Minding the Gap
Conceptualizing “Perceptualized” Timbre in Music Analysis

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In the past decade, a growing music-analytic practice has emerged around timbre, a parameter long considered either irrelevant to musical structure or too unwieldy to tackle. This new practice centers on an understanding of timbre as a perceptual rather than physical (acoustical) attribute and privileges timbre as a bearer of musical meaning. Through a focused survey of scholarship on timbre from the 1980s to present, this article considers theoretical commitments and challenges that have attended the shift toward this subjective, “perceptualized” conception of timbre, particularly in light of music theory’s objectivist and structuralist disciplinary leanings.

Timbre’s perceptual immediacy belies the challenges it poses in music analysis. Not only does timbre fall outside the purview of traditional analytical systems, designed to uncover and model structural relationships of pitch and duration, it also challenges disciplinary biases and values embedded in these systems. I explicate this claim below by examining ways in which recent music-analytic approaches to timbre negotiate related ontological, epistemological and axiological concerns. I must first however clarify three assumptions about timbre that ground this discussion.

Assumption 1: Timbre is a subjective perceptual attribute of a physical sound event, distinct from the sound event itself [1]. “Perceptualized” timbre, a term coined by Cornelia Fales, is a product of physiological and cognitive operations on acoustic inputs—a reconciliation of incoming sensory data, through filtering and supplementation, with the perceiver’s beliefs about that data, to create a fused percept [2]. This subjective understanding of timbre entails that timbre exists “only in the mind of the listener, not in the objective world;” but also that it “must implicate the acoustical world to some degree at least—else auditory perception becomes auditory hallucination” [3]. This separation and tension between the physical and perceptual worlds holds implications for music analysis. Can timbre be accessed through analysis of a sound event’s spectral attributes? Can subjectively intuited percepts be “objectively” verified via acoustical data? Our recognition of this gap also highlights timbre’s fundamental difference from other parameters, like pitch: Whereas pitch percepts have clear physical correlates, supporting conflation of percept with sound event (objectification), timbre resists reification and is instead experienced qualitatively.

Assumption 2: Timbre is conceptualized metaphorically. Timbre resists representation in ways that other musical domains, like pitch and time, do not. Our conceptualization of timbre instead operates through language, in the identification of experienced qualities. A marked lack of domain-specific descriptors reflects the metaphoric nature of our understanding of timbre, which relies on reference to other sensory domains, especially the visual (e.g. bright/dark) and tactile (e.g. rough/smooth). Two connected aspects of these cross-domain metaphors are noteworthy. First, our common timbre metaphors are not arbitrary but are grounded in embodied experience. As Zachary Wallmark demonstrates, our standard timbre metaphors can be understood as “indexes of bodily relations to sound,” reflecting our experiences of sound as produced through interactions of bodies and material sources [4]. Second, the shared “experiential structures” underlying these mappings yield remarkable consistency (intersubjective correspondence) in our use of timbre metaphors. Although the lack of a standardized “technical” vocabulary and notational system for timbre presents challenges, it by no means precludes intersubjective agreement.

Assumption 3: Timbre performs essential work. In a frequently quoted statement, Fales seems to relegate timbre to the realm of the ontological: “To the general listener, pitch and loudness are variable characteristics of sound, timbre is a condition; pitch and loudness are things a sound does, timbre is what a sound is” [5]. From a music-analytic perspective, this places timbre in a precarious position. As Wallmark riffs, “Musicologists tend to focus on those parameters of sound that do things: pitch, harmony, rhythm, and form” [6]. In this scenario, timbre is shunted into a subordinate role, extrane-
ous or supplemental to structure. Fales, however, immediately counters her opening assessment by saying, “Given that timbre is critical to human contact with the environment and a sonic dimension we track with peculiar sensitivity, given that timbre is routinely cited as one of the four parameters of sound, the fact that it attracts so little attention becomes itself part of the mystery: timbre seems to do its considerable work with secretive discretion.” The question, of course, is: What work does timbre do? The answer, increasingly suggested in music-analytical work, is that timbre signifies.

The roots of contemporary scholarship on timbre extend into the mid-1970s, in Robert Erickson’s Sound Structure (1975) and Robert Cogan and Pozzi Escot’s Sonic Design (1976), but it was a flurry of activity in the mid-1980s that ushered timbre analysis into music theory’s mainstream [7]. Significant works from this period include Robert Cogan’s New Images of Musical Sound (1984), Wayne Slawson’s Sound Color (1985) and Fred Lerdahl’s “Timbral Hierarchies” (1987) [8]. More recently, a new generation of scholars has contributed to an emerging discourse around timbre, one centered explicitly on perceptualized timbre’s ability to convey meaning. Their approaches reflect a number of influences—including Fales’s article, a growing body of scholarship on timbre in popular music and related work on musical meaning, embodiment and cognition. Recent works to be discussed are Rebecca Leydon’s “Clean as a Whistle: Timbral Trajectories and the Modern Musical Sublime” (2012), Karen Siegel’s “Timbral Transformations in Kaija Saariaho’s From the Grammar of Dreams” (2014) and Megan Lavengood’s “A New Approach to the Analysis of Timbre” (2017) [9]. Before examining these authors’ ideas, I will first review the historical context in which they arose.

Timbre’s arrival within the music-theoretical mainstream coincided, interestingly, with that of phenomenology, through the works of Judith Lochhead, Thomas Clifton and David Lewin [10]. Maryam Moshaver’s recent reading of Lewin’s essay, “Music Theory, Phenomenology, and Modes of Perception” (1986), as a response to Joseph Kerman’s “How We Got into Analysis, and How to Get Out” (1980)—a polemic against entrenched objectivist biases and formalist analytical methodologies—offers a reminder of music theory’s decidedly structuralist orientation at the start of the decade [11]. Lochhead, Clifton and Lewin were not concerned primarily with timbre, but their advocacy of an analytical practice grounded in listener perception and requiring the negotiation of relationships between the physical and phenomenal worlds is echoed in recent work on timbre. Lochhead, in particular, emphasized a focus on “features of music which are not given by notation or by acoustical analysis” and, even more significantly, stressed the empirical reality of experience, noting that “phenomenological philosophy... allows a structural status to the phenomena of experience and reduces the epistemological hierarchy which relegates certain sorts of knowledge (e.g., knowledge through hearing) to the level of subjective unreality” [12].

In adjacent disciplines of composition and music psychology, technological advances in digital analysis and synthesis had supported an increasingly robust understanding and control of sound. Saariaho’s frequently cited article “Timbre and Harmony” (1987) foregrounds a link between technical control and growing compositional interest in timbre during this period [13]. But objective conceptions of sound, here conflated with timbre, as multidimensional and scalable seemingly conflicted with subjective conceptions of timbre as unitary and qualitative. Awareness of this epistemological tension emerges with some frequency during the 1980s, as in the origins of Lewin’s phenomenology essay “as an intervention in the emerging scientific discourse around music perception,” and in Phillipe Manoury’s exhortation to fellow composers that, given unprecedented control over sounds’ components, it remains up to them “to have the necessary clairvoyance to know how they will be perceived” [14].

With this context established, I turn to more recent scholars’ approaches to timbre. My intent is not to present comprehensive expositions but rather to sample and explore these authors’ beliefs about the nature and work of timbre and the extent to which their approaches—their methodologies and values—conform to or reject a lingering disciplinary tendency toward structuralism. I structure the discussion loosely around the three assumptions about timbre given above, and I proceed chronologically, examining connections and contrasts between works to offer a window on the developing practice around timbre.

Unquestionably the most influential aspect of Cogan’s New Images of Musical Sound is his use of spectral imaging to uncover relationships of sonic resemblance and contrast. The book opens with a set of spectrum photographs of a variety of vocal, instrumental and electronic and tape music. Cogan introduces a set of context-dependent binary “oppositions” (such as “compact/diffuse” and “sparse/rich”) to describe sound characteristics as revealed in these images. A quantitative process of tabulation and comparison is then said to reveal how “sonic characteristics combine and work together to create sensations of direction of sonic transformation” [15]. Cogan assigns timbre “work” in relation to the shaping of musical experience, but his vector approach and especially his use of the spectral-image-as-piece are perceptually questionable.

The problem is not the use of a visualization of sound per se; the problem is the substitution of the visualization of sound for the experience of sound—implying it represents the perception of the listener, negating the process of perceptualization. But spectrograms and other means of accessing the acoustic properties of sound can play a role in perceptually oriented treatments of timbre, by suggesting potentially perceptible relationships or serving as a measure of perceptualization, in that the extent to which the signal and a listener’s perception correspond reflects the degree to which perceptualization has acted [16].

Slawson and Lerdahl both espouse structuralist approaches to timbre, essentially seeking to “elevate” timbre by demonstrating that it can do the same kind of work as pitch. Both depart explicitly from Schoenberg’s conception of a “tone color melody” governed by “a kind of logic entirely equiva-
lent to that logic which satisfies us in the melody of pitches,” leading them to construct timbral theories that mimic existing theories of pitch relations [17]. In Sound Color, Slawson defines four timbral “dimensions”—openness, acuteness, laxness and smallness—in relation to which he organizes sound-color space and defines sound-color transformations of transposition and inversion. In “Timbral Hierarchies,” Lerdahl constructs timbral analogs of the grouping structures, designed to model our hearing of pitch relations, described in his work with Ray Jackendoff, A Generative Theory of Tonal Music [18].

The different degrees to which pitch and timbre are perceptualized poses a challenge in the creation of timbral analogs of pitch continua. Both Slawson and Lerdahl rely on listeners’ perceptual acts in defining relationships between timbre “objects.” Lerdahl, for example, describes his timbral intervals as involving distance “judged not by acoustic specification but by perceived difference (as psychologists know well, there is often a discrepancy between the two),” and he appeals to sensory experience in his classifications of timbral consonance and dissonance, relationships he asserts are best intuited: “Along any particular dimension, one can feel timbres becoming more consonant or dissonant. . . . It seems to me only sensible that timbral consonance and dissonance be developed not on some arbitrary foundation but on the sensory experience of timbre” [19].

Lerdahl’s notions of perceived orderings and distances resonate with contour theory, a connection made by Siegel. Siegel’s approach incorporates aspects of the three assumptions previously discussed and strikes a balance between subjective experience and objective formalism. Like Slawson, Siegel models perceived timbre through reference to isolated sound dimensions and their interactions—Siegel’s contour vectors track noise, vibrato, airiness and brightness—and like both Slawson and Lerdahl, she takes a subjective approach to scaling these sound attributes. Although Siegel stresses that her methodology, in general, “minimizes the focus on the quantification of timbre,” she also does make use of acoustical data to shape and confirm her perceptions, noting, “I supplemented my subjective perception of the relative brightness . . . with information from experimental research in acoustics and psychoacoustics” [20]. Overall, Siegel suggests that timbral contours reveal patterns of tension and release, within and between dimensions, echoing Cogan’s and Lerdahl’s views on timbre’s contribution to our perceptual experience of music.

Other recent scholarship suggests that timbre can serve an additional role: carrying meaning. Rather than engaging timbre’s perceptual nature to substitute intuition for quantification, these works espouse the more fully perceptualized understanding of timbre advanced by Fales, in which subjective construction of timbre is influenced by embodied knowledge of the physical world and by sociocultural understandings, opening paths of meaning.

An important component of Fales’s theory is the notion that, while the process of perceptualization usually passes unnoticed, specific types and arrangements of timbres can move the listener, within their own perceptual world, to different positions relative to the acoustic world, positions reflecting “auditory processes differing in quality and degree, and resulting in different sensory reactions”—for example, “from a more or less vague sense of perceiving something normally imperceivable, to an unaccountable feeling of transcendence or separation from the earthly world (as sources)” [21].

In “Clean as a Whistle: Timbral Trajectories and the Modern Musical Sublime” [22], Leydon leverages Fales’s notion of timbre’s signification of embodiment and transcendence to create an interpretive framework. Sonic manipulations effect perceptual and contextual shifts along a timbral continuum representing varying degrees of corporeality, ranging from (in Leydon’s terms) “incorrigibly fleshy” inharmonic noises, including respiration and buzzing, through fused timbral percepts corroborating the materiality of a sounding body, to gradually fracturing percepts revealing previously concealed harmonics and ultimately to sinusoid purity. Leydon reads these shifts or “timbral trajectories” as narrative mappings: In Stockhausen’s Gesang der Jünglinge, for example, the recorded and fragmented vocal line—embodied, as its source is still identifiable—contrasts and interacts with disembodied, ethereal sine tones in a liminal zone, whereas in Crumb’s Black Angels, noise and purity, as evil and good, are revealed to be nestled within one another.

In her study of timbre in 1980s popular music, Lavengood offers a different perspective on the constitution of meaning through convergences and divergences of perceived timbres and their acoustic signals. Lavengood’s methodology includes analysis of spectrograms through a system of oppositions—a refinement of Cogan’s system—as an initial step, but then incorporates this data into a broader interpretive framework, including comparison of equally valid and valued perceptual and physical information. Convergences, Lavengood suggests, can provide empirical support for normative metaphoric associations, while divergences raise questions, not about “correctness,” but about why the divergences occur. As an example, Lavengood considers why a musician has described an instrument, the Fender Rhodes, as having a “warm” sound—in comparison with the Yamaha DX7’s electric piano sound—when its metallic sound would likely not register as “warm” in other contexts. Spectrographic analysis reveals slight differences in the instruments’ attack and decay profiles, providing a possible acoustic reason, but Lavengood suggests another, related reason as well:

Warmth is an inherently tactile analogy for describing timbre. I suspect that [the musician’s] sense of warmth corresponds just as much to the Rhodes’s touch as to any acoustic phenomena. . . . The corporeal feedback of physical action vs. digital action undoubtedly corresponds to and influences his feelings about the lack of warmth in the DX7 timbre [23].

At the outset of the above discussion, Lavengood lays out a road map for her reader, setting her goal as the demonstration of “relationship between the sound of the ’80s and timbre, reception history, aesthetics, and culture,” and then promising that “although I proceed from a technical analysis...
of spectrogram images, I will show that what listeners describe as ‘warmth’ is sensed not only through the observable acoustic phenomena, but also through culturally-contingent metaphors and perception” [24]. This promise encapsulates the significant progress that has been made on the “timbre problem” in recent years, as well as reflecting the extent to which our discipline has broadened since the mid-1980s.

In essence, what Lavengood maps is a bridging of the gap between the physical and perceptual worlds, accomplished through explicitly engaging and finding promise in the tension between the tools of spectrographic representation and a phenomenological perspective. Increasingly, music-analytic work on timbre centers on this negotiation, reflecting developments in our understanding of timbre over the past few decades. On the one hand, technological advances, including the ready availability of spectrograms, have made it relatively easy for analysts to access and integrate information about sounds’ spectral structures into their works—certainly far easier than it would have been in the mid-1980s. On the other hand, the emergence of an understanding of timbre as subjectively constructed and contingent upon metaphor (assumptions 1 and 2 above) has been accompanied by a disciplinary shift increasingly acknowledging the empirical reality of subjective experience alongside objective data (an epistemological stance fundamental to the phenomenological perspective).

Substantial work remains to be done before timbre is truly in conversation with music analysis. This includes work related to mechanisms of perception and cognition, generally, as well as work related to the fundamental question of what exactly it is that timbre does (assumption 3). How does timbre inform our musical experiences? Current research points toward both a structural role, in terms of the creation of perceived patterns of tension and release (Siegel, building on Cogan, Slawson and Lerdahl), and one of signification, via networks of meaning encoding embodied knowledge of the physical world and sociocultural associations (Fales, Leydon and Lavengood). Both center on perception and—to varying degrees—a perceptualized understanding of timbre, and both intersect—in varying ways—with the acoustic data from the physical world. This notion of a variety of possibilities resonates with Lochhead’s observation that “what is phenomenologically present in experience reflects training, beliefs, expectations, or more generally, possible ways of listening to a musical presentation” [25]. Perhaps the most that can be said at this early stage in the analysis of timbre is that minding the gap between the subjective and objective timbral worlds may well open the doors to richer musical experiences.

References and Notes

22. Leydon [9].

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