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# Musical Emotions and Timbre: from Expressiveness to Atmospheres

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## Abstract

In this paper, I address the question of how emotional qualities can be attributed to musical timbre, an acoustic feature that has proven challenging to explain using traditional accounts of musical emotions. I begin presenting the notion of musical expressiveness, as it has been conceived by cognitivists to account for the emotional quality of various musical elements like melody and rhythm. However, I also point out some limitations in these accounts, which hinder their ability to fully elucidate the emotional expressiveness of timbre, especially when considering it as a result of non-cognitively mediated processes. Consequently, I explore the link between timbre and atmosphere by reviewing anecdotal sources that have characterized timbre in terms of atmosphere. The goal here is to determine if these characterizations should be seen as merely allusive and metaphoric expressions or if they genuinely reveal essential properties of timbre. To achieve this goal, I delve deeper into the notion of atmosphere, and I show that it shares several key traits with the notion of musical emotions as conceived in the cognitivist's account. Both musical emotions and atmospheres are affectively charged externalities that are apprehended by the subject without cognitive mediation. Drawing from this insight, I conclude that the notion of atmosphere can serve as a valuable tool in explaining the emotional expressivity of timbre without invoking the resemblance-based mechanisms often found in cognitive accounts of expressiveness.

**Keywords** Music aesthetics · Philosophy of music · Musical emotions · Timbre

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## 1 Introduction

The issue of musical emotions is one of the most intensely debated in the philosophy of music. In general, the problem is one of how to account for a very common listening experience, that is, the experience of perceiving emotional or affective qualities in music and attributing them to music. For instance, when listeners characterize Rachmaninoff's *Vocalise* as a "mournful" or "sad" chant, are they describing a quality of the music or, rather, the emotions triggered by the music in the listener? Or the emotions that inspired the composer?

Similar questions have stimulated the debate among philosophers, giving rise to different answers (e.g., Davies, 1983, 2006, 2017; Kivy, 1989; Zangwill, 2004; see Ravasio, 2017, for a review), which can be distinguished into two main groups depending on the role attributed to emotions. On the one side are the emotivists, who hold that musical emotions are genuine emotions triggered by music in the listeners (e.g., "*Vocalise* is sad" means that this music makes me feel sad). On the other are the cognitivists, who assume that musical emotions are recognized in music owing to some cognitive mediation. A crucial role in this latter view is played by the notion of expressiveness (e.g., Radford, 1989), that is, the capacity of music to express affective or emotional meanings (see Benenti, 2020, for a broad analysis of the concept). In this paper, I will mainly focus on cognitivism and, especially, the notion of expressiveness[1].

The concept of expression has been evoked in aesthetics to explain the emotional contents of arts (Benenti, 2020). While in the context of visual arts (e.g., painting, sculpture, photography), the expressivity of works of art can be explained in terms of representation or depiction, issues arise when dealing with music, and especially with absolute music[2], as in the latter context the meaning of the term 'expression' cannot be conceived as being related to any form of representation (see Zangwill, 2004 and Kivy, 2006). Therefore, cognitivists have proposed alternative interpretations of the notion of expression for the case of music. In this paper, I discuss Davies' appearance emotionalism, which grounds musical expressiveness in the movement-mediated resemblance between affective qualities and musical features.

For Davies (e.g., 1994, 2008), music is emotionally expressive as it resembles bodily movements or behaviours that manifest emotional or inner states (see also Kivy, 1989; Larson, 2012; Hubbard, 2017). For example, sad music and human sadness perceptibly possess similar motion features (e.g., slow and small movements). In this respect, the expressivity of music is mediated by *similar emotional features*.

[1] There are several reasons that lead me to reject emotivism as a phenomenologically reliable explanation of musical expressiveness, particularly concerning timbre. While I generally concur with emotivists that a listener's emotions can play a role in our experience of musical expressiveness, I disagree with the notion that subjectively-felt emotions are essential for the emotional expressiveness of music. In line with Hanslick (1986), Allen (1990), and Zangwill (2004), among others, I contend that when someone describes music in emotional terms, no emotion is (necessarily) invoked as felt within the subject. Instead, the emotional quality pertains to the perceived properties of the musical object (see also Davies, e.g., 2017).

[2] Typically conceived as instrumental music not intended to represent or illustrate something else.

The point can be generalized by claiming that music perceived as X (i.e., with an "emotional" or affective quality) *manifests* features that are *perceived as* those that human beings show when they feel X. For example, when people feel sad, they move slowly, walk softly, and talk in hushed tones. Sad music perceptibly possesses similar features, such as a slow tempo, small interval leaps, a soft timbre, soft dynamics, and a minor mode.

Davies' account conceives musical expressiveness as essentially related to the phenomenal properties of musical stimuli and their resemblance to human movement. Importantly, such an account excludes the idea that musical expressiveness implies a conscious, occurrent recognition of the resemblance and then a further experience of association or recognition of the emotional quality involved; rather, the whole process is occurring sub-consciously, or 'under the surface' of what is experienced as an immediate perception. For example, seeing the sadness of a Saint Bernard's face or hearing the sadness of a funeral march does not require any conscious matchings between these percepts (a Saint Bernard's face or a funeral march) and any human gestures that are supposed to be prototypical of sadness.

Empirical evidence seemingly provides support for appearance emotionalism. Sievers and colleagues (2013) tested whether music and movement share a common structure that affords equivalent and universal emotional expressions. To this aim, they created a computer program capable of generating both music and movement; the former as simple, monophonic piano melodies, and the latter as an animated bouncing ball. Participants were asked to interact with the program to create a movement or melody that express the target emotion (e.g., happiness, sadness). Two different samples were tested, one from US and another from a rural village in Cambodia. Results showed that each emotion was represented by a unique combination of features which expressed the same emotion in both music and movement across cultures, thus strengthening the idea that the emotional expressivity of music (at least for the emotions tested) is mediated by similar dynamic features of movement and music.

While appearance emotionalism, along with other resemblance-based accounts, works well in explaining the expressiveness of musical features associated with movement, primarily melody (Sievers et al., 2013) and rhythm, it seemingly fails to account for the expressive quality of timbre. Timbre, a fundamental acoustic feature, is unmistakably perceived as emotionally expressive despite lacking any phenomenologically evident connection with (human) movement (Reymore et al., 2023). Such an objection weakens the explanatory power of resemblance-based notions in an account of expressive descriptions of music. In order to tackle this issue, I will propose an alternative account for timbre expressivity based on the concept of atmosphere.

The structure of the paper is as follows. In Section 2, I will review multidisciplinary evidence from the psychology of music to support the claim that timbre is perceived as emotionally-affectively charged, just like melody and rhythm. However, I will also demonstrate that the emotional expressiveness of timbre cannot be adequately explained using movement-mediated resemblance accounts, as is the case with melody or rhythm. In Section 3, I will shift focus to reviewing various interdisciplinary sources that have characterized timbre in terms of atmosphere. The aim

here is to determine whether these occurrences should be interpreted merely as allusive and metaphoric expressions or if they actually reveal essential properties of timbre. To do this, in Section 4, I go deeper into the notion of atmosphere, and I show that it shares several key traits with the notion of musical emotions as conceived in the cognitivist's account. Therefore, in Section 5, I suggest that the apparently naïve association between atmosphere and timbre might have a solid basis in the shared phenomenological qualities of atmosphere and timbre, and I conclude by claiming that atmosphere can usefully account for timbre expressivity without referring to any form of (movement-mediated) resemblance.

## 2 The Emotional Expressiveness of Timbre

In the psychological literature, timbre is often credited with much of the affective power of music. Empirical studies have largely demonstrated that affective qualities are consistently associated with timbre, for instance, brass instruments with cold feelings and reed instruments with lonely and melancholic feelings (Bruner, 1990). In Wallmark (2018), 'affect' turned out to be the most frequent category of timbre descriptor used in 11 orchestration treatises. Further perceptual studies showed that a dull spectral quality is associated with sadness in music, whereas the brash quality conferred by prominent high frequencies is associated with anger (Juslin, 2011, 2013). Notably, Hailstone and colleagues (2009) showed that timbre alone affects the perception of emotions in music independently of other acoustic, cognitive, and performance factors (see also Eerola et al., 2012; Hailstone et al., 2009).

Additional empirical evidence concerning an auditory feature essentially determining timbre, namely roughness, seems to support such a direct link between emotion and timbre, suggesting that rough and harsh timbre is perceived as negatively valenced because it evokes potential pain/danger (see Di Stefano & Spence, 2022 for a review on roughness, and Di Stefano et al., 2022 for the relationship between roughness and dissonance). For example, Arnal and colleagues (2019) demonstrated that the perception of rough timbre triggers neural networks classically involved in aversion processing. Interestingly, auditory roughness per se has been shown to trigger defensive reactions in humans with respect to non-rough stimuli (harmonic tone) in the absence of contextual information (Taffou et al., 2021). Therefore, these results seem to provide evidence of a neurobiological link between rough timbre and negative emotions, thus supporting the claim that emotional expressivity of timbre is *immediately* perceived as, and not merely resembling/associated with, something negative.

Taken together, these findings converge to suggest that timbre is an acoustic feature capable of conveying emotional factors as well as melody and rhythm. However, in contrast with melody and rhythm, which likely require more time to be processed, timbre is perceived on the basis of prereflective and prepredicative dimensions of consciousness, i.e., without involving deliberate processes of predicting, cognizing, attending or willing. This is further supported by psychophysical evidence proving that perceptions of emotional qualities of sounds occur very quickly after exposure to sounds (Filipic et al., 2010), thus excluding any contribution from high-level

cognitively mediated processes, such as inference or associative learning, from the perception of the emotional quality of timbre[3].

How can this evidence be accounted for in resemblance theories of musical expressiveness? Doing so seems difficult. Given the prominent role of movement in such accounts (e.g., Davies' appearance emotionalism), it is not surprising that the notion of timbre is underrepresented in the philosophical debate with respect to other features, such as melody and rhythm, as timbre seems less intuitively associated with movement than melody and rhythm (see, e.g., contour theory, Benenti and Meini, 2018)[4]. As demonstrated by the recent study by Reymore and colleagues (2023), in fact, timbre semantic associations are rarely inspired/mediated by the domain of movement, mostly referring to the visual appearance of objects, such as the material or haptic features of surface textures (e.g., raspy, smooth, brilliant). In order to answer this question, in the next section I will briefly consider anecdotal sources which talk about the atmospheric quality of timbre; then, I will more rigorously explore these allusive expressions, trying to assess whether and how the notion of atmosphere, as it has been conceptualized in the field of aesthetics and the arts, can represent a useful conceptual tool to approach the issue of the emotional expressivity of timbre.

## 3 The "Atmospheric Dimension" of Timbre

The term atmosphere has long been used by musicologists to address those musical parameters that cannot easily be quantitatively measured or assessed, such as timbre (or sound-mass) (Riedel, 2019). At the beginning of the last century, for instance, discussing Beethoven's *Fidelio*, Oskar Bie observes that the timbre of the trumpet and the C-major motive endowed the character Florestan with an "atmosphere much greater than the entire stage" (Bie, 1913, p. 221, see also Riedel, 2019). More recently, Morton (2007) defines timbre in an allusive way, conceiving it as a medium for the transmission of musical percepts which undermines the traditional boundaries between background and foreground in auditory perception, thus being pre-attentively perceived as having an atmospheric character. In the same line, Absaroka (2019) suggestively talks about the "atmospheric dimension" (p. 84) of timbre.

[3] Many hypotheses have been formulated to account for the emotional expressivity of timbre. According to Spencer (1857/1951), humans tend to associate a feeling with the sound that caused it; such an association establishes an affective connection between the subject and the environment mediated by timbre. In line with Spencer, Juslin and Laukka (2003) suggested that the emotional expressivity we perceive in timbre is related to its resemblance to human voice. For example, if human speech is perceived as angry when it has loud intensity and harsh timbre, a musical instrument might sound extremely angry in virtue of its louder intensity and harsher timbre. According to this account, we associate the timbre of a sound with the emotional states felt by a human being producing a vocalization presenting similar timbral features.

[4] The ancillary role of timbre in the literature on musical expressiveness might also be related to the blurred meaning of the concept with respect to more sharply defined notions such as pitch or rhythm (Wallmark, 2018), which are more easily and extensively investigated empirically.

The term "atmosphere" might have slightly different meanings in various cultural contexts (see Riedel, 2019, for a historical review). However, the consistent association between timbre and atmosphere in the highlighted occurrences indicates a potential semantic proximity between 'timbre' and 'atmosphere,' suggesting that the notion of atmosphere could provide insights into the nature of timbre. In this respect, it is worth noting that the two terms 'atmosphere' and 'timbre' have often been used interchangeably (see, e.g., Tellenbach, 1968). For example, commenting on Shakespeare's theatre, Hugo von Hofmannsthal extensively talks of atmosphere in terms of quality of sound (often used as an alternative term for 'timbre', e.g., Berlioz, 1882), which is ultimately coextensive with atmosphere characterized as "imponderable, impalpable, a nothingness that yet is everything" (Hofmannsthal, 1905, pp. 19–20).

Timbral features of sounds play a crucial role in creating aesthetic experiences and establishing the atmosphere in various audiovisual works, spanning from movies to video games (Herzfeld, 2013). One compelling example of this can be observed in horror movies, where music plays a significant part in shaping the atmosphere of tense scenes through the deliberate utilization of timbral features such as harshness, roughness, and noises (see e.g., Lee, 2019, for an analysis of Alfred Hitchcock's 'The Birds'). In such audiovisual contexts, the distinctive qualities of timbre serve as powerful tools to evoke specific emotions and heighten the audience's engagement. Through strategic manipulation of timbral elements in the music and sound design, filmmakers and creators can craft immersive and emotionally charged experiences, amplifying the intended atmosphere and evoking desired reactions from the viewers or players.

Interestingly, the atmospheric dimension of timbre has also been empirically confirmed in the recent study by Ehret et al. (2021), in which participants were invited to evaluate the atmosphere of music that presents different timbral features, namely, harsh and rough (e.g., Penderecki's "Threnody for the Victims of Hiroshima") vs. delicate and smooth (e.g., Grieg's "Morning Mood"). The results show that listeners perceive Grieg's music as evoking the most pleasant musical atmosphere and Penderecki's piece as evoking the most unpleasant musical atmosphere.

## 4 Defining Atmospheres

I will now attempt to delve deeper into the link between atmosphere and timbre in order to understand whether this connection is established on an allusive and metaphoric basis or if it is rooted in essential properties of atmosphere that might be related to timbre expressivity. To achieve this, I will examine the concept of atmosphere as it was originally conceived in the field of phenomenology and later explored in related fields of aesthetics and the arts.

The philosophical roots of the notion of atmosphere are in the "new phenomenology" of German philosopher Hermann Schmitz (e.g., 2005). The notion of atmosphere has also been applied to music and sound (e.g., Riedel & Torvinen, 2019), although it has rarely been directly evoked in the literature on music and emotions (see Bertinetto, 2019, for an exception). A significant contribution to the

conceptualization of atmospheres has been provided in recent decades by Böhme (e.g., 1993, 2000, 2001), who conceives it as an aesthetic concept (though see also von Hofmannsthal, 1905). Böhme characterizes atmospheres using metaphorical and allusive language, defining them, for example, as subjective-and-objective realities that appeal to or impress us while being neither objective nor subjective but somewhere *in-between* (Böhme, 1993). Such 'in-betweenness' and a subjective-objective mixed nature is quintessential in Böhme's understanding of atmospheres though it also likely contributes to conferring an ambiguous, if not vague, nature to the concept.

Other conceptualizations stress the *externality* of atmospheres as one of their defining traits. Atmospheres originate and spread out in space, thereby reaching the perceiving subject (Griffero, 2014, 2017). Such characterization is popular in the field of architecture, in which atmosphere has been conceived as the aesthetic and affective quality of the environment in which an individual is placed. For example, Kotler (1973) defines the *intended atmosphere* as "the set of sensory qualities that the designer of the artificial environment sought to imbue in the space" (Kotler, 1973, p. 51). In environmental studies, the externality of atmospheres is also assumed to confer on places the invisible character that makes them unique (e.g., the Capri-ness of Capri; see Seamon, 2021 and Anderson, 2009). In design studies, it has been extensively investigated how lighting shapes the atmosphere of places, thus affecting subjects' perceptions of those spaces (e.g., Stokkermans et al., 2018). The development of methods to quantify the perceived atmosphere of a space (e.g., Vogels, 2008), conceived of as a measure of the affective appraisal of the space, confirms that atmospheres are assumed to be attributes of space. For Böhme, atmospheres are "spatially discharged, quasi-objective feelings" (2006, p. 16). Interestingly, this concept aligns with an externalist model of affective experience that was present in the ancient Greek world and in which feelings are considered to be external to the subject (Griffero, 2014).

Externality implies that atmospheres are given to, rather than projected or inferred by, the perceiving subjects as features of the outer environment. Atmospheres are therefore apprehended by subjects without requiring any active or conscious cognitive mediation. Additionally, not perceiving them would be a highly demanding perceptual and cognitive task. For example, perceiving a funeral march as an affectively neutral or happy piece of music requires the mediation of abstraction and strong cognitive efforts, which might nevertheless be ineffective, thus suggesting that the perception of atmosphere is, at least to some extent, cognitively impenetrable. For these reasons, atmospheres have been occasionally considered the affective counterpart of what perceptual affordances are in the spatial environment (Arbib, 2021, p. 221 and ff; Griffero, 2022).

Atmospheres also have an essential *affective component*. In German, the term "Atmosphäre" relates to the concept of Stimmung ("mood," "attunement"), which indicates an affective state[5]. Perceiving an atmosphere, therefore, means first

[5] Interestingly, the German term "Stimmung", which is sometimes translated as the English word "atmosphere", was first used in reference to music to describe the tuning of instruments.

apprehending an *affective* quality of the surrounding space (Pallasmaa, 2014). Combining the features of externality and the affective component, some commentators have proposed conceiving of an atmosphere as a shared *affective space* (see, e.g., Griffero, 2014, 2017).

## 5 Timbre and Expressivity Through Atmospheres

Based on this characterization of atmospheres, I will now seek to investigate whether the seemingly allusive and anecdotal connection between atmosphere and timbre can be interpreted in a more direct and literal manner. To accomplish this, I will first demonstrate that the majority of affective experiences commonly referred to as musical emotions can be understood in terms of musical atmospheres. Supporting this assertion, I will show that the attributes commonly associated with atmospheres—externality, unmediatedness, and affectivity—also fundamentally apply to musical expressiveness. Once the link between atmosphere and musical emotions is firmly established, I will revisit the relationship between timbre and atmosphere, explaining it as mediated by their shared reference to musical emotions.

i) *Externality*. Both musical emotions and atmospheres are conceived as affective qualities that are rooted in the perceived stimuli, whether sounds or places (see, e.g., Di Stefano, 2022 and Macedo, 2015 on the spatiality of sounds). I suggest that musical emotions can be conceived in terms of musical atmospheres, which are in turn conceived as the objectively recognized affective qualities of stimuli. This satisfies Levinson's externality requirement for musical expressiveness, on which it "should be seen to *belong unequivocally to the music* – to be a property or aspect thereof – and not to the listener or performer or composer… the expressiveness of music is understood first and foremost as *belonging to and inhering in the music, not in oneself*" (Levinson, 1996, p. 91 and p. 94, emphasis mine). Moreover, the reference to externality highlights that atmospheres are *perceived in* and not *expressed by* music.
ii) *Unmediatedness*. Musical expressiveness results from a perceptual act not permeated by concepts or any cognitive inference, i.e., it is cognitively *unmediated*, or, as said above, cognitively impenetrable. This is also true of other acoustic features of sounds such as pitch, timbre, and melodic contour (e.g., we cannot hear an ascending interval as descending). Unmediatedness also characterizes Davies' account of expressiveness as being directly heard in music and not deduced from a self-conscious, cognitively mediated comparison of its features with human behaviour (see, e.g., Davies, 1994, 2006, 2017). As observed above, atmospheres are also apprehended by subjects without requiring any active or conscious cognitive mediation.
iii) *Affective or pathic dimension*. Similar to other externalities we perceive, musical atmospheres can affect our feelings. Although from a cognitivist's perspective this effect is not essential in the conceptualization of musical emotions, I acknowledge that it plays a role in the explanation of the 'emotional contagion' that might occur

when we listen to music. Entering a train station might trigger a feeling of loneliness, just as listening to happy music might make me feel happy[6]. Thus, we must acknowledge that affective responses matter when dealing with atmosphere, as well as music. However, the point is that there is no evident causal link between musical atmosphere and first-person induced affective states, which are therefore only contingently related to musical features[7].

An example from audiovisual perception can help illustrate how I conceptualize the perception of musical atmospheres. When I watch a movie, I consciously and actively direct my attention to the visual aspects, such as following the actions and facial expressions of the actors. However, simultaneously, there are other auditory features, such as the background music, that are synthesized as part of the experience without requiring active participation of my will, cognition, or attention. These auditory elements might also carry an emotional or affective quality, evoking feelings of joy, fear, or melancholy. Importantly, none of these features needs to be actively or deliberately intended by me; rather, they become part of the same perceptual process directed towards the movie. In this context, musical atmospheres can be understood as the emotional or affective qualities of the auditory elements that seamlessly integrate into the overall perceptual experience of watching the movie.

To summarize, I have shown that most of the properties that have been recognized as key to musical emotions are also essential for the traditional definition of the concept of atmosphere. In particular, both musical emotions and atmospheres (i) refer to perceptual contents directly perceived in external stimuli (i.e., externality); (ii) are apprehended by the subject without any active cognitive effort or inference (i.e., unmediatedness); and (iii) can influence the subject's inner state by triggering emotional responses (i.e., contingent affective dimension). This theoretical result forms the basis for an argument to the effect that, where people have so far been talking in terms of expressiveness or emotions, they might have actually been referring to atmospheres—hence, the concept of atmosphere can more adequately account for the kinds of experiences and phenomena that people have been trying to explain than the concept of expression.

## 6 Conclusion

I have argued that (i) timbre is perceived as emotionally expressive, but traditional cognitive accounts of musical expressivity based on movement-mediated resemblance cannot explain the expressiveness of timbre; (ii) timbre has been often described in terms of atmosphere; (iii) musical emotions share fundamental aspects

[6] However, a train station might also elicit happiness (if I am leaving for a vacation with friends), and happy music might elicit sadness if I am not in the mood for such music.

[7] Reflecting on the criterion for the artistic relevance of music-induced emotions, Ravasio (2017) has emphasized, inter alia, the causal relation between the listener's emotion and the artistic features of the music.

with atmospheres, as these have been consistently treated across phenomenology, aesthetics and the arts; (iv) the notion of atmosphere can be a useful tool to account for the emotional expressivity of timbre without evoking the resemblance-based mechanisms typically found in cognitive accounts of expressiveness[8].

The first claim is supported by evidence from psychology showing that timbre is consistently perceived as emotionally charged (e.g., Hailstone et al., 2009; Filipic et al., 2010; Wallmark, 2018). The second claim finds support from interdisciplinary sources across musicology and the arts, particularly in the audiovisual domain, where timbre is recognized for its atmospheric and affective power. The third claim is based on the similarity of core features of atmosphere and musical emotions, as conceived in the cognitivist view. Both musical emotions and atmospheres are affectively charged externalities that are apprehended by the subject without any cognitive mediation. Finally, the fourth claim is supported by observing that timbre resists explanation in traditional resemblance-based terms. Unlike melody—which can intuitively resemble movement—timbre lacks certain key phenomenal qualities that allow for primarily perceiving/conceptualizing it in terms of motion. Empirical findings further support this claim, showing that the interaction between perceived emotion and timbre does not depend on high-level cognitive mediation, seemingly excluding any inference or association by similarity; rather, this interaction is a robust effect driven directly by changes in the acoustic characteristics of sounds, such as attack and spectral content (e.g., Hailstone et al., 2009; Filipic et al., 2010).

The overall argument supports the idea that understanding the emotional expressivity of timbre necessitates a departure from traditional cognitive accounts and embraces the concept of atmosphere to provide a more comprehensive framework for explaining the nuanced interplay between emotions, music, and the perceptual experience of timbre. Moreover, the present view paves the way for empirical investigations into the relationship between atmosphere and timbre. For instance, future studies could explore how variations in timbre influence both the perceived atmosphere and the emotional expressiveness that listeners associate with a musical piece. Such investigations could be conducted in a cross-cultural context to explore potential cultural influences as well as being extended to include artificial listeners, such as machine learning algorithms trained to detect emotional features in music.

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## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest.

[8] A similar observation is in line with Noordhof (2008), who stated that the fact that we might notice resemblances between certain musical features (e.g., melody) and typically expressive behaviours (e.g., sadness), does not imply that whenever we experience music as emotionally expressive (as in the case of timbre), we necessarily hear it as resembling a human emotional expression. Moreover, resemblance-based explanations of musical expressiveness need also to face issues related to perceptual similarity across the senses (e.g., Di Stefano & Spence, 2023).

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