
NODALISM AND CREATIVE PRACTICE

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This paper proposes the notion of Nodalism as a means describing contemporary culture and of understanding my own creative practice in electronic music composition. It draws on theories and ideas from Boden, Lacan, Deleuze, Guatarri, and Gochenour *et al* to demonstrate how networks of ideas or connectionist neural models of cognitive behaviour can be used to contextualize, understand and become a creative tool for the creation of contemporary electronic music.



1. INTRODUCTION: CREATIVE AND CULTURE

In the hundred years since Russolo's Art of Noises manifesto of 1913 we have witnessed an exponential rise in the number of musical genres as diverse musical practices collide, meld and fracture to create previously unimagined sound worlds. What we hear today is predominantly technologically mediated audio, given a plethora of tags in a vain attempt to define boundaries and normative modes of behaviour. Kim Cascone, uses flocking behaviour as a model to describe the emergence and formation of new genres of electronic music. Cascone writes that,

... a group of nodes assembles and follows a set of simple rules, which creates emergent behaviors. These simple rules are the basis of all flocking behavior [sic]: alignment, separation and cohesion... In the context of electronic music a flock consists of a cluster of individual nodes that generate content. Content can consist of a sound file, a software instrument, an algorithm, an idea or information... Because no single node in a flock determines its overall behavior, a flock is not a hierarchical organization but a decentralized one. (Cascone 2005)

Cascone's quotation is not only interesting in itself but also in its terminology. Although the model Cascone draws on in his paper is based on Craig Reynolds' description of the Boid Algorithm,¹ his use of a decentralized non-hierarchical model is clearly derived from the thinking of Deleuze and Guattari's notion of the rhizome – a distributed network (see Fig. 1). Reynolds' terminology in his paper 'Flocks, Herds, and Schools: A Distributed Behavioral Model' (Reynolds 1987) focuses on emergent and dynamic behavioural models rather than non-hierarchical networks. In *A Thousand Plateaus*, Deleuze and Guattari propose the model of the rhizome as a means of describing contemporary cultural activity, one in which hierarchical structures are supplanted with the concept of a planar (non-hierarchical) network of connections. Such systems are,

finite networks of automata in which communication runs from any neighbor to another, the stems or channels do not pre-exist, and all individuals are interchangeable, defined only by their state at a given moment – such that the local operations are coordinated and the final, global result synchronized without central agency (Deleuze and Guattari 1987).

¹ <http://www.red3d.com/cwr/boids/>

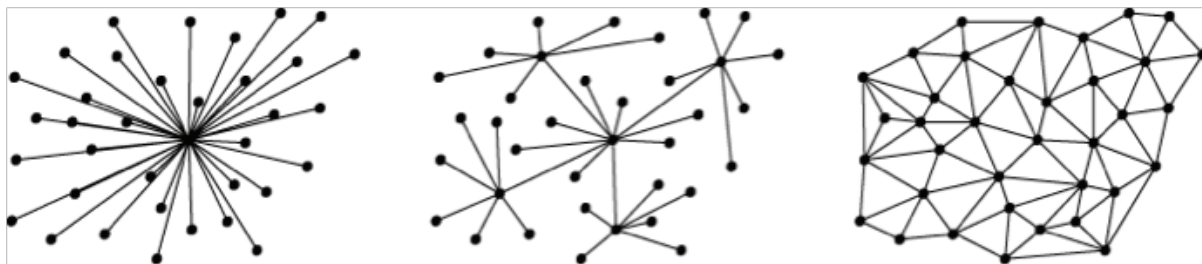


Fig. 1 centralized, decentralized and distributed network models

Cascone is also clearly thinking nodally and his definition of ‘content’ is what Richard Dawkins would term memes – units of cultural information. Dawkins’ notion of the meme is one in which ideas are spread from one brain to the next and that creative activity arises from the intersection of memes in a sound artist or composer’s brain. Memes are neuronally encoded cultural information and their phenotypic products (behaviour and artifacts) spread through a process of imitation from one individual’s memory to another. Richard Dawkins in *The Selfish Gene* writes that, ‘examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or building arches...’ (Dawkins 1989).

As composers and sound artists we traditionally pride ourselves on originality or the unique sound world we create in our works. Steven Jan, writing specifically about Dawkins’ work in relation to music writes that, ‘memetics maintains that conscious intentionality, the fundamental attribute of the human mind, is not some unitary presence, but the resultant construct of a multitude of memes in constant competitive interplay’ (Jan 2007). At its most reductive, Jan’s work suggests that a composer’s musical style or ‘musical identity’ is actually the result of memes residing within the composer’s brain (Adkins 2009). The corollary being the more memes one has absorbed through engaging in all areas of contemporary culture, science and ideas, the more unusual neuronal connections that can be made and hence potentially a more varied and richer compositional style can result as memes are combined and hybridized.

In her paper ‘Creativity and unpredictability’ (Boden 1995), Margaret Boden uses the term *conceptual space* as an equivalent to Cascone’s musical genre. Boden’s term is informed by Koestler’s view of creativity as the ‘bisociation of matrices’ (Koestler 1975) and is explored at length in Boden’s book *The Creative Mind* (Boden 1990). She writes that,

The ‘mapping’ of a conceptual space involves the representation, whether at conscious or unconscious levels, of its structural features. The more such features are represented in the mind of the person concerned, the more power (or freedom) they have to navigate and negotiate these spaces. A crucial difference - probably the crucial difference - between Mozart and the rest of us is that his cognitive maps of musical space were very much richer, deeper, and more detailed than ours. In addition, he presumably had available many more domain-specific processes for negotiating them... mental maps enable us to explore and transform our conceptual spaces in imaginative ways. (Boden 1995)

The inner dynamics of the mind are complex. Each mind is idiosyncratic no matter how culturally conditioned we consider ourselves to be. This idiosyncrasy is, in part, a result of our experiences but is also neural – suggested by Aniruddh Patel’s shared syntactic integration resource hypothesis (Patel 1998) which proposes that our neural paths for perceiving sound, touch, sight and smell are shared when first born and develop into independent pathways in unique ways for each of us as we mature from young infants to children. This suggests that creativity and the ability to produce new compositional ideas is the result of both our neurological functioning and an individual’s accumulated memetic repository.

Boden states that a quasi-scientific approach to define creativity is through the novel combinations of existing ideas, or in Dawkins’ terms, memes. She states that,

At the heart of creativity lie constraints: the very opposite of unpredictability. Constraints and unpredictability, familiarity and surprise, are somehow combined in original thinking... It must show how creativity is grounded in constraints, and why it is that creative ideas are unpredictable - and often inexplicable even after they have occurred... Many creative ideas are surprising not because they involve some unusual mix of familiar ideas, but in a deeper way. They concern novel ideas which not only did not happen before, but which - in a sense that must be made clear (and which combination-theory cannot express) - could not have happened before... A merely novel idea is one, which can be described and/or produced by the same

(specified) set of generative rules, as are other, familiar ideas. A genuinely original, or creative, idea is one which cannot. It follows that constraints, far from being opposed to creativity, make creativity possible. To throw away all constraints would be to destroy the capacity for creative thinking. Random processes alone can produce only first-time curiosities, not radical surprises. (Boden 1995)

Boden's research is echoed in that of Santanen *et al.* (Santanen, Briggs, Vreede 2000) who present a network model of creativity. Their paper is aimed at problem solving and proposes a new brainstorming technique. However, their premise is applicable to our current discussion of nodalism. In their model they recognize,

...that human memory is organized into bundles of related items that derive from our experiences. These individual experiences are grouped together according to different principles such as the time sequence of events (as in episodic memory), the meaning of the perceived items (as in semantic memory), or the similarity or typicality of the items. (Santanen et al 2000)

They refer to these bundles as *frames*. They posit that over time connections are made between individual frames that manifest as,

vast networks which represent our knowledge and experiences. Due to the sheer size of these networks it is only possible to actively manipulate a very small number of frames at any one given time. This manipulation occurs in our short-term memory, which may be thought of as the workspace for information, which is under active consideration at the moment. We refer to individual frames that currently occupy short-term memory as being salient, and activation as the process that causes some particular frame to become salient. By traversing the links, which connect some activated frame to other frames within our knowledge networks, activation of successive frames spreads through our memory causing the activation of yet other frames. When two or more frames are simultaneously salient that are said to be associated. (Santanen et al 2000)

The authors determine that activation among frames take two forms: *automatic spreading activation* which occurs without conscious awareness - allowing critical reflection, and *conscious, limited capacity spreading activation* which requires cognitive intention - allowing analytical insights from determined choices.

Boden proposes a number of creative modes (explorative, associative, transformative and combinatorial). In 'Creativity and unpredictability' she poses the question 'What is it to transform a conceptual space?' One method Boden proposes is the dropping of a constraint characteristic of one genre. Boden writes that, 'Dropping a constraint is a general heuristic for transforming conceptual spaces. Non-Euclidean geometry, for instance, resulted from dropping Euclid's fifth axiom, about parallel lines meeting at infinity' (Boden 1995). I propose that one could equally transform a conceptual compositional space by adopting the constraints from another space, or even another artistic practice altogether and applying them to music.² This process may be either a conscious decision in which ideas or nodes are drawn together in a considered manner or an unconscious act as Santanen *et al* propose. Boden writes that 'The more clearly we can map this space, the more confidently we can identify and ask questions about the creativity involved in negotiating it... novel ideas gained by exploring an unknown niche in a pre-existing conceptual space are regarded as less creative than ideas formed by transforming that space in radical ways.' (Boden 1995).

What draws Boden's *conceptual space*, Santanen's *et al frames*, Dawkins' *meme*, Deleuze and Guattari's *rhizome* together is the concept of a network of nodes and the interchange between them. Nodalism describes how we think, create and communicate in interconnected networks or 'chains' of nodes. In a previous article, 'Acoustic Chains in Acousmatic Music' (Adkins 1999) I proposed a similar model for listening using Lacan's signifying chain originally applied to linguistics. Lacan described the model for this chain as "rings of a necklace that is a ring in another necklace made of rings" (Lacan 1977). The dynamic nature of this chain, essential to the development of creative compositional thinking was described by Bowie who writes that,

² This is something I have consciously done in works such as *Rift Patterns* (2014), which situates the constraints of contemporary prepared piano techniques and the rhythmic and melodic configurations arising from classical contrapuntal writing into ambient/glitch electronica.

the chain is also mobile, sinuous, and able to loop back upon itself; any one of its links can provide a point of attachment to other chains... The 'vertical dependencies' of the signifying chain extend as far downwards into the hidden worlds of mental process as it is possible for the speculative imagination to descend (Bowie 1991).

A nodalist model of creativity and culture celebrates this mobile, sinuous network. Through this model we can posit that listening and composing are culturally conditioned, contextual, relational, reflective and personal acts and that dynamic nodal networks of influences and ideas are constantly formed and reformed by the experiential knowledge of the individual.

Philip Gochenour (Gochenour 2011) proposes that in the 21st century 'we find that our conception of the world has taken on a particular form, one of nodes situated in networks... the nodalistic trope can be simply described as a figure of speech that is used to portray an object or process in terms of the connection of discrete units by an open network system that has no hierarchical structure' (Gochenour, 2011). For Gochenour this non-hierarchical model is a,

significant structural metaphor in contemporary thought. Unlike other structural metaphors, however, the nodalistic trope is not confined to the realm of the linguistic and figurative; as it has migrated from a model of mind in neuroscience into psychology and computer science, it has also migrated from concept to concrete architecture, from a typographic representation in Freud to the technological underpinnings of globalism (Gochenour 2011).

Gochenour's advocacy of nodalism is compelling. His idea of an open non-hierarchical model is similar to Deleuze and Guattari's planar model proposed as an antidote to the hierarchy of Modernism. However, this it is not a convincing or accurate means for describing, modelling and understanding compositional practice. Composers do not work with a planar or flat model of ideas and influences. This planar model is too neutral – too like Boden's notion of randomness. Creative practitioners have preferences and, more importantly, they have

different preferences in different works. Composers do exert a 'central agency' and each work will have its own weighted concerns be they structural, narrative, timbral or technical.

Paul Baran proposes that a decentralized network is a hierarchical network with multiple centres, while a distributed one is a network without hierarchy. We should therefore discuss a composer's work in terms of a decentralized nodal network model. The convergence of memes or nodes within one work of a given composer working (generally) within a specific genre demonstrates that there is a *local hierarchy* of nodal interactions within a given musical work as certain memes are given prominence and hence lend a specific character to a piece. This notion of a *local hierarchy* differentiates nodalism from the postmodern non-hierarchical model of the rhizome as proposed by Deleuze and Guattari.

An individual piece will not always express all of these interests and may deliberately deal with new ones. This model of *local hierarchy* is exemplified by Leonard Meyer's (Meyer 1989) definition of musical style. Meyer identifies six hierarchical levels: (1) intraopus style; (2) style of a period in the life of a composer; (3) idiom – the style of a composer within a particular cultural community; (4) dialect – the style of a cultural community defined either geographically or chronologically – akin to Cascone's definition of genre through flocking behaviour; (5) rules – the system of musical organization; (6) laws – these are the biologically - and physically or acoustically defined attributes of perception and cognition. In my paper 'The application of memetic analysis to electroacoustic music' (Adkins 2009) I demonstrated how Meyer's six levels could be understood from a holistic memetic perspective. The 'intraopus style' of a given composer's work can be discussed in terms of the totality of memes that are replicated within a single work. The 'dialect' of a given musical genre, such as glitch or ambient music, can also be considered as being concerned with a collection of musical memes that characterize this body of work. An interesting analysis can therefore be undertaken to assess how a particular composer uses specific memes in a given work (intraopus) common to and outside of a given 'dialect' in order to assess the creative ambition or novelty of the work and its influences. If, as I propose, when

a composer is working on a new composition, a local nodal-hierarchy of memes is established, demonstrating their specific musical and cultural influences within the piece, then a nodal model can be extrapolated following Meyer's six hierarchical levels to aid analysis of the work. We can propose that the nodal model be used as a unifying concept for understanding models of creativity, local hierarchy within a composer's work, the genre in which they work and their cultural community.

Many connectionist models of creativity used in the cognitive sciences (artificial intelligence, neuroscience, cognitive science *et al*) adopt a nodal model, one based on interconnected dynamic networks of simple elements exhibiting emergent forms of behaviour. The origins of these models stem from research done in the 1930s by Warren McCulloch and Walter Pitts, and in the following decades by Donald Hebb and Friedrich Hayek. Hayek's brain research and his proposition of 'connective learning' at the neurological level, was published in his book *The Sensory Order* (1952). Hebb's work resulted in a principle termed Hebbian learning that is still pertinent today. In his book *The Organization of Behavior*, Hebb proposes 'lasting cellular changes' (Hebb 1949), occur in neurons in the learning process through persistent firing in a consistent pattern. What is important in Hebb's model is that the 'metabolic change' that takes place is due to the causal relationship between cell A and cell B through the temporal precedence of the neural firing of cell A. There is a hierarchy of firing to stimulate neural change and connective strength between neurons in Hebbian learning. Hebb writes, 'When one cell repeatedly assists in firing another, the axon of the first cell develops synaptic knobs (or enlarges them if they already exist) in contact with the soma of the second cell.' (Hebb 1949). In his book 'Neural Darwinism' (1987), Gerald Edelman takes this concept of neuronal plasticity and adaptability further exploring a theory of memory based on environmental neural conditioning. This again, can be posited as memetic. Edelman's theory is anti-reductionist (unlike some computational models of creativity) and proposes that consciousness is a unique manifestation of the neurologically complex biology of our brain. Further research by John Horgan demonstrates a Hebbian-like modification of local neighbouring neurons in addition

to those directly reinforcing one another in an established network (Horgan 1994). This is termed ‘retrograde signalling’ and illustrates the ripple effect of such nodal connections. I would contend that this neurological process is also evident in contemporary culture in the way that two differing memes, for example differing musical ideas, when brought together also trigger associations with other diverse and related memes, so enriching and contextualizing the original connection. The connectionist thinking of Hebb and Hayek was much developed in the 1970s and the following decade by James McClelland and David Rumelhart and their work on parallel distributed processing (PDP) models. This model emphasised parallel neural processing and the distributed nature of neural connectivity.

The adaptation of neural pathways proposed by Hebb and Horgan is modelled computationally in neural networks by means of weighting matrices. Such weighting is deemed important in our understanding of how memory and learning occur. ‘Memory’ and ‘learning’ are engendered in a neural network by modifying the weighting (or strength) of the connections between nodes. Learning always involves modifying the weighting patterns between neurons and is closely akin to my notion of a *local hierarchy* of nodes when considering the intraopus style of a composer’s work.

A further example of embedded local hierarchy is found in the development of Optimality Theory, first proposed by Paul Smolensky and Alan Prince (1993) and concerned primarily with how language arises from the interaction of conflicting constraints. It differs from other linguistic models due to its being concerned not with rule-based systems but rather with constraint-based ones. In Smolensky and Prince’s model, the grammar of a language is determined by a ranking of constraints. Joe Pater (2009) has drawn together Smolensky’s work with Prince on Optimality Theory and a previous model the former proposed in 1990 along with Géraldine Legendre and Yoshiro Miyata called Harmonic Grammar (Legendre *et al* 1990) with weighted constraints.

Although these connectionist models all contain local hierarchy either in terms of weighted constraints, temporal precedence or adaptive neuronal connectivity and support my concept of nodalism from a creative perspec-

tive, Boden states that what is often lacking from such models is not so much an understanding of the mechanisms involved in neural activity in creativity but an explanation of how and why it arises from such mechanisms. Boden writes that,

‘novel combinations’ have to be not only new, but interesting: to call an idea creative is, in part, to say that it is valuable. Combination-theorists, however, usually omit value from their definition of creativity. Also, they fail to explain how the novel combination comes about. They take it for granted (for instance) that we can associate similar ideas or recognize more distant analogies, without asking just how such feats are possible. (Boden 1995).

Boden draws together connectionist and associative models of creativity as well as PDP-models to consider how ideas from very different sources can be merged to produce new structures, ideas and thoughts. Boden broadly suggests that these associative elements of creativity can for the most part be explained in computational terms and features of connectionist models such as powers of pattern-completion, multiple constraint-satisfaction, and best-fit equilibration.

From a musical perspective these models suggest that composition within a specific genre becomes an established pattern involving the repeated firing of specific neural pathways. This patterning strengthens compositional practice and is further reinforced through listening to similar works within a genre that trigger similar neural firing patterns. It is only when such patterns are consciously questioned that they can be enlarged, or the conceptual spaces occupied, transformed. Nodalism offers a mechanism for this conscious change through the drawing together of differing memes or conceptual spaces and, through the retrograde signalling effect, further associated memes or musical influences.

Although my main preoccupation here is a consideration of nodalism as a model for describing and considering creativity and cultural behaviour more broadly, Gochenour has demonstrated that nodalism is much more than this. Nodalism, with its origin in 19th century graph theory, mathematics, critical theory, neuroscience and Associationist models of mind, does provide a model for understanding contemporary society. Vilem Flusser writes that,

We must imagine a net of relations among human beings, an 'intersubjective field of relations'. The threads of this net should be seen as channels through which information flows. The threads knot themselves together provisionally and develop into what we call human subjects. The totality of the threads constitutes the concrete lifeworld, and the knots therein are abstract extrapolations (Flusser 2005).

Chris Salter takes Flusser's knot analogy further using the term entangled when writing of technologically mediated activity. Salter writes,

that my appropriation of the term entangled from its anthropological connotations suggests that human and technical beings and processes are so intimately bound up in a conglomeration of relations that it makes it difficult, if not impossible to tease out separate essences for each. (Salter 2010)

The difficulty in unraveling the real, the virtual and our relations within these is that the idea of separation and isolation are conceptually problematic. Our understanding is contextual. Nodes are always relational. Gochenour writes that,

the model of the node and network has taken on epistemic significance to such a degree that it shapes our conceptual frameworks across disciplines, both 'hard' and 'soft'. (Gochenour 2011).

Broader still, multiculturalism and the ways in which we trade and are economically interdependent can also be represented in a nodal model. However, like the local-hierarchical model proposed for composition – our global economy is also not planar – whilst it is decentralized there is definitely a hierarchy of nations and economic prosperity.

I propose that the significance of nodalism is not merely as a model for cross-disciplinary conceptual frameworks. I maintain that nodalism is a 'theory of everything' applicable to societal, scientific and artistic models and as such it is *the contemporary condition*.

2. DEFINITION OF NODALISM

We live in a nodal age in which no one -ism predominates.

We can no longer define what is new, avant-garde, or cutting edge in music or the arts as the unilinear narrative that Modernism purported has been subsumed by a diversity of thought and practice. Culture has splintered into many paths. Parallel streams exist as decentralized nodes of practice rather than one 'true path' - the 'nostalgia of the whole and the one.' (Lyotard 1984). This splintering of culture into different aesthetic concerns is a characteristic of both nodal and postmodern ideas. In his article about the notion of pluralism in the social theories of John Rawls and Jean-François Lyotard, Alemseghed Kebede writes that,

Aesthetically, it [postmodernism] augments our inventiveness, for it is in dissent that the free play of multiple narratives is made possible... Hence, postmodern knowledge allows us not only to recognize multiple discourses, but it also augments our sensitivity concerning the incommensurable nature of narratives... Both contend that contemporary societies are inherently pluralistic because they are characterized by the proliferation of incommensurable narratives/doctrines. Rawls considers pluralism as the positive outcome of the expansion of civil society; Lyotard, on the other hand, aligns pluralism with the demise of grand narratives that he believes hopelessly suffer from the problems of overextension... Indeed, pluralism is a condition that prevails in democratic societies; it is not a mere historical accident that will phase out over time. Democratic societies cannot dissociate themselves from the state of pluralism unless they degenerate into some form of totalitarianism. (Kebede 2002).

Nodalism, with its emphasis on a plurality of decentralized but locally hierarchical loci, thus arises from the postmodern condition but facilitates ideas that have transcended it or been proposed by contemporary theorists as following it. The fact that these conditions exist in parallel rather than in some linear cultural determinism is not new and is already exemplified in the music of Bernd Alois Zimmermann from the 1950s. Simultaneous to

the emergence of the modernist composers of the Darmstadt School (Boulez, Stockhausen, Nono *et al*), Zimmermann developed his pluralistic klangkomposition using a combination of serialism, avant-garde techniques, collage, and extensive quotation from medieval music to jazz. Such techniques are evident in the Violin Concerto (1950), Trumpet Concerto (1954) and the Alfred Jarry inspired collage-based work *Musique pour les soupers du Roi Ubu* (1966). Tom Service writes,

Unlike his slightly younger colleagues, Karlheinz Stockhausen, Pierre Boulez, or Luigi Nono, Zimmermann never subscribed to the idea that a single musical or political approach was the solution to the world's creative problems. Instead, in his acceptance of the diversity of musical possibility, his postmodern experiments in stylistic and intertextual fusion, Zimmermann looks forward to the generation after him, and to the creative world of today's composers, for whom all of music history is available as material to be worked with. (Service 2012)

In the past two decades we have witnessed a resurgence of –isms/ities. Re-modernism (Billy Childish, Charles Thomson, Jesse Richard and Harris Smith); Neo-modernism (Guy Denning and fellow artists); Second Modernity (coined by German sociologist Ulrich Beck); Automodernity (Robert Samuels); Hyper- or Supermodernity (Gilles Lipvetsky); Digimodernity (Alan Kirby); Transmodernism (proposed by Argentinian-Mexican philosopher Enrique Dussel) and the Altermodern, proposed by Nicolas Bourriaud at the 2009 Tate Triennial, are but the most prominent. Many of these new theories emphasise connectedness within a global frame. However, Lyotard prefers postmodern ‘little narratives’ (Lyotard 1984) and for many musicians and artists these local narratives intersect with, or are negotiated within, more global narratives. Kebede writes that these ‘little narratives are bound to their own local ‘discursive rules’ and their ‘evaluative logic’ is less epistemic and more social... The self, therefore, is not an entity existing unto itself; rather its existence is bound up with the intricate social interaction within which it exists.’ (Kebede 2002). Lyotard writes that, ‘A self does not amount to much, but no self is an island; each exists in a fabric of relations that is now more complex and mobile than ever before’. (Lyotard

1984). This fabric of relations is inherently nodal. The self exists in relation to others in social groupings. The 'little narratives' of Lyotard contrast with Bourriaud's 'new universalism' of the Altermodern in which Bourriaud proposes that 'Artists are responding to a new globalised perception. They traverse a cultural landscape saturated with signs and create new pathways between multiple formats of expression and communication.' (Bourriaud 2009). Despite the different theoretical standpoints of Lyotard and Bourriaud, the emphasis on connectivity and the relationship between an individual and society can be reconciled in the nodal model. The difference being their respective perspectival starting points from either the individual or the global.

As a composer, I can clearly identify a weighted emphasis on either 'local narratives' or a more global perspective in my work and acknowledge that this weighting will change from work to work depending on the subject matter. In *Rift Patterns*, a work concerned the psychogeography and the 'drift', I particularly identify with the Altermodern as defined by Bourriaud,

Altermodernism can be defined as that moment when it became possible for us to produce something that made sense starting from an assumed heterochrony, that is, from a vision of human history as constituted of multiple temporalities, disdaining the nostalgia for the avant-garde and indeed for any era – a positive vision of chaos and complexity. It is neither a petrified kind of time advancing in loops (postmodernism) nor a linear vision of history (modernism) but a positive experience of disorientation through an art-form exploring all dimensions of the present, tracing lines in all directions of time and space. The artist turns cultural nomad: what remains of the Baudelairean model of modernism is no doubt this flânerie, transformed into a technique for generating creativeness and deriving knowledge. (Bourriaud 2009).

In *Unfurling Streams*, I identify more with Alan Kirby's notion of digimodernism which is related to Chris Salter's idea of the 'entanglement' of the human and the technological. Kirby writes in response to Frederic Jameson's *The End of Temporality* that 'digimodernism does not choose to focus on either time or space in this man-

ner [that proposed by Jameson], but that it combines and enmeshes two relatively new definitions of both. “Real time” and “cyberspace” are the twin axes of digimodernism. The digimodern appears at the intersection of the two.’ (Kirby 2010). Finally, in *Spiral Paths*, it is the more localized narrative that comes to the fore. What is important in these three compositions is the weightedness of these influences. In my work I consider all to be important and co-exist reflecting Marc Augé’s on supermodernism in which he contends that the contemporary understanding of ‘local’ can only be defined through reference to the ‘global’ (Augé 1995).

In contemporary culture we find different nodes of cultural thought or practice each given a specific name as above. Rather than a composer having to sign up to any one of these to legitimate their work, nodalism acts as a unifying network in which these different emergent cultural trends act as local centres of behavioural trends or aesthetic thinking. Furthermore, the composer can freely appropriate and hybridize any of these elements.

Nodalism allows residual and emergent forms of cultural behavior to co-exist. Nodalism draws multiple elements together in a neutral manner.

Nodalism is atemporal. As such it is akin to Integral Theory proposed by Ken Wilber – a contemporary movement that seeks to synthesize the best of pre-modern, modern and postmodern thinking. Modernist and Post-Modernist practices and ideas have not ‘died’ as have been claimed (Bourriaud 2009, Kirby 2013), but now co-exist in continually reconfigured guises. Notions of the ‘canon’ have been exploded into a myriad of nodes of cultural activity each with its own sub-culture, modes of thinking, and stylistic referents. Arvo Pärt, Brian Ferneyhough, Georg Frederich Haas, Alva Noto, Andrew Rayel, Björk, Amon Tobin, Eliane Radigue and Taylor Deupree all are key nodal points within specific activities of music – an example of parallel distributed cultural activity.

Within each of these sub-cultures there can exist a radical ‘cosmopolitanism’. Just as Ligeti drew together influences from fractal geometry, chaos theory, Colon Nancarrow and African pygmy tribes in his remarkable music of the 1980s onwards, so Alva Noto fuses influences from visual and installation art, techno, minimal music,

and glitch experimentalism with its origins in the work of Yasanou Tone and Oval.

In its atemporality, Nodalism does not deny canons but like postmodernism acknowledges a plurality of canons. Although Zygmunt Bauman identifies the nature of contemporary art in the denial of all canons, Bolognini writing that 'according to Bauman, the rejection of all canons has enhanced the critical and liberating function of art, forcing the artist and the public to participate in an ongoing process of interpretation and meaning creation' (Bolognini 2008), there is no need for such denial in the nodalist model. Canons are both localized within global communities of a given cultural practice (art, music *et al*) and potentially reconfigured in each work through Bourriaud's notion of creative practice 'exploring all dimensions of the present, tracing lines in all directions of time and space.' (Bourriaud 2009).

In my own work I make use of tonal musical elements within an abstract electronic music context. In this work there is no specific postmodern irony in musical tonality, no critique of modernity. Such elements co-exist to be utilized within new work. An artist may choose to highlight these influences and feature their 'assemblage' within a work, or simply integrate them into a whole. Bolognini writes that 'This is also the reason why art, its narrative, its branding, are now less tied to the vertical dimension (art history) and more to the horizontal dimension (relations with other disciplines, other existential and cultural contexts)' (Bolognini 2008).

Nodalism does not define a style. It is a neutral model of contemporary cultural behaviour. It is apolitical and post-geographical (aterritorial). Nodalism reflects artistic practice in our multicultural post-colonial society.

Whilst some artists are keen for their work not to be categorized avoiding ideology and the controlling (hegemonic) aspect to -isms, others wish to delineate cultural space for their artistic practice. Recent manifestos marking a cultural territory include: The Istanbul Manifesto (Leonel Moura, Henrique Garcia Pereira and Ken Rinaldo), Avant-Pop Manifesto (Mark Amerika), A Mille Plateaux Manifesto (Szepanski 2001) Altermodern Manifesto (Bourriaud 2009).

Nodalism is apolitical and aterritorial in that it embraces the complexity of the coexistence of multiple politics and territories. Artistic 'globalization' and atemporality are reflected through YouTube and the manner in which music from different periods and styles co-exist in a nodal network of entwined references. Nevertheless, much multicultural influence is still situated within the European-American axis and modes of artistic practice. Although, at its worst this can lead to the multicultural DJ and a form of cultural collectionism, nodalism extends beyond such activities. Nodalism is not merely about sampling. It is, like Bartok's relationship with folk music, about the assimilation and convergence of ideas and integrity of practice that acknowledges the complexity of our artistic practice in today's society. As such nodalism marks a shift from postmodern thinking regarding of the semantic value of the elements drawn.

Nodalism is a means for continual dynamic reconstruction of 'little' and 'grand' narratives over and over.

No experience of music is entirely autonomous. Georgina Born states that the listener is 'entangled in a musical assemblage' (Born 2010). The listener perceives the work as the sum of a network of interactions. Some of these may be due to local circumstance, such as the acoustic of the environment in which the piece is played, extraneous sounds, mood etc. Others however, are to do with the knowledge of the individual, their recognition of this piece as belonging to a genre, how different influences feed in to a given work. Foucault writes that 'The frontiers of a book are never clear-cut... it is caught up in a system of references to other books, other texts, other sentences: it is a node within a network' (Foucault 1982). The system of references – the nodes in the network – is of course entirely dependent on the knowledge and cultural acuity of the individual reading the text. Similarly with a piece of electronic music, the nodal network is never fixed, it is renewed in the mind of every listener at each new listening.

This local-hierarchy is essential to understanding and interpreting specific pieces of music and is an example of a decentralized nodal network rather than the distributed (rhizomatic) nodal network favoured by Deleuze and Guattari. Cascone writes 'There are single artists who

have initiated the formation of a genre by establishing an initial set of codes and symbols which are reinforced by a hierarchical (one-to-many) network...' (Cascone 2005). Nodalism does not answer the question how or why ideas are connected, or how new genres are created – just that they are. The signification of an artwork is still determined by the semiotic model proposed by Jean Molina (Molina 1990) and developed by Jean-Jacques Nattiez (Nattiez 1990). Meaning is constructed entirely through the intersection of the nodal connections, their perceived weighting within a work, and the individual's own experiential nodal networks. The composition or sonic artwork is a cultural artifact insomuch that within it is a nodal complex of ideas and influences stemming from the creator – a central agent. The work's reception will depend on the listener or viewer and their cultural experience. They will create their own nodal network (consciously or not) due to the neurological patterning of their brain resulting from their experiences, or as Daniel Dennett would contend, the memetic functioning of the brain. Dennett writes that the 'haven all memes depend on reaching is the human mind, but a human mind is itself an artefact created when memes restructure a human brain in order to make it a better habitat for memes.' (Dennett 1993). So the meaning of an electronic music composition as a cultural artifact is constructed through the negotiation of an individual's own nodal network in which meaning is reconfigured at each listening as the selfplex (Blackmore 1999) develops. In nodalism there is not one message but a polyphony of parallel messages.

3. CASE STUDIES

There are a number of projects that could be discussed to illustrate nodal practice. One such is the *Présences Électroniques Festival*, directed by Christian Zanési, and held annually at the *Groupe de recherches musicales (GRM)* which has brought together sound artists, acousmatic and electronic music composers since its inception in 2005. The work of Bernard Parmegiani, Luc Ferrari, Ryoji Ikeda, Helena Gough, Matmos, Kaffe Matthews, Antje Greie, Colleen, Fennesz, Amon Tobin and Maja Ratkje amongst others has been presented side-by-side enabling the audience to draw connections between the similarities of approach and sound world of music from superficially different cultural arenas. Similar festivals

in Sweden (Norberg), England (Huddersfield Contemporary Music Festival) and Spain (Sónar) also aim to bring diverse forms of music and new media art together. However, the case studies presented here demonstrate nodalism in differing musical and wider contexts: Björk's *Biophilia* (2011) and two projects I have been involved in, the first for hardanger fiddle and electronics initiated by the folk musician Britt Pernille Frøholm, and the second entitled *Rift Patterns*.

Any interpretation of a composer's work is both individual and culturally conditioned. It is acknowledged that Nattiez's poietic and esthetic come into play here. The nodal diagrams presented below although superficially similar, present my esthetic interpretation of Björk's *Biophilia* and a poietic (composer's) view of *Rift Patterns* demonstrating the conscious drawing together of elements. It is not intended or anticipated that the listener would make all of these connections and would in fact make ones of their own.

3.1. BJÖRK – BIOPHILIA

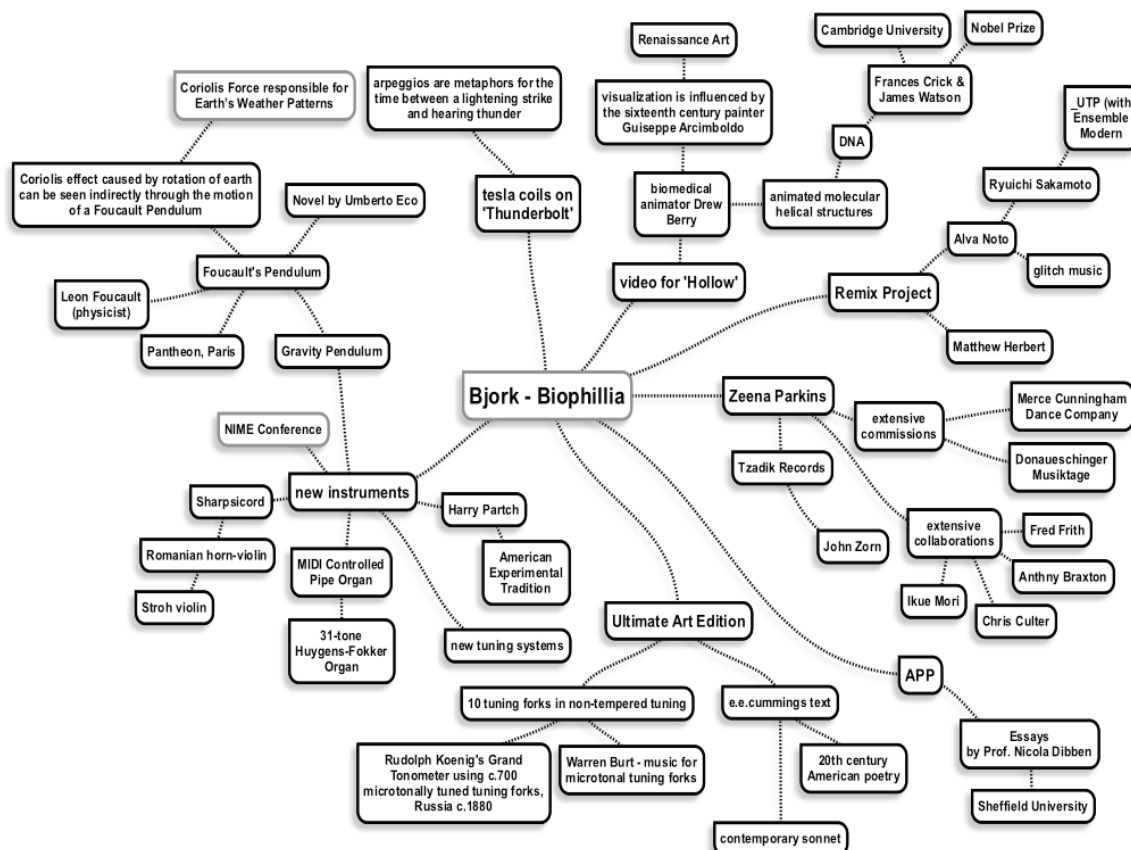
Björk's *Biophilia* was released in October 2011. It is interesting in the context of nodal practice due to the wealth of influences and practices that it embraces (see Fig. 2). *Biophilia* comprises a series of live shows, a CD release, an iPad app with games, animations and essays, education projects with schools, as well as the designing and building of bespoke instruments.

The songs were originally debuted during the Manchester International Festival in March 2011. These events were described by Björk as a 'meditation on the relationship between music, nature and technology' (Perpetua 2012). The concerts included the experimental harpist Zeena Parkins, an Icelandic choir (Graduale Nobili), a large brass ensemble as well as a series of new instruments. This instrumental line-up itself demonstrates an original range of nodal influences for what is nominally labeled 'pop music'.

The new instruments used for *Biophilia* are in the tradition of Harry Partch's work in the mid-twentieth century on tuning systems and new percussion instruments. The new instruments for *Biophilia* also reflect the musical intent of the album, as does Björk's use of the titles and lyrics of songs to inform their structure. The manner in which the lyrics and form of the songs are also reflect-

ed in the construction of the instruments used in specific tracks clearly demonstrates how nodal thought permeates every facet of the album's creation.

Fig. 2 Esthetic nodal connections in Björk's *Biophilia*



The Gravity Pendulum Harp, designed by Andrew Cavatorta comprises four computer-controlled 11-stringed pendulums. This large instrument is particularly evident on the track *Solstice* and is a conscious tribute to Foucault's Pendulum. Björk maintains that the contrapuntal nature of this song is a reference to the rotation of the earth and the movement of planets in general. This idea is again reflected in *Moon*, which contains musical material that cycles throughout. The Sharpicord, designed by Henry Dagg, is like a large music box in its construction as it contains a rotating studded cylinder amplified through a gramophone horn. Hearing music come from the horns of this instrument invokes similar instruments in folk music such as the Romanian horn-violin and the Stroh violin invented by John Stroh in 1899. The

MIDI controlled pipe organ created by Bjorgvin Tomasson is similar in its control to the 31-tone Huygens-Fokker organ in Amsterdam and older mechanical fairground organs. Tomasson also constructed the Gameleste, a celesta and gamelan hybrid controlled via iPad. Finally, on the track *Thunderbolt*, the bass line is composed from bolts of electricity produced by Tesla coils. The arpeggios are metaphors for the time between a lightning strike and hearing thunder. The nodal connectivity of ‘natural forces’ - specifically the Coriolis effect which impacts on weather patterns as well as being observed indirectly through the movement of Foucault’s Pendulum, and the emphasis on orbits and circular motion in the lyrics and structure of the musical materials demonstrate strong nodal connectivity unifying diverse aspects of musical, instrumental and compositional decision making at all levels of the albums production.

The Ultimate Art Edition of the album also reflects these lyric and musical influences. Contained in this limited edition is an additional song featuring lyrics adapted by Björk from e.e.cummings and a wooden box with 10 tuning forks in it, each one tuned to the tone of a particular track from the album and covering an octave in non-tempered tuning. The creation of these microtonal tuning forks suggests nodal links to Australian sound artist Warren Burt’s extensive work with these instruments as well as Rudolph Koenig’s *Grand Tonometer* (c.1880), based on multiple tuning forks (up to 700), tuned in microtonal scales (see figure 3).

From a wider musical perspective, Björk’s interest in contemporary classical music and other forms of experimental music is reflected in her use of unusual time signatures. Instances of $3/4$, $6/4$, and $7/4$ within songs occur throughout the album. *Mutual Core* is in $5/4$ whilst *Hollow*, *Crystalline* and *Moon* are all in $17/8$. Whilst such time signatures are to be found in electronica artists such as Autechre or Venetian Snares they are unusual in songs.

In the video for *Hollow* directed by biomedical animator Drew Barry a molecular complex based on a head scan of Björk is featured.

The construction of this visualization is influenced by the sixteenth century painter Giuseppe Arcimboldo (1526-1593).

Fig. 3 Rudolph Koenig’s Grand Tonometer (c.1880).



Fig. 4 Still from Björk’s *Hollow* directed by Drew Barry



The video also includes animated molecular helical structures. Björk's description of this song is included here as it recalls the quotation above referring to Lacan's signifying chain. Björk says the song is about,

the feeling when you start thinking about your ancestors and DNA that the grounds open below you and you can feel your mother and her mother, and her mother, and her mother, and her mother 30,000 years back. So suddenly you're this kinda tunnel, or trunk of DNA... All these ghosts come up so it ended up begin a Halloween song and quite gothic in a way... It's like being part of this everlasting necklace when you're just a bead on a chain and you sort of want to belong and be a part of it and it's just like a miracle (Raby 2012).

In addition, Björk also curated an extensive eight part remix series of the album featuring remixes by artists as diverse as Alva Noto, Matthew Herbert, Current Value, King Cannibal, Death Grips, Hudson Mohawke *et al.* As with other aspects of *Biophilia*, the scope and ambition of the remix series demonstrates a desire to be stylistically inclusive and it suggests a nodal network adjunct to that illustrated above in the creation of the work itself.

The *Biophilia* project is elaborate even by Björk's standards. The drawing together of scientific, artistic and literary concepts and memes to shape and inform the music, lyrics and even the instruments designed for the performances are the epitome of nodal creative practice. The esthetic nodal diagram above (Fig. 2) illustrates the connections that I begin to make as an informed listener when listening to and experiencing *Biophilia*. I am aware that the connectivity I make, beyond Björk's acknowledged intentions is both personal and culturally conditioned. Nevertheless, it clearly enables the many unique facets of this work and its broader creative context to be explored from a nodal connectivist perspective.

3.2. BRITT PERNILLE FRØHOLM

In 2011-12 Britt Pernille Frøholm commissioned three works for hardanger fiddle and electronics: Rose Dodd's *mobius ii* (2011), Nicolas Bernier's *Phantom*⁽¹⁶⁵¹⁾ (2013) and Monty Adkins' *Spiral Paths* (2014). All three works exhibit different nodal qualities.

Dodd's work can be understood nodally as connecting elements of Norwegian folk music, electronic and

Fig. 5 Giuseppe Arcimboldo Vertumnus (1590)



ambient music, and improvisation as well as drawing on ideas of psychosonography. Dodd's use of these elements deliberately brings together differing even conflicting narratives that she wants the audience to absorb and actively explore within the work. For Dodd there is a conscious intention to bring differing performance traditions together – that of an improvising folk musician and acousmatic diffusion as well as the natural environmental sound world. Ambient textures derived from the sympathetic string resonances of the hardanger fiddle create a harmonic field within which the performer has considerable liberty. Dodd's score is a mixture of notation, text and more open instructions to the performer. Dodd also combines original pseudo-Norwegian folk melody with authentic Norwegian tunes the folk fiddler chooses to incorporate in improvisatory passages. In *mobius ii* the nodes are carefully chosen and rather than merely being absorbed into a hybrid work, Dodd intends these differing conceptual spaces to be apprehended and understood by the listener. It is the balance and negotiation of these musically interacting conceptual spaces musically that provide meaning for the listener.

Bernier's work is less consciously considered in its constituent elements but is equally complex from a nodal perspective. The composer writes 'as an artist, I can't say that my work is fitting under one label (I don't think it is my role to think about that)' (Bernier 2014). Although Bernier has a distinctive compositional idiom he does not consciously consider the element that make up his musical language. His background as a musician in punk and rock bands has led to an improvisatory approach to melody, rhythm and harmony, and form. His is a music that is the result of a practitioner absorbed in the moment of the creative act. Bernier writes that in his music,

the influences/interests are so multifaceted (theatre, science, sociology, music – every genre, etc.)... I heard composer/performer Dominic Thibault talking about 'post-genre' and I think this is more like it. We are post-post, we are beyond being 'post', as everything is now intrinsically connected, or 'Entangled' as Chris Salter calls it... Ambient, minimal, glitch are also in there but are just some of the ingredients of the overall portrait which also includes influences (even if they can be quite subtle) from romantic, serial, noise, rock, punk, funk, techno, etc. (Bernier 2014).

In *Phantom*⁽¹⁶⁵¹⁾ Bernier, like Dodd, draws on Norwegian folk music. However, unlike Dodd's work in which the folk melody is presented partly in fragments of its original form, Bernier subjects the melody to more extreme transformation – augmenting it or stretching it out and pitch shifting it very high (see Fig. 5). He also presents the hardanger fiddle within an environment of sustained electronic tones, glitches and rhythmic passages – a nod to European glitch electronica. Bernier's use of a graphic score, like Dodd's, gives an improvisatory freedom to Frøholm. The final element in Bernier's work is video, which draws upon yet another nodal network of techniques, influences and practice.

My own work consciously draws together a number of differing stylistic influences reflecting both my classical and electronic music training, and my choral background.

In *Spiral Paths* (2014) and in an earlier work *Rift Patterns* (2014) I want to make connections with older musical forms, recasting their strong harmonic foundation in my own musical language. One section from *Spiral Paths* entitled *Lament* (see Fig. 6 for a simplified nodal diagram of the elements drawn on), uses the technique of mensuration canon – a process of melodic imitation in which differing rhythmic proportions are employed to create differing speeds of musical movement. This influence has its origins in my time as a choirboy when I regularly sang renaissance masses – particularly by Johannes Ockegham and also the later influence of Arvo Pärt whose *Cantus in Memoriam Benjamin Britten* is also written in this manner. Although no folk music itself is used, the rhythmic figurations characteristic of Norwegian fiddle music, particularly from the West coast where Frøholm comes from are integrated into original melodic lines.

Fig. 6 Nicolas Bernier *Phantom*⁽¹⁶⁵¹⁾, section 5 score.

computer: music always with trigger pre-creative outcome
synthesis / noises / pulse

video: from ground to sky and back

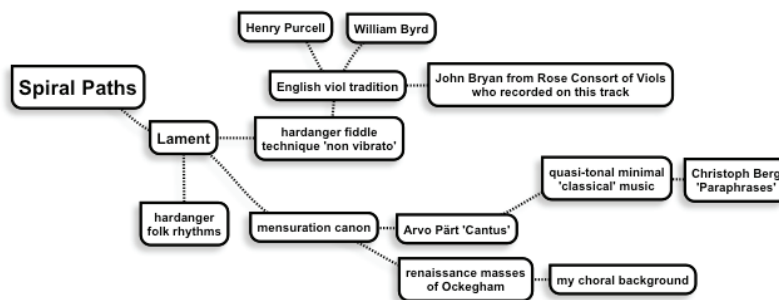
instrument: tremolo, rhythmic patterns staccato / glissandos, 11:54 v v, 13:14 v, 13:50 melody in highest pitch

computer: 4/4 110BPM

10:52 14:5

In *Lament* there is also the influence of Norwegian hardanger fiddle playing on the musical material itself. The lack of vibrato in hardanger playing suggested to me a playing technique akin to the viol, another important instrument and sound world for me as I have extensively studied late renaissance and early Baroque music – particularly that of Byrd and Purcell. In *Lament* Frøholm plays the principal part, with a viol consort presenting the canonic lines beneath. Ambient and electronic music techniques are also evident in this work. As a result of these influences, the work is more classically oriented than Bernier's glitch folk-electronica, but occupies a different more experimental territory than a work such as Christoph Berg's ambient-classical *Paraphrases*. At the same time the work is less folk inspired than Dodd's work.

Fig. 7 Poietic nodal diagram of *Lament* from *Spiral Paths*.

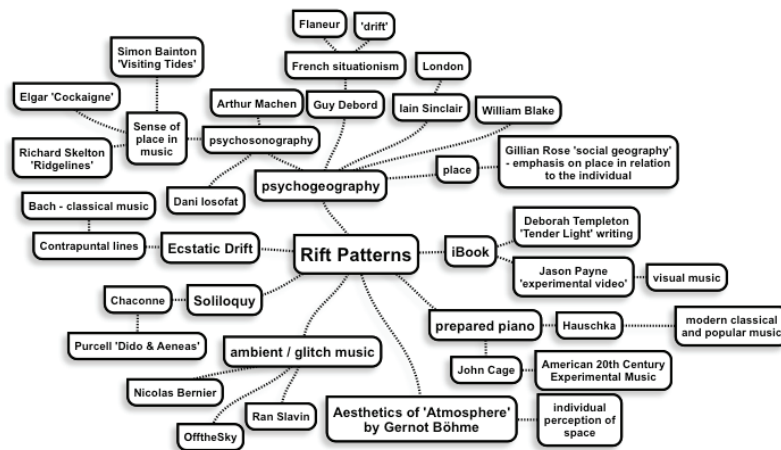


For me, these influences are consciously considered and brought together. It is not that I am trying deliberately to draw together unusual elements – this would lead merely to Boden's notion of novelty. What I am interested in is how the fiddle, its repertoire and style of playing suggest areas for compositional exploration. I want to investigate these as thoroughly and as extensively as possible. Some nodes may become too far removed to be compositionally useful and therefore make direct connections, but may still inform other ideas that are relevant in a manner akin to 'retrograde signalling'. The purpose of this nodal research is simply to make the work as rich and interesting as possible both for a listener and me as composer.

In *Rift Patterns* (2014) I again draw on older classical forms to underpin the harmonic foundation of tracks, specifically *Ecstatic Drift* and *Soliloquy* and, like its partner EP *Residual Forms* (2014), is based on readings

from psychogeography. Fig. 6 provides an overview of the principal nodal connections intended from a poetic perspective. *Rift Patterns* is driven musically by the psychogeographical exploration of places and how they impact on our identity and feelings. Psychogeography has historically been associated with the exploration of our cities and the 'drift', and has been described by Joseph Hart as 'a whole toy box full of playful, inventive strategies for exploring cities... just about anything that takes pedestrians off their predictable paths and jolts them into a new awareness of the urban landscape'. In *Rift Patterns* I wanted to continue our drift from the city, into the country and into our inner world of thoughts and relationships. As such it draws on research by the social geographer, Gillian Rose, the neogeographical and virtual geographic theory of Mark Graham as well as psychogeographical writers and theorists in both the French and English traditions. In considering the impact of place on music I was keen to listen as widely as possible from Machaut to the Romantic tone poets, from Elgar to Simon Bainton, John Surman and Richard Skelton. It was through listening to the latter composers, whose work extends beyond the mere musical representation of physical landscape or onomatopoeic imitation of nature or the city in their work that I explore the notion of psychosonography first proposed by Dani Iosofat (Iosofat 2009).

In my choice of the prepared piano as the main instrument for *Rift Patterns* I was choosing something not only that I could play but also an instrument whose sonority I could radically change. In using household objects to manipulate the sonority of the piano I was conscious of the heritage of both John Cage and the more contemporary tonal work of Hauschka. However, in choosing also to prepare the piano with more natural objects found in many of the geographical locations important in the making of this work, my process here is perhaps closer to that of Richard Skelton. At no point is my work merely an emulation or appropriation of these influences. I stand by an adage that one should either know everything or nothing, and that the artistically dangerous place is in the middle. Therefore I try to be aware of as much different musical, literary and cultural thinking as possible and to use it to situate my own work.



In all of these case studies I have attempted to demonstrate how each of the artists is trying to draw together a number of Boden's conceptual spaces and in doing so transform them through drawing on a wide and diverse range of memes from science, literature, music, art and culture more generally. The links made between these memes can be illustrated as a decentralized nodal network. A local hierarchy of nodes facilitates the understanding and interpretation of a given work. The concept of retrograde signalling can be used to demonstrate the wealth of possible wider meanings and nodal connectivity that may arise from any given interpretation of a work. In all of these examples, nodalism does not contribute to a given musical or artistic 'style'. Rather, it is either seen as a model for understanding creative thought processes and a mapping of this onto a broader societal framework, or an attitude to creative exploration.

Fig. 8 Poietic nodal diagram of *Rift Patterns*

4. CONCLUSION

In this paper I have presented nodalism as a means of describing contemporary culture and thought. As more and more theorists proclaim the death of postmodernism there has been a succession of alternatives proposed of which some of the most prominent and discussed are Lipvetsky's Supermodernity, Kirby's Digimodernity and Bourriaud's Altermodern. As a composer I am open to all creative stimuli and identify with many aspects of each of these proposed successors to postmodernism. There are also many elements of postmodernism that are also still pertinent to my and other composer's thinking. As such I propose nodalism as an over-arching framework for all of these contemporary trends. I contend that our

society exhibits elements of all of these proposed ways of thinking and that, like the models of creativity discussed above, that their importance in any given community is weighted. Nodalism allows us to reconcile Bourriaud's questioning of how artists are responding to the reconfiguration of modernity in light of ever-increasing globalization in which 'Multiculturalism and identity is being overtaken by creolisation' (Bourriaud 2009) producing a new altermodern culture, and Marc Augé's idea of non-place as outlined in his book *Non-Places: Introduction to an Anthropology of Supermodernity* (Augé 1995) with painters, sculptures, architects and musicians creating work under the banner of neo-minimalism or reductionism as well as those who draw together aspects of all of these with postmodernism such as sound artists like Janek Schaefer, Taylor Deupree, Kaffe Matthews, Stephan Mathieu and Steve Roden.

My proposition of nodalism as a model to describe the multitude of ways philosophers and theorists attempt to describe contemporary society is derived from associative and connectionist models of creativity derived from our understanding of neurology. I contend that supermodernity, neo-minimalism, postmodernism are simultaneous pockets of activity and thought within society, equivalent to parallel distributed processing within the individual brain. As such I propose that the nodal model extends beyond the planar non-hierarchical network of Deleuze and Guatarri. There is a local hierarchy at play. The extent to which this hierarchy is weighted is both societally, culturally, and individually conditioned. Furthermore, like the neural connections in the brain, we should think of the nodal model as a three dimensional network in which sinuous threads cluster and aggregate around local nodal hierarchies. These agglomerations are dynamic and fluid. It is this ability to reconfigure networks, to consider their nodal properties anew that makes nodalism such an all-encompassing means for understanding the contemporary condition.

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