

## **Composition, Change and Musical Objects in *Infinite Music: Imagining the Next Millennium of Human Music-Making***

(by Adam Harper)

*Infinite Music*, published in November 2011, is my attempt at building a broad-based, progressive philosophy of musical composition and aesthetics for the modern era. I use the term 'modern' in its sense as 'contemporary' and 'new', since much of my approach is informed by aspects of music technology that developed relatively recently, at least as far as its long-term history is concerned. But I also use the term in its relation to concepts of 'modernity' and even 'modernism', concepts that many now believe to have had their day. These concepts often carry negative associations with aesthetic dogmatism and failed cultural projects, and for good reason, but in that they represent concerted and collective artistic focus on imagining new forms and, indeed, new ways of perceiving and living in a changed and changing world, their lasting importance cannot be emphasised enough.

*Infinite Music* aims to call for such a modernism, one which is directed towards the imagination of the new but which refuses dogma or limitations. Ferruccio Busoni's *Sketch of a New Aesthetic of Music* was perhaps the key inspiration in this regard, since it advocates dismantling musical rules without making very explicit assumptions or demands about the specific nature of music in the future. In many areas of contemporary culture, such a call still needs to be heard. Part of my background is in the criticism of underground popular music, where resistance to the conservatism of mainstream music and debate over the value of 'retro' idioms are common themes. But here at the 46<sup>th</sup> Internationale Ferienkurse für Neue Musik, Darmstadt, such a call – explaining the importance of New Music – might be relatively redundant.

Instead, I'd like to elaborate on a central aspect of *Infinite Music* that is less explicit than its call for a twenty-first-century-modernist expansion of the musical imagination. I'd like to describe the musical ontology - its system of conceptualising the 'being' of music - that I hope supports this call and provides it with its method. As well as describing what music might be 'composed of' in better imagining the possibilities open to the modern composer, *Infinite Music* also aims to describe the process of hearing new music in constructive ways.

Unlike many of the musical ontologies that might be connected to modernism, *Infinite Music's* is not a hierarchical or absolute system. It is not based on particular laws, structures or fundamental musical units. Instead it is a fluid, relativistic, infinitely flexible system based on change itself – constant, continuous and infinitesimal change, change in the abstract. Here's how the ontology is summarized in *Infinite Music's* introduction:

This book proposes a system for the imagining of music. It's not just a single system as was offered by serialism, but a

system of systems, an infinite system allowing for the creation of subordinate musical systems or what will be called 'musical objects', describing how they interrelate and how they're perceived (or not). It sees music as a *complex system of variables relating primarily to the production of sound*, and takes this idea to its infinitely variable conclusions. This system, which is given the name 'music space', situates the limitations of any one, particular idea or set of ideas about musical forms against a space of infinite variability expressed in infinite dimensions. It ultimately treats all music as *a process of continuously changing information* and thus at the point of infinity, music, which manifests as an event, is always unrepeatable and different (i.e. changed) unless we restrict the perception of this change in some way. We see every musical structure as one of different relative rates of this change, with some elements changing while others repeat or remain effectively the same. We see how the same structures of musical change apply both within and outside of the borders of musical performances, making music as a whole a single system spanning all lengths of time. We see how composers and listeners perceive this change in relation to their own capacities and interests and thus come to handle and develop musical information discriminately. Most importantly, by imagining music in terms of paths of possible change running through a space of infinite possibility, we learn how the restrictions of unwitting convention and the apparent finitude of our imaginations can be detected and thus overcome. – p. 11

One of the first things to note about *Infinite Music's* ontology might be that there is no stable, discrete object at the centre of it. Elsewhere, such a fundamental object might be the motif (as in Schoenberg), or the note (as either pitch or rhythmic value), or sound (as in Varèse), or the sonic grain (as in Curtis Roads's *Microsound*). There are no sonic atoms of the system, no taxonomy or periodic table of musical elements with which to proscribe music-making. But how might we handle, as an alternative ontological base, this 'change' – changing information, difference, relative difference in information?

To find a more useful fundamental creative condition of composition, we'd need a way of expressing [the] power to manipulate sound by grasping the specific attributes of (any) sound based on the ways in which it varies. There is a term

for this, common in maths, science and their applications:  
*variables*. – p. 17.

Of course, it is nothing new to consider the activity of composition to amount to the manipulation of variables, the most prominent of them being pitch, volume, timbre and duration or time. This was often the perspective of twentieth-century music, as in post-war serialism, the theory of John Cage, and indeed in folk music champion and ethnomusicologist Alan Lomax's Cantometrics system, in which the characteristics of any folk music in the world could be described using a system of thirty-seven variables. Variables express values, such as, for example, 440Hz for pitch, 30dB for volume, sine waveform for timbre and three seconds for duration. Taken as a category in themselves, these 'musical variables' represent the continuity behind values that change in time and space. But this variability can be considered more than just a descriptive signifier for *a priori* sounds:

When it comes to musical composition, sounds don't exist independently of the activity of the variables and values that specify them. Sounds are made up of values expressed by variables, whatever they may be: it's the activity of combinations of variables and their values that actually *creates* or *constitutes* in the first place what we may then identify as (certain) sounds. There's no such thing as a sound without values, that is, values that can be expressed through variables. For composers, variables can do more than just describe sound(s) – they are in a significant sense what compose them... Musical variability comes *before* sounds, not vice versa. – p. 24

In its first part, *Infinite Music* looks at the workings and possibilities of musical variables at length. Irreducible, again, to any single set of elements (even as forms of change), they can be broken down or built up into simpler or more complex paths of changing values. Pitch, for example, can be understood on another level as the joint activity of amplitude and time, while a choice between different musical instruments (also a variable) involves relations between certain particular possibilities of pitch, volume, timbre and duration all grouped together in each instrument, as well as variables and values that might pertain to social, cultural or economic concerns. Indeed, I propose that variables with no effect on sound, 'non-sonic variables', be considered as musical variables that composers and listeners might observe. Furthermore, the values of variables might be continuous (changing smoothly, as in the pitches on a trombone) or be 'quantised', thus becoming discrete (changing in step, as in the pitches on a piano), and might have range limitations imposed on them in particular contexts, such as those of particular instruments.

Most important, perhaps, is that the values of a musical variable might be left unspecified, to whatever degree, at the point of performance. This allows for the continuity behind the differently detailed performance events that might arise from a single musical work – for example, the different values expressed by the variable of tempo with which the same piano piece can be performed on different occasions. The term I apply to music with values that, in this way, change at the point of performance is 'flexible music', in contrast to 'concrete music', whose values are, notionally at least, entirely specified in each performance and do not differ between them. However, these two categories are, as is typical for *Infinite Music's* ontology, relative, since no two performances can have infinitely specified values such that they are identical:

In contrast to the way we usually talk about musical works, we could say that when we hear 'the same' work performed in two different sets of circumstances, we are in a different sense – that is, at a more advanced *degree of specification* – hearing what we could think of as two *different* musical works in actuality. We could adapt the famous saying of the Ancient Greek philosopher Heraclitus, 'one cannot step twice into the same river', and say similarly that one can't experience exactly the same musical work twice... [Therefore] just as with sounds, the borders that we conventionally draw around 'pieces of music' – what is in the music and what is outside of it – are arbitrary with regard to the multitude of variations that may occur between differently specified musical actualities, and only limit our awareness of the detailed possibilities of compositional specification open to composers. – p. 32

Like the ontologies of Gilles Deleuze and Alfred North Whitehead, in following Heraclitus *Infinite Music's* is a process ontology, one not founded on the nouns of stable, discrete 'beings', but on the verbs of changing, intransitive 'becoming', on an inexhaustible flow of continuously and infinitesimally changing information. Therefore:

In order to appreciate the full range of possible musical specifications in a composition, we shouldn't think of 'a piece of music' in the conventional sense – as a fixed and passively experienced sound object – but rather of musical events, such as concerts or the playing of personal mp3 players (which amount to the same thing), over which composers have varying degrees of specific control. Listening and participating in any way, too, makes you a part of that event. Music is not just something you listen to,

it's something that happens, something you're involved in – something you do. – p. 35

In *Infinite Music*, this is connected to musicologist Christopher Small's account of music-making in his landmark book *Musicking*, in which he proposes that music is not a set of particular cultural objects such as works but an activity. Small's verb 'musicking' can be applied to any instance of musical activity, even if it is passive, as is traditionally considered the case with listening.

In place of the particular unchanging 'beings' that might make up music, then, *Infinite Music* offers 'configurations of constrained variables' within which change is possible. They can apply continuously throughout music-making, allowing for a more complete perspective of its possibilities:

Limited configurations of variables can operate at any level of music-making, and imagining music as consisting of them can give us a clear view of what variable structures make up musical activity and how they relate. – p. 52

Perhaps the most significant and yet least traditionally apparent consequence of this is that these configurations of constrained variables can apply both within formally composed musical works or performances (as a recurring motif might) and outside of or between them (as an instrument or even a musical style might), with no absolute ontological distinction separating these two applications:

Both musical instruments and musical styles are examples of flexible music. They're not individual flexible musical works, but they're no less flexible: as limited configurations they can give rise to different musical outcomes in performance. This means that a musical instrument or a musical style and a flexible musical work are, in just the same way, not so different in kind either. Again, instruments, styles and musical works are all alike in being limited configurations of variables where some values are more fixed than others. – p. 55

Because of the cultural primacy of musical works compared with other tools of music-making, it might feel intuitively true that instruments would occupy a position within an ontology of music that is absolutely distinct from that of musical works, but the difference lies only in their relation to (compositionally or culturally) specified time, which is just another musical variable / value:

"Put simply, *a musical instrument is a musical work without a time limit*. It operates outside of and between the time-limited performances of musical works in their traditional

sense... All time continuums, whether music happens within them or outside of and between them, *are no more or less the domain of musical variables than any other structure within music.* – pp. 55-7

This perspective might lead to an expanded, more open sense of where musical creativity might be appreciated:

Thinking of instruments and styles as configurations of variables just like musical works, which makes them all level within the same category, suggests to us that instruments and styles deserve status as musical 'art objects' just as much as musical works do. Like musical works, they create musical performances, and so what if those performances happen to be flexible, differing more than those of conventional musical works? [Indeterminate] experimental musical works can differ at the point of performance too, and often just as much. We conventionally think of instruments and styles as subordinate or incidental to the category of musical works, but they are the 'art objects' that make up music as a whole no less than musical works are. – p. 56-7

But it is not just styles, instruments and works that might not be ontologically distinct – everything within music-making can be considered ontologically equal in that it embodies the activity of constrained variables. This dissolution of traditional musical categories might be a radical opportunity for the musical imagination:

So whatever sort of time continuums they do or don't occupy, everything we may wish to talk about in music-making, any entity or structure within music, is a limited configuration, a cluster of musical variables where some [values] may be more flexible than others and some may have ranges imposed on them... Music as a whole is a vast rolling sea of variables, all potentially equal in importance, with changing values – sometimes still, sometimes gently shifting, sometimes surging heavily – and all grouping together in any and every way to create an astonishing variety of different forms and practices of varying flexibilities, many of which we have yet to imagine, let alone define and use...

Seeing music only through such seemingly discrete concepts as 'style', 'work', 'instrument', 'melody', 'rhythm',

'notes' and indeed 'sounds' makes it difficult for us to imagine the configurations of variables *outside of* and *between* these categories for which there are no existing terms or concepts (yet)... It's difficult to describe configurations that don't fall neatly into the categories of 'works', 'instruments' or 'styles' using existing concepts from language, but we should try. All these concepts hide from us the pure, complete potential for variability in music, its utmost possibilities and combinations, its continuous, pre-quantised, pre-constrained infinity.

This is why it's so important and so inspiring to think of music in terms of the variables from which it's created, as a *complex system of variables relating to the production of sound*. Music's variable attributes come before the rules, discrete concepts and labels we impose on it, and will remain even if all those rules and concepts melt away. No one musical variable or collection of musical variables, or quantisation or range limitation (these are variables too), is necessary for the creation of music, but all are sufficient, and all can be applied in any way or in any combination at all.

Musical variables are the paths that the imaginations of composers and listeners may tread – each is a certain locus of possibilities. Some paths are more beaten than others. Imagine a discrete concept or sound by itself, and it's only so easy to imagine it being any different. Imagine a variable of pitch, and you can imagine a virtually infinite number of pitches from very low to very high values. Better still, imagine a discrete concept or sound as something created by a configuration of musical variables, and you can imagine adding or removing variables, changing values and the flexibility of those values – you have easy access to a whole host of new forms that differ in new and strange ways from the all-too-familiar sounds and concepts that lie behind us. We can begin to see how, especially with the help of modern music technology, composers may control the activity of variables with precision and at any and every level of specification (far beyond the physical and mental capabilities of traditional human performers), and even outside of the conventional boundaries and modes of music-making, which dissolve as a result.

If composers are truly to take advantage of music's utmost possibilities and set out into that vast sea of musical variability along a new route, they must *dequantise* what

they know – break it down into its rawer, continuous variability – and then *requantise* by creating strange new configurations of musical variables from what they find. These new configurations may be re-used and explored in detail, but they, too, may ultimately be dequantised. Composers can keep themselves and their listeners constantly mindful of music's full potential for variability by continually *dequantising, requantising, and dequantising again*, and by finding some equilibrium between the rule-breaking of dequantisation and the rule-making of quantisation. - pp. 57-60

So ends Part 1. Of course, this philosophy of the musical imagination does not differ very much from many of those of the twentieth-century, especially Busoni's, having only a sense of relativism that is perhaps more contemporary. Yet more conceptual details and implications arise in Part 2 where musical possibility is considered spatially, with the whole of music becoming a highly multidimensional (n-dimensional, in fact) space of possible change. Part 2 begins with a new vocabulary:

We'll also refer to limited configurations of musical variables together with the constraints (i.e. quantisations, ranges) imposed on the values of those variables as *musical objects*. This is both for the sake of convenience and because those limited configurations are the objects that make up music, where terms like 'sounds', 'melodies', 'pieces of music' and 'instruments' are, as we've seen, either too vague or too specific as concepts. Music space, then, is the *continuous space* or *continuum formed by all musical objects*. – p. 62

A musical object is thus defined as a constrained system of musical variables. It follows that:

Musical objects are subsets or subspaces within music space. Let's remind ourselves: what do these sets and subsets *contain*? Remember that a flexible musical object can give rise to many different performance events: it is a space in which multiple different performance events are made possible, and it can actualise as any of those performance events. If a musical object is a set or space, then that set or space contains the full range of possible performance events that that musical object can actualise. To continue the analogy of sound space as a library of all possible books, a musical object is like a subsection of that library, containing

books limited to a particular range of attributes. If that musical object can actualise more than one different performance, then it's flexible. If that musical object can only actualise a single, infinitely specific performance event, then it's 'concrete'. Each of the performance events that a flexible musical object can actualise is a single, infinitely specific point located in the space represented by that musical object, each of which in turn can be thought of as a 'concrete' musical object. To create a subset or subspace is to constrain the performance possibilities of the larger space it's contained within in a certain way, and that constraining is determined by the variables and the constraints on them that make up that subspace, that musical object. – p. 71

Following the work of philosopher Manuel DeLanda, this ontology shares similarities with concepts from dynamical systems theory:

In many areas of science, particularly dynamical systems theory, a system like [a musical object] can be depicted as a 'phase space' or 'state space'. Any configuration of the values of those variables, and thus *any possible state of a system*, can be represented by a single point plotted, as on a graph, in that system's phase space. A phase space describes a system by constituting every possible state in which the system can be presented regarding any and all possible combinations of the values given by those variables. A pendulum, for example, is a system that passes through multiple spatial positions and amounts of momentum while in motion, so the variables of 'position in one spatial dimension' and 'momentum' form the dimensions that are used to mark all the possible states of that system as points in a two-dimensional phase space. – p. 79.

This is what gives musical objects their more flexible character:

Musical objects are the *dramatis personae* of music. But they are not objects in an everyday sense... Musical objects are *abstractions*: they are collections of certain possible performance events grouped together as a certain limited identity defined by a certain set of constrained variables, and abstracted – extrapolated – from actual, concrete reality. Returning to Heraclitus's saying, 'one cannot step twice into the same river', we can say that in parallel, one cannot experience the same actualised musical performance twice,

but there can be the conceptual object or phase space of 'a river' or 'the river' that remains, even though that river is always actualised ('performed') differently. Musical objects remain, as abstract concepts, in the same way. We can't step twice into the same music, but if we unify a range of musical events as a constrained locus of variability, we can at least step into the same musical object twice – we can play the clarinet twice, we can see the same musical twice, we can hear rock music twice. But take away the words or conceptual definitions we use to constrain and demarcate their identities, and all such musical objects are continuous with each other, making up the pure variability of music space." – pp. 83-4.

Furthermore, musical objects should not be considered as made objective and distinct, or exhaustively defined, by whatever signifiers might be applied to music, since these signifiers are created only for imperfect (and potentially obsolete) statistical models:

The musical objects that we infer from the real world are statistically derived, and have problematic, imprecise relationships to the words we use to represent them. – p. 76

With all this, *Infinite Music's* system hopes to find a means for imagining specific sites and avenues of musical creativity without taxonomic or essentialist dogma about what particular characteristics musical objects should or should not have. This might benefit musical ontologists, but what does it mean for composing and listening to new music? In order to answer this question we turn, in Part 3, to the perception and aesthetics of music, and the potential disparity between listening experience and the continuously changing musical information (that is, always new information, such as from new musical performances), from which new musical objects might be derived.

This disparity begins as a physiological shortfall, shown using the example of listening to white noise:

The [contemporary human] brain can't 'sample' the white noise at a fast enough rate. In unaided human music space all the different permutations of white noise are effectively constituted as *the same, undifferentiated musical object*, even if the computer, with its different, particular patterns of ones and zeros, would know otherwise. – pp. 123-4

But, again without changing ontological categories, this shortfall becomes the domain of psychology (in *Infinite Music*, the theory of J. J. Gibson) and indeed

culture, since listening is a process of collecting information in an interested, discriminate way, based on prior experience:

When we listen to music, (re)constituting it in our minds, we only collect and constitute musical information *according to the needs and interests that we've developed prior to listening or develop during listening*, whatever they might be... So how do these discriminatory needs and interests arise? They're the result of our being living, learning creatures in a living world with a wealth of prior experience and concerns that stretch beyond any culturally imposed borders that might surround what we term musical activity. We don't hang our worldly social, personal and other needs and interests at the door when we evaluate and (re)constitute music, and though they can have a greater or lesser effect in different circumstances they are right at the heart of how and why we listen to music. Even if we try our hardest to listen attentively and objectively, music isn't separate from its outside world but often an activity within it and of great significance to it. We listen to music – indeed, we 'music' – by means of its capacity to meet these needs. – pp. 125-6

What effect does this process have on the possibilities (both of perception and composition) of musical objects?

Aesthetic responses discriminate between all the potential pieces of information musical objects can offer a listener and come to constitute a particular structure or subset of features, effectively presented to them as a structure of constrained variables. This process will only constitute some variables, values and musical objects while the rest will be discounted, effectively undetected, or allotted a more peripheral status. In Part 1 this process was called 'taking variables into account in a musical context' and in Part 2 it was called 'constituting a musical object'. It doesn't just happen during listening itself but *between listenings*, and affects our assumptions, opinions and expectations about what we think make up certain musical objects away from actual musical performances. In this way, affordance generates a certain representation or ideal of a musical object we could call an *image of music*. – p. 130

Rather than the notional objectivity of musical objects then, the arena most important to new music, perhaps, is the subjectivity of images of music. To elaborate on this concept:

*Aesthetics... constitutes or maps musical objects as corresponding images of music... [Interested listening] structures certain expected and perceived characteristics of musical objects as images of those objects... Images are musical objects as they appear in the mind, literally, theoretically or potentially: they are 'imagination' of music. They're what listeners experience in music in place of exhaustively described musical objects themselves, what listeners expect and derive in their minds from the musical performances they hear or hear about... Composing, performing and listening are ultimately the same activity: the constituting of images of music... [Images of music] are the aesthetic constructions (or (re)constitutions) of music, aesthetic 'preparations' of it, and as such are compositions themselves... [Images of music are] orderings of perceptions, aesthetic priorities, assumptions and expectations, and they average out over time as tendencies and cultural beliefs – p. 130-141*

Images of music structure and are structured by listening. They may not necessarily be simple lists of salient features, but a certain structuring or ordering of perception, an 'aesthetic agenda' concerning what types of change – during the performance or in relation to other performances – are significant. Without images of music, all we hear are disordered sounds (in fact, without the information processing capabilities that create these images for us, our brains wouldn't really be functioning at all). – pp. 136-7

And just like the musical objects they replace, images of music apply at every level of music-making, even on a cultural level, where they regulate elements such as style and musical canons:

An inability or unwillingness to observe and comply with the implicit images regulating the perception and aesthetics of art and life in general was classified as madness or put down to limited or altered mental capacity in many eras, and judgements of this kind persist to this day...

Images of music direct our perception of what it is that constitutes particular musical objects – especially at the level

of style, that is, our opinions and assumptions concerning how musical change will operate between performances – and even what constitutes musical activity itself. In this way, images of music have very real consequences for the way we judge aesthetic value in music, and as such can have a detrimental effect on the ability to appreciate and even imagine music that doesn't fit to their templates... canons are not just lists, but play a role as value-orientated images of music applying at a cultural level – pp. 140-3

Musical composition works in relation to these images of music, and when it manages to expand or supercede them (as I discuss, music criticism, critical listening, repetition and stylistic coherence all aid this process) it could even be considered 'modernist':

Images of music have blind spots. If images of music are what regulate our perception of change in musical information, then some types of change will be recognised more than others... Because of this, images of music can be an obstacle to the production and appreciation of genuinely new music, and composers are pitted against them when they compose new music. Listening according to an insufficient image can be thought of as listening in the wrong dimensions (i.e. using the wrong variables): if the image of some particular music you hold to be valid is that the music varies in two dimensions  $A$  and  $B$ , and some composers produce new music that varies in dimensions  $B$  and  $C$ , you'll only be able to constitute the music as one-dimensional. You'll miss  $A$ , and you'll only find the music half as appreciable. If composers do branch out into new dimensions, such an image of music may prevent this novelty being appreciated or noticed at all. Even if in the West the authority of musical tradition and convention is weaker than ever before and modern technology has given us more access to music space than ever before, the more subtle, unconscious and ubiquitous authority of images of music can still threaten to obscure or extinguish genuinely new and potentially appreciable musical innovation, both today and tomorrow.

It's only half the battle, then, for composers to compose new music. Listening equates to composing in that both activities constitute musical information, so without an appropriate way of listening – an appropriately adapted image of music – new music will not appear new, viable or

recognisable at all... If new music (or different music in general) is to be appreciated, then it has to be received through *new ways of listening*. Indeed, the dichotomy is largely false because the two activities both constitute music: new music *is* new listening, and new listening *is* new music.

So it's not just up to composers to identify and overcome their images of music. Listeners must do this too if they want to experience music *as* new – whether it's new music itself or old music with a fresh perspective... Music space can be seen as both the destination and the source of this process in music, which we can call *modernism*. All images of music are reductions of and constraints on the infinity and absolute equality of music space. Images are less than music space: music space exceeds images, it lies beyond them. But of course images are unavoidable – we need them in order to experience any information in music at all. Yet given the role of images as describing systems that reconstitute musical objects, we can constantly strive for better, more accurate, more detailed images of music, images that have a better fidelity to music space and its sub-spaces – better maps of music space. This process is achieved through, or at least in metaphorical parallel with, the development and usage of *modern* technology and scientific discovery, and reflects *modernity*. Modernity is constantly 'beyond' images, one step ahead of them, and as such necessitates the creation of new images that better reflect the changed possibilities and structures of the modern world.

Composers, listeners, performers and anyone who constitutes music (they all do the same thing) accomplish this by better revealing the infinite and continuous music space beyond images of music... In this way the musical objects that go unobserved or unappreciated because of the restrictions of images can be revealed, and more information can be added to our maps of music, increasing our perception of its reality. - Pp. 144-147

Why compose modern music in this way? I hope it would not be controversial to assert that music is a crucial component of personal, social and cultural communication, and that better representation of its possibilities, broad and subtle, and bigger imaginations in any area of human activity, can make for better art and a better world.