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Dedication

The Conference organizers would like to dedicate these proceedings to the memory of Kani Karaca (1930-2004), in appreciation of his musical achievements, and for his generosity in granting us one of his last performances, in a completely new context.

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TIMBRE AS AN EXPRESSIVE DIMENSION IN MUSIC

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Anthropologists tell us that music is much older than civilization, which is assumed to have started with the invention of writing, about seven thousand years ago. Together with spoken language and religion, music is a universal attribute of humankind, and its universality has often been related to its expressive and affective powers. Indeed, one of the earliest written references to music in the West, a Sumerian inscription in cuneiform from about 2400 BCE, is about the powerful effects musical sounds were valued for. Accordingly, music was used in ancient Mesopotamia ...

To fill the temple court with joy
To chase the city’s gloom away;
The heart to still, the passions calm,
Of weeping eyes the tears to stay.¹

The nature of musical expression constitutes one of the central issues in Western musical aesthetics, and historically two stances can be discerned in this regard: one is known as formalism, and the other is what I shall refer to as the evocative tradition. The basic thesis of formalism is that the meaning of music resides singly in its structural relationships and that any expressive significance it may involve is purely and peculiarly musical. According to the evocative view, on the other hand, the intelligibility as well as the expressive powers of music arise from its capacity to point to, i.e. to symbolize and evoke, non-musical experiences. The majority of writers in the history of Western musical thought have maintained that music is indeed evocative in this sense. Even the most notable advocates of the formalist tradition, including Eduard Hanslick and Igor Stravinsky, contended that there is in our musical experience a dimension that inevitably evokes phenomena of a non-musical kind. Hence, Hanslick, who argued that the essence of music is only sound and motion, would nevertheless concede

¹ Quoted in Hadington 1977: 13.
music the capacity to represent the dynamics of inner movements that characterize our emotions. As for Stravinsky, while he stated, in his often-quoted words, that “music is, by its very nature, essentially powerless to express anything at all” (1936: 53), he would not hesitate to describe one of his own compositions dedicated to the memory of Rimsky-Korsakov in terms of its expressive, symbolic content, i.e. as a ceremony of “all the solo instruments of the orchestra [filing] past the tomb of the master in succession, each laying down its own melody as its wreath against a deep background of tremolo murmurs simulating the vibration of bass voices singing in chorus” (1936: 24). As music psychologist John A. Sloboda writes, “somehow the human mind endows sounds with significance. They become symbols for something other than pure sound, something which enables us to laugh or cry, like or dislike, be moved or be indifferent” (1985: 1).

Various writers within the evocative tradition have based their arguments on the assumption that at the root of musical expression are the formal resonances—or the isomorphism—between musical structures and various other kinds of human experiences. Accordingly, listeners experience music as intelligible and expressive due to the structural similarities to non-musical phenomena such as speech, emotions, and bodily movements. The tradition of finding correspondences between music and these kinds of human experiences can be traced back to ancient Greeks who conceived of the structures of music, poetry, and dance as naturally isomorphic, and used the same word—

mouike—to describe all three arts. Later periods of Western musical aesthetics and theory are each distinguished by the emphasis given to language, or emotions, or bodily movements in discussions about musical meaning and expression. For example, during the late sixteenth century—the early Baroque period—

theorists were preoccupied with the relationships between musical structures and the dynamic patterns of the emotions, and their hypotheses were glorified as the Doctrine of the Affections. During the seventeenth century, the emphasis shifted to the structural similarities between music and oratory, both of which aimed to move the affections of the listener. With the 18th century came a synthesis of these prevailing views: accordingly, the dynamic patterns defining emotions were most clearly manifested in the voice, and therefore the meaning and expression of music arose from its capacity to imitate the voice delivering an impassioned speech or song. As we come to more recent times, we find an increasing interest among music theorists in explaining musical experiences by reference to bodily movements, or to so-called body-image schemas; their main assumption is that we experience musical phenomena as meaningful

and expressive due to a metaphorical mapping of our bodily experience of the physical world onto music.

Writers within the evocative tradition have scrutinized essentially two variables of music in their discussions of musical expression and symbolism: pitch and rhythm. For instance, the Baroque Doctrine of the Affections is centered on the structural resonances between various affects such as anger, fear, love, tenderness, etc., and specific rhythmic patterns and intervals. Recent studies on the relation between music and body image schemas are again based on the relationships between melodic, harmonic, rhythmic movements in music and bodily motion.

In comparison to pitch and rhythm, timbre has received very little attention in studies of musical meaning and expression, partly because there has not been much consensus among music theorists and psychologists on the precise nature of this complex musical phenomenon. Until the advent of computer technology, which greatly contributed to our understanding of timbral phenomena, the prevailing conception has been that timbre is determined acoustically by the presence and strength of particular overtones. According to this conception, which originated around the mid-19th century particularly as a result of the discoveries made by Hermann von Helmholtz, timbre is brought about by the spectrum of the steady state of a tone. Recent investigations, however, have revealed that other factors—including the attack, the temporal evolution of the spectrum during the transient phases, and noise—are crucial in determining timbre. Furthermore, it is common knowledge that the way an instrument is played can profoundly alter the resulting timbre. Hence, unlike pitch, timbre does not present a single scale along which tones can be ordered, and in this sense, it is regarded as a multidimensional phenomenon. In spite of all the recent advances, however, there is no substantial work on the expressive and symbolic functions of timbre in Western music.

Before discussing timbre in its musical capacity, a brief remark on the significance of the timbral dimension in our aural experiences is in order. Human beings are universally sensitive to the timbral attributes of sounds, and as in the case of pitch and rhythm, timbral semantics has biological, psychological, and cultural bases. In the case of pitch and rhythm, our biological make-up predisposes us to respond with (often negative) affect to sounds with very low pitch, or to rhythms that unfold very slowly. Whether

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2 Carl Stumpf already discovered in 1910 that when the initial transient or the attack of tones played by various instruments was removed, listeners could no longer identify the instruments (Stumpf 1910).
humans are universally predisposed to respond to certain timbres in similar ways has not been investigated; however, many—if not all—humans experience the screech of a chalk, for instance, as disturbing and even painful. This is a very basic, almost elemental response that takes place without any need for cognitive processing to decipher the meaning of the sound. The universal sensitivity of humans to timbre is closely related to the fact that one of our basic means of communication—i.e. our own voices—consists of rich palettes of tone colors. There is much evidence indicating that humans employ timbral information of the voice in detecting and identifying various emotions. Even very young infants are sensitive to subtle shifts in vocal timbre expressive of affect. For instance, according to research carried out by Alf Gabrielson and Patrik N. Justin (1996), sadness is associated with dull timbre, anger with spectral noise, happiness with bright timbre, etc. Since the inner feel of emotions is largely distinguished by their dynamic shape, speed, and intensity, the kinds of associations reported by Gabrielson and Justin may be rooted in the isomorphisms we detect between the movement and transformation patterns heard in the temporal unfolding of a sound’s spectra, and the dynamics of emotions. In this connection, Denis Smalley writes that motion and growth processes are not exclusively or even primarily sonic phenomena. Energy, which is inherent in spectral motion, belongs both to sounding and non-sounding experience. Motion, growth, and energy can be regarded as having a sonic reality but they can also be interpreted metaphorically and symbolically. (1994: 37)

Hence, spectromorphological features of sounds, i.e. their timbres, can evoke non-musical phenomena related to motion, including emotion. The affective meaning of vocal timbres is closely related to the idea of timbre as the cause of a sound. It is well known that the manner of physically initiating and sustaining a sound, i.e. the gestural aspect in producing it, is one of the decisive factors for its timbral identity. The timbral variations that we hear in the voice expressing an emotion are related to the physical gesture that produces the sound; vocal gesture, in turn, is related to the state of the muscles of the vocal apparatus. Researchers argue that each emotion is characterized by a specific imprint in the muscular structure of the vocal organs, and it is these changes that lead to the characteristic timbral changes in the voice for each affective state of the speaker (Scherer 1995). It can be argued that these gestural imprints that we naturally identify in the voice serve as paradigms for attributing expression to instrumental tones. The similarity of the articulatory gesture behind an instrumental tone to a vocal gesture—in terms of speed, intensity, and motion—evokes the affective content of the vocal tone. It is due to such evocation that gesturally sensitive instruments have traditionally been regarded as capable of producing “singing” or “declamatory” tones; indeed, one way of ordering instrumental timbres is through their closeness to the voice in this sense.

A similar line of recent research concerning the motor aspects of timbre perception takes the sound-producing bodily gestures—rather than vocal ones—as fundamental. Accordingly, humans categorize sounding events on the basis of the actions involved in producing them, such as hitting, striking, blowing, kicking, scraping, etc., and timbre perception and cognition are related to the features of sound-producing actions. The gestural experience of producing a sound in the physical world interacts with its perception. Hence, this motor theory holds that “a definite component of what we do as listeners involves … a form of kinesesthetic empathy, an identification with the embodiment of a sound” (Mead 1999: 10). There is not much work on whether such gestural information that reaches our ears through timbre indeed evokes specific affective states, or is expressive in non-iconic ways. My intuition is that it would require an additional step—one we normally do not find in the case of vocal gestures—to relate the action in question to an affective state. For instance, the sound of someone scraping a surface with vigor may evoke anger only if we associate the action that we imagine ourselves as hearing, with anger, rather than directly relating the timbral quality of the sound to anger. Thus, vocal gestures—rather than bodily ones—function as primary timbral referents in attributions of affective meanings to non-vocal sounds.

The source-cause dimension of timbre has been a central topic of discussion in recent literature on electro-acoustic music, as the interactive relationships between a sound and a source or causal agent may not be clearly established in this medium. According to one writer, “in the listening process of traditional Western music we have always been very aware of instrumental and vocal sources,” and “the possibility (or impossibility) of source recognition seems to be a crucial aspect of the comprehension of electro-acoustic music” (Ten Hoopen 1984: 61; emphasis added). In contrast to this commonly accepted view of “traditional” Western music among writers on electro-acoustic music, theorists of the tonal and non-tonal repertoire have complained that most analysts view the listening experience as almost a disembodied process of engaging with a totally abstract structure, such that the contributions of the physicality of the sources and of music-making to musical meaning are disregarded. Indeed, it is this
presumed neglect that has led to the recent interest in re-evaluating some of the basic concepts of music theory—such as musical space, tonal attractions, and musical motion—in terms of body-image schemas. Those opposing perspectives on the way traditional Western music is heard derive in large part from a peculiarity of the phenomenon of timbre: since timbre is one of the primary perceptual means for sound-source recognition and identification, it is perhaps the most objective of aural phenomena directly pointing to physical reality—to the matter of sound. At the same time, timbre is phenomenally the least mimetically available attribute of sounds: unlike the pitch and rhythmic dimensions, we cannot faithfully reproduce in our voice the timbres of most natural events and of musical instruments. Thus, timbre can be seen as the least embodied, and in this sense, the most fleeting and abstract attribute of a sound. These peculiarities do not involve, however, a contradiction but point to a dimension of the aural world that only timbral phenomena can represent. Timbre is in fact not only about the matter of sound, but more precisely, about the meeting and interaction of matter with force: it is the experiential result of the constant attunement between the force initiating and sustaining a sound and the responding sound-body. In hearing timbre, we hear the boundary between the most concrete and the most abstract of all phenomena, i.e. the boundary between matter and force. Metaphorically, we can say that timbre is the voice of matter as it converses with force.

Now, contrary to what most theorists of electro-acoustic music claim, the essential difference between "traditional" and electro-acoustic music is not that in the former the material cause of sounds is always recognizable by listeners. I would like to argue that it is rather our experience of the permanence of the source/sources that distinguishes the music of the tonal/non-tonal and electro-acoustic repertories. Indeed, in "traditional" Western music, it is this permanence that allows us to focus on non-timbral musical structures in the listening process; source-permanence causes us to take the existence of a material source for granted, so to speak, and pitch and durational features can be experienced as abstract structures. In this connection, Pierre Schaeffer's words are revealing: he writes that "instrumental activity, the visible and first cause of every musical phenomenon, has the distinctive quality of tending first and foremost to cancel itself out as a material cause" (Schaeffer 1966: 43).

The dimensions of timbre I have discussed so far, namely the connections with the source and gestural cause of sounds are local, i.e. short-range phenomena. Indeed, many writers have regarded timbre as the primary element in music, lacking large-scale structural significance. According to this view that regards pitch structures as primary, timbre serves to highlight the formal divisions, tension and relaxation patterns arising from pitch relationships. While instrumentation certainly plays a role in the expressive meaning of music—recall, for instance, Mozart's representation of the terror of the Commedia in the final act of Don Giovanni through horns and trombones playing fortissimo—timbre in this view functions as a local, expressive intensifier.

The expressive meaning of timbre in traditional Western music is not, however, limited to its local functions. The subjective constancy and permanence of the sound-source(s) that we experience provide the grounds for the large-scale significance as well as the symbolic power of timbre. A few words on the notion of "subjective constancy" would be appropriate here. Research on timbre has revealed that "the transients and steady-state frequency spectra change dramatically from note to note across an instrument's playing range" (Handel 1991: 170). For instance, the number and amplitude of the spectral components for low and high notes of a piano are very different. Yet, we experience the timbre of a piano as the same through all its registers. The human voice when articulating different vowels, and in different registers also produces very different timbres. Our knowledge of the timbral identity of instruments is acquired culturally through long-term exposure to their timbral behavior. The process of identification based on the subjective constancy of vocal and instrumental timbres is hence "a complex cognitive task which involves much more than a preordained, specific amount of acoustical data. Rather, the listener must also utilize musical knowledge (i.e. the playing range of certain instruments, whether or not they are commonly played with vibrato, etc.) in order to make an informed judgment" (Hajda et al. 1997: 267).

It should be noted here that it is not only our knowledge of the timbral identity of instruments that depends on cultural familiarity; the associations of instruments with various frames of mind are also cultural and in this sense rather arbitrary. For instance, the associations of the organ with religiosity, of the harp with celestiality, or of the trumpet with regality are based on Western musical practice.

Once we conceive of the essence of timbral phenomena in music as permanence-through-change, then the large-scale timbral structure of music can be heard as evolving and expressing selfhood or personality through formal resemblances. Indeed, in the words of music phenomenologist Don Ihde, "there is an old and deeply held tradition that vision 'objectifies,' and, conversely but not so widely noted, there is also a tradition which holds that sound 'personifies'" (Ihde 1976: 21). Among various non-sounding
phenomena that represent permanence-through-change, the most fundamental is the one we refer to as the self or as personality.

Indeed, even a cursory glance at historical sources would show that the large-scale expressive meaning of timbre has often been related to the notions of selfhood and personality, and that the integrity of an instrument has been based on its timbre. Plato, for example, in Book 3 of his Laws, where he describes the musical activities in a corrupt society, and refers to them as “lawless innovations,” writes that the musicians involved in these practices “were men of genius, but they had no perception of what is just and lawful in music. [They] imitated the sounds of the aulos on the lyre [and] ignorantly affirmed that music has no truth, and whether good or bad, can only be judged of rightly by the pleasure of the hearer.” According to Plato, then, instruments have personalities and ethical characters and should behave according to their nature. Another example along similar lines comes from the writings of Charles Avison, an 18th-century writer on musical aesthetics. In An Essay on Musical Expression (1752), Avison argues that neither the composer nor the performer should engage in “trifling imitations, such as mimicking flageolets, horns, or bagpipes on the violin.” Such imitations distort the personality of the instrument. To bring out its full expressive potential, however, an instrument can—and should, according to Avison—imitate the voice, a view characteristic of 18th-century music aesthetics, according to which the human voice serves as the paradigm for the “voice” of the instrumental persona. In this connection, I am convinced that there are significant connections between the rise of psychoanalysis, the incorporation of the subconscious realm into theories of personality at the end of the 19th and the beginning of the 20th centuries, and the attempts by composers starting around this period to bring out unusual timbres from traditional instruments—including Schoenberg’s technique of “Sprechstimme.”

These cannot be seen merely as efforts to produce new timbres per se, but to make a well-known instrument speak in a new voice, in the voice of its subconscious, so to speak.

Conceptualizing the timbral structure of music as evoking a virtual persona is consistent with the various expressive meanings that are assumed to arise from pitch and durational factors. If pitch and rhythm express, symbolize, or evoke emotions, speech, bodily movements, and narratives—

as many writers in the history of Western musical thought have argued—it is only logical that listeners experience these as the expressions of a unified virtual musical persona. Timbre thus gives “voice” to the emotions, speech, and movements of the musical self. In fact, it is the voice of such a self. Edward Cone argues along similar lines and states, “any instrumental composition can be interpreted as the symbolic utterance of a virtual persona” (1974: 94). According to Cone, “what makes a unitary virtual agent of an instrument is its assumption of a specific role in a musical context … its individualization as the maker of a significant musical gesture” (1974: 96). Throughout his discussion, Cone refers to instruments rather than to timbres. Since timbre individualizes and personalizes a musical gesture, however, speaking of timbres rather than instruments would be more accurate: a musical gesture can be individualized by more than one instrument, and due to timbral blending still be experienced as a unified utterance.

Just as we understand as the personality of an individual is the totality of his/her behavioral response patterns as seen in various contexts, the timbre or timbral identity, the individuality of an instrument (or sound-source), emerges as it displays its expressive range in various musical contexts. A richer, more varied expressive range means that the listener can experience the source-permanence more strongly, as the timbral identity is retained through many varying contexts. For instance, hearing the timbral behavior of a piano in all its registers, in various dynamic levels, and played with different manners of articulation, creates for the listener a strong Gestalt for its individuality. It should also be noted that it would be most

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4 The issue of subjectivity in music has interested a number of authors, and some have carried out empirical research on this topic. Watt and Ash (1998), for example, showed that listeners indeed identify person-like qualities in music readily, and accordingly experience music as creating a virtual person. These studies, however, do not address the connections between timbre and subjectivity.

5 Schenker’s organic conception of musical form rests on a similar assumption. In his Harmony he writes: “The sonata represents the motif’s in ever changing situations in which their characters are revealed, just as human beings are represented in a drama. For this is just what happens in a drama: men are led through situations in which their characters are tested in all their shades and grades, so that one characteristic feature is revealed in each particular situation. And what is character as a whole, if not a synthesis of these qualities which have been revealed by such a sequence of situations? The life of a motif is represented in an analogous way. The motif is led through various situations. At one time, its melodic character is tested; at another time, a harmonic peculiarity must prove its value in

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instructive to consider the timbres of natural phenomena (water, wind, fire, etc.), of machines, and of electronic sounds in terms of their capacities for retaining timbral identities through expressive timbral changes, and see whether traditional instruments have richer ranges in this sense.

As a conclusion to this discussion on the expressive dimensions of timbre, let us consider two musical examples: the "Russian Dance" from Stravinsky's ballet suite Petrushka and the same Russian dance as transcribed for the piano by the composer himself. There is not much research on how transcriptions affect the expression and meaning of musical works. In one of the few studies on this topic, orchestrated pieces—from both tonal and non-tonal repertoires—were compared with their piano transcriptions (Paraskeva and McAdams 1997). The authors concluded that orchestration plays a modulating role on tension-relaxation profiles measured across the excerpts. According to their study, large-scale expressive aspects of musical experience are not based merely on pitch structures. To be sure, not all music is amenable to transcription. When timbre is the defining parameter of a musical gesture, as for instance in spectral music, the idea of transcribing the music cannot arise. Here, the musical gesture comes into being already individualized: there is no other way of expressing it musically, whereas a gesture from a tonal work, for instance, retains something of its identity when presented in a different timbre. This is not to say that all tonal—or non-tonal—pieces in the Western tradition can easily be transcribed. For instance, Liszt, who was a master of transcription, spoke of one specific piece for which he could not conceive a convincing piano transcription: the first movement of Mozart's Symphony No. 40 in G Minor.

In the "Russian Dance" from Petrushka three puppets—Petrushka, the Ballerina, and the Moor—suddenly come to life and dance a wild trepak, a fast Russian dance in duple meter, for the fairgoers in St. Petersburg. In Stravinsky's own words, the piano is supposed to represent Petrushka himself. Very often, piano transcriptions of orchestrated music are regarded as impoverished versions of the originals. With these two musical examples, I essentially make two points. Even though something of the original

unaccustomed surroundings, a third time, again, the motif is subjected to some rhythmic change; in other words, the motif lives through its fate, like a personage in a drama. Thus it is illicit to present the motif in a situation which cannot contribute anything new to the clarification of its character" (1954: 12).

identity of the orchestrated version is retained in the piano transcription, there are substantial philosophical reasons for calling them different pieces of music—and among these reasons is timbre. Secondly, the piano version is certainly at least as rich as the orchestral version in terms of timbre. Furthermore, one instrument does not necessarily imply a single musical persona. In other words, if the orchestrated version can generate several virtual musical personas for the listener through its rich timbral qualities, so too can the piano version.

Without doubt, the rapid advances in technology will reveal more of the mysteries of timbral phenomena in the near future.

REFERENCES


SPECTRAL MUSIC AND SCHAEFFERIAN METHODOLOGY

John Dack

INTRODUCTION

In this paper, I investigate how theoretical concepts formulated by Pierre Schaeffer (the "inventor" of musique concrète) might be applied to spectral music. Schaeffer made a clear distinction between musical languages using sounds of long duration and those based on differences between sound objects with discrete, short to medium durations. This distinction forms an important part of his typological system for sound classification. I examine the sound types of Typology and suggest the consequences for musical languages in general and spectral music in particular. In the conclusion, I apply some of these notions to an analysis of a short extract from György Ligeti’s orchestral work Atmosphères. While this composition might not be regarded as a spectral work, properly speaking, Ligeti is cited by musicologists as a spectral composer avant la lettre. Consequently, even a short analysis of his music will demonstrate the relevance of Schaeffer’s "generalized" theories.

SPECTRAL MUSIC AND THE ELECTRO-ACOUSTIC MEDIUM

Many connections can be identified between spectral music and the electro-acoustic medium. Indeed, the potential for the subtle control and transformation of sound characteristics offered by the electro-acoustic studio provides many opportunities for the realization of spectral music. Consequently, it is unsurprising that several composers, such as Tristan Murail, Jonathan Harvey, and Kaija Saariaho, create spectral music both in the electro-acoustic studio and with conventional instrumental resources, thus indicating the plurality of musical languages that can be subsumed under the term "spectral." Some of these compositions demand technological mediation, whereas others eschew the use of technology and

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1 For example, see Anderson 2000, Pressnitzer and McAdams 2000, and Harvey 2000.