Musical Events and Perceptual Ecologies.

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Abstract

This paper, followed by two responses, discusses the application of ecological theory to an understanding of a number of issues in the aesthetics of music. It argues for an understanding of music as based in event perception, with an expanded conception of the sources that are specified by those events. Building on the theory of affordances, it considers the limitations of an information theoretic conception of musical complexity, discusses the importance of perceptual learning (understood as shaping by a structured environment) in understanding the affordances of music for different listeners, and raises the challenging problem of the terms in which musical materials might be appropriately described. The apparent tension between ecological and aesthetic positions – in which adaptation and accommodation seem to be at odds with the Modernist aesthetic perspective which prioritises the unsettling and de-familiarising function of art – is confronted, before the paper concludes with some observations about different disciplinary perspectives on aesthetics, and matters of specificity and generality.

Keywords

Ecological theory, music, event perception, affordance, complexity, disciplinarity

Aesthetics

Aesthetics – certainly as it applies to music – has since its earliest Western beginnings been closely associated with questions of perception. Classical Greek writers (Plato, Aristotle, Aristoxenus among them) were preoccupied with how music *affects* people, as well as with more idealised notions of music's materials and organising principles. Similarly, Alexander Gottlieb Baumgarten – often credited with being the source of the Enlightenment (and post-Enlightenment) conception of aesthetics – also understood aesthetics as being intimately bound up with 'the science of what is sensed and imagined' (Guyer 2016), rather than with more abstract notions of beauty and value, as the subject has often been portrayed. But what approach to perception might be fruitful as a basis for aesthetic questions? The last twenty-five years or so has seen the steady development of work that has addressed the perception of music from a broadly ecological perspective (e.g. Balzano 1986; Clarke 1987, 2005, 2012; Windsor 2000; Reybrouck 2005, 2012; Krueger 2014), though seldom in a way that engages explicitly with aesthetic concerns. In this paper I examine some principles of perception from a broadly ecological perspective, considering the mutualism of perceivers and their environments (including the aesthetic characteristics of those environments); the ecological principle of affordance and its relevance to

music; the relationship between accommodation and critique within aesthetics; and finally some consequences of different disciplinary orientations.

Event Perception and Music

For organisms trying to flourish in an uncertain world, perception is fundamentally concerned with picking up what's going on in the world, and what to do about it. And 'what is going on', as well as what to do about it, is thoroughly relational, dialectically specified in the environmental information that is available with reference to the capacities of the organism. If on a warm day I notice a nicely placed and comfortable-looking chair, I may go over and sit on it to relax in the sun for a while. If I am a slightly overheated spaniel, I may notice the enticing pool of shade cast by this same four-legged object, and go over to lie on the cool ground that offers itself up under that conveniently placed horizontal surface. The chair-ness and sit-ability of the object that I notice as a human are *specified in* (i.e. are lawfully related to) the reflected light arriving at my visual system: the wood and metal of the object, and its consequent capacity to support human-scale weight; its human-scale height off the ground; the angle between its seat and back, specifying anticipated comfort; and so on.[1] Equally, the shadiness and lie-under-ability that I might notice as a dog are specified by the dark patch under an appropriately elevated (relative to my spaniel body size) horizontal roof that I can easily walk beneath to flop down. The different

opportunities that this notionally identical object offers are specified in the lawful relationship between the optical array and the size (low enough to sit on/high enough to get under), orientation (horizontal) and illumination (in the sun/shaded) of the object as seen from my perspective as either a human or a dog. And my actions in relation to it (sitting on it, flopping down under it) enact its meaning for me (warm relaxing chair; cool shady place).

Perception, then, is about discovering and acting upon the world's events (Bingham 2000; Chemero 2000) and meanings (what's going on and what to do about it), and to listen to music is to engage perceptually with music's events and meanings (what's going on in this music, and what to do about it). Perceptual principles can account for the ways in which listeners perceive structural processes in music, but in a more far-reaching manner people also listen to the ways in which musical sounds specify the wider world of which they are a part – and the sounds of music specify a huge diversity of objects and events: the instruments and recording media from which they emanate, the musical styles to which they belong, the social functions in which they participate, the emotional states and bodily actions of their performers, the spaces and places in which they are found, the discourses with which they are intertwined. Because instruments, bodies, loudspeakers, stages, cathedrals, and clubs are palpably physical, there is little difficulty in accepting them as sources that are specified in sound. I hear the sound *of* a drum kit, *of* vibrato, *of* a club as I pass its doorway. But there is more resistance to the idea that cultures, social practices, emotional states and

ideological allegiances could be conceived as 'sources' (things that are specified in sound) because they seem too abstract, too non-material. This is unnecessarily restrictive: cultures, emotions and ideologies are not *only* material, but they are all manifest in material forms of one sort or another, amongst which there are the sounds of those phenomena. Vienna around 1900, or 1960s American minimalism, or the 2007 British dubstep scene are all cultures and sub-cultures that are manifest in, expressed through, and constructed by material forms (images, buildings, technological artifacts, language, clothing, hair styles) to which perceivers can be more or less attuned - and musical sounds are one of those material forms. These cultures and sub-cultures (and instruments, bodies, emotional expressions, social practices) are the *sources* of those sounds, since they constitute the conditions and circumstances that give rise to the music, and are specified in those sounds. In the same way, a cadence in A minor, a verse and chorus, or a Gavotte rhythm can be regarded as the sources of a sound that a listener hears – as being events that are specified in sound.

The structuralist orientation of both traditional musicology and the psychology of music has meant that both disciplines have tended to confine themselves to a consideration of the immediate sources that lie either within an individual work, or a style. In this respect, both traditions adopt a view of music as autonomous. By contrast, an ecological perspective addresses both immanent properties in music and also a far wider and more diverse range of other sources - without abandoning a commitment to the material manner in which these

sources are specified. Ecological theory focuses on the particular invariants - distributed over different timespans - that specify different sources. A number of studies (Gjerdingen & Perrott 2008; Krumhansl 2010; Plazak & Huron 2011) have shown that so-called 'high level' attributes of music, such as genre, style, or cultural origin can be identified extremely quickly (often due to the manner in which they are specified by timbre) – much *more* quickly than supposedly more 'basic' attributes such as metre or tonality. It may require a longer stretch of music for someone to perceive that it is the Kronos Quartet playing than to perceive that there is a cello being played: but that does not imply a difference of level or abstraction. It may simply be that the invariant properties that specify the Kronos Quartet are not present at the start of the sound, or are distributed over a longer timespan.

Lastly, the objects and processes specified in sound may belong either to a real world or to a virtual world. Imagine that you are sitting in your room and a motorbike goes past in the street outside. It is uncontroversial to assert that the sounds arriving at your auditory system are structured in such a way that they specify a motorbike (to a listener enculturated into a world that has motorbikes, and who is attuned to the sound of motorbikes through perceptual learning – see below), and that the motorbike that they specify has a tangible and concrete reality that can be confirmed by going to the window to watch it go past. This is a motorbike in the real world. Now suppose that you download a soundclip called 'passing motorbike' and play it through your sound system. Depending

on the quality of both the clip and the sound system, the acoustical information may be almost identical to the first case, but the motorbike that is specified has no existence in an immediate real world: nothing has *actually* moved, no real space has been traversed – however perceptually convincing it may be.[2] It is a motorbike in a virtual world – rather like the virtual images that obervers see when they look in a mirror. Recorded music specifies objects and events in a virtual world (as do films, television and video games in the equivalent visual domains). But even live instrumental music can specify a virtual world, as the sense of motion and space in music demonstrates. When, at the start of the first movement of Beethoven's Ninth Symphony, for example, we hear the bare A/E fifths of the strings, horns and woodwind, to which is added the descending line across the strings moving from A to E, down to a lower A and a lower E, and so on, gradually filling the musical texture, what is the textural 'space' that this material fills, and within what space does the downward movement of string line take place? The answer is: a virtual space, and one which can be thought of as helping to constitute 'the world of the work' – an idea to which I return toward the end of this paper.

Commonalities and Distinctions: Perceptual Learning

The mutualism of perceiver and environment (a fundamental principle of ecological theory) means that different perceivers at different times will be

attuned to different invariants. We all have the potential to hear different things in the same music - but the fact that we don't (or at least not all the time) is an indication of the degree to which we share a common cultural ecosystem, by which we are all similarly shaped. This commonality is only partial, and the explicit mutualism that characterizes an ecological approach means that listening must be considered in relation to the capacities of particular listeners, and particular groups of listeners, rather than in general or abstracted terms.

How and why listeners share perceptual sensitivities in relation to music, and are also more or less idiosyncratic in their perceptual attunement, is a question of perceptual learning. The vast majority of human beings are biologically endowed with overwhelmingly the same perceptual capacities and potential at birth. But exposure to the environment powerfully shapes our perceptual capacities – from day one and for the rest of our lives.[3] And this is as true of our auditory (and musical) environments as of any other aspect of our world. Perceptual learning (which was extensively studied by Eleanor Gibson – e.g. E. J. Gibson 1969; and for a substantial review of recent ecological developmental theory see Szokolszky & Read 2018) can be understood as the differentiation of attention: at birth, human infants have relatively blunt, if powerful, perceptual (and motor) capacities which are intensely focused on a limited number of domains (hunger, comfort, sources of sustenance and companionship, etc.). Exposure to a highly structured environment shapes and

differentiates these capacities, with the result that the developing infant (and later adult) becomes sensitive to distinctions in the environmental information that were 'always there' – but to which the perceiver had no access/sensitivity. Rather than conceiving of this as as the acquisition of knowledge, to be accessed activated by memory, it can be regarded as a sophisticated kind of shaping.

By analogy, consider those trees that are often found in places that have constant prevailing winds, such as on exposed coastlines, and which have been shaped by the wind. Their branches often grow almost parallel to the ground, shaped or driven by the wind and offering less damaging resistance to it than if they grew more vertically. As a result, the wind flows over the surface of the tree in a different pattern than would be the case were the tree to be more vertical, and the tree therefore continues to grow in an altered manner. Furthermore, the tree itself will cast a different patch of shade and shelter from the elements than it otherwise would, providing an ecological niche for other organisms (shade-loving ferns, mosses and lichens, and the organisms that live amongst them). Both of these consequences (altered wind flow resulting in altered growth pattern, and shady shelter) illustrate the reciprocal relationship between dynamically changing organisms and their dynamically changing environments (see e.g. Lombardo 1987).[4] In analogous manner, an infant born into an early twenty-first century British environment (for example) will be shaped by the 'wind' of that culture in profound and continuous ways, and will in turn act

within and upon that 'wind' in continually shaped and shaping ways. In specifically musical terms, this will almost certainly mean an early and constant exposure to the veritable hurricane of tonal and rhythmic structures and processes in which we live our lives, and which shape our musical sensitivities so profoundly. And this shaping – apparently passive in one sense (it is mostly an 'unsupervised' kind of shaping and learning) – is in reality as active as it is receptive: once shaped by and attuned to a particular musical environment, we seek out the niches in that environment in which we feel comfortable or which excite us, and avoid those niches that seem strange, incomprehensible or threatening; and with our voices and any other music-making resources that we find to hand (surfaces to bang on, instruments to play, software to run) we contribute to and perhaps modify those niches – or even construct appealing niches of our own.

Physical and Ecological Descriptions of Musical Materials

How might the musical materials with which we engage be appropriately described within an ecological framework? The dominating influence of the physical sciences makes it all too easy to assume that standard acoustical descriptions of sounds are the appropriate ones to use in perceptual research - endorsed by the precision and technological sophistication of the instruments from which they are often derived. But an important distinction needs to be drawn between two kinds of acoustics: physical acoustics and ecological

acoustics. The spectrum photographs of passages of music shown in Cogan (1984), for instance, are concerned with physical acoustics. They illustrate physical facts about musical sounds, and can make no claims about the relevance of what is shown for a human listener. Imagine a spectrum photo with a fascinating and highly structured pattern of activity in a frequency range that is beyond the limits of human hearing. The photo is not a false representation of the stimulus, but it has no relevance for human listeners.

A similar point might be made about complexity – an issue that is germane both to questions of perception and aesthetics. How might perceptual complexity be theorised and perhaps measured? And what is the role of complexity in aesthetics? Figures 1 and 2 (from McAdams, Depalle & Clarke, 2004) show spectrograms of short sections of Ravel's *Bolero* and Kraftwerk's "Die Roboter" from *The Man-Machine* (1978).[5] While these representations provide a great deal of information about the distribution of intensity (shown as darkness) and frequency (vertical axis) in time (horizontal axis), and approximate to a comprehensive representation of the physical energy in the signal, they are of little value in trying to gauge the relative complexity of these two slices of music. One (the Kraftwerk) looks more clearly defined and more varied, and perhaps on

<Figures 1 and 2 about here>

that basis might suggest greater complexity. But all this spectral information conveys little or nothing about the musical events taking place in the two extracts (snare drum sounds, wind instruments, Spanish rhythm, etc. in one; synth

sounds, futuristic electronica, reverberation, etc. in the other) – and it is the organisation, and wider cultural-ecological resonance, of those musical events that determines their perceived complexity. Influenced by a general enthusiasm for information theory in the 1960s, Leonard Meyer (1967) and Abraham Moles (1966) both presented attempts to understand musical complexity in terms of information theory, arguing the case for relating information-based complexity to aesthetic value – an approach that continues to find a place in more recent work by Eugene Narmour (Narmour 1990) and David Huron, for example (Huron 2006). But information theory, while attractively explicit about how the information content of an event can be defined (as the reciprocal of its probability), runs into hopeless difficulties when applied to the reality of actual musical materials. The event-to-event probabilities in the theme from Ravel's *Bolero*, for example, are – in ecological and perceptual terms – utterly different when a listener has arrived at the middle of the piece (cf. Fig 1), by comparison with the start, since by that point in the music a listener has already heard the rhythm and melody of the theme repeated many times.

More than that, an information theory approach has no capacity to take account of the wider cultural resonances/references of any of the material in this (or any other) music. A waltz or a march heard in the context of a Mahler symphony has a very different aesthetic and cultural complexity than it does at a New Year's eve ball or a military parade; just as the 'doo-wop' music performed by Frank Zappa and the Mothers of Invention on their 1970 album *Burnt Weeny*

Sandwich has a different aesthetic and cultural complexity than it does when performed by Randy and The Rainbows (e.g. their 1963 hit 'Denise').[6] The Zappa is a parody of this music (and perhaps also a curious kind of celebration of it), and this can direct the attention of a listener to different features of the music in the two cases: the exaggerrated and ludicrous quality of the falsetto singing, and banal lyrics and rhyme schemes in the Zappa, for example; and perhaps the vocal quality/blend and semitone harmonic shift halfway through the track in the case of The Rainbows. These differences are, of course, dependent on the cultural attunement of the listeners under consideration: a listener with no previous experience of Western music might hear little or no difference in complexity between a waltz in a Mahler symphony and a standard ballroom waltz; and someone who mostly listens to opera, or early music, and who has heard little or no pop music might hear no significant difference between the Zappa and Rainbows tracks. Complexity is a relational attribute that is a function of perceivers' sensitivities/competences in relation to environmental information. The same musical materials afford widely differing degrees of complexity to listeners with different listening skills, orientations and histories of perceptual learning.

Ecological acoustics – by contrast with physical acoustics – is the attempt to describe the properties of the environment in terms that are relevant to the perceptual capacities of the organism in question, a matter that is clearly species

specific. James Gibson pointed out that phenomena can be described at scales ranging from the subatomic, to the cosmic, but that 'the appropriate scale for animals is the intermediate one of millimeters to kilometers, and it is appropriate because the world and the animal are then comparable.' (Gibson 1966: 22) The general principle of ecological scale is an important counter to the belief that properties of perceptual objects must be significant simply because they can be shown to be there by a physical measuring device – and 'scale' is just one (relatively simple) aspect of what might be called ecological salience. What is needed is a systematic investigation of the stimulus properties that directly inform musical behaviours (including musical judgements), by analogy with other ecological investigations of the properties of the visual world that inform the successful co-ordination of perception and action (as, for example, in catching a ball). There is already some work that has made progress in this direction (e.g. Gaver 1993a, 1993b; Dibben 2001; Windsor and de Bézenac 2012), but there is still to a long way go – and there are significant problems to be addressed in defining how general or specific the 'user group' is assumed to be. Describing the affordances of the 1995 track 'Hell is round the corner', by Tricky (which is based around a sample from a 1971 Isaac Hayes song, and which features a deliberately emphasized 'vinyl' crackliness) is very different for someone who is attuned to those references (Hayes, vinyl as a medium, the past…) than for someone who is not.[7]

Perceptual Theory and Aesthetic Interpretation: Music's Affordances

Is there a way in which an ecological perceptual approach might relate to the aesthetics of interpretation? At first sight it might seem that aesthetic interpretation should be incompatible with ecology, but the ecological approach can provide a 'grounding' that limits the infinite room for interpretative manoeuvre, and thereby helps to break the vicious circle that potentially undermines the whole enterprise. If everything is interpretation, then there are no constraints and we are in a relativistic free-for-all where the loudest or ideologically most powerful voice dominates. What Nicholas Cook (2002) has called the 'Scylla and Charybdis' of inherent versus socially constructed theories of meaning in music can be avoided by recognising that ecological principles can help to explain why interpretations don't just spread unchecked in every possible direction. Ecological theory offers the possibility of a different approach, based on the principle of affordances.

James Gibson coined the term 'affordance' to stand for the opportunities, functions and values that a perceiver detects in the environment. The concept depends on the mutual relationship between the needs and capacities of the organism, and the properties of objects and events. 'An affordance is neither an objective property nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of

behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer.' (Gibson 1979: 129) In the specific context of music, musical materials can be conceived as affording certain kinds of interpretations and not others.[8] The much discussed recapitulation in the first movement of Beethoven's Ninth Symphony that Cook (2002) uses as an example for his own approach, affords interpretation both as 'murderous sexual rage' (McClary 1991, cited in Cook 2002) and 'the heavens on fire' (Tovey 1935-9, cited in Cook 2002), but not, for instance, 'world-weary indifference'; and the reason that it affords the first two interpretations but not the third is because the music has attributes that are consistent with the semantic requirements of some verbal interpretations and not others. Indifference and world-weariness have semantic requirements which this material cannot meet.

Central to the definition of affordance is the idea that the perceiver/event relationship affords an action – a reflection of the more general ecological principle of the reciprocity of perception and action. In this sense, my own use of the term affordance in the paragraph above appears somewhat non-standard, referring as it does to the relationship between musical material and a socially constructed interpretation. But interpretation is also action – the speaking, writing, gesturing and grimacing in which interpretation is manifest (see Ramstead, Veissière and Kirmayer 2016; Rietveld and Kiverstein 2014). To be more accurate, then (and a bit pedantic), the recapitulation of the first movement

of Beethoven's Ninth Symphony affords writing (or speaking) about it in terms of murderous sexual rage, or the heavens on fire.

Interpretative writing and speaking are forms of action, but of a comparatively discreet kind. In musicology, and aesthetics, they play a crucial role - indeed they more or less constitute these disciplines - but in the wider world a whole range of other actions are afforded by music, and it is these that play the more central role in most people's lives. Music affords dancing, singing (and singing along), playing (and playing along), working, persuading, drinking and eating, doing aerobics, taking drugs, playing air guitar, travelling, protesting, seducing, waiting on the telephone, sleeping... the list is endless. These, as well as writing and speaking are what music affords, and what they demonstrate is the enacted character of musical meaning. So-called passive musical listening is a kind of listening that is typical of only a small proportion of listening even in Western culture. And even here it is an illusion: there really is no such thing as passive listening, or the 'rapt contemplation' that is its more loftily expressed counterpart, but only different varieties of more or less concealed or sublimated active engagement (as the evidence for the widespread activation of the human motor system during 'passive' listening indicates). Nonetheless, the Western art music tradition, with its sharp division of musical labour (specialist composers, performers and listeners), and the listening style with which it has become entwined, has had a cultural influence that vastly exceeds its actual currency.

The myth of passive listening is strongest where music presents itself (or is socially constructed) as having no function: in other words within the aesthetic ideology of musical autonomy. In various guises, the 'problem' of autonomy remains a persistent and recurring theme: the closed world of purely musical sounds, versus the source-specifying sounds of everyday listening; the 'special' internal world of heightened subjectivity - idealised, escapist, a site of particular intensity; the virtual motion and virtual space of an encapsulated and hermetic musical world (often emblematically represented by Bach's *The Art of Fugue*, or Beethoven's late instrumental music); the ubiquitous acousmatic presentation of music (heard over loudspeakers or headphones, and divorced from the means of production) - each of these stands in relation to autonomy in one way or another. As a cultural construction, the idea of autonomy continues to perform a powerful aesthetic role, and remains both an ideological barrier and a dynamic force in the critical power of music. While autonomy and ecology seem so incompatible, ecological theory provides a way to understand how music is able to move seamlessly between degrees of autonomy and heteronomy by means of the same perceptual principles: sounds specify and afford - and can specify and afford sources and actions which are either predominantly immanent to the musical material, helping to constitute the (virtual) world of the work (see above); or are predominantly 'worldly' in a more tangible and actual manner.

While many aspects of people's experience of Western concert music are amenable to an ecological analysis, nonetheless the autonomy to which this

music aspires - the self-sufficient integration that is both illusory and real - is at odds with the practical and survival-driven character of an ecological perspective. Because ecology is first and foremost about adapting to, and conforming with the world, it seems to run diametrically counter to the idea of art as critique, as a deliberate attempt to unsettle the relationship between people and their all-too-familiar environments – a fundamental aspect of Modernist and contemporary aesthetics (e.g. Adorno 1997). The critical value of art, from almost any perspective, is a function of its resistance to current conditions, its failure to conform to easy adaptation. If the ecological ideal is the optimally efficient mutual adaptation of organisms and their environments, then it is against the background assumption of this ideally adapted state that music attains its uncomfortable and critical power. It constitutes a virtual world in which 'easy adaptation' is explored, manipulated and deliberately thwarted in contrast to the ecological premise of adaptation and accommodation.

General Principles and Specific Instances: an Afterword on Disciplinarity

The Leverhulme Network to which this paper relates is an explicitly and deliberately interdisciplinary endeavour,[9] and this contribution is quite obviously an engagement between psychology and musicology. There is much to be gained from interdisciplinarity – in re-framing questions, overcoming disciplinary entrenchment, benefitting from good ideas in parallel domains,

discovering powerful new syntheses, and so on. But there are also tensions and challenges. A central feature of psychology (and one of the hallmarks of a science) that distinguishes it from musicology is that it is primarily focused on general principles rather than specific manifestations. At the level of individual pieces of research this may not always be evident: a paper may seem to be concerned with the ability of American college students to recognise and name specific pop music hits from the last 50 years (Krumhansl and Zupnick 2013); but the primary aim is to explore something much more general about autobiographical factors in human memory. By contrast, a considerable amount of work in musicology focuses on a detailed understanding of very particular phenomena. A study of formal structures in Schoenberg's *Pierrot Lunaire* may engage with larger questions of convention and radicalism in the early twentieth century; but the emphasis is likely to be on the attributes of this specific piece – explored in considerable depth and with unapologetic particularity. This difference in perspective should offer an opportunity for fruitful complementarity. But it is often the case that the trade-off between broad explanatory power and local specificity leads psychological research on music to seem blandly obvious and lacking in critical awareness to musicologists; while psychologists point to the apparently arbitrary particularity of musicological research and its speculative and discursive character; and raise questions about empirical support, generalisability, and evidence. This is not an easy problem to solve; but in the approach that I have presented here I hope to have shown that

general ecological principles and the particularity of different listeners' responses are not at odds with one another; and that paying careful attention to what musical sounds specify and how they do so, and what those sounds afford, is a promising way to tackle both perceptual and aesthetic questions.

Figure Captions

Figure 1: Spectrogram of 4 seconds of Maurice Ravel's *Bolero* just after Rehearsal Figure 9 in the score (around the mid-point of the piece).

Figure 2: Spectrogram of 6 seconds of Kraftwerk's "Die Roboter", from near the start of the track (0:04 – 0:10).

Response to Eric Clarke's "Musical Events and Perceptual Ecologies"

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Complexity, to a classical performer or composer usually has a very specific meaning, bound up with the density and predictability of musical material. A strand of contemporary composition (that of James Dillon, Brian Ferneyhough and others) has been termed "New Complexity". Despite the many problems that exist with information theory as applied to music, as a composer I find it a useful concept in thinking about how the (or an) audience might respond to what I'm doing with musical material – mainly by varying the rate at which "new stuff" is introduced. As Eric Clarke puts it: "Complexity is a relational attribute that is a function of perceivers' sensitivities/competences in relation to environmental information". When I imagine an audience response, I'm also imagining their musical competency. We can't know exactly how the music will be understood, and most composers understand that fully understanding their audience's likely response is an impossibility. Clarke argues that: "What is needed is a systematic investigation of the stimulus properties that directly inform musical behaviours…". Such a comprehensive investigation does not exist (some may say could not), and in its absence, composers must just take a punt at it, adjusting the level of complexity of musical material according to their gut instinct for what will be swallowed by their audience. Of course, we are

also our own audience, and the ecological approach allows us to see this reciprocal relationship in action.

Unfortunately, complexity has also been used at various times as a proxy for quality, with structural analysis of complexity being conflated with value judgement. It is probably harder to write a hit single than a new complexity style string quartet, if we are to judge from the likelihood of the two compositions achieving their musical goal, since simply to exist in performance is the goal of the latter, but the achievement of hit status requires the participation of the marketplace and of an audience of consumers. Yet the latter generates in Bourdieu's terms enormous cultural capital, whereas the former only generates economic capital, and in the UK HE sector terms, the composer of the hit song would not be likely to have her work taken very seriously as research.

If, as Clarke says, the meaning of anything is enacted by my actions in relation to it, how meaningful to the practising composer is the theoretical framework proposed by Clarke? Is it useful for composers to think of what they do in ecological terms? And what are the consequences for the idea of individual expression of thinking of music in this way? I'd like to try to address these questions which arise out of Clarke's article and consider them in relation to a compositional act in which I am engaged while also writing this response.

Firstly let us candidly admit that classical music has an audience problem: across the Western world, rates of audience participation in classical music are dropping. Contemporary classical music deriving from a modernist aesthetic

tends towards complexity of material, driven there by modernism's valuing of individual expression, originality and in Adornian terms, *resistance* to commercial pressures (also noted by Clarke). Modernism was from the start characterised by anxiety in many ways, but Bartók's oft-quoted question to Nielsen "Is my music modern enough?" can be taken as an example of the fear of negative judgement that drives many composers towards the complex and away from the more obviously communicative. Moreover, the more complex the musical material, the more time it takes to rehearse, and therefore, roughly speaking the music's capacity to generate a sufficient audience to pay the musicians a reasonable amount for their time is in inverse proportion to its complexity. Viewed as an eco-system, then, contemporary classical music's relationship to other musical subcultures is a parasitic one.

The urgency of the audience problem in classical music is beginning to be addressed through ensembles such as the Manchester Collective, or series such as the BBC Philharmonic's Red Brick Sessions at the University of Salford; and these attempts to address the problem of audiences for classical music and new music often involve a kind of re-contextualising of the music being performed, as well as a deliberate lowering of the status of the composer in advertising literature and so on. This *de facto* rejection of music's supposed autonomous status and the authority of the composer is being done for pragmatic reasons: presenting music without comment or explanation in the expectation that an audience will appear (Who? From where?) to genuflect at the shrine of the great

composer doesn't work any more. So encouraging composers to think in more ecological terms about what they do seems likely to improve the environment for classical music over the long term, since it might free them to think about what they do as a means of communication.

As an example, I would like to discuss a string quartet I am currently engaged in writing, commissioned by the Hungarian Unitarian church as part of their celebration for the 450th anniversary of the Edict of Torda, the first proclamation of religious toleration. The original idea of the commission was for a choral cantata, but when the choir dropped out a string quartet was proposed instead for purely pragmatic reasons. However, the string quartet has long been associated with the idea of music's autonomy, and the commissioning of a new piece of 'occasional music' (i.e. music whose purpose is to commemorate something for a group of people) runs entirely counter to the string quartet's assumed autonomous status. From Beethoven's late quartets to Shostakovich's cycle of fifteen quartets, the medium has been associated with many composers' most intimate and personal musical expressions. It is also used to demonstrate technical knowledge – a kind of *ars technica* as well as *ars poetica*: Kurtág, for example, pointedly called his quartet written in 1958-9 his Opus 1, reflecting his rejection of the Kodály influence then dominating Hungarian composition in favour of more contemporary extended techniques. So on the one hand there is an anxiety caused by the expectation to 'declare oneself' as an individual artist both technically and aesthetically: can the string quartet I am about to write

sound sufficiently original, personal, and technically accomplished for it to bear the name of string quartet? And on the other hand, the quartet will have to operate within certain constraints: the ensemble available is not particularly experienced in contemporary classical music, and will not have much time to rehearse; the audience will be theologians and ministers of religion for the most part, and have little experience of contemporary classical music. This generates a different anxiety – will the audience respond to the piece? Will the quartet do a good job in playing it?

Thinking about music in ecological terms, then, has a number of useful consequences which alleviates this tension between the expectation of the string quartet to be an autonomous and timeless statement of musical expression; and the need to write a piece which works for this audience, on this occasion. Viewed as an ecological 'niche', then, the string quartet will have to respond to a number of different conditions. The ecological perspective allows the piece to be seen as a balancing of these various affordances, stripped of the value judgements and consequent anxieties derived from modernism ('is my music modern enough?').

As an example of the way that this viewpoint allows a re-evaluation of the conditions of the creation of music, let's look for a minute at the idea of the musical programme. Classical music has always had recourse to symbolism and narrative in attempting to appeal to audiences: for example, Liszt's response to 'the growing gap between artist and public' was the creation of the Symphonic Poem. We train our composers, though, not to explain their music according to

some authorial explanatory code; at undergraduate level, a musical piece accompanied by the inevitable commentary which consisted of a simple narrative would not get a good mark, regardless of how accomplished the music was when viewed as autonomous. Clarke's example of Beethoven's 9th affording a broad range of interpretations but excluding others might allow us to return to a kind of narrative symbolism that communicates well with non-specialist audiences without sacrificing music's transcendent ability to symbolize many different things simultaneously.

In the quartet I use a complex web of musical symbol and reference relevant to the occasion. Methods include direct quotation (for example, a passage from a piece by John Ireland, who, I recently discovered, attended the same Unitarian chapel as a boy that I did); encoding of names (following the practice of 16th century counterpoint, the names of the 16th Century Religious reformer Dávid Ferenc/Franz Hertel as D-A-D F-E-E-C and F-A-E flat B , or H in German; a hymn tune, derived from these notes, but set in a Bach-era four-part harmony; and a secondary 12-note theme based around the augmented triad, that refers to Liszt's 12-note experimentations, and by extension to the Faust myth, because Liszt used a theme made up of four augmented triads in his Faust symphony. Liszt is referred to because he performed several times in Kolozsvár (now Cluj, Romania, the location of the quartet's premiere), and his likeness was used as the face of Dávid Ferenc in a famous painting by Aladár Körösfői-Kriesch of the debate at Gyulafehérvár in 1568 which led to the proclamation of

the edict of Torda. The methods also include pentatonic material related to all the main themes, representing a dream recounted by the Hungarian Unitarian minister Balázs Ferenc in his 1929 book *Bejárom a Kerék Világot* (I travel the round world) after he heard music played on the Gu Zhang zither in China in 1928, which I also heard in China in 2016. Throughout there is a strong Bartókian flavour, particularly in the multiple polyphonic lines and long-short "Bulgarian" rhythms.

I describe this complexity of reference, not with the intention to bewilder a non-Transylvanian Hungarian Unitarian audience – which is the ecological niche which this piece will inhabit - but to describe a type of complexity which is not necessarily a function of the music's surface. The piece doesn't need to be understood as a web of symbols, and could be interpreted in many other ways – but it is intended to work as an alternation between moods of contemplation, and dynamic polyphony.

Finally, to return to Clarke's afterword in which he states that music psychology as a discipline tends to deal with general principles rather than specific manifestations. As he points out, musicology tends towards the opposite end of the spectrum, and as an individual endeavour composition is even more extreme. Somehow as an individual composer writing a piece I must believe in the uniqueness of the piece's expressive form, although I know that for it to have meaning for an audience it must also have 'partial commonality' with other pieces. Thinking about musical or artistic scenes (such as New York in the 1960s,

Paris in the 1920s) as ecological niches allows us to understand this apparent contradiction, in the same way that an ant, if it could cognize such things, would probably believe that it was acting with complete individual freedom when it carries a leaf along a trail of pheromones, even as its behaviour contributes to an *emergent* collaborative effect (the ant hill). Classical music urgently needs to embrace collective scenes as the outcome of emergent behaviour, rather than the atomizing effect of a belief in the unique expression of the individual; and the ecological metaphor proposed by Eric Clarke can give us the intellectual framework to do so.

Response to Eric Clarke's "Musical Events and Perceptual Ecologies"

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Adapting the principles of ecological thinking as derived from James Gibson to the study of aesthetic issues develops significantly our understanding of what we might term, following Jan Mukařovský, the 'aesthetic function'.[10] For Mukařovský, the aesthetic function was not confined to art, and although he focussed closely on materials and techniques, he considered that the aesthetic function needed to be seen in relation to social contexts. He argued that 'an active capacity for functioning aesthetically is not an inherent property of an object, even if it were deliberately created with that in mind; it only transpires under certain circumstances, specifically in a given social context.'[11]

From an ecological perceptive, the aesthetic function can be seen as purely relational, created by what Clarke calls a 'mutualism of perceivers and their environments'. The opportunities offered to the perceiver by the musical (or other) materials are dependent on the nature of the relationship between perceiver and perceived. As Clarke points out: 'the same musical materials afford widely differing degrees of complexity to listeners with different listening skills, orientations and histories of perceptual learning.' However, the specific

properties of the object – in this case music – play a co-determining role in the relationship with the listener, and this means that we always need to take both into account.

When James Gibson used the concept of affordance (influenced by Gestalt psychology), he was thinking primarily of behaviour, in particular adaptive behavior that enables organisms to function successfully in their environment (1966, p.73). The kinds of behaviour 'afforded' by properties of objects depend on the attributes of the organism in question. The perception of affordances involves identification of stimuli and also orientation to their values (p.147). In perceiving, we can both identify information and orient ourselves to it. These aspects can be intertwined, such as when we discover uses for an object by interacting with it, which is also a learning process.

Precisely because affordance cuts across subject-object distinctions while at the same time embracing their interaction, it also reconciles the orientation of the human sciences broadly speaking towards the study of general trends and contexts with the concern of the aesthetician who is a specialist in a given art form with the detailed and technical study of the material textures of the artistic medium. The attributes of the medium are crucial because, as Clarke puts it, 'the music [or other medium] has attributes that are consistent with the semantic requirements of some interpretations and not others'. The requirements of

mutualism are ones that can be identified and scrutinized across a spectrum ranging from minutely observed features perceptible only to specialists, to the study of the social trends in the British dubstep scene in 2007 discussed by Clarke.

The concept of affordance is, then, hugely useful to aesthetic enquiry across disciplines. However, given that it is predicated on interactions between organisms and environment that enable organisms to benefit from the opportunities offered to them for purposes that are useful to them (e.g . eating, resting, sheltering), this does still leave the question of what kinds of usefulness we are talking about in the case of 'aesthetic' affordances, where, as Clarke argues, interpretation is itself an action that can be 'afforded'. He addresses the issue of how the critical function of art appears to work differently from other kinds of affordance, which are about enabling organisms to adapt to their environment, as art can foster resistance rather than adaptation.

I would like to take up this point and try to push it further. It seems to me that enabling humans to interact better with/adapt to their environments continues to be a crucial function of art that is not at odds with critique, as the two often work together. For instance, the foregrounding of multi-sensory experience in much contemporary art (see discussion by Pursey in this volume) is often seen as in some way compensating for the lack of sensory immediacy that characterizes

the digital information that is so much part of contemporary life – in other words, it allows us to adapt to this 'lack' by providing us with an alternative source of multisensory experience. At the same time, by virtue of making visible the need for such sensory interventions, art contributes to raising awareness of the problem of sensory deprivation in our culture, thereby fostering critique.[12]

In this way, the value of aesthetic affordance for humans may be precisely to provide us with more satisfying ways of interacting with our environment (facilitating 'adaptation') while at the same time making us more aware of changes that need to be made.

Finally, a point about the evolution of affordances. Like the notion of aesthetic function discussed at the outset, affordances change across place and through time. One of the effects of aesthetic affordances is to be instrumental in producing such changes, through impacting on perceptual habits. We cannot fully predict how the environment and our lifestyles will evolve and what contribution human aesthetic activity will make to that process, but we can be sure that it will continue to change affordances.

Notes

1. The objection is often raised that I may be deceived: the chair may be made of paper and cardboard, cleverly painted to look like wood and metal, but which collapses when I sit on it. But this only serves to *confirm* the principle of specification: materials can be deliberately made to reflect light in a way that is indistiguishable from the very different materials that are being simulated. We can mistake a painting of a violin hanging on the back of a door, as appears in the Music Room at Chatsworth House in Derbyshire, England – complete with shadow effects and a painted ribbon suspending it from a painted peg – for a real violin. But this merely demonstrates that a skilled painter (Jan van der Vaardt in this case) can use applied pigment to reflect light in a way that, for the deceived viewer, is indistinguishable from the way in which varnished wood, lengths of thin gut, and a piece of shiny blue ribbon, also reflect light to specify the same objects.

2. Like the painted violin (see previous note), this constitutes no counter-example to the ecological principle of source specification. Just as the disposition of pigment on a surface can generate an optic array that is indistinguishable from the array that specifies a real violin in real space, so also the movements of two loudspeaker cones can generate soundwaves arriving at my ears that may be indistinguishable from those that are generated by a real motorbike going past.

3. As is increasingly recognised, perceptual learning (particularly auditory learning) starts well before birth: the human foetus has an essentially fully functioning auditory system about halfway through pregnancy, and there is now plenty of evidence that a new born infant is already strongly attuned to its mother's voice, as well as to music that it may have heard *in utero* (e.g Parncutt 2016).

4. The language of 'shaping' and 'growth' clearly has attractive similarities to the processes of shaping, growth and pruning of synaptic connections that are widely accepted as the basis of perceptual learning and memory (e.g. Rose 2003; Reybrouck and Brattico 2015). There are also affinities with connectionist models of human perception, as discussed in Clarke 2005, p. 25-32.

5. These can be heard at: https://www.youtube.com/watch?v=CJRE1y5uxOM (Ravel, with scrolling score) and https://www.youtube.com/watch?v=SQrb85O3HQA (Kraftwerk – the spectrogram is from around 0:04 – 0:10)

6. A representative example of Zappa's approach to doo-wop can be heard at https://www.youtube.com/watch?v=NBRUcElxhJU; and Denise by Randy and the Rainbows at: https://www.youtube.com/watch?v=xgqMW4CHClk

7. The track can be heard at: https://www.google.co.uk/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=tricky+hell+is+round+the+corner

8. For the developing literature on musical affordances see e.g. Reybrouck (2012); Windsor and de Bézenac (2012); and Krueger (2014).

9. The network title is 'Evaluating Methods of Aesthetic Enquiry across Disciplines'.

10. Mukařovský (1891-1975) was a member of the Prague Linguistic Circle and was also known for his association with Russian Formalism. His best known text is probably *Aesthetic function, form and value as social facts* (1970).

11. https://www.tandfonline.com/doi/full/10.1080/17561310.2015.1049476. Accessed 2 March 2018.

12. See, for instance, this discussion of the Open Senses festival held in London, May 2017: 'Singer [Stephanie Singer, composer and founder of Bittersuite] thinks the reason so many people are interested in the multi-sensory (or multi-modal) field right now is because the rocketing use of technology has resulted in less physical interaction in a society ever more divided by screens. "The festival comes at a time when we are experiencing a lack of intimacy in our daily lives," she says. "Digital is great, but digital needs to come with a human element... Technologists are thinking about how to make tech more synonymous with the body, to move beyond clunky technology."'. https://www.standard.co.uk/go/london/arts/open-senses-festival-how-a-multisensory-extravaganza-is-heightening-the-capitals-delights-a3535061.html. Accessed 04.03.18.

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