Local and Global Connotations in Sonic Composition

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An aspect of the local/global binarism in music regards the cultural identity of the sounds, musical styles and grammars of a composition. This article intends to explore the role of the local/global issue in the context of the semantic dimension of sounds, both during the composition of a musical piece and during its reception.

In the first part of the article the local or global identity of a sonic event will be examined from two different perspectives: on the one hand that of the composer, starting from his or her attitudes with regard to the semantic aspects of the sonic material and the compositional processes used; on the other hand that of the listener, starting from the cognitive processes (s)he activates in the search for a musical and an extramusical meaning. Based on this analysis, in the second part of the article the usefulness of describing the cultural identity of a sonic event and more generally its semantic dimensions in terms of 'shared connotations' will be explored. Finally, some of the interactions between connoted sonic events will be analysed, mainly focusing on global and local cultural identities.

1. LOCAL/GLOBAL PERSPECTIVES

Apart from the traditional familiarity of the electroacoustic composer with concrete sounds, there are many kinds of music in which it is easy nowadays to find the presence of 'local' elements in the choice of the sonic materials, instruments, musical syntax and rules.

Despite this, the composer who is interested in developing interactions with such elements often finds him- or herself having to deal with various issues far from usual or traditional compositional techniques. Signal processing and compositional techniques are often hard to control and therefore often entail the risk of going far beyond the aesthetic intentions of the composer, rapidly dissolving the local or global identity of a sonic event and thus rendering such a dimension ineffective for the listener. To be more precise, what is difficult to define and control are the thresholds beyond which the sonic material loses its 'original nature' and becomes semantically homogenous with the rest of the material. These problems are due to the complex nature of the semantic dimension of sounds, but also to the way in which this dimension is described and investigated. A reflection on the compositional possibilities of the local/global binarism therefore leads us to investigate the attitude of the composer and the listener regarding those aspects of the sound that, as is often said, refer to the extramusical sphere. In other words, as Nattiez would say, the issue of the identity of a sonic event is to be considered both in the phase of creation (*poiesis*) and in that of reception (*aesthesia*) of a composition.

1.1. Local/global poiesis

The attitude of the composer towards 'local' elements depends above all on his or her willingness to consider it as an aural signifier and therefore as an expression of the world around him or her. In the past composers have often been suspicious of the possible semantic ties between the sound and the world. This attitude is based on a western vision that considers music in a 'Pythagorean' way, determined by abstract mathematical relationships rather than by relationships with the physical world (Eggebrecht 1977). From this derives the conviction that sound can be considered as an exclusively self-referential sign equipped with a substantially abstract meaning, for the creator as much as for the listener. Consequently, the extrinsic dimension of sonic objects has often been denied by our culture (e.g. Stravinsky 1935) or seen as a limiting factor both during the definition of one's own musical system (Boulez 1971) and during the reception of music (e.g. Prieberg 1954). For Schaeffer (1966), for example, a profound musical experience must necessarily entail an *écoute réduite*, that is to say a phenomenological reduction involving the removal of every 'residual signification' connected to sounds as indicative or communicative signs.

Such a perspective presupposes an ahistorical view about the nature of musical material and can therefore lead to objections from both a philosophical (Kane 2007) and a perceptive point of view. From the philosophical viewpoint Adorno affirms that it is fallacious to imagine any musical material that can escape from its historical dimension. History and the social forces to which it testifies are, however, always deposited as a residue in every creative action, independently of the composer's intentions or wishes (Adorno 1970). On the other hand, from the perceptive

Organised Sound **13**(2): 123–135 © 2008 Cambridge University Press. Printed in the United Kingdom. doi:10.1017/S1355771808000162

https://doi.org/10.1017/S1355771808000162 Published online by Cambridge University Press

viewpoint, one can hardly accept the hypothesis of self-referentiality in music: the perception of any sound is bound to a cognitive activity that is always influenced by relationships between the listener and the environment around him or her. In other words, our knowledge of the world is based on our acquaintance with the world. In this context, Windsor (1995), in applying the perceptual theories of Gibson (1979) to the description and the analysis of acousmatic music, inverts the terms of the question: the perception of musical structures *must necessarily* presuppose an understanding of the extramusical aspects that emerge from within such structures.

In the moment in which the composer refutes the vision of the total self-referentiality of sonic material and considers its historical and cultural identity, one can conceive of at least two possible approaches that explore the possible dialectics between the 'local' and 'global' elements of a composition.

The first of these could be considered a *colonial* approach. In this case the composer uses, develops or arranges sonic material connected to a local situation or context essentially for the capacity of that material to 'colour' a style with atmospheres pertaining to far-off lands. The sound is *subjugated*. The crosscultural endeavours and explorations of the composer are limited to the use of the sonic material which is evaluated and used for its exoticism: unfamiliar musical gestures which may evoke distant locales or alien frames of reference are assimilated into a familiar style. This attitude is typical of the dominant cultures of every time and place. Contemporary exoticism, for example, is not very different from that of the composers of the eighteenth century who assimilated superficial musical aspects of what they presumed to be Ottoman culture, in the style known as *alla turca* (Hunter 1998).

A second type of approach could be called post-colonial or *ecological*. Here the attitude of the composer changes: the sound and the network of relationships that define it are not simply chosen in order to be used within a predefined syntactic framework, but instead they are considered as elements that can cause profound changes in the strategies and syntaxes used by the composer. To paraphrase Næss (1973), we could say that an ecological approach substitutes the 'utilitarian environmentalism' of the colonial approach with a 'biospheric egalitarianism'. Sounds acquire a relational, 'total-field' image as 'knots in the biospherical net or field of intrinsic relations.' (Naess 1973: 95).

In this context, the local/global binarism is not defined by the composer only within the categories of familiar/exotic, but is thoroughly developed along multiple trajectories that, as well as the musical aspects, also take into consideration the rules, philosophies and traditions of the local culture to which the material used refers. One is not therefore limited to assimilating the local into one's own style, but one defines a style by means of a simultaneous vibration of various different coexisting identities, each of which provides not only an exotic flavour, but a substantial linguistic contribution. Gyorgy Ligeti (1991), for example, in the preface to *African Polyphony and Polyrhythm Musical Structure and Methodology* by Simha Arom explicitly puts the renewal of his own compositional language in relation to the furthering of his acquaintance with the music of the Banda-Linda tribe of Central Africa. Analogously, a particular feature of the style of the Chinese composer Tan Dun (for example Tan Dun 1990) seems to be the search for fertile encounters between his own culture and that of the West. In his music, no local element seems to feel the need to dominate the other, but on the contrary each one is used in an original way to convey various aspects of the other.

In the electroacoustic field a classic example of an ecological approach is that of the soundscape composition (i.e. tape recordings of environmental sounds). Starting with the pioneering approach of Raymond Murray Schafer, the complexity of local sonic landscapes has not simply opened up an infinitely rich sonic and symbolic universe, but it has deeply influenced the formal (such as Truax 1996), aesthetic, political (for example, Westerkamp 2002) and technological (Truax 1994) choices of various different composers.

1.2. Local/global aesthesis

The non-predictability inherent in sonic reception favours of a self-referential compositional approach. For a group of listeners a sonic event[1] can turn out to be loaded with precise meanings that other listeners are not at all able to understand. The fact that the sonic flow can, nearly instantaneously and without effort, activate various mental images connected to one's own experience has often been seen as an impediment to a *true* understanding of music, also in the case in which these images seem to delimit a fairly precise semantic area:

> Once I played Ionisation [by E. Varese] to a group of elderly gentlemen, nearly all of whom were well versed in literature and the figurative arts […] the first words after a consternated silence were 'it's like in a machine room… an air…raid …'. This was just what I had expected. I then spoke about the composition and tried to make it comprehensible. (*Una volta feci sentire* Ionisation *a un gruppo di vecchi signori, quasi tutte persone in buoni rapporti con la letteratura e le arti figurative […] Le prime parole dopo un costernato silenzio furono 'come in una sala macchine… un attacco aereo…'. Precisamente questo mi ero aspettato. Parlai allora della composizione, tentai di renderla comprensibile.*) (Prieberg, 1954: 63, the author's italics)

[1]The term 'event' is used here in its psychological perspective, as a phenomenon perceived by one or more subjects by means of their senses in a precise time and place.

https://doi.org/10.1017/S1355771808000162 Published online by Cambridge University Press

While one could probably not consider the first reaction of the listeners to be a form of understanding of the piece, an ecological attitude would instead have tended not to underrate the association between 'an air-raid' and the sirens heard in *Ionisation* made by an audience which perhaps shared an experience of the war. For those 'elderly gentlemen', the musical and emotional experience of *Ionisation* had probably been profoundly influenced by their own local cultural context.

More precisely for the listeners of *Ionisation* the fact of having recognised the sound of a siren as a 'global' sound, that many people today know, was perhaps not important in itself. Their 'consternated silence' was perhaps connected to the fact they had listened to something that had activated a 'local' dimension: the memory of the sirens that they had once heard. The emotional impact perhaps depended on the correlation between the symbolic function associated with the sound of the siren and their *personal* knowledge.

At this point it is natural to ask oneself if and to what degree such a reaction could have been produced in a group of young listeners without any direct experience of war. Whatever the answer is, this must necessarily be based on empirical considerations connected to the shared expectations and experiences that allow us to classify a set of listeners as a 'group'. For example, we cannot rule out the possibility that a member of the group, despite never having actually seen a siren, might directly associate the sound to its symbolic function (danger, war, attack) without taking into account the actual form of the physical object. Here, as elsewhere, the meaning is revealed to be a semantic construct with blurred outlines, which can emerge even in the case of incomplete sensory information. We therefore cannot rule out the possibility that for some people the sound of the siren might be connected not so much to what sight or touch can perceive and validate, as much as to the functional value that the auditory experience alone has deposited in the listener's experience. More generally, the constraints that bind the sound to its source play a role based on the widespread anthropological tendency to interrogate oneself as to the origin of a sound (Cadoz 1991; Emmerson 1986). Nevertheless, the causal connection between the sound and the phenomenon that created it is not necessarily a prerequisite for a sonic semantic dimension to be encoded. That is to say: the extramusical dimension of a sonic event is not unavoidably connected to its 'source bonding' (Smalley, 1986), but it can also derive from various inferences such as, for example, the social function of that sonic event or its local or global cultural identity.

The issue is summed up very well by Umberto Eco, who states that it is unnecessary to relate meaning to any physical referent (Eco 1979). 'Meaning', according to him, is not determined by reference to the world but is the product of an interpretation of information that rests not on equivalences (for example, 'cat' equivalent to 'domestic feline'), as much as on implications (for example, 'cat' implies four legs, small size, purring, and so on) (Eco 1984).

2. LOCAL/GLOBAL AS A SEMANTIC DIMENSION

2.1. Sharing of sonic event connotation

From a cognitive point of view, what has been said presupposes our ability to encode and memorise sound by connecting sensory data with a network of abstract and temporally defined relations that express our semantic and episodic memory (Tulving 1972). The outspreading activation of the nodes of such a network allows us to attribute a set of properties to a sonic event (Klimesh 1994) that influence what we believe to be its 'meaning'. The temporal order in which distinct properties are elicited has a central importance for understanding the cognitive and social processes that lead to a crystallisation of meanings we have in common with others. Denotation (that is, the first and immediate correlation between the significant sonic event and the meaning that is attributed to it) may depend entirely on the autobiographic memory of listeners and their particular emotional, cognitive and attentive states in that moment. Nevertheless, as the reception proceeds, these correlations are integrated with others, some of which are based on our shared experience of the world. We can conceive of the sum of these 'successive' correlations as constituting a *shared connotation of a sonic event* (in other words, certain people might regard a sonic event as a shared concept more than as a subjective percept) (Cifariello Ciardi 1998).

A sonic event can be defined as *connoted* if it maintains the properties that make it recognisable even if it is detached from the flow of information it is situated in. In this context it is evident that the 'global' or 'local' nature of a sonic event cannot be limited to the recognition of the source to which the sound refers, but it has to take into consideration the nature and the shared nature of its connotation. This means that what can be considered as local or global are not the sounds, their acoustic parameters or the syntaxes that articulate them, but the interconnected semantic properties that the listener constructs by connecting sensory data and experiences to a network of meaningful relations.

The attribution of a local or global quality will therefore depends on the listener binding the intrinsic dimensions (e.g. timbre, style, genre) and the extrinsic dimensions (e.g. social, symbolic, metaphoric function) of a sonic event to memory traces that can even refer to spatial or temporal locations. In the same way, the global nature of a sonic event depends on the possibility of associating the sensory data with certain semantic

https://doi.org/10.1017/S1355771808000162 Published online by Cambridge University Press

attributes that according to our experience are accessible all over the planet.

This implies that the composer who is interested in a communicative use of 'global' or 'local' sonic materials is bound to question him- or herself about the social and cultural experiences that (s)he shares with the listener as well as about the way in which such experiences can influence the reception of his or her work.

2.2. Variables in sonic event connotation

Although individual aspects of the listener's knowledge cannot be fully investigated, reflection upon the cultural context to which listeners belong can help us to understand to what extent they can individuate certain semantic attributes. Cultural traditions have a central importance in this respect. Tadahiko Imada (Imada 2005) has pointed out how non-western cultures such as that of Japan do not share the same methods of listening as western cultures, and that this is bound to deeply influence the network of meanings that the sound is able to activate in the mind of the listener.

Apart from the strength of cultural influence, the possibility of a semantic attribute being individuated depends on the morphological aspects of the sonic event. The study of the acoustic correlates of semantic dimensions is a central factor in many psychophysical studies of everyday sounds (e.g. Cosmides 1983; Warren and Verbrugge 1984) and sound qualities (Freed 1990).

The identity of a connoted sonic event can be maintained also when certain acoustic parameters have been altered. The semantic network that defines the connotation is not always rigid, but it sometimes *resists* variation. However, in most cases, a shared connotation must be considered as a very fragile quality of a sonic event. Sounds that today are 'global' such as an automobile braking or the sound of the wind, and 'local' sounds such as a fragment of a *gamelan* or a television news jingle can activate our semantic memory only if some of their peculiar acoustic features remain perceivable. In some cases, the connotation can easily be compromised, even by a mere alteration of its original amplitude. For example, the local identity of an acoustic landscape depends not only on its components, but also on their loudness and on its evolution through time (Truax 1978).

The sensibility to variations that seems to accompany many connoted sonic events also increases considerably if they are perceived in a different context from that which the listener considers to be plausible or probable. Ballas and Mullins have shown that the ability to discriminate between and identify everyday sounds is radically limited if there is a semantic non-correspondence between the sound and the context in which it is listened to (Ballas and Mullins 1991).

This means that the complex and dynamic interaction between the acoustic attributes that establish the connotation of a sonic event can easily be altered by the action of the composer. For example, the variation in pitch of the squealing of a car's brakes can be relatively wide, but this variation reduces the connotation of the event if it is not accompanied by a corresponding movement in space. In the end one has to remember that the semantic impoverishment deriving from the detachment of a sound from its source reduces the connotative impact and its effective shareability. For this reason the use of connoted sonic events in electroacoustic music cannot be detached from their auralisation (i.e. the process of rendering audible the sound-field of a source in a space, by means of physical or mathematical modelling). Various variables that can influence the connotation of a sonic event are listed in Table 1.

As we have seen, the possibility of a connoted sonic event maintaining its own identity following its elaboration or delocalisation depends on the listener being able to detect its peculiar and shared semantic properties. In order for the attributes regarding the 'local' or 'global' identity of a sonic event to be communicated it is necessary for the composer to take account of the *threshold of semantic activation* necessary for the transmission of their shared properties. In the case of environmental sounds, this threshold seems to be similar to that of the perception of speech. For example, the recognition and the perception of ambiguity in environmental sounds and speech seem to be based on similar semantic interpretations (Ballas and Howard 1987). One of the reasons at the root of such a similarity is probably the fact that both these categories of sounds require a high degree of interconnection between the nodes activated in the network of long-term memory (Klimesh 1994). The meaning of a word, or of a sound in

Table 1. Variables in sonic event connotation

Objective	*Shared*	*Subjective*
• acoustic morphology • coherence with context	• culturally influenced listening modalities • shared experiences, concepts and skills	• listening conditions • personal knowledge, abilities and skills

https://doi.org/10.1017/S1355771808000162 Published online by Cambridge University Press

the environment, is unlikely to be exclusively connected to an abstract portion of knowledge, but they are both rooted in our personal and shared relationship with the world around us.

3. LOCAL/GLOBAL CONNOTATION AS A COMPOSITIONAL PARAMETER

The use of connotation in music, ranges from direct citation to complex and refined practices used not only for purely expressive purposes, but also in contexts such as those of sound design (Back 1996) and applied music (Cipriani, Cifariello Ciardi, Cardi and Ceccarelli 2004) and for declared political aims (Metzer 2003).

The compositional use of connoted sonic events can be partially equated with musical borrowing, which has always been widespread in very many kinds of music. There are two main differences between musical borrowing and the use of connoted sonic events. The first of these differences regards the nature of that which is borrowed: traditionally either the transcription of a musical fragment or the partial representation of it that musical notation permits has often been used by composers. In our case, as we have seen, the object of the composer's attention is not only the transcription of the acoustic parameters of the connoted event, but the network of the stylistic, cultural and political data that can be transmitted by means of sound. Above all, in the specific case of sonic events with a local or global cultural identity, what the composer wants to elaborate might not only be pitches, durations, timbres, but also syntaxes, traditions and visions of the world. The second difference regards the perspective from which the musical borrowing is considered. A borrowing is always a cultural agent that participates in and shapes the cultural discourse (Metzer 2003). However, from a musicological or analytical point of view, the personal or cultural motivations for a quotation often help us to better understand the personality of the composer and the hidden structures of his or her work. From a strictly compositional point of view, considering the musical borrowing without evaluating the possibilities and conditions necessary for it to be detected by the listener may be without any particular interest.

If a contraposition between local and global is not detected by the listener, or also if the activated sharing is sufficient only for the perception of a vague exoticism, the communicative, social or political intentions of the composer inevitably risk losing at least a part of their effectiveness (Westerkamp 2002).

What follows is an attempt, which is certainly not comprehensive and exhaustive, to describe the main dialectics between sonic events with different connotations (Table 2) and in particular between those to which a local or global cultural identity can be attributed. Here our theoretical analysis distinguishes between separate compositional strategies that in practice are often used together or blended according to the composer's aesthetic intentions.

3.1. Citation

Perhaps citation represents the most simple case of semantic correlation between sonic materials. One generally speaks about citation in the cases in which the composer deliberately inserts a sonic event that is considered in some way 'foreign' to the context defined by the surrounding sounds. Citation can have a more or less well defined historical origin, and it often refers to other contemporary composers or to those of other ages, but there are many examples of citations that refer to previous works by the same composer who re-uses his or her own musical materials. In this context, the practice of citation does not involve any difficulties. If instead we consider the point of view of the listener the difficulties connected to a communicative use of citation increase considerably.

In the scenario we have outlined, two conditions are necessary so that the listener can interpret the sonic data perceived as a citation. First of all, the listener must be able to perform an acoustic extrapolation, which means (s)he must be able to separate the acoustic components of the citation from those of the sonic flow. Then, in order to individuate the alien nature of the citation the listener must be able to perform a semantic extrapolation: (s)he must be able to isolate a sufficient number of semantic properties of the citation, so as to be able to determine the distance that separates the connoted material from the rest of the musical material. In order for this to happen it is necessary for the sonic elements that surround the citation to be stylistically in contrast, so as to provide a reference point that is useful for identifying and delimiting the citation and for

Table 2. Main compositional processes in sonic events with different connotations

	Citation	*Integration*	*Translation*	*Encapsulation*
What is used	The sonic event	The sonic event	Some of the sonic event dimensions	The sonic event
How it is used	Unvaried	Varied	Unvaried	Unvaried
Why it is used	As a mean of sharp semantic contrast	As a mean of controllable semantic contrast	As a semantic qualifier	As a container for extra-musical information

https://doi.org/10.1017/S1355771808000162 Published online by Cambridge University Press

evaluating its aesthetic and structural relevance within the composition.

That which makes a connoted sonic event perceivable as a citation is the possibility of attributing an independent identity to the event, which tends to be impermeable to the other information perceived.

This sort of impermeableness depends on the close interrelation between the semantic properties of the connoted sonic event. The connotation does not only allow us to identify *what* we are hearing in terms of individual sources, but it supplies us with information on the structural *relationships* between sounds. For example, Howard and Ballas' work suggests that the perception of sound sources may play a role in the detection of higher-order relationships between everyday sounds. For example, one would expect to hear the garage door open before hearing the car being driven out (Howard and Ballas 1982). This is also often true in the field of music: in the moment in which the *incipit* of a national anthem is recognised, its acoustic properties can be connected to the nation to which the anthem refers, to the knowledge that the listener has of that nation and to the emotions that this may evoke in him or her.

Once it has been identified, a connoted sonic event activates a network of meanings, which may be seen as more 'in-focus' with regard to the meanings attributed to the sounds that surround it. This different semantic perspective – determined by a high degree of interconnection between the properties perceived – also has an important consequence on the speed with which we elaborate the information. Our cognitive system produces faster responses for semantically encoded information, that is to say the listener's cognitive processing of recognisable input is faster than that of non-recognisable input (cf. Chang 1986 for a review). These conclusions can provide a valid explanation for an effect that often accompanies the recognition of a citation within a composition. The stronger the connotation of a sonic event is, the more it causes a magnetic effect attracting the listener's attention. This power of attraction in turn creates a *semantic space* in which the connoted event acquires a well-differentiated position compared to the less clearly connoted material.

A similar perspective has been used by Salvatore Sciarrino to emphasise the different connotations of the sonic materials in his piece *Efebo con Radio* (1981). On the one hand, the piece presents, in a window structure, an alternation of imaginary excerpts from radio programmes (with speakers, news bulletins and advertising) and a selection of 'local' music, taken from the Italian popular musical repertoire of the postwar period. On the other hand, the same orchestra imitates the typical and therefore 'global' sound of radio interference, realised with some irony, using the typical instrumental techniques developed by the composer himself (Sciarrino 1998).

3.2. Integration

While citation represents the most elementary modality of compositional use of the connotation, integration is probably the most frequent practice. All *musique concrète* that uses recognisable sounds can in fact be placed in this category.

In every form of integration, it is the artistic need that leads the composer's attention from *what* is used, to *how* it is used.

In the citation those morphological aspects that contribute towards defining the semantic dimension of a sonic event are maintained unchanged, whereas in integration some of these aspects are deliberately altered by the composer in order to improve the integration between the connoted sonic event and all the other events that constitute the sound-flow.

In order to connect a connoted event with the sounds around it, the composer has to deal with the problem of how to tackle the sonic material so as to modify it according to his or her own structural and aesthetic needs. If the structural principles that are at the root of the composition are independent from those that characterise the connoted event, then it may be necessary to modulate the differences between the event and the rest of the sonic materials (e.g. Stockhausen's concept of 'inter-modulation', 1966a).

Vice versa, in the case in which the structural principles of the composition derive from the connoted sonic event, their elaboration can lead to the creation and articulation of stylistically differentiated sonic materials in which the semantic identity is totally controlled by the composer. An interesting example of this is Alfred Schnittke's *Concerto Grosso No. 1* (1977). Beginning from a basic intervallic structure the composer articulates the piece into three strongly contrasting stylistic areas: the Italian baroque of Vivaldi, a microtonal chromatism, and some nuances and flavours that are typical of some popular music. The different connotations of the materials create a well-defined semantic field in which the sonic elements defined by Schnittke as 'trivial music' intervene as a force that 'resolves' the expressive tensions accumulated. At the same time, the structural connections that bind the different connoted materials together give the work a strong overall stylistic coherence.

From a cognitive point of view, by means of integration, the composer actually finds him- or herself intervening on the network of interconnections that defines the semantic identity of the event. As we have already said, the consequences of this can make the detection of a shared connotation possible, but they can also easily lead to an irreparable deterioration of the semantic identity of the event. The outcome of the intervention certainly depends on the sensibility and technical skills of the composer, but also on the 'meanings' of the event considered. Since connotation

https://doi.org/10.1017/S1355771808000162 Published online by Cambridge University Press

is the consequence of an interconnection between the semantic properties that the listener attributes to the event, the greater or lesser ability to 'resist' the compositional elaboration will depend on the *elasticity* of the lattice that defines the meaning of that event.

This semantic elasticity is often strongly influenced by the acoustic morphology of the event. The properties that connote watery sounds, for example, allow for a relatively wide range of spectral and dynamic elaborations. On the contrary, the connotation of the fascinating song of the Australian Bell-bird (*myzantha melanophrys*), since it is associated with the tinkle of a small bell, is more rigid, and would therefore be more likely to deteriorate if its acoustic qualities were altered.

Semantic elasticity should also be put into relation with the 'cultural morphology' of the sonic event. In the case of a sonic event to which it is possible to assign a strongly shared connotation, the network of the semantic properties will better be able to resist the jolts due to the high degree of interconnection between its nodes. An example of this can be found in another piece by Stockhausen, *Hymnen* (1967), in which the composer uses some of the processes of 'inter-modulation' already used in *Telemusik*, but with some rather different outcomes. In the case of *Telemusik* the material has a connotation that a western audience would be unlikely to share and that is therefore sometimes reduced to sonic exoticism. Instead, since *Hymnen* is based on national anthems that can usually be recognised outside the strictly local dimension, it seems to have a connotation that is more able to resist the 'inter-modulations' conceived by the composer.

In more general terms, even though the experimental research dedicated to the definition of acoustic invariants can provide the composer with some important indications, integration is never a risk-free operation.

From the listener's point of view, integration involves a more complex cognitive process compared to that required by citation. The extrapolation of the semantically connoted components is more difficult here because some of them have been altered by the composer in order to integrate them with the other sonic elements of the composition. While on the one hand the integration of a connoted element improves the perception of the structural coherence of the composition, on the other hand, the very integration itself makes the perception of the semantic consistency of the connoted element more difficult: that is to say, the listener must apprehend the semantic identity of an element on the basis of an incomplete set of information, made still more semantically ambiguous as a result of the changes that the composer has made

Any variation performed on the acoustic dimensions of a connoted sonic event has consequences that are never completely predictable as regards its communicational effectiveness for at least two reasons. On the one hand, while the cognitive approach imposes a rigid control over the interferences that can alter the experimental results, in music a connoted event is varied with the intention of improving its integration within the composition, that is to say within a flow of pieces of information that often intentionally interfere with each other. On the other hand, the significance of a given acoustic parameter cannot be conceived of as being independent from subjective cognitive variables (autobiographic memory, attention, emotional state). This is particularly true when the composer is interested in the specific semantic dimension that regards the exogenous or endogenous identity of sonic material. (S)he can use connoted sonic events while eliminating or reducing their elaboration to a minimum, so as hopefully to preserve their identity, but in doing so (s)he runs the risk of limiting the ability to realise his or her own creative aims. This problem can be avoided if the compositional intentions are pedagogical or political, rather than artistic, or if the composer aims to put his or her own subjectivity 'in brackets', transmitting to the listener his or her intention to explore the sonic material (e.g. a particular soundscape) without expectations or predetermined plans. Vice versa, the composer can consciously use connoted sonic material, in order to integrate it into his or her work, or in order to explore it by means of its elaboration. In the latter case, however, (s)he also has to beware of the risk of providing the listener with an artistic result in which the cultural identity of the material has been substantially cancelled by his or her creative intervention.

A typically postmodern form of elaboration is that in which the integration between different connoted sonic events is obtained by means of the rapid juxtaposition of semantically heterogeneous fragments, without the variation of any of their acoustic dimensions. In this approach the semantic activation of the connotation depends primarily on the duration of the fragment: the brevity of the fragment can prevent extended semantic correlations, leading not to recognition, but to a more hazy sensation of familiarity. In addition what makes the difference can be the skill of the composer in subdividing the connoted material into musically and culturally coherent units. A fragment of a theme, even if it is well known, can easily become unrecognisable if the segmentation is not able to preserve the phraseological structure of the original. Finally, even if a fragment is sufficiently long and 'well cut' to be recognised, its connotation can be masked thanks to the semantic attraction exercised by a adjacent fragment that imposes itself upon the listener's attention.

The perceived level of coherence tends to be impeded by the centrifugal force of each connoted event, leading to a sense of incoherence that is typical of the pastiche. In certain cases, however, as in *Cobra* by John Zorn (1985–86), 'a stylistically coherent incoherence' can partially emerge from the rapidity of the game of juxtaposition (Spruance 2002).

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Coherence can be partially ensured if different semantic identities are based on similar structural characteristics. In my piece *Altre Tracce* (1991, 1999) for solo clarinet, various different melodic fragments are used, each of them characterised by a precise local cultural dimension (i.e. jazz standards, South American songs, and melodies from German and Italian operas). Their connotation leads to a centrifugal force that is used to enhance a stream-segregation of the solo clarinet. In Figure 1, for example, two melodic streams with different metric structures are based on two different interlaced combinations of connoted melodic fragments: for the upper part, the Sequidilla from Bizet's *Carmen*, the theme from the first movement of Symphony No. 40 by Mozart, and one of the main themes from the Overture to Rossini's *Gazza ladra*; and for the lower part the most famous theme from *Il barbiere di Siviglia* by Rossini. In Sound example 1 a multiphonic gradually splits into two virtual voices having independent metrical structures. Stream segregation becomes evident as connoted melodic fragments are presented (Figure 1).

An opposite centripetal force is caused by the common intervallic structure that binds each fragment with the others and to other sonic materials that are connoted semantically in a more hazy way (Cifariello Ciardi 1997). Here the composer is not interested in the listener's accurate recognition, so much as in the sense of loss caused by the rapid alternation of the connoted fragments. Such a mental state calls to mind what has been called 'cognitive dissonance': a motivational tension caused by the cognition of contradictory elements that impels the individual to attempt to reduce and eliminate it (Wicklund and Brehm 1976).

3.3. Translation

Translation differs from citation and integration due to an intentionally partial use of the shared semantic properties that characterise the connoted event. In citation as well as in integration the intention of the composer is that of borrowing a sonic event defined by a set of semantic properties that can activate the long-term memory of the listener (i.e. in both cases attention is focused on the sonic event as a whole). In translation, instead, the composer does not directly use the connoted sonic event, but borrows only some of its morphological aspects.

The procedure reminds one of the cross-synthesis techniques or Stockhausen's 'inter-modulations', but in this case the intention is not simply to replace the acoustic dimensions of one sound with those taken from another, but to extract a shared semantic quality from a sonic event and use it to semantically qualify a different sonic event. This practice is defined as *translation* since some of the attributes of the semantic network, which shape a connoted sonic event, are *translated* (in the original Latin sense of *trans-latus*: carried over) into the network of properties that defines another event.

From the point of view of the listener, translation involves a use of the semantic dimension which is in some ways different from the cases considered until now. In citation and integration the detection of the connoted components of a sonic object makes it possible to apprehend the semantic *distance* between the citation and the sonic material around it. In translation, however, the extraction of the semantic properties is intended to clarify the *function* that binds a set of semantically connoted properties to a certain sonic material – for example, the translation of the inflections and the rhythm of a voice onto sonic objects characterised by timbres of an instrumental origin, if perceived, has the function of a semantic qualifier which is able to confer a quality of speech to the musical material (Cipriani et al. 2004). In other words, citation and integration are successful from a cognitive point of view if they contribute towards separating the connoted elements from the other elements semantically and, therefore, perceptively (Cifariello Ciardi 1997); vice versa, translation is effective in so far as it makes it possible to merge a connoted attribute with a sonic event possessing a different connotation.

Examples of translation can be found in much of the *programme music* of every period, ranging from the mimicry of Jean-Philippe Rameau's *La poule* to the numerous musical representations of the twentieth-century 'myth of the machine'. Among the latter, those inspired by the locomotive are particularly meaningful in this context. The translation of the characteristic rhythm of acceleration of the locomotive in the first bars of Gioacchino Rossini's *Un petit train de plaisir* or the beginning of Arthur Honegger's *Pacific 231* probably

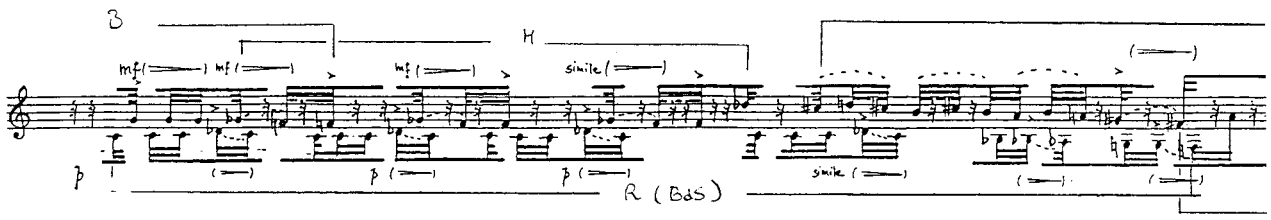


Figure 1. Fabio Cifariello Ciardi *Altre Tracce* (1991, 1999) for solo clarinet, excerpt p. 5.

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activated a rich and articulated network of meanings which were broadly shared by the listeners of the nineteenth and twentieth centuries: the locomotive, with its incessant rhythm, was perhaps one of the first truly 'global' symbols of technological progress. More recently the connotation of the sounds of a locomotive has been widely shared and used not only in jazz but also in acousmatic music (e.g. Pierre Schaeffer's *Etude aux chemins de fer*, 1948) and electro-acoustic music (e.g. Steve Reich's *Different Trains*, 1988), but its meaning more than its global quality is connected to a local dimension by now quite far from the present day, in which the level of progress of technological devices is gauged by their quietness.

In general terms the interconnections within a semantic network activated by a translation seem to be looser than those which characterise 'borrowing'. Information extracted from a sonic event and projected onto other musical materials has a less precise meaning than a recognisable citation. In many cases it refers to the abstract knowledge that we use to describe the world.

For example Christiane Ten Hoopen, in analysing the movement 'Aquatisme' from *Création du monde* (1982–84) by Bernard Parmegiani, pointed out how the composer did not limit himself to using sounds connected to the world of water, but was able to isolate a quality that we could call 'wateriness', in order to semantically qualify the electronic sounds (Ten Hoopen 1992). In the case of 'Aquatisme' the translation of the semantic properties associated with local sonic events (i.e. sounds of water) was used in order to investigate the attributes of the global category of 'wateriness'.

In my work *Altri Passaggi* (2005) for *zarb, daf* and electronics what is translated is instead the characteristics of two speaking voices that bear witnesses to two very different 'local' identities: the voice of the founding-father of Futurism, F. T. Marinetti, who recites one of his texts (*Gli amanti simultanei*), and the voice of the percussionist of the *zarb* and the *daf*, who recites some verses by the Persian Sufi poet Mowlana Jalaluddin Rûmi. The well-known colonial attitude of Futurism thus encounters the proud and ancient Persian culture in a sort of sonic ritual created and led by the beating of Persian drums used as a means of transmission and a bridge between two different worlds. Sound example 2 is a dialogue between processed samples of F. T. Marinetti's voice and phrases of the *zarb* that imitate the rhythm of speaking.

Translation also makes a further pathway available for exploration by using some of the attributes of a given category of globally connoted sounds, in order to direct the listener's attention towards locally connoted events. This is the case of my piece *Ab* for nine instruments (2007a). The piece is based on the segmentation and the morphological analysis of various recordings of speaking voices. The aim of the work is to throw light on typical attributes, such as inflection, rhythm and expressive emphasis, which help to define the semantic dimension of speech. The shared and global connotation of such attributes is used in order to explore the subtle communicative cues in various representative present-day voices chosen for their strong social and political overtones. *Ab* uses voices of our own time taken from short videoclips available on YouTube: an interview with the young daughter of a Palestinian 'martyr', who died in an anti-Israeli suicide attack; a video of the sentencing and execution of the presumed Pakistani spy Ghulam Nabi by a 12-year-old Taliban boy; an interview with the elderly father of Ghulam Nabi; and short clips showing the aberrant and demeaning practices in the American jail of Abu Ghraib (Cifariello Ciardi 2007b).

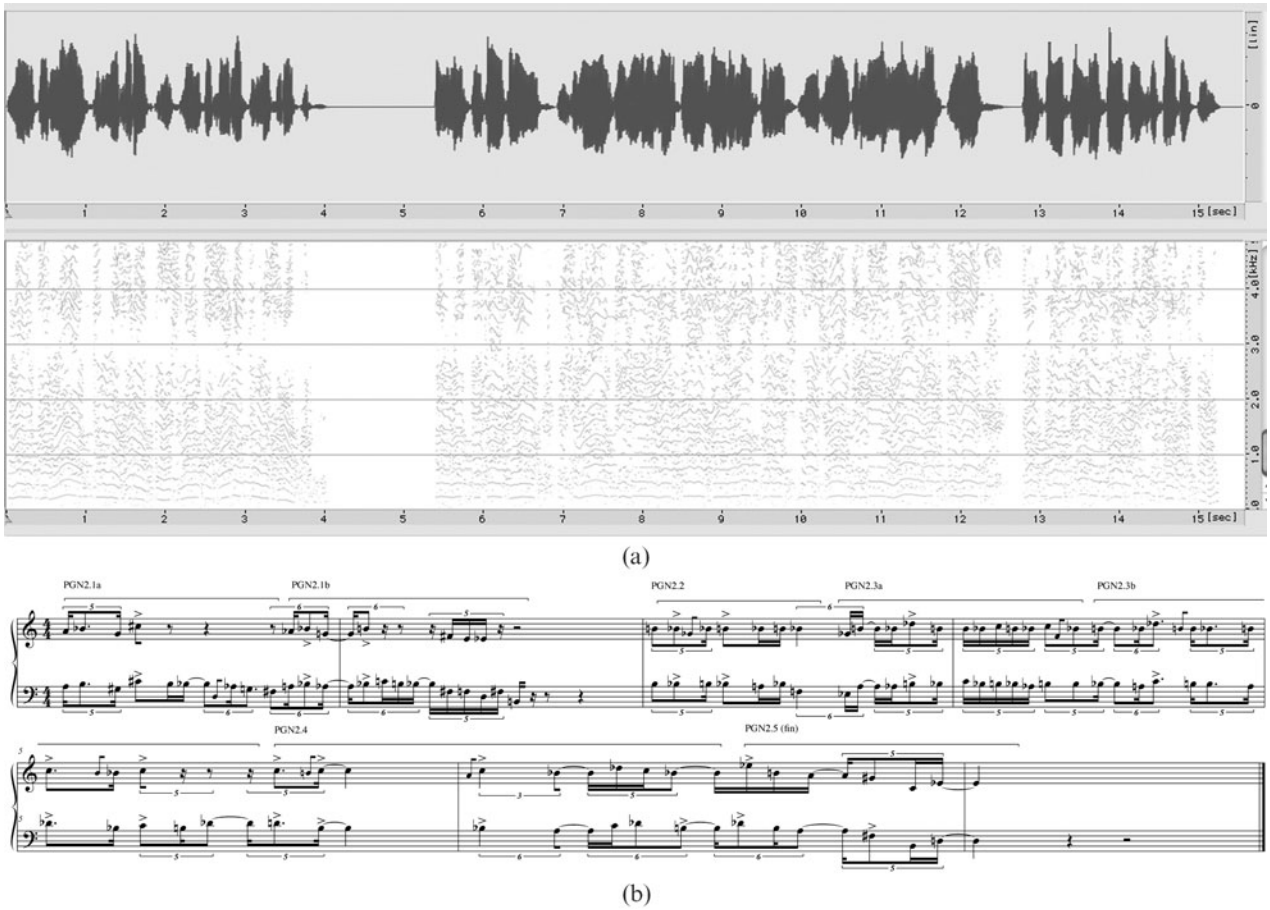
Ab intends to bring the listener closer to a *locale* that is unfortunately also ours and should therefore be witnessed, even without understanding the languages, without the images and before adopting any political stance or moral attitude. Figure 2 shows the partial tracking analysis of a sample of the voice of Ghulam Nabi's father and the automatic transcription obtained from a software program written by the author in with the aid of *Openmusic*.[2] Sound example 3 is a fragment of the voice of Ghulam Nabi's father, its automatic transcription, and a excerpt of *Ab* for nine instruments (2007a) in which the transcribed fragment has been used.

3.4. Encapsulation

In the encoding of the sonic flow, the elaboration of the sensory data leads to continuous exchanges between short-term and long-term memory. The extent to which these relations might relate to abstract categories or concrete events depends on how much we are able to connect what we listen to with our past experience: the more a sonic event is perceived as 'new', the less we are able to correlate the sensory data with our knowledge and consequently the more we will try to utilise general and abstract categories, which are independent from a precise context (e.g. 'this new sound sounds very *harsh* to me'). On the contrary, the more we recognise what we listen to, the more sensory data will be interconnected with concrete knowledge, which could even be temporally datable (e.g. 'this is the same sound that I listened to a week ago'). This last case can have a negative effect on the musical experience of the listener, since the activation of episodic knowledge often entails aesthetic, ethical or political judgements that are correlated with it. Upon perceiving a connection of the sound to the real world, the listener therefore becomes aware of the sound

[2]Regarding this compositional approach see also the work of PerMagnus Lindborg on Mao's oratorical inflections (Lindborg 2007).

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Figures 2a and 2b. Partial tracking analysis and automatic transcription of a sample of the voice of Ghulam Nabi's father.

as a cultural agent, which (s)he must engage with. The connotation calls into play not only the musical abilities and the aesthetic inclinations of the listener, but also his or her cultural identity.

As a consequence the musical experience is evaluated by the listener not only on the basis of the acoustic and semantic properties that have been elicited, but also on the basis of the reception of the social and political message conveyed by the sound. This can contribute towards explaining how and why the attitude of the composer towards connoted sonic materials has often been interpreted politically, both as a form of regression (e.g. 'Parody, the basic form of music about music, implies the imitation of something and its resulting degradation through this imitation' Adorno 1949: 186) or as a reaction to global trends ('the successful soundscape composition has the effect of changing the listener's awareness and attitudes toward the soundscape, and thereby changing the listener's relationship to it' Truax 2000: 237).

The capacity of connoted sonic events to convey information which can also be distant from the musical sphere is being increasingly used in many fields of scientific research using the *sonification* (i.e. the use of non-speech audio to convey information) of various types of data. Several studies have demonstrated how brief everyday sounds ('auditory icons') have the potential to convey information by non-verbal means quickly and accurately (Blattner, Sumikawa and Greenberg 1989). Sonification uses the auditory icon as a sort of container in which information of an extramusical kind is enclosed. The shared connotation of the sonic event makes the transmission of the information rapid and efficient. In addition, if the variation of some acoustic dimensions of the event does not alter its connotation, that same variation can be effectively used to make the sonified data and its variations audible.

In the case in which the sonified data has an independent meaning that is not only scientific but also cultural, the use of connoted sonic events allows one to articulate these sounds according to a musical, semantic and political perspective. In my series of audio-video installations *Nasdaq Voices* (2003–07; Figure 3) the timbres of well-known musical instruments are used to sonify in real time the variations of prices and volumes of stocks and shares listed on the largest US electronic stock market (Cifariello Ciardi 2004). The intention is to create a complex sonic landscape that the audience can explore in order to interpret and judge the 'musical'

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Figure 3. Audio display of the author's installation *Nasdaq Voices.*

potential and the pulsating nature of the global economy (Aquili 2007).

In the context of the possible dialectics between local and global sonic identities *Nasdaq Voices* examines a further issue. Financial information today is limited and circumscribed as well as being planetary. The direction of a share-price has a local relevance since it is related to the opinion of investors on the financial health of a company that is located in one or more specific geographical areas. At the same time, however, the variations of that same share-price are global since they are heavily influenced by an intricate transnational network of economic relations. This double semantic level can be amplified in the sonification of the financial data by comparing the companies located in the same place as the installation with their global competitors. The result is a sort of 'local-global double-choir' which can be adapted to various different contexts.

This *modus operandi* can be described by the neologism 'glocal', coined at the end of the 1980s in the specific context of the globalisation debate with regard to Japanese marketing procedures (Robertson 2003). From an economic point of view, glocalisation is a strategy that aims to tailor global goods to local conditions. From a musical point of view, *Nasdaq Voices* is a 'glocal' installation because it adopts the shared connotation of sonic events in a flexible way in order to throw light on the local aspects of financial dynamics. In *Nasdaq Voice – Spain* (Canet et al. 2006) variations in price and volumes of Spanish companies were sonified with the timbre of a flamenco guitar, while the corresponding English competitors replied with the harsh double reeds of oboes and bassoons. In *Nasdaq Voice – Germany* the author intends to juxtapose the grand piano of a German multinational company with the Fender Rhodes of a small and dynamic American company or, perhaps ,the harpsichord of a distinguished French competitor. An effective association between a particular timbre and a local company usually influences the reception, since the listener activates a portion of his or her knowledge that (s)he is particularly fond of, i.e. the one that regards his or her own country and perhaps also his or her wallet. The effect is not necessarily always pleasant, but in any case it throws light on an ability of the sound, which was unknown in the music of the past, to enhance the present situation around us and consequently the emotions that it evokes.

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4. CONCLUSIONS

An exploration of the global or local identity of a sonic event compels the composer to deal with problems that are not only musical, but also cognitive and even political. The great quantity of experimental evidence, however stimulating it may be, does not allow us to elaborate universally valid norms or guidelines. Instead it helps to illuminate problems, which however do not necessarily always have effective solutions. In order for the semantic dimensions at the roots of the global or local nature of the sound to be explored it is necessary for the composer first of all to take up a challenge: to evaluate the homogenous cultural features that transform a generic set of individuals into a certain fairly well-defined group of listeners. Apart from the probabilities of success, such a challenge entails what at first may seem a very high price to pay: the abandonment of the composer's ambitions to create music that can be 'comprehensible' for all. An ecological approach to composition, whether it is acoustic or electronic, should help us to reconsider the possibilities of realising such an ambition. If one considers connotation as a unavoidable dimension of composition rather than a parameter that can never be completely dominated, what disappears is the idea of a 'comprehension' of music that depends on the ability of the listener to pick up information that is traditionally considered as essential and to ignore other information that is usually considered to be insignificant or even detrimental to musical understanding.

As a consequence of such a healthy disappearance an idea can emerge of composition as an experience that composers *consciously* stratify in its semantic attributes. In this way they can create a dense network of maps of meanings that turn out to be no longer completely accidental or involuntary, but that are explicitly defined as far as possible, although with the knowledge of the limits of the composer's own inferences. In these maps groups of listeners from different cultures and with different skills can find their own personally satisfying paths within the musical experience.

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