THE ONTOLOGY OF LIVE NOTATIONS THROUGH ASSEMBLAGE THEORY

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ABSTRACT

This paper uses assemblage theory to help develop an ontological framework for better understanding live notation practice. Originally developed by Deleuze and Guattari across a range of theoretical writings, assemblage theory is more fully explicated in the work of Manuel de Landa in the more focused context of social ontology. This paper examines the basic concepts of assemblage theory such as material components, expressive capacities, and relations of exteriority and how they may provide useful insights in the analysis of music which explores the creative potential of live notation. The temporal dynamics of nonlinear musical forms are discussed and assemblage theory is shown to be a powerful tool for promoting a better understanding of how the various interactions between material and expressive components help catalyze the emergent properties of the assemblage and through it, the ontological identity of a live notation aesthetic practice.

1. INTRODUCTION TO ASSEMBLAGE THEORY

In *A New Philosophy of Society*, De Landa uses assemblage theory to develop a social ontology for better understanding the complex dynamics of social structures. [1] Drawing heavily from Deleuze, [2] De Landa describes assemblages as constructs defined by what Deleuze refers to as *relations of exteriority*. *Relations of exteriority* ascribe defining characteristics to the relations that exist between an assemblage's component parts. Indeed, the ontological identity of an assemblage becomes an emergent property of those relationships rather than a reductive one -

> *...the reason why the properties of a whole cannot be reduced to those of its parts is that they are the result not of an aggregation of the components' own properties but of the actual exercise of their capacities.* [1]

To that end, and especially in the context of social ontology, assemblage theory refers to objects and relations between them that are ostensibly real. [3] In the course of his investigation, De Landa applies assemblage theory in the analysis of a variety of social structures from interpersonal networks through to the organization of institutions. Each of the social constructs which De Landa examines comprise interchangeable components which have both material and expressive capacities.

The materiality of an assemblage's components is constituted by its spatial presence. De Landa offers numerous examples within the framework of societies including bodies, food, physical labor, tools, machines, and buildings.

A component's materiality is complemented by its expressive capacity. These expressive capacities encompass both linguistic and non-linguistic forms of social expression. The content of an interpersonal conversation is given by De Landa as an example of linguistic expressivity while accompanying facial expressions or bodily gestures are of a non-linguistic form. In each case, both forms of expressivity are a realization of the expressive capacity of material components. It is worth recognizing as well, that these expressive capacities can only be realized through the interaction of material components and to that end, expressive capacities are a second-order property.

Defining the materiality and expressive capacities of an assemblage's components constitutes a type of analytic reduction. The interaction between these components, however, acts as a synthetic complement, helping to stabilize the ontological identity of an assemblage through processes of territorialization and deterritorialization. Both Deleuze and De Landa describe how territorialization is most simply defined by the physical networks formed between component elements. Once again using the example of a conversation, De Landa demonstrates how that conversation territorializes a space through the physical presence and interaction between two people. Conversely, a deterritorialization may occur when the physical presence is less material or spatial boundaries are blurred such as might occur when that same conversation is enabled through the modulation of electromagnetic waves over a telecommunications network.

Territorialization and deterritorialization are a first-order synthetic process in the respective stabilization and destabilization of an assemblage. A second-order articulation is formed by a process of *coding* or *consolidation*,

[2] which consolidates "…the identity of the assemblage or, on the contrary, allow(s) the assemblage a certain latitude for more flexible operation while benefiting from genetic or linguistic resources." [1] Deleuze and Guattari further define this process of consolidation as one of interiorization based on processes of reinforcement (intercalary events), distribution, and articulations of superposition. [2] These various processes of homogenization within assemblages are summarized in Figure 1.

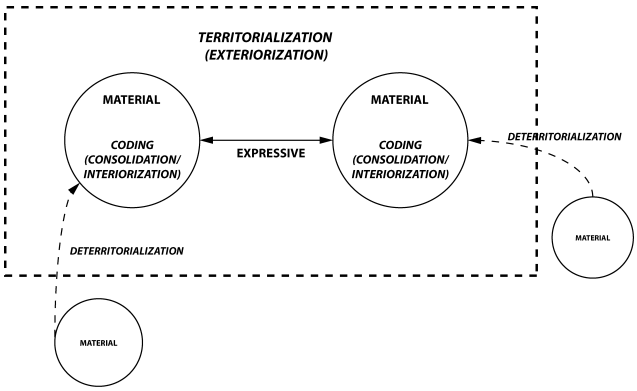

Figure 1. Schematic of the basic concepts of assemblage theory.

While assemblage theory has been developed to better understand social interactions and constructs, to what extent might these concepts be useful in the development of an ontological framework for understanding live notation practice?

2. LIVE NOTATION PRACTICE – A BRIEF REVIEW

Live notation practice is a relatively new area of creative inquiry which encompasses many different artistic practices and aesthetic styles. It includes work in which scores are generated live but also work in which scores are largely predetermined prior to performance but only recalled at the instance of performance. Unifying all these approaches is a move away from paper-based to screen-based media and an embrace of animated graphical typographies. Along with this transition come a number of visual design constraints that influence formal structural elements of the music in ways largely unknown to paper-based media. [4] While live notations often test the limits of a performer's sight reading ability, [5] the graphical schemata employed in such notations typically remains stable from realization to realization. Similarly, the way the notation develops during the performance does not typically fall outside the bounds of predetermined constraints established by the composer. In Kim-Boyle's *point studies no. 2*, for example, for any two pitched instruments, the two performers interpret a grid of moving, interconnected colored nodes. The spatial distribution and movement of nodes, their colors, sizes, and separation, are determined through various stochastic processes which result in different nodal configurations for each performance. Despite these different manifestations of the score, the manner in which its various components are interpreted and the graphical schemata itself, remains fixed.

Similarly, in Ryan Ross-Smith's *Study no. 41 [rr:___]* for nine or more instrumentalists, one of over forty studies by Ross-Smith exploring live notation, performers interpret a kinetic shell of nodes with individual instrumentalists not knowing which nodes the other instrumentalists have chosen. Despite this uncertainty, along with which comes a tremendous variety in musical expression, the graphic schemata used in the work and the way performers interpret its flowing movements remains stable.

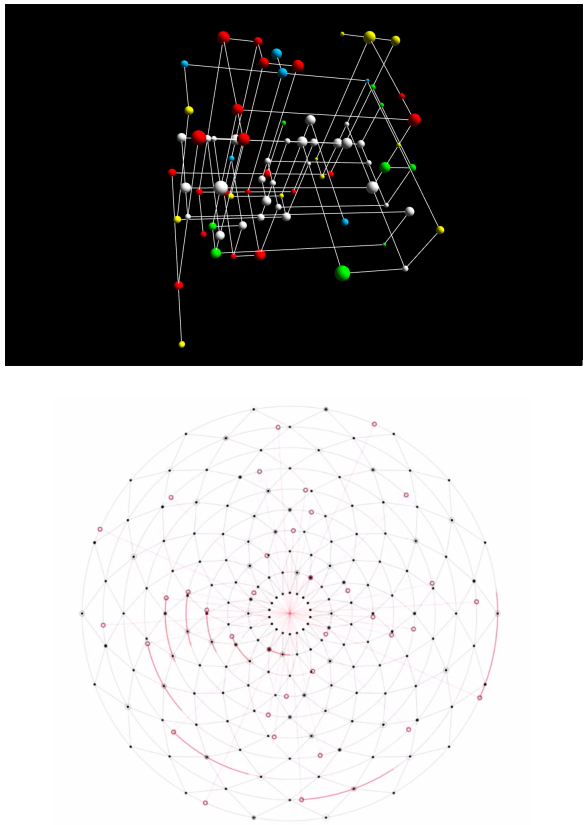

Figure 2. Upper) Snapshot from the score of Kim-Boyle's *point studies no. 2*; Lower) Ross-Smith's *Study no. 41 [rr:___]*.

In both Kim-Boyle and Ross-Smith's works the key or code that establishes how the score is to be interpreted remains constant across performances as does the graphic typography employed in the score's visual design. Performers are never presented with symbols they have not previously encountered, nor does the movement of symbols present unique transformations. In this respect this presents performance challenges no different to those involved with the interpretation of works written in common practice notation or which employ more overtly graphic typographies which have clear rules or guidelines regarding their interpretation. The only difference, of course, is that the real-time manifestation of the score contains kinetic components the low-level organisation of which may differ from performance to performance.

Unlike fixed media scores, live notation enables more complex nonlinear processes to be integrated into the formal structure of musical works. In Kim-Boyle's *Valses and Etudes* for pianist and computer (MaxMSP/Jitter), for example, the pianist is presented with a series of score fragments from established works in the piano repertoire by composers such as Chopin, Ravel, Webern, Debussy, and Schoenberg. The order in which the fragments are presented is based on a series of weighted probabilities that determine the likelihood that one score will follow another, i.e. a first-order Markov chain. Had the pianist been asked to determine the succession of musical fragments, as they might in a similar open form work such as Stockhausen's *Klavierstücke No. XI* (1956) it is unlikely they would be able to implement such successions as are derived through the Markov chain selection process. In addition, by delegating the ordering process to a Max patch, the risk of the performer choosing fixed, and subjectively preferred orderings of material is also avoided.

Nonlinear processes can be integrated in many levels of a musical score other than structural ordering. Rebelo, for example, has explored how notation can be made responsive to live elements of performance [6] and composers such as Ross-Smith, Vickery, Kim-Boyle and others have integrated various nonlinear processes into lower-level musical structures such as pitch selection or rhythmic articulation. Given that assemblages are defined by relations of exteriority rather than by their component elements, assemblage theory is particularly well suited to helping develop an ontological framework for live-notation practices exploring such nonlinear processes.

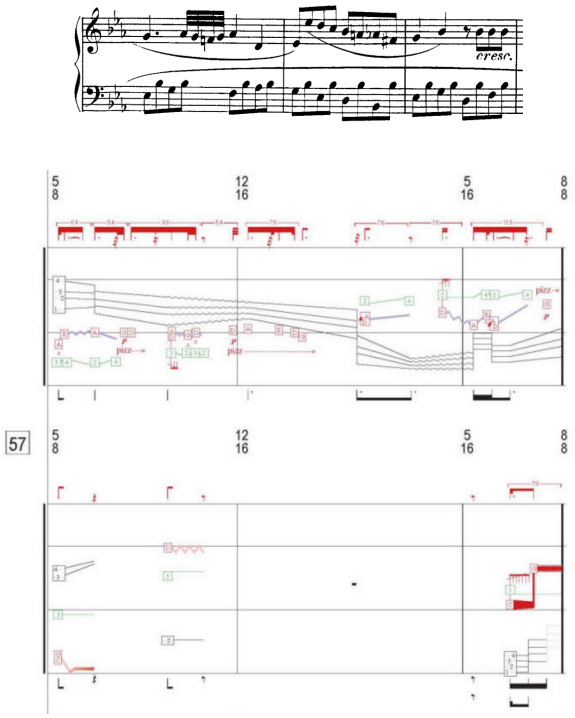

Figure 3. Upper) Descriptive notation in which a score's material components represent stable musical properties such as pitch, rhythm or dynamics (extract from score for W. A. Mozart's *Piano Sonata in C Minor*, K.457); Lower) Prescriptive notation in which a score's material components represent stable performative gestures which may result in a wider variety of sonic results (extract from the score for Aaron Cassidy's *Second String Quartet*).

3. NOTATION AS ASSEMBLAGE

Musical scores assume many forms but usually adopt either a descriptive function through describing musical structures to be interpreted by performers, a prescriptive function in prescribing a course of performative actions or some combination of the two. It is important to distinguish between these contrasting roles as the manifest sonic outcomes of each may be quite different, subsequently broadening the ontological identity of the work. In common practice notation, which is inherently descriptive, a score's material components include graphic symbols which denote various structural elements such as pitch, rhythmic values, dynamics and articulations. In such notation, the symbols used to define these elements has remained relatively stable for hundreds of years while the manner in which their expressive capacities are realized has also helped to stabilize the ontological identity of the works they are intended to articulate. Through the expression of these material components, the traditional (common practice notation) score thus territorializes a musical space through stabilizing relationships between its material components and their expressive capacities. Conversely, a prescriptive notation establishes stable relationships between performative gestures the expressive realization of which may result in quite different sonic outcomes from one performance to another.

The relationship between a score's material components, whether they have a prescriptive or descriptive function, and how those components are expressed, i.e. the expressive capacity of those components, can only be strongly related when that relationship exists within an understood code of practice. This *decoding* from the material to the expressive is traditionally informed by the conventions of performance practice. When the expressive realization of a score's material components is not strongly coded, however, the ontological identity of a work becomes less strongly bound to sonic outcomes. In Christian Wolff's *Edges* (1964) for example, the score presents the performer with a series of graphic symbols spatially distributed on a single page. The performers are free to musically interpret the symbols themselves and the order in which they are performed. This naturally provides each realization of *Edges* with a spontaneity and variety not bound by conventions or codes of strict performance practice. Similarly in Cardew's celebrated *Treatise* (1963-67), performers are free to determine how they interpret the score's diverse range of graphic symbols. Both *Treatise* and *Edges* thus become defined not so much by any manifest sonic outcome but by the interrelationships, or relations of exteriority, that emerge between atomic musical gestures.

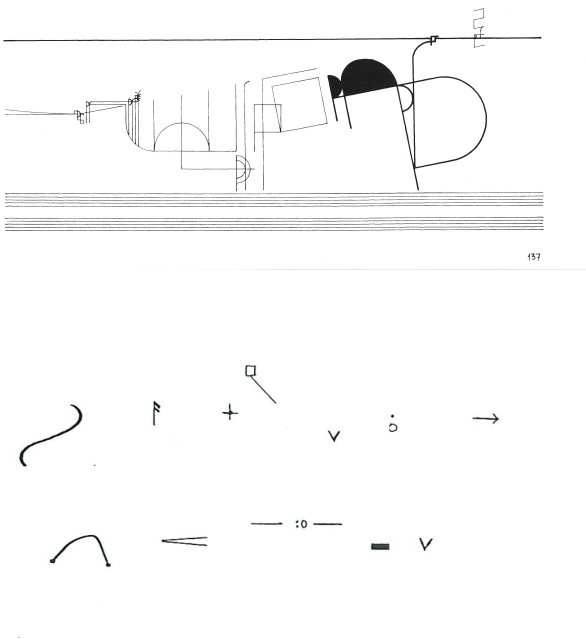

Figure 4. Upper) Excerpt from the score for Cardew's *Treatise* (1963-67); Lower) Detail from Wolff's *Edges* (1964).

The material components of a graphic score may be articulated at many different levels, have different referential allusions, and be parsed into various different aggregates. The *Treatise* excerpt in Figure 4, for example, makes strong allusions to common practice notation through the prominent use of staves which brings with it common practice notation's inherent linear associations but also helps frame the prominent use of long horizontal, vertical and curved lines elsewhere on the page. The deconstructed staves and various other shapes from which this page of the score are constructed, can be grouped into different low-level assemblages or aggregates, providing different expressive capacities to these material components as their interrelationships shift. The graphic shapes in the score excerpt shown in Figure 4, for example, can form various different aggregates, see Figure 5, each of which suggest unique expressive possibilities.

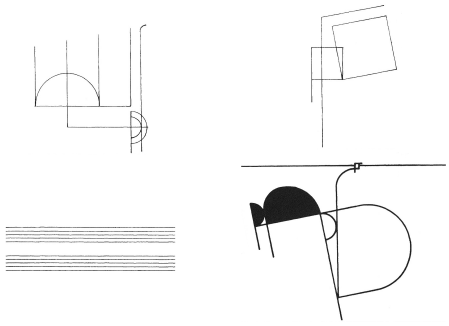

Figure 5. Possible aggregates within Cardew's *Treatise*.

Paper-based scores such as *Treatise* or *Edges*, in which the distribution of material components is fixed despite the relations of exteriority that may pertain to their expressivity also present the distinct likelihood that performers will establish certain expressive preferences. Ironically, this tendency to stabilize relationships has the affect of prioritizing sonic outcomes in a similar way to that of common practice notation. In other words, the ontology of the work territorializes a musical space through *habitual repetition*. [1]

The manner in which a score's material components are decoded in live notation practice follows similar trajectories to those experience in fixed, paper-based notation but establishes less of a likelihood that preferential expressive capacities of the score will be habitually established. In the two works cited earlier, Kim-Boyle's *point studies no. 2* and Ross-Smith's *Study no. 41 [rr:___]*, for example, the material components of the score remain stable as does the manner in which they are expressed by the performer. The decoding mechanism, in other words, is clearly defined and remains consistent from performance to performance. The live notation of both works, however, establishes a greater opportunity for performers to explore unique expressive possibilities that emerge from constantly shifting relations of exteriority. Similarly, in works employing live notation in which the material components can be interpreted in many different ways, such as in Pedro Rebelo's *Netgraph* (2010), see Figure 6, the performance issues related to the broader expressive capacities of the notation are not that dissimilar to those involved in graphic scores on fixed media, although the opportunities for playful exploration of a musical space are considerably enhanced through the live, dynamic notation.

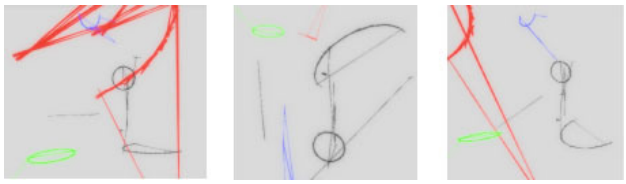

Figure 6. Still shots from the live score of Pedro Rebelo's *Netgraph* (2010).

The fundamental and perhaps defining ontological distinction between fixed and live notation schemas to be explored is of course that pertaining to the temporal dynamics of each form of practice.

4. TEMPORAL DYNAMICS

As previously noted, common practice notation presents assemblages in which the material components are structured according to strictly linear relationships of exteriority. The understood decoding process through which these components are expressed territorializes the musical space of the work with a highly homogenous identity further stabilized through *habitual repetition*. [1] While De Landa uses Deleuze and Guatarri's term *territoriali-*

zation to refer to the social processes through which assemblages are spatially defined, it can also refer to the assignment of ontological identity. Thus, the territory established by a Beethoven piano sonata, for example, is such because the material components that comprise the work (pitches, rhythmic values, dynamic shadings, tempi etc.) exist in defined relationships that are reinforced and unvaried through repetition. Similarly, in works that are realized through a more prescriptively notated score, a gestural language is organized according to pre-established formal rules and repeated from one performance to another.

As noted by Bryant, within an assemblage, "Time and space should not be conceived as containers or milieus within which events take place, but rather as meshes of connective relations." [7] To that end, as the relationships between the material components of an assemblage become less strictly linear, the ontological identity of the assemblage becomes defined by the relationships of exteriority that emerge between the expressive capacities of those material components. Even within nonlinear musical forms, these relationships can be codified and stabilized as Christian Wolff attempts in his *For 1, 2 or 3 People* (1964) which require performers to listen and respond to each other. Within live notation practice, synchronicities within essentially nonlinear temporal dynamics can occur in complex configurations as in Australian composer Lindsay Vickery's *UBahn* (2012) for two violas, two cellos, double bass, percussion, and electronics where performers read scores from networked iPads and synchronicities between performers are determined by computer.

The temporal dynamics within an assemblage are not always strictly linear or nonlinear, in the same way that musical scores can combine both descriptive and prescriptive modes of notation. Roman Haubenstock-Ramati's *Mobile for Shakespeare* (1960), for example, with its integration of common practice notation figures and graphical notation schema, blends the two. The work thus presents assemblages within assemblages with its material components connected in both linear and nonlinear relationships.

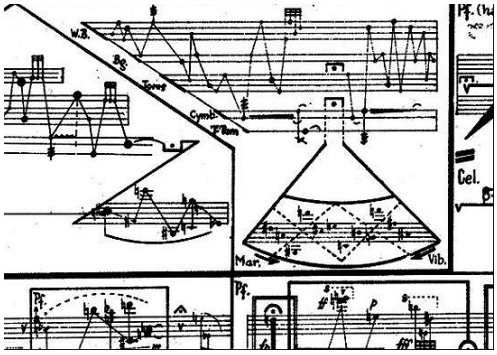

Figure 7. Detail from Haubenstock-Ramati's *Mobile for Shakespeare* (1960).

Live notation practices often eschew the requirement for performers to determine how musical fragments are ordered. In some respects this parallels the approach taken in a work such as Earle Brown's *Available Forms I* (1961) for orchestra in which the conductor determines the succession of discrete sections of musical material, but as previously noted the ordering process in live notation practices can allow more complex successions and distributions of musical components to be realized and help dissuade a tendency for performers to establish preferred orderings. This type of nonlinearity does not necessarily lead to a deterritorialization of the assemblage and corresponding destabilizing of the ontological identity of the work as assemblages are only destabilized through exogenous forces. Recalling the author's *Valses and Etudes* in which the succession of musical fragments is determined by a first-order Markov chain, the stabilizing effect of habitual repetition is not present but this does not mean that the connective relationships between musical fragments results in a destabilization of the work's identity. Rather, it highlights the fact that those relationships are more multifaceted than those of simple linear succession, i.e. they exist as a "mesh of connective relations." It is through the consolidation of those relations, rather than their stabilization that the work's identity is established.

Nonlinear relationships between the material components of live notation can be extended to lower levels of musical order. In some respects, this is not that dissimilar from the nonlinearity called forth in works such *as Mobile for Shakespeare*, but again, more complex nonlinear relationship can be realized in live notation practice. In Kim-Boyle's *point studies no. 1* for any four musician, for example, the material components of the score comprising pitches, durations, and dynamic levels are stochastically distributed and related to each other, falling within certain boundaries but never entirely predictable. The relationship between the material components of the score change as the work develops through rotation and extension of arcs which determine the duration of notes and affect how the performers navigate through the score, and the appearance and gradual disappearance of nodes, which denote particular pitches. It is doubtful whether the same types of nonlinear relationships between the material components of the score could be so easily achieved in fixed media.

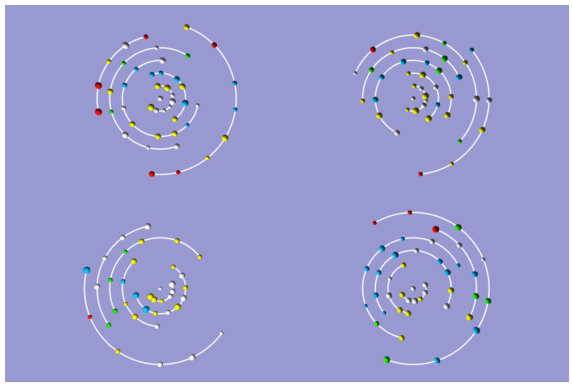

Figure 8. Score excerpt from the author's *point studies no. 1*.

Like social ontologies in which relations of exteriority between material components can be one of exchange (such as that between a consumer and seller), the relationship between material components in a live score may also be related to the expressive capacity of performance. In Pedro Rebelo's *Netgraph*, cited earlier (see Figure 6), the material components of the score are responsive to the expressive capacities of other material components. In performance, the performers are spatially distributed across different physical locations and their interpretation of the score's graphical schema modulates that schema for other performers. These dynamic relationships are a unique feature and possibility of what Rebelo refers to as *reactive scores*. [6]

5. CONCLUSIONS

Assemblage theory presents a useful ontological framework for better understanding live notation practice. Through prioritizing relations of exteriority such a framework is particularly well suited to the analysis of nonlinear processes which live notation practices. It is hoped that this brief paper helps illustrate some ways in which assemblage theory can be applied in the analysis of live notation practices and provide useful insights into this rich field of creative enquiry.

6. REFERENCES

[1] M. De Landa, *A New Philosophy of Society – Assemblage Theory and Social Complexity*. Continuum: New York, 2006.

[2] G. Deleuze and F. Guattari, *A Thousand Plateaus*. Trans. B. Massumi. University of Minnesota Press: Minneapolis, 1987.

[3] G. Harman, "DeLanda's Ontology: Assemblage and Realism," *Continental Philosophical Review* 41, pp. 367-383, 2008.

[4] D. Kim-Boyle, "Visual Design of Real-Time Scores," *Organised Sound* 19(3), pp. 286-294, 2014.

[5] J. Freeman, "Extreme Sight-Reading, Mediated Expression, and Audience Participation: Real-Time Music Notation in Live Performance," *Computer Music Journal* 32(3), pp. 25-41, 2008.

[6] P. Rebelo, "Playspace – 3D Reactive Notation," June 9, 2010. Accessed January, 2015. Available at <https://pedrorebelo.wordpress.com/2010/06/09/playspace-3d-reactive-notation/>.

[7] L. R. Bryant, "DRG: 'Assemblages Against Totalities'" September 8, 2010. Accessed September, 2015. Available at <https://larvalsubjects.wordpress.com/2010/09/08/drg-assemblages-against-totalities/>.