Technical Activity, the Geographic Milieu, and the Art of Composition

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By RACHEL HAEBIN YEO

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AUTHOR: Rachel 혜빈 Yeo, B.A. (McMaster University)

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Lay Abstract

This work seeks uncover a world of relations between human and technics that goes beyond that of labour. To view technical activity in its fullness, as an activity that engages and performs a coupling between each of the terms: human, nature, technics, I introduce a theory of technical composition which borrows from the musical layering technique of counterpoint.

Abstract

This work was made with the intention of opening up a path to discovery of technical activity's potential for emancipation once we free technical activity from the reductive shackles of labour. I utilize the philosophy of Gilbert Simondon throughout the work to build upon his theory of technics and individuation. I begin with the acknowledgement that technical activity plays an expressive role beyond that of mere work, utility, and needs fulfilment. From there, we explore the inventive aspect of technical activity and draw parallels between technical individuation and individuation within nature, which gives us a more robust definition of technical invention. Honing in on the co-constitutive relationship between organisms and environment we find a rich vocabulary of mutual formation and operation which we can translate into technical realm. True technical activity should be able to cut across organic-nonorganic lines, being able to take stock of the communicative aspects of all systems under consideration. A theory of technical composition is needed in order to think more clearly of the relations between these disparate domains, and there is no better concept than that of musical counterpoint to aid us in this task.

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Contents

Introduction

Our use of technology has never been more ubiquitous and our understanding of this realm so insufficient. In the rush to technicize nearly every aspect of our lives from the prolific to the mundane, humans have fallen short of understanding what it is that this particular activity does and what it means for us. As a consequence, culture has fallen behind technics. We can see this through what appears as a great struggle between technics and culture, where those that glorify technics believe that its introduction rings the death knell for a historical culture and introduces a new one, one that is pure, sanitized, viewing the objects of culture as ornamental, while on the other hand, technics from the perspective of culture has taken up fragmented, sometimes conflicting roles. Some artists have acceded to this glorification of the sanitized, alien, future-fever. Others are more tentative, with a refusal of all things technical, seeking to return to a bygone era of pastoral craftsmanship.

Now, what is so beautiful about Simondon's theory is its ambitions for convergence. It promotes a resistance to the distinctness of these categories, a resistance which stems from an overall affirmation of life. This curiously affirmative "no" denies the dichotomy between technics and culture altogether and instead provokes us to look more scrutinizingly into each realm, to strike a balance between them, turning what at first seems to be an irresolvable difference into a reciprocal system. A path is carved out towards a human-technics relationship that does not besmirch the one on behalf of the other, instead revealing how they can, and in fact already have been, working in tandem. Technics, is, after all, a *human* activity and thus a natural one. And so, in flipping the theory on its head to bring technics back into nature's fold, we uncover a vision of the role of technology in human life, as something beyond both labour and utility.

In this work, I develop a line of thought alongside Simondon's which advocates for a convergence of the technical and cultural spheres of human life. However, in doing so, I wish to acknowledge the importance of the forms of knowledge which already straddle this difference. The goal of this work is to elucidate a form of knowledge that is emblematic of this convergence of technics and culture. This form of knowledge—the art of composition--while most often visible in the arts of music and writing, has yet to find adequate philosophical expression. Composition is ultimately a study of technique and its applications to construct a coherent body of work.

To demonstrate the efficacy of making operational analogies over structural and functional ones, as Simondon does, I argue that the operational aspects of musical composition are similar to technical activity in that that they engage in both technique and art. Both activities deal in the layering of schemas, the arrangement of parts, and attention to tempo. Composition is the encyclopedic technique *par excellence*, a technique developed over centuries that incorporates both forms of knowledge which Simondon finds important to bridge: that of intuition and intellect, due to its contents being about the movement of human feeling, the building of a non-linguistic sense, and the intellectual analysis of the relation of parts to the whole, from the rudiments to the advanced. Through the exercise and development of these two forms of knowledge, new forms of technical activity arise which escape the confines of mere 'work' and resemble more of a signifying art.

What I envision is an application of compositional ideas to technical activity, bringing to it the same principles of repetition and variation, the same structural divisions of phraseology, and other techniques with the goal of providing a framework for the *exercise* of this technical mentality which Simondon believes will lead to the liberation of

technics itself. To apply musical concepts to technical activity is to acknowledge the fundamentally human gestures which comprise the technical object and the fundamentally natural movements which sustain it.

To acknowledge these human gestures is also to combat what Barry Allen calls the "ideological impediment to the free deliberation humane science and technology require."[1] He is referring to the "inhuman objectivity" bestowed upon technology, the rules of technical activity appearing as eternal as the laws of physics, which separates our technical practices from the domain of the political and historical. Belief in this inhuman objectivity can be sustained only through ignorance with regard to the different technical traditions and lineages from which our artifacts arise. In truth, technical objects always involve processes of selection, processes which constitute a technical genealogy, and exist as an example of good or bad composition. The technical object is constructed through a series of bifurcations, of fits and starts, rather than following a singular line of "progress".

"Technics" is the word used in the English translation of Simondon's *On the Mode of Existence of Technical Objects,* to encompass the whole field of techniques. It is described as "the theory or study of industry and of the mechanical arts."[2] But as we engage further with *METO,* we see traces of technics also beyond the industrial modality, as well as in things that existed before the *mechanical* arts became prominent—where techniques often had nothing to do with machines per se. Of course, the mechanical arts and the industrial modality naturally take center stage as human interaction with these

[1] Barry Allen, *Artifice and Design: Art and Technology in Human Experience* (Ithaca, NY: Cornell University Press, 2008), p. 7.
[2] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 15.

machines became increasingly inseparable, but it is important to acknowledge that before their emergence in the European industrial revolution something of technics already existed.

Technology on the other hand can be conceived as a meta-theory of technics. It is, according to Barthelemy, the *logos* of technics—the application of the *logos* of science to technics[3].This is a more typically French usage for the term "technology" that I do not follow. I am interested in both techniques and the technologies that arise out of them: Techniques as connected to style or type, and technology as the application of scientific principles to a certain type, underlying a technology that is always a combination of techniques. Technical composition is concerned, then, with both style and rules, aesthetics and knowledge.

Structure

Since my reflections on composition do not appear until the end of the work, some preliminary work must be done first to establish the distinction between technical activity and labour to bring the geographic milieu into the fold of technical consideration, expanding the domain of technical discourse. I do this in order to give weight to the co-constitutive aspect of technical objects, to acknowledge that they do not exist in a vacuum but are always coupled to their environments, both natural and cultural. Technical creation, in a sense, *is* the environment, that is, both the amalgamation of parts and the plurality of effects. Technical creation is never simply the construction of a new object, a veritable genesis, but participation in a lineage, a genealogical line, which sends reverberations through the geographic and social sphere. Thus, the notion of re-cycling plays a larger part

[3] Jean-Hugues Barthélémy, "Fifty Key Terms in the Works of Gilbert Simondon" *Gilbert Simondon: Being and technology* (Edinburgh: Edinburgh University Press, 2012), 33.

in technical creation than that of the new. It is precisely this re-cycling of elements, thrust into a slurry of differential relations, that brings about the new.

At this point, let me say something about how technical activity differs fundamentally from labour. Doubtless, labour is *involved* in technical activity, and at some level labour is required to establish technical activity, but it should not be *reduced* to labour wholesale. The first chapter stresses this. In technical activity, it is an act of *creation* which engages us, and this creative practice is what ultimately establishes what Simondon calls a *transindividual* relation, that is, a relation not between already established individuals, but one that is co-constitutive of the very terms it unifies. This transindividual relation indicates that a collective psycho-social individuation is under way. Labour (or work, terms I shall use interchangeably) is too much of a utilitarian concept to capture this act of creation, and technical activity has yet to be liberated from the domination of utility.

This perspective means that the alienation between the capitalist and the proletariat is recast, so that industrial production is no longer the sole regime under which technics is viewed. Technical alienation pre-exists and is presupposed by labour relations. It is important to note that this does not make the phenomenon of alienation any less *real* or *experienced*, and that these economic conditions do exist, are exploitative, and should be overcome. However, this new perspective takes a different approach to social dynamics, one that allows for the different entities which populate our social sphere to demonstrate their effects: a machine, a button, a code—these are likewise participants in our political domain, which produce a cascade of effects, and should be considered as such. I place weight on Simondon's declaration that technical objects "prepare an availability"[4]—and

[4] Simondon, *METO*, 251.

this is the lens through which my argument is to be read. An object is created, disparate parts are aggregated, and as an object which is beyond unity, beyond identity, it begins to bleed into the world. Rather than jump straight to the technical object's effect on the human social sphere, a key constitutive factor of this social sphere will be missed if we do not take into account the effects of technical activity on the geographic milieu—the *silenced* milieu in the human-technics-world relation. In order for technical activity to first be *capable* of being grasped in its fullness we must acknowledge its environment.

Chapter Two discusses what goes into the technical individual. Recasting the technical object as one which is capable of producing effects, *and* being affected, we reveal an ontology in which matter flows. Rather than being objects with pre-existing internal and external components that rarely come into communication with one another, matter itself is always engaged in the process of constituting interiorities and exteriorities, being enfolded within itself. The technical object is always coupled to an environment, with which it is always in communication. The object is constituted by making what was once exterior, interior. The technical object, then, can be seen as undergoing a similar process of individuation as that of organic being.

In this connection I shall exploit Simondon's description of organic individuation and his non-anthropomorphic aims for describing the emergence of sense[5]. By taking the organismic approach that informs his ontology, we find his theory of ontogenesis to translate equally well into the biological, geological, and technical domains. The theory of ontogenesis is analyzed in order to find a description of nature that goes beyond the organic/inorganic distinction, which is required to explain the coupling that occurs between

[5] Andrea Bardin, *Epistemology and Political Philosophy in Gilbert Simondon*. (Dordrecht: Springer, 2015), 49.

the geographical and technical milieu. We find in Simondon a definition of the technical network that is far different from the one which exists today, or at least has us realize the existing schism between two aspects of the network (the technical and the geographic) which reveal its incompleteness and accounts for its dysfunction.

A technical network is firmly rooted in its geography. I explain what this means, relating it to the notion of implicit forms, which becomes a key term in my argument along with its relational conditions of discovery. These implicit forms modulate information when they come into contact with another object, in-forming it and establishing its capacities. The technical network, then, is viewed as one that must connect to the world and its various ecosystems. In this chapter I also discuss Simondon's distinction between physical and vital individuation, showing that pure physical individuation is an ideal abstraction compared to vital individuation, where the nature of all components is thoroughly mixed. An ecosystem is a vital system, operating in much the same way as an organism might. An ecosystem preserves its connection to a pre-individual milieu, Simondon's term for the reservoir of potential energy that enables transformation.

The third chapter applies considerations of the geographic milieu to the contemporary technical sphere. In this chapter I describe features of a technical activity that reach beyond utilitarian relations. By looking at our current technical activities in relation to their geographic milieu we can assess the technical sophistication of certain developments, determining their aptness for maintaining the level of technical concreteness required to maintain the internal coherence of the object. The notion of labour will hardly be able to maintain this technical coherence, since it is singularly goal-oriented, whereas a *coherent* approach to technical activity must be concerned with the object *compositionally,*

that is, with the relation of the object to the various parts and lines which intersect to make it possible.

Simondon makes a distinction between two types of "culturing", the first being the method of domestication, and the second, that of a veritable cultivation[6]. The first method has the tendency to sap the living being of its potential, of its connection to the pre-individual milieu, and renders it incapable of reproducing or being self-subsistent, ultimately becoming entirely dependent on human intervention. My example is the development of hydroelectric dams in Nepal. I show the nature of such activities in such a precarious environment and the reciprocal effects that ultimately characterize the technical object. We may view this attempt as a technical mis-integration due to its ignorance of the various compositional elements and of the landscape's implicit forms. My analysis shows that the notion of sustainability requires reformulation. As an unanchored ethical concept the notion of sustainability contributes to the current confusion of technical activity and labour. I expand on these different misunderstandings (sustainability as a *goal*, sustainable as existing *within an object*, sustainability as exchange between past and future), and show that this notion is better understood as a technical principle in order to match with the re-cycling nature of technical creation. Thus, "to sustain" is no longer to be taken as the goal of upholding a certain system state, or to perpetuate more of the same. Instead, what is to be sustained is the very access of a system to its share of the preindividual milieu, which enables it to undergo continuous transformation and retain its vital force. This is not so problematic as it may seem because the usual definition of sustainability relies on a concept of "needs" which presumes too much, assuming, for example, that we can predict what the

[6] Gilbert Simondon. "Culture and Technics (1965)" *Radical Philosophy*. Vol 189. Tran. Olivia Lucca Fraser, (Jan/Feb 2015)

needs at t_2, t_3, t_4, etc., will be, and that these will be more or less the same. In reality, these are unpredictable outside of a certain range of time. A forewarning, however, must be made. This does not mean that unfettered transformation of any particular system is preferable, or "allowed" by our vital regimes (as it may recklessly lead to the very decay of domestication practices), and that attention to an object's implicit forms is also to participate-with, to *introduce* natural fields to different forms, to understand a system's *rhythms* of contraction, to absorb its tempo.

The final chapter expands on the notion of technical composition, or an application of compositional techniques to the natural-technical milieu. If sustainability as a technical principle refers to the aim of preserving a level of vital potential, which depends on connection to the pre-individual milieu, we should know what this means, for which I find helpful Deleuze and Guattari's notion of the *refrain*. To understand how techniques of composition involve the juxtaposition of horizontal and vertical lines of development I look to the musical analogues of harmony and counterpoint. Contrapuntal techniques appear to be the clearest contender for the explication of technical activity in its various forms. Counterpoint, as the technique of combining several melodic lines that are able to maintain their relative independence, gives the plurality and relational complexity required to explain technical creation in its fullness.

The connection between art and technology is this: that rather than art being a uniquely human endeavour which sets us most apart from other creatures in nature, rather than an aesthetic *sense* being one which only humans may enjoy, it is in fact by virtue of its participation in nature that art gains its fullest expression, that an aesthetic *sense* is primary to psychological structures. Far from being a subjective judgment, aesthetic sense has a

practical, evolutionary function, and what evaluative notions arise have, at bottom, this practical basis. We may think of both the pleasing taste of certain fruit, or of the tug of empathetic sadness when listening to an elegy. Each experience carries underneath it an evolutionarily beneficial reason: consuming fructose gives me a potent source of energy, this empathy strengthens my social drive. To say that an aesthetic sense is not subjective does not mean it is not plural. Each lineage of technical creation may come with its own set of rules. A certain perspectival approach may need to be adopted to be able to recognize whether a particular feature is detrimental to one object but beneficial to another. In this, *objective* contradictions may arise, but are nonetheless sensible to the object itself in its particular environment.

Technical activity is the engagement and evolution of human knowledge to grasp in what ways the technical object participates in nature. Within technical composition, we think of practicality, not in terms of the ability to achieve a single, particular function, but in terms of an ability to manage complexity through the coherence of relations which ultimately becomes expressive. In managing complexity through the evolution of structures, the goal is not to close off a particular phylogenetic lineage to the future, not to stifle becoming, but to foster it. Where counterpoint comes in, is that it is the art of interweaving. Composition and counterpoint are important concepts to thinking of technical and human longevity—so that less in nature is poisonous to technical becoming, and less of technical becoming is poisonous to nature.

Chapter One

Technical Alienation

Throughout this chapter, I engage with Simondon's theory of alienation, and address a number of criticisms which conclude that his emphatic focus on technology comes at the expense of a clear understanding of the social and economic conditions which play a crucial role in the technical sphere. In this view, economic and social formations are inseparable from the technical object's development, and thus, an account of technological development that is "purified" of human folly is not possible. Our creations will never be free from the instigating factors of political influence. What others view to be an untenable commitment to an overly purified account of the technical realm, however, is in reality a prescient account of alienation which acknowledges that conditions themselves have to be created. Thus, Simondon's technical approach actually reveals a deficiency in the Marxian approach to technical engagement. I argue that if we take into account Simondon's theory of individuation, we can appreciate his criticism of Marx's concept of alienation as a sensible approach considering the different ontological background from which he draws his conclusions. This is a conclusion I maintain alongside Combes (2013), who go so far as to argue that Simondon's misunderstanding of Marx is a *strategic sidestep* in order to introduce this notion of technical primacy[7]. In reality, this sidestep need not be so 'strategic' should we pay close attention to the differences in terminology.

Having explained this theory of the technical primacy of alienation, I take up the theory itself and point to some innovative and theoretically useful consequences. The first insight is that this technical focus opens up an avenue for critique, one which is not possible

[7] Muriel Combes and Thomas Lamarre, *Philosophy of the Transindividual* (Cambridge: MIT Press, 2013), 74.

to access without having first bracketed technics into its own domain of inquiry. In order to discuss the technical object, we must first specify precisely what this "object" is. We are then able to grasp in much greater depth the reciprocal exchange between technical growth and human development—what these objects *do*. Where there was once, and is still now, a gap between the human and technical world which predominant forms of technical knowledge are unable to bridge, we have the promise of a way to look at technology beyond mere utility. The second insight, is that technical creation carries with it an emancipatory strength. Simondon, by making technical activity the production of a 'regulative apparatus' of social systems, illustrates how thought develops alongside life in tandem, and are able to direct the course of its development[8]. Genuine technicity brings with it a proliferation of meaning, and this meaning-making activity is something that dominant conceptions of work or labour are unable to account for, as it already presupposes the entrance of the activity into a system of economic production. In this chapter, I argue that technical activity, or more precisely what Simondon calls *technicity*, establishes the possibility of new forms of meaningful human activity.

Labour and Technical Activity

In Simondon's view, one of the unfortunate faults of Marx's theory is the reduction technical activity to labour. The Marxian view of alienation is best understood through the lens of the political economy, where the division between labour and capital, wages and

[8] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 129.

profit, fragment the potentially unified experience of productive activity and lead to the estrangement of the individual worker from her society, self, and products.

Capitalist alienation affects several different relations throughout the production process, which Marx categorizes into four dimensions: first, the worker is alienated from the very product of his own labour. The product is labour objectified. Become alien, it is no longer one that they own or control. Secondly, the labourer is separated from their own activity, being required to operate in a way that services the creation of this alien product. One's energy, one's body is sacrificed, channeled into this system of commodity production. Third, the labourer is alienated from others in society, being incapable of relating to others outside of this system of exchange, only able to view others as means to an end. Finally, the labourer is separated from their creative and conscious capacities, their species-being. All of these different separations contribute to the stunting of human flourishing, erecting blockages to the realization of true human capacities[9].

Labour, in political economy, is reduced only to a source of livelihood, becoming an activity *external* to the worker rather than something voluntary, becoming a mere means in service to an end which is external to the activity itself[10]. Marx assigns to labour in the *Economic and Philosophic Manuscripts of 1844* the feature of being expressive of one's species-being. He writes:

> The object of labor is, therefore, the *objectification of man's species life:* for he duplicates himself not only, as in consciousness, intellectually, but also actively, in reality, and therefore he sees himself in a world that he has created. In tearing away

[9] Karl Marx, *Economic and Philosophic Manuscripts of 1844* (Moscow: Progress Publishers, 1932), 30.
[10] Marx, *Manuscripts*, 7, 30.

> from man the object of his production, therefore, estranged labor tears from him his species-life, his real objectivity, as a member of the species and transforms his advantage over animals into the disadvantage that his inorganic body, nature, is taken from him.[11]

Labour reduces the worker to merely *animal* functions, rather than allowing the human to realize his privileged place or experiencing the *haecceity* (the unique and singular *this*-ness) of human existence[12]. The human thus becomes separated from their ability to see themselves reflected in the world, unable to become fully differentiated, individualized,

[11] Marx, Manuscripts, 32.
In existing scholarship, how strong the continuity is between the early and late Marx is debated. Some scholars, who we may call the Marxist Humanists, believe that the *Economic and Philosophic Manuscripts of 1844 can be read as a foundation for the later Marx as an ethical foundation which provides the humanistic seeds that later flourish in his more scientific works. Other scholars argue that the later Marx is more focused on dialectical materialism as a description of real historical conditions which do not carry any of the same tenor as the previous work. The strongest piece of evidence for this latter camp that claims there is a division is the fact that Marx never intended to publish this manuscript in the first place. If we attempt to place Simondon on the spectrum between the humanist Marxists, and the later scientific Marx, we may initially speculate his loyalties to the former, due to his own interests in alienation and the role it plays in his own theory, along with his attempts at defining humanism.* However, the textual evidence in fact could point us to a different conclusion, most notably his characterization of Marx's view as a "purely economic theory". This statement appears, very deliberately, to be point us away from the direction of the humanist interpretation, and may be imploring us to take the stance of the late Marx as that which we should set beside his own theory. Thus, it is not lamenting that Marx is not enough of a humanist. It could be said that Simondon is criticizing Marx's theory for not being *scientific enough* by relegating the analysis of alienation to these economic relations and speaking *around* the very objects being created as a passive object in the system of social and economic relations. In a theory that does everything it can to bridge gaps between the different domains within the human sciences, as noted in his address on "Form, Information, and Potentials", Simondon's theory, through its analysis of technical objects is giving us a route through which we can think the object undergoing commodification, as the counterpart to labour. When we see the object in its full light, we realize that it is not only a counterpart to labour, but it is *vaster* than labour itself. By illuminating the obscure zone, a thus-far-silent actor in the analysis of labour relations appears. It ultimately births a theory of praxis: a theory of the social that involves the object as part of the circulation of signification, and part of the shaping of history—ethics is then embedded into the scientific theory, and arises out of the objects under study. With a theory like Simondon's, *the object can no longer escape critique*. That is not to say that a villainization of the object becomes permissible in Simondon whereas Marx does not allow this, but simply that the very contingencies and material circumstances which led the object to be created as it exists, the very way in which the object operates through society, can finally come to light. It is not only the industrial modality as a whole that we may condemn or accept, but a question of which practices, which processes leak out of this larger machinery and how have they been allowed to escape, to continue on.
[12] Marx *Manuscripts*, 30.

and feel the full objectivity of their existence[13]. Labour plays a dual role: it is both a means to satisfy needs, *and* an expression of one's species-life. However, the means of fulfillment of the latter role has been blocked (while the former is also only attained indirectly.) For Marx, it is a fundamental connection to one's human nature which is being subjugated by capital. The full expressive force of human nature becomes detached from the activity, becoming silenced in favour of an overarching system of capitalist production.

Simondon's criticism of Marx can be read as a re-evaluation of the aforementioned four dimensions of alienation. By scrutinizing Marx's definition of labour and honing in on the fourth dimension (that of alienation of the worker from their creative expression), Simondon in fact uncovers an error of conflation in Marx between two fundamentally different types of activity which must be prised apart in order to even begin to understand what it is that these activities do. It is at this error of conflation that we can see the precise point where Simondon deviates from Marx, and why it is that he labels this view a purely economic theory[14]. It is not solely the fault of capitalist relations that humans, in labour, have been reduced to their merely animal functions. Rather, this reduction may stem, instead, from a reduction that occurs first at the level of our understanding of technical reality and our ignorance of the sheer potency of the kinds of activity that we engage in, prior to *social* relations of domination and subordination. Thus, this fourth form of alienation becomes antecedent to the other three, and its resolution requires a different approach.

[13] Marx, *Manuscripts*, 32.
[14] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 133, 253.

It is more likely for Simondon that the reduction of human to animal persists because the value of labour is overemphasized. While Marx acknowledges labour's role as necessary for the fulfillment of needs, he also attributes to the same activity as bringing with it a form of self-realization at a species-level. But for Simondon, labour cannot occupy both roles as needs fulfillment *and* as expressive activity, simultaneously. Deleuze and Guattari identify the difference between these two activities through the birdsong: "What objectively distinguishes a musician bird from a nonmusician bird is precisely this aptitude for motifs and counterpoints that, if they are variable, or even when they are constant, make matters of expression something other than a poster—a style—since they articulate rhythm and harmonize melody."[15] The content of the activity may be similar, between a veritably expressive and incidental, or quasi-expressive act, but there exists in one of these activities a particular aptitude for understanding relations between components—a compositional aptitude— that makes the birdsong truly musical, versus the mere repetition of a particular refrain. An expressive act is incidental (a poster) in the sense that a particular species' characteristic habits of need fulfillment may be deemed "expressive"—it possesses a set of behaviours or attributes which make the species identifiable, differentiating it from others[16]. A veritably expressive act indicates some level of mastery over these habits or attributes, these are acts which *articulate.* This compositional aptitude is that which also distinguishes technical activity from mere labour. It is unlikely that a mere biological functional adaptation will give us the means to find the kind of fulfillment required to reduce human alienation from creative and intellectual expression. And while these activities may look similar to the untrained eye in terms of energetic and productive output, the fundamental

[15] Gilles Deleuze and Felix Guattari, *A Thousand Plateaus* (University of Minnesota Press, 1987), 318.
[16] Gilles Deleuze and Felix Guattari, *A Thousand Plateaus,* 316-318.

difference between them is this compositional capacity. Taking ownership of the means of production, then, is not a viable solution to the problem of alienation, unless it were to lead to the resolution of this more primary technical alienation, as humans will still be cut off from a fundamental expressive activity.

Technical Activity and Individuation

Looking back at the history of labour and human engagement with technics during the industrial revolution reveals to Simondon that it is technical activity which is overlooked, technical objects which are misunderstood. The problem of alienation stems from the fact that technical activity has thus far been reduced to labour instead of being regarded in its own right. In other words, the activity has been reduced to a mere means, an activity which provides utility. While this notion of technics as utility may have been prevalent in a time where our level of technical sophistication limited us to craftsmanship or tool use, the industrial revolution has displaced us from the role of mere "tool-bearer" and opened up new possibilities for technical activity, as being one which is able to consider arrangements[17]. This is not the type of consideration which focuses on structural and functional arrangements, since this is already an advanced component of technical knowledge. Rather, it is the *operational* arrangement which knowledge has not yet grasped. By operational, Simondon is talking about what potentialities are loaded into the object's structural and functional *relations*, what will produce transformations[18]. It is not whether I can mimic the song that I have heard, but whether I can engage with it—introduce

[17] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 141.
[18] Gilbert Simondon, *METO*, 141.

variation, transpose to a new key, and find the implicit harmonies, without losing the initial character of the song which guides me. Going beyond utility to an understanding of arrangements, is what Simondon means when he says that one must approach the technical object "from above and from below."[19]

Excavating what was lost in our conception of technical activity, Simondon looks back into our past philosophical engagement with technical concepts. There exists an obscure, or "dark zone" in our technical analogies which are used to form ontological frameworks, applying faulty images of thought to the nature of reality[20]. For Simondon, it is Aristotle's hylomorphic schema which, in its role as ontological framework, has found its way into shaping human knowledge to the point of creating these "obscure zones" in several other domains, more specifically within the human sciences[21]. Briefly, the hylomorphic schema is exemplified through the act of brick-making. There are two components in this schema: that of indeterminate matter, and a pre-existing form, of clay and the mold. The story of the hylomorphic schema sees the relationship between matter and form as one of imposition. Form is the only active component, always *imposed on* and thus making determinate or differentiating passive matter. The mold compresses clay. A closer look at the matter-form technical analogy, however, reveals a gap in understanding[22]. This is an understanding of the *operation* of form-taking as opposed to the mere structural or functional aspects of the analogy. In reality, clay must be prepared to receive the mold, to be at a certain threshold of malleability, it must be formed. The mold itself must be also prepared, given its shape, and is itself still matter that needed to be treated in order to take

[19] Gilbert Simondon, *METO*, 80.
[20] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 3.
[21] Gilbert Simondon, *Individuation*, 675.
[22] Gilbert Simondon, *Individuation*, 23.

part in the brickmaking process. Form is, contrary to this hylomorphic schema, not pre-given. Matter is likewise not entirely indeterminate, or passive. There is, instead, a reciprocal exchange that takes place between matter and form—matter is that which in-forms and is in-formed, participating in an exchange of information[23] that can only arise through the relation between the two terms[24].

When we grasp this reality of technical activity, we are able to see technical activity as taking part in a process operationally similar to organic individuation. It is a similar, yet different continuation of a process of organic individuation. Getting clear on this form of technical knowledge will give us the ability to tune into this type of activity—understanding each component involved in order to begin this compositional engagement required to unlock a world of human expressiveness, no longer arriving at such expression as the incidental result of a pre-existing arrangement. By expressive Simondon means that the technical object enters into relations with objects of different orders of magnitude and yet contribute a mode of signification, as for example, when Simondon states that the quality of a needle "expresses the degree of perfection of a nation's industry". The whole ensemble (a nation's industry) is *expressed* in the technical element (the needle) through the *technicity* that exists within the technical object. The *technicity* of a technical object is

[23] The term information is used here in a way that is shaped by, but not exactly identical to that of the notion used within cybernetic and information theory. This term goes beyond that of an accumulation of data, and beyond that of knowledge as graspable by a conscience. It encompasses a much more *general* phenomenon, which Norbert Wiener describes as communication. Within communication there must be at least two objects which entire into relation (an emitter and a receiver) and messages sent between them are forms of pattern and organization. In the case of the hylomorphic schema, it would be that the mould would *inform* the brick, giving matter its form through their relation. This is why, to Wiener, information is a *measure of organization*—Wiener's theory also emphasizes the way in which an emitter *commands* the receiver to perform some act. Command and control in his view are key features of the communication of information. What is *new* in Simondon's conception of information is that he distances himself from this command and control conception, showing how that which "commands" must be prepared, calibrated, and that which receives, prepared, calibrated. Communication of information in a relation is *reciprocal,* and born out of the relation of two terms.

[24] Gilbert Simondon, *Individuation,* 26.

similar to what, in Spinozan terms, would be called affections— a body's capacity to affect and be affected, "by which the body's power of acting is increased or diminished, aided or restrained, and at the same time, the idea of these affections"[25]. Simondon explains the continuation of the power of nature in man through similar terms. The *phusis* is explained, not by the laws of nature as divulged through mere cause and effect but involve "the capacities to produce effects"[26].

In essence, Simondon advocates for a future in which the capacity of technical objects to produce effects is better appreciated and understood. If this were the case, the kind of human flourishing we would see is one where technical invention takes priority. Understanding the reciprocal causality set in motion at the moment of technical invention introduces the possibility of transformation of the socio-political field.

Technical Invention and "Innovation"

Simondon's discussion of technical invention has proved controversial. For example, Daniela Voss views his focus on technical invention, along with the reformulation of alienation from technics to labour, as ignorant of the background upon which technical objects are built, utilized, and deployed. Technical objects exist in social fields which condition their use. They can be utilized and directed to exploit others, to exacerbate or even *establish* conditions of domination and subordination. Thus, it is quite strange to place responsibility for these exploitative conditions on the object, when clearly, it is the *human* which applies these techniques, regardless of an object's internal constitution. It is strange

[25] Benedict de Spinoza, *Ethics* (Urbana: Project Gutenberg, 2009), III
[26] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 214.

to put responsibility for exploitative conditions on the object itself when clearly it is human *uses* for certain objects that are exploitative. This is what Simondon gets wrong about the seeming "technophobia" of those that were resistant to the changes of the industrial revolution. For example, the Luddite movement at the crest of the 19th century was not actually a resistance to industrial machines themselves, or to technology in general. Chabot rightly point out that "Their rejection of the new system of production was a targeted response to the systematic negation of their traditional rights."[27] The real, lived, *practical* experience of workers and technology was always as tool, and their own relation to the factory was "as part of a mutilated humanity."[28] The reduction of Marx to a "loss of private ownership" is misunderstanding the social and economic factors that went into the shaping of the industrial world[29]. The example Voss uses to display this is of an automated spinning machine, designed in such a way that only small children could clean and operate it. It was a common accident that sometimes these children would be crushed [30]. Were it not for the exploitative conditions already in place, such a machine would not exist. Economic and social factors shaped the industrial world.

Voss's second criticism of Simondon's focus on technical activity is that even this form of creative expression is subject to capture by capitalist relations, entering the products of creative expression into circulation as an object within the market, as a commodity, thus retaining the conditions of alienation of labour. The concept of "innovation" in current use is prevalent in "the current appearance of cognitive capitalism,

[27] Pascale Chabot, *The Philosophy of Simondon: Between Technology and Individuation* (London: Bloomsbury, 2013), 42.
[28] Muriel Combes and Thomas Lamarre, *Philosophy of the Transindividual*. (Cambridge: MIT Press, 2013), 125
[29] Daniela Voss, "Invention and capture: a critique of Simondon" *Culture, Theory, and Critique*, 60:3-4 (Fall 2019): 4, 16.
[30] Voss, "Invention and Capture" *Culture, Theory, and Critique*, 16.

which celebrates the creativity and inventive capacity of the worker, in which so-called creative jobs have much more flexible space-times yet are no less oppressive"[31] The notion itself functions to mask relations of domination and subordination, and create an ethos of free creation while further obscuring the asymmetrical capitalist relation from sight. Simondon's utopian vision of technical invention ultimately cannot escape what Voss calls "a subtending logic of innovation, that of capital."[32] Technical creation will always be subsumed.

In response to Voss's first concern, we may look at where each of Marx and Simondon's stance on the technical object lead us in terms of our ability to critique. In Marx's view, with the social and economic domains being the ultimate origins with regard to the trajectory of technical development, the object itself is exempt from any meaningful engagement, and it becomes all the more difficult to ask *how* the technical object contributes to this socio-economic field beyond the mere utilization of tools. In Simondon's view, the object is not exempt—technical objects cannot escape criticism. It is possible to map the operational schemes of technical objects to see how they aid in establishing those relations of domination and subordination, what they make possible, how they amplify these conditions. Examples of technical objects that have been designed *for the purpose of* domination or with the obvious intent to subject humans to horrible treatment, do not quite demonstrate any meaningful counterargument to Simondon's theory of technical alienation. It is true that these exist, it is true that such design occurs, is purposive and absolutely *pervasive*, and that the lived experience of technical objects are not ideal. But shifting the focus to the technical object above and beyond the socio-economic conditions which

[31] Voss, "Invention and Capture" *Culture, Theory, and Critique*, 18.
[32] Voss, "Invention and Capture" *Culture, Theory, and Critique, 18.*

surround them, are what will give us a clean technical operational *taxonomy* to be able to understand different features of technical objects and the effects that come about through their deployment. To set aside certain external aspects in order to get a clearer picture of the field is not a new technique, and is what has enabled the different natural sciences to gain their precision (and to finally find areas of meaningful convergence, e.g., biology and chemistry as separate fields, enabling biochemistry.) The industrial modality can be criticized while being able to salvage elements to take forward which would presumably be stable enough to introduce into ever new contexts. All of the machinery responsible for the political economy that Marx critiques can be taken apart, analyzed, repurposed, and even discarded. Knowledge of this decomposability and re-cycling will give us what is missing in the picture of technical engagement, that is, one of *escape*, which ties into Voss's next concern.

What is thought of as "innovation" in the contemporary capitalist sphere must be distinguished from veritable technical invention. While this form of technical innovation, the type of "creativity" which is being promoted within the private sector is doubtless problematic, as Gille (1986) notes, invention is 'disappearing as a distinct entity'[33]. But it is not in the way that Voss describes: that the invention "needs to make a certain leap toward becoming a predominant operation in the technical system."[34] No, technical invention has less to do with this "predominance", and more to do with the planting of seeds by way of technicity.

[33] Bertrand Gille, *The History of Techniques. Volume 1: Techniques and Civilizations*. Trans. P. Southgate and T. Williamson. (New York: Gordon and Breach), 63.
[34] Daniela Voss, "Invention and capture: a critique of Simondon" *Culture, Theory, and Critique*, 60:3-4 (Fall 2019): 19.

True technical invention must meet certain criteria which are distinct from social pressures to be considered a veritable invention. These criteria can be captured in Simondon's notion of technicity. What we think of as "innovation" is often *not* a veritable technical invention, since these so-called innovations may arise with very little technicity[35]. The technical object's measurement of success is not one that is limited to its perfectibility in accomplishing one particular function. Instead, what is important to technicity is an object's internal coherence—the marrying of several functions which were once incompatible.

We may think of technicity as the increasing stabilization of the object (beginning from an aggregate of disparate features which are less compatible, to becoming more and more internally synergistic), but along with this increasing stability is also a crucial component which ties back into the notion of information replacing that of form within the hylomorphic schema. At the same time that an internal coherence between parts and functions is established, the object is also further enabled to undergo transformations—to be de- and re-stabilized, opening the possibility of an indefinite future development. A veritable technical invention, then, should be one that is open to further individuations, again, proceeding stochastically—provisionally determinate—until its next restructuration. The growing technicity of an object should also be able to be traced, like an organism's phylogenetic lineage[36]. This is the paradoxical status of the technical object, appearing closed in the past, but open to the future. A truly developed technics is one that leaks, jumps from metastable state to metastable state.

[35] Simondon attributes this lack to an over-aesthetized technics.
[36] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 26.

In sum, a high degree of technicity within an object indicates that the conditions of deployment are broadened.[37] This broadening is thanks to the increasing stabilization of the object, being able to persist through a wider variety of circumstances. This persistence is *not* due to stabilization alone, but to the *metastability* that the object provisionally attains, and can be suspended in, until the system becomes oversaturated with tension to the point of requiring restructuration. This is why objects do not communicate to each other qua stable beings but through what extends beyond the stable being[38].

The reason why Simondon's type of technical invention does not fit into the capitalistic notion of "innovation" by this point may not be clear. It is part of my goal throughout the rest of this work why it is that technical activity provides, more accurately, methods of escape, rather than capture. For now, I will briefly attribute this view to the fact that Simondon's work does not privilege the bounded object over the environment to which it is always coupled. Doing this gives us not only a more robust understanding of the *criteria of a truly technical object* (because environment establishes rules, boundaries, requires consideration of balance), but gives us part of the machinery involved in social transformation[39].

A technical object is metastable to the extent that there is always a pre-individual reality to which it is connected in the moment of invention that propels it forward into a

[37] Gilbert Simondon, *METO,* 75.
[38] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 209.
[39] To state that an object is "truly technical" may appear at the outset to be a staunchly evaluative statement rather than a descriptive one. This is where I will invoke the notion of practicality—a pragmatic approach to the technical object where the truly technical object is one that has survived several "generations" is one which has evolutionarily beneficial features. To understand how to build an object that is "truly technical" is to understand which of these features have potential for longevity and for what reason. There would be empirical reasons, rather than staunchly evaluative ones, for technical decisions which lead to a properly technical object which has a high degree of *technicity*.

new system state. If we are to compare the metastability of the technical object to a vital being, the fundamental difference between the two is that the vital being is able to carry its preindividual milieu around with it, whereas to the technical object it is *given* by humans through our inventiveness and imagination[40]. The preindividual milieu includes the set of possibilities which allow an individual to communicate with and become incorporated in the collective. It is the "weight of nature that is preserved with the individual being", what makes the being "more than unity and more than identity."[41]

To understand the notion of a pre-individual milieu, we need look no further than standard physics, which takes *potential energy* into account in its calculations of force. By doing the same in our philosophy and acknowledging potential energy as a *real* energy, to be actualized when certain thresholds are met which give it a direction, and force, the image of metastable systems as the fundamental operational scheme for all being becomes clear. To take potential energy as real is also to take "every veritable relation as having the status of being and as developing from within a new individuation."[42]

A relation between two terms constitutes a system state which contains within it a problematic. This is not to be mistaken for a problem that requires resolution, where two disparate terms can only be resolved by the elimination of the weaker one. The problematic may persist within the system state, and may well even become part of the new system's

[40] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 58, 60.
[41] Gilbert Simondon, *METO,* 253, and *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 5.
[42] Gilbert Simondon, *Individuation*, 8.

operational organization, and will only require a new resolution when the system reaches a point of oversaturation.[43].

Technical objects evolve through this process Simondon calls *transduction*, which is similar to the way seeds transport information in the propagation of a species. Some of the object's margin of indeterminacy is pulled into its own functioning when irresolvable tension from a previous state is resolved in a new one—polarized forces are maintained by subsuming them in the resolution[44]. The movement from system-state to system-state, the charge of potential energy that makes a system topple over into requiring a new structuration, and the information that then brings about a new organization unique to the system are all parts of the process of individuation which are just as important to analyze as the resultant "individual," this being really just the suspension of a stable period in an ultimately metastable system[45]. The individual, in reality, overflows. To give the concept of the individual such privilege over other aspects of individuation is a limitation on our thought which obscures what overflows from view.

Technical activity continues an object's relation to its pre-individual milieu—giving the object potentials that are ripe for actualization under specific conditions. The same reciprocity that was missed out on in the hylomorphic schema is what has escaped us in our understanding of technical objects and how they shape our world. That is, at the

[43] The terms involved which precede and make up this point of oversaturation is labelled the state of disparation. This is when a fundamental difference exists within the system state that creates tension. Simondon's prime example of a disparation undergoing transductive resolution is that of binocular vision. When the left eye and right eye contain two images that are different (not so different, not so similar, but just different enough), the brain must resolve this disparation by incorporating both into a single image, giving rise to depth perception. (See: Gilbert Simondon, *Individuation,* 16, 694.)
[44] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 152.
[45] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 16, 68-71.

macro-scale of technical objects to society, we can see technical objects as that which informs our broader social field, establishing possibilities for action, channels of communication, and transformational potential. This is why Simondon says that "to construct the technical object is to prepare an availability."[46] It is an availability of *information*, relating man and world to the extent that a stochastic pathway is carved out through the relation that only the technical object can establish.

The theory of the social that arises from this understanding of technical activity goes far beyond economics or sociology. It is not the Marxist humanist view where man takes ultimate precedence over nature and becomes the measure of all things, nor is it that we are powerless to direct the ebb and flow of nature's energy. Simondon wants to theorize the interaction between the social and the material, their inseparability, and reciprocal causality[47]. Technical reality, the ensemble of technical objects which constitute an enmeshment, enters into relation with both nature and human society in order to makes available different courses of action, to the point of throwing the existent reality into an altogether new configuration. Technical activity is *inventive*.

In the following chapter I will elaborate more on what it means for an environment to be on equal footing as the individual which lives there. In Simondon's view, this is a crucial aspect to understanding any object under consideration. In a sense, the environment *is* its object, and vice versa.

[46] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 251
[47] Muriel Combes and Thomas LaMarre, *Philosophy of the Transindividual*,

Chapter Two

Techno-Geographic Milieu, Non-Organic Life, and Information

Technology creates a world. The network structure of technical reality is best thought as a "second nature" grafted onto a geographic milieu[48]. This second nature organizes itself by creating centres—key points and key moments around which a theatre of gestures, actions, and norms proliferate. In this way, the technical object is always a mixed one, carrying within its makeup aspects both human and earthly.

Since the invention of modern technology, this networked reality has taken on an increasingly stabilized form. Technology has progressed much since the era of railway tracks, or the first networked electrical grid along with its substations. We are now in an era of the inter-network, that is, networks of networks, which, while relying on material structures in place, furnishes us with connectivity that can be described as mostly virtual.

As this virtual connectivity deepens, however, it seems that technology's geographic relation to the world recedes further and further into the background. There is a troubling element to this detachment from the earth. Our own reliance on geographical conditions tends not to be recognized unless disruptions, energetic or material, shock us into awareness. In reality, the geographic milieu is a key player in the man-machine coupling. We still rely on energy grids, those scattered tendrils with their own

[48] Though this term "second nature" is only really utilized in reference to the intuitive knowledge of the craftsman, it is a useful notion to think about the initial stages of technical evolution where the technical network begins to establish key points nearly isomorphic to the natural milieu. As technology progresses, one may expect this "second nature" to become more concretely integrated into the natural milieu, no longer taking on this role of a secondary graft. Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 107, 196.

topographical schemes, WiFi towers must be placed *somewhere*, and we have seen time and again how inappropriate it has been to engage with the geographic milieu haphazardly. As Simondon notes, "To throw a bridge over an inland sea, to attach an island to the continent, to pierce an isthmus, is to modify the configuration of the earth, to undermine its natural integrity"[49]. Thus, even with the increasingly virtual tendencies of our technological engagement, care must be taken to ensure the earth's own metastable eco-systems, upon which technology's own self-subsistence is contingent. This environmental concern is not *purely* for the sake of "the environment" with regard to the preservation of human life, but can be understood as a technical necessity—for an object to have internal coherence and perfection of function, the external conditions of its functioning must be known.

This chapter deals with problems that arise from the absence of consideration of the geographic milieu in current technological discourse, and demonstrates why it is that true technical sophistication will take this environment into account. My goal is to coax out the role of the techno-geographic milieu as it relates to the technical object. Along the way, I show that the distinction that Simondon makes between vital individuation and physical individuation, do *not* necessarily occur between organic and inorganic lines, but can also refer to the process of individuation of their intermingling.

In fact, to restrict our consideration of life to "vital" individuation, if we are to use this term to denote the organic, living and breathing individual, is to arbitrarily over-privilege but one aspect of life. The geographic milieu itself is something very much alive, in the sense that different localities may constitute something like a quasi-individual system, have an interior and an exterior, with organized pockets within. I will expand on

[49] Gilbert Simondon, *METO*, 140.

this theory of nature which does not restrict life to organic over non-organic beings. Instead, matter is that which flows[50]. Within the flow, boundaries serve as veritable limitation only insofar as it enables an object to form, and grow into its own active component. Bennett (2005) states that "humans and nonhumans live and act in open wholes that pulse with energies, only some of which are actualized at any given time and place"[51].

When different energies are aggregated and channeled into a particular direction, they are charged with power to function as a seed, a germinal power, generating points of bifurcation. Bennett's is a theory of objectal *agency*, one that goes beyond usual thinking about intentionality. The notion of intentionality limits agential thought to represent *human* agency, but does not capture the world of causal action in the natural world. Removing the notion of intentionality from agency stresses the operational isomorphism between the "acts" of humans and non-humans. To blur this distinction is to recognize that materialities are capable of forming "cultures"—systems in which interactions between disparate entities may catalyze a process of growth unique to that environment. To think materiality in these terms is to recognize not only the plurality of causes but the ultimately collective nature of emergent phenomena—several lines moving in various trajectories meeting at a singular point to constitute a provisional agential body that sets a cascade of effects in motion. Nature expresses itself through these contractions and spurts and gives rise to mixed milieus. Agency in this view is "distributive and composite"[52]. Plants, gases, and factories,

[50] Thomas Nail, *Lucretius I: An Ontology of Motion* (Edinburgh: Edinburgh University Press, 2018), 73-74 Nail finds in Lucretius's view, contrary to popular interpretation of the atomic view, instead speaks of matter that *swerves*. "If we think of things as fundamentally distinct, discrete, or separate entities, then there can be no connection, motion, or change between them." If things cannot be affected, then it would require a divine *ex nihilo* cause in order to set them in motion. But for Lucretius, matter *is* motion.
[51] Jane Bennett. "The Agency of Assemblages and the North American Blackout" *Public Culture.* 17(3) (2005): 461
[52] Jane Bennett, "The Agency Of…" *Public Culture,* 446.

can be conceived as *actants,* according to Latour, which have force, influence, and motion—machine and world alike act directly on the human world.

The Reticular Network: "Firmly Rooted" Technics and Implicit Form

In Simondon's work, there is a synchronization of the technical object to a sort of organic becoming where an object's concretization is analogically related to that of a living being's own individuation. The only difference between technical objects and living beings here are that living beings carry their associated milieus around with them. The living being carries with itself a self-organizing capacity due to its ability to actualize its share of potential energy. The technical object, on the other hand, must be introduced to its associated milieu through human action. When the technical object *does* come into relation with its associated milieu, its capacity for individuation becomes awakened. This ultimately natural capacity (natural insofar as it is a process of individuation, not insofar as it is created by man) gives a regime of natural elements a coherence in the technical object, enabling its operation. Due to its position at the interstices of human and world, technology establishes a communication between these domains. Along with being an extension of nature, the technical object itself can be thought as an extension of the human world, just as a tool is an extension of the body structurally and gesturally, it is also an extension of the capacities of the materials of which it is constituted.[53]

A concrete technical object extends both the capacities of the human and the geographic world being brought into relation that is able to prolong a movement or gesture.

[53] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 139, 183.

This is why when technical reality develops, objects begin to relate to one another (because it arises from these networks.) Communication channels are established between the object and others which constitute its environment, much like a how living being evolves in response to a repertoire of external stimuli. This allows the object to become responsive and become part of the emergence of a reticular networked structure, "technical ensembles are true networks concretely attached to the natural world"[54].

A technical network is thought by Simondon to be the high point of technical development. This type of network is one that should hook up to the 'key points' of the world, where exchange between an individual and a milieu take place. The world is a "network of places and things that have a power and that are bound to other things and other places that also have a power."[55] We may think of the power the desert oasis, drawing a variety of heterogeneous creatures to it to carry out their different life activities. Key points of technical development are thought to share a similar power. This is because, if we recall from the previous chapter, object with a high degree of technicity naturally have this "open" component to them, being available to become connected to, expanded, built upon. They are "that by which the human being is immediately bound to the world."[56]

Interestingly, in the development of a technical network, Simondon recognizes that there may be an associated disappearance of traditional cultures and local customs. While an unfortunate loss, Simondon claims that "technical development creates a far more important and much more firmly rooted concretization than the one it destroys"[57]. This is because certain traditional customs are *only* rooted in the human world. *Purely* human

[54] Gilbert Simondon, *METO*, 228.
[55] Gilbert Simondon, *METO*, 178.
[56] Gilbert Simondon, *METO*, 178.
[57] Gilbert Simondon *METO,* 178.

traditional customs are transportable from place to place. Customary dress, table setting, practices with non-technical elements are typically able to be replicated by diaspora members outside of their traditional region. Practices with technical elements, on the other hand, are "rooted" in the natural milieu. Of course, we must address the colonial implications of this statement: to say that it is a *better technic* that leads to the disappearance of traditional cultures would demonstrate striking ignorance of the violence with which certain technologies were mobilized to ensure that such cultures were erased. However, we may be able to penetrate this perplexing statement by looking at what practices *have* ended up surviving against these practices of domination.

In the Malaysian Kinabatangan estuary, the people of Mumiang came together in 2021 to address a dwindling supply of fish in the area[58]. While fishing has been the main economic activity for the village, over time, several causes (from an increase in commercial fisheries and unpredictable weather changes to agrochemicals and water pollution) have led to a diminishing supply over time. While many of these problems were too complicated for them to do anything about, what *was* in their control were fishing methods. The indigenous Suluk people volunteered their operational knowledge of the estuary to inform a more sustainable fishing practice.

Rengga is the Suluk word for an underwater structure—an ecosystem made out of a sunken tree trunk amidst an arrangement of mangrove roots, rocks, and sediment. These components together act as attractors for certain schools of fish, as they serve well for breeding and feeding grounds. The Suluk people mimic these structures in order to catch fish with ease. Constructing them in the right places at the right times is a clever and easy

[58] Neville Yapp. "Mangrove, moon, and the tides: the story of progress in the Mumiang Locally Managed Marine Area of the Suluk People" *ICCA Consortium* (10 Aug 2022)

method to fulfill their economic need. Due to this method's great success, the technique became banned for a time. However, with this current community-led project, the use of *renggas* has been re-introduced, this time with carefully monitored locations and tempered frequency of use. Deploying them in designated no-fishing zones allows juveniles and eggs to develop well enough into adulthood without disturbance. This is a way to maintain population balance alongside fishing activities.

The manufacture and deployment of these technical systems are an interesting mix of methods both traditional and technical. Coupled with modern mobile data technologies, the fishers are able to monitor the health of their sites and adjust their behaviour as needed. According to Simondon's description of the 'merely human' tradition versus the technical, this particular technical ensemble can be considered a "more firmly rooted" concretization than would be methods adopted by industrial fishing practices. This is because the technique realizes a coupling with the natural milieu that is able to work *with* nature's own creative force, prolonging (and even assisting in) proliferation. The more such practices develop along with the land, the more *firmly* rooted they become, as they begin to participate in the natural network of key points. It also operates without creating an absolute *dependence* on human intervention and does not lead to depletion. Instead, the natural and human rhythms of development have been synchronized and enabled to subsist through further technical sophistication[59]. This is what it means to establish a network that connects human, technical, and natural features. It is "that by which the human being is immediately bound to the world […] points of contact and of mutual, mixed reality, places of exchange and of communication because they are formed from a knot between two

[59] Gilbert Simondon, "Culture and Technics (1965)" *Radical Philosophy*. Vol 189. Tran. Olivia Lucca Fraser, (Jan/Feb 2015): 68.

realities"[60]. Part of the success of this reality is owed to the technical practice's ability to engage nature's implicit forms to the extent that the cultural practice becomes *embedded* in the natural milieu.

A particularly salient aspect of this example of a rooted technic is the practice of imitation or mimicry of natural forms. The sameness between the mimicked object and the original structure begins to shift from an incidental expression to a deliberate one, the more that humans begin to involve consideration of components within the natural milieu and how these relate to their own actions. We should not view this mimicry of form as a repetition of the same, taking this replicative effect as the goal. We should instead look at precise ways in which the mobilization of these structures differ from the original. This practice differs not only by virtue of the one performing this replicative function (that is, the peoples' technically constructed, artificial breeding bed) but also by the effects that this activity produces. Through this difference we see that the "sameness" of the rengga is only useful insofar as it establishes a communication channel—an opening or gap—for the human to saturate the field with its own difference[61]. In fact, it is not that the practice establishes the *same* which enables us to view it as a veritable technology, but that it is *just different enough* to produce an explosion of potential effects. Along with the introduction of data technology which enables fisheries to track changes in the population, the human community can now participate in the rhythms of this natural flow. Human life rhythms begin to sync up to the riverbed with more and more precision.

[60] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 178.
[61]

With this fishing technique as context, looking at Simondon's statement that "one can only connect to a network, adapt to it, participate in it," shows us that the purely virtual technical implication of Simondon's networked focus is not plausible. In other words, the networked reality of social media communications, or the network of networks (the internet) is *not* a veritable technical object[62] (or at least, remains an under-developed version of a technical object.) What is implied is that objects which do not take the physical reality of networks into account, and take stock of the full technical and natural *reality* which is being established, will never construct a truly sophisticated technical network. In truth, these "disembodied" technologies, i.e., social network platforms, do not yet meet the criteria of a veritable technical object: technicity. Not only does Simondon state that a network "dominates each technical ensemble", implying that the existence of a technical ensemble is not *enough* to constitute a network, but also that "one cannot change the network, one doesn't construct a network of one's own."[63] There is something of the network that *preexists* the technical ensemble. From this, we can only conclude that a network arises through participation in the natural milieu, working with what preconditions of a network already exist within nature. But this pre-existing network is not one that is static and thus entirely mappable structurally. In fact, it requires that one participate in its rhythms and understand the temporal dimensions of the natural structure, to build an understanding which then becomes operational. The natural milieu provides the both the constraints and the conditions of the technical object's functioning. Without knowing truly what it is that we are connecting to, we cannot know what new configurations will arise, what sorts of connections will be established, what, exactly, is being expressed.

[62] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 229.
[63] Gilbert Simondon, *METO,* 229.

Implicit Forms, Material and Organic Co-Evolution

A networked reality arises out of the mapping of nature's implicit forms. Implicit forms only ever become apparent in the relation of an object to its environment. In its inchoate, incipient stages, knowledge of nature's implicit forms is grasped by the craftsman's intuition. It is through the direct experience of these forms that the craftsman is able to work on the object. In this way, such artisans are "dominated by the object"[64], unable to abstract this knowledge in the form of general laws. On the other hand, the engineer can be said to dominate the object, as the sciences are able to make intelligible these different features and render them into a universalized conception. According to Simondon, the veritable technician would be able to engage objects at both the levels of the craftsman and the scientist/engineer—being able to intuit nature's implicit forms *and* render them explicit. It is important to recognize that the initial perceptual attentiveness that gives rise to this knowledge can only be delivered by this craftsman-like intuition. An example of this intuitive knowledge can be seen in Werner Herzog's *Happy People*.

Gennady Soloviev, the central figure of this documentary, teaches his son to make wooden skis using his community's traditional techniques. During the making of these skis, Gennady explains to viewers what goes into the work. First, one must select the right tree—a small wedge is made at the trunk to assess the health of the tree and the direction of its grain and thus whether it would be a good candidate for the procedure. Then there is the process of prising off long planks of a desired width and a gradual splitting of the plank from the rest of the trunk in the direction of the grain so that the skis will be able to take advantage of the wood's natural flexibility. The wood's natural grain, the continuity of the

[64] Gilbert Simondon, *METO*, 105

fibres, is respected. Then, throughout the process of bending the tips of this material over the flame is an hours-long process requiring the cooperation with the wood. The craftsman follows a certain rhythm—*timing is everything in the bending of the plank's fibres.* Success requires a marriage of the natural object, the craftsman's kinetic energy, and his technical *sensibility*. Gennady shows his son how to place his hands on the plank of wood when it is mounted over the fire, describing to him the precise amount of pressure to apply—what to feel for—in order to prevent breakage while achieving the desired result. Gennady describes the purpose of this attentive hand*: "so the wood will get used to it."* [65]

Of course, these felt conditions have intelligible terms associated with them—pressure, heat, humidity—but without the initial experimentation and practice one would not know where to begin. Deleuze and Guattari find an example of nature's implicit forms in the practice of metallurgy.

> "What metal and metallurgy bring to light is a life proper to matter, a vital state of matter as such, a material vitalism that doubtless exists everywhere but is ordinarily hidden or covered, rendered unrecognizable, dissociated by the hylomorphic model. Metallurgy is the consciousness or thought of the matter-flow, and metal the correlate of this consciousness.[66]"

To practice metallurgy is to participate in a sort of "combinatorial productivity"[67], and acknowledge that materials are active and pregnant with forms. By treating natural objects as active, a knowledge is unearthed that allows for active *participation with* the

[65] Dmitry Vasyukov and Werner Herzog. *Happy People: A year in the Taiga*. Christoph Fisser et al., 2010. Film.
[66] Gilles Deleuze and Felix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia* (Minneapolis: University of Minnesota Press, 1980), 409
[67] Manuel Delanda. "Machinic Phylum" *Technomorphia* (1997) URL: https://v2.nl/archive/articles/the-machinic-phylum

object. One is neither subservient to, nor seeking to dominate matter. Instead, by engaging with the wood as Gennady did, we may say that the object was enabled to "explore" a world of capacities and relations that it would otherwise have been unable to access.

When we speak of an object's capacities, we often speak of them with regard to the goal for which the object was created. This mode of thinking translates, as well, into our interpretation of organic life. We speak of the amoeba's process of phagocytosis as a predator-prey relationship, in which the amoeba seeks to accomplish the goal of eating. Since Darwin's time, the prevalent account of biological function was a goal-oriented one. The organism is *teleological*, and adaptation through evolution pushes itself forward this way: life evolves for a purpose, becoming ever more specified toward a particular end[68]. However, alternate accounts of biological evolution which criticize this teleological interpretation have become more and more prevalent.

For Varela and Thompson, the fault of the teleological approach rests in the view that an organism moves its way through the environment as though the environment were some static backdrop to which they must acclimate[69]. What is more plausible is that an organism's environment is not pre-given, but constructed simultaneously with the organism it hosts[70]. Co-evolution between object and environment proceed through a process of what Varela and Thompson call mutual specification. For example, rather than viewing the bee as having evolved to be able to seek out flowers, and flowers awaiting bees to come along and assist them with reproduction, it is all the more likely that this mutual specification occurred. Bees' vision enables them to be sensitive to ultraviolet light. Flowers, on the

[68] Michael Ruse and Joseph Travis, *Evolution: The First Four Billion Years* (Cambridge: Belknap Press of Harvard University Press, 2009), 364.
[69] Francisco J. Varela and Evan Thompson, *The Embodied Mind* (Cambridge: MIT Press, 1993), 193.
[70] Francisco J. Varela and Evan Thompson, *The Embodied Mind*, 192-196.

other hand, have high contrast reflectance patterns under UV light. While it may be tempting to ask "Which came first, the world (ultraviolet reflectance), or the vision (ultraviolet sensitivity)", this would *already* presume that some linear progression of "x and then y" has taken place, when what is more likely is that the history of *coupling* has made each organism become what they are.

In addition to this view of mutual specification, the purported purposiveness of an organism's evolutionary features is weakened. It is not so much the case that the world is governed by a logic of "survival of the fittest."[71] Selective pressures need not be so strict as to call for a particular feature with a particular configuration, but the environment may exist as "broad constraints" in which a being need only retain features which are "good enough" rather than optimal, leaving much more room for variety[72]. This is the process of "natural drift", where several possible lines of development and organization can be explored. As to the question of where these broad constraints come from, we need only turn to the notion of implicit form, as Simondon writes, "the discontinuity of matter intervenes as form [73]." It is through the *differences* within matter, and through mutual specification with the environment that an evolutionary lineage is established. Discontinuities serve as a limit, defining lines along which matter finds form.

Nature is porous. We may broaden the notion of bodies to speak of objects with greater or lesser degrees of porosity in order to acknowledge the permeability of all bodies. Porosity is best described through the operation of a membrane. All bodies are in possession of a membrane, which modulates the flow of matter-energy through them.

[71] Ronald Bogue, *Deleuze on Music, Painting, and the Arts* (Routledge, 2003), 68
[72] Francisco J. Varela and Evan Thompson, *The Embodied Mind* (Cambridge: MIT Press, 1993), 196.
[73] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 39.

Membranes perform a selective function. Each membrane possesses a measure of selectivity which allows some things to pass from the exterior to the interior and not others. An organic being is as much a body as is a chemical compound, a pond, a lightning cloud, or a technical object. All have a membrane through which the object's operation is defined, by what it brings into the system and what it leaves out. With each selective measure, what is allowed to pass through the body leaves its mark upon it. Caffeine passes through the membrane of my stomach, becomes metabolized by the liver, leaves through the urine. In this process of passing through, not only has the coffee undergone significant change (chemical decomposition), but the body it passes through is also affected, as evinced through changes in heart rate and blood pressure, and a felt enhancement of my capacity to act. As Varela and Thompson explain, "We are claiming that organism and environment are mutually enfolded in multiple ways, and so what constitutes the world of a given organism is enacted by that organism's history of structural coupling."[74]

The technical object is a body made up of components that are "mutually enfolded" in its environment. The detachability of technical devices does not take away from this fact—it merely contributes to the illusion of the absence of this co-constitutive tendency which characterizes individuation. The entire process of technical development performs a structural coupling with its natural milieu in a way that establishes communication channels between technical objects and nature, enabling the one to affect the other. The technical object is set into nature, just as the natural milieu is *brought inside* the technical object. According to Elizabeth Grosz, this mutual enfolding is the precise coming-into-being of a

[74] Varela and Thompson, *The Embodied Mind,* 202.

substance[75]. The porous membrane allows us to understand how the pre-individual (the *excess* of energy and information in a given system) operates. *Non-organic life* continuously creates, constitutes and dissolves through the double conversion of exterior and interior[76].

We can see the implicit forms of nature in relation to technical objects as the same "broad constraints" mentioned in Varela and Thompson's organic becoming[77]. "Broad constraints" in nature function as limits only insofar as they allow matter to attain form. They are experienced by the organism not as catalysts to a determinate trajectory but as introductory distortions—oversaturating the field with them, leading organisms to break off from their previous trajectory and seek a new formation. With this in mind, the technical object can be said from a materials standpoint to have certain evolutionary constraints (constraints based on what the material *can do*), as well as broad environmental constraints (what is or is not absorbed from the outside) depending on the milieu in which it is placed. Those constraints may shift and change slowly as the object alters that environment once coupled to it. Just as the environment is a creation of living beings, the environment is likewise a creation of technical beings[78]. The environment *responds* to the introduction of a technical object.

Implicit forms which exist within technical objects are never those of an "absolute genesis", where the technical object itself is fully responsible for its own birth, self-regulation and development. Rather, it is "supported by several layers of natural haecceity

[75] Elizabeth Grosz. *The Incorporeal: Ontology ,Ethics, and the Limits of Materialism* (New York: Columbia University Press, 2017), 171-174.
[76] Manuel DeLanda, "Non-Organic Life" *Zone 6: Incorporations* (New York: Urzone, 1992)
[77] Francisco J. Varela and Evan Thompson, *The Embodied Mind* (Cambridge: MIT Press, 1993), 196.
[78] Lewontin. "The Organism as the Subject and Object of Evolution," *Scentia*. 118 (1983): 63-82. Introduces the idea, or the statement, that the environment is a creation of the living being.

that it systematizes, reveals, and clarifies and that comodulate the operation of form-taking"[79], which can only *be* supported by the contribution of forms *both* natural and human. Haecceity, as mentioned earlier, refers to the "this-ness" of an object. First coined by Duns Scotus, some use it to denote an "essence"—it is not merely sum of the object's parts, but what exists as, and alongside the sum of its parts[80]. It is important to this notion because what exists above the sum of its parts is precisely what will contribute to this notion of "implicit form", which it seems can only arise with interaction with a human able to conceive it. It is always in relation to an environment that anything takes form. The world is a world of porous limits. In this sense, the object *is* an environment. The network of natural haecceities operate as a provisional constraint on the technical object and give it its form-taking capacities. Some interiorities serve as exterior to others, and vice versa.

Thus, instead of characterizing the goal of technical creation as destroying these constraints, these *implicit forms*; instead of viewing natural limits as *limitations*, the true technical operation cooperates with and participate in a modulation of such constraints while allowing them to subsist. Such natural limits are described by Chabot as the "here-and-now" of individuation[81], because it is precisely the place at which past and future converge—what was, and what is to be. In a sense, then, participation with implicit forms, is participation in the construction of a *present*.

We have reflected on the permanence of certain cultural practices in addition to what Simondon calls those "more firmly rooted" technologies. Simondon judged cultural

[79] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 42.
[80] Ronald Bogue, *Deleuze on Music, Painting, and the Arts* (New York: Routledge, 2003), 34.
[81] Pascale Chabot. *The Philosophy of Simondon: between technology and individuation* (London: Bloomsbury Press, 2013),

practices that have disappeared to have done so because they were rooted only in human rather than properly technical practice. While at the outset such a statement appears to promote a colonial view according to which a more "advanced" technology is introduced that eradicates existing cultural practices, a closer reading of Simondon reveals that a truly developed technics is one that is able to integrate into the natural milieu, participate *with* nature's implicit forms, and coevolve with its environment. Thus, to call those technologies which destroy certain cultural practices "more firmly rooted" is not to promote haphazard practices of domination and subordination of people and world, rather it is to acknowledge that a sophisticated technics engage both the human and natural world, establishing a communication that allows the human to take part in, and engage with, natural processes of individuation.

Ecosystems and Individuation

Let us look now at Simondon's distinction between physical and vital individuation, and first to identify the basis for this distinction. Physical individuation is described as an "instantaneous, quantum, abrupt and definitive" development. It is best captured in a process like crystallization, where a singularity is introduced from outside into a supersaturated solution. The introduction of this singularity shocks the solution into a new trajectory of formation. These singularities do not carry within themselves the information required for this new structuration, but as mentioned in Chapter One, information arises through the relation between this singularity and the system to which it becomes related. "A compatibility must therefore exist between the milieu and the seed, a compatibility which is

above all not of the order of identity, but rather of difference"[82]. What is needed for this sharing of information is first a disparation, a tension, a difference which meets, and doesn't exceed, a certain threshold for both the singularity and the solution to have internal resonance—an "exchange of energies and movements in a determined enclosure, a communication between a microphysical matter and a macrophysical energy based on a singularity whose dimension is intermediate and topologically defined."[83]

Vital individuation is the "slowing down" of physical individuation—this is to say that it does not occur *after* physical individuation, but in the midst of physical individuation, where physical individuation finds that it can no longer resolve tensions internally, with the same mechanisms and must find its resolution at a different order of magnitude[84]. This distinction between physical and vital systems replaces that between living and non-living matter[85]. Instead, there is primary individuation, which captures the theoretically infinite expansion of crystallization, where individuation occurs at its limits, and secondary individuation, which introduces the vital. Here, in the domain of the vital, the difference from physical individuation is the vital individual's capacity to receive information[86]. The vital system's secondary individuation is "capable of successively receiving several inputs of information (of compatibilizing several singularities instead of iterating the single and initial singularity cumulatively and through transductive amplification)."[87]

[82] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 60.
[83] Gilbert Simondon, *Individuation*, 29.
[84] Gilbert Simondon, *Individuation*, 163.
[85] Gilbert Simondon, *Individuation*, 162.
[86] Gilbert Simondon, *Individuation*, 163.
[87] Gilbert Simondon, *individuation*, 163.

The physical-vital distinction must therefore not be mistaken for the organic-nonorganic distinction. For an image of individuals beyond the conception of clearly bounded forms, think of a patch of soil, a valley, or a riverbed as something that is capable of receiving several inputs of information and acquiring its own vital form. The porosity of the eco-systems may only differ by degree. It is the admixture of organic *and* nonorganic spheres that make up precisely the organ-ization of systems. *Pure* physical individuation or *pure* vital individuation are only abstractions from what actually happens in nature. In reality, physical and vital individuation often comingle, which becomes apparent if we broaden the scope of our analysis to include all actants within the environment. For example, *pure* H2O does not exist in our waterways—there are other beings which constantly populate the field and affect what any H2O *can do*, that is, what informational role it can play for other entities that surround and interact with it. H2O is absorbed and transformed by the organisms that populate the environment. As my reflection on the *rengga* shows, even dead trees can become key points of such mixed milieus in a body of water.

In nature, pure physical individuation, i.e., the constitution of a singular membrane is not the norm. Disruptions are likely to occur. According to Simondon, vital individuation is a suspension of the course of physical individuation, by "slowing it down and by making it capable of propagating in the inchoate state."[88] For example, the process of crystallization rarely occurs in its pure form. In fact, findings show that in real cases of crystallization, heterogeneous seeding leading to distortion and interruption is more common than not, due

[88] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 164.

to impurities[89]. What is interesting about this impure seeding is that the crystallite, while at first growing on the seed, increases in elastic tension due to impurity-driven distortions (most distortions being concentrated near the seed) which oversaturate the object, then break off to enter a state of relaxation. The broken-off crystallite continues to grow as a separate body. However, in this case, the crystallite which was borne around the initial seed now *acts* as an impurity to the secondary crystallite, Impeding its growth[90]. The origin of growth now serves as limit. Distortion here serves as a differentiating factor sufficient for such a difference to persist even in detachment. The crystallite born from distortion has begun its own lineage. What was once interior has now become exterior, selected out from the secondary crystallite's edges.

Even within the microscopic physical scenario then, we see a disruption and a fundamental difference that induces a further differentiation. We can say that the singularity introduced in this impure crystallization process quickly multiplies and that the initial introduction of this plurality is what allows its iterative tendencies to produce this difference. It is precisely these halts which allow information to continue to arise between bodies—it is the creation of new bodies. This impurity of physical individuation shows that the line tween physical and vital information is thinner than once thought, because it is much rarer to find an instance of *pure* physical individuation, where information from one seed becomes iterated continually[91].

Information was mentioned in Chapter One as "what arises in the interaction between two disparate systems". To explain this notion further we may describe it in terms

[89] E. Allahyarov et al., "Crystallization seeds favour crystallization only during initial growth" *Nature Communications (15 May 2015) [Accessed Aug 19 2022]*
[90] E. Allahyarov et al., "Crystallization seeds…"
[91] Interestingly, Deleuze speaks of these "impure crystallizations" in his chapter on the refrain as well (see:

of the relationship between emitters and receivers. In the cybernetic view, the role of the receiver is that of a passive recipient of the signal given by the emitter. However, Simondon revitalizes this notion of information in order to give it a role in describing individuation. In his view, information is an operation—it is a factor that sets in motion the process of individuation[92]. Information is what delivers a resolution to energetic and material tensions, being that which arises out of their tension. Information can be described as the variability of form and what establishes an internal resonance between two disparate parts. In this view, the emitter and receiver both can take up an active or passive role, and the identity of each affected system is not stable but becomes fundamentally transformed. Information, then, performs a modulation function.

Informational exchange can be seen in ecosystems both in the interaction between organic beings and in the mixture of organic and non-organic parts. The geographic milieu functions like a membrane when it comes to human activity and the integration of technical components. The implicit forms of the geographic milieu serve as membraneous limits, performing a selective function on the information allowed to transfer into certain ecosystems while preserving their connection to the pre-individual milieu. They serve as a limit in the sense that they are the stage upon which individuation plays out and that guide technical form. Thus, it is possible to understand certain ecological systems, these "contingently obligatory" relations, as quasi-individuals that may well be described as vital systems. For example, the distinct "spheres"—the hydrosphere, atmosphere, biosphere, and so on, are often *de facto* mixed—gases, H2O, minerals, bacteria, algae, soil are linked and comprise a quasi-individual assemblage.

[92] Gilbert Simondon, *Individuation in Light of Notions of Form and Information*. trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 80.

Ecosystems, being that which make up the natural milieu, house the here-and-now of the limiting geographic milieu in its function as a membrane—or as many membranes, interwoven, folded and layered among each other. If an interior space is what designates an individual, and the exterior is what exists outside of the individual, then information is what is selectively allowed to enter this interior space in order for the overall system to undergo a transformation. Information is what exists in the *relation* between interior and exterior, is what in-forms the implicit form that arises through an interaction between two systems, giving the objects their haecceity.

Problems with the Notion of a "Cloud"

I have described a way to look at technical activity that does not distinguish itself so wholly from nature, as in each case the processes of creation are operationally similar—they are both domains in which we are able connect and form networks of mixed milieus. Engaging with ecosystems as quasi-individuals acknowledges their capacities both in response to integrated technologies and as something that can fundamentally change its characteristics too. I now would like to finish this chapter with a reflection on contemporary technology. Contemporary practices of technics seem for the most part unable to understand the geographic milieu as one part of the networked structure that is established in this technical "second nature", and attempts to do so typically operate as though the object were still distinct from, and not in communication with a static background. In *A Geology of Media,* Parikka sheds critiques the development of an increasingly disembodied conception of the technical world at the expense of what grounds it. Inattention to the geographic share of a techno-geographic milieu neglects a crucial part

of the reticular structure which Simondon envisions. This is exemplified in the notion of a 'cloud' where data is stored in servers external to user-end devices. The natural conditions of this 'cloud's' existence are obscured from public sight. As Parikka notes,

> The transistor-based information technology culture would not be thinkable without the various meticulous insights into the material characteristics and differences between germanium and silicon—or the energetic regimes—whether that involves the consideration of current clouds (as in server farms) or the attempts to manage power consumption inside computer architectures[93]

It is knowledge of material reality that had given us these technologies, and part of the process of discovery has been to experiment with different combinations of elements. At the level of elements, knowledge should recognize that our mining activities are part of the techniques involved in the construction of any technical element—part of the structural coupling of technics and world—the element thus far is not independent enough from the ensemble of industrial mining practices to subsist without it. User-end devices, such as smartphones and laptops, likewise require a number of earth-sources the construction of which is currently only realized in an industrial modality. Not only does the mining of the material leave its geological footprint, but the disposal of such devices has become part of the technical culture to the extent that one can truly say that technical *waste* is now a part of our geological reality. We may describe the modern development of technology as leaving its own peculiar layer of sedimentation, shaping the very geographic landscape[94]. Tonnes and tonnes of smartphones are discarded yearly, as consumers replace them for slightly

[93] Jussi Parikka, *A Geology of Media,* 57.
[94] Jussi Parikka, *A Geology of Media,* 81.

modified versions. As anthropologist Monserrate remarks, "The refuse of the digital is ecologically transformative."[95]

We see the pinnacle of this detachment from the geographic milieu in cloud technology. This is where data is stored in servers external to our user-end devices. The natural conditions of this Cloud's existence are often overlooked in technological discourse, but the material reality of the Cloud cannot be overlooked. There is a complex web of structural and energetic conditions which sustain this technology, from fiber optic cables to cellular towers, energy grids, servers, and cooling mechanisms. The infrastructural component, the very *second nature* which comprises Cloud computing, is thus rendered invisible to users. In reality, data centers rely on these human and natural elements to sustain their activity.

Continuation of this practice will ultimately lead to a degradation of the environment (but this degradation must be thought differently from that of the regular decomposition into the pre-individual milieu which ultimately allows further individuation to occur.) As mentioned before, to deal with these material dependencies, we must treat them as active components of the techno-geographic milieu. We may ask whether, and how, such infrastructure fits into Simondon's vision of a reticular technical network. On the one hand, we may feel the need to dismiss his statement that "one cannot change the network, one doesn't construct a network of one's own"—because that is precisely what we have done. On the other hand, taking into account his description of implicit forms and the integration of the natural milieu, we get a different reading.

[95]Steven Gonzales Monserrate, "The Staggering Ecological Impacts of Computation and the Cloud" *The MIT Press Reader* (14 February 2022) ****

Proper integration is the key here, but we also find some guidance as to what that looks like, which is *not* to impose a "totally new and foreign form on matter that would remain passive vis-à-vis this form."[96] There are certain ways in which humans force matter to take on forms that ultimately exhaust their active elements. A good example of this is the technique of cross-breeding species, which often produce sterility as an unwanted side effect. We may also think of the Dust Bowl in the 1930s, in which ignorance of the role of native deep-rooted grass in the Great Plains promoted the deep plowing of virgin soil.[97] Deep-rooted grass in the plains played an important role which was overlooked by agriculturalists who attempted to utilize the same practices as in other areas. Instead of familiarizing with the environment, first, action was taken. This deep-rooted grass not only anchored the soil but assisted with water retention, keeping this soil *active* and life-bearing. Without this grass, the soil transmogrified to dust, blowing aimlessly in huge billows across the landscape, creating significant damage along its path.

As we can see, mis-integration can occur not only in an object's internal constitution but its relationship to its surroundings. In the next chapter I will expand on this notion of integration with regard to ecosystems and argue for their quasi-individual nature. Different environments have different thresholds for integration with different techniques. Once that threshold is surpassed, a technical intervention can become parasitic on the environment's active force. To bring the notion of ecosystems into the consideration of individuation, we can start by troubling our division of nature into categories of active and inactive components, vital and non-vital.

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[96] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 42.
[97] See: Donald Worster. *Dust Bowl: The Southern Plains in the 1930s.* 2nd ed. (Oxford: Oxford University Press, 2004)

Conclusion

In the previous chapter, we saw technical activity as fundamentally different from labour, and technical creation as participation in nature's own evolutionary process. This was understood through the notion of the pre-individual milieu and moments of object's evolution was understood through the actualization of an objects potentials, which led to a restructuration. This current chapter looked at how, exactly, it was that the technical object could be said to participate in nature. In order to fully grasp this participation we had to look at the technical object beyond the lens of an atomic individual. Looking at the relationship between an organism and its environment, gave us tools to understand the relationship between a technical object and its environment. In each case, there are processes of formation which are akin to the informational exchange which occurred between the brick and the mould: If we recall Simondon's revisions to the hylomorphic schema it was to highlight the *reciprocity* of this process of formation beyond that of control. This same *reciprocity* of information exchange can be seen between technical objects and the environment within which it is situated. The interiority of the technical object is in communication with its exterior environment.

This is why when we begin to think of the network structure of technical reality, we must think of it as firmly rooted. A "network" is an arrangement of intersections, interconnections. Its primary feature is to *link* things to other things. The possibility of linkage in a technical object can only subsist if it does not, by virtue of its existence, degrade or destroy that which it is linked to. The reason why the geographical milieu comes into play at all is because this arrangement of intersections and interconnections is not a

proper network if it precludes the ability of the object to continue on a trajectory of interlinkage. With the geographic milieu we see, for lack of a better term, *rules* for interlinkage in the shape of *implicit forms.*

Chapter Three

Sustainability as a Technical Principle

My first chapter discussed the primacy of technical alienation, and Chapter Two explained the importance of the geographic milieu to technical creation. Explaining Simondon's technical focus enabled us to think about the geographic milieu and its relation to technical creation. A geographic milieu folds together organic and non-organic components, with technical activity as the mediating action that is establishes a relation between man and world and makes the geographic milieu an active participant in technical creation. Thus, in the reticular network which Simondon espouses, an escape to the purely virtual realm while overlooking geographical, geological, ecosystemic factors overlooks the very reality of the network itself, rendering us unable to think through its changes and effects. I turn now to a discussion of the concept of sustainability, which applies the earlier framework to contemporary practice.

The notion of sustainability is what comes to mind in a discussion of methods of engagement or mediation between technics and world. While flawed, sustainability is not a notion we should discard for its shortcomings but one that should be reformulated to suit the theoretical position at hand. By "flawed" I mean that in typical ecological discourses, sustainability is supposed to be a purely cultural notion, and relies on a principle of temporal exchange that is ultimately self-defeating. As I shall show, by carefully modifying this common understanding, sustainability can become the principle that drives this coupling of technical and natural objects so that the concretization of technical objects can occur alongside the exploration of implicit forms.

I will first discuss technical cultivation, then look at how the notion of sustainability currently functions in order to locate its effects. We find that a theory of relations must undergird sustainability in order to properly describe the complexity of the various effects of an attempted technical integration, precisely one that imposes, as mentioned before, a "totally new and foreign form". The passivity of matter that I mentioned in the previous chapter does not mean the object made passive is fully negated, for in reality it is simply transformed—even if disintegrated. We may think of the wandering dust on the plains of North America in the 1930s—still with the power to affect change, though unanchored. A string of events follow in which the death of the system reverberates through all connected ones (the earth reacts, people are affected). But this reverberation shows why keen knowledge of the natural network is so crucial, and over and beyond a view of creation as innovation what is required is an understanding of technical creation as modulation. I conclude with a note about technical activity and its usefulness in "stabilizing" key points which serve as centers of further activity.

Critique of the Notion of Sustainability

Sustainability is presented in current discourse as a "social goal". While concern for ecosystems and biodiversity are often implied in the use of this concept, its primary purpose is to prevent us from compromising future human generations from meeting their needs[98] . The notion of sustainability has been used to promote a reduction of consumption, a modification of our ways of living, and reduction of greenhouse gases. However, this use

[98] Brundtland, G.H. *Our Common Future: Report of the World Commission on Environment and Development* (Geneva, 1987: UN), 7.

of the term is reserved for the cultural sphere, which is taken only to be embedded in the technological domain post-hoc, or as a goal set for a particular technical object, rather than being a consistent dimension of all technical thought. This leads the term to lose its techno-ecological relevance, and makes it ripe for exploitation. The term easily creates the illusion of sensible technical activity while functioning to protect the status quo[99].

The term sustainability has held a floating status for a while. In different fields sustainability is either an economic and distributive problem, a scientific concern, or an ethical one. The problem is that sustainability is tied to the notion of responsibility and calling on individuals to act if they *care enough* about the environment. There is a choice to be made between a vulgar sustainability, "exploit as much as desired without infringing on future ability to exploit as much as desired", or a virtuous one, "to exploit as little as necessary to maintain a meaningful life." But I show that neither of these are viable solutions[100]. So far ethical notions of sustainability call on individual actors must change their practices, consume *responsibly,* in order to live a sustainable life. However, from our earlier reflections on technical creation and the geographic milieu, we find that in reality sustainability is more accurately understood as a technical principle, due to the mutual implication it calls for between people and their activities. A better appreciation of this relationship will give concrete content to the free-floating notion of changing practices.

My goal of situating sustainability ties into Simondon's criticism of domestication practices, set next to a method of cultivation more amicable to nature's own self-creative process. There is a useful distinction to make between methods of 'culturing' that can be

[99] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 192.
[100] John A. Vucetich and Michael P. Nelson "Sustainability: Virtuous or Vulgar?" *BioScience* vol. 60, No. 7, (Summer 2010): 539

applied to the geographical sphere, that is, between practices of cultivation and domestication[101]. This becomes relevant to the analysis of technical activity when we look at the notion of sustainability and our existing attempts to integrate this as a cultural notion first and foremost, shaping practices prior to utilizing technologies to accomplish particular goals. If we are truly concerned with "sustainability" at any level, a broadening of scope is necessary that requires a reformulation of existing notions that make sustainability depend on human intervention, but rather is able to sustain nature's own self-creative force.

Two techniques fall under the umbrella of cultivation, though only one perpetuates individuation. These are the ways that technical activity can perform a 'culturing': the first is through the process of domestication, which, while productive, exhausts the system's "specific vital potentials". We can use this term to encompass both animal and plant life which is being 'raised', or bred, by humans towards a certain goal. What characterizes this particular technique is the fact that it works directly on the object[102]. The problem with this direct intervention is that there are often obstacles to the object's access to its pre-individual milieu, which makes it rely on the human technician in order to sustain it. The species becomes dependent. It needs "continual technical assistance, and this is because they are artefacts; they are products of technicity"[103]. The human in this case, instead of taking up the relation of mediation between nature and technics and allowing for natural processes to play out, intrudes directly on the object's operation, forcing the object to adapt to human rhythms for its continuation. The object that is worked on directly becomes enslaved to humans. Domestication techniques are more likely to lead to a detachment from nature,

[101] Gilbert Simondon, "Culture and Technics" *Radical Philosophy*. Vol 189 (Winter 2015): https://www.radicalphilosophy.com/article/culture-and-technics-1965
[102] Gilbert Simondon, "Culture and Technics", 17.
[103] Gilbert Simondon, "Culture and Technics", 17.

forcing the object down a hypertelic path—one in which the object's features become *disadvantageous* to the organism, limiting the object's threshold of functioning. This hypertelic path may not *always* be the case, but is more likely to occur if operating in ignorance of environmental considerations. In contrast, a veritable *cultivation* is one that "respects the forces of evolution; it can even stimulate them" [104]. The methods involved in this form of cultivation include working indirectly on the object by acting on its environment rather than itself, which maintains a species' biological potential. This is due, in part, to the co-constitutive relationship between an object and its environment. A veritable cultivation respects the forces of evolution, and allows the object to maintain a certain level of freedom[105]. The principles of cultivation of the object additionally have a feedback effect on humankind. It is through the environment that the human being is transformed, if *human* development is the object. Thus, a veritable cultivation in the human sphere must first approach the environment, instead of seeking to influence human action directly. Any meaningful social shifts first occur with the application of techniques in the modification of the environment.

When it comes to the construction of a technical object, as well, we see that an understanding of the environment is required first, before any meaningful engagement with the object can be had. We may look back to the use of *renggas* discussed in Chapter Two, where a feature of the environment was mimicked and placed strategically to stimulate the species' flourishing. Maintaining the species' biological potential means maintaining the reservoir of singularities that make up the pre-individual milieu, and requires a keen

[104] Gilbert Simondon, "Culture and Technics", 18.
[105] Gilbert Simondon, "Culture and Technics", 16, 17.

understanding of the entanglements that sustain the metastable systems which constitutes the object.

By reformulating the definition of sustainability we are able to move closer to the understanding of culture as cultivation. Here, I once again fold in the understanding of implicit forms and the geographic milieu. Cultivation depends ultimately on a form of participation with the object of cultivation (as opposed to a relationship in which the object is worked-on), which is always attached to a particular system—one must know when to water plants, when to give sunlight, when to adjust humidity, and so on. To view this type of knowledge as simple intuition is not entirely accurate. Its contents can be described quite precisely in technical terms. At the moment, this direct experience lies within indigenous or rural communities which rely on the land and its mixture of tempos, but this is not *a merely* intuitive sense, only being relegated to this category due to the inability of the sciences to engage meaningfully with this form of knowledge. Science right now only goes so far as to recruit these experiences post-hoc and to observe geographical *reactions* to human a technical intervention that does not take them into account from the beginning.

Accepting Simondon's theory of individuation means that what were once 'obscure zones' can be brought to light, and practices shaped to be conducive to the kind of flourishing that takes stock of the natural processes of individuation. Part of what is required to transform our technical practices is to get to know these processes and how they operate not by a principle of exchange (between form and matter or past and future), but by unfolding the share of preindividual reality that is already present within any metastable system. Technical mediation should facilitate an increase in information.

This idea of "principle of exchange" draws from those formal definitions and practical applications of sustainability that operate with an understanding of nature as a "scarce resource." As we will see, these definitions fundamentally operate on a static definition of nature, one that cannot account for the process of individuation, and which lead ultimately to stagnation or at best a gradual process of decay. We require a more robust understanding of temporality to find the right vision of technology and proper technical integration with the environment.

The inappropriateness of domestication for understanding the sort of sustainability proper to technical development arises from the same information-theoretical error that Simondon points out in *METO*, namely, within an information theoretical approach where the receiver is only placid and the emitter is active, which shows an ignorance to the conditions brought about by information. In other words, the human is viewed as an active, form-giving element in its relation to the object, while simultaneously viewing the object as passive, inert matter. In reality, there is a reciprocal exchange between the emitter and receiver, where the receiver is prepared through certain 'openings' to communicate with the object, these openings which are conventions shared by both the emitter and the receiver[106]. The *resolution* is always thought of as that which comes from the outside, but in truth the solution, or the *information* required for resolution, never rests in the emitter alone—the receiver must be primed to accept and give meaning to the emitter's message by virtue of its own constitution[107]. This is why the "green" designation of a technical intervention needs a closer look. There are a number of modifications to human behaviour, as well as a

[106] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 673.
[107] Gilbert Simondon, *Individuation,* 687.

number of technical interventions which are promoted under the umbrella of sustainability, but it is precisely here that we must proceed skeptically, as the blanket promotion of a vague notion may risk turning something like sustainability into a 'floating signifier', a term introduced by Levi-Strauss to denote a concept that has become detached from a singular context and can seem to be equally appropriate in many different contexts[108].

Sustainability is not a concept well-suited for this 'floating' status. Sustainability as defined by the Brundtland Report is the principle of "meeting the needs of the present without compromising the ability of future generations to meet their own needs." [109] It is primarily an ethical concept, promoted as a social goal that would ideally unify groups around this singular end. I want to focus on the language of temporal exchange here (present/future) to point out some gaps in this conception. First of all, there is in this definition an implication that our present meeting of needs may conflict with those of a future generation. There is also an implication of risk due to ways of living and acting that diminish future peoples' access to the earth's limited resources. Such a definition of sustainability can be described as negative insofar as it is a principle that wishes *not* to compromise future peoples. The needs of the future are contingent on the method of fulfillment of the needs of the present. However, the notion of sustainability is not meant to capture a principle that should be valid for only one period of time, but should be upheld at each present, relevant to each future.

[108] For example, the term "liberty" may find contradictory uses in different circles of discourse. (See: Jeffrey Mehlman, "The 'Floating Signifier': From Lévi-Strauss to Lacan." *Yale French Studies*, no. 48 (1972): 10–37. https://doi.org/10.2307/2929621.)
[109] Brundtland, G.H. *Our Common Future: Report of the World Commission on Environment and Development* (Geneva, 1987: UN) 7

There are a couple of methods that are able to achieve this goal of non-compromise. The first is to diminish the practices of the present in order to leave resources available for the future, meting out these resources over time. The second is to change the methods of production and consumption altogether to somehow circumvent the issue.

However, a closer look shows us that the first solution is untenable—not only does a conception such as a "scarcity of resources" rely on a notion of the environment as static provider of such limited resources. This reasoning also leads to the situation where consumption levels would approach zero if we were to account for each future, leading the concept to promote decay or at best stasis. The second solution is imprecise, and the goal of not compromising future needs' rests on the assumption that one can predict these "future needs" as well as the landscape within which these needs will be shaped, which is especially problematic if we take the view that environments and organisms engage in a gradual co-evolution, in which case the principle requires present generations to predict something that is ultimately unknowable.

The truth is that upholding sustainability as a purely 'human' value is powerless to effect change, especially technically medicated change. The role of ethics in the technological landscape at the moment is centered on post-hoc modifications or overly simplified solutions, too narrow to penetrate the field of reciprocal causality. While ethics-by-design is a concept that may at face value escape this criticism, it does not take the required *operational* perspective, opting for structural or functional solutions instead, which are still too singularly goal-oriented in their design to produce an adequately concretized technical object. Relegating sustainability to a purely ethical domain also erects a barrier to understanding proper technical reality and how its embeddedness in the geographical

milieu can give rise to information. In order to resolve this lack of clarity I propose a redefinition of the notion of sustainability and argue for its role as a *technical* principle rather than a simply ethical one. In order to do so, let us first locate the current use of sustainability in terms of what it *does,* what it allows us to do at the moment.

Often, this term sustainability is coupled with the term "development", which has led to some very problematic outcomes. Several thinkers have noted the oxymoronic function of this coupling of terms, and demonstrate thoroughly exactly how this coupling provides the illusion of ethical practice while continuing practices of domination, destruction, and displacement[110]. Often, the type of "development" sought forcefully imposes Western values and practices onto communities which have less power or stake in the process[111]. While presented as the aim of providing all peoples with a higher quality of life, many contemporary development practices tend, in fact, to do the opposite[112]. Practices of urbanization and industrialization tend to lead to the displacement and disenfranchisement of those unfortunate enough to fall outside the scope of consideration.

Technical Mis-Integration: A Study of Hydroelectric Dams in Nepal

The situation of hydroelectric dam construction in Nepal provides a more robust philosophical-technical understanding of the current conceptual operation of sustainability in the context of development. According to a recent needs assessment, in 2018-19 the total

[110] Development critics include: Arturo Escobar, James H. Brown, James Ferguson, and others.
[111] Arturo Escobar, *Pluriversal Politic: the real and the possible* (Durham: Duke University Press, 2020), 6, 14-15.
[112] See: Bill Cooke and Uma Kothari, eds., *Participation: The New Tyranny?* (London: Zed Books, 2001) and Wolfgang Sachs, *The Development Dictionary: A Guide to Knowledge as Power* (London: Zed Books, 1992) and for a view which attempts to carve a middle-ground between anti-development and development: Peter Penz, Jay Drydyk, and Pablo S. Bose, *Displacement by Development: Ethics, Rights, and Responsibilities* (Cambridge: Cambridge University Press, 2011)

generation capacity of the nation was around 1200 MW. Since the instalment of the Upper Tamakoshi Basin dam that number has increased to about 1800[113]. Interestingly, the nation's peak electricity demand was around 1300 in 2019,[114] and with most of the methods of hydroelectric production lacking storage capabilities, this left nearly 460MW, or the equivalence of nearly 240 Walmarts, of unused surplus.

Although a proportional excess may be acceptable provided that need is met, plans are in place to build even more hydroelectric dams in the Himalayan region in order to leverage as much generating capacity as possible. The "theoretical potential", which is the amount one could generate using all available waterways, sits at approximately 83,000 MW[115]. The "technically feasible potential", which is the amount of power practically attainable (taking into account factors such as safety, economic sense, etc.) is around 42,000 MW, or about half of the theoretical potential[116]. The aim is to make Nepal "one of the major green power exporters in the region. The revenue from power export will help to achieve economic prosperity and generate funds for education, healthcare, housing, agriculture, and infrastructure."[117]

The nation has set generation targets reaching another 10,000 MW of power generation by 2030[118] (sacrificing local to support find citation in there), but in the

[113] Prithvi Man Shrestha, "Once power starved Nepal now aims to export electricity", *Kathmandu Post*, August 10, 2021, https://kathmandupost.com/money/2021/08/10/once-power-starved-nepal-now-aims-to-export-electricity
[114] Firoz Alam et al., "A Review of Hydropower Projects in Nepal," *Energy Procedia*, 110 (March 2017): 581–85, https://doi.org/10.1016/j.egypro.2017.03.188.
[115] Deepak Adhikari, "Hydropower Development in Nepal", *Economic Review for Nepal Rastra Bank*, 75, https://www.nrb.org.np/contents/uploads/2021/09/vol18_art4.pdf
[116] Deepak Adhikari, "Hydropower Development…"
[117] Firoz Alam, et al. "A Review of Hydropower Projects in Nepal" *Energy Procedia.* Vol. 110 (March 2017): 585.
[118] Kenichi Yokoyama, "Nepal's Infrastructure 2030 – What's achievable and how?" *Nepal Economic Forum*, July 19 2016, https://nepaleconomicforum.org/nepals-infrastructure-2030-whats-achievable-and-how/

meantime, implementation has been somewhat chaotic. Shailendra Guragain, former president of the Independent Power Producers Association of Nepal, has admitted that generation capacity has already exceeded peak demand. Thus, an increase in consumption is necessary so as not to let electricity go to waste. As Guragain says, "Nepal needs the external market to sell excess power in the short-term as domestic demand has not been growing to consume all upcoming power."[119] Kul Man Ghising, former manager of the Nepal Electricity Authority, mentions a number of avenues which could be used to increase local consumption, such as promoting the use of electric ovens, converting power from local distribution to larger factories in order to meet industrial demands, and reducing nighttime rates to encourage usage.

The concern of waste has scarcely been acknowledged, as authorities are hoping that energy export will eat up the excess production. However, it is concerning from the standpoint of sustainability that local inhabitants need to be encouraged to increase their energy consumption. Manufacturing a previously non-existent local electricity "need" is a bizarre way to mitigate the problem of waste, especially in association with hydroelectricity, which is typically considered a green technology. The questionable nature of the "sustainability" of this technology becomes clearer when we take into account that the IPCC has predicted that the Himalayan region will be severely affected by global warming, with temperature predicted to rise at twice the rate of the rest of the globe. Up to two thirds of the glaciers are predicted to melt by 2050[120].

[119] Prithvi Man Shrestha, "Once power starved Nepal now aims to export electricity" Kathmandu Post, August 10, 2021. https://kathmandupost.com/money/2021/08/10/once-power-starved-nepal-now-aims-to-export-electricity

[120] Susan Solomon, et al. *Climate Change 2007: The Physical Science Basis: Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge ; New

Not only would these dams face risk of destruction due to periodic landslides and flooding, but we must note as well that the Himalayan region, being the youngest mountain range is the world, is still undergoing a process of growth itself, making it extremely earthquake-prone[121]. There is something troubling about this picture that is difficult to square with the purported "green" designation of hydroelectric energy. How can a practice so damaging to the environment and surrounding peoples be allowed to continue?

Technology is conceptually severed from the environment in which it operates, with the object's substance being taken to exist in a non-communicative vacuum. Viewing the construction of hydroelectric dams as "sustainable" in such a context—where significant damage is being done not only to the topographical, geological, and biological integrity of the area but to the human life that exists there as well—seems ludicrous in the face of mounting evidence. But this is what is being promoted. Besides the disastrous consequences for the region due to global warming, there are concerns that these additional dams will have a trickle-over effect on *Adivasi janajati* (the Nepalese term encompassing a number of indigenous populations) in the region that rely on these ecosystems for their means of subsistence[122]. Studies have shown the effects of land-use on existing ecosystems and barriers to glacial sediment supply to downstream biodiversity. Such biodiversity is

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York: Cambridge University Press, 2007), 493, and P.D.A. Kraaijenbrink, M.F.P. Bierkens, A. Lutz, et al., "Impact of a global temperature rise of 1.5 degrees Celsius on Asia's glaciers" *Nature*, Vol. 549, No. 7671, (September 2017), 257-260. https://doi.org/10.1038/nature23878

[121] Phillipus Wester, et al., Ed. *The Hindu Kush Himalaya Assessment: Mountains, Climate Change, Sustainability, and People* (Cham: Springer International Publishing, 2019), 137.

[122] See: "Damn the Dam The Impacts of Hydropower Development on the Rights of the Adivasi Janajati of Nepal" *Kathmandu School of Law Review*. Vol. 7, No. 2 (November 2019)

necessary to maintain the dwindling agricultural sector, which approximately seventy percent of the population currently relies on for their livelihood[123].

In considering whether these practices are technically sound, we at once notice that a veritable coupling with the geographic milieu is not taken into account, even if utilizing the flow of water to convert to energy for human use seems to be taking into account water's implicit potential. However, in the broader context, this technical intervention can be said to be parasitic on its own environment as well. Due to its inability to account for the effects on land-use and biodiversity of connected waterways, the hydroelectric dam's ability to connect to the network is yet incomplete. On the flipside of the dam's effects on the environment is the environment's effect on the dam should it be situated in an environment to which it has not been optimized. The proper health of the technical object, and its ability to achieve its function is compromised if attention not only to the natural environment but the existing technological one is not taken into account.

Sustainability as a Technical Principle: A Redress

In order to redirect sustainability into a more appropriate channel, let us begin by doing away with the notion of development. Development as a broad, overarching goal is not a helpful concept for understanding technical activity. This view of technical development rests ultimately on a questionable biological theory. In our chapter on organic and non-organic individuation, the teleological approach to technical change was shown to be unlikely. Technical individuation does not orient us towards a pre-determined end, but

[123] S. Neupane et al., "Impact of Thirteen Run-of-River Hydroelectric Projects on Land Use Land Cover and Ecosystem Services in Nepal." *International Journal of Energy and Water Resources*, February 18, 2022.

rather, it is that technical objects have the tendency to undergo non-teleological phase transitions. Phase transitions in nature occur because of an increase of tension that causes the organism to restructure itself in such a way that it can accommodate this tension, making it a part of its functioning. The way the human mind and the eyes coordinate to establish binocular vision is an example of this restructuration[124]. Two images are provided, one by the left eye, another by the right. These images are similar, but *just different enough* for tension to exist between these images. However, the brain is able to converge these in order to construct a unified vision with greater depth. Technical objects, too, undergo this increase in tension, and yet such objects may persist in their state of tension, because it is only human imagination which can provide it with a resolution.

For the same reason that this notion of teleological progress is rejected in organic becoming, the economic growth model of development is unviable. Perpetual economic growth presumes the possible attainment of a transcendent state. Human capital-P Progress, is pre-loaded with assumptions about human value—urbanization and industrialization are taken as naturally progressive developments, when in reality, these are only two out of an infinite variety of forms of development. Sustainability has little to do with the meeting of human needs, since it is harmful to presume that such needs are at once both predetermined and *not* defined in relation to a particular environment. Basic needs in terms of sustenance and water may exist at the core, but the different patterns of behaviour which are centred around their attainment can vary. While human needs are of course woven into the fabric of the system under consideration, the truth is that there are many possible ways to engage with the world in order that these needs be met. A broad, overarching notion of

[124] Gilbert Simondon. *Individuation in Light of Notions of Form and Information*. Trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 694.

"development" also does not make sense without an object to provide it context through its situatedness. We may speak of development if it is oriented to a particular object or system, but when speaking of development in general, for all humans, all places, and all systems, we may as well be referring to mere changes without the notions of technicity or sustainability to support them. In other words, development without an understanding of the process of individuation lacks a sense.

Sustainability should be understood in terms of technical activity as the continued connection of the object to its environment, or more specifically, between the object and its pre-individual milieu. The question is not merely whether the object is able to accomplish a particular function. There are many ways to accomplish a particular function. Instead, one should ask whether the object is opened up to more of its own potential. Does the object remain attached to its pre-individual milieu? This pre-individual milieu is ultimately a natural condition—it refers to the natural forces that incites differentiation and fuel individuation. Multifunctionality is a key component here. We cannot assess the object's internal coherence without recognizing the multitude of parts. We are not asking whether these parts are all directed toward one particular function, but whether this multitude can retain its different features while resolving any tensions within the object-as-system. We are asking whether the object is capable of internally redistributing tasks in order to resolve any possible detrimental side-effects. Side-effects are overcome by *integrating* their resolution into the object's own functioning[125]. According to Simondon, *this* is the mark of a genuinely concretized technical object.

[125] Rather than further restricting its functioning to an over-specific level as this specificity leads typically to a decrease in its ability to function well in different contexts.

We may apply this notion to the hydroelectric facility that affects land use and biodiversity. The object becomes an obstacle to its own functioning in the sense that it is parasitic on its environment. It may "function", but only at a relatively abstract level in its ability to convert water to electricity. It, in reality, compromises its own functioning, and *limits* its own domain of application, due to its inability to deal with side effects that arise in its use. The different side effects that this technology both actually and potentially encounter can only be incorporated and integrated into the object's functioning through an act of technical creation[126]. Such incorporation of function must keep in mind the kind of cultivation required so as not to adversely affect the environment, making it ultimately dependent on the object for its functioning.

This is the technical challenge presented when we speak of sustainability, which we can condense into two points. Sustainability as a technical principle requires that the technician must:

(1) Maintain the object's connection to its pre-individual milieu.
(2) Increase the multi-functionality of the object in order to render the resolution to negative side-effects part of its own functioning and have this multiplicity of function be internally coherent[127].

This aspect of multifunctionality is often required for instance where the object becomes parasitic on itself or faces the "easy" solution of self-limitation of functioning which restricts its domains of use. It is an expansion of the technical object's functional

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Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017), 38.
[126] Gilbert Simondon, *METO*, 38.
[127] Gilbert Simondon, *METO*, 38-42.

achievements and an increase in its possible domains of application, increasing its overall capacity. Connection to the object's pre-individual milieu is *sustained*.

Sustainability is a technical notion. It is concerned with a certain continuity of change. Viewing this continuity as what is singled out *within* change would miss the point. It is not the preservation of continuity which should be the ultimate technical goal, but rather the preservation of these individuating motions of life. Continuity acts as a springboard for change--not *just* change, but the birth of a new lineage of objects replete with their own rules of formation. Being able to acknowledge this and use the notion as a technical *guide,* is what indicates technical excellence.

We may think about old notions of progress as the human attempt to bring order to an ultimately chaotic world. Development practices draw circles of safety and predictability, creating environments which minimize the threat of chaos which looms, ever threatening these safe zones. However, what these unexpected side-effects of our development practices have shown, is that chaos is never fully "on the outside", and if it were, this would leave a dead world, stagnant, and without form. Chaos and order in fact exist simultaneously, feeding into one another. This dichotomy is what ultimately enables matter to re-cycle. Chaos and order are two poles of nature's continual conversion of energetic and material flows. What is created anew is never a birth in the sense that something has come from nothing. True creation is one in which something has come from a confluence of the many. In Thomas Nail's reading of Lucretius, the popular statement that "nothing comes from nothing" is shown to be an oft misinterpreted argument *denying* the reality of an Unmoved Mover[128]. Nail performs a remarkable close reading on the original text to

[128] Thomas Nail, *Lucretius I: An Ontology of Motion* (Edinburgh: Edinburgh University Press, 2018), 75.

demonstrate that this view of creation *ex nihilo* by an Unmoved Mover is in direct conflict with the actual text. The full quotation which contains this statement is:

"*Nam si de nihilo fierent, ex omnibus rebus*
omne genus nasci posset, nil semine egeret.

For if things came to be from nothing, every kind of thing
could be born from all things, and nothing would need a seed."[129]

Lucretius here is not, in fact, stating that "nothing comes from nothing." It is rather an argument that "if" things came from nothing, th.at anything could change into anything. Since this is clearly not possible, Lucretius states that this demonstrates the existence of seeds. Seeds in Lucretius' view are not to be seen as entirely discrete objects but part of the infinite flow of matter. They themselves are formed spontaneously through matter-flows. "If the world is only discrete things then they cannot affect each other without changing one another, which would assume some commonality or interconnection between them and the violation of their vacuum-sealed nature."[130] Seeds are the origin of things, what initiates a bifurcation in the matter-flow of life, which themselves were likely constituted through prior seed-making flows. Matter is movement, and the preindividual milieu is what underlies this seed-making process[131].

Chaos and order are what enable matter to perform a re-cycling—a conversion of energetic and material flows, creating anew from what already is. This process of conversion has always been a natural principle, and this is why the notion of creation itself

[129] Thomas Nail, *Lucretius I*, 74.
[130] Thomas Nail, *Lucretius I*, 74.
[131] Thomas Nail, *Lucretius I*, 78.

needs to be reformulated. but with this reformulated notion of sustainability, humans can construct technical objects to begin engaging with this re-cycling process. In sum, connection to pre-individual milieu is connection of the object to nature's evolutionary capacity, connection to that which enables change. This is the importance of the first aspect of sustainability. The second aspect of sustainability as a technical principle refers to the resolution of tension in individuation: Nothing is ever created or destroyed, just converted, modulated. Modulations are typically made in order to resolve tensions with the system state by incorporating them, rather than eliminating them fully[132].

[132] Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017),

Chapter Four

The Role of Counterpoint in a Theory of Technical Composition

This final chapter synthesizes the findings from previous chapters, as they've allowed us to encounter technical activity as creative, relational, and a method of mediation between the human and natural milieu. In the first chapter, I discussed technical alienation as more primary than alienated labour, as it is the technical sphere that prepares and makes available relations of domination and subordination[133]. Once technical activity is uncovered as something that plants seeds of individuation in the natural landscape, we are able to demystify the earth's responses, since technical activity is "firmly rooted" in a geographic network. Contemporary approaches to technical activity tend to commit two conceptual errors: first, that technology is conceptually cut off from the environment that is co-constituted alongside it, and second, that a technical object's is taken to consist in a substance inside the object itself in a non-communicative, non-porous vacuum. The remedy I have explored for these deficiencies is to acknowledge the porosity of organic and non-organic matter and reconfigure the notion of sustainability to reflect this porosity in a technical principle, sustaining access to an object's pre-individual milieu throughout the process of individuation. Engaging in technical creation should be thought of less as a sculpting craft and more as an orchestration. Technical activity should be thought less as labour, and more as participation with matter's own creative force. Doing this should create a feedback loop in which human societies are naturally affected by their embedded

[133] This is not to abscond individual actors of responsibility, but rather that the availability of certain tools and techniques are what enable this.

technical networks, and can provide experimental channels for innovation beyond the industrial modality.

The type of creative exercise which most accurately reflects this technical orchestration is that of musical composition, due to its ability to juxtapose plural forms. To operate with the implicit forms found within natural objects, the technical object must find an opening, a place in which it can insert itself into the natural rhythms. Of course, this fundamentally changes the character of both terms—both object and world are affected. But we are able to distinguish this interruption from the abrupt changes induced by forceful insertion (such as domestication) by focusing on the notion of cultivation and reflecting on what it means to work indirectly on the object. In this way we achieve a theory that is able to induce a transformation of human and the natural world, with keen attention to the rhythms and tempo of natural individuation. Technical activity should preserve nature's individuating power, avoiding complete dissolution, because it is at bottom a natural activity.

I would like to emphasize the musical analogy because it enables us to think *creation, creatively*. In doing so, we link the notion of *creative expression* to a natural force. That the technical object participates in nature, means that it is participating in nature's *creative expression*. Modulation and re-cycling are not only ways in which humans deal with technical objects but are in fact ways of biological, geographical *becoming*. In this chapter we look at *how* to sustain, in the sense which we have defined, where the technical object is connected to its pre-individual milieu, and where the environment is taken into consideration as a component of technical becoming. Musical analogies like counterpoint and refrain will give us a conceptual framework for technical engagement.

I begin this chapter by expanding on the musical analogy used by Deleuze and Guattari to describe natural processes of individuation. In their chapter "Of the Refrain" of *A Thousand Plateaus,* the notion of the refrain is utilized to describe processes of deterritorialization. I show that these concepts are useful for describing technical activity as the proliferation of singularities in the natural environment—planting seed after seed. Finally, I end with a description of *counterpoint* as the musical analogy par excellence for describing the strategies of technical orchestration needed for any technician of ensembles.

Refrain and Territory

The verb "to sustain" has a number of meanings in different contexts. For example, one may sustain an injury, or prolong an existing state. In music, however, the definition of the term refers to "the steady state of sound at its maximum intensity"[134]. Such steadiness merely refers to the experience of the recipient. However, what is being emitted contrasts with the listener's experience of a sustained note. In reality, it is *movement* that is facilitated, the oscillations of the sound waves being pushed forward at maximum intensity.

This musical definition represents particularly well the technical notion of sustainability as earlier described. To sustain doesn't mean to "freeze" something in a particular state, but simply to allow something, such as a sound wave, to press its intensive force into the future. To sustain is to maintain a series of contractions and relaxations. Sustainability as a technical principle means to perform a coupling with the natural milieu,

[134] This definition is taken from the Britannica Dictionary.

to hold the technical ensemble at maximum intensity, when dealing with implicit forms, recognizing the vast realm of possibilities of movement that arise out of this coupling.

It is difficult to locate precisely what technical creation sustains, because it is an *activity* rather than an object and as such is unbounded, or more specifically contains binding and unbinding powers. At this point it is helpful to introduce Deleuze and Guattari's notions of territoriality and the refrain and tie these into our analysis of technical creation.

We may think of a refrain as any short melody which is repeated within a song. In musical theory a refrain is called a musical phrase. It contains within it a beginning, middle, and end. The formal term that Deleuze and Guattari use is *ritornello* which is Italian for "little return". According to Deleuze and Guattari, the refrain is territorial. Within nature, there is an interlaced world of *ritornellos* which co-exist and interact with one another, which can be "optical, gestural, motoral."[135] The notion of the refrain can apply to behaviours, qualities, or traits, all of which then become *territorial*. The refrain establishes a set of repetitions which constitute a habit and each habit constitutes a territory. Birds sing, carrying a refrain, to mark their territory. Dogs urinate, to mark their territory. These patterns of behaviour have the purpose of establishing the animal's own peculiar order within chaos. The refrain aggregates: it is "*any aggregate of matters of expression that draws a territory and develops into territorial motifs and landscapes*."[136] Animals carve out their dynamic territories through the refrain—different gestures and movements perform this constitution. "The rhythms of mating, feeding, reproduction, nurture, play, struggle,

[135] Gillles Deleuze and Felix Guattari, *A Thousand Plateaus: capitalism and schizophrenia*. Trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987),
[136] Gilles Deleuze and Felix Guattari, *A Thousand Plateaus*, 323.

and exploration; the periodic fluctuations of weather, seasons, tides, or currents; the recurrent flows of gestures, movements, sights, sounds, smells, tastes—all combine in refrains." [137]

The refrain is brief, and minimal. It is "the minimum rhythmic or melodic form"[138] (*rhuthmos*), effecting a delicate balance between crystallization and chaos. A refrain can be sung by a child to comfort them in the dark. But one also "ventures from home on the thread of a tune", where the security of a familiar refrain allows the child to discover the world away from home, taking home with him, allowing this notion of home to transform as more world populates his view.

There are three aspects of the refrain, which do not occur in succession but rather comingle simultaneously. These are a center (the point of order), a circle (a form), a line of flight (a "breakaway" improvisation)[139]. The center establishes an interior order, the circle draws and aggregates, establishing an exterior, and lines of flight establish the porosity of the refrain, being lines of improvisation that open it up onto to the future. The refrain is rhythmic—constituted through the relational patterns with the environment which constitute a territory. The edges of each territory are porous, often meeting with things external to be made interior, sometimes coupling with other territories, as in the case of a symbiotic relationship between species. The notion of the refrain shows that creativity does not require a consciousness or subject to be expressed. Nature is autopoetic, self-

[137] Ronald Bogue, *Deleuze's Way: Essays in Transverse Ethics and Aessthetics.* (New York: Routledge, 2017), 30.
[138] Gillles Deleuze and Felix Guattari, *A Thousand Plateaus: capitalism and schizophrenia*. Trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987),
[139] "Nine Notes on the Refrain"

organizing[140]. The living being forms itself according to a theme, or code, which allows the system to selectively engage in a "structural coupling" with different features within the environment[141].

The refrain can be compared to nature's *implicit forms*. The repetition of concentric circles which constitute a tree's rings establish a particular rhythmic pattern over the course of its life. They serve as communication signals; they tell us its age. The refrain contains within it this rhythmic component, as the demarcation of a unique space and duration (distinguished from strict meter, as meter sets limits on the time-spaces that rhythm instead develops)[142]. The territorial risks of the refrain are double. The refrain can be overly territorialized—the same set of notes repeated over and over again—becoming monotonous, and the refrain can be deterritorialized, taken apart until disintegrated, cut up into pulp[143]. But when music is introduced, the refrain undergoes a series of changes, a note here, a pause there, being transposed, hastened or slowed at various points[144]. These become points of recognition, and of transformation—the refrain is deterritorialized to be taken up again in music.

Schoenberg's *Fundamentals of Composition* discusses the technical background of the *motive (or motif)* which is another term for the *ritournello*. The deterritorialization of the motive is subject to certain minimal constraints in order for music to occur. In other words, certain techniques must be employed, care must be taken, in order that the refrain is deterritorialized and given a sense in music. "A motive appears constantly throughout a

[140] Ronald Bogue, *Deleuze on Music, Painting, and the Arts* (New York: Routledge, 2003), 66.
[141] Ronald Bogue, *Deleuze on Music*, 67.
[142] Gillles Deleuze and Felix Guattari, *A Thousand Plateaus: capitalism and schizophrenia*. Trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987), 323.
[143] Gilles Deleuze and Felix Guattari, *A Thousand Plateaus*,
[144] Gilles Deleuze and Felix Guattari, *A Thousand Plateaus*, 323.

piece: *it is repeated*. Repetition alone gives rise to *monotony*. Monotony can be overcome by *variation.*"[145] In variation, only some features are changed while the rest are preserved. Changing the entire motive will introduce too much variation, making it foreign and thus unrecognizable throughout the piece. However, it is possible for all of the features of a motive to be subject to variation: the rhythm, intervals, harmonies, shape, and can be developed further and further throughout the piece, but "such changes must not produce a motive-form too foreign to the basic motive."[146] It is a matter of technical skill to introduce enough variation such that this continuity between the original motif and later variations is maintained, yet becomes different enough not to be monotonous. One can also connect different motives through establishing a common content. Either a similar rhythmic structure, or coherent harmony, can establish a relationship in which multiple motives may co-exist in one piece.

To clarify the relationship between the refrain and implicit forms, we may say that these implicit forms are what are *established* by the refrain within nature, but are not identical to it. This is much like the *implicit harmony* that arises out of a particular musical phrase. As I listen to a particular melody, even if it is for the first time, my mind may be able to build this implicit harmony as the music plays. A simple example is the transposition of all melodic notes into the major third interval of the melodic scale used. The refrain acts as a code or scheme which enables harmonic relations to arise out of it. In a sense, the refrain is the code or scheme underlying all *interior* relations within a particular system, and it represents the result of the selective processes through which systems convert exterior to interior, which have initiated a more or less self-regulatory scheme. The

[145] Arthur Schoenberg, *Fundamentals of Musical Composition,* (City: Faber and Faber Ltd., 1967), 8.
[146] Arthur Schoenberg, *Fundamentals*, 9.

consequences of this discovery to technical creation is that familiarity with the refrain will be able to enable technicians to construct phrases which become variations to each refrain, following implicit forms which arise out of the relation between human and object.

Technical Creation: Counterpoint and Technics

Human art is "a specialized and indirect manifestation of the organism's ongoing formative activity, one that is increasingly detached from other life functions"[147] Humans are not the only creatures able to create art, and art does not require a conscious subject to carry out. It is, in fact, participation with nature's autopoetic force. Technical activity is a special kind of art, as it indicates a graduation from craftsmanship which can only feel or intuit this natural power. Technical activity, on the other hand, can incorporate more and more scientific knowledge to be able to translate the different movements and little refrains within nature into human language, to modulate them with greater efficacy. Through technical activity there is access to a greater share in nature's creative power.

We may characterize the technical object as a sequence of variations on natural themes, a re-cycling of themes or *motifs.* To relate this notion of the refrain to the realm of technical creation, we have only to reflect on the intraspecific relation that arises through the imitation of a birdsong in different species. To say that a bird "imitates" the songs of other species overlooks how this song operates once taken up by the other species.

> It is less a question of imitating a song than of occupying corresponding frequencies; for there may be an advantage in being able to restrict oneself to a very determinate

[147] Ronald Bogue, *Deleuze's Way: Essays in Transverse Ethics and Aessthetics.* (New York: Routledge, 2017), 65.

> zone in some circumstances, and in others to widen or deepen the zone to assure oneself counterpoints and to invent chords that would otherwise remain diffuse, as, for example, in the rain forest, which is precisely where the greatest number of "imitative" birds are found.[148]

Imitation is described here as having either a localizing function (determinate zones) or a network function (to assure oneself counterpoints). While an initial entry point for a technical object into the natural milieu may require this imitative function, it brings about an altogether new set of relations. A territory is drawn around a new technical refrain, aggregating the different natural and human elements which populate it. The use of the *renggas* created a puncture, a small opening, just enough for humans to inject themselves into this *interior* of the natural system. From there, it is up to the human technician to establish harmonic relationships, and counterpoint. This is why, when Olivier Messaien attempts to incorporate birdsongs into his music, what results is the deterritorialization of birdsong itself, "Once the intervals are stretched to fit the chromatic scale, the tempos slowed to human speeds, and the attack and tone adapted to suit orchestral instruments, the melodies are virtually unrecognizable to the most discerning of ornithologists, and once the birdsong motifs are combined in polyphonic patterns and manipulated to become parts of a compositional whole, they are even further transformed."[149]

Moving to the themes of harmony and counterpoint, we may describe the difference between them in terms of vertical and horizontal vectors. Harmony has both vertical and horizontal components. There is harmony both in the construction of a chord (the layering

[148] Gillles Deleuze and Felix Guattari, *A Thousand Plateaus: capitalism and schizophrenia*. Trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987), 353.
[149] Ronald Bogue, *Deleuze on Music, Painting, and the Arts* (New York: Routledge, 2003), 30.

notes above or below the root), and underlying a melody or refrain. All harmony can be described as dependent on some dominant melody or note. Chords are beholden to their root, being a structure with a base. This is why the horizontal relationships of harmony differ fundamentally from the horizontal relationships of counterpoint. The horizontal development of harmony is to an extent, limited—transitions typically occur along the same unfolding of a chord (As a sort of guiding line, the notes of, for example, an Am7 chord can unfold interval-by-interval, from the first, to the minor third, to the fifth, to the seventh, by another voice which supports the melody. That is not to downplay the importance of harmony. There is much flexibility, even here. Harmonic progression can be implied when developing lines converge at key points: for example, from the dominant seventh chord a proliferation of possible pathways for musical development opens up, which establishes new possibilities, new ways for a piece to develop: "if such and such a chord gets played, a certain scale becomes implied as a resource for melodic invention in harmony with that chord."[150] Harmonic deviations allow a musical piece to grow, introducing moments of tension and resolution.

Counterpoint (*puntus contra punctum*) is a form of melodic development which is fundamentally plural, and while some categorize contrapuntal techniques under the umbrella of harmony, I believe they are best kept separate as entirely different techniques. This is because, rather than total dependence on a dominant melody, counterpoint requires the skill of being able to incorporate plural voices into a piece while allowing each layer to maintain relative independence from each other. It is polyphonic. This horizontal progression is less about adhering to a strict set of initial conditions, or even to a particular

[150] Martin E. Rosenberg, "Jazz and Emergence (Part One)" *Inflexions 4* "Transversal Fields of Experience" (December 2010), 198.

melody as the dominant voice, but proceeds step by step, note by note. The notion is not restricted to a certain number of lines (though counterpoint always involves more than one line); for example, in Mozart's *Jupiter* Symphony, we find five distinct voices set next to each other, each developing in their own course but finding a unity that goes above and beyond the amalgamation of parts. The ability to establish contrapuntal relations within a system indicates a relatively advanced level of technical sophistication. Reflecting back on Simondon's theory of cultivation, the proper technique is one that does not directly interfere with the natural object, but instead influences it indirectly through its environment. In counterpoint we find the same operational rules at play.

If the refrain represents the interior code, the result of these selective processes which enable an organism or system to configure itself by converting exterior to interior, then counterpoint represents *exterior* relations—the *environment* from which aspects are selected. These are relative terms—the interior and exterior may be interchangeable by taking a different perspective of the object, and "insofar as any individual is capable of growth, what was exterior to it can become interior."[151] In nature we may find that a refrain is made up of a plurality of little refrains, we can think of the selection of intervals in a melody and their corresponding scales which underlie or imply them. Counterpoint is the technique of assembly—taking up aspects of these interiorities, treating them as exterior, and putting them into exterior relations. What results is the strange but wonderful phenomenon of mutual specification—the co-evolution of a line. Lines, little refrains within a countrapuntal sequence, behave *as if* independent, but taken together, constitute a

[151] Muriel Combes and Thomas Lamarre, *Philosophy of the Transindividual* (Cambridge: MIT Press, 2013), 20.

whole that exists above and beyond the amalgamation of parts—it constitutes another sort of *interior* by technical arrangement of these exterior relations.

Counterpoint provides an important connection of the object to the outside, that enables the refrain to explore beyond its home, to be deterritorialized, without meeting absolute chaos. Counterpoint is the technique of maneuvering within chaos. Contrapuntal practices establish something that exists beyond the parts that make it up. In a sense, it establishes a territory of territories, making expressive the overall *relations between* distinct territories, creating its own unique refrain—a network. Counterpoint is only recognizeable, and will only be established if different melodic lines are hooked up next to each other, juxtaposed. However, to attempt to "grab" a separate melodic refrain from an exterior system (with its own interior relations) is not a task which should be carried out haphazardly. According to Antonioli, "It involves a specific ear sensible to non-organic life that cannot be contained by organisms or organizations—a life which has to be seized without trapping it…"[152] Contrapuntal techniques demonstrate an awareness of the interior relations which constitute the refrain, and the exterior relations which stabilize it, beyond organic and non-organic lines. It is important to grasp the conditions of multifunctionality which earlier was demonstrated to be a principle of technical creation.

Technical activity liberates itself from labour the moment that it begins to operate with this compositional framework. What distinguishes labour from technical activity for Simondon is the creative element that goes above and beyond mere species expression. To come into contact with ecosystems and their admixture of organic and non-organic layers is to enter into a world of distinct melodic parts. Some may be more "developed" than others,

[152] Manola Antonioli and Bruno Heuzé, "The Power of Sound: Resonance and Refrain" *Parallax,* vol. 18, no. 1 (2012): 88.

certainly, but at the same time technical activity gives what is implicit, or exists as mere potential, a form of expression—a body. We may understand these forms and matters of expression with Deleuze, and later DeLanda's idea of a double synthesis. There is a first articulation which is "territorialization" by the refrain, which concerns the *formed materiality.* This formed materiality concerns the "selection of raw materials out of which it will be synthesized."[153] The second articulation is "coding" and is the *material expressivity*. This second articulation, this "coding" refers to the new powers and qualities that the territory begins to embody as a body unto itself[154]. The idea with introducing the notion of a double synthesis to technical objects is precisely the connection between the formed materiality and what it expresses. The issue with engaging in technics without an understanding of this compositional framework, is that most actions become potentially destructive, or hypertelic to the point of compromised functioning. "This is the very basis of territorial expression. Before we can have territorial semiotics (forms of expression) we must have matters of expression or components of passage, milieus (expressing matters) that have been decoded away from their "natural" functions so as to grant safe passage to a territory."[155] First, matters of expression must be constituted before granting that any veritable expressivity has been achieved—otherwise one risks decomposition. The issue with our modern approach to technics is a lack of this safe passage. Our reflections on hydroelectric dam construction demonstrate this lack. The seemingly expressed "green-ness" of this technology has not gone through the technical process of establishing and arranging these components of passage to the truly expressive, sustainable state. In reality,

[153] Manuel DeLanda, "Deleuze, Materialism, and Politics" *Deleuze and Politics*. Eds. Ian Buchanan, Nicholas Thoburn (Edinburgh: Edinburgh University press, 2008): 5.
[154] Manuel DeLanda, "Deleuze, Materialism, and Politics", 5.
[155] Manola Antonioli and Bruno Heuzé, "The Power of Sound: Resonance and Refrain" *Parallax,* vol. 18, no. 1 (2012): 54.

"a foreign element is only determined as a component of passage to a new assemblage once its consistency with other territorial matters of expression has been verified."[156]

Concluding Remarks

In Chapter One, we have looked at the distinction between technical activity and labour in order to demonstrate that there is a meaningful difference between the two worth considering. Rather than viewing technical activity as something that is subject to capitalist capture, or something that becomes an expression of the human species, it has been shown that technical activity is best understood as active participation in the process of individuation. Viewing technics in this way means that technical objects need not be viewed as tools which express some adjacent reality, but are expressive themselves. What this means is explored in Chapter Two. Technics is best understood as that which cuts across physical and vital, organic and inorganic domains. Giving an object a physical or vital designation is a matter of scale, and depends on whether or not we are including a consideration of the object's environment into our analysis. I look for a non-teleological account of organic individuation to demonstrate the isomorphism between natural and technical individuation, and find that the co-constitutive aspect of organic individuation is also found in the technical realm. A way is carved out to view ecosystems as participants in the construction of a technical object, and in the establishment of a technical network.

Indeed, at the outset, the technical object should be viewed in a category distinct from social and economic formations, but this is not to say that they are ultimately to be

[156] Manola Antonioli and Bruno Heuzé, "The Power of Sound…", 54,

taken in a vacuum. The demarcation of technics from social life enables one to grasp technical reality in and of itself, liberated from that of mere utility, to demonstrate how, on the plane of *activity*, and *affect*, the technical object is on equal plane with humanity, rather than playing a subservient or dominant role. What an understanding of this equal plane shows us is that technical objects, along with natural objects, are to be participated with—they carry within them *implicit forms* which serve as limits (not limitations) which guide further individuation, that each system or object possesses its own porous membrane which performs a selectivity function that guides technical engagement like the refrain acts as a schematism underlying variation. Technical creation, then creates a reality in which human social and economic activity are transformed by the invention's very appearance if it is firmly rooted enough, and can connect to the natural network of becomings.

The practice of sustainable development is meaningless without an understanding of how their activities affect the environment, and vice versa. Sustainability, instead of referring to an exchange of resources between past and future, or continuity for continuity's sake, should look to maintain the creative force implicit in each object by maintaining an attachment to the preindividual milieu. Once again, there are two facets of sustainability indicate technical excellence. The first, as mentioned, is to maintain the object's connection to its pre-individual milieu. This is to ensure, not only that one inadvertently decomposes the object and its environment, but also to ensure a platform for future variations. The second facet is an increase in the multi-functionality of an object, rather than focusing on perfecting objects toward singular goals. This acknowledged the networked aspect of technical activity, where the multiplicity of nature would prevent a singularly goal-oriented technical creation to individuate much further beyond its current order—the repetition of a

single refrain would become monotonous, non-expressive. Multiplicity of function allows negative side-effects which would be detrimental to the integrity of the object itself to *incorporate* what was previously a threat to its consistency as a part of its own functioning. The technical challenge is to strike up an internal coherence between these seemingly disparate functions and features.

The final chapter deals with the technical object in its interiority and exteriority, demonstrating the importance of a compositional approach to technical activity in the hopes of providing a method of conceptualizing conscious technical expression. Rather than being concerned with the technical object insofar as it is an amalgamation of parts, a certain attention must be paid to the effect which is achieved over and above the separate parts. The compositional technique of counterpoint is best able to capture the type of attention necessary for this sort of technical practice.

The notion of counterpoint is important because technical activity is precisely that which allows a coexistence of distinct territorial assemblages, and enable communication between them. A theory of contrapuntal composition will bring about an understanding of how to construct a veritable network. Composition acts as the bridge between chaos and order, contains within it a repertoire of implicit forms, as landing pads on which the refrain may jump, as it travels beyond its own center. As mentioned in previous chapters, true invention is participation in a network, and participation with the inventive capacities that already exist in nature. Contemporary notions of technics and technology have been ignorant of this fact, and instead reduce technical activity to labour. The notion of "innovation", while seemingly liberatory and creative, functions still to reduce technical

activity to labour. These notions take technical activity to exist in a vacuum, and mistakenly view technical creation or "innovation" as the introduction of something *new*.

What Simondon has criticized about "innovative" objects are that what new traits *are* introduced tend to exist *purely* for aesthetic reasons with no functional relevance, or worse, that these aesthetic features serve as functional impediments[157]. At the outset this denouncement of purely aesthetic considerations may run counter to my argument, that technical activity is an art. A way to smooth the tension between Simondon's view and the one presented here is to understand that there are two different perspectives on aesthetics. Simondon himself is hopeful that a techno-aesthetic will develop, which demonstrates that there is a separate understanding of aesthetics which would differ from the prevalent form[158]. The aesthetics he denounces are those that come from "social burdens" which are typically ignorant of the *compositional* consequences of certain aesthetic choices, instead, taking each feature in piecemeal fashion and regarding them as distinct from their environment. However, a techno-aesthetic keeping the principles of sustainability in mind will achieve a far more coherent result. Real invention is the re-cycling of the refrain, transforming it, transposing it, introducing it to ever new environments. The notion of counterpoint adds to the techno-aesthetic by taking into consideration the compositional and dynamic *schemes* which already exist within the environment. These dynamic schemes will guide the development of future technical forms by functioning as loose constraints for technical evolution. Technical evolution, much like organic evolution, proceeds in such a way that explores the infinite possibilities of configuration within those constraints.

[157] Gilbert Simondon "Technical Mentality" *Parrhesia: A Journal of Critical Philosophy*, Vol. 7 (November 2009), 24.

Importantly, at the same time as technical objects evolve, the environment undergoes its own dynamic shifts due to the co-constitutive nature of reality. Ultimately, this environmental shift will produce feedback, modifying the conditions in which humans exist, modifying our behaviours from the outside. This will only be successful if a technics is *firmly rooted* in the natural milieu, to the point where the existence of this key point—where technics and culture converge—becomes undeniable.

At present, we are engaged in the development of hypertelic objects, with little regard for the *technicity* that should connect each operational scheme to their phylogenetic lineage. Doing so we create incidentally expressive rather than veritably expressive territories. Broadening technical activity to incorporate the aforementioned notions of sustainability, implicit form, refrain, territory, and composition, is the starting point to developing a technical knowledge that will enable the emancipation of technical activity from labour, and human and natural meaning from capitalist production.

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