Chapter 6 - DIGITAL POTENTIAL

In accordance with the exposed at Section 4.3, the notion of "algorithmic metaphor" accompanying the last Section's examples entails the possibility of considering digital computation as a mode of thought with its own potentials. Such possibility is a plausible way to delve into the question posed in Section 1.2 of whether the encounter between dance and technology can ever be granted its own potentials and, therefore, the capacity to individuate novel cases of solution with regard to choreographic knowledge (i.e. the question of the technogenetic body). This next and final chapter will pursue this possibility and discuss its implications. Section 6.1 will posit the problem of a digital potential. It will departure from Erin Manning's plea for a vocabulary of process, capable of tapping into the unmappable reality of movement, in order to posit the hypothesis that digital computation mobilizes its own potentials, beyond the usual conception that such operation is dependent upon possibility only. Section 6.2 will pursue this hypothesis by drawing both from Andrew Goffey's conception of algorithms and from Gregory Chaitin's theory of algorithmic complexity. Specially the latter will be useful to consider that, at the very level of binary computation, there exist incomputable quantities of data that exceed the synthetic resolution of digital expressions. Such notion will be then contrasted with two ontologically distinct conceptions of objects. Respectively, Sections 6.3 and 6.4 will expound Graham Harman's object-oriented philosophy and Alfred N. Whitehead's theory of the "extensive continuum". If the first approach will provide the means to consider digital algorithms in phenomenological terms, the second approach will allow for considering objects as processes. Both the one and the other will attest the ontological implications of Chaitin's theory of algorithmic complexity and, in this way, provide the means to understand how can a digital potential be like. From this standpoint, Section 6.5 will discuss Luciana Parisi's notion of "soft(ware) thought", which draws greatly upon both Chaitin's theory and Whitehead's philosophy. It will be shown how this notion is opposed to theories of cognition and, as such, proposes digital algorithms to be related to an infinity of uncountable parts, which cannot computed.

6.1 - Problems in Potential

By now it comes with no surprise that the gestural body of choreographic notation is capable of becoming propositional. Not in itself, but rather as the expression of a choreographic knowledge that can elicit further learnings. Be it in the case of traditional systems of choreographic notation or in the case of algorithmic calculations of quantitative data, the expressions of choreographic knowledge can propose the individuation of novel solutions for the problems that in the first place originated them. For the learning subject, the expressions of a choreographic idea necessarily act as a sign of difference. They can elicit the feeling of a contrast sufficiently intense to prompt novel resolutions. Notwithstanding, from the perspective of choreographic transduction, the expressions of a choreographic object are a point of rest. As what results from technical individuation, they represent cases of solution with regard to the object's problematic ideas. They arrest the potentials of choreographic ideas with determinate forms of expression. And insofar as choreographic expressions implicate conventional definitions of gesture, they can be said to hold in form the same potentials of the technical contexts in which they have obtained a determinate value of signification. The expression of choreographic knowledge in the form of gesture is thus not a matter of truth, but rather a matter of negotiation (what does that sign really mean?). What is kept in form is convention itself.

Beyond the conventional agreements that define gesture in terms of its conformity to the requirements of written language, Erin Manning proposes something different. Instead of a gestural body established in these terms, the philosopher rather suggests "establishing a kind of grammar of movement that would—paradoxically—be more likely to tie the body to some preestablished understanding of how it actualizes", that is, to "[…] the potential of the wholeness of movement, including its 'unmappable' virtuality" (2009, p. 61). A grammar of process according to which neither dancing bodies nor technologies of writing are conceived as being external to one another, i.e. as being the supplemental extension of one another, but rather as being varieties of one same process of technical individuation. In short, the grammar developed throughout this study.

It is important to notice why, for Manning, such grammar holds the status of a paradox. On the one hand, as much as "[a]n engagement with technology and dance demands an encounter with the syntax of the moving body" (2009, p. 61), the body needs to be approached grammatically, that is, it needs to be understood as being articulable with itself by means of expression. On the other hand, as much as the dancing body is defined by a plane of movement where actuality and virtuality rhythmically co-compose one another, it necessarily resists articulatory reductions. In this sense, the dancing body is unmappable. Its expressions are but partial samples of its whole movement. To create gestures with the dancing body is thus to cut the latter's potentials into discrete and articulable sections. Which is the reason why “a focus on gesture (defined as extensive displacement of body parts divisible from a wholeness of movement) tends to lose sight of movement’s incipiency, thus overlooking the virtual opening [that] sensitive technologies wish to encounter.” (Manning, 2009, p. 62).

It is true that digital technologies such as the ones discussed in the previous chapter are not always developed together with dancing bodies. In such cases, dancing bodies and digital softwares can only encounter one another by means of what is possibly given, i.e. predetermined and preset before their encounter. This is, for example, the case of the relation between the “*Gesture Follower”* (GF) software,[145] which requires being given determinate definitions of gesture to recognize determinate expressions of motion, and the learning subject's dancing body. From the latter's perspective, the definitions of gesture given to the software determine what is to be learnt. Even if granted that what is learnt is not a given form but a principle of individuation, the dancing body remains nonetheless limited by the possibilities inscribed into the software's algorithms. It needs to conform with the software's definitions of gesture for this to recognize its motion and for it to learn what its relation with the software holds in potential. The dancing body can, notwithstanding, express more than what is defined as gesture. Its excess can easily not conform to the definitions of gesture inscribed in the software (just think of all that is too small or too large for the motion devices to capture). But if a determinate gesture is to be learnt, then what is expressed with an excessive body needs to conform to what has been programmed into the software.

This doesn't regard, of course, the fabrication of the software itself. If, from the perspective of the learning subject, the *GF* corresponds to a set of possibilities, from the perspective of its own individuation there's necessarily more to it than possibility only. After all, the definitions of gesture embedded into the software express the knowledge that, in a first moment, existed with the dancing body and that, in a second moment, has

145 See Section 5.1.

been transduced into the digital domain. The fact that such transduction individuated novel instances of knowledge with regard to the dancing body itself, attests that this was not a unilateral process. The *GF*'s concretization individuated instances of knowledge that were expressed digitally and understood abstractly (by the dancing body itself). This process can therefore be said to have been a co-individuation through which the resolutions of the one domain depended on the resolutions of the other. A technical individuation that, while moving the potentials of its system's multiplicities, co-individuated dancing bodies and gestural bodies.

The same can be said in regard to the other examples discussed in this study. Though these projects might not have been specifically focused on Manning's call for the constitution of a grammar of process, all of them have notwithstanding individuated instances of knowledge that, while concerning the dancing body, became expressed gesturally. Moreover, as exemplified by the *GF,* some expressions of gesture individuated precisely from dwelling upon the dancing body's emergent character and its principles of individuation. But what Manning proposes is of another order. It is of the order of technogenesis itself: a vocabulary that, rather than only objectifying the dancing body for the purpose of transducing its principles of individuation, can express the very processes by means of which dancing bodies and gestural bodies co-individuate with and co-constitute one another. In her words: “If a vocabulary of gesture is to be reclaimed as part of what can be stimulated in the encounter between dance and new technology, I believe it must be done through the continuum of movement, through the body’s emergence in the realm of the virtual becoming of preacceleration. Rather than moulding the body to the measure of motion-detecting technology, I propose we begin with pure plastic rhythm, situating the sensing body in movement in a mutating matrix of technological becoming. Let’s call this body-emergent technogenetic.” (2009, p. 62).

What Manning's plea stresses is the fact that, in this movement of co-individuation, there is a continuum where both dancing bodies and digital technologies are in contact with one another and where they affect one another, reciprocally, for a mutual becoming. Hence, this continuum of movement does not correspond only to the dancing body's plane of composition. It is also the continuum of movement through which technogenesis unfolds and therefore the very plane of composition from which its expressions derive. This is also what Manning understands by preacceleration, i.e. the movement before expression. It is the process through which the abstract machine ingathers potentials and engenders the greatest forces. A process with a topology where tendencies inform the system to compress the virtual into the actual present. Whereas acceleration can be understood as a relation between metric spaces, preaccelaration is the very movement by means of which the virtual tends towards actual incipiency. Insofar as this is a durational movement, preaccelaration is the movement through which the unconscious tends to become sensible and intelligible. Hence, it is an intensive movement, of intuition, rather than an extensive one, of expression.

The virtual-actual continuum through which dancing bodies and gestural bodies co-compose one another should therefore be thought in terms of the individuating system's associated milieu. It is with the system's excessive reality, i.e. its technicity, that both dancing bodies and gestural bodies can come into relation, not as supplementary extensions of one another, but rather as different actualizations of one same field of potentials. It is in this sense that, according to Manning, "[w]e must move beyond the prosthetic as an external category toward an exploration of the originary technicity that technogenesis taps into" (2009, p. 66). This originary technicity corresponds to the system's capacity to compose technical individuals. It corresponds to its capacity to bring into emergence the resolution of its implicit problems in different domains. This is a capacity that only acquires an operative value by means of transduction. It is only through transduction that the system's abstract machine becomes capable of acting out resolutions in different domains. It is only by its means that dancing bodies and gestural bodies can be said to derive from one same choreographic idea.

Transduction is not a simple passage from one state to another. Rather, it reconfigures the very context in which it occurs. As a process of informational transfer, it changes the milieu of its own individuation. It is by means of transduction that technogenesis can tap into the field of its system's originary technicity. Precisely because of this, says Manning, "[t]echnogenesis cannot be premapped. […] Rather than mapping the technology—as a prosthesis—onto a moving body, it is necessary to incite the movement to appear out of the technological process that is the machinic assemblage of individuation. To make the movement appear does not mean to restrict the movement to the parameters of the technology. It does not mean to delimit movement to gesture. We require operations that traverse the spectrum of the technology's potential metastability in relation to a becoming-body. When technology begins to operate along this spectrum it forms an associated milieu with the interval that is the becoming-body. Technology not mapped-onto but emergent-with a body-becoming might make different durations felt along the stratum that is the sensing body in movement. […] There is no doubt this already happens – but still too rarely. Techniques for technogenetic emergence must become part of the technology's interface: we must develop techniques that create new associated milieus never distinct from the ontogenetic body. Technological recomposition must no longer be inserted into a body-system: it must be emergent with it." (Manning, 2009, pp. 74–75).

It is for this reason that, if dancing bodies and gestural bodies are to co-individuate, such must happen in relation to one same associated milieu. In this sense, the associated milieu of the technical individuals in formation is a condition of their differentiation and of their choreographic nexus. This is also to say that the co-individuation of dancing bodies and gestural bodies corresponds to the emergence of different species of technologies. There are technologies that allow for choreographic transductions to occur and there are technologies that allow for choreographic transductions to be resolved in domains of mnemonic extension. In technogenesis, the informational exchange between what will have become a dancing body and what will have become a gestural body is key for the process to tap into the system's originary technicity. With the exertion of problematic forces onto what is given, both the dancing body and its gestural expressions can emerge from one same relation. Both of them can result from and belong to one same problematic field, which is the system's very technicity. If dancing bodies and gestural bodies are not to supplement one another, these different technologies must become one another's associated milieu. Their individuation must result from an exchange of information between potentials belonging to different orders of magnitude, but yet belonging to the same topological continuum.

Furthermore, asks Manning, if "[t]echnogenesis cannot be premapped, [h]ow then can it work alongside a technological system whose parameters are set?" (2009, p. 74). This question pertains, evidently, to the limits of possibility of the digital domain. It pertains to the tension between the excessive reality of the dancing body and the possibilities of digital computation. The answer to this question might be approached by considering the invention of technologies that, at once, deal with the potentials of individuation and with the kinds of relation whereby different species of individuals are expressed. Such technologies allow for what has been resolved in one individuation to be differently known or expressed in another, by means of transduction. In other words, the answer to this question regards not the determination of parameters on the basis of what is given and known, but rather their determination on the basis of what is not known. Which is to say that digital algorithms need to be invented together with the actuality and the virtuality of movement. As Manning puts it, the question is then "[h]ow to create functioning parameters for software development on the basis of something that cannot be known, that can only be felt in its effects? Technology becoming technogenetic involves inflecting the digital with virtual potential, bringing to the fore movement's incipiency and its relational matrix. How does a movement that cannot yet be seen make itself known?" (2009, p. 72).

From the examples discussed throughout this study, it is perhaps the *GF* that attends the most to these concerns. After all, its algorithms strive to depict what cannot be computed as such, i.e. qualities of movement. To invent digital algorithms that define movement qualities in terms of discrete quantities of data is to necessarily undergo a process of transduction. If the software is to recognize gesture on the basis of a quantitative definition, it needs to be set according to parameters that express the subjective and conceptual diagrams of gesture, as known from and with the dancing body's experience. For such transduction to occur, movement needs to be experienced in all its varieties. An experience tantamount to a subject constituted together with the constitution of what it comes to know. A subject that, because of being embedded in the same milieu of potentials from which movement comes to be expressed, necessarily experiences movement's intensive incipiency towards the actualization of extension.

The knowledge of a movement quality is therefore a processual one. It regards the process whereby determinate expressions appear and not solely their appearance. Notwithstanding this knowledge's analogical character, the *GF*'s algorithms do in fact correspond to determinate quantities of data and, as such, to the expressions of the dancing body. Here, recognition occurs on the basis of given possibilities, which when actualized regard but the end product of individuation. Nevertheless, these algorithmic definitions of gesture can express gesture in different ways. After all, they are set to not only compute variable quantities of data, but also to do it in accordance with a parametric structure that is itself a set of different possibilities. In this sense, these algorithms convey not a knowledge of gesture as finalized expression, but as the resolution of a movement that comprises virtuality and actuality, preaccelaration and displacement, potentials and possibilities. The reduction of these varieties to the expressive possibilities of digital media should therefore be here understood as the resolution of an individuation from which the knowledge of movement as a whole was not absent. The subjects involved in this process were sufficiently implicated in it to individuate a knowledge together with the individuation of the objects known. Were their knowledge not an analogical one, and these algorithmic expressions would probably not allow for such a degree of variation.

Some other digital algorithms of the choreographic objects discussed in the previous chapter also stand as good examples of how to create parametric structures on the basis of what cannot be known and is accepted as such. The *"Reactor for Awareness in Motion"* responded quite precisely to Manning's question by having developed some of its algorithms not only on the basis of what was known about the dancing body, but also in accordance with a co-individuation of dancing bodies and gestural bodies. Not only were the problems of how to represent the dancing body in the digital domain the source from which determinate resolutions were extracted, but also the intertwinement of dancing bodies and gestural bodies in the process of their development served the determination of resolutions that, rather than only conforming dancing bodies to the possibilities of the digital domain, expressed the veritable technogenesis of their affective and co-constitutive relation. This is how the digital domain gets infected by what cannot be known but that, notwithstanding, contributes determinately for the technical system's development. It is by means of this co-individuation between dancing bodies and gestural bodies that the virtual potentials of the system's associated milieu get to be conveyed towards resolutions proper of a technogenetic process. Which is also Manning's understanding of how to resolve the problem of technogenetic transduction when including the digital domain into the system of individuation. Since digital computation cannot tap into the virtual because it "must conform to actual ones and zeros", for the philosopher the solution resides in "bringing the analog into the digital mix (by intermixing new technologies with dancing bodies such that the dancing body is emergent with the technology rather than simply added to it), [so that] the technical system might tend toward ontogenesis, toward technogenetic evolution" (2009, p. 65).

But this position also entails the credo that digital algorithms, in themselves, are but a set of programmed possibilities with no relation whatsoever with the virtual. What this view perhaps dismisses is the capacity of digital computation to stand by itself as a mode of thought. In which case the compression of data into data, i.e. the calculation of possibilities for the expression of determinate cases of solution, would necessarily comprise the ingression of virtuality into computation itself. It is a condition for digital computation to occur within the limits of its own possibilities. Digital algorithms compute data according to determinate parametric structures and within the possibilities of digital coding itself. But if the result of algorithmic computations in the digital domain is the accretion of data on data, it can be argued that, being this an event, it necessarily holds at some point a relation with virtuality. The temporal vector that is formed with the accretion of data can be argued to correspond not only to the progression of a metric time, but also to the durational experience of the computational system. Hence, the question is: can experience be addressed in any way to digital computation? In other words, and besides the technogenetic mixing of analog and digital domains, can the very process of digital computation regard the durational progression of a virtual experience? If so, the digital domain would comprise in itself unmappable dimensions. It would be excessive in relation to itself and its algorithmic computations could be understood as modes of thought in their own right.

The question regarding whether or not the virtual is a constitutive dimension of digital computation can be understood in two different ways. It can be understood in terms of how the digital domain affects with its own indetermination the progression of technical experimentation. And it can be understood in terms of how digital computation is itself pervaded by undetermined potentials, being therefore irreducible to determinate sets of limited possibilities. These two perspectives can, notwithstanding, be thought as corresponding to one same reality. For, if the case in question regards how potentials can exist with the expressive determination of digital choreographies, then what must be acknowledged in regard to potentiality itself is the very fact that, as this verges virtuality towards actuality, it distributes tendencies of formation throughout a topological continuum without which different orders of magnitude could not communicate. This continuum was already mentioned to be the means by which different multiplicities connect with one another and form differentiated parts of one overall encompassing whole.[146] But, further, it bears with itself the hypothesis that the distinction according to which continuity is exclusive of virtuality and discontinuity exclusive of actuality no longer holds. The indistinction between the one and the other would thus allow for potentiality to pervade not only the conditions on which technogenetic transductions unfold but also the very workings of digital computation. In this case, not only would digital algorithms have to be considered together with a continuum of constitutive potentials, but also the relation between virtuality and actuality would have to be reconsidered with regard to this same continuum. This chapter's following sections will entertain this idea, of which it can be advanced that, as it has already been mentioned in other various instances throughout this study, rhythm is key. It is by means of a rhythmic relation between potentials belonging to different orders of magnitude that the virtual and the actual can be said to exist immanently in one another, not any longer on the basis of a distinction between intensity and

146 See pages 34 – 38 of Section 1.1.

extension, but rather on the basis of a continuum of potentials where these dualities no longer hold. In this sense, this is a hypothesis that dismisses the Bergsonian distinction between duration and space, only to call for yet another way of conceiving the relationship between qualities and quantities.

Posing questions with regard to the experiential character of digital computation is therefore not to dismiss the necessity of inflecting the digital with the analog, but rather to question whether the digital domain is itself capable of generating novelty as such. If digital algorithms are to be thought as being constituent elements of technical networks, communicating not only with one another, but also with other technical individuals, their computational system must be granted to comprise the undetermined potentials implicated in informational exchange. In this sense, the creation of novelty should be possible in the digital domain without any necessary recourse to its analog counterpart. Of course the one cannot be thought without the other, for the analog pervades the digital as the very ground on which this runs. But to say that the digital domain can generate novelty is to say that, at the very level of digital code, algorithms are capable of more than what is possible. In other words, insofar as digital computation can generate novelty, it must comprise more than possibility. If the excessive reality of digital computation is to be found at the very level of binary code, then its potentials might very well be not qualitative but quantitative. This hypothesis, according to which there might be quantities of data that, despite of being constitutive of the digital domain, are not computable, necessarily implies a notion of potentiality that, rather than regarding only qualitative potentials, regards as well quantitative ones. With the idea of a continuum of potentials extending itself throughout different domains of expression, the very distinction between analog and digital domains dissipates to give place to a distinction between unstructured and structured quantities of data. Likewise, and inasmuch as the notion of a continuum in extension is, according to what has until now been discussed, a paradox, both the duality between continuity and discontinuity and the duality between quantities and qualities become blurred. This notion of "extensive continuum" will be here approached from the perspective of Alfred N. Whitehead's philosophy of extension (1978, pp. 61–82). For it has been he, as philosopher and mathematician, who most thoroughly proposed and discussed this idea and its implications in what regards the relation between actuality and virtuality, potentiality and possibility, the past and the present, and so on. Importantly, the notion of structure remains key to understand how potentials can be simultaneously virtual and actual. Meaning that, not only in regard to digital media, but also in regard to systems of individuation in general, the extensive continuum's potentials can only be understood as data that is not structured, that is, as the unstructured kind of data that pervades whatever determinate form.

6.2 - Algorithmic Complexity

The notion of "algorithm" is endemic to computer science, where its definition finds in the words of American philosopher David Berlinski a synthetic and precise enunciation: "an algorithm is a finite procedure, written in a fixed symbolic vocabulary, governed by precise instructions, moving in discrete steps, 1, 2, 3, whose execution requires no insight, cleverness, intuition, intelligence, or perspicuity, and that sooner or later comes to an end" (2001, p. 9). In the guise of what has already been mentioned, this enunciation depicts, even if not explicitly, an algorithm's transductive character. It affirms algorithms as concrete cases of solution for the problematic abstractions from which they derive. As the expression of problems, they convey possibilities of resolution. As solution, they can be seen either as simple mechanical formulas or as propositions capable of eliciting further individuations. And if, as proffered by Whitehead, "the proposition constitutes what the feeling has felt" (1978, p. 186), then the question is how can propositional algorithms feel the data computed? Such question will be discussed ahead. For now, what matters to notice is that, as technical objects, digital algorithms are interfaces apt to convey transductions. They convey the knowledge of a determinate problem into a computational system that, if it proceeds on the basis of informational exchanges, it necessarily inflects its own development with undetermined potentials. On this ground, digital algorithms must be seen not only as mechanical recipes.

As interfaces of transduction, algorithms necessarily bridge abstraction and expression. If considered from the perspective of their expressions, algorithms do function as signs for the computation of solutions to the problems that they pose. If considered from the perspective of their abstractions, algorithms are conceptual tools that can be expressed in different domains. From which it follows that each algorithm requires an appropriate domain of expression. A cooking recipe, for example, as a function of expression, requires not a digital matter of content but rather actual food. And this is not to say that the encounter between the one and the other cannot be simulated by digital means. As already mentioned, to the extent that the possibility space of digital simulations coincides with the simulated processes' space, it can act as the condition after which cases of solution that are also possible in regard to the referential process are expressed. Notwithstanding, the digital simulation of a cooking recipe does not result in edibles. Hence, it does not resolve the problematic structure of the diagram to which it belongs. In the same way, a mathematical problem might very well be better resolved by means of digital computation than by the exercise of cooking. But beyond the adequacy of domains of expression in regard to the problematic structure of determinate diagrams, the transferability that the latter's abstractions assure in regard to the former attests the fundamental core of an algorithm. If one same algorithm can be expressed in different domains, it does not depend on them. As such, it is determinate and abstract. It is the diagrammatic arrangement of a knowledge that pertains to the ways in which a given problem can be solved.

The relation between an algorithm's abstractions and its material conditions of execution can be thought either in terms of the extrapolation of formal procedures into material processes or in terms of their pragmatic reality, that is, from the perspective according to which algorithms, by and in themselves, are “actants” (Latour, 1996). The first approach marked the advent of cybernetics as a science of control based on the idea that physical processes are reducible to mathematical abstractions and that, therefore, they can be simulated—of which one recent reformulation has been proffered by mathematician Stephen Wolfram (2002), who conceives of the whole universe as a giant computer, reducible to the mathematical calculation of algorithmic sets. The second approach fundamentally deals with the notion that there are incomputable data that not only pervade algorithmic computation but that moreover are its very condition—a notion that not only undermines the first approach but that also obliges algorithms to be considered together with their associated milieus. The basic argument of a pragmatic approach to algorithmic procedures, which opposes it to any sort of radical formalism, is put in the following way by media theorist Andrew Goffey: “formal logics are inherently incomplete and indiscernibles exist” (2008, p. 19). And what this means in regard to the actual effects that algorithms might have in the world is that, at the very heart of the processes with which datasets are computed for the generation of novel facts of unity, exist incomputable and random quantities of data that open what would be otherwise finite to unpredictable modes of affect, connection and creativity. In this way, what most fundamentally defines the pragmatic approach to algorithmic computation is the fact that it not only takes into consideration the possibility spaces of each dataset but also the potentials that pervade them.

Already in the beginnings of computer science, Alan Turing had acknowledged the existence of incomputable problems within computation. The British mathematician conceived of the Turing machine, the first prototypical computer, as an algorithmic application capable of determining whether a problem was susceptible of being solved mechanically or not (Herken, 1995). The algorithmic set of instructions given to it was in this case, as well as in the case of the computers that would follow, the basic condition on which this could solve a problem or not. In this sense, and as much as computation can be defined in terms of problem solving, algorithms are its fundamental condition. Algorithms are the model with which a given problem can be computed and actually solved. Symbolically, this is expressed by means of a procedure that computes whether a given number belongs to an algorithmic set or not. By making use of Boolean logic,[147] computer science has dedicated itself to investigating how to answer to sets of questions by means of a binary logic, always answering either yes or no. In the binary language of digital code, this means that all the possible variables of a given set are defined as 1 (the universal set), whereas 0 defines an empty set containing no variable of the algorithmic set defined by 1. Digital computation therefore corresponds to the mathematical calculation of whether a variable corresponds to the universal set defined by 1 or not (in which case it is defined as 0). And it is at this very level, which is the level of the formal languages with which algorithms can be both abstracted and expressed, that the openness required for their operation manifests the incompleteness of calculation. For, as media theorist Luciana Parisi reminds us, "Alan Turing demonstrated that there is no computable function (no finite binary set) that could correctly answer every question in the problem set. This meant that not every set of natural numbers is computable, and Turing's description of the halting problem (the set of Turing machines that halt on input 0) is one example, among many, of an incomputable set" (2013, pp. 260–261).

It is from this very notion of incomputable data existing at the heart of computation that an algorithmic pragmatism can be asserted. For if algorithms can only be said to act insofar as they are open to informational exchanges, then what their action necessarily comprises is a constitutive indetermination and the immanence of

147 This modality of logics, which also goes by the name of pure mathematics, was theorized by British mathematician George Boole in 1847. This is a logics that favours abstract and universal operations, instead of concrete and relative ones (such as those involving quantities and magnitudes). From this dismissal, the mathematician formulated an algebraic system, known as Boolean algebra, which represents sets and subsets of abstract or actual things and the operations relating them (i.e. coincidence, intersection, inclusion, exclusion and so on). Importantly, for what regards digital programming, these operations are represented with symbols which indicate values such as OR, AND and NOT.

incomputable data in computation. Moreover, the fact that an algorithm's operations cannot be considered independently from its data structures determines that its action necessarily implicates all the data that it cannot compute. The upshot of such implication is that algorithmic indetermination is a fundamental condition of computation, a postulate that Parisi also acknowledges by defining computation as "the capacity of algorithms to compress infinite amounts of data", whereby "incomputable data must be the condition, and not the result, of computation" (2013, pp. 260–261). Even modern computers should be understood according to the indetermination that in them is implicit. Algorithms are not pure automatic procedures working with absolute sets of data. Rather, they are technical individuals programmed with limits that regard the range of possible commutations in the electronic circuits which mediate them. Algorithms are technical objects designed for operating within the margins of indetermination given to the computational system.

It is with these random and incomputable quantities of data that the potentials of algorithmic emergence can be thought. As potentials they remain undetermined. As data they are given. And though this might seem a paradox according to what has until now been expounded, what the notion of given potentials entails, is the actual redefinition of what potentials are and how they exist amidst systems of individuation. In other words, these are potentials that no longer can be thought only in qualitative terms, resulting only from the intensive interplay of forces constitutive of continuous multiplicities, but that need to be thought in quantitative terms. In this way, actuality itself becomes potential: not the actual remarkable points of individuated structures, but rather the actuality of all those points of an individual that are not remarkable but yet constitute the charged ground against which the individual is remarked. From this standpoint, it can be argued that what is potential still remains qualitative, since it necessarily results from intensive forces that relate random and structured quantities of data between one another. Under these conditions, potentiality can be argued to remain relational and thus dependent on the intervallic forces with which forms (random or non-random) affect one another. But what the notion of incomputabilities brings forth is the very idea of a past that, despite being given to the constitution of novel facts, is not determinately given. In other words, what is given is not known, it is random and, as such, unpredictable in regard to the ways in which it might come to ingress into novel facts of unity. For this very reason, Goffey writes that: "just because the development of an algorithm requires a level of *de facto* formal abstraction, which then allows that algorithm to be applied to other kinds of content, does not mean that we have exhausted everything that we need to know to understand the processes of which it is a part" (2008, p. 18). What the notion of given potentials thus proposes is a redefinition of the relation between quantities and qualities. In other words, if potentials can be thought as pertaining both to what is given, but yet unknown, and to the intensive forces with which disparities amidst these random quantities of data come to occur, what necessarily needs to be acknowledged is the processual character of potentiality. The constitutive immanence between qualities and quantities needs to be considered from an affective point of view, according to which a permanent rhythm of actualization and deactualization, quantification and qualification, forces the individuating system to inform the future (individual) with what is given from the past. Given potentials thus concern the unknown both in actuality and in virtuality. And, as it will be discussed ahead, because the past can be given undeterminably, virtuality can also be seen as random quantities of data, rather than only as a transcendental kind of memory.

Goffey points out two different aspects that offer a mode of approaching these incomputabilities. First, the structuration of data implicates an "incorporeal transformation"[148] that, by definition, cannot be computed. This means that the passage from raw data to structured data, necessary to the operation of algorithms, implicates a change in the status of the things to which they correspond. Take the example of a personal name inscribed on an online form for a journal's subscription. Before the array of alphanumerical characters is included in the server's database, the person in question is not yet a subscriber. After the name has been included, the person has become a subscriber. The transformation of the person's status, which corresponds for example to a change in the way the person thinks of itself, is missed by the structuration of finite sets of data. In spite of occurring together with the algorithmic procedure, this incorporeal transformation is not accounted for by the structuration of data. Algorithmic procedures effect changes that are neither compressible nor computable. In Goffey's words: "Algorithms act, but they do so as part of an ill-defined network of actions upon

148 This expression, "incorporeal transformation", is used by Goffey with the precise effect of echoing both J. L. Austin's speech act theory and Michel Foucault's philosophy of the event. In regard to the former, it is known how Austin differentiated the constantive and the performative elements of an act of speech. On the one hand, a speech act does describe things in the world, but on the other hand it also effects changes in the world. In this sense, the performative speech act refers only to itself, enacting the semantic value of speech (Austin, 1975). In regard to the latter, it is here enough to quote how Foucault implicated incorporeality at the heart of the event: "[…] certainly not immaterial; it takes effect, becomes effect, always on the level of materiality. Events have their place; they consist in relation to, coexistence with, dispersion of, the cross-checking accumulation and the selection of material elements; it occurs as an effect of, and in, material dispersion. Let us say that the philosophy of event should advance in the direction, at first sight paradoxical, of an incorporeal materialism." (2007, p. 231).

actions, part of a complex of power-knowledge relations, in which unintended consequences, like the side effects of a program's behaviour, can become critically important" (2008, p. 19). This can be better understood when recalling Simondon's theory of networks. The very networkability of algorithms (with data structures, other algorithms, machines, machine's users, and so on), implicates resonances that can easily involve regions of the network that are not directly implicated in a given computation. The "side effects" of a computation can in this way be located at any point whatsoever of the network partaken by an algorithm.

Another way to conceive of technical networks is through what media theorist Matthew Fuller (2005) designates as "media ecologies". The author has developed this notion in order to account for the fact that, be it at the level of the mechanical supports dedicated to the transmission of events or at the level of the software with which information is codified, the objective unification of a whole does not suffice to explain the processes by means of which technical networks evolve. Modes of potentiality must be considered as being constituent of the systems composed by the interaction of media objects. For Fuller, "the only way to find things out about what happens when complex objects such as media systems interact is to carry out such interactions – it has to be done live, with no control sample". And, in order to do this, he further adds, "[o]bjects [...] should also be understood to mean processes embodied as objects, as elements in a composition". In this sense, the constituent parts of one whole "no longer exist simply as discrete bits that stay separate", but rather "set in play a process of mutual stimulation that exceeds what they are as a set". (Ibid., p. 1). As in Simondon's theory of individuation, here too, information exceeds the set's constituent elements. It opens the technical system to an associated milieu of potentials, which is the very means by which the system can in any case access its preindividual reality and engender from its own resources novel resolutions. As such, objects can be considered from the viewpoint of the processes that they partake and of which they are a remarkable expression. A standpoint that accords with the notion of ecology, which for Fuller is "one of the most expressive that language currently has to indicate the massive and dynamic interrelation of processes and objects, beings and things, patterns and matter" (Ibid, p. 2). As it perhaps has already become explicit throughout this study's development, conceiving objects as processes does not cease to be in tension with the fact that objects can be sensed, perceived and used as unchanging unities. The dual character of an object, both as part and as whole, does not cease to be a problem. But as much as problems are a condition of individuation, the very distinction between movement and stasis, between an openness towards the self-excess of being and the objective structures with which this excess is kept in form, ceases to exist. It is in terms of a system's overall development that an object must be considered. Neither only as form nor only as process, but rather as a dynamic entity with structural points and contrasting grounds, which exchange energies with and are converted into one another, from metastability to metastability.

Goffey's second approach to incomputabilities regards the excess of information. One possible definition of excess can be that it corresponds to what cannot be compressed. Though informational excess is a necessary condition of individuation, it cannot be determinately synthesized. A system's preindividual reality will never be individual. It partakes individuation, but it resists resolution. It is always, even after individuation, indeterminate excess. In regard to computation, excess is that which cannot be compressed into determinate arrays of binary data. In this way, inasmuch as incompressible and incomputable varieties of data pervade algorithmic ecologies, they affect computation. As Goffey says, “indiscernibles exist”. Even at the level of digital programming. “Formal logics [cannot but be] inherently incomplete”. Computation itself distinguishes what is discernible, and thus numerable, from what is not. It organizes into arrays of numerable quantities of data that which is random and unstructured. But this compression of data does not assure the synthesis according to which all that is given gets to be computed. On the contrary, raw data is computable and computed, but only to a certain extent. Amidst it, random quantities of data remain indiscernible and incomputable. Which is the very reason why, despite the limits of algorithms' possibility spaces, computation can still generate the unexpected and the accidental. In Goffey's words: “[m]achines break down, programs are buggy, projects are abandoned and systems hacked”. (2008, p. 19).

Information theorist Gregory Chaitin (2005) has been a major proponent of the notion that random numbers are intrinsic to algorithmic computation. The author argues that there are quantities of data underlying computation that cannot be counted. Even the most simple algorithm used for sorting a list of numbers is “infected”[149] with random

149 This term, “infection”, is characteristic of the way in which philosopher Alfred N. Whitehead thinks of the inevitable ingression of abstractions into actual occasions of experience. In philosopher of science Isabelle Stengers' words: “'Infection' is the term Whitehead chooses to designate, in a generic way, what the poets celebrate as 'presence'. Celebration refers to the fact that it is a poet's experience that is infected by the mountain, gloomy and ancient. [...] This infectious holding-together is not a fusion but a valorization, a determinate shaping, conferring a value-that is, a role-on what is prehended. The fact that the variables of a function, in the same way as the poet's experience, require a 'value' thus ceases to belong to linguistic contingency. Far from being a mere quantity, the value of a variable presupposes the stability of the role that one thing plays for something else and measures

quantities of data that cannot be sorted and grouped into a finite set of numbers. As such, any computation operates amidst an infinity of discrete quantities of data. The incomputability of the infinity of numbers underlying computation can in a way be said to be an intrinsic quality of algorithms. This is not the kind of infinity of a numerical interval's infinitesimals. It does not correspond to the transcendental numbers of an uncountable infinity.[150] Rather, it corresponds to an infinity of discrete quantities of data that are random and thus uncountable. Their randomness corresponds to the fact that, in spite of being discrete, they are not structured. In Chaitin's words, "something is random if it can't be compressed into a shorter description." (2001, p. 18). The infinity of random quantities in computation consists of unstructured data that cannot be compressed either into finite numbers or into finite sets of instructions. Indetermination is made to be a necessary condition to computation. A condition from which it follows that both algorithms and the mathematical axioms that underly computation are incomplete.

To the incomputable number implicit in the computational order of data, Chaitin (2005) calls "Omega". A real number that is nevertheless random and thus complex. The author argues that the complexity of Omega results from the fact that the infinitesimals existing in between any two points cannot be reduced to the finite results of integral calculus. Omega thus corresponds to random quantities of data that cannot be counted nor ordered. The infinity in computation is complex because it is irreducible to numerical calculus. Nonetheless, it is together with this infinity that algorithmic

---

the importance of that role. […] The term 'infection' is thus technical, that is, neutral with regard to the differences we attribute to what endures." (2011, pp. 157–158). Interestingly for this study, Stengers also points out how Whitehead uses the term "infection" to think the body. She writes that: "For Whitehead, the parts do not constitute the whole without the whole infecting the parts. In other words, the identity, or the enduring pattern, of the whole and the parts is strictly contemporary. This is why the same term, 'infection', can be used both to designate the relations between the whole and the parts, and to describe the relations of a living organism with its environment. If the body exists for its parts, it is because its parts are infected by such-and-such an obstinate aspect of what we call the body, but which, for them, is a portion of their environment; if the parts exist for each other and for the body, it is because the respective patterns of each are highly sensitive to any modification of the environment they constitute for one another." (Ibid., p. 174).

150 As mentioned before, when accounting for Bergson's concept of virtuality (see Section 1.1), the topological space of an infinitesimal continuity (consisting of transcendental, and thus undetermined, factors of determination) is non-actual in absolute. As such, it is uncountable and, ultimately, virtual. Hence, the virtual, considered in this way, can never belong to the random quantities of data that underly algorithmic computation (if the smooth space of continuous variation is to be kept). Precisely because of the constitutive incompleteness of algorithmic objects, which is tantamount to an immanence between random quantities and determinate numbers, actuality is neither finite nor it can contain the totality of space and time. Contrary to the topological variation of the spatio-temporal continuum, what this immanence attests is the very fact that infinity exists as quantitative potentials amidst the definiteness of actuality. In other words, the additive sequencing of instructions through which algorithms "array alternative states for sequencing into alternative routines" (Massumi, 2002, p. 137) not only creates data, but creates it with a constitutive difference.

computations group countable numbers for the execution of finite sets of instructions. From this standpoint, algorithms can be conceived both as finite sets of instructions and as being pervaded and conditioned by random quantities of data. Algorithms can only be defined by determinate sets of structured data as much as they are also defined by the infinity of random quantities of data existing together with any set of finite numbers. This is clearly a standpoint that differs from a universal computation, according to which finite sets of instructions are enough to generate all the complexity of the world. Chaitin argues that the world's complexity corresponds to its incalculability, that is, to the real number by means of which virtuality and actuality become immanent in one another and which is to be found in all strings of countable numbers. Accordingly, the binary logic of probabilities with which cybernetics approached Turing's conception of the computer, as much as it is based on the idea that complexity is reducible to the finite numbers of algorithmic computation, cannot account for the intrinsic incompleteness of knowledge. The binarism of algorithmic objects does not consider the complex infinity constitutive of random quantities of data existing at the heart of any computation. What Chaitin's notion of Omega brings forth is the idea that algorithms are not only finite sets of instructions but also random quantities of data that, notwithstanding their discrete character, are incomputable.

Underlying Chaitin's theory of algorithmic complexity is a conception of information that does not pertain to finite and measurable spatio-temporal quantities. Rather, it pertains to irreducible, random and complex quantities of data. Here, information is defined in terms of "computational entropy". And this is so precisely because any countable quantity of data is considered to include within itself Omega's random infinity, an infinity that computation cannot exhaust (i.e. there's more quantity to it than to finite numbers). What can then be said with regard to the relation between this infinity of discrete points and the finite numbers with which computation executes its counting procedures is that each of the latter is necessarily an indivisible whole composed of uncountable parts. The difference between Chaitin's and cybernetics' notions of information is that, whereas the latter is considered as a seamless unity of finite parts, the former is considered together with random quantities of data.[151]

151 It should be reminded that, as mentioned before (see page 57, Section 2.1), Gilbert Simondon also criticized the cybernetic conception of information, since it did not account for information's intrinsic infinity. While characterizing information as the process by which a difference between potentials belonging to different orders of magnitude is resolved, Simondon instead introduces infinity at the heart of information. In this way, instead of being a unified entity, information is considered from the standpoint of the differences underlying intensive quantities. As much as these differences are potential conditions of individuation, information is necessarily heterogeneous or, in other words, made of different parts, and pervaded by uncountable infinities.

The upshot of this, in what regards the problems that such complex notion of information poses to the cybernetic logic of control, is that in this way parts can be considered as being larger than wholes. Because they necessarily comprise discrete infinities, the random quantities of data underlying algorithmic computation are necessarily larger than the finite forms of those same algorithms. Conversely, not only are finite quantities smaller than their immanent infinities, but also parts, such as simple algorithms, are irreducible to the systems that they might partake, such as full blown software programs. According to Chaitin's theory, algorithmic objects are not reducible to finite series of simpler parts, due to their openness to an infinity of discrete and random quantities of data. With such infinity, the notion of universal computation is no longer possible. The mathematical reduction of every single factor of determination (quantitative and qualitative) into finite sets no longer holds. Chaitin's theory of algorithmic complexity demonstrates that the limits of computation are not given only by the digital domain's limits of possibility, but also, and more fundamentally, by the random quantities of data pervading algorithms. As much as incomputable quantities of random data are irreducible to the necessary finitude of algorithmic instructions, it is here, in this irreducibility, that computation finds, first and foremost, its limits.

The random quantities of data constitutive of algorithmic computation should moreover be understood as the very condition that allows for algorithms to be in contact with one another, i.e. for them to be capable of exchanging information. It is this connectability that realizes the mathematical infinity of Omega, in conformity to Simondon's notion of networks, according to which objects are open to the infinity of potentials by means of information. Only by constituting itself as the mediatic field where different orders of magnitude communicate with one another can an object not be isolated. And insofar as it is not, it necessarily exchanges information with other objects. From which it follows that any algorithmic object necessarily partakes the constitution of informational networks. What Chaitin's notion of Omega specifies in regard to Simondon's conception of networks is the quality of the potential infinities by means of which actuality is open to informational resolutions. Instead of being a transcendental and uncountable number, the potential infinity that opens objects to one another (and therefore to the inscription of time)[152] is a quantitative quality, i.e. it is a

152 Let us recall Deleuze's statement on the inscription of time in wholes: “According to Bergson, the whole is neither given nor giveable. […] if the whole is not giveable, it is because it is the Open, and because its nature is to change constantly, or to give rise to something new, in short, to endure. […] So that each time we find ourselves confronted with a duration, or in a duration, we may conclude that there exists somewhere a whole which is changing, and which is open somewhere.” (1986, p. 9).

quality made of an infinity of discrete quantities. On the basis of all that was previously expounded in relation to Simondon's notion of technicity,[153] it becomes possible to conceive of algorithms not only in terms of finite numbers arrayed in iterative sequences, to which an infinity of steps can always be added, but also in terms of the infinity with which they are open to exchange information between one another.

From here onwards, the problems posed by Chaitin's theory of algorithmic complexity, both to computation and to the generic definition of objects, will be addressed from two distinct perspectives. They will be addressed from the perspective of objects and from the perspective of processes. These two approaches are meant to contrast a phenomenological perspective with a speculative one. The exposition of a phenomenological perspective is aimed at addressing the definite character of objects, specially by articulating the mathematical definition of algorithmic objects with their expressive qualities. The exposition of a speculative perspective is aimed at exploring the notion of the extensive continuum. By approaching objects as processual entities, their definiteness will be put into question and both their virtuality and their actuality will be reconsidered in terms of the relation between random and structured quantities of data. In sum, the following inquiry will build considerations towards a notion of digital potentiality.

6.3 - Object Orientation

Recently, the American philosopher Graham Harman (2002, 2005, 2011) has proffered an "object-oriented metaphysics"[154] that tries to conciliate the individual autonomy of objects with their capacity to be in relation with one another. For him, objects do not change and are discontinuous with one another. A condition that impedes any sort of approach taking direct relations between objects as being the ground on which objects themselves are to be explained. From this standpoint, and regardless of its possible variations, an object remains unchanged because it does neither depend on its

153 See page 82, Section 2.5.

154 Also designated as object-oriented philosophy or object-oriented ontology. These terms have been derived by Harman from "object-oriented programming". Contrary to software programmes conceived as series of routines and subroutines to be executed, object-oriented programming conceives them as bundles of interactive objects. Moreover, each object is conceived as a discrete bundle of algorithmic procedures based on discrete units of programming logic. Each object has its own functional autonomy. It receives and sends messages to other objects, while simultaneously processing data according to its own functions. For more on object-oriented programming, see Crutzen & Kotkamp, 2008.

variable expressions (e.g. the different ways to construct a chair) nor on its variable appearances (e.g. the different ways in which a chair can be perceived). In Harman's words: “When I circle an object or when it rotates freely before me, I do not see a discrete series of closely related contents and then make an arbitrary decision that they all belong together as a set of closely linked specific profiles. Instead, what I experience is always one object undergoing accidental, transient changes that do not alter the thing itself.” (2005, p. 98). The qualities of an object, such as colour, fragrance, weight, and so on, are therefore for Harman distinct from one another and from the object itself. They are said to constitute a field of relatedness that can be thought and experienced without objects. “In this way the fleshly medium of loose qualities is placed everywhere in the world” (Ibid, p. 91). To the point of being that which allows for objects to enter in relation with one another. The problem of explaining how objects are related to one another, when granted the case that they are radically distinct from one another, finds in their own qualities the field of potentials and the space of possibilities by means of which relations can come to be established. From which two different questions arise: if qualities are different from the objects that they qualify, then how are they related, not only to objects, but also to one another?; and, does the relation between qualities belonging to different objects constitute a novel object? In order to answer to these questions, Harman's object-oriented philosophy divides the world in two different kinds of objects. There are real objects, characterized by their radical discontinuity relatively to one another and to the qualities existing in the world, and there are sensual objects, a designation which discloses the fact that they exist only in relation to qualities.

Harman's notion of real objects is his own take on the problem of how to explain the independence of objects from qualities. One can say that a chair does not need to be made out of wood in order to be a chair, but also that there are some minimal requirements for it to be a chair. Meaning that, without a surface capable of supporting a person's back and another capable of supporting the person's buttocks, simultaneously, any object will hardly qualify as a chair. In this sense, there is a relatedness of parts that necessarily includes a minimum of different qualities. An object can be defined by determinate relationships between qualities, rather than by the qualities themselves. In Harman's words: “An object is real not by virtue of being tiny and fundamental, but by virtue of having an intrinsic reality that is not reducible to its subcomponents or exhausted by its functional effects on other things” (2009, p. 215). From this, what is most important to retain is the implicit tension between the fact that objects are independent from their qualities and the fact that they cannot be thought without them.

With such formulation, what seems to be most determinant for an object's definition is (perhaps not surprisingly) relation. Relation both as the constitutive excess of objects and qualities and as what cannot be reduced to either the one or the other. Conversely, this is to say that objects are irreducible to qualities, since qualities are irreducible to the relations that they partake and which express objects.

It follows that an object's intrinsic character results from a process that cannot be fully known because it is simply too complex. For Harman (2005, p. 174), an object's intrinsic character results from “indirect or vicarious” relations, a notion depicting the non-linearity of the qualitative relations underlying any objective formation. Indirect relations explain why it is possible for objects to loose certain attributes and still remain what they are. They assure that an object's attributes are not interchangeable and that what therefore results from a bundle of qualities is but the object's singular and unrepeatable expression. In this sense, an object can endure as long as its qualitative relations are not destroyed. In contrast, one singular object can never be repeated in the exact same way, for its qualitative self-affection cannot be known as such. Hence, it is vicarious. It remains inaccessible, in spite of being determinant for what may result from the resolution of problems posed at the diagrammatic level of materiality. For example, though the flowers of one same species of plant may be similar to one another, no one flower is alike. Each results from singular movements of individuation where the actual resolution of problems in potential expresses the undetermined, unconscious and unknowable depth of the material abstract machine. The indetermination of potential relations in a continuum of qualitative affects is the indirect or vicarious cause of individuation. Any object is unrepeatable because its vicarious cause, being unknowable, remains inaccessible. Its constitution is irreproducible and, therefore, singular. Which also means that no object can be reduced to a sum of parts. There is always more to it than its actual resolution. It is excessive over itself, but not in any determinate way. It is vicariously excessive, since the source of its individuation (i.e. its preindividual reality) remains implicit in its resolute actuality. Hence, no object can be fully known. Any object is only accessible up to a certain point. Beyond this, it is vicariously undetermined with regard to itself. If objects are somewhat inaccessible, it is only because qualities are fundamentally inaccessible too. To say that objects and qualities are inaccessible is not the same as saying that they don't exist. “The inaccessibility of the subterranean depth of the sun does not entail its nonexistence.” (Harman, 2005, p. 86). It is rather to say that they exist as a potential to be in relation with one another. From which it follows that only determinate modes of association between qualities and objects can be accessed. Such association, which is expression itself, is understood by Harman as being a "phenomenon". A notion that Harman (Ibid., pp. 7–70) owes to the work of the so called "carnal phenomenologists", a strand of philosophers including Maurice Merleau-Ponty, Emmanuel Levinas and Alphonso Lingis.

Phenomenology was first systematized by Edmund Husserl (1960, 2013), whom inherited from René Descartes and John Locke the idea that objects possess primary and secondary qualities. This distinction, according to which Husserl based his theoretical explorations both on the mathematization of the world and on phenomenological intentionality, can be understood in terms of causality and access. Whereas secondary qualities can be directly accessed, for the reason that they correspond to the qualitative expressions of objects, including colour, shape, mass, and any quality accessible by means of a sensible system, primary qualities cannot, for they are considered to be the cause of secondary ones. While primary qualities can be approached by means of mathematical abstractions and cannot be directly sensed, secondary qualities are not mathemathizable and can only be directly sensed. Harman explicitly argues against a world divided in this manner, for the reason that this is a distinction that posits a hierarchy between immutable substances and derivative relations. In his words: "One of the objections made against theories of substance is that they pamper some elite layer of explanatory things – subatomic particles for the sciences, or everyday specimens like horses and trees for Aristotle – while explaining away all more complex entities as secondary products of the combination of simple parts. Either everything is made of atoms, and moods are explained away as the by-product of brain chemicals; or machines are viewed as artificial composites with no reality of their own." Against this distinction, Harman posits that "[w]hat we have is not a universe split between aristocratic natural kinds and miserable, pauper-like accidents. Instead, we have a universe made up of objects wrapped in objects wrapped in objects wrapped in objects". (Harman, 2005, pp. 84–85).

It is, nevertheless, by making use of the notion of substance that Harman defines objects. For him, "[e]very object is both a substance and a complex of relations". Not only this, but if "[w]hen two objects enter into genuine relation, even if they do not permanently fuse together, they generate a reality that has all of the features that we require of an object", then "any relation must count as a substance". (2005, pp. 85). According to this view, relations are objects. Which accords with the fractal geometry that the regressive wrapping of objects into one another proposes. Moreover, according to Harman, “[t]he reason we call these objects 'substances' is not because they are ultimate or indestructible, but simply because none of them can be identified with any (or even all) of their relations with other entities. None of them is a pristine kernel of substantial unity unspoiled by interior parts. We never reach some final layer of tiny components that explains everything else, but enter instead into an indefinite regress of parts and wholes.” (Ibid.). For this reason, the notion of substance regards here relations that, in spite of assuring an object's identity, are inaccessible. For Harman, it is this inaccessible character of objects that constitutes not only their reality, but the real as such. Which is a standpoint that goes directly against a metaphysics of presence. In this sense, real objects are withdrawn from any possibility of knowledge. “It is not even possible to get 'closer' to the things in such a way that presence could provide some sort of measuring stick for how nearly we have approached reality”, says Harman (Ibid., p.86). Because such inaccessibility doesn't say much of the world except for the fact that it resists both material and conceptual reductions, it can be said to be the reason why Harman's philosophy has such a speculative tone. In fact, it is precisely because of this that his work can be included in the recent trend in continental philosophy designated as “speculative realism”, which results precisely for various tentatives to overcome the shortcomings of “philosophies of human access” (Harman, 2005).

In contrast, objects are accessible via relations. One can see how yellow the sun is, or feel its warmth, but only insofar as the conditions of sensation necessarily include a number of other objects, such as the atmosphere, sensorial organs, a nervous system, and so on. In this sense, perception requires more than one object. Colour does not happen without an eye, weight does not happen without a difference between masses, proprioception does not happen without muscles, and so on. To define an object in terms of qualities is to define it in terms of its relation to other objects. In Harman's philosophy, this is how sensual objects differ from real ones: they exist in relation. Insofar as they are accessible, they comprise relations between different objects, from which their qualifying attributes emerge. The fractal geometry of objects proposed by Harman's object-oriented metaphysics, i.e. the wrapping of objects into one another, is simultaneously the cause and the effect of a phenomenon of exteriority. Only because objects exist outside of themselves, with other objects, can they be defined by indirect relations within a bundle of qualities. Sensual objects coincide with their presence in other objects. In opposition, a real object has no exteriority. It is inaccessible and therefore cannot exist together with the interior reality of other objects. Real objects coincide only with themselves. Harman's understanding of the world as being divided between real and sensual objects corresponds to a metaphysics that is itself divided in terms of absence and presence (being that, here, absence regards a lack of exteriority and presence a qualitative relation between objects). Since, in this way, presence coincides with relation, relations themselves are granted an objective status. Relations are objective because they coincide with the exteriority of presence, which unifies the emergence of different qualities in an act of perception.

It is worth noting that Harman's belief on a substantial core of objects owes much to phenomenology's method of eidetic reduction, which is commonly performed by means of mathematical abstractions. In contrast, sensual objects can be thought by means of a phenomenological kind of reduction, which ultimately synthesizes interiority with the intentional act of a subjective experience. While the interiority of an object remains inaccessible, it suffices to imagine it for the object to become intentional and, in this way, acquire a degree of exteriority, i.e. relatedness. For such reason, in the phenomenological tradition and specially in Husserl's philosophy, the common outcome of thinking the world beyond intentionality has been the subsumption of eidetic reduction by phenomenological reduction. Which is to say that, even if the eidetic core of objects is approachable by means of mathematical abstractions, it remains in all occasions fundamentally inaccessible.

Notwithstanding, Harman insists that, in order for objects to be defined, they need to be granted an eidetic reality. More than unchanging substances, Harman thinks the *eidos* of things as dynamic kernels of relations, accessible only in effect. In this sense, an object's unchanging reality is necessarily somehow related with its variable attributes. “There is one sense in which a substance is not affected by its qualities at all, since it can lose some of them while remaining itself, but another sense in which it depends on them utterly. But this means that the union of an object with its own essence requires vicarious bonding no less than the bond between one thing and another.” (Harman, 2005, p. 93). Hence, this conception of vicarious bonding implies that there is a certain reciprocity between real objects and sensual qualities. Not only are objects qualified by given attributes, but they are the very reason why different qualities can establish determinate facts of togetherness. “Consider an apple”, says Harman, “[i]ts sweetness and fragrance and colour and price and nutritional value are to a large extent distinct. Yet somehow all of these qualities are unified in a single thing, despite their relative inability to interfere with one another” (Ibid.). Vicarious causation at once approximates Harman's object-oriented metaphysics to a transcendental level of determination and to an immanent reality of constitution, both of which are objective. In this way, objects are defined by a codetermination between their own vicarious depth and the accessible surface of their qualitative attributes. This sort of codetermination should be thought to regard as well general relations between parts and wholes. As Harman explains, for example, "it cannot really be said that windmills are made of ladders, pumps, rotating blades, and wire-mesh crow's nests. Or rather, it is made of these things only in a derivative, material sense. Although the windmill needs these smaller parts in order to exist, it never fully deploys these objects in their total reality, but makes use of them only by reducing them to useful caricatures. That is to say, a windmill does not fully sound the depths of its own pieces any more than a human observer does. It merely siphons away the needed qualities from these objects, just as animal stomachs reduce the sparkling allure of fruits to brutal, one-dimensional fuels." (Ibid., pp. 93–94). From this, Harman extracts the formula that "the sum of parts is always greater than the whole" (Ibid.), since each part is only related to the whole to the degree that the whole reduces it. As much as an object is part of a whole, it can only be to that whole a part of what itself is as a whole. This partiality of access between two different objects coincides with the depth that each one possesses and which is inaccessible to the other. Conversely, only the surface of an object can be directly accessed by another object.

"If objects exceed any of their perceptual or causal relations with other objects, if they inhabit some still undefined vacuous space of reality, the question immediately arises as to how they interact at all. More concisely: we have the problem of nonrelating objects that somehow relate" (Harman, 2005, p. 91). In order to deal with this problem, Harman conceives of objects as modules that are capable of connecting to one another. In his words, "objects do not fully manifest to each other but communicate with one another through the levels that bring their qualities into communion" (Ibid., p. 68). The paradigmatic example of this are atoms, for atoms can combine with one another in as many ways as the objects known to result from their assemblages. This is where Harman's object-oriented metaphysics can start being related to processes of algorithmic computation. Because what determines the ways in which non-relating objects do in fact relate are rules as simple as quantitative relations of electric attraction and repulsion. In this regard, it is possible to compute relations without further knowledge about the intrinsic reality of the objects involved. Or, which amounts to the same thing, "the levels that bring qualities into communion" can be thought quantitatively. Harman himself doesn't do this. What he inherits from phenomenology is a concern with perception (and thus accessibility) and with what might exist beyond its variations, that is, with the eidetic core of objects. Nonetheless, in his object-oriented metaphysics, quantities are conflated with the levels of inter-objective communication. They are thought spatially, but not in a way that specifies their relation to qualities.

Harman's philosophy proposes a general schema of relations where qualities are related to one another so as to form objects, and objects can only be related to one another qualitatively. Here, it seems straightforward to think that, in such schema of spatial modularity, there must exist qualities that are quantitatively determined. Meaning that the qualitative determination of objects must at some point result from the accretion of space on space occurring with their modular assemblage. In this sense, there are variable degrees of spatial magnitude underlying and conditioning the expression of qualities. Colour is a good example, since the quantities of primary colours, such as red, green and blue, determine the resulting expression of their own mixture. Mix blue and green, and you'll get yellow. Change the ratio between these two colours' quantities and you'll get different tonalities of yellow. The relation between two colour-objects results in the emergence of a third novel object. Hence, the qualitative expression of an encounter between parts necessarily depends on how much each of the parts participates in the whole. Despite the fact that quantities and qualities are hardly inextricable from one another, the different levels of relation between objects do indicate their spatial character and thus the quantitative aspect of determination involved in their causality. Which is to say that, at different orders of magnitude (or even different domains, for that matter), the quantitative inclusion of objects can have different results, depending on the given spaces. The same quantities of colour will generate different results, depending on how other objects, such as a support of inscription, react to the mix. Therefore, the many levels that can be granted to belong to an object, be them accessible or not, must be understood under the prism of a quantitative relation between qualitative objects.

The notion of "level", inherited by Harman from Lingis' phenomenology, is central to an object-oriented metaphysics, since it allows for the reconciliation between objects' eidetic inaccessibility and their capacity to be in relation with one another. But instead of level, Harman calls it "medium", which he defines in the following manner: "A medium is any space in which two objects interact, whether the human mind be one of these objects or not. Human sense experience is only one particular zone or medium of the world, and possibly not even the most interesting one. The medium between objects is the glue that makes possible the entire carpentry of things – without it, the world would remain a set of noncommunicating crystalline spheres sleeping away in private vacuums." (2005, p. 91). In other words, the medium is the "intermediate zone through which objects signal to one another, and transfer energies for the benefit or destruction of one another." (Ibid., p. 70). In order for two different atoms to relate to one another, a medium is required. Importantly, the medium cannot be thought without the atoms themselves. And to the extent that one same type of atom can participate in different types of molecules, and these in different types of compounds, and these in different types of bodies, and so on, what necessarily results from this style of organization is a multimediatic structuration of connectivity or, in other words, from an object's perspective, connections at different levels. Ultimately, for Harman, such connections remain inaccessible. "Since no causation between [objects] can be direct, it clearly can only be vicarious, taking place by means of some unspecified intermediary." (Ibid.). Which is to say that the causal relations occurring throughout the different levels that mediate the communication between objects are indirect and inaccessible. Despite its real dimension, an object can in this way be thought to be structured by the different levels throughout which it is in fact related to other objects. The levels of an object are neither internal nor external to it. Rather, they are the object's very spatiality. They correspond to the spatial structures throughout which the events of one given scale are communicated to other scales. In an object-oriented metaphysics, there is no relation outside of objects. Across different scales, objects comprise the different levels of their relatedness. For example, one can think of the body's joints. They simultaneously connect and separate different regions of the body. Whereas they can be seen as objects in themselves, they can also be seen as being part of any of the connected regions. A joint is both an object and a medium. In fact, fractal geometries like this can be found in whatever kind of network. Every object is a multimediatic cluster. Every medium is an object. Objects within objects, media within media, *ad infinitum*.

The fractal geometry according to which objects are wrapped around and into one another results therefore from a levelled exchange of energies. A novel object can only come about by means of a communication of events between levels. A perspective which is close to Simondon's understanding of relations on the basis of notions such as information and metastability. Notwithstanding, Harman himself is critical of the idea that potentials constitute an intrinsic dimension of objects. For him, objects do reserve a capacity to establish novel relations, but this potential is necessarily actual. In his words: "This secret reservoir cannot be the 'potential', because the potential needs to be inscribed somewhere actual right now, and if the actual is entirely determined by its relations then this gets us nowhere" (2009, p. 187). Here, at the same time that potentiality is conflated with actuality, it is also conflated with resolute determinations.

"The potential can only mean a potential for future relations, and the actual can only mean what is in and of itself actual apart from any relations" (Ibid.). This understanding of potentials conforms to the idea that actuality is relative to itself and potentiality relative to future objects. But, in contrast to Simondon, Harman understands potentials as being determinately given. From which it follows that he grants to virtuality no special value. Of the notion of virtuality he says that it "merely plays the double game of saying that true reality in the universe is both connected and separate, both continuous and heterogeneous" (Ibid.). But by saying this, what Harman seems to dismiss is the immanent factor of determination implied in the conjunctive article "and", which he uses. For such conjunction between disjunctive parts implies not only their relation, but more specifically, their relation in potential, which necessarily implicates an immanent factor of determination between what is given and what is not. What Harman dismisses is the general potential of constitution that is actually nowhere to be found but that, notwithstanding, is real. As such, it is undetermined. For if novelty is to occur, the world needs to include a general potential of creativity. Hence, what Harman's philosophy overrides is the constitutive indetermination of affect. Instead of accounting for this reality, Harman instead engages himself with a renewal of occasionalism, not by making use of any notion of transcendence, but rather by using the notion of "vicarious causation". Instead of an indeterminate cause, what this notion implies is the idea that all causation is actual but, inasmuch as it is inaccessible, non-linear and too complex to be known. According to the author, if neither potentiality nor virtuality qualify for the task of causation and for a distinction between real and sensual objects, "[t]he only thing that will fit the bill is a non-relational actuality: objects that exist quite apart from their relation to other objects, and even apart from their relation to their own pieces" (Harman, 2009, p. 187).

In regard to algorithmic objects and to the computations in which they might be involved, this conception of vicarious causation is somewhat problematic. In a sense, all the constituent elements of an algorithmic object can be distinguished from one another in an infinite regression that necessarily leads to the kind of Harman's conclusions. Which is to say that all objects correspond to mediatic levels of communication between other objects, even if not actually, at least in the sort of way that Harman grants their potential to be like, that is, as determinate possibilities. What in this way can come to be known are the very operations of communication that objects partake. This not only allows for a knowledge of structures, but also for a knowledge of the contrasting grounds against which objective structures are remarked. Notwithstanding these terms, this is by no means to say that an object-oriented metaphysics, as theorized by Harman, conceives of process in terms of undetermined potentials and of individuals with associated milieus. In fact, as much as such metaphysical approach conceives of all reality as actual, novelty is hardly made to be a part of the picture. This approach postulates an ontology of possibilities, regardless of what cannot be known because of being vicarious. In the actual spaces of an object-oriented world, novelty is more correctly seen as the outcome of possibilities that, because of being vicarious, cannot be anticipated. It could be argued that, in this case (like with the principles of an universal computation), objects are combinable with one another in as many ways as possible. In which case, emergents would merely correspond to the outcomes of a combinatorics that, despite being possibly unpredictable, is determinately given and therefore knowable. Whereas this is the case of a computable possibility space, the vicarious causation that Harman argues to be fundamental for the understanding of an object-oriented world precludes this ontology's possibilities from being computed. This factor of unknowability at the heart of possibility is the very incomputability of objects. But, in contrast to Chaitin's theory of algorithmic complexity, this is not an incomputability made out of random quantities of data. In fact, as much as in Harman's philosophy this randomness pertains to the unknowable core of objects, what the notion of vicarious causation overrides is the very necessity to define the indetermination constitutive of this lack of knowledge. If the notion of vicarious causation pertains to process's indetermination, then the quality of such indetermination remains to be discussed. A lack that corresponds as well to an absent discussion on the relationship between quantities and qualities.

While striving to articulate objects with relations, Harman's object-oriented metaphysics results in a seamless conflation of forms with actuality. Here, the paradox resides in the incompatibility between the assumption that actual determinations are knowable and the assumption according to which beyond what can be known exists only actuality. Because in this philosophy the latter is only accepted to be determined, it should therefore be knowable. But because a factor of unknowability needs to be granted to reality, the notion of vicarious causation comes into use in order to conceal this paradox in an inexplicable space. In other words, Harman's philosophy doesn't really discuss the relation between what is known and what is not. It doesn't consider the dynamisms of affect between the unconscious and the resolute determinations resulting from it. The spatial character of an object-oriented ontology does provide a way to conceive of algorithmic objects and their relations. Any algorithmic object can in this way be conceived as a multimediatic module throughout which information is transmitted. But even here, with the notion of information, Harman's philosophy leaves no space for indetermination. In an object-oriented metaphysics, information cannot but correspond to the serialization of data. In short, what this theory overlooks is indetermination in general. More specifically, it does not account for an actuality that is itself random and undetermined. It does not strive to consider the kinds of quantities that are unaccountable by the qualitative expression of objects and their relations. If one is to take Chaitin's proof of Omega seriously, then a whole field of excessive quantities must be considered. And instead of equating actuality with what is determined, as Harman does, one needs to consider it as well in undetermined terms. From which it follows that, instead of a qualitative continuum resulting out of a total quantitative determination, what one gets is an extensive continuum pervaded by incomplete and undetermined quantities. In order to discuss the notion of the extensive continuum, which comprises both the spatiotemporal distribution of objects and an infinity of random quantities, bigger than the realized qualities, this study will now turn to Alfred N. Whitehead's process philosophy. In this way, not only objects will be conceded a processual character, but also and precisely because of this, their parts will be conceived as being bigger and more random than their determinate and qualitative expressions.

But before this, it is perhaps worth noting that an inquiry on the relationship between qualities and quantities, from the perspective of algorithmic objects, shouldn't be understood as pertaining only to digital computation. One should bear in mind that digital simulations are feasible not only because they share the possibility space with the systems of reference, but also because their algorithms coincide with these systems's processes.[155] Be it on the side of digital simulations or on the side of their systems of reference, algorithms can be found as what results from the co-individuation of subjects and objects, that is, as the knowledge of the models according to which processes unfold. If, for example, there would not be a specific sequence of genes responsible for producing a specific protein, we wouldn't be able to create this same protein by means of computational procedures. Which is simply to say that the genetic code itself is the basis of a complex ecology of algorithmic procedures by means of which determinate syntheses are actualized. In this regard, the field of biotechnology is most exemplary. One moves from conceiving of the world as a set of autonomous algorithmic

155 For a philosophical incursion into, not only all sorts of digital simulations, but also more broadly the synthetic style of reasoning underlying them, see Manuel DeLanda's book *"Philosophy and Simulation: The Emergence of Synthetic Reason"* (2011).

procedures, from which we can only derive simulations, to the practice of programming with its own codes. In this manner, instead of just simulating processes, we become able to create systems that, unlike any others before them, result from a knowledgeable manipulation of the world's most intrinsic algorithms. Thus, to inquire into the mode of relation between quantities and qualities, from the perspective of algorithmic objects, corresponds more to a given take on the world, i.e. to the assumption that its processes unfold according to an algorithmic architecture, than to a specific focus on digital computation. It is nonetheless from such scope that digital computation might come to be understood under a new light.

6.4 - Process Orientation

It was philosopher Alfred N. Whitehead (a notable influence on Gilles Deleuze's philosophy) who most consistently and systematically argued for the immanence of transcendental ideas and actual experiences, that is, for the inextricable relation between transcendental objects and the actual conditions of emergence from which empirical facts result. To the objects of transcendental memory Whitehead calls "eternal objects", and to the objects of empirical memory he calls "actual occasions" or "actual entities". For him, eternal objects correspond to the ideas of what has been already once objectified, i.e. the regularity of past occasions. Ideas that, because they are potential in regard to future occasions, can ingress time and again into novel facts of unity, i.e. into the formation of experience, perception and empirical memory. In Whitehead's words, "an eternal object can be described only in terms of its potentiality for 'ingression' into the becoming of actual entities; and its analysis only discloses other eternal objects. It is a pure potential" (1978, p. 23). For example, the idea of blue, before being expressed, is neither this or that expression of blue, but rather the general schema, or pure abstraction, encompassing all possible expressions of blue. Each expression of blue necessarily depends on spatio-temporal conditions that determine the ingressing idea's variation (i.e. no one blue is alike) and conserve its virtual invariance (i.e. blue as an ideal pattern or eternal object).

In order to conceive this processual relation between virtuality and actuality, instead of conflating the virtual with the topological invariance of infinitesimal division, Whitehead elaborates a "mereotopology" where ideas are actual but, nonetheless, distributed across a continuum of relations. In this way, virtuality is made to correspond to an infinite series of discrete points, rather than to a continuous infinity. At the same time that it abstracts ideas from actuality, it remains implicit in its discrete multiplicities. This results in virtual-actual dynamisms that correspond to infinite extensions of inclusion and exclusion between wholes and parts, rather than to rhythmic pulsations between movements of actualization and deactualization, in the sense of topological processes. Mereotopology—a mode of thought that articulates mereology with topology —refers to the study of extensive relations between parts and wholes (Whitehead, 1978, pp. 281–333). Media theorist Luciana Parisi explains Whitehead's use of this method in the following way: "Whitehead's analysis of parthood relations (mereology, from the Greek mero, 'part') was an ontological alternative to set theory. It dispensed with abstract entities and treated all objects of quantification as individuals. As a formal theory, mereology is an attempt to set out the general principles underlying the relationships between a whole and its constituent parts, as opposed to set theory's search for the principles that underlie the relationships between a class and its constituent members. As is often argued, mereology could not explain by itself, however, the notion of a whole (a self-connected whole, such as a stone or a whistle, as opposed to a scattered entity of disconnected parts, such as a broken glass, an archipelago, or the sum of two distinct cats). Whitehead's early attempts to characterize his ontology of events provide a good exemplification of this mereological dilemma. For Whitehead, a necessary condition for two events to have a sum was that they were at least 'joined' to each other, i.e., connected (despite being or not being discrete). These connections, however, concerned spatiotemporal entities, and could not be defined directly in terms of plain mereological primitives. To overcome the bounds of mereology, the microscopic discontinuity of matter (and its atomic composition) had to be overcome. The question of what characterized an object required topological and not mereological analysis. From this standpoint, two distinct events could be perfectly spatiotemporally colocated without occupying the spatiotemporal region at which they were located, and could therefore share the region with other entities. The combination of mereology and topology contributed to Whitehead's articulation of the notion of the extended continuum." (Parisi, 2013, pp. 309–310).

In Whitehead's theory of regional extension, parts do not preexist the relations that they come to establish. Rather, they are defined by the ways in which they include and exclude themselves from one another. In this perspective, continuity ceases to be exclusively virtual, condemning the actual to be discontinuous, to become proper of extension itself. Each actual entity is defined by the relations of extension that it partakes with other entities. Their contact generates concrete limit-points and surfaces of contact that no longer fall into the topological infinity of infinitesimals. Rather, these are discrete conditions of transition from one spatiotemporal region to another, organized in accordance with a continuity of potential discontinuities (i.e. discrete points of contact). Here, connection concerns the critical limits at which the state of a regional system is altered to the point of having to change. The passage from one state of affairs to another is designated by Whitehead as "concrescence", which "is the name for the process in which the universe of many things acquires an individual unity in a determinate relegation of each item of the 'many' to its subordination in the constitution of the novel tone" (1978, p. 211). As such, the transitory connectivity of spatiotemporal regions corresponds to the unification of a multiplicity of actual entities. It is the constitution of a mereotopological space where parts and wholes are related to one another in extension.

If computation is considered, it is here, with Whitehead's extensive schema, that digital algorithms can be understood beyond the credo of a disjunction between virtuality and actuality. To the extent that digital computation can be seen as an accretion of data on data, its algorithms can be understood as concrescences. Of course in this framework an algorithm can also be said to be an actual entity. But in this regard, it matters to say, together with Whitehead, that "[t]here are not 'the concrescence' and 'the novel thing' [or actual entity]: when we analyse the novel thing we find nothing but the concrescence" (Whitehead, 1978, p. 211). And the reason for this, the philosopher explains, is that "'[a]ctuality' means nothing else than this ultimate entry into the concrete, in abstraction from which there is mere nonentity. In other words, abstraction from the notion of 'entry into the concrete' is a self-contradictory notion, since it asks us to conceive a thing as not a thing" (Ibid.). From this standpoint, algorithms themselves can be understood as processes. For, as Whitehead proffers, "[a]n actual entity is a process, and is not describable in terms of the morphology of a 'stuff.'" (Ibid., p. 41). Algorithms ingather data into the concrescence of novel facts of unity, which on their turn become part of the extensive schema where all actual entities are potentially related to one another. Such perspective of digital computation becomes all the more adequate if the parametric structure of algorithms is considered. Such structures can in this way be seen as extensive spaces where concrescences take place. Their constituent entities, rather than being discontinuous, in the fashion of digital bits of data, are continuous with one another in the extensive whole where their own constitution takes place. Importantly, this is a whole that, by reason of being the object of both an "indefinite divisibility" and an "unbounded extension", which according to Whitehead are the main features of the extensive continuum, comprises in itself the infinity of virtual potentials.

It can nevertheless be argued that the results of parametric computation pertain to a space of topological invariance. After all, parametricism is a mode of control characteristic of cybernetics and of the pervasive culture of prediction that followed from it. Parametric algorithms can be used as functions of control with regard to the variation of results. From which follows the possibility of approaching algorithms, and specially parametric ones, both from different standpoints with regard to space and from different conceptions of virtuality. If one thinks, for example, of the gestural bodies expressed by the parametric algorithms of the *Gesture Follower* (discussed in Section 5.1), one can say that they take form in accordance with the topological invariance of a determinate definition of gesture. The expressions actually vary, but within the limits of possibility given to the software in the form of parametric structures. The expression of gesture is constrained by what is possible at the intersection of imagination and digital programming, and thus made to be the function with which gesture can be predicted, i.e. followed, and controlled (by signalling the learning subject with the binary possibility of conformity between the different domains of expression at stake). On the other hand, the parametric structure of the algorithms expressing here the definition of gesture entails a mereotopology of extensive relations between wholes and parts. As much as given parameters correspond to discrete quantities of data, the computation of parametric algorithms corresponds to the concrescence of many series of data. Computation realizes the many potentials of relation existing between the infinity of discrete parts in concrescence. A parametric algorithm can thus be seen as an extensive schema where many discrete quantities of data intersect with and overlap to one another, forming a mereotopological infinity.

It is acknowledgeable that Whitehead's theory of extension and his mereotopological approach fit the consideration that algorithms are more than finite sets of data. A mereotopological approach allows for considering algorithms' incomputable data with a notion of space that, at the same time that it articulates the undetermined with the determined, it articulates as well the virtual with the actual in a way that somewhat resolves the problem of how to understand the processual relation between quantities and qualities. For this reason, Whitehead's theory of extension deserves to be further expounded, so that the processes whereby incomputabilities infect the calculation of actuality can be better understood. Needless to say that this conforms to Chaitin's theory of algorithmic complexity.

For Whitehead, ideas “exhibit the definiteness of mathematical relations” (1978, p. 327). Only this allows abstraction to measure the physical world in an exact way. In contrast to relativity theory, which conflates the laws of physics with geometry and relegates abstraction to the limits of space's infinitesimal divisibility, Whitehead proposes a disarticulation between abstractions and expressions so that the measurement of space can occur in purely formal terms (1978, pp. 283–289, 294–301). On the one hand, this amounts to saying that only the potentials of pure abstractions can define the mathematical relations actually established between the different parts of one extensive whole. On the other, it is to say that the contact between the different entities cannot actually express the definiteness of mathematical relations. It follows that there is necessarily a degree of indetermination constitutive of the extensive continuum's mereotopological relations. If one were to perform, concretely, the partition of a whole, one would necessarily find impossible to express the definiteness of mathematical relations. To the same extent that this is concretely impossible, it is possible in abstraction. Only in abstraction can the definiteness of mathematical relations be defined. Notwithstanding, the potentials of such relations do exist immanently in extension. The pure potentials of eternal objects are immanent in the extensive continuum's mereotopology. Abstraction in general and the definiteness of mathematical relations in particular, rather than doubling in potential what can in fact come to occur, simply correspond to yet undetermined relations of contact between the extensive continuum's actual regions of space-time. As such, mathematical relations are pure potentials.

Accordingly, if spatial relations can be measured, and if measurement is a method of abstraction, then space is to be thought in terms of extensive abstractions. Such corollary owes much to the fact that, in Whitehead's philosophy, virtuality is not considered to be a formless potential, capable of being determined in many possible ways, but rather a series of infinite ideas, each of which distinct from the rest. Since each actual occasion is a singular event, the pattern of occurrence that it comes to inscribe in the continuum of extensions is historically located. Ideas participate in this way in the continuum of potentials, at the same time that their historical ingression into actuality allows them to become distinct from one another. They exist as general potentials, but they also become historically located and actually distinct from one another. With the implication of ideas in the actual definition of the world's expression, not only are virtuality and actuality assured to be immanent in one another, but also ideas are granted definiteness because of being implicated, as general potentials, in the actual continuum of extensive relations between parts and wholes.

Whereas ideas are here conceived as general potentials of expression, the extensive continuum where they exist and from which they acquire definiteness is seen to be not without its own non-abstract capacities. Which is to say that matter itself is here too conceived as being autonomously active, not only capable of expressing the ideality of patterns, but also capable of moving in accordance with its own specific, i.e. non-general, potentials. In this sense, Whitehead's schema of extension coincides with the previously expounded notion of matter's diagram.[156] It grants matter the capacity to organize itself, with no necessity for external factors of determination. The reciprocal determinability of forces and forms that constitutes the physical pole of reality, provides the ground on which abstractions can be imagined, for it is in matter itself that ideas, in potential and before subjectification, are already implicit. Which is to say that the diagram of matter is doubled by an abstract one: the "mental pole" of all material formations. For Whitehead, "no actual entity is devoid of either pole, though their relative importance differs in different actual entities" (1978, p. 239). It is from this very conception of abstraction in actuality that the notion of experience is disentangled from subjectivity. Because "an actual entity may, or may not, be conscious of some part of its experience" (Ibid, p. 53), Whitehead postulates the presupposition of experience by consciousness, rather than the opposite. Hence, it can be said that the world experiences itself, with no necessity for a conscious subject. The mental pole of reality grants the world the capacity to think itself, as this selects from the potentials of eternity the ideas that it chooses to actually realize. Conversely, all matter abstracts the world in its own way. Be it through the layered stratification of geological sediments or through the formal variation of waters drops and snow flakes, matter's physical expression always expresses ideas. With the primacy of experience over consciousness, Whitehead's process-oriented metaphysics distances itself from the kind of dualities that divide the world between given subjects and object, to define experience as the process through which the mental and physical poles of reality co-exist and co-evolve, immanently in one another. Experience unfolds the general potentials of abstraction together with the relative potentials of matter's diagrammatic dynamisms towards a constant rearticulation of novelty with what is actually given from the past. Experience: a continuous definition of ideas by means of extensive creation.

To the schema of extensive abstraction, Whitehead calls the "extensive

156 See pages 137-139, Section 4.3.

continuum" (Ibid., pp. 61–82). This continuity of extension is a potential for indefinite division, which grants it with the capacity to express the definiteness of mathematical relations. The general potentials of ideas are here granted an actuality that, rather than being determined, is undetermined. It is through such indetermination that the extensive schema of general expression ceases to relate only discrete and discontinuous entities, to not only relate them in a continuous field of potentials but also relate them to these same potentials, i.e. to the ideal patterns of occurrence that they express each time anew. From which it follows that each determinate expression necessarily implicates undetermined quantities of data that allow for it to connect to all other actual entities, if not in fact, at least in potential. Conversely, it is only by means of these potentials' ingression into the concrescence of novel facts of unity that the continuum becomes extensive, i.e. that it acquires determinate standpoints with regard to its overall development. Whitehead explains the relationship between the extensive continuum and the concrescences that in it take place in the following way: "The real potentialities relative to all standpoints are coordinated as diverse determinations of one extensive continuum. This extensive continuum is one relational complex in which all potential objectifications find their niche. It underlies the whole world, past, present, and future. […] the properties of this continuum are very few and do not include the relationships of metrical geometry. An extensive continuum is a complex of entities united by the various allied relationships of whole to part, and of overlapping so as to possess common parts, and of contact, and of other relationships derived from these primary relationships. The notion of a 'continuum' involves both the property of indefinite divisibility and the property of unbounded extension." (Ibid., p. 66).

If the extensive continuum holds a potential of division, then it is by actual means that this potential is realized. On the one hand, the continuum is undetermined. It infects concretization with real potentials of division. On the other, actual division is a sort of atomization. In Whitehead's words: "Actual entities atomize the extensive continuum. [...] For each process of concrescence a regional standpoint in the world, defining a limited potentiality for objectifications, has been adopted. In the mere extensive continuum there is no principle to determine what regional quanta shall be atomized, so as to form the real perspective standpoint for the primary data constituting the basic phase in the concrescence of an actual entity." (Ibid., 67). There is, therefore, an absolute potential of extension in the continuum. But as much as actual entities correspond to determinate standpoints and each entity implicates undetermined quantities of data, potentials need also to be seen as being relative to one another.

Accordingly, “[w]e have always to consider two meanings of potentiality: (a) the 'general' potentiality, which is the bundle of possibilities, mutually consistent or alternative, provided by the multiplicity of eternal objects, and (b) the 'real' potentiality, which is conditioned by the data provided by the actual world. General potentiality is absolute, and real potentiality is relative to some actual entity, taken as a standpoint whereby the actual world is defined.” (Ibid., p. 65).

In order to better understand the relationship between general and real potentials, let's once again consider the example of colour. Once granted that whatever expression of blue cannot be but a singular event, and that it can only be so insofar as the general potential of blue exists as a potential of relatedness between the multiplicity of actual entities in concrescence, it must be acknowledged that absolute and relative potentials are immanent in one another. The eternal object blue exists in actuality as much as actual entities exist in the continuum of eternal objects. There is no one singular expression of blue that doesn't implicate the eternal object blue. Reciprocally, the general idea of blue does not exist without being implicated in actuality, i.e. without being somehow expressed. Real, local and relative potentials are intrinsic to the objects of eternity, since these constitute the continuum that each actual occasion cuts. Each actual cut realizes potentials relatively to the concrescent data, which are themselves approximations, in continuity, to the general potentials of relatedness that the continuum provides.

Inasmuch as actual entities implicate general potentials, they can be said to be randomly located in the continuum. Or, they can be said to be located everywhere in the continuum. In contrast, inasmuch as they are determinately inscribed in the continuum, they are historically circumscribed and therefore actually defined relatively to one another. This double character of space, simultaneously relative and general, is explained by Whitehead in the following way: “In the mere continuum there are contrary potentialities; in the actual world there are definite atomic actualities determining one coherent system of real divisions throughout the region of actuality. Every actual entity in its relationship to other actual entities is in this sense somewhere in the continuum, and arises out of the data provided by this standpoint. But in another sense it is everywhere throughout the continuum; for its constitution includes the objectifications of the actual world and thereby includes the continuum; also the potential objectifications of itself contribute to the real potentialities whose solidarity the continuum expresses. Thus the continuum is present in each actual entity, and each actual entity pervades the continuum.” (Ibid., p. 67). This results in a fractal geometrization of space and time that, contrary to Harman's object-oriented metaphysics, depends on the immanent relation between random quantities of data and the continuum's determinate standpoints.

As a potential to ingress into actual occasions and to realize ideal relations between different spatiotemporal regions, the extensive continuum expresses the general schema according to which the actual contact of parts comes to occur. While the continuum unifies actual occasions by providing the potential of their relatedness, actual occasions cut the continuum's potentials by realizing the ideality of patterns. The actualization of a potential idea is thus a discrete cut in the continuous infinity of discrete points constituting the Whiteheadian virtual. While not determinate in itself, a potential idea determines the precision of the cut with which it gets to be determined, in its concrete occurrence. Such determination involves an exclusive limitation of what is admitted into the actual occasions of experience. Meaning that, with each concrescence, only some eternal objects of the whole continuum are realized. For Whitehead, "[t]his element of 'exclusive limitation' is the definiteness essential for the synthetic unity of an actual entity" (Ibid., p. 66). The cut that each actual occasion operates in the gregarious continuity of discrete points marks the transitional limit between stationary data and concrescent emergence.

Moreover, says the philosopher, concrescence "embodies a determinate attitude of 'yes' or 'no'" (Ibid.). It selects and limits ingression in order to define the actual occasion. Such selection happens by means of what he calls "prehensions". A prehension refers to the immanent affectivity between the actual entities in concrescence. It registers the affective transformation that takes place when one entity enters another's world. An object is prehended by a subject, simultaneously to their reciprocal concrescence as the singular terms of a real affective connection. But also a thought prehends another thought; the contraction of a muscle prehends the extension of another muscle; and an arrow prehends the target that it comes to hit when in flight. Through prehensions, actual occasions come to relate to one another by including or excluding themselves from one another, in extension. This is what Whitehead calls, respectively, positive and negative prehensions. Through positive and negative prehensions, the actual occasions decide and select on what to admit into the final synthesis of process.

The concrescence of actual entities corresponds to the concrete determination of the present by the immediate past, a determination tantamount to the one of the future by the present. This actualization, tells us Whitehead, is initiated with the "pure reception of the actual world in its guise of objective datum for aesthetic synthesis", a movement that necessarily comes to include in the actual occasion a multiplicity of previous entities. This process, in which "the many become one, and are increased by one", is guided by what the author calls "the ultimate metaphysical principle", that is, "the advance from disjunction to conjunction, creating a novel entity other than the entities given in disjunction. The novel entity is at once the togetherness of the 'many' which it finds, and also it is one among the disjunctive 'many' which it leaves; it is a novel entity, disjunctively among the many entities which it synthesizes." Each creative process is therefore determined by the actual data that it can receive into concrescence. The concrescence resolves the extensive continuum's indetermination into a coherent coordination of different standpoints and, in this way, synthesises it aesthetically. (Ibid., p. 21).

Whitehead's extensive continuum undoes the split between space and time that was still so prevalent in Bergson's theory of duration, to give prevalence to the notion of an infinity of discrete points. In contrast to Bergson's philosophy, which understands experience according to duration, Whitehead's notion of the extensive continuum provides the possibility of conceiving the relation between intensive and extensive multiplicities in terms of an atemporal depth (of affect). Here, resonance is key. For it is through the processual resonance of the extensive continuum that a multiplicity of spatio-temporalities can co-exist. Contrary to the continual flow of becoming so characteristic of durational experience, the extensive continuum's actual entities come to be in contact with one another by selecting the potentials of eternity into the vibratory resonance of the concrescent becoming. The extensive continuum is a field of becoming, the internal resonance of which assures the affective prehension between actuals entities.

From this standpoint, algorithmic objects can be seen under a different light. In contrast to Harman's object-oriented metaphysics', Whitehead's philosophy offers the possibility of understanding algorithmic objects as processes. Algorithms can be thought in terms of both physical and conceptual prehensions of data. They can actually prehend data, but not without prehending as well, conceptually, the eternal objects available to be selected into concrescence. Moreover, instead of relegating algorithms' mathematical definiteness to some inaccessible depth, it understands it as belonging to extension itself, while it remains undetermined and, therefore, just a general potential. To say that algorithms prehend the general potentials of ideas is to say that they reorganize the extensive continuum by constituting, out of the immanent relation between random data and determinate standpoints, novel facts of unity. As such, they are actual entities. They are the very concrescence through which what is given into process, both determinately and indeterminately, comes to be selected for the latter's termination. For, as Whitehead explains, "[t]he 'formal' constitution of an actual entity, is a process of transition from indetermination towards terminal determination. But the indetermination is referent to determinate data. The 'objective' constitution of an actual entity is its terminal determination, considered as a complex of component determinates by reason of which the actual entity is a datum for the creative advance." (1978, p. 45). In the guise of Chaitin's theory of algorithmic complexity, Whitehead's notion of the extensive continuum provides a consistent framework to conceive of the incomputability of algorithms. Instead of just random quantities of data, Chaitin's Omega is seen, under the light of Whitehead's philosophy, as an infinite series of eternal objects.

Whitehead's theory of the extensive continuum is closer to Chaitin's theory of algorithmic complexity than to Bergson's theory of duration. The pervasion of algorithmic computation by an infinite number, corollary derived from the theory of Omega, is paralleled by the understanding that algorithms actually prehend, either positively or negatively, infinite series of data. Both Omega and the extensive continuum's eternal objects grant algorithms the capacity to interpolate and accrete data in infinite ways. This is the way in which algorithms realize the mathematical concept of infinity. Such infinity can be thought in terms of incomputable and random quantities of data, which pervade every single computational process. But it can be thought as well as the excess of actuality over itself. What Whitehead's notion of the extensive continuum facilitates with regard to conceiving this excess, is the conception that potentials, instead of being qualitative multiplicities, correspond to the indefinite divisibility of an extensive space that cannot be bounded. And this is not to say that intensive qualities are not accountable by Whitehead's theory of extension. On the contrary, it is to say that it is precisely by means of indefinitely discrete and unbounded quantities that qualities are expressed.

6.5 - Thoughtful Character

Algorithmic excess, in accordance both with Chaitin's theory of algorithmic complexity and with Whitehead's theory of extension, does result in a processual dynamism whereby incomputable quantities of data are prehended into the resolution of initial disparities between the extensive continuum's potentials. As actual occasions of experience, algorithms cannot be fully synthesised into expression. The parts of an algorithmic object are necessarily larger than the whole, because of their constitutive infinity. To prehend the eternal objects of such infinity into the concrete resolutions of computation means nothing else but to think. This is the major outcome that can be said to result from approaching the algorithms of digital computation with the extensive schema of Whitehead's philosophy. Inasmuch as algorithms prehend, not only physically but also conceptually, the many potentials of the extensive continuum where they exist, they are the conditional basis of a thoughtful character that must be granted to digital computation. Since algorithms prehend the incomputable quantities of data constitutive of the extensive continuum's series of infinite ideas, digital computation does not occur without being infected with ideas that it cannot compute. With such incomputabilities, digital computation is assured with a capacity to eventuate concrescences that cannot be fully predicted. It is granted the capacity to generate facts of togetherness that are truly novel. Further, the irreducibility of those infinite ideas potentially given to the concrescences of algorithmic computation confers to the latter the very status of thought. Inasmuch as algorithmic computation prehends the conceptual infinity of the extensive continuum where it occurs and to which it belongs, it does not occur without abstracting its own procedural determinations with ideas that cannot be known as such.

Recently, Luciana Parisi proposed that the thoughtful character of computation, and more specifically of digital algorithms, should be considered not as what results from cognition, but rather as what corresponds to the undetermined reality existing at the heart of computation and constituting its excessive character. She designates this mode of mode thought as "soft(ware)[157] thought", which she describes in the following way: "Soft thought is not a tool for thinking (i.e., for planning, calculating, and rationalizing) space-time. Instead, soft thought is a way of producing computational space-time. The algorithmic processing of data is not just a means to explore new spatio-temporal forms. Instead, this automated prehension of data is equivalent to the

157 In his book "Software Studies", Matthew Fuller notes that "[r]ecent etymological research credits John W. Tukey with the first published use of the term 'software'. In a 1958 article for American Mathematical Monthly he described how the mathematical and logical instructions for electronic calculators had become increasingly important [in the following way]: 'Today the 'software' comprising the carefully planned interpretive routines, compilers, and other aspects of automative programming are at least as important to the modern electronic calculator as its 'hardware' of tubes, transistors, wires, tapes and the like'." (2008, p. 2).

immanent construction of digital spatiotemporalities. From this standpoint, soft thought cannot be simply disqualified for being a mechanical calculation of possibilities. At the same time, it may also be misleading to assume that computation is yet another extension of living thought. Soft thought is instead the mental pole of an algorithmic actual object. It is the conceptual prehension of infinite data that defines computational actualities or spatiotemporalities as the point at which algorithms stop being determined by the efficient order of sequences and rather prehend their incomputable limit. Soft thought thus explains algorithmic computation as an actual mode of thinking that cannot be reproduced or instantiated by the neuroarchitecture of the brain (the neurosynaptic network), or to the neurophenomenology of the mind (the reflexive ability of the mind to become aware of its actions on the world). Soft thought, in consequence, is autonomous from cognition and perception." (2013, p. 169).

It follows that algorithmic objects are conceptual prehensions of incomputable quantities of data. In fact, only by being so can algorithmic objects be said to be independent from any material order of symbolic coordination, that is, to neither depend on computational machines (hardware) nor on the symbolic languages that they use (software). Soft-thought is abstract in a way that neither requires concretization in terms of what could resemble the neuroarchitecture of the brain or the neurophenomenology of the mind nor any sort of linguistic expression.[158] The algorithmic objects of soft-thought are defined more fundamentally by their immanent connection with unknown and undetermined potentials than by whatever possible determination that they might express. Which is not to say that algorithmic objects are fully undetermined or that they exist only in abstraction. Algorithmic objects are models of transduction. Their determination conditions and constrains the passage from one state to another of infinity itself. They convey the transfer and amplification of abstract forces towards diagrammatic determinations and, possibly, their actual expressions. But it is only

158 It is worth noting that Parisi, by using both the expression "neuroarchitecture" and the expression "neurophenomenology", is referring to what she designates as "the split between the neurocognitive and the neuroperceptual understanding of thought" (2013, p. 177). This split can be synthetically understood with the following passage: "If neuroarchitecture aims at designing the experience of space according to adaptive neural responses to the environment, neurophenomenology argues that it is the structure of experience – and not the cognitive mapping of the brain's adaptation to space – that leads us to view cognition as enacted experience. According to enactivism, the interaction between thought and space – between experience and architecture – cannot coincide with a neural pack of connections, but rather needs to be studied in terms of first-person, experiential evidence of spatial phenomena or of variations such as depth, height, volume, temperature, colour, sound, etc. For neuroarchitecture on the other hand [...] the data collected on these variations [...] are enough to qualify these elements of interaction as first-person […]. Neurophenomenology instead employs specific first-person methods in order to generate original first-person data, which can then be used to guide the study of physiological processes." (Parisi, 2013, p. 182).

insofar as algorithms convey the influence of random quantities of data over the various degrees of their own determination and of the determination of their effects that they can be said to be the subject of soft-thought. And this is not to say that soft-thought is to be understood as the kind of reflexive cognition so typical of neurophenomenologies, such as the enactivist theories of cognition, perception and the mind (Parisi, 2013, pp. 180–185). On the contrary, because soft-thought is defined as "a manifestation of incomputable infinity or the conceptual prehension of incompressible data that suspends the order of algorithmic sequences." (Ibid., p. 17), it can only be experienced either non-consciously or in terms of its unpredictable effects.

This requires perhaps a twofold explanation, one that explains the unconscious experience of thought and the novelty that from it might result. In the case of algorithmic computation, novelty corresponds to what results from the infection of incomputable quantities of data in computation itself, a creative capacity that can be best understood when accounting for the structure of parametric algorithms. As previously mentioned, the space of parametric algorithms can be approached either topologically or mereotopologically. If the relation between parameters is approached from a topological perspective, expression is seen as the result of determinate parametric variations. But if the relation between parameters is approached from a mereotopological perspective, it must be acknowledged that the computation of finite datasets is pervaded by and infected with an immanent and constitutive infinity of discrete and random quantities of data. In this way, variations in parametric expression are seen to result not from direct causes but rather from the mobilization of undetermined potentials. If the information exchanged between parameters is considered to be undetermined and random, then its effects on the overall structure of algorithms cannot be said to result exclusively from direct causations. Instead, a whole process of individuation needs to be acknowledged. Between the general potentials of ideas and the actual entities which express them, there necessarily needs to occur an exchange of information that, not only is the means by which a novel resolution can come into being, and therefore constitute a determinate standpoint in the historicity of the extensive continuum, but also the very cancellation of an initial disparity between potentials. In this sense, the algorithmic processing of information from which determinate quantities of data can emerge, necessarily corresponds to the resolution of problems in potential. Novelty can then appear as the expression of more than what has been algorithmically programmed. An expression which asserts algorithms as the very prehension of incomputable quantities of data. With this, it must be acknowledged that only the conceptual prehension of random quantities of data realizes computation's potential to "deploy new actualities of relation or space events that are new and invisible to parametric programming" (Parisi, 2013, p. 171). The effective deployment of novel relations without perceivable effects thus regards the already mentioned presupposition of experience by consciousness. As such, in the extensive continuum, novelty is constant. It is always already there, not only potentially but also as the actual deployment of relational events that, even if unperceivable, are real and contributive.

It is from this standpoint that soft-thought's abstract character can be asserted. Since mechanical understandings of thought do not account for the prehension of infinity, soft-thought cannot be reduced to the algorithmic programming of computational languages. It is always more than that. From the perspective of digital programming languages, the incomputable infinity of random quantities of data is somewhat of a blind-spot from which dysfunctional results may appear. After all, as already quoted, "[m]achines break down, programs are buggy, projects are abandoned and systems hacked" (Goffey, 2008, p. 19). But, as Parisi also argues, "[...] far from being computational failures", all these, "are instead [...] symptoms of algorithmic thought" (Ibid., p. 172). Because in all these cases algorithms process more data than what they have been programmed to, instead of being conceived only as ordered and finite sets of data, they must be conceived as conceptual prehensions of computational infinities. Though cognitive models such as those corresponding to the neuroarchitecture of the brain, i.e. cognitivism, or to the neurophenomenology of the mind, i.e. enactivism, can be used to approach algorithms, they do not account for the excessive reality of quantity existing amidst the structures of ordered data that the execution of predetermined and automated procedures requires. For both the one and the other, algorithms correspond to no more than to the programming languages used for the execution of sequential thought, the conditional basis of which is the concrete materiality of computational machines. As Parisi points out, "[f]or cognitivism, the condition for algorithmic processing is any physical architecture that runs the instructions through the connection of data that form a neural network; for enactivism, this condition is an environment in which the neural structure of cognition is dynamically triggered through sensorimotor perception. Thus while for cognitivism algorithmic processing is equivalent to cognitive states, for enactivism it is the effect of being embedded within an environment that allows cognitive states (as neural changes) to emerge. Consequently, and although they offer what seem to be incompatible ontological frameworks, both approaches conceive of algorithms as executable procedures, as codes that perform thoughts upon a material substratum, or which cause thoughts to emerge from the latter. Yet regardless of whether these thoughts emerge from neural connections or are constructed throughout the sensorimotor schema of perception, algorithmic procedures remain the executers of thought. In short, the conditions for algorithmic processing are established by the sense in which the physical architecture of the brain is always already set to ensure the performance of thought. What is missing from these approaches is the possibility of conceiving algorithmic processing as a mode of thought, an expression or finite actuality, and not as the instrument through which thought can be performed, whether through neural nets or enacted via embodiment." (2013, pp. 185–186).

Against the hegemonic prevalence of "the architecture of the brain" as the paradigm according to which thought is to be explained, Parisi argues for a conception of algorithmic thought independent both from the "mechanical functionalism" of the neuroarchitecture of the brain and from the "embedded vitalism" of the neurophenomenology of the mind. In contrast to these perspectives, it is contended that algorithmic thought must be considered from the perspective of its prehensive character. Algorithms must be conceived as prehensions of data that, if looked upon from the perspective of the extensive continuum's excessive character, are necessarily conceptual. Such conceptual prehensions of infinity abstract the physical prehensions of data, not as models according to which the definiteness of mathematical relations is instantiated, but rather as infections of excessive and incomputable quantities of data in actual computation. The abstract character of soft-thought regards therefore the existence of incomputable quantities of data at the heart of computation or, in other words, the constitution of the extensive continuum (from which computation feeds off data into concrescence) in terms of eternal objects.

According to this, abstraction is a fundamental condition of the singular constitution of determinate standpoints. The eternal objects of the extensive continuum infect the determinate character of any occasion of experience. In the case of algorithmic objects, this infection corresponds to the affective determination of computation by random and incomputable quantities of data. Only through the notion of prehension can this infection be understood. After all, what remains outside of computation is not absolutely excluded from process. On the contrary, since they are intrinsic to actuality, incomputable data necessarily partake computation. To say that there is an excessive field of multidimensional quantities pervading process in general and computation in particular is to say that, from the perspective of the actual entities in concrescence, these excessive quantities of data correspond to what is negatively prehended into process. As already mentioned, a "negative prehension holds its datum as inoperative in the progressive concrescence of prehensions constituting the [novel fact of] unity [...] (Whitehead, 1978, pp. 23–24). As such, it is a function of subtraction. It doesn't subtract eternal objects from the actual occasions of experience, but rather actual occasions from the extensive continuum's eternal objects. Some general potentials are positively prehended into the actual occasions of experience, some are negatively prehended. But never the extensive continuum's eternal objects can be said to be inaccessible to the occurrent concrescences. They are of process and, as such, one of its fundamental conditions. Which is the very reason why it is possible to conceive of soft-thought as a fundamentally abstract process. Inasmuch as algorithms can be defined as conceptual prehensions of incomputable quantities of data, the structuration of soft-thought owes more to what is negatively prehended into computation than to what is positively prehended. Incomputabilities can then be defined as those quantities of data that, despite being a fundamental condition to computation, are negatively prehended into concrescence.

From this standpoint, it is perhaps worth to emphasize the importance of negative prehensions in process. For Whitehead, "[t]he importance of negative prehensions arises from the fact, that (i) actual entities form a system, in the sense of entering into each other's constitutions, (ii) that by the ontological principle every entity is felt by some actual entity,[159] (iii) that, as a consequence of (i) and (ii), every entity in the actual world of a concrescent actuality has some gradation of real relevance to that concrescence, (iv) that, in consequence of (iii), the negative prehension of an entity is a positive fact with its emotional subjective form, (v) there is a mutual sensitivity of the subjective forms of prehensions, so that they are not indifferent to each other, (vi) the concrescence issues in one concrete feeling, the satisfaction." (1978, p. 41). This term, satisfaction, depicts in Whitehead's philosophy the termination of concrescences. Of it,

159 "The 'ontological principle' broadens and extends a general principle laid down by John Locke in his Essay (Bk. II, Ch. XXIII, Sect. 7), when he asserts that 'power' is 'a great part of our complex ideas of substances'. The notion of 'substance' is transformed into that of 'actual entity'; and the notion of 'power' is transformed into the principle that the reasons for things are always to be found in the composite nature of definite actual entities – in the nature of God for reasons of the highest absoluteness, and in the nature of definite temporal actual entities for reasons which refer to a particular environment. The ontological principle can be summarized as: no actual entity, then no reason." (Whitehead, 1978, pp. 18–19). As such, "[t]his ontological principle means that actual entities are the only reasons; so that to search for a reason is to search for one or more actual entities. It follows that any condition to be satisfied by one actual entity in its process expresses a fact either about the 'real internal constitutions' of some other actual entities, or about the 'subjective aim' conditioning that process." (Ibid., p. 24).

the philosopher says: “The actual entity terminates its becoming in one complex feeling involving a completely determinate bond with every item in the universe, the bond being either a positive or a negative prehension. This termination is the 'satisfaction' of the actual entity.” (Ibid., p. 44). Thus, everything in concrescence is a positive affect, be it a positive prehension or a negative one. The satisfaction of actual entities assures the determinate bond by which they come to be part of the whole extensive continuum. Negative prehensions assure that, when satisfied, the actual entity remains bonded with the extensive continuum. They assure that its concrescence conveys unlived, unknown and unexpressed potentials. Only in this way it is possible to conceive of concrescence as a process that, at once, feeds off from the potentials of the extensive continuum and feeds back into them, becoming as such a relative standpoint amidst the general potentials of all eternal objects. Only in this way is possible to assure that, after concrescence, negatively prehended eternal objects remain available, as general potentials, for further concrescences. The relevance of negative prehensions “must express some real fact of togetherness among forms. The ontological principle can be expressed as: All real togetherness is togetherness in the formal constitution of an actuality. So if there be a relevance of what in the temporal world is unrealized, the relevance must express a fact of togetherness in the formal constitution of a non-temporal actuality.” (Ibid., p. 32). In other words, actual entities must become part of the extensive continuum via the negative prehension of eternal objects. In any actual occasion of experience, what is not lived is as constitutive of it as what is.

It follows that algorithms must be conceived beyond the positive prehension of data. Not only beyond expression, but more fundamentally beyond perception and cognition. The negative prehension of eternal objects corresponds here, in digital computation, to the prehension of data that are not computable but without which computation cannot occur. The reason why random quantities of data are a fundamental condition for the exercise of digital computation regards the general potentials that these incomputabilities convey. As much as actual occasions unfold together with the exchange of information between concrescent parts, not only do they physically prehend the actual data available, but they also conceptually prehend the continuum's eternal objects. In Parisi's words: “Digital algorithms do not simply compute these incomputable algorithms (as is suggested by Chaitin’s discovery of Omega, for instance, which as a discrete infinity appears among the innumerable number of incomputables), but also negatively prehend the infinity of infinities that define their capacities of prediction independently of the sequential execution of codes. These negative prehensions explain that computation is not simply a form of cognition that constructs cognitive maps as recipes for action. On the contrary, the negative prehension of infinite incomputable algorithms leads us to conclude from the understanding of random, patternless, or contingent data that [software is] irreducible to one overarching system of thought *qua* cognition. Instead, this negative prehension reveals that there are infinite modes of thought, involving a multiplicity of predictive capacities that correspond to nonunified (chemical, physical, biological, digital) patterns of decision making. In order to address the existence of these heterogeneous modes of thought, which are not always already referable to an eternally unchangeable being, it is important to conceive of algorithmic procedures as actualities that are defined by both physical and conceptual prehensions. This means that the sequential order of programming is only an aspect of computation. Yet we must bear in mind that any algorithmic execution is conditioned by the conceptual prehension of incomputables." (2013, p. 222).

Therefore, algorithms cannot be understood without the conceptual prehension of incomputable quantities of data. Not only this, but inasmuch as these incomputabilities correspond to the extensive continuum's eternal objects, they are capable of determining any algorithm whatsoever. Because the determination of algorithmic objects necessarily results from the conceptual prehension of undetermined data, these general potentials cannot be understood without the extensive continuum, i.e. without the notion that, from a multiplicity of satisfied concrescences, not only result actual relations but also potential ones. The principle of immanence between actual relations and potential ones can be simply understood as the positive character of the concrescence of prehensions. Concrescence itself is creative, since it brings into constitution novel facts of unity. Regardless of being included into or excluded from concrescence, prehensions hold an absolutely positive value of creativity. Negative prehensions constitute the ground against which positive prehensions are contrasted. If this relation is considered in terms of eternal objects and actual occasions, it can be easily understood that the concrescence of prehensions conveys both what is expressed and what is not. As much as the abstract machine of the infinity of eternal objects moves together with the concrescences that it energizes and by means of which it is extended, experience exceeds consciousness, cognition, perception, and so on. Soft-thought cannot be known as such. But it can be acknowledged to be as fundamental to computation as the unconscious is to any other mode of thought. There's always more to process than what meets the subject.

There is no other way to conceive of the immanence of undetermined potentials in the extensive continuum's determined actuality if not through the notion of process. In the frame of media theory, the extensive continuum has been characterized by Steve Goodman and Luciana Parisi in terms of a “rhythmic anarchitecture”. In their words: “To the becoming of continuity we call rhythmic anarchitecture, where anarchitecture denotes a method of composition, which feeds off the vibratory tension between contrasting occasions. A rhythmic anarchitecture is amodal and atemporal. Rhythm proper, cannot be perceived purely via the five senses but is crucially transensory or even nonsensuous. Rhythmic anarchitecture is concerned with the virtuality of quantum vibration. It is necessary here to go beyond the quantification of vibration in physics into primary frequencies. For us, it is rhythm as potential relation, which is key. If rhythm defines the discontinuous vibrations of matter, then we must also ontologically prioritize the in-between of oscillation, the vibration of vibration, the virtuality of the tremble. The rhythmic potential that is an eternal object, cannot be reduced to its phenomenological corporeality. The vibratory resonance between actual occasions in their own regions of space-time occurs through the rhythmic potential of eternal objects, which enables the participation of one entity in another. The rhythmic potential of an eternal object exceeds the actual occasion into which it ingresses. To become, an actual entity must be out of phase with itself.” (2009).

Not only the negative prehension of eternal objects assures the bond between actual entities, but concrescence itself is only possible because of the extensive continuum's indetermination. Concrescences can only occur by means of an affective resonance of non-localized relations between actual entities. These are clearly Simondonian terms. For, if actual entities must fall out of phase with themselves in order to come into being, then dephasings are only possible when potentials of different orders come to affect one another. From this perspective, the concrescence of prehensions can be seen as a movement of transduction: it transfers principles of individuation and amplifies them in a network of vibratory resonances. The extensive continuum's rhythmic anarchitecture therefore regards the ingression of what cannot be sensed into the order of the sensible and of the virtual-actual dynamisms that result from this. From which it follows that, in the case of algorithmic objects, rhythm necessarily pertains to the prehension of what cannot be computed into determinate algorithmic expressions. This notion of rhythmic anarchitecture is most adequate to understand the workings of soft-thought. The conceptual prehension of infinite quantities of random data assures the ground on which the resonance of contrasting entities can take place. If positive prehensions contribute to expression, negative prehensions assure the implicit endurance of eternal objects amidst actual entities. Only the vibratory resonance of affect between actual entities assures that the latter can, not only be inscribed in the extensive continuum as local, relative and historical potentials, but also be connected to one another by means of mereotopological relations of extension. The negative prehension of discrete and random quantities of data relates actual entities, such as algorithms, to one another via the extensive continuum's general potentials.

6.6 - Speculative Proposition

If the individuation of a technogenetic body requires technicity, if it requires an excess of information transferred and amplified across the networks that it partakes, then it also requires that these potentials, the ones of information, are not only physically, but also conceptually prehended into individuation. Not only this, but inasmuch as the concrescence of prehensions in individuation includes both positive and negative prehensions, its physical and mental poles equally include that which is felt and that which is extracted from feeling. From this important insight brought about by a processual perspective on algorithmic computation follows that the potentials of a technogenetic body necessarily exceed, not only the structure of individuals, but also the feelings that individuals might capture from the experiential event of their own individuation. The potentials of information are therefore to be acknowledged as partaking the concrescence of prehensions not only with what is positively prehended and thus known, but also with all the negatively prehended data that can be neither felt nor known. The information of technical networks conveys, therefore, more than the resolution of process. It conveys as well all the irresolutions that are insufficiently problematic to be positively prehended.

The excessive character of information cannot be stressed enough. In what regards technogenesis and the constitution of a technogenetic body, information is an all pervasive and most determinant dimension. The technogenetic body cannot be considered without the processual character of its informing resolutions. Both the occurrence of technical transductions and the formal constitution of technical networks are functions of information. It is by means of information that the different domains of a technical network can communicate with one another. Information opens the communicating domains to one same continuous field, by transducing the latter's potentials. Once information has occurred, i.e. once it has been exchanged, its resolution conserves, in the whole's structured parts, the enabling potentials of the latter's connection. By means of information, the unknown remains immanent in the technogenetic body, i.e. it remains immanent in the individuating system's sensitive and cognitive capacities.

It follows that it is possible to conceive of technogenesis as a process that can be enhanced by being opened to the unknown, that is, by the technical determination of a series of connections that will inevitably open the system to the infinity of potentials existing in the extensive continuum to which it belongs. As such, it is the contention of this study that, the more connections are consciously created, the more the system will prehend what it cannot compress and the more it will be infected by potentials that it cannot predict. If both positive and negative prehensions condition technogenesis, it is by maximizing the technical system's capacity to exchange information and resonate with itself, that the unconscious forces in it implicated can be fostered and enhanced. Since the saturation of technical connections necessarily heightens the system's self-affectivity, it potentiates as well its tendencies towards the emergence of unpredictable results. Hence, the proposed equation is: the more relations are actually established between different parts of the whole, the more the extensive continuum will become, unpredictably.

The assumption that novelty results from the ingression of undetermined potentials into the concrescence of prehensions has been a guideline for this study. From the beginning, especially together with Simondon's approach to technical individuation, it has been argued that, for a transformation to occur, i.e. for a system to fall out of phase with itself and move from one state of affairs to another, an incompatibility between potentials needs to occur. The relation between potentials belonging to different orders of magnitude needs to come to the critical point of an informational exchange, i.e. to the point at which potential energy is transformed into the kind of movement that restructures the system towards a novel state of metastability. But more than this processual account of the relation between forces and forms, what is here being proposed is the simple realization that, the more actual connections are built by technical means, the more the system will tend to fall out of phase with itself. If the generative potentials of the unconscious are in any case at work within the extensive continuum's becoming, it is by means of technical individuation, with a special focus on the actual complication of informational networks, that the technogenetic body can become more than what it is, generating in this way what can be neither anticipated nor regulated. The more information is made to open the technogenetic body to the infinity of its own potentials, the more this will confuse its implicated domains. The technogenetic body can be defined by this very heterogeneity. The more heterogeneous it is, the more unpredictable it becomes. As such, heterogeneity is here tantamount to the prehension of infinity. It corresponds to the vibratory activity of technogenesis' rhythmic anarchitecture, and it is equally proportional to the individuating system's creativity. The more heterogeneous a system becomes, the more it is capable of overcoming the limits of its own possibilities. In sum, only because connectivity is a determinant function of technical individuation, can the increment of connections be said to enhance the technogenetic body's technicity.

Whereas Simondon's theory of technical individuation conserves the split between actuality and virtuality, still so prevalent in Bergson's theory of duration, Whitehead's theory of extension avoids such break by affirming ideas as undetermined but yet discrete potentials, immanent in the extensive continuum's determination. Not only this, but it is by thinking in terms of an extensive continuum that the relation between the virtual, the potential and the actual, so fundamental in Simondon's theory of individuation, can be best tackled. With Whitehead's theory of extension, the continuum is conceived in terms of relations between undetermined and determined potentials, i.e. between actual entities and eternal objects. This notion of the extensive continuum facilitates the connection not only between virtuality and actuality, but also between the different domains implicated in a system of technical individuation. With this notion, it is the very distinction between the subjects and the objects of knowledge that ceases to exist.

Notwithstanding this turn, it should be reminded that the notion of knowledge is deeply implicated in the notion of technical individuation. Also, because of the difference between co-individuating subjects and objects, it is the very notion of allagmatics that is found to be deeply implicated in technical individuation. Allagmatics, it should be reminded, corresponds to the reciprocal and dynamic convertibility between abstract ideas and concrete solutions. It regards the convertibility between structures and the processes by means of which these transmit potentials between one another. In between expression and abstraction, technical individuation progresses in a heuristic fashion, to which experimentation is key. Allagmatics thus concerns the abstract machine's double dynamism of content-expression encounters. The genetic past of emergence gives birth to thoughts that, on their turn, are capable of expressing themselves. In any case, allagmatics is said to be a theory of knowledge precisely because it regards the dynamisms by which subjects and objects are co-constituted.

There is no other way to conceive of allagmatics but as a dynamism constitutive of technical transduction. And, notwithstanding the fact that information is here conceived as being undetermined, it is through the conceptual prehension of what cannot be compressed into concrescence that the workings of the abstract machine in allagmatics can be best understood.

The abstract machine pervades the system of individuation by including in its actuality a blind-spot: the same diagrammatic fracture in transitioning between states that corresponds to the immanent infinity of eternal objects. In contrast to the topological understanding of process, according to which only the virtual is continuous as a result of the infinitesimal discontinuities of actuality, the mereotopological schema of Whitehead's philosophy allows for conceiving the abstract machine as a mereotopological potential, immanent in extension. The diagrammatic fracture in transitioning between states must be conceived of as the ingression into concrescence of what can neither be known nor felt, but which is as fundamental to resolution as what can. The constitution of technical individuals such as algorithms, or of technical networks such as computational machines, must therefore be conceived on the basis of an extensive continuum from which individuation feeds off its potentials. Rather than being conceived in accordance with a virtual-actual split, technical individuation must be conceived as an accretion of actuality whereby determinate standpoints can emerge. Despite the fact that subjective and objective perspectives contribute in determinate ways with the past to future resolutions, it is by means of undetermined potentials that such resolutions can come about. Any concrescence prehends into the emergent facts both what it can select and what it cannot. From which it follows both the integration of technical individuals in the extensive continuum, and the integration of the continuum in technical individuals. The workings of the abstract machine need therefore to be located at the level of the extensive continuum's actual indetermination. It is the ingression of purely undetermined potentials into technical concrescences that not only allows for novelty to occur (as a function of affection) but for it to fundamentally condition the ways in which determinate and relative potentials can once again be prehended. In individuation, novelty is not something that can appear, but rather something that is always already there (appearing, so to say), even if not perceptibly.

To say that the individuation of a technogenetic body is enhanced by actual increments, is to assume that these increments do enhance the extensive continuum's connectivity. Only by connecting, intensively, the extensive continuum's regions, can its complexity be brought to perception. Complexity, novelty and infinity are all designations that depict the immanent character of the abstract machine at the heart process. They all depict an undetermined reality existing not at the end of an infinitesimal division of space, but rather at the level of actuality itself (actual indetermination being itself just another name for the indefinite divisibility with which Whitehead defines the unbounded extension of the continuum). But this is not a plea to either render the invisible visible or expand consciousness and knowledge. Rather, it is the following proposition: in order to overcome the dictates of regulation, prediction and control, all of which are organized solely in accordance with determinate sorts of actuality, the unknown must be not only accepted as constitutive of developmental processes but also as a potential to connect all that is known or knowable. There is no other way for technical individuals to become than through the concrescence of negative and positive prehensions. And the more data is prehended into concrescence, the more the extensive continuum is restructured.

It is the contention of this study that algorithmic computation can be seen as a paradigm of technical individuation. An algorithm has all the necessary ingredients to allow for the characteristic resumptions of technicity: it can be known, transmitted and iterated, but not without an immanent infinity of potentials, which in themselves are not computable. The fact that the rise of computational machines has served both the codification and automation of technics, confirms the latter's algorithmic character. But it confirms as well allagmatic transduction as the veritable operation of technical progress. And this is so because the informational exchange between humans and machines operates on the basis of both what is known and what is not. Both general and relative potentials participate in transferring and amplifying information across scales and domains. Both participate in the extensive continuum's rhythmic anarchitecture.

The individuation of choreographic knowledge can therefore be said to correspond to the determination of procedures with the potential to be expressed in different ways. This stands in accordance with the algorithmic paradigm. The examples discussed in this study demonstrate that the algorithmic character of thought is most suitable for the transmission of choreographic principles of individuation. In a very literal way, algorithmic automation allows for the digital domain to express choreographic knowledge. Hence, the diagrams of choreographic knowledge are, at least potentially, algorithmic. Which agrees with Forsythe's comprehension of how there are choreographic thoughts that coincide with algorithmic ones.[160]

160 Though a review of algorithmic strategies in the history of choreography has not been made here, other cases beyond Forsythe's choreographic procedures can be mentioned as being paradigmatic of

From this standpoint, and together with the argument that algorithms are not exclusive of digital programming, but that they rather express a specific way of thinking, the individuation of choreographic knowledge must be granted to comprise what is negatively prehended into concrescence. Choreographic knowledge must be considered together with the technological milieu of its own individuation. The fact that the cases discussed here have used digital technologies to assert choreographic knowledge is just one example of the interdisciplinary conditions of these same assertions. Though the interdisciplinary character of these projects has been just briefly mentioned, this remark is enough to consider the difference in connectivity conveyed by them in contrast to less interdisciplinary or transindividual approaches. Regardless of the domains of abstraction and expression summoned by the projects in case, what matters to acknowledge is the tendency that these projects demonstrated towards the complication of process, i.e. towards the saturation of process with general and relative potentials of connectivity. In fact, it seems evident that the larger a research project is—i.e. the more people, technologies, time frames, geographical scales, knowledge fields, and so on, it involves—the more complicated it gets.[161] But rather than this complication being a burden, the argument here is that it potentiates the creation of novelty in technical individuation. It is with such complication that the individuation of knowledge can yield unanticipated results.

The complication of process that follows from the increment of actual connections in technical networks thus potentiates the affective prehension of both

---

algorithmic choreography. It is here enough to mention that it was Merce Cunningham, the American choreographer who, from the fifties onwards, set himself to emancipate dance from all other forms of theatrical expression (and thus to modernize it as an autonomous artistic form, where "movement is only about movement"), that pioneered the use of algorithmic procedures to compose dance. Cunningham's drive to de-subjectify choreography brought him to experiment with compositional procedures involving chance. Since chance procedures require the calculation of ideas, choreographic composition became in this way equated with computation. This would bring Cunningham to work with computers for the calculation of complex conditions of possibility, making him "the first choreographer of international renown who routinely utilized the computer as a choreographic tool" (Copeland, 2004, p. 168). But more fundamentally, what Cunningham activated when applying the faculty of computation to the composition of dance, was the very idea of choreographic software. When commenting upon the software-like methodologies and aesthetics of Merce Cunningham's choreographic work, Stamatia Portanova has conflated these two terms, i.e. composition and computation, into one: "compu-sition" (2013, pp. 97 – 132). With this term, Portanova indicates how much the procedural character of many choreographic practices quantifies not only spatio-temporal actualities but also of virtual infinities. Which is to say that, because choreographic compu-sition (like any other composition) involves both determinate quantities and the immanent infinity of random data, it can be said to be a mode of thought in its own right. After these first compu-sitional experiments, the field of dance expanded considerably, most notably with the next generation of New York based choreographers, such as Trisha Brown, Steve Paxton, Simone Forti, Yvonne Rainer, Douglas Dunn and David Gordon, most of whom had danced with Cunningham.

161 The paradigmatic case being the Motion Bank project, the documentation of which, accessible at http://motionbank.org/en/documentation, indicates the inherent complexity.

determined and undetermined data. It opens the system of individuation to its self-excess and it intensifies its tendencies towards dephasing. And what remains most acknowledgeable in regard to such increment is the intensification of affect between different quantities of data. If negative prehensions are as determinant to concrescence as positive ones, the increment of actual connections does not only correspond to the increment of physical data but also to the increment of conceptual data. The more actual connections are built into the system, the more the system will generate its own ideas (be them known or not). From which it follows that the more connections are built into the system, the more the system will be capable of conceptually prehend eternal objects into the concrescent resolution of differences in potential.

The exchange between contexts of research, fields of knowledge and processes of technical concretization, all conveyed by the projects here discussed, stands for the sort of ethical ground that inevitably brings forth a wider range of ideas. These projects' digital choreographies attest this. Not only could these novel choreographies be expressed as they were because of the networks that came to condition them, as the eternal objects in concrescence could not have been prehended as they were if it were not for these same networks. Which is to say that it was by reason of the information exchanged between the different domains here at stake that a whole field of potentials could be brought into process. And inasmuch as these potentials remain undetermined, they can only be negatively prehended. In short, in these projects' (as in others alike)[162] there were more ideas than those expressed.

What the openness of technical networks towards different domains of thought and expression thus conveys is the affective becoming of the extensive continuum. A becoming partaken by both undetermined problems and determinate solutions. The technological milieus involved in process do transmit potentials by formal means, that is, the knowability of ideas and expressions is a condition for the transductive transmission of what cannot be known. But, likewise, the potentials of eternal objects are a condition for the concrescence of determinate diagrams, i.e. for the emergence of knowable ideas and expressions. In process, neither the one nor the other can be thought independently. The reciprocal conditioning of potentials and structures is the same as

162 Though this study has only dealt with examples that make use of digital media, similar examples that don't could also be discussed. Some of these are: the already mentioned (see Page 18) "*Mind and Movement: Choreographic Thinking Tools*", by Wayne McGregor/Random Dance; Anne Teresa de Keersmaeker's "*A Choreographer's Score",* edited by dance theoretician Bojana Cvejic; the *"FUNKTIONEN"* toolbox, by choreographer Thomas Lehmen; the "*Everybody's Performance Scores",* published by www.everybodystoolbox.net; and the publication series "*Scores",* by Tanzquartier Wien (http://www.tqw.at/en/scores).

the reciprocal and affective implication of quantities and qualities. In relation to one another, they constitute the fundamental condition for the becoming of a rhythmic anarchitecture. And inasmuch as rhythm is not constant, but rather subjectable to the intensification of problems and to the constraints of extension, it is by these very means that the continuum's becoming can generate novel knowledge and ideas that cannot be known as such.

These tendencies in process—intensification and constraining—are inextricable from one another. Constraining intensifies potentials, since it creates actual differences in the extensive continuum. In turn, the intensification that follows from constraining can be strong enough to create disparities in the extensive continuum's potentials. Which is the reason why adding relations to process intensifies informational resonance and charges the extensive continuum with more potentials. In short, the more connections in process, the more ideas in formation. The examples discussed in this study demonstrate this. But more than this being a simple formation of determinate instances of knowledge, it is a complex one. More than generating knowledge, these projects intensified the extensive continuum by creating actual connections between different domains of thought and expression. These connections constrain the continuum's rhythmic becoming and, in this way, determine possibilities of abstraction and expression. Additionally, they charge the continuum with ideas that cannot be known, but which are fundamental to individuation. It is therefore by intensifying the extensive continuum's connections that the transindividual character of knowledge is potentiated. Only by connecting differences and intensifying disparities can transindividual potentials individuate novel instances of knowledge and charge the extensive continuum with the generative capacities of real but yet undetermined relations.