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Involutionary Architecture Unyoking Coherence from Congruence

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Chapter 4

Involutionary Architecture

Unyoking Coherence from Congruence

Andrej Radman

Men are conscious of their own desire, but are ignorant of the causes whereby that desire has been determined. —Baruch Spinoza¹

In solipsism, you are ultimately isolated and alone, isolated by the premise “I make it all up.” But at the other extreme, the opposite of solipsism, you would cease to exist, becoming nothing but a metaphoric feather blown by the winds of external “reality.” (But in that region there are no metaphors!) Somewhere between these two is a region where you are partly blown by the winds of reality and partly an artist creating a composite out of the inner and outer events. —Gregory Bateson²

It would no longer involve raising to infinity or finitude but an unlimited finity, thereby evoking every situation of force in which a finite number of components yields a practically unlimited diversity of combinations. It would be neither the fold nor the unfold that would constitute the active mechanism, but something like the Superfold. ... And is this unlimited finity or superfold not what Nietzsche had already designated with the name of eternal return? The forces within man enter into a relation with forces from the outside. —Gilles Deleuze³

ANNEXED MILIEU AS A SITE OF RESISTANCE TO THE PRESENT

This chapter is devoted to the ‘involutionary’ relation of the forces from within with the forces from without.⁴ It starts from the premise that the interior as a given needs to be set aside until the issue of *how* the given is given has been addressed. Only then will it be possible to make sense of the Superfold’s

(eternal) giving. When the explanatory ladder is turned upside down, what has figured as an explanation—namely interiority as a *datum*—becomes that which begs the question. To give due prominence to interiorisation it is necessary to stop treating structure and agency independently. To discount the facile rejoinder that evolution is imposed design, focus must be given to the mutation of boundary conditions.⁵ In the words of Didier Debaise: ‘It is as if the universe, in its creative advance, never ceases to create new constraints, which are the existents themselves, canalizing how they inherit what is possible, in a new way’.⁶

To think the moving by way of the unmovable is to privilege *homeostasis* over and above *homeodynamics*. This is a misconception, since the latter bears the capacity to learn. The idea of a progressive constraint, as captured in Félix Guattari’s concept of ethico-aesthetics, will require a step further in order to substitute the gregarious *morphodynamics* for the parochial metabolic concerns of *homeodynamics*.⁷ As Guattari’s radical empiricist predecessor William James surmised, only if sentience is involved do ethical considerations come into play.⁸ Sentience inevitably implies a valence (‘response-ability’),⁹ and that raises the question of immanent normativity. Physics may be value-free, but ecology is certainly not.¹⁰ By positing that there are good and bad encounters, Spinoza paved the road for such a nomadic version of normativity. The encounters can be distinguished as the empowering powers *of* life and the hindering powers *over* life.¹¹ His ethics equals ethology. Consequently, niche construction could have taken another course because no thing is logically necessary but only ever contingently obligatory.

The truth of the relative, which is not to be confused with the (postmodern) relativity of truth, has profound consequences for design in general and architecture in particular. In his preface to Bernard Cache’s *Earth Moves*, Michael Speaks draws a diagram of architecture’s enabling constraints. Building a wall is to *disconnect* first and then *reconnect* differently by punching holes in it.¹² Crucially and somewhat paradoxically, architectural relation is always antecedent to its ‘*relata*’, the interior and exterior. While the interior and exterior are interior to the actualised systems of strata, the process of dividing remains exterior to both regardless of whether they are inorganic (geological), organic (biological), or alloplastic (cultural).¹³

The thesis of Gerald Raunig’s recent book, aptly named *Dividuum*, rests on a kindred premise.¹⁴ By introducing a third term, namely the *singular-one*, Raunig overcomes the impasse of the binary opposition between the *individual-one* and the *all-one*. In his *Cartography of Exhaustion: Nihilism Inside Out*, Peter Pál Pelbart joins Raunig in refusing to take sides between (what effectively is the conceptual double of) individualism and communalism. As he puts it, ‘neither fusion, nor intersubjective dialectic, nor

metaphysics of alterity, but rather an enveloping composition, a disjunctive synthesis, a polyphonic game'.¹⁵ For our own purposes it is worth emphasising that interiority does not entail detachment from the world. Rather, the interior is inconceivable as nonreciprocally presupposed with, or nonmutually constitutive of, the exterior.

Notoriously, Deleuze and Guattari never settled for diacritical solutions either. That is why they proposed a further 'con-division' of every stratum into metastable epistrata and parastrata.¹⁶ The former relate to territorialities and movements of de-re-territorialisation, while the latter relate to codes and processes of de-re-coding. Material and discursive *activity* is all there is.¹⁷ The epistrata are just as inseparable from the movements that constitute them as are the parastrata from their processes of semiosis. The entanglement of epistrata and parastrata is known as the Ecumenon. This unity of composition is opposed to the plane of consistency, or the Planomenon.

To bring the concept of the Ecumenon down from a high register of abstraction, the authors of *Deleuze and Geophilosophy* provide a helpful diagram.¹⁸ In the case of religion, the unity of composition is not established solely by the faithful who make up the interior and the unfaithful from the exterior. It also includes the membrane that both protects the Ecumenon's integrity and projects its messages. In this particular diagram (the Ecumenon need not be religious), the epistrata are different internal stable states or organisational nuances and the parastrata are different affects, or capacities for becomings when encountering other assemblages.

Drawing on Gilbert Simondon's work, Deleuze and Guattari do not merely distinguish between the interior and exterior milieus mediated by the milieu of the membrane. They introduce the fourth—annexed—milieu, whereby sources of energy, different from the material that will make up the interior, are annexed to the organism. Crucially for our thesis, apart from being defined by the capture of energy sources, the fourth milieu is related to action-perceptions.¹⁹

According to Deleuze and Guattari, the development of associated milieus with all their active-perceptive and energetic characteristics culminates in the *umwelt* of Jacob von Uexküll.²⁰ They provide a graphic example which was also the favourite of Gregory Bateson's.²¹ The annexed milieu of the tick is 'three-fold' and consists of (1) the gravitational pull (climbing the tree), (2) olfactory field (perception: scenting the prey), and (3) haptic sense (action: locating a hairless spot to latch on). Although much more is to be found there, it is blatantly disregarded because it matters not for the life of ticks. Here one recognises a Bergsonian trope where perception is a function of *ascesis*, and not of enrichment.²² Existential niches are subtracted from the intensive space (*spatium*).²³ In contrast to phenomenology, which maintains the isomorphic symmetry between the two prongs of the empirico-transcendental

double, we ought to insist on the ‘vital’ asymmetry between the actual territory and the virtual milieu-of-milieus. The disparation is literally ontogenetic (in this region there are no metaphors!).

Deleuze never tires of expressing his preference for lines over points. This is his subtle way of distinguishing between the milieu’s dimensions that are directional (topological) and those of territories that are dimensional (metric). While accepting multiple scales of reality, this view opposes the alleged primacy of the ‘physical’ world. What we cope with is the *umwelt*. The *umwelt* is an ethological concept insofar as it is defined by capacities or affects. Affect is shorthand for to-affect-and-be-affected. The animal is prone to fight as much as it is to flight. By this curious assertion Deleuze and Guattari target the vulgar view of the supposed evolutionary drive known as the ‘survival of the fittest’. Flights of those ‘less fit’ are also conquests and creations in their own right:

A ... kind of line of flight arises when the associated milieu is rocked by blows from the exterior, forcing the animal to abandon it and strike up an association with new portions of exteriority, this time leaning on its interior milieus like fragile crutches. When the seas dried, the primitive Fish left its associated milieu to explore land, forced to “stand on its own legs,” now carrying water only on the inside, in the amniotic membranes protecting the embryo.²⁴

Although the process of natural selection decreases variety and increases constraints on form and function, the resultant consistency provides a certain resilience that in turn allows new forms of ‘cultural’ variety to emerge in parallel to the ‘natural’. The new means by which new information—defined as difference that makes a difference—can emerge open up new higher-order combinatorial possibilities. These new possibilities, however, come under the constraining influence of the natural selection process. In the words of the biological anthropologist Terry Deacon: ‘such back-and-forth interplay between [evolutionary] selection and [involutionary] morphodynamics thus opens the door to indefinite complexification and ever higher-order forms of teleodynamic organisation’.²⁵ Deacon’s concept of ‘teleonomy’ from *The Incomplete Nature* is precious for describing the kind of action that is intentional without being intended (by some-one, least of all the fully constituted self-identical subject):

Teleonomy implies law-like behavior that is oriented toward a particular target state in systems where there is no explicit representation of that state (much less an intention to achieve it), but only a regular predictable orientation toward an end state.²⁶

In conformity with Deleuzian ‘static genesis’, teleonomy is propelled by teleodynamics. Static genesis is pitted against its counterpart that qualifies as dynamic by virtue of its movement from a sensation-intensive encounter to the thinking of abstract-yet-real Ideas. Conversely, static geneses move from the virtual Idea to an intensive individuation process to an actual entity.²⁷ The concept genesis, which is static, is meant to challenge the bad habit of privileging the mechanistic (push-pull) efficient causality over the quasi-final ‘braided causality’.²⁸ This prematurely disqualified nonlinear causal efficacy is teleonomic or tendential (i.e., *neofinalist*),²⁹ rather than teleological or axiomatic. It is important to stress that in terms of coping with (the constraints and opportunities of) the environment, *interactions* are triggered as much *kinematically*—without reference to force or mass—as they are *kinetically* or techno-deterministically. Put simply, response-able life-forms respond as much to signs as they do to causal impulses, if not more.³⁰ Better still, what Karen Barad refers to as *intraaction*³¹—the mutual constitution of entangled agencies—depends on the flow of ‘epistemic engines’ as much as it does on the force of ‘thermodynamic engines’, where ‘engine’ stands for any system that supplies dynamics for another system.³²

Due to its dependence on abstract tools (for production) and concrete social purpose (of consumption), the discipline of architecture has a unique insight into the entanglement of the pathic and ontic, the kinematic and kinetic. We argue that it is the incommensurability of the non-discursive and discursive that makes involution possible and superfolding thinkable. As Bateson emphatically argued, ‘confusing information processes [pathic epistemic engines] with energetic processes [ontic thermodynamic engines] was one of the most problematic tendencies of twentieth-century science ... they are in fact warp and weft of a single causal fabric’.³³

An example is in order. Let us once again refer to the animal *umwelt*. Not a tick or fish this time, but a cat. According to Bateson, to exist is to be engaged in a certain form of play which, as he effectively argues, has a teleonomic structure: a cat’s nip ‘means’ a ‘non-bite’.³⁴ This, however, is not to be confused with language. The concept of involution becomes instrumental in putting the nondiscursive intensity and its affective ‘catalytic operators’ before intentionality or ‘aboutness’ of reason. In the words of David Roden, ‘if the encounter gives non-inferential knowledge of the structure of reality, then it must do so without situating this categorical insight within the “space of reasons” secured by the inferential proprieties of language’.³⁵ After all, the development from bacteria to Bach was achieved through ‘competence without comprehension’—that is, relying on significance without signification.³⁶

While meaning is traditionally defined in terms of an organism’s perceptions governed by ‘intentionality’, James Jerome Gibson proposes an alternative

approach by way of ‘affordance’ that is a-personal, pre-subjective, extra-propositional and sub-representative—that is, immanent. This is how he introduces the neologism in his major work *The Ecological Approach to Visual Perception*:

The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill. The verb to afford is found in the dictionary, but the noun affordance is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment.³⁷

The frequent reference to animals in both Gibson’s and Deleuze’s work is not accidental. It is meant to emphasise the shared continuum of humans and animals rather than the break so dear to the rationalist tradition that insists on human exceptionalism. Social implications ensue. Society is *not* an aggregate of Hobbesian rational individuals as agents who are each aiming to maximise profit by way of communication. In the words of Debaise, ‘What communicates are not subjects between themselves, but regimes of [subjectivation] which meet’.³⁸ The always-already-collective unconscious investment of desire—where desire implies rupture with linear causality—counts for more than the individual conscious investment of interest. The annexed milieu thus becomes a potential site of resistance to the hegemony of representational and instrumental thinking. The *umwelt* is a locus of creation, rather than communication. As certified niche constructionists, what architects modulate first and foremost are ethico-aesthetical affordances.

The primacy of temporal boundedness (affect/affordances) over spatial boundedness (shelter) becomes more evident as we ascend the level of biological and mental selfhood.³⁹ Beth Lord identifies the moment in which Kant approaches the theory of immanent differential genesis: ‘it is a matter of *producing* my being by internally differentiating it from my thinking’.⁴⁰ This kind of determination does not presuppose re-recognition, as in subsuming a given being under an external concept that would determine it as my being. Ernst Cassirer would qualify it as a move from the *generic* to the *genetic* principle of determination.⁴¹ This ‘bootstrapping’ moment occurs when the ‘I think’ generates itself from its own differential relation to itself. Dan Smith espouses Deleuze’s self-declared indebtedness to Kant.⁴² When desire is no longer defined in terms of lack, but in terms of production, the already miraculous ‘bootstrapping’ transforms itself into an even more miraculous substantiation of sorts whereby one produces the object because one desires it.⁴³

By contrast to evolution, involution is not only irreducible to mechanistic causality but also free from any parochial fatalism including that of self-preservation. After all, if effects were reducible to their causes novelty would

be ruled out in advance. As Sanford Kwinter recently underscored, the essential human engagement in the environment is geared toward extraction of sensory stimulation, not nourishment.⁴⁴ In this he sides with Nietzsche, who took issue with the Darwinist emphasis on the all-too-reactive ‘adaptation’. He argued for the ‘will to power’ that provides life with new self-overcoming directions and interpretations.⁴⁵ A contemporary version of the ‘power of the false’ is best exemplified by the slogan concluding the recent Xenofeminist manifesto: ‘If nature is unjust, change nature!’⁴⁶

It ought to be clear by now that the exterior milieu is equally inconceivable as noncorrelative of the interior milieu. As we have argued, both interior and exterior are exterior to the *relation* of exchange (porosity) between them. This is the crux of radical empiricism. The terms of the relation are determined only *ex post facto*. First comes the *ritornello*, minimally defined as the relation which is free of conceptual prejudices. In the words of Anne Sauvagnargues from her superb *Artmachines*:

Neither objective, cosmological time, nor a time of consciousness ‘in general’, ritornellos express time less as it is lived (*vécu*) than as it is inhabited (*habité*), as bundles of sensory signs by which we extract a territory from surrounding milieus through consolidation and habit. For habit very much concerns the temporal milieu in the form of repetition, but valorises the attainment of consistency as well as the crisis by which we attain consistency when we interiorise time as a power of transformation, by stabilising it as a milieu and as a habitation.⁴⁷

In the next two sections we will position the discipline of architecture in relation to the Affect Theory and demonstrate that the so-called perceptual illusions are not illusions at all. It is not a surprise then that Deleuze and Guattari underscored the (molecular) revolutionary capacity of op art.⁴⁸

RECLAIMING THE AFFECT THEORY FOR ARCHITECTURAL ENUNCIATION

Incorporeal materialism knows no ultimate foundation but the immanence of powers, relations, and bodily compositions. There is no need to postulate the existence of a more fundamental realm. To embrace radical empiricism is to see cognition as belonging to the same world as that of its ‘objects’.⁴⁹ In Spinozian parlance, *natura naturans* and *natura naturata*—the engendering and engendered—are inseparable.

To embrace the Affective Turn is to acknowledge that, unlike affections (feelings), affect is impersonal, preindividual and unmediated. Paradoxically, feelings are states produced by thoughts, while thoughts are actually produced

by affects. ‘Not a thought that is assembled individually’, Guattari stresses, ‘but an n-dimensional thought in which everything thinks at the same time, individuals as well as groups, the “chemical” as well as the “chromosome”, and the biosphere’.⁵⁰

Instead of focusing on the all-too-human meaning (signification), the posthuman architect ought to focus on affect (affordance). In contrast to representation, expression is singularly determined (univocal). Architecture is effective not because of its predicates, but rather for the absolutely singular event of its relationality that remains irreducible to any conclusive determination. Consequently, the built environment affects without a priori determining any meaning. It neither solicits nor precludes consensus.

In this approach we side with Jeffrey Kipnis who insists on the cleavage between engineering and architecture—that is, between the subjugating effect of the former and the liberating affect of the latter.⁵¹ While engineering—as science—delivers the greatest good for most people by reducing difference (geodesic principle), architecture—conceived as art—offers emancipatory potential by constructing new existential niches; that is, a new set of affects/ affordances. Arguably, architects produce nothing but affordances, or a way of affecting which recasts them as psychotropic practitioners. Psychotropy is Daniel Smail’s version of what Daniel Stern called the modulation of ‘affective tonality’.⁵² It includes the mood-shaping of others (tele-tropy), things we do to ourselves (auto-tropy) and things we ingest.

The mood-altering practices, behaviors, and institutions generated by human culture are what I refer to, collectively, as psychotropic mechanisms. Psychotropic is a strong word but not wholly inapt, for these mechanisms have neurochemical effects that are not all that dissimilar from those produced by the drugs normally called psychotropic or psychoactive.⁵³

To exemplify the difference between tele- and auto-tropic practices, Smail refers to Christianity. This particular faith with its *teletropic* practices, such as liturgy and confession, is famously hostile to a range of ‘sinful’ *autotropic* practices, such as masturbation and alcohol consumption.⁵⁴ It could be argued that psychotropy is one of the fundamental posthuman conditions. Smail makes a connection with the advent of civilisation which ‘brought with it an economy and a political system organised increasingly around the delivery of sets of practices, institutions, and goods that alter or subvert human body chemistry. This is what gives civilisations their color and texture’.⁵⁵

The reference to colour and texture is not coincidental. As far as we are concerned, any attempt to undermine the so-called *qualia* would result in the fallacy of what Whitehead called the ‘bifurcation of nature’, or the untenable split of primary from secondary qualities. Gibson was adamant: ‘It is … a

mistake to separate the cultural environment from the natural environment, as if there were a world of mental products distinct from the world of material products. There is only one world'.⁵⁶ Likewise, the privilege of ‘presentational immediacy’ (discretion) over ‘causal efficacy’ (becoming) would lead to the Whiteheadian fallacy of ‘misplaced concreteness’. As Deleuze’s caveat goes, the true opposite of the concrete is not the abstract, but the discrete.⁵⁷

In contrast to the metaphysical viewpoint of Nominalism, Affect Theory embraces Realism according to which virtualities or state spaces—not just actual instances—are important in determining what happens in the world. In the concluding section we will give a concrete example of such abstract space with real efficacy, akin to Karen Barad’s ‘agential realism’.⁵⁸ Recasting the Realism/Nominalism debate in terms of dynamics and constraints eliminates the need to pit generalities against particulars and communalism against individualism. Deacon: ‘What exist are processes of change, constraints exhibited by those processes, and the statistical smoothing and the attractors (dynamical regularities that form due to self-organising processes) that embody the options left by these constraints’.⁵⁹

Once again, we want to carve out a third line, which diverges from both the totalising wholes and constitutive parts.⁶⁰ The all-too-structuralist mereology ought to give way to the conception of the open whole that is not *of* the parts, but alongside them.⁶¹ We thus turn our attention to mereotopology defined in terms of progressive constraint (teleodynamics). Given the growing prestige of contemporary neurosciences it has become impossible to continue to rely on armchair theorising. As Catherine Malabou argues, the reinvigorated interest in the cerebral is not to be dismissed as neuroreductionism.⁶² Quite the opposite, it is the locus of the most promising research trajectory that places biology and history—nature and culture—on the same footing.⁶³ Only humans are biologically compelled to modify and redesign their environment in an innovative and historical manner.⁶⁴ The (neo)Lamarckian ‘accelerationist’ nature of cultural involution exposes the vulnerability of purely Darwinian explanations. The mode of relating itself, rather than any adaptationist end, is arguably the dominant ontower. We are not just evolutionary products, but also evolving causes of involution. Deacon’s espousal is worth quoting at length:

The shift from simple autogen replication to information-based reproduction, though it might be a rare evolutionary transition in a cosmic sense, is one that would make a fundamental difference wherever and whenever it occurred. The capacity to offload, store, conserve, transmit, and manipulate information about the relationship between components in a teleodynamic system and its potential environmental contexts is the ultimate ententional revolution.

By combining the prefix en- (for ‘within’) with the adjectival form meaning something like ‘inclined toward’, Deacon coins the word ententional to define intention minus intentionality. He continues:

It marks the beginning of [asignifying] semiosis as we normally conceive of it, and with it a vast virtual representational universe of possibilities, because it marks a fundamental decoupling of what is dynamically possible from immediately present dynamical probabilities—the point at which the merely probable becomes subordinate to representational possibility. This is the source of the explosive profligacy of biological evolution.⁶⁵

To put it succinctly, *passive* (‘evo’) adaptation to the environment is complemented by *active* modulation of (and by) the annexed milieu, hence ‘evo-devo’. In this light we might want to recast involution as becoming active out of constitutive passivity:

The evolution of this “anticipatory sentience”—nested within, constituted by, and acting on behalf of the “reactive (or vegetative) sentience” of the organism—has given rise to emergent features that have no precedent. Animal sentience is one of these. As brains have evolved to become more complex, the teleodynamic processes they support have become more convoluted as well, and with this the additional distinctively higher-order mode of human symbolically mediated sentience has emerged. These symbolic abilities provide what might be described as sentience of the abstract.⁶⁶

Geno-reductionists were wrong to privilege filiation over alliance.⁶⁷ It has now become undeniable that the phenotypical expression of genes is shaped by the *umwelt*.⁶⁸ Unsurprisingly, the rates of phenotypical change are greater in urbanising systems than in natural and nonurban anthropogenic systems.⁶⁹ The Gibsonian approach was ahead of the epigenetic curve by focusing on affordances: ‘ask not what’s inside your head, but what your head’s inside of’.⁷⁰ A contemporary version of this motto spells ‘Ask not what’s inside the genes you inherited, but what your genes are inside of’.⁷¹ Epogenesis, let us remind ourselves briefly, is the theory of development in which forms are influenced and modified by the milieu. It provides for the often overlooked link between the genotype and phenotype. The fatally missing link is the process of development itself—that is, progressive differentiation.

The developmental biologist Conrad Waddington is credited with coining the term epigenetics in 1942 for the branch of biology that studies causal interactions between genes and their products giving rise to the phenotype. While the question of the extent to which we are pre-programmed—by filiation—versus developmentally shaped—in alliance—awaits universal consensus, it is safe to suggest that the field of epigenetics has helped bridge

the gap between nature and nurture.⁷² No wonder that it should appeal to architects as niche constructionists who could be said to sculpt brains by way of sculpting neither the genetic, nor the epigenetic, but the epi-phylogenetic nature-cultures. The distinction between the three mnemotechnics comes from Bernard Stiegler who urges us to rethink the relationship between ontogeny and phylogeny—that is, between development at organismic scales and branching at evolutionary scales.⁷³ If epigenetics is the concept of nongenetic heritability such as language acquisition, then epi-phylo-genetic means that the rhetoric of ‘we build our cities and in return they build us’ is to be taken literally.⁷⁴

Epiphylogenetics … designates the appearance of a new relation between the organism and its environment, which is also a new state of matter. If the individual is organic organized matter, then its relation to its environment (to matter in general, organic or inorganic) … is mediated by the organized but inorganic matter of the *organon*, the tool with its instructive role. … It is in this sense that the *what* invents the *who* just as much as it is invented by it.⁷⁵

It is time for the discipline of architecture to awaken from the slumber of anthropocentrism and fully embrace the posthumanist involution. By opposing the Ecumenon to the Planomenon, Deleuze and Guattari propose that we drop anthropomorphism for ‘geomorphism’. The problem with our inherited abstractions is not that they are too abstract. On the contrary, they are not abstract enough. The ecological approach to cognition must not rely on representation, which typically comes in the form of a model. The problem is not to understand how to construct a simulacrum of the world, but how to cope with it. Or better, make with it, *sympoietically*. According to Donna Haraway, we ought to learn to be truly present by ‘staying with the trouble’. There is no awful or edenic past to go to. There are no apocalyptic or salvic futures either. There are only ‘myriad unfinished configurations of places, times, matters, meanings’.⁷⁶

James’s fellow pragmatist Charles Sanders Peirce recognised the limit of the formal *if-then* logic (induction and deduction) and argued for the hands-on *what-if* logic of abduction.⁷⁷ This form of ‘material inference’ or ‘speculative extrapolation’ presupposes an intervention into the causal fabric of reality. Paraphrasing the famous Marxist dictum, Maria Puig de la Bellacasa writes: ‘theory has only observed the world; the point is to touch it’. She elaborates:

Awareness that knowledge-making processes are inseparably world making and materially consequential evokes the power to touch of knowledge practices, and therefore a feminist concern to keep in touch with the politics and ethics at the heart of scientific and academic conversations.⁷⁸

As we have argued, radical empiricism takes relations to be as real as objects. Furthermore, relations as higher-order facts or invariants are not only real but also directly perceivable. Under Speculative Pragmatism, reality is subject to scrutiny—that is, indefinite differentiation. It unfolds in experience, rather than sitting behind experience.

Let us consider a simple but illustrative *what-if* example. Take three snapshots of a frame within a frame (A, B, C) defined not merely by outlines, but by two superimposed textured surfaces (patterned, as they usually are in the environment).⁷⁹

Let us now imagine that the surfaces start looming (as a result of the beholder's forward locomotion), which comes across as continuous transformation of the pattern (self-induced optical flow) both within and without the inner frame (A', B', C'). If the rate of change of the inner and outer patterns is the same, the frames are flush (A-A'). If the rate of change of the

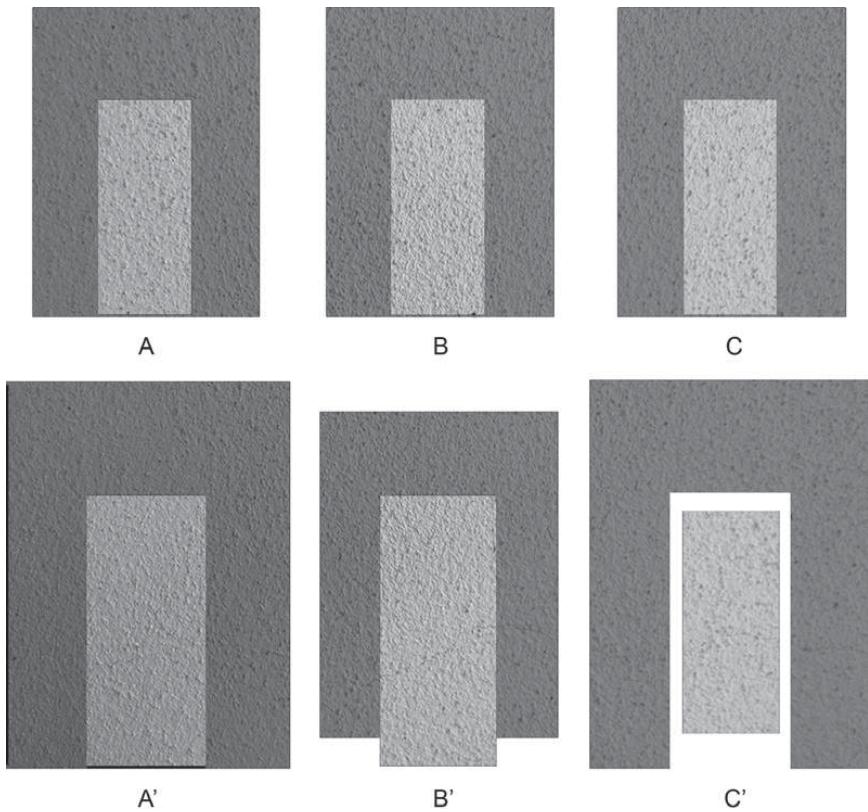


Figure 4.1: Occlusion as a higher-order invariant. Based on 'Perception: The Ecological Approach' (Turvey 2003).

inner pattern is faster, it is a protruding obstacle (B-B'). If the rate of change of the inner pattern is slower, it is a recess which affords 'walk-through-ability' (C-C'). Curiously, even here at the level of *umwelt* (action-perceptions) we are relying on none other than the two greatest Darwinian contributions to mereotopology, namely the substitution of populations for (eternal) types, and the substitution of rates-of-change (intensity) for degrees.

In line with our previous argument, we could go as far as to suggest a reversal of the logic that rests on the substantive conception of the subject. As Leibniz knew, it is not the subject that has a point of view. Rather, the subject is second in relation to the point of view.⁸⁰ In our concrete example it would entail the following reversal: to make the optic array flow is to start moving; to cancel the flow is to stop; to make the flow reverse is to go back (and not the other way around!). By consuming these states (make/cancel/reverse flow)—the third passive synthesis of consumption—one gradually becomes aware of one's selfhood (larval subject): the experience is 'mine', hence there is also 'me'.⁸¹

Senses fold upon each other, intensively cross-referencing disparate planes of experience. They are neither separate nor discrete. Nor are ethics and aesthetics, action and perception, movement and image. In *Gesture and Speech*, André Leroi-Gourhan shows that encephalisation 'begins from the feet' more than from the head, since the brain 'profits' from locomotion but does not provoke it.⁸² The teleodynamism of the brain that evolved to guide locomotion and the capacity to modify the *umwelt* will inevitably sculpt the brain itself. Not only does a special emergent form of self continually create its self-similarity and continuity, but it does so with respect to its alternative virtual forms.⁸³

The isomorphism between the virtual space of experience (*umwelt*) and the actual experience of space (environment) does not depend on resemblance. It requires continuum-thinking attuned to transformations of states (field of rapidities and slownesses), rather than identification of transcendental objects (figure-ground). The separation between the molecular and molar is never clear-cut and that is why we resort to Guattari's concept of 'transversality', akin to Haraway's making-with (sympoiesis) rather self-making (autopoiesis). We now turn to the concluding section in order to (schizo)analyse a concrete case of the involutionary immanent relation of forces from within with forces from without.

SPECULATIONS ON COMPLEX INTERIORS AND (SPECULATIVE) ENTENTIONALITY

In their paper ‘Symmetry and Symmetry-Breaking in Thermodynamic and Epistemic Engines’, the ecological psychologists Peter Kugler and Robert Shaw effectively describe an involutionary process based on nonlinear coupling of thermodynamic laws.⁸⁴ We will start this third and last section by laying out the key terms, with the exception of symmetry (breaking) that will be dealt with subsequently.

First comes the difference between the First and the Second Law. The First Law of thermodynamics is that of conservation of matter and energy, which stipulates that matter and energy cannot be created or destroyed. They can be transformed, and energy can be converted from one form into another, but the total of the equivalent amounts of both must always remain constant. The Second Law of Thermodynamics, a.k.a. *entropy*, states that energy of all sorts tends to change itself spontaneously into more dispersed, random, or less organised, forms. No wonder then that entropy is seized upon by artists such as Robert Smithson who used it to create a new kind of geophilosophical continuity between the interior and exterior, one that involved the immediate present and the most remote geological past alike.⁸⁵ The Second Law is nearly ubiquitous, yet not universal. Precisely because it is not absolutely necessary, there can be special circumstances where it does not obtain, at least locally. It is this loophole that allows the possibility of life and mind.⁸⁶

To talk of tendency rather than law is to describe a process of falling toward regularity (contingent *nomos*), rather than being forced into it (necessary *logos*). When this ‘memory of the future’ is conflated with more generic notions of causality, it yields a troubling implication, especially for those with eliminativist leanings. Deacon does not shy away from the (inconvenient) truth of the involutionary effect: ‘Such phenomena as life and cognition might be changing or adding to the fundamental physical laws and constants, or at least be capable of modifying them’.⁸⁷

Traditionally, physics is taken to be the study of thermodynamic engines (movement/action), while psychology is the study of its epistemic counterparts (image/perception). By contrast to psychology and physics, biology is meant to suture the gap between the systems with and without complex interiors. By complex interiors we mean systems with ententional dynamics, vital and (non-consciously) cognitive. In the wake of the Transdisciplinary Turn, it is no longer possible to place images in consciousness and movements in space, for how is one to pass from one order to another once the ‘ontological iron curtain’ between them is up?⁸⁸ The downfall of the disciplinary apartheid has given birth to ecology, the cross-scale science *par excellence*.

By contrast to the *ecological* categories of time and space, *ecologic* is concerned solely with symmetry as the measure of consistency—that is, ‘what on a given stratum varies and what does not’.⁸⁹ The transversal coupling (*sympoiesis*) remains reversible across the *same* scale (symmetry-preserving), but crucially, it is irreversible across *different* scales (symmetry-breaking). The former can be summed up in the famous mereological maxim: ‘the whole is the sum of its parts’. The latter is ecological by virtue of not offering such reassurance. Simply put, the Superfold stands for irreducible complexity of the *singular-one*. Deacon: ‘What we interpret as parts are in most cases the consequence of differentiation processes in which structural discontinuities and functional modularization emerged from a prior, less-differentiated state, whether in evolution or development’.⁹⁰ In contrast to agglomerations—that can be dissected into their synchronic parts and reconstructed without loss—Superfolds suffer the Humpty-Dumpty problem when taken apart. In diachronic superfolding, synthesis is *not* analysis in reverse.

Whereas the Second Law has traditionally been seen as a destructive agency, a new view has emerged that considers it an active participant in constructive processes. Systems open to the replenishing and dissipative processes can develop new symmetries that lead to new ententions manifested as fitness landscapes. As Waddington discovered, ‘we will find that the system resists some types of changes more than others, or restores itself more quickly after changes in some directions than in others’.⁹¹ The new attractors (*ritornellos*) that emerge out of the competition between import of high-grade energy and export of low-grade energy are invariant solutions (symmetries) that relate the molecular and molar states of a system. Kwinter elucidates:

The relentless cleaving and changing of the universe’s ‘matter-flow’ establishes *the rule of the differential* in nature, and following from it the irrepressible, some might even say divine reality of the gradient without which nothing would ever happen, and thanks to which so many wonderful things not yet imagined, easily could.⁹²

Therein lies the most profound (negentropic) lesson for posthuman architects. There is no such thing as simple part-to-whole relationship. This is what Spinoza expressed in his oft-quoted maxim ‘we don’t know what a body can do’.⁹³ However, if we substituted mereotopology for mereology, it would become possible to find a subset of solutions for multiple interacting systems in spite of their *dynamical* relationship. The Gibsonian affordance, which is akin to the Deleuzian affect, is such a ‘critical set’, which specifies the symmetries shared by the systems of acting-perceiving organisms and their associated milieus. Affect always cuts both ways. The affordance of ‘sit-on-ability’ depends as much on the quasi-objective layout (structure formerly

known as a chair) as it does on the quasi-subjective entention (agency wrongly attributed to intention).

Affordance is best described as a higher-order invariant (invariant of invariants). Deacon describes invariants with reference to constraints, as something ‘less’ than varying without limit. If there is a bias in the probability of the occurrence of states, not all of them are realised.⁹⁴ Any long-term tendency of a system (attractor) is but a Peircean ‘habit’. In this sense, gravity is the habit of the Earth. Even things could be said to have propensities, or sympathies.⁹⁵ So do situations. The presence of constraints entails the absence of certain potential states. The nature of the constraint determines ‘which differences can and cannot make a difference in any interaction’.⁹⁶ Consequently, an increase in entropy is a decrease in constraint, and vice versa, or, as Stuart Kauffman put it, ‘constraints are information and information is constraint’.⁹⁷ Most importantly for our thesis, constraint propagation—which can be translated as habits-begetting-habits—is the ultimate locus of vicarious causality or what Deleuze calls becoming (*devenir*).

Where does it all leave us in terms of niche construction? To adopt a mereotopological approach to posthuman architecture and urbanism is to think in terms of intensive capacities rather than mere extensive properties. This understanding of response-able life is tied with Deleuze’s analysis of sensation that exceeds the bounds of the organic body because it is registered at an antecedent level. Sensation is not representational. It is not *like* something, explains the champion of the Corporeal Turn, Maxine Sheets-Johnstone.⁹⁸ However, to claim that it-is-what-it-is is not a tautology, since things are powers, not forms. As we have argued, agency cannot be segregated from structure nor can it be possessed; it can only be produced *ad hoc*, as implied in the concept of assemblage (*agencement*). By the same token, the so-called perceptual illusions are not illusions, but locally generated geometro-dynamical real effects. Crucially, these curvature-based effects are forceless. They are kinematic.

We will conclude by considering a well-known but wrongly qualified ‘optical illusion’. We shall argue that it is not a self-induced effect on the part of the observer, but an *effect* yielded by the observer’s state space which literally gets warped by what it detects. Kugler and Shaw explain:

By tracking the equidistant, parallel lines depicted by the trivial gradient sets of a flat space (B) to the left (A) and to the right (C), we see what failure of our nervous systems to solve the cohomology problem means perceptually.

What cohomology actually measures, at its most elementary, is failure of *local* solutions to glue together to form a *global* (cross-scale) solution. As in the process of tessellation (*planification*), the problem is how modular

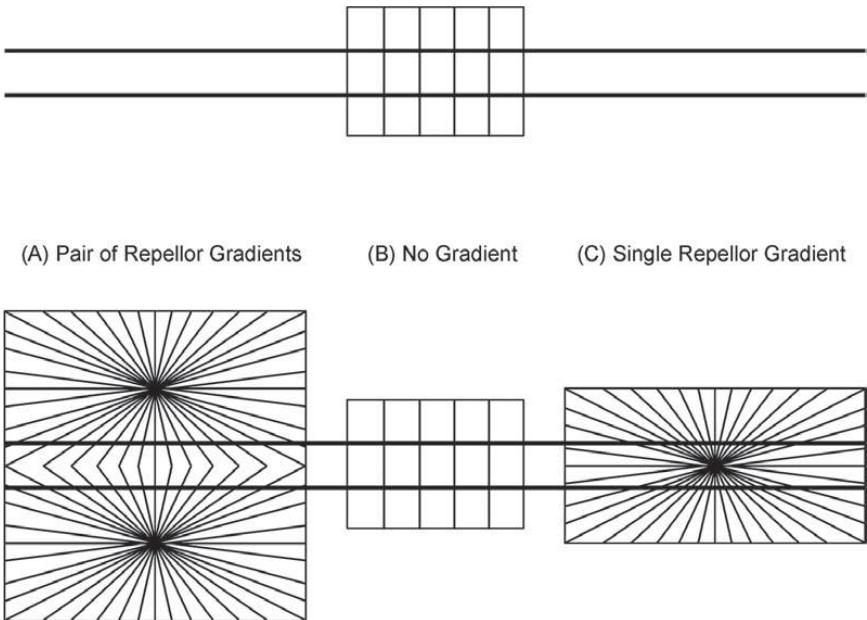


Figure 4.2: Kinematic effect manifested as warping of manifolds. Based on ‘Symmetry and Symmetry-Breaking in Thermodynamic and Epistemic Engines’ (Kugler and Shaw 1990).

quantities (tiles), when distributed under local constraints only, fit together globally over the manifold that they attempt to cover (floor). Cohomology reveals the impossibility of patching locally consistent data into a consistent whole. Simpler still, it demonstrates the *impossibility of totalisation*. Transversal onto-hetero-genesis, or what we referred to as the Superfold, provides a frame-free means for explaining discrepancies between local and nonlocal constraints. Kugler and Shaw continue:

The information for change in curvature of the lines is due to the failure of gradient sets (A), (B), and (C) to share a common homological solution. Hence the pair of lines conforms locally to the direction and distance metrics of the manifold to which they are most proximal. Our state space as observers is being warped by what it detects rather than causing the effect itself. The critical set properties [affordances/affects] have as much reality status as any other physical property, and more than most. Hence the lines are indeed curved, and they are not illusions!⁹⁹

It was the Stoics who first proposed that things themselves are bearers of ‘ideal events’ that do not exactly coincide with their properties. Any *actual*

incarnation may in fact be seen as a provisional ‘solution’ to the *virtual* problem posed by the state space, the same way that lightning is the solution to the problem of electrical potential differences between the cloud and the ground.¹⁰⁰ It is why the virtual is qualified as ‘problematic’, real yet incorporeal. However, by no means are we proposing the Manichean opposition between the *quantitative* actual and *qualitative* virtual. Likewise, a paralogism of psycho-physical commensurability of *extensive* magnitudes and *intensive* differences must be debunked, a generalised economy of equivalences refused. The difference between the difference in degree and in kind is *not* reducible to either: ‘between the two are all the degrees of difference—beneath the two lies the entire nature of difference, in other words, the intensive’.¹⁰¹ And indeed, for Deleuze it is the *intensive* nature of difference that binds the virtual and actual and provides the catalyst for subjectivation.

The geometro-dynamical warping is the Stoic incorporeal effect of the kinetic corporeal cause, which in turn operates as an onto-powerful formal and kinematic quasi-cause.¹⁰² Our conjecture is that there could be no teleonomy without mereotopology (against mereology), which in turn is a problem of sympoiesis (against autopoiesis), the hallmark of ethico-aesthetics. The concept of quasi-cause (‘dark precursor’) prevents regression into simple reductionism. It designates the pure agency of vicarious causality, the difference in itself that relates heterogeneities. Deacon too is unambiguous about the fact that ‘all efficient causes ultimately depend on the juxtaposition of formal [quasi] causes!’¹⁰³ The warped state space of the observer from the earlier example is of the same ilk as the process by which mass singularities curve space-time. ‘It is, crucially, not a matter of curves in a flat space but of the curvature of the space itself’.¹⁰⁴ The major difference is that such effects may be induced through neuro-perceptual fields into the abstract machines of thought and experience. In Andy Clark’s terms, these are ‘optimal illusions’ quasi-caused by predictions.¹⁰⁵ These pockets of inconsistency, Kugler and Shaw insist, are like local inertial frames. They show up as nonlinearities (not ‘perceptual errors’) at the more exacting level of systems integration.¹⁰⁶ They are wrongly assumed to be self-induced alterations in the mind that distort the perception of the world. Quite the contrary, the imperceptible is virtually perceived, albeit as actually inconsistent over local frames. The failure of homologies to mesh across scales is unsurprising since the molar has fewer degrees of freedom (i.e. less symmetry) than the molecular.

In contrast to Rationalists who believe that nature has solved the cohomology problem, Speculative Pragmatists see reality more like a Harlequin’s coat, ‘an infinite patchwork with multiple joinings’.¹⁰⁷ The joinings stand for entanglements of Epi- and Para-Strata. The ontological question of what-there-is cannot be separated from its ethical counterpart of how-to-live, nor from the aesthetic imperative of constructing a new sensorium. The question of

interior, interiority and interiorisation is ultimately a matter of sensibility, not of judgement.¹⁰⁸ It is a matter of radical auto-affectivity sustained by an ongoing artistic, conceptual and historical involution; not of pleasure, but of self-enjoyment defined as immediacy without objectification. If we can accept as really real only that which is cohomologically systematic across our experience (*partes extra partes*), perhaps the fault lies more with our all-too-phenomenological conception of *possible* experience than with the *real* unlimited finity.

NOTES

1. Spinoza 1764.
2. Bateson 1977, 245.
3. Deleuze 1988 [1986], 131.
4. Deleuze and Guattari 2004 [1980], 238–39.
5. Deacon 2012, 426.
6. Debaise 2017, 66.
7. Guattari 1995 [1992].
8. James 1979 [1897], 198.
9. Haraway 2016, 29.
10. Gibson 1986 [1979], 137–40.
11. Deleuze 1988 [1970], 17–29.
12. Speaks, 1995, xviii.
13. Deleuze and Guattari 2004 [1980], 57–60.
14. Raunig 2016.
15. Pál Pelbart 2015 [2013], 18.
16. Deleuze and Guattari 2004 [1980], 53.
17. Foucault and Deleuze 1977, 205–7.
18. Bonta and Protevi 2004, 81.
19. Deleuze and Guattari 2004 [1980], 51.
20. von Uexküll 1957.
21. Bateson 1977, 241.
22. Meilllassoux 2007.
23. Radman 2017.
24. Deleuze and Guattari 2004 [1980], 54–55.
25. Deacon 2012, 462.
26. Deacon 2012, 116.
27. Deleuze 1994 [1968], 183.
28. Massumi 2017, 353–54.
29. Ruyer 2016 [1952].
30. Bains 2006, 61.
31. Barad 2007, 33.
32. Kugler and Shaw 1990, 312.

33. Bateson 1977, 241.
34. Bateson 1972, 141–46.
35. Roden 2016.
36. Dennett 2017.
37. Gibson 1986, 127.
38. Debaise 2012, 7.
39. Deacon 2012, 470.
40. Lord 2012, 92.
41. Cassirer 1970 [1945], 69, 93.
42. Smith 2012, 117.
43. *Ibid.*, 187.
44. Kwinter 2014, 331.
45. Ansell-Pearson 2000, 26.
46. Laboria Cuboniks 2015.
47. Sauvagnargues 2016, 126.
48. Deleuze and Guattari 2004 [1980], 478.
49. Heft 2001, 73.
50. Guattari 2015, 205.
51. Kipnis et al. 2015.
52. Smail 2008. Cf., Stern 1985.
53. Smail 2008, 161.
54. Smail 2008, 177–78.
55. Smail 2008, 162.
56. Gibson 1986 [1979], 130.
57. Deleuze 1978.
58. Barad 2007, 132–85.
59. Deacon 2012, 197.
60. Bateson 1977, 244.
61. Deleuze and Guattari 2004 [1980], 266.
62. Malabou 2008, 72.
63. Deleuze and Guattari 1994, 208.
64. Kwinter 2014, 313–33.
65. Deacon 2012, 458.
66. Deacon 2012, 504–5.
67. Deleuze and Guattari 2004, 238.
68. Wexler 2013, 185–217.
69. Alberti et al. 2016.
70. Mace 1977.
71. Stotz 2017.
72. Kwinter 2008, 40.
73. Stiegler 1998.
74. Stiegler 1998, 134–79.
75. Stiegler 1998, 177.
76. Haraway 2016, 1.
77. Peirce 1955 [1903], 302–5.

78. Puig de la Bellacasa 2009, 298–99.
79. Turvey 2003, 340.
80. Deleuze 1980.
81. Deleuze 1994 [1968], 78–79.
82. Leroi-Gourhan 1993 [1964], 229.
83. Deacon 2012, 484.
84. Kugler and Shaw 1990, 296–331.
85. Smithson 1996, 23.
86. Deacon 2012, 237.
87. Deacon 2012, 368.
88. Guattari 1995, 108.
89. Deleuze and Guattari 2004 [1980], 45.
90. Deacon 2012, 135.
91. Waddington 1977, 113.
92. Kwinter 2016.
93. Deleuze and Guattari 2004 [1980], 283.
94. Deacon 2012, 202.
95. Jullien 1995. Cf. Spuybroek 2011.
96. Deacon 2012, 198.
97. Deacon 2012, 228, 392.
98. Sheets-Johnstone 1999, 139, 146–50.
99. Kugler and Shaw 1990, 328.
100. Gilles Deleuze 1994, 119.
101. Ibid., 239.
102. Deleuze and Guattari 2004 [1980], 86.
103. Deacon 2012, 232.
104. Plotinsky 2003, 101–2.
105. Clark 2016.
106. Kugler and Shaw 1990, 329–30.
107. Deleuze 1997, 86.
108. Deleuze 1983 [1962], 94.

REFERENCES

- Alberti, M., et al. (2016). ‘Global Urban Signatures of Phenotypic Change in Animal and Plant Populations’ In *Proceedings of the National Academy of Sciences of The USA*, ed. Jay S. Golden. Durham, NC: Duke University Press. <http://www.pnas.org/content/early/2017/01/01/1606034114.full.pdf>. Accessed November 26, 2017.
- Ansell-Pearson, K. (2000). ‘Nietzsche’s Brave New World of Force: Thoughts on Nietzsche’s 1873 “Time Atom Theory” Fragment and on the Influence of Boscovich on Nietzsche,’ *Pli* 9: 6–35.
- Bains, P. (2006). *The Primacy of Semiosis: An Ontology of Relations*. Toronto: University of Toronto Press.

- Barad, K. (2007). *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press.
- Bateson, G. (1972). ‘A Theory of Play and Fantasy’. In *Steps to an Ecology of Mind; Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology*. New York: Ballantine, 138–48.
- Bateson, G. (1977). ‘Afterword’. In *About Bateson*, John Brockman, ed. New York: E.P. Dutton, 233–47.
- Bonta, M., and Protevi, J. (2004). *Deleuze and Geophilosophy: A Guide and Glossary*. Edinburgh: Edinburgh University Press.
- Cassirer, E. (1970) [1945]. *Rousseau, Kant, Goethe: Two Essays*. Translated by J. Gutmann, P. O. Kristeller, and J. H. Randall Jr. Princeton, NJ: Princeton University Press.
- Clark, A. (2016). *Surfing Uncertainty: Prediction, Action, and the Embodied Mind*. Oxford: Oxford University Press.
- Deacon, T. (2012). *Incomplete Nature: How Mind Emerged from Matter*. New York: W.W. Norton.
- Debaise, D. (2012). ‘What Is Relational Thinking?’. In *INFLExions 5: Milieus, Techniques, Aesthetics*, M. Boucher and P. Harrop, ied. Translated by Thomas Jellis: 1–11.
- Debaise, D. (2017). *Nature as Event: The Lure of the Possible*. Translated by M. Halewood Durham, NC: Duke University Press.
- Deleuze, G. (1978). ‘Kant, Synthesis and Time,’ *Cours Vincennes*, March 14, <https://www.webdeleuze.com/textes/66>. Accessed November 26, 2017.
- Deleuze, G. (1980). ‘Leibniz,’ *Cours Vincennes*, April 4, <https://www.webdeleuze.com/textes/50>. Accessed November 26, 2017.
- Deleuze, G. (1983) [1962]. *Nietzsche and Philosophy*. Translated by Hugh Tomlinson. New York: Columbia University Press.
- Deleuze, G. (1988) [1970]. *Spinoza, Practical Philosophy*. Translated by Robert Hurley. San Francisco: City Lights Books.
- Deleuze, G. (1988) [1986]. *Foucault*. Translated by Seán Hand. Minneapolis: University of Minnesota.
- Deleuze, G. (1994) [1968]. *Difference and Repetition*. Translated by Paul Patton. New York: Columbia University Press.
- Deleuze, G. (1997). ‘Bartleby: or, The Formula’. In *Essays Critical and Clinical*, Translated by D. W. Smith and M. A. Greco. Minneapolis: University of Minnesota Press, 68–90.
- Deleuze, G., and Guattari, F. (2004) [1980]. *A Thousand Plateaus*. Translated by B. Massumi. London: Continuum.
- Dennett, D. C. (2017). *From Bacteria to Bach and Back: The Evolution of Minds*. London: Allen Lane.
- Foucault, M., and Deleuze, G. (1977). ‘Intellectuals and Power’. In *Language, Counter-Memory and Practice*, D. F. Bouchard, ed. Translated by D. F. Bouchard and S. Simon. Ithaca, NY: Cornell University Press, 205–7.
- Gibson, J. J. (1986) [1979]. *The Ecological Approach to Visual Perception*. Mahwah, NJ: Lawrence Erlbaum Associates.

- Guattari, F. (1995) [1992]. *Chaosmosis: An Ethico-aesthetic Paradigm*. Translated by P. Bains and J. Pefanis. Bloomington: Indiana University Press.
- Guattari, F. (2015). *Lines of Flight: For Another World of Possibilities*. Translated by A. Goffey London: Bloomsbury Academic.
- Haraway, D. J. (2016). *Staying with the Trouble: Making Kin with the Chthulucene*. Durham, NC: Duke University Press.
- Heft, H. (2001). *Ecological Psychology in Context: James Gibson, Roger Barker, and the Legacy of William James's Radical Empiricism*. Mahwah, NJ: Lawrence Erlbaum.
- James, W. (1979) [1897]. *The Will to Believe and Other Essays in Popular Philosophy*. Cambridge, MA: Harvard University Press.
- Jullien, F. (1995). *The Propensity of Things: Toward a History of Efficacy in China*. Translated by J. Lloyd. New York: Zone Books.
- Kipnis, J., et al. (2015). '2015 Grad Thesis Prep Symposium,' <http://sma.sciarc.edu/video/2015-grad-thesis-prep-symposium/> Accessed May 4, 2015.
- Kugler, P. N., and Shaw, R. (1990). 'Symmetry and Symmetry-Breaking in Thermodynamic and Epistemic Engines: A Coupling of First and Second Laws'. In *Synergetics of Cognition*, H. Haken and M. Stadler, eds. Heidelberg: Springer-Verlag Berlin, 296–331.
- Kwinter, S. (2008). 'A Discourse on Method'. In *Explorations in Architecture*, Reto Geiser, ed. Basel: Birkhäuser, 34–47.
- Kwinter, S. (2014). 'Neuroecology: Notes Toward a Synthesis'. In *The Psychopathologies of Cognitive Capitalism: Part Two*, Warren Neidich, ed. Berlin: Archive Books, 313–33.
- Kwinter, S. (2016). 'Sensing the Aerocene' <http://sanfordkwinter.com/Sensing-the-Aerocene> Accessed November 26, 2017.
- Laboria Cuboniks. (2015). 'Xenofeminism: A Politics for Alienation', <http://www.laboriacuboniks.net>. Accessed November 26, 2017.
- Leroi-Gourhan, A. (1993) [1964]. *Gesture and Speech*. Translated by A. B. Berger. Cambridge, MA: MIT Press.
- Lord, B. (2012). 'Deleuze and Kant'. In *The Cambridge Companion to Deleuze*, D. Smith and H. Somers-Hall, eds. Cambridge: Cambridge University Press, 82–102.
- Mace, W. (1977). 'James J. Gibson's Strategy for Perceiving: Ask Not What's Inside Your Head, but What Your Head's Inside Of'. In *Perceiving, Acting and Knowing: Toward an Ecological Psychology*, R. Shaw and J. Bransford, eds. Hillsdale, NJ: Lawrence Erlbaum Associates, 43–65.
- Malabou, C. (2008). *What Should We Do with Our Brain?* Translated by Sebastian Rand. New York: Fordham University Press.
- Massumi, B. (2017). 'Virtual Ecology and the Question of Value'. In *General Ecology: The New Ecological Paradigm*, E. Hörl, ed. London: Bloomsbury Academic, 345–73.
- Meilloux, Q. (2007). 'Subtraction and Contraction: Deleuze, Immanence, and Matter and Memory,' *Collapse: Unknown Deleuze III*, 63–107.

- Pál Pelbart, P. (2015) [2013]. *Cartography of Exhaustion: Nihilism Inside Out*. Translated by J. Laudenberger and F. R. Palazclos. Minneapolis: Univocity Publishing.
- Peirce, C. S. (1955) [1903]. ‘Abduction and Induction’. In *Philosophical Writings of Peirce*, J. Buchler, ed. New York: Dover, 302–5.
- Plotinsky, A. (2003). ‘Algebras, Geometries and Topologies of the Fold: Deleuze, Derrida and Quasi-Mathematical Thinking (with Leibniz and Mallarmé)’. In *Between Deleuze and Derrida*, P. Patton and J. Protevi, eds. New York: Continuum, 98–119.
- Puig de la Bellacasa, M. (2009). ‘Touching Technologies, Touching Visions: The Reclaiming of Sensorial Experience and the Politics of Speculative Thinking,’ *Subjectivity* 28, 297–315.
- Radman, A. (2017). ‘Space Always Comes After: It Is Good When It Comes After; It Is Good Only When It Comes After’. In *Speculative Art Histories: Analysis at the Limits*, ed. S. van Tuinen. Edinburgh: Edinburgh University Press, 185–201.
- Raunig G. (2016). *Dividuum: Machinic Capitalism and Molecular Revolution*, Vol. 1. Translated by A. Derieg. Los Angeles: Semiotext(e).
- Roden, D (2016). ‘A Post-Sellarsian Encounter,’ <https://enemyindustry.wordpress.com/2016/11/25/a-post-sellarsian-encounter/>. Accessed November 26, 2017.
- Ruyer, R. (2016) [1952]. *Neofinalism*. Translated by A. Edlebi. Minneapolis: Minnesota University Press.
- Sauvagnargues, A. (2016). *Artmachines: Deleuze, Guattari, Simondon*. Translated by S. Verderber with E. W. Holland. Edinburgh: Edinburgh University Press.
- Sheets-Johnstone, M. (1999). *The Primacy of Movement*. Aarhus: Aarhus University.
- Smail, D. (2008). *On Deep History and the Brain*. Berkeley: University of California Press.
- Smith, D. W. (2012). *Essays on Deleuze*. Edinburgh: Edinburgh University Press.
- Smithson, R. (1996). *Robert Smithson: The Collected Writings*, J. Flam, ed. Los Angeles: University of California Press.
- Speaks, M. (1995). ‘Folding toward a New Architecture’. In *Earth Moves: The Furnishing of Territories*, B. Cache, ed. Cambridge, MA: MIT Press, xviii–xx.
- Spinoza, B. (1764). ‘Letter 62 (P03) to G. H. Schuller or Schaller (The Hague, October 1764)’, http://www.faculty.umb.edu/gary_zabel/Courses/Spinoza/Texts/Spinoza/let6258.htm. Accessed November 26, 2017.
- Spuybroek, L. (2011). *The Sympathy of Things; Ruskin and the Ecology of Design*. Rotterdam: V2 Pub./Nai.
- Stern, D. N. (1985). *The Interpersonal World of the Infant: A View from Psychoanalysis and Developmental Psychology*. New York: H. Karnac.
- Stiegler, B. (1998). *Technics and Time 1: The Fault of Epimetheus*. Translated by G. Collins and R. Beardsworth. Stanford, CA: Stanford University Press.
- Stotz, K. (2017). ‘Why Developmental Niche Construction Is Not Selective Niche Construction: and Why It Matters’. *Interface Focus* 7. DOI: 10.1098/rsfs.2016.0157. Accessed March 24, 2018.
- Turvey, M. T. (2003). ‘Perception: The Ecological Approach’. In *Encyclopedia of Cognitive Science*, Lynn Nadel, ed. New York: Nature Publishing Group, 538–41.

- von Uexküll, J. (1957). ‘A Stroll through the Worlds of Animals and Men: A Picture Book of Invisible Worlds’. In *Instinctive Behavior: The Development of a Modern Concept*, ed. and trans. C. H. Schiller. New York: International Universities Press, 5–80.
- Waddington, C. H. (1977). *Tools for Thought*. New York: Basic Books.
- Wexler, B. (2013). ‘Neuroplasticity, Culture and Society’. In *The Psychopathologies of Cognitive Capitalism: Part One*, A. De Boever and W. Neidich, eds. Berlin: Archive Books, 185–217.

