to sad music often does not result in these positive states [4]. We simply do not experience satisfaction when the piece reaches its end. In addition, not all sad pieces have a happy ending: consider Tchaikovsky’s *Symphony No. 6* [150]. But we appreciate these works, nonetheless.

The rewards of emotional resolution, expression, and communion rely on the assumption that musical contexts, like artistic contexts more generally, allow some level of control on behalf of the audience. Our appreciation of sad music partly depends on this control. This contrasts with everyday life sadness, where control is absent or limited. However, Davies (ibid) emphasizes that control in artistic contexts is importantly limited too. True, one may decide to stop reading a novel or to leave a concert hall. But the engagement with artworks elicits emotions that are not under our control, as our emotions are guided by the artwork. Thus, control cannot be the key to our appreciation of sad music.

More importantly, in Levinson’s view, music-elicited sadness is still an unpleasant feeling, although to a minor extent than real-life sadness. This negative tone raises the following worry [150]: why would people be willing to feel sadness, as this feeling is unpleasant? Why would people want to savor sadness, considering that sadness feels bad? The puzzle remains.

Lastly, even if we assume that sad music comes with the practical benefits described by Levinson, this does not fully address the problem [4,191]. At best, this would explain why we *resign* ourselves to listening to sad music. For instance, we resign ourselves to going to the dentist and experience unpleasant feelings, as we expect a greater good. But we do not *resign* ourselves to listening to sad music; we happily embrace it. This suggests that our appreciation of sad music goes beyond its instrumental or practical value.

#### 4.3. Musical Understanding

According to Davies [29], feeling sad is the price we are ready to pay to *understand* some musical works (see also Goodman [192]). Feeling sad is a way of understanding sad music. Now, people are generally interested in music for the enjoyment of understanding music. This explains many musical choices and preferences. People can then enjoy sad music even when it makes them feel sad because this response yields understanding of the music. The emotion felt is welcome because it constitutes understanding. The appreciation of the feeling is not explained by music’s instrumental value; it is integral to musical understanding. Understanding music calls for positive *and* negative responses.

Scholars have doubted this picture. It is not clear why we would be willing to pay this price for musical understanding [189]. It does not appear that the cognitive reward of understanding a musical work outweighs the discomfort induced by sadness. Moreover, the account does not vindicate the profundity of sad music. Cognitive rewards do not explain why we are so fond of sad music. Moreover, in this view, we appreciate the feeling because it is a means to understanding music. But it seems that in sad music we value the feeling for itself—not just for the sake of aesthetic pursuits.

Most importantly, as acknowledged by Davies, this account leaves our puzzle untouched. One might still wonder: why are we willing to embrace sadness in order to understand music, as this feeling is unpleasant? Why not rather listen to and appreciate happy music instead, especially when one feels sad?

Davies argues that the case of music is not different from myriads of painful and unpleasant activities we enjoy [29]. We are just like that: we enjoy horror, macabre, and difficult things, as witnessed by our interest in the news, intense sports, raising a family, long-term relationships, or playing chess. We enjoy these activities for their own sake, not just for practical consequences. And our enjoyment of these activities depends on the unpleasantness and struggle they involve. Our interest in understanding sad music is no exception.

This may well be true. But this does not really explain the allure of sad music; it merely raises the issue of our interest in unpleasant things, which remains perplexing.

One promising future line of research would be to take into consideration the vast empirical literature on the attraction of sad music [19]. Not everybody loves sad music, and we sometimes avoid it. Who is attracted to sad music and when do people indulge in this love? Unraveling the situations and personality traits that predict the appreciation of sad music is central to understanding the phenomenon.

As observed, people especially listen to sad music when they are sad, but also when they feel alone, miss somebody, feel homesick, want to retrieve memories, need to be understood, need consolation, are in an introspective mood, want to relax, are tired or in nature [187,193]. Arguments, failures, frustrations, death, love-sickness, or break-ups are among the typical situations in which people resort to sad music.

We are not all equal in our love for sad music. Roughly, the chief personal determinants of the love for sad music are high levels of empathy, high capacity for absorption and imagination, introversion, openness to experience, and neuroticism [188,194]. In addition, low emotional stability and the tendency to ruminate are significant predictors of seeking sad music [194]. Developmentally speaking, it appears that the allure of sad music emerges quite late, as 3–8 years old children tend to feel aversion towards it [195]. A parent offers a poignant description of the paradox of sad music: “[A]t church, the hymns make him sad, and he wonders why in the world do we need to have so sad songs” (*idem*: 461). Philosophers have neglected this body of evidence, although it offers the barebones of an informed philosophical theory (see, however, [196,197]).

A promising philosophical proposal would consist of emphasizing the epistemic value of listening to sad music. As sad music elicits sadness, listening to it can help to exploit the epistemic value of sadness, such as acute critical thinking, analytic and realistic mindset, and reappraisal of goals [198,199]. Maybe our love for sad music can be partly explained by the resort to these epistemic benefits.

Finally, as observed earlier (Section 3.4), psychologists have recently paid attention to the role of being moved, in addition to sadness, in our appreciation of sad music [145], and of negative art more generally [200,201]. Philosophers need to explore this new solution to the paradox of sad music in more detail (see [202]).

## 5. Conclusions

This extensive review has presented the chief philosophical problems raised by affective responses to music in light of recent developments in affective science. It has revealed the paramount importance of musical emotions for understanding what emotions fundamentally are and how they contribute to the good life. For each main philosophical proposal, I have recommended future directions of research inspired by recent trends in emotion theory, hot topics in affective science, and synergies between them. As such, this article contributes to bridging the gap between philosophical and empirical investigations. It is time that these two bodies of knowledge interact more closely so as to mix philosophical rigor with the insights offered by experimental and real-life preoccupations.

The philosophy of musical emotions covers other puzzles that go beyond the aim of this review, such as the role of musical expectations [62], the question of the existence of music-specific emotions [127], the exposure effect on musical liking and preferences, the role of emotion in aesthetic and moral judgments [17], and issues specific to songs [186].

Yet I hope that this panorama has shown that the affective science of musical emotions is doing wonderfully well.

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