Extra-Musical Meanings and Spectromorphology

DANTE TANZI

Via Felice Masini 16 – 28066 Galliate (No) Italia
E-mail: dante.tanzi@gmail.com

Denis Smalley devoted himself to the elaboration of a method based on the analysis of spectral transformations by connoting sonorous motions and adopting metaphors borrowed from non-musical contexts. While considering Smalley's earlier theorising within the context of past and contemporary research, this paper focuses on the use of non-musical models in spectromorphological design in order to show how sonorous qualities, imaginative factors and extra-musical meanings concurred in defining new cognitive itineraries and in extending the terminology adopted, thereby establishing the basis of a new compositional approach.

1. PREMISE

When developing a project, composers may use forms inherited from musical tradition or rely on models from other contexts. According to Eugenio Giordani, most electroacoustic composers gradually ceased to use the *cyclic* form, the *enumerative* forms and the *symmetric* or *descriptive* forms. While turning from the classical models of instrumental music this tendency favoured the emergence of formal organisations based on extra-musical models. Giordani actually maintains that, in the field of electroacoustic music, compositions using non-synthetic materials as basic ingredients prior to further elaborations are almost in the majority.

> In some cases natural sounds are used without any kind of elaboration or manipulation, in other cases their use is a prelude to situations where the sounds preserve some connotative characters while mutating others. The composer can restrict himself to taking into consideration just one among the usual parameters of sound (time, space, timbre, dynamics) holding the others unaltered, but in doing so he can obtain variants of a certain interest. (Giordani 2001).

The advent of digital technology made it possible for composers to base their activities on a direct and extremely precise control of musical structures and sonorous matter. Subsequent compositional practice based on natural and synthetic sounds produced an abundance of creative solutions but also contradictions and excess, sometimes followed by preoccupied comments. In 1982 Hugues Dufourt observed that 'Numerical synthesis systems … provoke the formation of a theoretical field with specific physical sound characteristics with their psychoacoustic properties; and the microscopic details of sound (which technique makes it possible for the human ear to hear) become the object of conscious excitement and supply the material for a refined art in their transitions, even the most imperceptible, tenuous variations' (Dufourt 1982). More than ten years later, D. M. Richard warned against the effects of a sort of schizophrenia affecting computer music: 'computer music compositions that are pre-composed – textualized as a rational process – take distance from the body of the composer and interpreter, making music a remote and disembodied exercise for the ear and the brain' (Richard 1994: 29). He noted that compositional practices which create results that clearly stray from a linguistic order shared with the audience often do not follow even basic communicative strategies, focused as they are on promoting the institution, diffusion and use of what are, after all, technological events more than musical. While giving rise to meaningful changes in musical communication, the poetics of quotation, transformation and de-contextualisation transformed the net of relationships between sounds, imagination and sensitivity. So much so that Valentina De Angelis, communication theorist, observed that excessively abstract and artificial sounds hardly succeed in triggering a symbolic–imaginative participation (De Angelis 2000: 155). Not only did the musical applications of digital technology produce new and different approaches in the way of composing and listening, but they also emphasised the difficulties arising out of analytical approaches. This is probably why Lelio Camilleri pointed out that the best way to analyse electroacoustic music is to use a multi-dimensional approach based on different layers: frequential, dynamical, spatial, syntactical and phenomenological or evocative (Camilleri 1993; Cella 2002).

2. THE NEEDS OF MUSICAL COMMUNICATION

Through elaborating spectromorphology as an analytical method, Denis Smalley demonstrated that building relationships among musical and non-musical representations of sonorous events helps their analytical comprehension. He did not confine himself to

Organised Sound **16**(1): 36–41 © Cambridge University Press, 2011. doi:10.1017/S1355771810000415

https://doi.org/10.1017/S1355771810000415 Published online by Cambridge University Press

elaborating the Schaefferian approach. On the contrary, his method focused on the dynamic properties of sounds and the interpretation of spectral changes over time. After re-visiting the models of reception pertaining to electroacoustic music, he considered it necessary to extend and integrate the vocabulary shared by the electroacoustic community. Starting from the distinction between the *intrinsic* and *extrinsic*, and referring to meanings present in composition and listening, Smalley used both *musical* and *extra-musical* connotations in order to provide descriptions of spectral transformations and sound motions. Since Smalley's research gave rise to new analytical strategies, it is worth looking closely at the premise that informed the development of his method. One of his concerns was to *restore a balance* between musical production and listening, in favour of the needs of musical communication. It is interesting to note that D. M. Richard ascribed one reason of unbalance to the academic rituals, observing that 'the [computer music] discourse is confined to *prominent institutions* which reluctantly repeat a few intersecting concepts. Thus computer music is sometimes seen as a "pure" celebration of technology and knowledge, as the privileged locus of the symbiosis between the sciences and the arts' (Richard 1994: 30).

Chronologically, the concern about the critical condition of listening came after that revealed by H. Dufourt in 1982 (as quoted in the premise), but anticipated the observations made by Richard and E. Giordani. This issue was clearly expressed in the introduction of the article 'Spectromorphology and Structuring Processes' published in 1986: 'The heritage of twentieth-century formalism and the continuing propensity of composers to seek support in non-musical models have produced the undesirable side-effect of stressing concept at expense of percept' (Smalley 1986: 63). In fact, while in the second part of the article Smalley explained the basic principles of the spectromorphological method and dealt with the structuring processes, in the first part he examined in depth the relationships between artificial sounds, synthetic sounds and language, thus deciding to ascribe a foundational value to the distinction between the *concrete* and the *abstract* aspects of the electronic sounds.

First, Smalley stated that, although conceptually distinct, the *concrete* and *abstract* connotations of sounds were not taken into due consideration by the electroacoustic community; secondly, that this distinction was not present either in the compositional processes of timbre or in their categorical descriptions. Added to the absence of a shared terminology, this made the interpretation of the electroacoustic music structures impossible and this is why Smalley started to use categories borrowed from extra-musical contexts. He used them for the sake of musical communication, and in particular when the electronic sounds could resemble those belonging to the real world. Smalley considered the possibility of describing a range of spectral transformations through analogies provided by some selected categories of movement, and decided to illustrate the dynamics of the relationships among spectra, through using criteria that recalled principles of cause and effect borrowed from physics. Considering the relationships between cause and effect, Smalley wrote that 'Causality, actual or surmised, is related not only to physical intervention of breath, hand or fingers, but also to natural and engineered events, visual analogues, psychological experiences felt or mediated through language or paralanguage, indeed any occurrence which seems to provoke a consequence, or consequence which seems to have been provoked by an occurrence' (Smalley 1986: 82). In the meantime, probably concerned by some excess of digital-based compositional approaches, he clarified this fundamental point: 'Spectromorphological composition, like other musical languages, is concerned with expectations gratified and foiled, and such expectations are founded on shared perceptual experience' (Smalley 1986: 75).

3. USING EXTRA-MUSICAL CATEGORIES: SOME ILLUSTRIOUS PREDECESSORS

Smalley's decision to use extra-musical categories was not an isolated experience: in the second half of the twentieth century his research came after a series of previous studies carried out by composers seeking similar solutions. Some of them borrowed concepts or terms from disciplines such as mathematics, physics and biology, while others adopted scientific criteria to inspire models for musical organisation. Iannis Xenakis, Geörgy Ligeti and Gérard Grisey succeeded in fixing clear relationships between the extra-musical models they used and the objects derived from them.

The musical thought of Iannis Xenakis justified a compositional dimension that adopted extra-musical resources: mathematical and logical operations applied to classes of sounds, intervals and characters. According to Riccardo Pecci, 'In Xenakis, time, which would seem to be closely bound to musical creation, is strongly reframed by an architecture which is neither born nor lives in time, but confines itself to entering and using it. The coercive power of *formal relationships* confers meaning to musical objects never before experienced. In other words, musical meaning is suggested by a *set of correlations* pre-constituting it and accompanying its eventual changes' (Pecci 2004). Xenakis revealed an inclination for mathematical abstraction and the introduction of non-temporal objects in time, such as

https://doi.org/10.1017/S1355771810000415 Published online by Cambridge University Press

geometrical contours and architectures which take the form of regular solids:

> Sonorous entities have characters which are non-temporal; those characters can be put in order, provided by a set structure, so as to form a vector space. According to traditional hypotheses, which we will temporarily admit, every sonorous entity can be reduced to three characters which in their turn are no more reducible: pitch, intensity and duration (as a multiple of a temporal unity); thus each logical entity can be considered as a logical function – in the sense of Set Theory or Symbolic Logic – of sets of vectors belonging to a vector space characterised by the three aforementioned dimensions. Such logical functions rely on the basic operations and relationships which modern mathematics brought to light: primary operations and logical relationships, which everybody can do. (Xenakis 1980: 73).

According to Ingrid Pustijanac, Ligeti's position differed from that of other European avant-garde composers, 'particularly due to the number of analogies traced between the concept of space in music and in fine arts, which allowed the composer to state that space is the main dimension by which his music develops, while the dimension of time is considered a means for manifesting music' (Pustijanac 2004). In fact Ligeti theorised a distinction between the immobilised, spatialised time of the objects and the fluid time of their representation: 'I privilege closed musical forms, built as objects rather than processes: music as frozen time, as a condition, within space evoked by our imagination through the music as such, as a picture, which develops in the flow of time, but remains imaginary, in the contemporaneous presence of all its elements. Immobilising time, neutralising its flow, enclosing it within the present represents my main compositional intent' (Ligeti 1985). As a consequence, musical form was to be considered as a *sonorous, timeless object:* enclosed in an instant, but showing itself through *the time of representation*.

In Gérard Grisey the visual functions played a still more important role. In his thorough analysis, Luigi Manfrin stated that *sonographic representation* of sound and *adequacy between visual and acoustic* images suggested a path that invited Grisey to extract and apply a visual function to temporal domain. In his writings, Grisey used the *zoom effect* as a metaphor for expressing the idea that musical time can be likened to a *lens* capable of extending the sonorous object, by selecting its connotations and qualities from within a micro-phonic dimension and then transferring them into a macro-phonic one.

> The sonorous object, from its complexity and dynamism incites us to open, extend, end enormously enlarge it so as to create formal development. In turn, the sonorous object is nothing but a contracted process. Two atmospheres, that is two different times correspond to these two organisms. Thus the musical form becomes a revelation a on human scale, projection of natural, micro-phonic space on an artificial and imaginary screen; more than that, this screen is at one and the same time a deforming, focusing, multiplier, selector, 'corrosive' mirror. (Grisey 2000)

In the second period of his production, Grisey defined the compositional process as a 'true net of continuous relationships, a coming and going from the material to the process'. Manfrin, nevertheless, noted that 'in Grisey's last works no longer the musical form appears to be uniquely linked to the continuous transformation of a complex sound, but it depends on *sonorous shapes* acting as a model, often through *discontinuous jumps* among the different temporal fields' (Manfrin 2007).

4. SONOROUS, CONCRETE AND MUSICAL

As Pierre Schaeffer built his method relying on the difference between sonorous and musical object, to some extent this difference implied a distinction between musical and non-musical. In an article published in 1997 on 'De Musica', Cristina Palomba hypothesised that Pierre Schaeffer considered the value not as a fixed quality of musical objects, but, rather, a function that could vary with the context and the compositional rules. According to Palomba, the origins of such a conviction would lie in the way of understanding the distinction between character and value.

> Whereas the character constitutes the concrete substance of a sound, independent of the musical structure, the value begins to exist as such in the very moment in which more than one object is present, and the difference between these objects is based on the variation of a common feature. In other words, when we listen to the characters related to a concrete object, we know that they can became values, *once placed in a context*. (Palomba 1997)

According to Palomba, Schaeffer recognised that contextual changes may influence the role of the values of sonorous objects, and his belief derived from the hypothesis that the relation object/structure as an *endless chain* structuring all our perceptions:

> Each object is perceived as an object only in a context which includes it within a structure; each structure is conceived as a structure of constituent objects; each object of our perception is at the same time an object perceived as a unit within a structure, and it is a structure since it is made up of several objects. (Palomba 1997)

But Palomba also noted that 'when the sound object passes from *sonorous* to *musical*, it is *no longer* a perceptual unit but becomes functional once again'. According to Palomba, though Schaeffer intended to describe the sonorous object without taking into account its function in a musical chain; the very moment it becomes 'musical' the same object can no

https://doi.org/10.1017/S1355771810000415 Published online by Cambridge University Press

longer be considered only a perceptual unit, because it is re-invested with meanings *deriving from* musical sense. As a consequence, two meanings of 'sound object' emerge, which seem to express two distinct analytical needs: one refers to the concrete connotations of the sound objects *independently* of their musical (contextual) use; the other refers to the need to re-ascribe a function to them *within* a musical context. As the difference between *sonorous concrete* and *sonorous musical* falls within the wider separation between non-musical and musical, this could mean that – even in Schaeffer – the idea of *concreteness* acted as an extra-musical category.

Palomba's analysis allows us to trace a sort of 'subterranean' line of continuity between Schaeffer and Smalley, which may conflict with deep-rooted convictions. In order to define the role and peculiarity of the spectromorphological approach as compared with the typomorphological one, Michael Norris pointed out that although 'Spectromorphology acts as a sonic gateway to the intrinsic, producing the notion of *intrinsic-extrinsic thread*', the two theoretical viewpoints (that of Schaeffer and that of Smalley) remain to a large extent unintegrated (Norris 1998). In saying this, Norris considered the notion of *intrinsic–extrinsic thread* as a result of deviation from the main Schaefferian course. In my opinion, and following Palomba's suggestion, the modality of *building relationships between sonorous concrete* and *sonorous musical* (relating to Schaeffer) and that of *structuring relationships among intrinsic and extrinsic sounds* (relating to Smalley) reveal common needs but non-unifying goals, using different conceptualisations and embodying different strategies.

However, even though in some fundamental points the course charted by Denis Smalley recalled the typomorphological approach it was, nevertheless, quite different. First, spectromorphology offered new solutions to the problem of describing spectral mutations *over time*. Secondly, the phenomenological category of *sonorous concrete* was convincingly included (together with the category of *abstract*) in the musical dimension. Thirdly, the connections between *intrinsic* and *extrinsic* were shaped through combinations of spectral changes and sound motions, declined in a number of variants. Those variants were to be considered in relationship with a range of *perceptual occasions*, in order to avoid the danger indicated by Smalley through these words: 'Borrowing concepts from non-musical disciplines is common and can be helpful, unless concept is cross-checked or mitigated by ear it is always possible that the listener will be ostracized' (Smalley 1986: 63). Smalley shaped the relationships between spectral changes and sonorous motions using some general terms derived from human-like behaviour. Mediated by composers' subjectivity and articulated through identification of formal, perceptual and energetic factors, the use of terms such as action, reaction and interaction produced new conceptual entities, entitled to form part of the spectromorphological discourse.

5. STRUCTURING MOTIONS AND BEHAVIOURS

Spectromorphological matter was distinguished into spectral typology, morphology, motion, structuring processes, and space. In turn, the structuring processes were subdivided into level and focus, gesture and texture, structural functions, structural relationships, and form. In the section called 'Morphology' the author introduced the idea of a temporal envelope seen as a sonorous extension of human behaviours. In the foreground, the descriptions of qualities relating to sound behaviours contributed to add new meanings to musical signification. Smalley did not consider the sphere of human behaviours as an abstract and separate world, but as part of a reality where the recognition of spectral changes was a commonly acknowledged feature of everyday experience, and the perceptual–auditory reactions were considered active behaviours. Smalley observed that the virtual space of sound diffusion produced a sort of radical re-addressing, a multi-directional enlargement that depended on the stereophonic space of recorded composition. This enlargement allowed the creation of a totally individual acoustic–visual imagination, to the extent that the dynamic control of spectral envelopes could produce imaginary motions without the need of real spatial motions. Thus, if on the one hand Smalley's intent was to recognise the increased importance of the listener's point of view – that is, of the listening activity – on the other hand he asked composers to recognise and adopt forms in which the naturalness of sound was preserved.

After detecting three main types of sound changes, Smalley articulated them through combinations among certain models, called archetypes, and their temporal reversing. Through indicating differential thresholds both in the shape and in the perceptive quality of sounds, new typological factors (like the spectrum node) were introduced, with the intent to represent mixed states of continuity and discontinuity among the morphologies. Within this framework, the concept of correspondence was proposed as a type of morphologic modulation. Smalley analysed the dynamic connections between spectral morphologies, in order to detect and classify a range of hybrid spectra. But he also identified the perceptual occasions from which such connections could be derived by fusion or interpolation. For example, the locution change of status (arising from the observation of frequency of occurrences) relates to a kind of perceptual

https://doi.org/10.1017/S1355771810000415 Published online by Cambridge University Press

occasion that can occur through reducing or compressing the distance among sounds characterised by short attacks. Through this operation, in fact, the composer can create objects called iteration, grain and flux. The author, however, did not omit to remark that the actual perception of timbre changes might depend on the context and on the perceptive threshold: this is in fact recognisable in the case of the pitch–effluvium continuum and in the case of the attack–effluvium continuum. While illustrating the descriptions of sound motions, Smalley introduced a new descriptive layer, thanks to which the sound qualities were related with terms such as tendencies, ambiguities and contradictions. Those terms were to connote the sonorous activities characterised by orientations, aims, conflicts or reciprocal conditioning. In this way, Smalley made the integration possible between the sphere of sonorous values and that of predictive values. Of course, such integration depended entirely on the composer's mediation: only subjective assessment could attribute values of conformity with certain purposes ascribed to sonorous motions – that is, an assessment factor that applies to human behaviour – just as if the sonorous motions or processes could make their own intentions clear or as if they were endowed with a faculty of prediction. Nevertheless, once integrated in the frame including musical and non-musical meanings, the intentional vectors became essential ingredients for revealing structure and morphology of musical processes.

6. TOWARDS A DIALOGIC CONSTRUCTION

Within the dimension of space, Smalley described the articulations of sonorous motion through five kinds of trajectories called *mono-directional*, *bi-directional*, *reciprocal*, *centric/cyclical* and *eccentric/multi-directional*. As the five kinds of trajectories were referred to *gestures* and *textures*, this opened the possibility to link the morphological factors to the relational ones. Nevertheless, though *gestures* and *textures* might recall the distinction between figure and background, according to Smalley their actual roles mainly depend on the contextual bonds: 'The relationship between gesture and texture is more one of collaboration than antithesis. Gesture and texture commonly share the structural workload but not always in egalitarian spirit. We may therefore refer to structures as either *gesture-carried* or *texture-carried*, depending on which is the more dominant partner' (Smalley 1986: 83). This makes it clear to us that the spectromorphological approach was conceived as a dialogic construction, capable of creating expectations and offering answers while relying on shared perceptual experiences. In fact the ideational course charted by Smalley proceeded through analysing the differentials among timbre characters and perceptual variations and mapping them into a communicative strategy capable of interpreting nuances and dealing with conflicting factors. On a linguistic level, some conflicts appeared as moments of opposition (and reciprocal conditioning) among *diverging tendencies*; on a logical level they appeared in the form of couples of *conceptual similarity*, capable of expressing some processes of change. Along this path the *transforming processes* acted both on structural and symbolic layers, each process representing a step in a cognitive itinerary that admitted, at one and the same time, the possibility of representing *new classes of sonorous entities* and revealing their musical meanings. Something different occurred when the opposite couples *dilatation–divergence* and *contraction–convergence* were combined with qualities such as *centric and eccentric*. Such combinations were to justify the possibility of deriving the *curvilinear* shapes from the *linear* ones through differences of *velocity of refraction*. On the other hand, even the mutations of spectral configurations were explained with the help of the opposition between *reciprocity* and *linearity*. And if it is clear that the descriptive model of *curvilinear motions* proposed by Smalley recalled causal models deriving from acoustics (oscillation and undulation) and mathematics (convolution), it seems that the description of the complementary relationship between *linearity and cyclicity* had the function of moving the issue of *sounds motion* towards a musical dimension.

Smalley felt it important to emphasise that part of musical meaning relies on the *cyclicity of the events* and in their being present in the short-term memory; he also stated that there were some objective factors conspiring in the creation of a *centric impression*, and that the category of *centricity* could inform the articulations of *centrifuge*, *pericentric*, *vortex* and *elicolidal* motions. Besides, Smalley defined the category of *eccentric motion* through the individuation of *growing motions* but in opposition to that of *centric motion*. Both categories were (say 'thermodynamically') declined as *exogeny*, *endogeny, accumulation*, *dissipation* and *confraction*, while the category of *conglomeration* was used to describe motions characterised by *opposite* signs. The distinction between *monotype* morphology and *mixture* morphology was articulated according to some temporal qualities, and gave rise to three different kinds of motion: *flocked*, *streamed* and *contorted*. The author specified and emphasised the role played by the textures, since he considered their *relative stability* necessary, in order to facilitate the attribution of meaning to spectral structures. Finally, the term style is referred to an upper level of control. It is considered to be capable of interpreting the shaping of formal elements, seen as the result of mutation processes interesting the spectral structures, even in the case of simultaneous processes.

https://doi.org/10.1017/S1355771810000415 Published online by Cambridge University Press

CONCLUSION

Adopting a multi-dimensional approach, Denis Smalley charted a map of spectral mutations and their references within a range of perceptual fields. The possibility of encoding transitions between the dynamic qualities of timbre became feasible through the extension of vocabulary and the comprehension of non-musical references. As a rational method subject to syntactic and stylistic criteria, spectromorphology solved the communicative problems arising from the encounter between electroacoustic music and information technology. As a disciplinary system, it was (and still is) fundamental in order to analyse, understand, compose and perform the transformations of sonorous matter.

REFERENCES

Camilleri, L. 1993. Electro-acoustic Music: Analysis and Listening Processes. *Sonus Contemporary Music Materials* **1**.

Cella, C. E. 2002. *Glissandi. Un approccio multidimensionale nell'analisi della musica elettroacustica*. www.cryptosound.org/writings/music/files/Glissandi.pdf (accessed on 1 September 2010).

De Angelis, V. 2000. *Arte e linguaggio nell'era elettronica* (Art and Language in the Electronic Era) (Milan: Bruno Mondadori).

Dufourt, H. 1982. La dialettica del suono fabbricato. In B. Barbini (ed.) *Numero e Suono, catalogo de La Biennale, Settore Musica: 4*. (Venice: Le Biennale di Venezia).

Giordani, E. 2001. *Osservando una nuvola. Riflessioni sulla musica di Walter Branchi*. http://xoomer.virgilio.it/e.giordani/docs/Osservando_una_nuvola.pdf (accessed on 1 September 2010).

Grisey, G. 2000. La musica, il divenire dei suoni. *I Quaderni della Civica Scuola di Musica* **15**(27) (June): 29–34.

Ligeti, G. 1985. L'eredità bartókiana nel Secondo Quartetto di Ligeti. Sul concetto di tradizione nella musica contemporanea. In E. Restagno (ed.) *Ligeti*. Torino: EDT, pp. 149–67.

Manfrin, L. 2007. Gérard Grisey: periodicità, oscillazioni e risonanze in 'Tempus ex machina' al limite tra udibilità e in udibilità (2003–2007). *De Musica* **12**. http://users.unimi.it/(~gpiana/dm12/manfrin%20-%20tempus%20ex%20machina/tempus%20ex%20machina.pdf (accessed on 1 September 2010).

Norris, M. 1998. *An Overview and Assessment of Selected Discourse on Electroacoustic Music*, MA Dissertation, City University, London. www.michaelnorris.info/soundmagic/diss2.html (accessed on 1 September 2010).

Palomba, C. 1997. Pierre Schaeffer: alla ricerca dell'oggetto sonoro. *De Musica* **1**. http://users.unimi.it/ ~ gpiana/dm1/dm1schcp.htm (accessed on 1 September 2010).

Pecci, R. 2004. Una ritmica hors-temps: Il paradosso di Iannis Xenakis, *Seminario Permanente di filosofia della musica, Milano: 'Tra evento e schema: la raffigurazione del ritmo in Nancarrow, Xenakis, Ligeti e Grisey'* ('Between scheme and event: the representation of rhythm in Nancarrow, Xenakis, Ligeti and Grisey'), Milan, 12 February.

Pustijanac, I. 2004. La musica di György Ligeti: riflessione teorica e prassi compositiva. Dottorato di ricerca in Filologia musicale presso l'Università degli Studi di Pavia.

Richard, D. M. 1994. Computer Music and the Post-Modern: A Case of Schizophrenia. *Computer Music Journal* **18**(4) 26–33.

Smalley, D. 1986. Spectromorphology and Structuring Processes. In S. Emmerson (ed.) *The Language of Electroacoustic Music*. (London: Macmillan) 61–93.

Xenakis, I. 1980. Problematiche tecnologiche della composizione. In A. Di Scipio (ed.) *Universi del suono, scritti e interventi 1955–1994*. Milan: BMG-Ediz. Musica Stampata: 73.

https://doi.org/10.1017/S1355771810000415 Published online by Cambridge University Press