

## The Veracity of Sociological Modelling in Political Music (2014)

David Pocknee

To my knowledge, Elias Canetti was the first European writer to draw the parallel between the conductor and power in his book *Crowds and Power* (first published in German in 1960, and English in 1962):

There is no more obvious expression of power than the performance of a conductor. Every detail of his public behaviour throws light on the nature of power. Someone who knew nothing about power could discover all its attributes, one after another, by careful observation of a conductor.  
(Canetti 1978, p. 394)

In Canetti's mind, the conductor embodies several attributes which make them a powerful figure. The conductor has a symbolic power, manifested in their standing position upon a raised dais, as opposed to the seated orchestra and audience – a relationship of postures which draws upon “ancient memories of what it meant when man first stood upright [which] still play[s] an important part in any representations of power.” (p. 394-395). This power also takes symbolic form as two types of legal apparatus: that of the police, imposing the code of laws in the form of the score and punishing any breach of it; and that of the panopticon (p. 395):

His eyes hold the whole orchestra. Every player feels that the conductor sees him personally, and, still more, hears him. The voices of the instruments are opinions and convictions on which he keeps a close watch. He is omniscient...His attention is everywhere at once, and it is this that he owes a large part of his authority...He is the living embodiment of law, both positive and negative. His hands decree and prohibit. His ears search out profanation.  
(p. 395)

Coupled with this symbolic power, is a literal power: firstly that of punishment, in a symbolic role as police; secondly, as one whose smallest actions gain a magnified power, able to “wake this or that instrument to life or silence it at will. He has the power of life and death over the voices of the instruments...” (p. 395). Thirdly, their power as organizing force – here Canetti moves from commenting upon the internal power relationships of the orchestra and starts to talk about them as a metaphor or analogue for larger social constructions:

Their diversity stands for the diversity of mankind; an orchestra is like an assemblage of different types of men. The willingness of its members to obey him makes it possible for the conductor to transform them into a unit, which he then embodies. (p. 395)

The orchestra lies under the control of the conductor through a symbolic and literal, hierarchical exercise of a power deriving from a legislative authority, conferred by the score and actioned through a judicial omniscience over a collective robbed of individual agency and under constant threat of legal sanction upon their transgression of the law.

Canetti does not use the words “dictator” or “totalitarianism” in his discussion. This analysis, however, had a large influence upon Theodor Adorno's analysis of the orchestra/conductor relationship in chapter 7 of his *Introduction To The Sociology Of Music* (he references Canetti's work on the first page of the chapter).

In Adorno's analysis we see the start of the modern myth. Whilst Canetti's work only occasionally implied that the orchestra might prove a sociological construction whose make-up could be an analogue for larger societal arrangements, it is from this point that Adorno's essay starts:

Reflecting on the conductor, the orchestra, and the relation between the two is not only justified by the

social relevance of their role in musical life. The main reason for such a reflection is that conductor and orchestra in themselves constitute a kind of microcosm in which social tensions recur and can be concretely studied – something comparable, for example, to a community or municipality as a sociological research object permitting extrapolations on society, which is never tangible as such. (Adorno, 1976 p. 104)

This idea of the orchestra being a microcosm of social tensions is mirrored in John Cage's thinking, where he not only draws parallels between the conductor as societal organizer, but between people and sounds.

We need first of all a music in which not only are sounds just sounds but in which people are just people, not subject, that is, to laws established by any one of them, even if he is “the composer” or “the conductor”.

The situation relates to individuals differently, because attention isn't focused in one direction. Freedom of movement is basic to both this art and this society. With all those parts and no conductor, you can see that even this populous a society can function without a conductor. (Kostelanetz 1988, p.257)

By the third page in his chapter, Adorno makes the connection between totalitarianism and conducting specific: “The histrionics at the podium are easy to credit with the dictatorial capacity for frothing at the mouth at will. It is astonishing that the Nazis did not persecute conductors as they did soothsayers, for competing with their own charisma.” (Adorno, 1976, p. 106).

\*\*\*

There is an earlier version of this trope, hinted at in Adorno's essay, and found in Soviet Russia in 1917. Adorno briefly makes reference to “[e]xperiments with conductorless orchestras ... made in the first years of the Russian Revolution, and however naïve those may have been in a purely musical sense, they were merely calling the conductor figure to account for permanent debts incurred in social psychology.” (Adorno, 1976, p. 106). This conductorless orchestra was *Persimfans*, which rejected the use of a conductor as being against the egalitarian revolutionary spirit, and which reportedly performed all the Beethoven symphonies without conductor, as well as many other works.

\*\*\*

In his discussion of Christian Wolff's political music of the 1970s, David Ryan (2010) draws on Jacques Attali's *Noise* (1985), in which Attali sees the conductor not only as a totalitarian leader, but the function of the orchestra as a propagandist one “to convince people of the rationality of the world and the necessity of its organization” (p. 65) and the orchestral musicians as “the image of programmed labor in our society. Each of them produces only a part of the whole having no value in itself.” (Attali, 1985, p. 66). In the orchestra, the duality of repression under a totalitarian political regime and repression under capital exist in parallel. Attali asserts that “up to and including Beethoven, even symphonies were performed by a small number of musicians (twenty-three for the Ninth), with no leader. But combinatorics entails growth, and growth entails the leader.” (Attali, 1985, p. 66) From this we can extrapolate that the timing (19<sup>th</sup> Century) of the switch to the orchestral conductor, combined with the increase in orchestral size is also a metaphorical representation of the creation and consolidation of European nation-states that occurred around this period.

Ryan concerns himself not only with the physical and sociological arrangement of the orchestra, in contrast to Canetti, Adorno and Attali, but with the music it produces as well, which he sees as being politically and sociology loaded: “If Attali and others pointed out the alienated conditions of the symphony orchestra as a representation of capitalist modes of production (and we could say a

*representation of existing* within that structure), what of the products that are churned out by this machinery?" (Ryan, 2010, p. 168). By the time of writing, the idea of the orchestra as having a metaphorical aspect has been so ingrained into the discourse that, for Ryan, mentioning it is almost superfluous: "It almost goes without saying that the orchestra is not only an 'image' or popular representation of classical music, but also an embodiment of social relations in society as a whole" (Ryan, 2010, p. 152).

Ryan uses Christian Wolff's large ensemble piece *Changing The System* (1973) as an example of a work which proposes a different set of performer-relations opposed to that of the orchestra, clearly aiming for a utopian anarcho-syndicalist sociological arrangement. Ryan sees not only the social structuring of the ensemble as the way in which the political content is conveyed, but that indeterminate elements in the score allow a human agency that the traditional hierarchical orchestral arrangement precludes. Due to the liberating impulse of the indeterminacy in the work, he sees an implicit political aspect of this type of notational approach – a similar libertarian mentality that Cage has also highlighted. Ryan asks:

'can we have politics of indeterminacy'? The answer is undoubtedly yes, and although specific pieces will act very differently, three basic reasons can be identified: indeterminacy,

1. questions the process of artistic labour and the division of labour;
2. allows for, or even prescribes, widely different concepts of musical skill (or even intentional 'deskilling'), to be used in the realization of a piece; and
3. questions the idea of how time is perceived as a governing principle, of events occurring in time.

(Ryan, 2010, p. 164)

However, this politicization of indeterminacy is questionable. If Ryan, after Attali, sees the traditional orchestral arrangement as representative of repression under capital, then the first two reasons why indeterminacy may work against this are strongly reminiscent of capitalist production techniques – division of labour and deskilling (along with the application of biomechanical principles) being the primary methodologies that drove the development of anti-unionized mass-production in Henry Ford's early car factories (see Pocknee, 2013b for more on this). Wolff's division of labour, especially in the context of the 1970s, is strongly reminiscent of outsourcing – one of the driving forces behind post-fordism.

On the third of these points, Ryan makes the claim that strictness of rhythm is an implicitly capitalist construction, drawing on the Italian political philosopher Antonio Negri's idea of the capitalist subsumption of time "*Time as measure*, far from being simply negotiable by the worker or producer, suggests Negri, designates and controls how we live, how we relate to others, and determines our very existence." (Ryan, 2010, p. 168). The measured aspect of time (pulse, in other words), has, for Ryan, clear parallels to capitalism's quantization of the otherwise unstriated temporality of existence – a gridding needed to impose value. This connection between repressive social structures and strict rhythm can also be seen in Stockhausen's eschewing of rhythm, due to its connotations with the Nazi marching music he experienced in his youth. In his work he avoided "the periodic beat, which makes people march without knowing it" (Maconie, 1976). This idea is backed up by recent research showing that synchronous rhythmic activity can increase compliance to requests to engage in aggressive behaviour (Wiltermuth, 2011).

Ryan sees indeterminacy as a way of the performer liberating this time "[i]n contrast to what we might call 'normative' contemporary classical music, where time structures are determined, filled and developed with events occurring at *just the right moment*, indeterminacy reflects much more of what Negri is talking about..." (Ryan, 2010, p. 168). However, didn't Wolff himself say "form in music could be taken as a length of program time" (Wolff, 1965) – is it possible not to see the piece itself as the striation of time defining work (the playing of the piece) and not-work (the time outside of the performance of the piece)? John Cage's *4'33"* is an example of striation *par excellence* – only the grid is left – the performer as factory worker dividing striated and smooth through the grid of

piano-lid-lifting.

Whilst Ryan draws upon Negri, he ignores the historical politicization of measured and unmeasured time. The indeterminacy in regards to performance that Ryan sees as giving Wolff's work its radical politics is itself the very technique that allows musical works to gain their value as commodities. In the conventional idea of musical performance practice, the performer's job is, to some extent, the smoothing out of striated time – to introduce temporal subtleties brought about through the collision between the performer's technique and the score, moving the music away from the striation of the metrical grid.

In earlier periods, this smoothing would be synonymous with the idea of “expression”, especially in the romantic period, yet in modern music, with its general disdain for overt emotional showmanship it is more likely that this occurs in order to give the live version of a work value which it would otherwise lack. The transformation of striated into smooth space is more complex and mathematically challenging than the opposite (Deleuze and Guattari, 2004) and this allows a performer's smoothing to imbue value, as it is an operation that cannot be mechanically replicated or mass-produced.

In the Romantic period, when this smoothing was more extreme, communicated through the extravagant rubato and embellishments of virtuoso performers it also existed as a polarity against that of the machine. It is no coincidence that this occurred as the industrial revolution (that great striation of time!) was underway. Here the smoothing existed not only as an aesthetic opposition to the striated, regular and repetitive sounds of the factory, placing a duality between oppression under capitalism as a working person and the freedom of the gentleman-at-leisure – a way of the upper-class distancing themselves from those of the working class – but it also served to play into what Deleuze and Guattari, like Negri, see as the imposed duality of capitalism – the striation of the working hours, and the smooth space of “leisure” (Deleuze, Guattari, 2004, p. 540-541).

\*\*\*

*...when you and David Tudor perform both your musics together, as you sometimes do, your actions might seem anarchic to the listener, although there must be a sort of nonanarchic corresponding attitude toward David Tudor as your co-performer, in spite of the fact that your two pieces are conceived as completely independent.*

It is a very simple form of anarchy because two of us were working together, but independently. I was not telling David Tudor what to do, nor was he telling me what to do, and anything that either of us did worked with everything the other did.  
(Kostelanetz 1988, p. 266)

The quote above gets to the heart of the problem of the conductor/dictator trope and that of the use of musical ensembles to model political ideologies: Can a relationship between two people be anarchistic?

Most assertions about the politics of the orchestra and its metaphorical power ignore number of members as a contributing factor to the socio-politics of a group. This is a mistake, as the size of a group fundamentally *defines* its socio-politics.

On a sociological level, an increase in the number of members has profound effects upon the relationships within the group, the behaviour of individuals, and that of the group as a whole. The relationships within a group become more complex following the addition of new members simply due to the exponentially increasing combinatorial possibilities of connections needed to link every member of a group to every other member – a relationship defined by the equation  $n(n-1)/2$  where  $n$  is the number of people in a group (Forsyth, 2014, p. 5). The sociologist Georg Simmel, who studied the effects of group size upon its nature, states:

the sociological structure of a group is essentially modified by the number of individuals that are united in it...a group of a certain extent and beyond a certain stage in its increase of numbers must develop for its maintenance certain forms and organization which it did not previously need; and that, on the other hand, more restricted groups manifest qualities and reciprocal activities which, in the case of their numerical extension, inevitably disappear.  
(Simmel, 1960, p. 2)

The size of groups not only affect its sociology, but the way in which that group is categorized. If one were to take a small community run upon anarcho-syndicalist principles, and explode it outwards to encompass an entire country you would have something similar to liberal democracy. This does not mean that anarcho-syndicalism and liberal-democracy are the same, far from it, instead it points to the fact that, in the modelling of the politics of human groups, scale is key.

Ideas of utopian modelling in musical ensembles also frequently neglect the intensity of the relationships between individuals which exist outside that of the work, in exchange for an indistinguishable set of performers whose instructions for the construction of relationships are the same. For instance, a dyad (two people) who are in love have a much different way of interacting than another group of the same size (this parallel is found in Antoine Beuger's duos, as well as his assertion that “[t]he number of performers is a very essential issue to me. I am strongly convinced that there is something...ontologically different about a solo, duo etc. ... Three again is a very different situation. When you go higher up differences seem to become more gradual and less ontological” (Beuger & Saunders, 2009)).

For a moment, let us not try to prove that the orchestra is not totalitarian, but that totalitarianism is not the orchestra. Let us take a totalitarian regime encompassing an entire country and shrink it down so that its ideology and politics is intact, but that it only encompasses 100 people. This arrangement would be something like a small cult, such as the Branch Davidians, or the Manson Family, in which a single charismatic leader holds complete power over a small group of people. Any look at the difference between the social and political structure of these types of small cults and that of the orchestra, show clear differences, even with a comparative number of people.

In creating a model of anything, it is important that the elements that are changed to allow it to be a model do not impact on the functionality of the model itself. For instance, an architect may make a small table-top model of a building out of balsa wood in order to check the dimensions or aesthetic of the design from multiple angles before investing in its full-size construction, but they would not use the same model as a way of testing the load-bearing potential of the materials planned to be used in the final building, as this is one of the parameters substituted in order to make the model possible (concrete table-top models are much more difficult to create). Similarly, scale plays an important, and as yet unsolved, role in the mathematical modelling of reality – one cannot use Einsteinian or Newtonian equations for the calculation of gravity upon sub-atomic particles, as scale defines the functionality of the equations. This element of scale and its importance and functionalism in the modelling of the sociology and politics of human groups is also a fundamental, and over-looked, element of the orchestral/totalitarianism analogy. Scale cannot be used as a control in the creation of the model.

The orchestra cannot act as a model for totalitarianism because, even though its usefulness as a model comes from the reduction of a political situation from the size of a country to only 100 people, the size of a group of humans fundamentally not only defines the way in which individuals react towards each other and to the political superstructure they exist as a part of, but it also changes the way in which we categorize the political and sociological system being used. With a small group of people something is a cult, yet with a large group it becomes fascism – this is a case of scale.

The change in scale in the orchestra/totalitarianism metaphor chokes on its own usefulness due to the fact that the very parameter changed to allow its metaphorical functionality is the same one needed to make distinctions between different types of sociologies and politics, the ability to make these distinctions being the primary reason for the employing of the metaphor in the first place.

\*\*\*

Much of the rhetoric surrounding works which attempt utopian modelling in a musical ensemble is related to ideas of human agency. David Ryan sees Christian Wolff's work as embodying a left-leaning political stance because the performers are given choices to make that have much larger implications for structure and sounding result than much more determinate notation allow for. This is seen as re-empowering the members of the ensemble by distributing to them power which would have previously been held by the composer or conductor. What many of these arrangements fail to acknowledge is the role of sabotage as a manifestation of human agency, the pleasure derived from a masochistic subsumption to the power of the author or conductor, and the limits of human agency.

The end of Adorno's chapter looks at the role of resistance as a fundamental aspect of the social psychology of the orchestra, describing the conduct of orchestral musicians as a "phenomenology of recalcitrance" (Adorno, 1976, p. 111). He sees this as stemming from the Oedipal character of the orchestral musician, "vacillating between rebelling and cringing" (p. 112), a nature which causes the orchestra's inherent conservatism: "The Oedipal character tends to be anti-modern; it wants fathers to be more right than sons. The act of sabotage, the intentional misplay, is thus selecting its object in modern music, a field where the stronger authority, that of *communis opinio*, will back it from the start" (p. 112). Much of this sabotage manifests itself as the sadistic humour that orchestral musicians direct at "every intermediary", especially "modern" composers (p. 112). Adorno doesn't mention any direct acts of sabotage other than a vague relating of the type of behaviour:

Significant for the habitus of recalcitrance are all the anecdotes emanating from orchestras, anecdotes which gleefully charge modern composers of the most varied schools with having failed to notice that some wind instrument had intentionally missed a transposition and played the wrong part. The truth of these tales is doubtful; beyond doubt is what they reveal about the spirit of orchestras  
(p. 112)

Adorno also sees sabotage as arising from a situation in which the conductor fails to fill his role as "the leader imago", either through incompetence, or through over-talking as orchestra members "fear the practice of deceit by the intellectual who has mastered the verbiage they lack" (p. 110).

The degree to which one sees underlying psychological factors as impinging upon human agency will, to a great extent determine how one perceives the famous sabotage of the 1964 performance of John Cage's *Atlas Elipticalis* by the New York Philharmonic. In his insightful analysis of the event, Benjamin Piekut's concludes:

At issue is the difference between purportedly advancing a *model* of utopian social systems that we do not yet have and providing a *mirror* of social systems as they actually exist. Cage tells us that his music demonstrates that if we get rid of the conductor/king, everything will continue fine without him...A society without laws is one that as yet does not exist. Thus, Cage's utopia of participatory disorganization must be based on the threat of discipline-and not only on the discipline of chance operations or eliminating one's ego in order to allow sounds to be just sounds. No, this is real discipline [Leonard] Bernstein [who oversaw rehearsals of the piece] and [Carlos] Moseley [general manager of the orchestra] castigating the orchestra, the position of Cage and his supporters that, no matter what they actually think about the piece, these musicians must obey Cage's demands (in fact, union rules and the labor contract with the Philharmonic make plain this metalevel of discipline).  
(Piekut, 2011, p. 63)

What arises out of Piekut's analysis is the anarchistic rebellion of an orchestra in response to a hierarchical power structure, whether or not this rebellion arises out of the essentially Oedipal compulsions of the orchestra, or perhaps a combination of orchestral musicians' higher levels of anxiety, introversion and independence (Kemp, 1996, p. 139), it is one in which the human agency that gives much of the intrinsically political musical works their power, is mobilized and militarized, yet which meets with disappointment from the anarchist Cage. This perhaps for Cage is an “impracticable anarchy”, which he defined as “one which provokes the intervention of the police” (Cage, 1976, p. 53).

Another problem with utopian political modelling is that it imposes a totalizing utopia with scant regard for the individual's needs. Cage's experience with *Atlas Ellipticalis* is an example of this. Adorno is astute in recognizing the masochism inherent in the orchestral musician – a masochism that is common to all musicians, though some experience it more strongly and compulsively than others. Adorno points out that it is not just that the orchestra need the conductor for the practical process of musical co-ordination, but that the conductor must be of the strong leader type, for “[i]t is as if the subject's masochism were resisting modes of conduct that would impair the superior's traditional role. If he violates the taboos attached to that role in the prehistory of his archetypes, the violation is rationalized and registered as his factual incompetence” (Adorno, 1976, p. 110) – the orchestra need the conductor in order to act out their masochistic fantasy. I have written before on the relationship between masochism and musical pleasure (Pocknee, D. *Some Further Sodomasochistic Aspects Of Musical Pleasure*, 2012b), yet without mentioning the role of the conductor. As Canetti observed, the conductor is the living embodiment of the law – and the law is a key factor which differentiates between the sadistic and masochistic relationship, the masochistic relationship being defined by the contract, the sadistic relationship flouting any connection with the law and its implicit consensuality. The conductor becomes the enactor and enforcer of the contract that is the score, allowing the performer to gain their pleasure not only under the direct control of the composer, but under that of the conductor as well, this control designed to allow the access of transcendental modes of being, such as Csikszentmihalyi's state of “flow” (Pocknee, 2012b).

Finally, human agency has its limits, in that humans are extremely predictable. To take a simplistic example, Karlheinz Stockhausen's *Klavierstück XI* consists of a set of nineteen isolated musical fragments spread out on a large sheet of paper. The instructions state that a player let their eye wander at random over the page, performing the fragment on which their eye settles, at a speed, dynamic and touch of their own choice, then letting their eye wonder randomly until it settles upon another fragment, playing it and repeating this process until one of the fragments has been played three times (Maconie, 1976). However, research into eye-tracking has shown that the way in which people scan a page is not random at all and, in fact, highly predictable. Given the limited amount of possible progressions through Stockhausen's work, if one did an eye-tracking analysis on a large enough group of people, looking at the ways in which their eyes scan over the piece and combining this with a sophisticated enough statistical model, it would be possible to calculate the way order in which people would perform the work to a high degree of statistical certainty. At this point, the indeterminate aspects of the work collapses and the human agency which gives the work its intrinsic political empowerment is revealed to be empty, as sociological, biological and psychological conditioning over-rides any agency that might be implicit in the task. With the right amount of data and the correct modelling tools, it is a possibility that many indeterminate works lose their political edge and become simply articulations of human predictability, rather than a rational agency (e.g. the statistical likelihood of playing at a specific point in a Cageian time-bracket...). This would point towards the idea that a politicized human agency within the circumscribed ideals of utopian modelling within ensembles (if one still believes in this after what I have written), would necessitate a move towards an aesthetic which divorced itself as much as possible from the predictabilities of human performers and towards an un-human or anti-human

aesthetic in order to hold onto an agency that transcends the conditioned – perhaps Cage's *Music of Changes*, or Boulez's *Structures*?

The lack of human agency that can be seen in human movement also arises in analyzing Xenakis' political modelling. Xenakis sees stochastic processes as analogous to that which happens when a crowd scatters from gunshot “Everyone has observed the sonic phenomena of a political crowd of dozens or hundreds of thousands of people...Imagine, in addition, the reports of dozens of machine guns and the whistle of bullets adding their punctuations to this total disorder. The crowd is then rapidly dispersed...The statistical laws of these events...are stochastic laws.” (Xenakis, 1971, p. 9). Here, not a utopia but an act of political horror and violence is seen as the basis for a musical modelling of reality. However, crowd scattering does not obey stochastic laws. The psychogeography of the city, so well understood by the Situationists, and basic human predictability (especially in crowds), mean that their scattering is not stochastic. This inability to scatter stochastically across a city is what prevents crowds from having a much more powerful political efficacy, as this would allow them to evade kettling tactics from the authorities (Runnels, J. 2014). The ability to apply Xenakis' compositional tools to the stochastic scattering of crowds would be a political art of interest, not the poor utopian masturbate-a-thons of the sociologically illiterate. The world modelling Xenakis, not Xenakis modelling the world. The fact that Persimfans disintegrated as soon as Stalin came to power points to the uselessness of artistic political modelling – what good is a modelled utopia if it crumbles when it comes into contact with the real world power it exists to oppose?

The orchestra is not totalitarian. In fact, it cannot be a model for anything other than a socio-political organization of the same size. The movement of 100 or so people all following a set of instructions towards a single musical goal strikes me more as a unique type of political and social situation which has no other analogue in the real world that I can think of – another reason why mobilizing it to model a non-existent social situation seems to miss the point.

Yet, the sociological, political and conceptual problems highlighted in the writing up to this point beg a bigger question: How aesthetically interesting is it to model utopia, anyway?

## Reference List

- Adorno, T. (1976). *Introduction to the sociology of music* trans. Ashton, E. B. New York: Seabury Press
- Theodor Adorno (1991) *The Schema of Mass Culture The Culture Industry* ed. J. M. Bernstein. Abingdon
- Attali, J. (1985). *Noise* trans. Brian Massumi. Minnesota: University Of Minnesota Press
- Beuger, A. Saunders, J. (2009) Antoine Beuger. *The Ashgate Research Companion to Experimental Music* Farnham, Burlington, VT: Ashgate
- Cage, J. (1968) *Silence* London: Marion Boyars
- Cage, J. (1976) *For The Birds* Boston, London: Marion Boyars
- Cage, H. (2001) *Anarchy* Middletown, CT: Wesleyan University Press
- Canetti E. (1978). *Crowds and power* trans. Carol Stewart. New York: Continuum
- Deleuze G. & Guattari, F. (2004) *A Thousand Plateaus* trans. Brian Massumi. London, New York: Continuum
- Egbert, D. D. (1970) *Social Radicalism and the Arts: Western Europe* New York: Knopf
- Forsyth, D. R. (2014) *Group Dynamics* 6<sup>th</sup> ed. n.p.: Wadsworth CENGAGE Learning
- Griffiths, P. (2010). *Modern music and after*. Oxford: Oxford University Press.
- Kemp, A. E. (1996) *The Musical Temperament* Oxford: Oxford University Press
- Kostelanetz, R. (1988). *Conversing with Cage* (1st ed.). New York: Limelight Editions.
- London, J. (2002). Cognitive constraints on metric systems: some observations and hypotheses *Music Perception*, 19 (4) p. 529-550
- Maconie, R. (1976) *The works of Karlheinz Stockhausen*. Oxford: Oxford University Press.
- Nyman, M. (1999) *Experimental music: Cage and beyond* Cambridge: Cambridge University Press
- Piekut, B. (2011) *Experimentalism Otherwise* London, Los Angeles: University of California Press
- Pisaro, M (2009). *Writing Music The Ashgate Research Companion to Experimental Music* Farnham, Burlington, VT: Ashgate
- Pocknee, D. (2012a) *Virtuosity, Flow and Re-Notating Modernism* <http://davidpocknee.ricercata.org/writing/virtuosityzax.pdf> accessed 26/06/2014
- Pocknee, D. (2012b) Some Further Sodomasochistic Aspects Of Musical Pleasure *Much Too Much Noise #2: Some Sodomasochistic Aspects Of Musical Pleasure* [http://issuu.com/much\\_too\\_much\\_noise/docs/zine02](http://issuu.com/much_too_much_noise/docs/zine02) accessed 26/06/2014
- Pocknee, D. (as Droppe, F.) (2013a) Post-Scriptum *The New Fordist Exhibition Report* The Hague: Institute Of Applied Cultural Economics and Sociology and [http://issuu.com/much\\_too\\_much\\_noise/docs/nfo\\_050514.2](http://issuu.com/much_too_much_noise/docs/nfo_050514.2) accessed 26/06/2014
- Pocknee, D. (2013b) What is new about new fordism? *The New Fordist Exhibition Report* The Hague: Institute Of Applied Cultural Economics and Sociology and [http://issuu.com/much\\_too\\_much\\_noise/docs/nfo\\_050514.2](http://issuu.com/much_too_much_noise/docs/nfo_050514.2) accessed 26/06/2014
- Repp, B. H. (2005). Sensorimotor synchronization: A review of the tapping literature *Psychonomic Bulletin & Review* 2005, 12 (6), p. 969-992
- Repp, B. H. (2013). Sensorimotor synchronization: A review of recent research (2006-2012) *Psychonomic Bulletin & Review* 2013 20 p. 403-452
- Runnels, J. (2014) email correspondence.
- Ryan, D. (2010) Changing the system: indeterminacy and politics in the early 1970s *Changing the system: the music of Christian Wolff* Farnham, Burlington, VT: Ashgate, p. 143-170
- Saint-Simon, H. de (1999) *Opinions litteraires, philosophiques et industrielles Art and It's Histories; A*

- Reader* ed. Steve Edwards. Guilford: Open University in association with Yale University Press.
- Simmel, G. (1960) *The Sociology Of Georg Simmel* ed. Kurt Wolff. Glencoe, IL: The Free Press
- Stockhausen, K. (1959) "...How Time Passes...", *Die Reihe* (3) Vienna, Zurich, London: Theodor Presser and Universal Edition, p. 10-40
- Wiltermuth, S. (2011) Synchronous activity boosts compliance with requests to agres. *Journal of Experimental Social Psychology* (48) p. 453-456
- Wolff, C. (1965) On Form. *Die Reihe* (7), Vienna, Zurich, London: Theodor Presser and Universal Edition. p. 26-31
- Xenakis, I (1971) *Formalized Music* Bloomington, London: Indiana University Press