Reality in the Name of God, or, Divine Insistence: An Essay on Creation, Infinity, and the Ontological Implications of Kabbalah

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Published by Punctum Books


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CHAPTER THREE

‘From It to Bit’:
Informational Ontology

§21. All is Matematizable

On the basis of this holy Name we have attempted to isolate and identify that creation occurs. But how does creation occur on the basis of the mark of the void? It has already been hinted that such an account depends on seeing all as matematizable, seeing the holy Name as the primary bit of information. In this way, it will not be enough to evoke this idea, but rather we need to formulate a clear ontological model for it. This means doing no less than trying to philosophically articulate the insights brought to us in Sefer Yetzirah, that the world is created in and through letters and numbers. Such a view first means that, as Galileo would put it, the great book of nature is written in a language. That language is mathematics. But by mathematics, one means more than just numbers, one means letters, differential relations, etc. For Galileo, the mathematical laws that grounded the workings of nature were supported and created by God. But we want to contend something perhaps more radical—that the world of nature is built up out of the very holy Name of God himself. That is, it is not that God simply created an ordered world expressible in exact figures, but that the world itself is built up out of the elementary element produced by God in creation as we have described it so far. It is not a matter of saying that mathematics, numbers, letters, etc. can represent or symbolize what is (we are not
proposing a representationalist model), but rather of arguing that all is expressible in terms of numbers, letters, etc. because all is made of them: “He engraved them, He carved them / He permuted them, He weighed them, / He transformed them, / And with them He formed / every letter in the Universe, / Seven days in the Year, / Seven Gates in the Soul, / male and female” (SY 4:6). This is essentially a position the Kabbalah itself requires: “If God spoke the world into being, the divine language is energy; the alphabet, elementary particles; God’s grammar, the laws of nature” (Matt 1998, 28). The claim is more radical than arguing that things can partially be expressed as an equation (that for instance, how a rock falls can be expressed as an equation).

One way to think about this expression is via the celebrated ‘wave functions’ of quantum physics. The wave function succinctly expresses the essential features of all that is known and knowable about a quantum event or system. Equations express the relations that obtain amongst quantities and between things. One can take what one witnesses and put them into symbols. But one needs to ask why these expressions involving numbers and letters in and of themselves can comprehend the things they stand for. We contend it is possible because the things they stand for are already made of such matter. Formulas thereby must take on a real existence, rather than that of an ideal mimicry or reflection. Mathesis is poesis in and of itself and not fundamentally a mimesis (although it can play this role epistemologically). The question then shifts from an epistemological one to an ontological one. In the past one asserted that numbers and mathematics are vital because one can know the world through them, yet this is only possible because their very being is made of numbers. We do not mean here just that physical objects can be counted or that human perception projects unity and numbering onto
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a pre-existing world. We also do not mean simply that things have physical properties such as shape and proportion that can be measured. Being measured is allowed by a thing’s being numerical in its very being.

The revolution Galileo and others inaugurated by literalizing the world, subjecting it and expressing it via numbers, merely revealed a truth already at work. It is not one dimension of the world, but the world itself. Many will agree that Descartes, for instance, helped us to see the matter of the world as defined primarily by its being extended in space. They will say that Descartes idealizes the world of matter and bodies by seeing them as pure extension in this way and therefore purely amenable to geometry. This is not a trick that Descartes or someone else pulled on us. Rather, the volume and shape of things can be expressed using the equations of geometry because that is the very nature of their being. This view is counter-intuitive insofar as intuition and the ‘natural attitude’ tell us that the world of matter is something primarily known by the senses and thereby seemingly something that exists in and through itself. But matter itself can be seen at its most elementary level to be comprehended by mathematical operations. Physics itself deals with the material world only in and through applied mathematics. Science deals with patterns, but this is not an idealization of the world insofar as the world itself is already ideal. The possible patterns that express relations have a reality of their own as the very things we see, touch, etc.

Whether or not there is a single pattern for all things (for instance a wave function comprehending the whole universe) is a separate issue (we will address it when addressing the work of Stephen Wolfram). For us, it would be the expression of the divine Name in its initial articulation at creation. But we may not be able to express this name ourselves, since it might require the whole universe to do so. If
there is one possible pattern for all that is, it is not a matter of finding it or expressing it as a representation since the world itself is the thing. It would require a reproduction of the world itself. But that a single pattern detailing the ordering of all objects may not be possible in this world does not exclude that the universe itself does this. It simply means that one should not look for a representation of all within the world. The very incompleteness of the world may even preclude it. An entire universe of mathematical objects representing all the possible expressions will not contain one expressing itself, etc. But that again is why it is not a matter of detailing representations, but how the world itself is already created from number.

On the other hand, if one can express things in a pattern or equation, then one can show it is possible to articulate it. A “clear and precise symbolism” for expressing “any possible thought” was already dreamed by Leibniz and called by him “characteristica universalis” (Moore 2001, 64). For Leibniz, all could be known and evaluated via such symbolism and calculation, as he lays out in his Dissertation de arte combinatoria of 1666. It should not be surprising that Leibniz was directly under the influence of the Kabbalah and Kabbalists (mainly Christian ones by the way) when articulating this mathesis universalis, a universal and purely symbolic language that often called a ‘cabala of the learned’ [cabala sapientium]. But Leibniz did not study his

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19 While Leibniz was the first to envision a version of what we are trying to articulate here, Leibniz’s own metaphysics as far as I can tell does not attempt to do so. Leibniz’s own monadology is built on the notions of identity (A=A), non-contradiction (A is not not-A), and sufficient reason (there is a reason for everything). Here, Leibniz is basing his theory on traditional subject-predicate logic rather than any sense of coding or computation by way of syntactic information. In this way, Leibniz can take a notion like that of Julius Caesar
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Kabbalah closely enough, as he only searches for a universal formal language that will represent our thoughts distinctly and clearly via calculable symbols. In this way, Leibniz did not take the more radical step of seeing reality itself as made up of these symbols, rather than just being expressed by them. While Leibniz does endorse the idea that God creates the world with a well-made language, he sees one as only being able to express this language rather than take the world itself as a language. Also, Badiou criticizes Leibniz for allegedly hunting “down the void with the same insistence that he employs in refuting atoms” (BE 327). But what Badiou misses here is that saying that all can be mathematized does not necessarily involve refusing the void, since numbers themselves are made of it. While Leibniz may have difficulty with the indiscernability of the void itself and thereby does not want to admit it, the undifferentiated ultimately leads to the differentiated and that action is what grounds seeing the world as structured by number and list all the predicates of any nature belonging to Caesar (crossed Rubicon, defeated Gaul, born by Caesarean section, a particular height, etc.) and see all these predicates as contained within the concept. Caesar is then a set certainly, but one only including such phenomenal, historical, etc. predicates in this logic. Caesar is not his DNA, a rule or program, a real pattern, a mathematical set of relations, etc. for Leibniz. That is, Leibniz does not ever attempt to say Caesar is computation by using some non-representative and non-semiotic set of code. In this way, while we do not disagree with Leibniz that a figure is a list of all these concepts as a set, the set must also include the code. To take a crude and inadequate example (but instructive nonetheless), Caesar is his full DNA sequence. One can list it as one of the items in the set. This is not to turn the set into something other than an extensional one since the basic nature of such a set allows it to contain anything. Rather, it shows how a full rendering requires the set contains a program, rule, and/or set of mathematical relations as well.
itself. As we have tried to argue, one can hold that “indifference” is prior to difference and still maintain the essence of Leibniz’s universal mathesis, for the incompletion of the world does not exclude its being created (BE 326-27).

While Badiou thinks that Leibniz excludes “the indiscernible, the indeterminate, the un-predicable” (BE 318), these things necessarily exclude themselves, as seen in the void disappearing into its mark. Badiou himself admits that “presented in-difference is impossible.” But we can take Badiou’s criticism of Leibniz here to be not that Leibniz is not a realist, but that Leibniz does not allow that differentiation arises from the void itself, from a pure name. And in that way Leibniz’s learned Kabbalah forgot a lesson. But Badiou is wrong in saying that “God cannot tolerate the nothing which is the action” and cannot tolerate “two indiscernible beings” if we take this statement as true outside the context of Leibniz (BE 318). God is not a “complete language,” as Badiou contends that Leibniz claims, but rather in creating the world via his holy Name, God creates it as an incomplete language marked by the signifier. Such a conception would always have superfluous extras that repeat the same things. It does not exclude noise. God is himself the unnamable surplus that founds the world. And as we noted, God can be named by the sign of the empty set or the name given to him in the Hebrew tradition. Both names are thereby indiscernible from each other and yet are noted as two.

We will return to these considerations when discussing the nature of what Badiou calls the event and its relation to the Name. But at this point it is enough to say that God’s creation of the world does not require a “complete language” as Badiou claims:

Being and meaning are made to coincide only insofar as the name, within the place of
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the complete language named God, is the effective construction of the thing. It is not a matter of an extensive superimposition, but of an ontological mark, of a legal signature. In definitive: if there are no indiscernibles, if one must rationally provoke the indeterminate, it is because a being is internally nameable. ‘For there are never two beings in nature which are perfectly alike, two beings in which it is not possible to discover an internal difference, that is, one founded on an intrinsic nomination.’ If you suppose a complete language, you suppose by the same token that the one-of-being is being itself, and that the symbol, far from being ‘the murder of thing’, is that which supports and perpetual its presentation. (BE 320)

Badiou here attempts as it were to make Leibniz be more of an ontological Kabbalist than he is. Leibniz does not see being as nameable in this way since he sticks to a representationalist model. In addition, that being is nameable does not require a complete language, but rather an incomplete one insofar as the name itself through the signifier requires a transfinite marking. This signifier is what makes it possible that two sets can have all the same elements and still be marked as two sets as the set itself is a framework independent of the elements aggregated in it. And the signifier itself is not necessarily part of a representationalist model.

§22: THE HOLY NAME AS THE PRIMORDIAL BIT: AN ONTOLOGY OF INFORMATION

To show how this model of creation presents the world as made out of number, we need to refer again to the holy Name as the primordial information bit
since it is via a theory of information that we will see how we speak here not of models, but of information itself as the very being of the world. Jacques Derrida, in Of Grammatology, contended that “the so-called ‘thing itself’ is always already a representamen” (Derrida 1976, 49). Derrida here argues that anything we perceive or conceive is already mediated by the signifier and thus by conceptual determinations. But Derrida does not take the further step of arguing that, ontologically, things themselves are represented because they are, in their being, really made of

20 Let’s be clear. We are not arguing for a version of representationalism. Representationalism is based, as Deleuze would say, on resemblance, identity, analogy and opposition. For instance, a painting of an apple represents an apple because it resembles it somehow. Representation is thereby stuck in the logic of mimesis first systematically formulated by Plato. As a shadow of a dog resembles a dog we see and/or the one we imagine, the concept is the perfect exemplification. But code or a rule does not follow this logic. DNA for instance is not identical to me in the sense of being a perfect analogue or resemblance. One thereby breaks with representation by not having degrees of being ordered along these terms. Also, if one posits that there is some thing in-itself beyond mental representations of a thing, one is still within the logic of representationalism. Making the difference between concept or mental imaginings and thing the very heart of things is imprisoning us in the very representationalism Kant systematized, as if some shadowy substratum identified with the true thing is forever withdrawn all we have are representations. Stating there is a thing rather than code or quantum wave functions is to remain with the idea that there is a series of analogues in this fashion. The digital concept is of course not analogue. Ultimately and literally re-presenting a thing (bringing it back to life from the dead for instance) involves a breaking with this logic of representation both insofar as one has an emulation of that thing and not a likeness and insofar as it occurs by way of a program that relates to the in-itself as pure differentiality.
differences, that they are ontologically constituted by the signifier. Kant already hinted at this direction when he argued that our own minds play a constitutive role in determining the nature of reality. In this way, a purely mimetic view of reality gave way to one constituted by the poesis of the human mind. But the human mind is itself a limited way of engaging with a world that always exceeds it. Even Kant had to presuppose things in themselves that transcend how the mind makes work of reality.

It is our contention that the very thing in itself is constituted by the signifier, by information. This idea is as old as the Kabbalah itself and also found in other traditions. For example, John, one of the authors of the Gospels, says that the logos is the divine source of information which creates the world by ordering it via distinctions (John 1:3). This gospel thereby picks up on a Gnostic tradition wherein the informational patterns combine to form things on their own. Given that John [Yochanan] came from the land of Israel might mean he was influenced by sources such as Sefer Yetzirah (said to have been first composed by Abraham himself over 3,000 years ago and passed on orally). In any event, what we are proposing here is not necessarily new, but we hope at least to give new philosophical and theological foundation to the idea that an information matrix forms what emerges and thereby constitutes the very basic fabric things.

Aryeh Kaplan, the translator of Sefer Yetzirah and eminent disseminator of Kabbalah, emphasizes how this central text is about the ontology of information itself by noting how the writing that constitutes the world via the tzimtzum involves the actualization of information (SY 32). The “letters and digits” of which Sefer Yetzirah speaks form the “basic bits of information” that through their engraving enacts creation itself (SY 143). Vlatko Vedral notes that information itself can replace mathematics as the
language in which the very nature of things is expressed:

Here is a quote from Galileo clearly expressing the view that the truths in the Universe are coded into mathematics: ‘Philosophy is written in this grand book—I mean the Universe—which stands continually open to our gaze, but it cannot be understood unless one first learns to comprehend the language in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures, without which it is humanly impossible to understand a single word of it; without these, one is wandering about in the labyrinth.’ But we want to go beyond Galileo’s sentiment in two key respects. First, we want to use information instead of geometric characters. Second we want to explain how the information in the Universe arises. Once the information is decoded and compressing into appropriately defined laws, we can then understand our reality according to the information encoded in these laws. The laws themselves must be an integral part of this evolving picture. Otherwise we are stuck in an infinite regression. The universe can rather be seen as an information process, in other words a gigantic quantum computer. (Vlatko 2010, 191)

21 Some might take issue with our argument that the universe is a computer. For instance, they might argue that computer programs run instructions similar to logical rules and steps (If x, then y; if y, then z; etc.). Since we are arguing that the universe as computer is founded by the holy Name
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of God (and its elaborations) and identify this name as the mark of the void, they would say that all we have is a name or at best bits rather than instructions as in a program. At most such a name can merely repeat itself or lead to a repetition of the same without further instructions. But the bit itself is already instructions. That is, 0 means off and 1 on in its most basic meaning. To speak about a string of bits, such as 01110 for example, is already to have instructions indicating what should be of one type rather than other. Also, to think of a program as a set of rules would mean that God is constantly commanding things to act as they do rather than them unfolding on their own. If the universe is a computer, and it must have rules and instructions in this already developed sense, then we more so have a model where matter already exists and through some act of commanding or active manipulation it runs as a computer. We reject this view inasmuch as we reject the idea of eternal matter. To anticipate the snowflake example we take from Wolfram, there the patterns of a snowflake arise precisely via a string of instructions for just freezing or heat-release. In this way, each part can correspond just to an on/off command. One can also think of things on the relation of language. A statement like ‘if x then y’ is already fairly advanced. The core of language of itself arises from phonemic opposition itself. In the initial phonemic opposition a child first acquires one has the seed of all that will be spoken. The name of God already as YHVH can be seen as a string of bits and commands. Each letter would itself represent a bit then. Whether such a string of commands would produce the sort of complexity one sees in Wolfram’s ‘Rule 30,’ only an experiment would say. But a name itself can be a command. How this command would relate to moral and behavioral commands would be another topic in and of itself. But at this point, I think we can say that it is part of the holy Name itself being a program that relates it to commands. All religious commands in Judaism for instance are done in the Name of God. Also, some might think we are collapsing two distinct ideas into one: the holy Name as mark of the void and as program. But these are two aspects of the same thing. As pure mark YHVH can be the mark of the void, but it also can itself express as a program.
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Beyond seeing the world as expressible mathematically, Vlatko represents a new tendency in physics and science in general to see information as the basic language of nature. But more so, to avoid an infinite regress, we need to see the universe as composed of information. The universe as a gigantic computer is both information as software and hardware at one and the same time. For us information is itself a physical pattern as much as an ideal one. Anything on any level that is thought, imagined, felt, touched, etc. can be rendered as information and more as a pattern of bits such as those processed by computers (01).

This information itself is not necessarily linguistic in nature, although words also form one version of it. As Badiou puts it, “the notion of information” we are working with is “that of a code,” something “differential” (BE 362). It is not the idea of information in any semiotic sense where one thing represents another (for instance, smoke indicates fire).

In this way, even if we say that God’s Name is primordial bit, this does not exclude it also from being made of a string of bits and commands to form the program out of which the universe unfolds. Such a program, if it cannot unfold from a single bit, is itself made up of multiple such elements. In addition, we have argued that the world is created via numbers and letters. And it is by such letters and numbers alone that we have rules. For instance, a rule can be abcbac. This string of letters can simply read as [a,b,c] then [b,a,c]; that is, just from a string of letters one has a rule for switching them around. The ‘then’ aspect is itself immanent and implied in the string. Given that letters are numbers in Hebrew, we then already have them in play. Also, the string can be take itself as a whole and thereby a mark. In this way, we return again to YHVH as both mark of the void and holy Name of God/rule/program. Keep in mind that the Torah itself was given to us without any punctuation marks. It is in itself just a string of letters.
This is then the idea of syntactic information wherein the elements, signs, and features work regardless of any possible reference to things in the world. This type of information transmits, displays, processes, etc. in symbols regardless of what they stand for. Information embodies relations and the transformation of those relations. What we encounter does not appear random. It involves distinct patterns. But bits can also be ordered randomly if need be, just as numbers can be generated randomly. But this information is not a parallel universe. Rather snowflakes only emerge when water molecules appear in arranged patterns and in this way the molecules themselves function as differential informational entities. For this reason, the bit is the best way to represent things, as the traditional bit is simply the differential relation between 0 and 1, on and off.

Our rejection of semiosis will seem strange to many since information, even as coded bits, is taken by many to mean information as instructions. That is, the software one installs on a computer tells it what to do. Bits themselves as the expressions of on/off relations may seem to simply involve actions. But the universe as computer is both hardware and software at the same time. Things do not need to receive instructions to be. They are those instructions. Think again of genetics. The genes exist as constantly unfolding processes that do not need to be commanded by something outside of them, but rather are information encoded unfolding itself. Like all that is, these processes are ultimately traceable to the act of creation itself.

There is nothing about information processes that allow for one to differentiate between them and physical or mental processes. The very features of our world are computations and they are manipulable and intelligible as such. We here have the notion of information that Claude Shannon first encoded. Bits
work without any reference to what they are ‘about’ or even that these bits are supposed to refer to anything. Any difference can be encoded in such bits, and such bits can later be said to represent or refer to something.

The semiotic concept of information is always already dependent on the differential and syntactic idea. Recall that for semiotics the sign is always triadic in nature. The sign not only stands for something beyond itself, it does so for some mind that interprets it. The sign in semiosis is therefore in many ways another name for causality or the interpretations made by mind. Smoke causes me to think of fire. It is also a question of epistemology and whether one thing can indicate something about another, a referent. The sign relies on this mind to exist in the first place. All the causal interactions of the world, such as a rock bearing the signs of a previous volcano, can only become meaningful when related by a mind. Semiosis is thereby dependent on humans who can differentiate between signs and things. That is to say, semiotics is already a conscious observation on what is presented rather than the substance of things themselves even if other living things for example receive signals and signs from the world and process themselves. One first needs differentiation itself before one could ever say smoke indicates fire otherwise all would be a blurred monolith.

Bits are intrinsic to the world, but the world as a set of references and objects is not intrinsic to bits and information. David Chalmers emphasizes this definition of information in his own work:

. . . which I will call information states, and a basic structure of difference relations between those states. The simple nontrivial information space is the space consisting of two states with a primitive difference
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between them. We can think of these states as the two ‘bits’, 0 and 1. The fact that these two states are different from each other exhausts their nature. That is, this information space is fully characterized by its difference structure. (Chalmers 1997, 278)

What Chalmers here calls an information space is the space of the world itself. All that is is always structured in itself. If this is what Derrida meant by saying that the thing in itself is a representamen, then we agree with Derrida. However, Chalmers thinks that such information spaces are only “abstract” and “not part of the concrete physical or phenomenal world” (Chalmers 1997, 280). But this is because Chalmers himself remains wedded to a representation model. He thinks that information is something we consciously abstract from the world without considering that what makes possible this expression is that the world was always already an information space in itself.

All that is is ultimately discrete. It is that discreteness that makes the universe possible and allows it to be modeled. We can then compute how the universe itself changes and develops. But this ability does not mean that we need to differentiate between an abstract space of possibilities and the actual thing. The actual thing is already made of differences, information, bits. Again, we should not confuse the fact that we can represent things digitally with the idea that the digital thing is just a representation or model. Things are already computing. The universe itself is the computer that computes digital information and all physical, material, mental, etc. phenomena are those computations. The universe is the computation, in our terms, of the holy Name of God and its complications. The bit is not only the simplest possible model. It is the substance of things. At any level we choose
(atomic, molecular, galactic, etc.) there are differences between states. The physical world is not something that we abstract from and then compute. It is already itself a computation. We therefore see our view as overlapping with what has been called ‘ontic pancomputationalism.’ All systems whether physical, mental, spiritual, etc. if they are of this world then they are computational in nature. It is not that computation comes before the physical, but that the software of the universe is also its hardware. Anything we see is a computation entity as much as anything we think. The universe is built up from differential bits. Atoms and the subatomic are not then any more fundamental then trees and texts, as both are built up from these same information bits, 0 and 1.

To recall the Pythagoreanism and set theory elaborated above, all is number, sets, and bits. It is the same ontological orientation. This view was perhaps best first formulated by John Archibald Wheeler (although perhaps Konrad Zuse first had the idea of the universe as a computer and first formulated digital ontology). Wheeler wrote, “the building element [of all] is the elementary ‘yes, no’ quantum phenomenon. It is an abstract entity. It is not localized in space and time” (Wheeler 1982, 570). For him, the bit is not in space and time because space and time articulate themselves in and through bits. It is not just that the laws of physics can be formulated as information, but that all that is is in differential states that give rise to effects. And it is only the differentiation that makes up things and the position of things that allows for space itself. Space is not an empty container. Time is also not a container. Time might seem to us to be continuous and interrupted. But just as a movie is made up of frames so things are made up of discrete instances that in their computation and elaboration give rise to the idea of spatial and temporal continuity.
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Many here would believe we are just confusing the things in themselves with the information that represents them. But this is not an inversion, as along it was information that allowed for things themselves to arise. Physics and computer science show us this endlessly, for instance, in the way that computers allow us to grasp on a screen a thing such as the very text I am writing. Wheeler explained:

every ‘it’—every particle, every field of force, even the space-time continuum itself—derives its function, its meaning, its very existence entirely—even if in some contexts indirectly—from the apparatus-elicited answers to yes-or-no questions, binary choices, bits. ‘It from bit’ symbolizes the idea that every item of the physical world has at bottom—a very deep bottom, in most instances—an immaterial source and explanation; that which we call reality arises in the last analysis from the posing of yes–no questions and the registering of equipment-evoked responses; in short, that all things physical are information-theoretic in origin and that this is a participatory universe. (Wheeler, qtd. Gupta 2010, 159)

The most primary bit is the holy Name made from the tzimtzum. It is this event of ‘symmetry breaking’ where without any other use the divine decides on the basic path the universe will take. But it is this first act that sets things in motion and the effulgence of bit after bit. Bits come from nowhere. There is no prior information telling us how bits should be formed and ordered. Only God is required so that information can be created from emptiness itself. There is no infinite regress as information itself is founded on nothingness, on pure indifference. There is no more
fundamental law or moment than creation itself, and creation itself is about the informing of the bit.

Think here of four states (00, 01, 10, 11), these states require two bits alone to be registered, but eight states will take three bits and so on (Lloyd 2007, X). In this way, just by a complication of 0 and 1 one can reach an endless amount of information. And information is unique here. If we were to see in creation the formation of matter, energy, light, etc., these ideas are themselves divisible, not made of the void itself, not something that by their very natures can be seen as arising from nothing. For this reason, the way in which numbers were created out of the empty set is not just a model or idea pertaining simply to the numerical itself, but to the entirety of creation. Out of zero information, the empty set, we receive all the numbers just as we receive all that is insofar as it is made of bits. A transfinite amount of information can be obtained from the initial zero information of the void—but only if the divine plays the key role of Creator as from nothing otherwise comes nothing. As Seth Lloyd puts it, “In the beginning was the bit’ (Lloyd 2007, ix). Lloyd expands on this idea here by saying that “things or its arise out of information or bits,” whether it is the genetic code that “programs the structure of future apples trees” or the atoms themselves that make up the molecular structure of DNA (Lloyd 2007, xi). For this reason, Lloyd calls the ‘big bang’ the “Bit Bang,” as before it there was nothing, no energy, no space, no time, etc., since to generate more information one needs differentiation (Lloyd 2007, 45-46). The big bang happened everywhere. It says the world has no center. But as we are contemplating, this is not to say that all is one as a whole, but rather that all is one as marked by the transfinite. This is the idea of the ‘Bit Bang,’ which shows that the signifier, the differential, is what is there at the start.
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A state of emptiness is a state needing no bits to describe it. Yet Lloyd and others do not see the need for the divine in order for such a state to lead to information, as its paucity of information would simply remain the same, in a simple state, as Leibniz thought. But perhaps the difference between philosophers and physicists is that philosophers by nature ask ‘why is there something rather than nothing?’, especially if a zero state is one that is simple and one in which nothing can be described or arise on its own. Lloyd contends that the universe is a computer and that it has been computing from its first instance, but also argues that only a computer the size of the universe itself “can accomplish what the universe does and thereby we cannot predict the future or anticipate by building a computer that does the work of the universe itself” (Lloyd 2007, 4). In other words, “the universe is a physical system. Thus it could be simulated efficiently by a quantum computer—one exactly the same size as the universe itself” (Lloyd 2007, 54). But short of the universe itself, there is no reason why elements of it could not also be simulated or possibly emulated. A “prefect depiction of the universe is indistinguishable from the universe itself” (Lloyd 2007, 153), but such a description would require the universe itself as a whole for the description. But if all can be digitized and that means that it is marked by incompleion, limited aspects such as physical being can be described in full. As Lloyd himself notes, there is a finite “number of bits required to specify the microscopic state of [an] apple and its atoms” (Lloyd 2007, x).

Lloyd here introduces quantum physics into the picture. We already met this viewpoint when we discussed how the wave function can express the reality of things by noting in one mathematical space all possible outcomes and positions of a thing.
Quantum physics holds that there is no true being of a thing, as its wave function contains all its possibilities. In some amplitudes a thing expresses itself in one way and in another a completely opposite way. The wave function therefore has an amplitude for every possible state. This theory therefore seems to introduce the wave function as the most fundamental aspect of reality. All things are ultimately wave functions. There are no atoms or molecules or cats (Schrodinger’s or someone else’s) in addition to wave functions. The wave function comprehends things.

This idea can also be expressed via what is called the ‘qubit.’ This new understanding of the bit captures the idea that there is a superposition state in which 0 and 1 can both occur. In this way, a qubit is not just 0 or 1, but also 0 and 1. It is therefore the differential relation of 0, 1, and 01 rather than just 0 and 1. Here, in superposition, two mutually contradictory states obtain at the same time. But the essential ontological points being made here hold in terms of how the differential is at the heart of creation itself. Moreover, creation is needed since if superposition is possible, only an observer can allow the states to disentangle and for there to be differentiate. In this way, prior to the tzimtzum, one has a state of superposition that God himself in his withdrawal allows to arise. Such superposition also explains why things appear continuous rather than discrete as the “wave nature of things along with the things be in similar states makes them not strictly discrete (Lloyd 2007, 152). In addition, quantum theory does not just apply to the subatomic, but to the large as well as the small, just as information does. The difference is that a qubit, as Hans Christian von Baeyer explains, “is not fully specified until its longitude and latitude are fully described, out to an infinity of decimal places” (von Baeyer 2005, 191). The qubit, in its very differential
structure, could hold an endless amount of information and embodies incompleteness itself.

One of the most powerful arguments for seeing the bit itself as the fundamental element of reality and that from which reality is made (rather than from things like atoms, substances, things, objects, etc.) is that such bits are purely relation entities and avoid the problems signaled by Kant’s second antinomy. This problem is the infinite regress with regards to things, atoms, objects. It seems that we can always divide things into more discrete parts indefinitely. Most simply, take an infinite regress as a sign of incoherence as such. If there are objects and parts all the way down, then it is not clear why or from where objects came from. In any event, Kant takes the idea that all answers to the second antinomy are false as a proof of idealism.

The easiest way to take what Kant argues is to say that both sides (the idea that ‘all things can be infinitely divided’ versus the idea that ‘there is an indivisible element out of which all things are composed’) have equally logical proofs, but cannot both be right. So we need a way for Kant to say both are false and articulate a new way to solve the problem. Part of Kant’s proof concerns the idea that one side posits that time is finite (has a beginning and end). For Kant, space and time are always incomplete, since they are finite yet our minds always project them out. Both parts of the antinomy presuppose that matter exists as a thing in and of itself. For Kant, things are constituted ideally by the structure of the transcendental subject. One option of this antinomy is finite and the other infinite and taken as contraries and contradictory. An infinite series would never begin and thereby cannot be. It would also be totally confused in its infinity. A finite series would end, but we cannot say or point to such an end without positing a next step. The main upshot
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is that the Kantian idealist solution of saying we cannot say how the in-itself is structured proves at least to be at this point better argued than its predecessors.

But we are arguing that the in-itself is structured and is so by bits. This presents a new solution to this Kantian antinomy, for bits are not atoms or particles that cannot be divided and not underlying indivisible substratums or atoms. Rather, bits form an elementary basis precisely because they are purely differential in nature. It is this differential nature that prevents the infinite regress. One does not need to ask further what a bit is made up of. Bits cannot be subdivided into smaller units. The bit is the smallest possible unit. The bit has no parts—only relations. The bit is made up of nothing and that is also why it forms a stopping point unlike the atom and solves Kant’s antinomy.

The logic of the signifier also shows that bits are not finite as they lead from and directly imply the transfinite. Information is the very entity to base a theory of everything on, including a theory that refers to God and creation *ex nihilo*.

To posit objects as a solution to Kant’s antinomy would mean that these objects are either substratums (eternal or not) or divisible. If eternal, then one needs to have all the objects that now are always be. If the substratums are not eternal, they are contingent, and thereby if the space in which they occur is eternal we are led to the modal proofs of God via contingency. More importantly, it is not clear how a substratum itself can exist other than as an eternal thing in itself, as it is removed from the change that it underlies. It thereby appears indestructible and yet, if the thing it underlies disappears, so does it. If these substratums are divisible, it is not clear what would cause an end to their division. With such an infinity of division, it then becomes completely arbitrary when one says one has an object, as anything could be collected as an
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object. With this insight, we are back to our own theory of sets, information, etc. In this way, even if one were to suggest that substances are a solution to Kant’s antinomy as part of a rejection of Kant’s idealism, then this view can only found itself on the one we are advocating.

For this reason as well, there is no reason to search for a God particle. The bit provides the answer. Kant’s own antinomy was influenced by the Newtonian idea of matter as being made of solid and hard masses that cannot be penetrated. These particles combined and were explicable by the laws of nature. But with the bit we no longer have such hard substance, but rather relation itself as the ultimate ur-element. The bit allows one to understand how the macroscopic and microscopic world are interwoven and interconnected. One does not need to reduce everything to some indivisible hard particle, but rather understand how on every level things are structured information patterns. Big and small occur at the same time. Atoms do not absorb all else and explain it. We do not mean merely that the properties of trees, for example, cannot be reduced to the atomic properties, as these properties are not found in them, but more so that an atom or molecule is just as much an information pattern as a tree.

Many would argue that a tree may have emergent properties, but it cannot exist without atoms. But as others have noted, a metal has, like many other things, a particular melting point. However, the individual atoms of that metal do not have a melting point. In this way, only the metal when it occurs on a large scale can melt and thereby affect what happens to the atoms. The emergent whole has effects on what seems to be its components. Atoms also cannot exist without trees, etc. and without informational patterns which obtain at all levels. Paul Davies writes:
Quantum physics teaches us that electrons simply don’t exist ‘out there’ in a well-defined sense, with places and motions, in the absence of observations. Even when a physicist uses the word ‘electron’ he is really referring to a mathematical algorithm which enables him to relate in a systematic way the results of certain very definite and precisely specified experiments. (Davies 1988, 175)

In this way, atoms are no different from anything that is both expressed mathematically and as a pattern. It is itself composed of information and relations systematically. Rather than contending there is a hard, impenetrable thing out there, one should hold that the same information rules apply to the bottom as to the top. The only really elementary thing is the bit itself, differentiality.

Once all things are seen in terms of bits, atoms are no more basic than apples, as both are reducible to bits and expressible as patterns. An apple is not reducible to its atoms, for when one has only atoms the apple disappears. And the apple also is not made up of components any more than anything else, insofar as it is a matter of bits and information. Also, an apple, just as a human, remains the same even if the atoms contained in it are not all the same. We recycle cells in our body and yet remain the same body. Apples also have seeds that emerge within new subparts that can lead to new apples containing and involved in new atoms. The issue here is then not just epistemological. Not only can one not understand the nature of large-scale phenomenon from atoms, but atoms themselves cannot be without the ‘infostuff’ of which they are made. Furthermore, particles are no longer considered by most to be the most fundamental entity, but rather that fields are. Particles are only ever perculations in a structured field. Particles have a
derivative status. Once one begins thinking in terms of field, one is already thinking in terms of structured patterns. It is important to note that we posit patterns rather than some underlying thing that persists through change. The pattern itself is developing and changing.

Our view here must be differentiated from the one James Ladyman and Don Ross advocate in their book *Every Thing Must Go*. Ladyman and Ross contend that “neither things, nor properties, nor events turn out to be ontologically fundamental” (Ladyman and Ross 2009, 51). For these authors, what truly exists are “real patterns” which mean “mathematical models,” “sometimes constructed by axiomatized theories, sometimes best expressed by set theory” (Ladyman and Ross 2009, 119). “So real patterns behave like things” (Ladyman and Ross 2009, 120). There are “not things,” as all there is is structure (Ladyman and Ross 2009, 137). In addition, these two authors identify their view with Cassirer’s notion of a field (Ladyman and Ross 2009, 140). Ladyman and Ross thereby see all as part of a differential system wherein each element is related to others.

These two philosophers clarify what they mean by a real pattern when discussing Napoleon. Here, “a person is an extended pattern over a run of data,” such that one tracking Napoleon in 1801 could get information and data that enables them to say how this pattern will look in 1805 (Ladyman and Ross 2009, 229). A person like Napoleon is therefore determined by patterns. And if we could not project how Napoleon would be via the pattern, then we have an individual in the sense of irreducible entity or non-projectible pattern. For this ontology, a real pattern is like a “trend in the market data” where its reality is dependent on whether or not one can project on its basis (that a broker would not say that trend is just a flash in the pan) (Ladyman and Ross 2009, 230).
But for Ladyman and Ross, not all patterns one can articulate are real. If physics does not offer us a way to track the pattern or a way to empirically verify the pattern, then it is not real (Ladyman and Ross, 235). In this way, God for them is not an idea they need to take metaphysically seriously. It is true that God is not a pattern just as much as God is not a being. But metaphysics has to explain where the patterns came from, what allows them to exist, etc. But there is no reason to say numbers, fictional characters, etc. are less real than books, market trends, etc. All patterns are made of bits and thereby are ontologically equivalent. Ladyman and Ross want to distinguish between real physical patterns and other ones that are built out of them. But once the bit is made the most fundamental aspect of reality, one can no longer hold this distinction, as writing is made of bits as much as our thoughts or a table. Ladyman and Ross would call fictional characters like “Tarzan” “second-order” patterns that are based on extra-representational real patterns (Ladyman and Ross 2009, 243). For us, all patterns are extra-representational since they are all made of bits. For example Sherlock Holmes is not represented in the “human genome” and is thereby not a real pattern (Ladyman and Ross 2009, 247). But “prices, neurons, peptides, gold, and Napoleon” are all real patterns as much are any atomic or subatomic particle (Ladyman and Ross 2009, 300).

The position here is based on verificationism. But verificationism cannot verify itself. This means that at the most fundamental level, anything that is a pattern has being. The main issue should be what makes for a pattern, as opposed to whether or not the pattern is perceived as a physical being. To say that some patterns only exist in one way rather than another is itself the second-order issue rather than that of the patterns themselves. Real patterns track another real pattern (Ladyman and Ross 2009, 243), but we still
have to ask where that real pattern comes from via a question of regression (and the answer should not be metaphysically simply that physics and the other sciences provide them).

On the face of it, and in terms of many larger picture issues in metaphysics, our views and those of Ladyman and Ross agree insofar as we both offer what has been called a Structural Realism—that the world consists of informational stuff that interacts and forms all there is. But they also argue that, “The fact that we only know the entities of physics in mathematical terms need not mean they are actually material entities” (Ladyman and Ross 2009, 160). We are arguing precisely that their being mathematical in nature as bits, etc. is what makes possible this type of physics. Ladyman and Ross also put forth that the “world is made up of a new substance or substantative particular called information (‘infostuff’)” (Ladyman and Ross 2009, 189), but they never provide philosophical and ontological reasoning that supports this view other than accepting whatever current physics and physicists put forth as the basic ontology which philosophy must always work with. For them, scientists populate ontology with all its possible entities, and philosophers are just “janitors” who come and order what the scientists provided (Ladyman and Ross 2009, 234). We do not have such a deflated conception of metaphysics.

Ladyman and Ross also do not make clear whether information is a fundamentally epistemological concept for understanding the modality of the world or if the world is itself information. In this way, while we both put forth a

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22 They say at one point that what they call second-order patterns are not less real than any other pattern, but only ones that have a historical relationship, wherein the one pattern always follows another
structural realism, our own ontology is more fundamentally a digital one. This means not only that the universe is a computer, but that all that is composed of bits, digits, etc. including matter, energy, material objects, and so forth. Material objects are not secondary manifestations, as they are differential structures and made up of bits as much as the text I am composing on this computer. All is reducible to the digital, including apparently continuous phenomena.

§23. AGAINST THE ONTOLOGY OF THE VIRTUAL (FOR IT AS EPISTEMOLOGY)

One must beware of taking information states and projecting them into another realm distinct from what it is. All that is is actual. It may develop and change on the basis of the initial creation and the incompleteness of being. But there is not a potential or virtual realm that exists wherein information is coded and an actual realm wherein things appear. Some people, for example, take a gene to be a set of instructions that tell molecules what to do. But the genes are not an abstract space. They are as actual as any other molecule and themselves made of bits. It is not a question of informational code preceding material configurations. The material configurations are themselves already informational code. While logically we might be able to distinguish the two, we need to beware of creating a split reality wherein information is one aspect of reality that what we see merely imitates or actualizes. We can deduce all possible mathematical states, but that does not mean that this state should itself be projected to form one half of reality. Again, that would be to take information as a model rather than reality itself.

For example, Chalmers suggests that a compact disc “has an infinite number of possible physical states,” but it realizes only some of these on a player
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(Chalmers 1997, 282). Here one should take the compact disk for what it is, rather than projecting a model and taking that space to form one part of reality. There is not a combinatorial structure that exists in one realm that is then only realized physically. Anything that is is already a structure. The processing of information involves states that transmit information, such as in the example of a disc that has locations etched into it and has an effect on a player. But one does not need to split reality in order to make this point.

For these reasons, we need to oppose the Deleuzian distinction of the virtual/actual if it is read in the way Manuel DeLanda does. DeLanda thinks the virtual as representational models. For him, these models are not eternal Platonic ideas and are not essences. Rather, DeLanda thinks these models as “spaces of possibility with a definite structure” (DeLanda 2011, 17). These spaces express “invariant properties” and note the “existence and distribution of special or remarkable points” (DeLanda 2011, 18). These topological spaces thereby are “phase spaces” that detail “possible solutions” to a particular problem and can be associated with material processes that enact one of these solutions (DeLanda 2011, 19).

DeLanda wants to insist that these spaces are “not transcendental entities in a world beyond that of matter and energy,” but rather are “immanent to the material world” (DeLanda 2011, 19). However, if they are only immanent it is not clear where and how they exist except as representational models that we conceive. These spaces have to be independent in some sense if they are not just projections we have of reality. But a purely immanent reality cannot be autonomous, and DeLanda wants these spaces to have this property. It is then unclear where and how these possibility spaces exist other than as representations in the mind. DeLanda contends that if “all matter and
energy cease to exist” then these possibility spaces would not continue on (DeLanda 2011, 20), but that still does not show that they do not exist as models or representations in the mind, since minds are made of matter and energy too. DeLanda wants to uphold “the objective existence of the diagrams of assemblages” and their reality and wants to distinguish them from what is actual at the same time (DeLanda 2011, 202). But DeLanda thus has a model where a sphere of potentiality exists on its own, and is then manifested and enacted by various instances. One projects into another space all the possibilities one can articulate and then sees reality as one manifestation of those possibilities.

This is what Henri Bergson always contended was the ultimate psychological basis of the concept of possibility. But the actual itself is already structured. It is not some purely continuous phenomenon, but is itself discrete. It is made up of actual information. In this way we oppose the idea that there are possibility states other than as mental conceptions and as epistemological tools. There is no virtual realm of being. Even such epistemological tools would be actual. If one does not think them or write them, these epistemological tools remain. They can be recreated on the basis of the already given structure of the world. And if one requires that all possibilities are in some space, then they need to exist somewhere transcendentally as we saw earlier with Cantor, since the possibility of conceiving presupposes an actual domain. For this reason, to avoid positing that all possibilities exist in God and what is created only manifests a limited actualization of these possibilities, we either need to do away with the Deleuzian distinction of the virtual and actual or articulate it in a matter that does not end up repeating what DeLanda articulates.
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One model that would already challenge this Deleuzian model is the ‘holographic principle.’ This view states that there is a precise limit on the amount of information that can be encoded in the world actually. It is often called the ‘entropy bound.’ It states how many quantum states are possible. It states also that the universe we experience and perceive would be a projection of a holographic encoding of an almost endless amount of information. Leonard Susskind writes:

[It is further imagined] that in the limit of a very large region the bounding surface can be taken to be a flat plane at infinity. In some way, the phenomena taking place in three-dimensional space can be projected onto a distant “viewing screen” with no loss of information. In what follows I will refer to such a two-dimensional surface as a “screen” and its discrete lattice sites as “pixels.” A pixel can only store one bit of information and is therefore either lit or dark. Hooft has made the analogy with a hologram which stores a three-dimensional image on a two-dimensional film. As in the case of the hologram the flat two-dimensional image must be rich enough to code the full rotationally invariant description of three-dimensional objects. (Susskind 1995, 6378)

In Susskind’s model the informational space itself is actual and projects itself onto a screen that is our own universe. One need not invent an immanent space that is not truly independent of what is, but not the same as it is, as DeLanda does.

The main issue surrounding the notion of the virtual as it appears in DeLanda’s interpretation of Deleuze is the question of representation. The digital
series no longer forms a referent for what appears in the same way that a territory did for a map, since it is no longer involved in a relation of resemblance, analogy, or proportion with what would ‘represent’ it. Rather, what appears appears as a purely self-referential world of images/beings, since its referent is itself, what it is made up of—the digital series is what appears.\(^{23}\) Our world of pure immanence is not simply a world in which representations have replaced or no longer obtain their meaning from what they once represented or resembled (as in the map/territory relation), but rather their \textit{‘virtuality’ lies precisely in the fact that they refer only to a digital series of which they are composed.} The interesting and remarkable thing about the images/patterns produced here, the very initial reason why they pose for us the question of the virtual, is that they no longer are what they are simply because they refer to something they resemble or are analogous to, but rather because they are ultimately made up only of code, of the minimal series of 0s and 1s. Image and referent have collapsed into one thing as images no longer merely refer in a strictly representation manner to a thing, \textit{but rather refer and derive from themselves in another form.} But the true reason for ascribing virtuality here to what appears on our computer screen or otherwise is that we know that it is related to some computer code or information bytes that \textit{do not appear.} What appears seems to be merely the manifestation of something not given and heterogeneous to what appears, computer code, for instance, and the images on the screen. In this way, one initially thinks what is given as the ‘mere appearance’ of what is not explicitly there, but here it

\(^{23}\) We are then arguing and will develop in the next section that the analog/digital divide is an irreducible one, insofar as the digitization of all leaves the analog qualities of things as irreducible aspects of mind.
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is not what is on our computer screens that is virtual so much as the relation between the given and what is not given and the fact that the two are the same thing.

It is not so much that what appears is virtual as that what appears forms the actualization or realization of something not given (computer code) and that it is within this relation that the virtual is ‘found’. What is called the virtual cannot be ‘mere appearance’, nor is it the imaginary, illusory, false, or irreal. It is fully real as it appears and insofar as it refers to itself and forms the manifestation of itself in another heterogeneous form. Computer code or the digital series and what appears on our screen would then be two different orders or regions when they are understood as separable. While what appears on our screen is related to computer code, the two are not separable. They are inseparable. They are two different versions of the same. It is not that what appears on our screens refers to some something more real or separate from it.

In Deleuzean terms, one here has a real or conceptual distinction that is not also a numerical distinction or distinction in existence.\textsuperscript{24} The virtual

\textsuperscript{24} One can already see in operation the molar-molecular distinction that Deleuze and Guattari elaborate in \textit{A Thousand Plateaus} (Deleuze and Guattari 1987, 505-6). Molecular phenomena are the micro phenomena or processes and medium that give rise to the larger, perceptible phenomena of common perception. Here, the digital series would be the molecular processes that give rise to the molar phenomena of what appears on one’s screen. However, as John Mullarkey notes in “Deleuze and Materialism” (1999), such a distinction does not reduce the molar to the molecular (60). Instead, it is a distinction not of a hierarchical nature (64), but rather one designed to show how subconscious processes give rise to perceptible phenomena. I will return to these issues and in particular to the non-reductivism argued for here in Chapter Three.
thereby poses the question of how one can split the world up into two without lapsing back into an ontological dualism. The virtual is defined by Deleuze as “real without being actual, ideal without being abstract; and symbolic without being fictional” (DR 208). In fact, for Deleuze, the virtual is very much “a part of the real object—as though the object had one part of itself in the virtual into which it plunged as though into an objective dimension” (DR 209). In this way, whereas realization involves selecting possibles that, in being realized, completely resemble the real when existence is added to them and limiting what possibles are actually given and selected, the actualization of the virtual is not governed by the “rules” of “resemblance and limitation, but those of difference or divergence and of creation” (B 97). Now, as Elizabeth Grosz argues, Deleuze is, in part, motivated to differentiate the virtual from the possible because the possible/real model precludes novelty and real creation since the real is already made and predetermined in the order of the possible (Grosz 1999, 27). Differentiation names the relationship between the virtual and the actual insofar as it shows how the Ideas, the virtuality of which consists in structure, are incarnated in various systems.

In other words, the complex notion of differentiation articulates Deleuze’s own version of structuralism—a structuralism whereby the virtual nature of structure demonstrates how structuralist theory is divorced from a representational model of thought. Here, the representation of stable identities gives way to a world of simulacra wherein “identities are only simulated, produced as an optical effect” (DR xix). The simulacrual nature of the modern world, not unlike Baudrillard’s conception, is a production of many things, but, in particular, of the failure of a
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straightforward logic of representation as well as “the more profound game of difference” (DR xix). “The Idea is thus defined as a structure. A structure or an Idea is a ‘complex theme’, an internal multiplicity—in other words, a system of multiple, non-localisable connections between differential elements which is incarnated in relations and actual terms” (DR 183). The Idea as structure forms the heart of Deleuze’s ontology insofar as it is an ontology of Structuralism. However, Deleuze’s concept of structure will diverge significantly from the usual (by the usual one means as elaborated by a Saussure, Levi-Strauss, or Lacan) definition of structure, in particular by evacuating the negative dimension from the relations that determine the basic elements and being primarily interested in difference as a creative process of self-differentiation. In addition, and more importantly, Deleuze’s elaboration of Ideas as structure will demonstrate how for him the virtual is and functions as structure, how structure is virtuality as such.

In Deleuze’s formulation, structure does not presuppose the identity of any phenomenon, but rather articulates and demonstrates how its identity is produced. Here, the intelligibility of the identity of anything is not governed by resemblance, but rather by its development. Ronald Bogue, for instance, offers the following example: “Just as the structure of genes bears no resemblance to the structure of an actual animal, so the structure of a virtual idea bears no resemblance to the structure of its actual embodiment” (Bogue 1989, 59-60). Another easy example, and one of Deleuze’s favorites for exhibiting the basic character of Ideas, is social Ideas. Here, these social Ideas are not the product of discourse or the formulation of merely the intelligible principle of a society or social organization. Instead, social phenomena themselves are, ontologically, the incarnation and actualization of basic social Ideas, just as an organism would consist
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in the actualization of a biological Idea. These Ideas thereby do not simply name psychic or epistemological entities, the concepts of discourse, but rather something that is both virtually and actually. The realization of the possible is the realization of something that lies outside of what is realized. In addition, the members of a set of possibles have no existence. They are in a way differently than the real. They make up an entirely different ontological order and regime. The distinction between possible and real is not then amenable to a univocal conception of Being. The virtual has reality, the reality of the Idea and structure. It is actualized rather than realized.

If Ideas as essences stand outside of their appearances, then these appearances can only ever be accidental and accidents. If the virtual is simply the possible, then existence merely happens. Possibles are realized and move from a state of nonexistence to existence in an unintelligible, sudden, and non-meaningful manner. Things pop out of nowhere into being by God’s command. However, we have been arguing, rather, that the very world of beings develops through elaborations of the holy Name, although creation ex nihilo is also always possible. Since the Idea for Deleuze is immanent to its actualizations, nothing merely pops out of nowhere or is suddenly created ex nihilo by God. Ideas produce the space-times of their representations, rather than being embodied in already existing environments.

The only theorist who to my knowledge comes close to Deleuze on this point is Anthony Giddens, who claims that “structure has a ‘virtual existence’” (Giddens 1979, 63). While Giddens argues that structure should not be confused with models and is inseparable from its instantiations, he also views it as “a set of differences” in such a way as it appears to be based on a negative and oppositional understanding of difference (Giddens 1979, 63). In addition, it is un-
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clear on Giddens’ account what sort of ontological status structures, as virtual, have. Whereas for Deleuze structures or Ideas are precisely what anything is the embodiment and actualization of, it appears that for Giddens, while structures are not simply models created by observers, their status as memories of social actors is not fully sketched out (Giddens 1979, 63-64). Also, it seems that for Giddens such structures only have a social existence. Finally, Giddens argues that structures are “non-temporal and non-spatial” whereas Deleuze attempts to show how the virtual involves actualization and thereby time (Giddens 1979, 3).

It is not simply that the structure is these images or entities that derive from it, since it is also not simply an essence as opposed to mere appearance (HDW 261). The symbolic dimension is more fundamental and not reducible to what is immediately perceptible, to a series of images. Instead, the symbolic, the structure, must not be confused with something that is given sensibly or immediately perceptible, with a schema or a product of imagination, and with a strict metaphysical essence or universal. In particular, in Structuralism, the whole is not distinguishable from its elements, but rather the whole consists in its differential elements and relations. There are certain basic differential elements that make up the whole and show how the parts vary. In other words, structure is a combinatory of basic differential elements, but these elements ‘are’ only insofar as they are differentially related to each other. They do not appear, as it were, and while they form the condition for seeing the sense of appearing, they do not make appearances seem to be merely occurrences that derive from some intelligible essence. Structure is then the coexistence of all these

25 Although in Gilles Deleuze (2002) Claire Colebrook treats
“elements,” “relations” and “relational values” “in a completely and perfectly determined whole” (HDW 268). But the whole is not itself actual since what is actual are only the “particular relations, relational values, and distributions of singularities” (HDW 268).

Language as such, as virtual whole, as structure, is “actualized following exclusive rules in diverse specific languages” (HDW 268). Society, the social Idea, as a whole does not exist, but any “social form embodies certain elements” and “relationships” (HDW 268). These particular relations and forms are then of course the actualization, the differenciation, of the virtual structure, of the structure as virtuality, as a virtual coexistence of determined differential elements. What can be called actual or actualized is “that in which the structure is incarnated” (HDW 267). This virtual structure of coexisting elements has a reality since it is only ever found in the very phenomena which incarnate and exhibit the structure.

However, structure is said not to be a set of possibilities, since it is strictly virtual. Since structure is not form (as opposed to content), since it involves the structuration of its content, it is inseparable from the actual appearings that incarnate it. One then understands time, duration, as itself the actualization of the structure (HDW 269). Such characteristics bring one back to the virtual Whole as articulated in Deleuze’s Bergsonism. For Deleuze, the virtual Whole is differentiated, and this differentiation forms its reality. For this reason, “the reality of the virtual is
structure” (HDW 269). In order to concretize the relationship between the virtual and the actual and to understand the many aspects Deleuze wishes to attribute to it one must see here the fundamental homology between the Bergsonist unconscious (time, duration, past in general, memory) and the Structuralist unconscious. This attempt should not be surprising since language and memory have an obvious and fundamental affinity. We have Sense in the same way that we have the pure past coexisting with the present. We can place ourselves in the pure past, into memory, immediately in the same way we find ourselves already in Sense (B 57). But Sense in the Structuralist manner is not something found merely in what is heard, but is rather found by way of seeing language in terms of negative differential relations and elements. Sense or meaning is, as it were, actualized in actual acts of speech and writing. Sense then is not language as it is heard, but rather Sense is the ontological foundation of the language that we hear.

The virtual Whole is thus structure in the strict Structuralist sense of the term. Memory and language as structure are then, as it were, one and the same, or determined in the same fashion. These issues bring about what Deleuze identifies as the second criterion for Structuralism: sense. Sense here names precisely the manner in which the basic elements of structure take neither “extrinsic designation nor intrinsic signification” (HDW 262), but rather are meaningful by way of location or position. Location here does not name a spatial sense in the same way as one orientates will be explored in what follows. As we shall see, the very difference between t/c will make all the difference and explain the relation between the virtual and the actual.
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oneself physically, but rather "sites in a properly structural space," a "topological space" (*HDW* 262). Structure is made up by way of its relations and elements such that it is an "unextended" or "preextensive" space, a "pure spatium" (*HDW* 262). Space here would be a function of relations, but insofar as entities are incarnations and embodiments of structure, space seemingly precedes them. For this reason, Structuralism is necessarily "a new transcendental philosophy," since anything already has its place and functional site already found with a Structure (*HDW* 263). In other words, here *relations precede relata*, since anything conceivably can occupy the relations due to the manner in which the relations determine the meaning or sense of the relata.

Sense itself can only ever be an effect, a result—the result or effect of a combination of elements and relations. And since these elements and relations are in and through themselves non-significant, sense emerges from non-sense, emerges from the non-meaningful. Deleuze describes this effect not as "a product but an optical effect", as the result of position (*HDW* 263). Or, following the terminology of *Difference and Repetition*, one could call it a "chaosmos from which the cosmos emerges" (*DR* 199). Sense ultimately functions as the emergent property and consequence of functions devoid of sense. Sense is emergence itself.

The virtual/actual relation thus must be explicated by "the complex notion of different/ciation" (*DR* 209). The difference between differentiation and differenciation must be understood as the difference between the *t* and the *c* (that is, as a purely phonemic difference). Of course, the difference between two phonemes is not something that appears. A phoneme is itself a purely differential element. In speaking, we hear the sound ‘t’, but not the phoneme *t*. Since the phoneme is not the actual letter, *it is*
virtuality itself. In this way, the difference here is caught up with our understanding of structure in the strictly Structuralist sense. These structures are unconscious (for instance, Lacan’s famous thesis that ‘the unconscious is structured like a language’).

But here Deleuze differentiates his ontology of Structuralism from the usual Structuralist understanding. Whereas Structuralism has understood difference as the negative differential relation between elements such as phonemes, Deleuze institutes a different conception of difference. Deleuze’s third criterion for recognizing and defining structure is “the differential and the singular” (HDW 264). A phoneme names the very basic element of structure and thereby virtuality as such, but not because of any negative differentiation:

What is distinct from the voiced elements, and the associated concepts and images, is called a phoneme, the smallest linguistic unit capable of differentiating two words of diverse meanings: for example billard [billiard] and pillard [pillager]. It is clear that the phoneme is embodied in letters, syllables, and sounds, but that it is not reducible to them. Moreover, letters, syllables, and sounds give it an independence, whereas in itself the phoneme is inseparable from the phonemic relation that unites it to other phonemes: b/p. Phonemes do not exist independently of the relations into which they enter and through which they reciprocally determine each other. (HDW 264)

The phoneme is not the heard or pronounced sound ‘b’. It is not even the image ‘b’. It is the smallest relation that operates to differentiate two words, two entities, found within any language whether written,
spoken, signed, or what have you. Deleuze here employs the example of ‘b’ and ‘p’ from French. In French, ‘b’ and ‘p’ are embodied and instantiated in various words and letters and sounds, but the two are not simply made up of such embodiments. Instead, the phonemic relation has a relative independence of any word or sound embodying it. Such independence makes up, in part, the virtuality of the relation, but also the very fact that b/p is only ever the relation between make up their virtuality. The phoneme then is this relation.

But such a relation is not simply negative in quality. It is not simply a question of saying ‘b’ is not ‘p’ and ‘p’ is not ‘b.’ Rather, they are differentially related by way of a mutual determination. Deleuze here opposes any linguistics that construes the differential relation between phonemes as one of opposition (DR 204). What is usually taken by Structuralist linguistics as a relation of opposition is really and fundamentally one of reciprocal determination. For Deleuze, the confusion is primarily a matter of “terminology,” since what these linguists mean by an opposition ultimately turns out to be “simply correlation” (DR 204). Since phonemes can in principle be related in any given language to one another, it is not simply a case of opposition or negative difference. In fact, for Deleuze, the attempt by Trubetzkoy and others to view phonemic relations as opposition stems more so from the hegemony of Hegelian dialectics and metaphysics when, in fact, the very idea of the phoneme is at odds with Hegelian philosophy (DR 204). According to Deleuze, despite the well-known Saussurean claim that language is ultimately only a system of differences without positive entities and Trubetzkoy’s claim that absence is constitutive of language and the manner in which both of these views assume an oppositional model, the phonemic relation “points to the contrary” (DR 204).
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Perhaps, reading phonemic relations as oppositional stems from viewing them from the perspective of their embodiment rather than in their sheer status as relational entities.

Because phonemic relations make up the virtuality of the linguistic Idea and demonstrate the virtuality of the Whole, the virtual system of relations that constitute Ideas, it is primarily “when the virtual is reduced” to a species of possibility that opposition supersedes reciprocal determination (DR 205). As possibles, such relations would only be able to actualize something from nothing, from a position of nonexistence. In this mutual or reciprocal determination, simply stating that one is not the other is not enough to give them any status. To further mark off the mutual and reciprocal determination found here, Deleuze distinguishes three kinds of relations. In the first example “3+2,” the two elements (3 and 2) are independent of each other (HDW 263). These two elements are real and exist independently of being in relation to each other. In the second example “x² + y² = r²,” the terms of the relation are undetermined insofar as no value is given to any of them and any value can be inputted for any (HDW 263). However, each term must be given a determined and specific value. In the third example “ydy + xdx = 0,” the elements not only “have no determined values themselves,” but also “determine each other reciprocally” (HDW 265). The phonemic relation is not like the addition of two numbers (this relation would correspond to the actual), but also not like that of a complex equation (which would correspond to structure insofar as any values can be inputted and the terms remain undetermined). The phonemic relation would be like a differential equation from which a structure can be derived. The symbolic for Deleuze is ultimately like a differential equation—one where all is determined reciprocally. Such a symbolic is not
made up of negative difference and absence, but rather mutual and reciprocal determination. Both dy and dx are totally undetermined outside of each other and only exist in relation to each other. Singularity comes into play insofar as, for example, a specific language is made up of and can be recognized by the specific phonemic relations it contains (HDW 265).

But in order to differentiate the virtual from the possible, Deleuze must differentiate it from Levi-Strauss’s understanding of structure as an ideal combinatory, a reservoir. According to this conception, what is actualized merely follows due to limitations or selecting from pre-formed possibilities. However, since structure involves the emergence of sense from non-meaning and mutual determination, actualization cannot be a matter of selecting pre-formed possibilities. Instead, Deleuze’s view leads to showing how actualization occurs by way of various combinations which are always a partial instantiation of the virtual Whole. As long as the combinatory is not a set of possibles, it forms a virtual structure. In addition, Levi-Strauss’ conception does show how the virtual involves the coexistence of all at once: “To discern the structure of a domain is to determine an entire virtuality of coexistence that preexist the beings, objects, and works of this domain. Every structure is a multiplicity of virtual coexistence” (HDW 267-68). The virtual Whole is not a mere set of pre-formed entities which wait to be given existence, but rather a set of relations that are virtual due to their differential nature. For this reason, what virtually coexists is differentiated even though it is not yet or not viewed in terms of its differenciation or actualization (HDW 268). Whatever is actualized is then a part in relation to the virtual Whole. It is a part insofar as it is partial, the effect and result of differential relations and elements that are reciprocally determined. In terms of language, a
specific language actualizes the language Idea. Or perhaps even better, a particular speech act actualizes the virtual Whole of a language. Here, one moves from the virtual to the actual insofar as the virtual is found in its actualization.

But we must ultimately reject this model for thinking the digital universe of bytes as much as we reject DeLanda’s treatment of it in terms of the possible, possibility, or phase spaces. While Deleuze may admit that the digitization of the Real is its structuration, he still requires reference to a virtual Whole, a structure or Idea, of which individual beings are only embodiments. As seen above, an entire language exists as a virtual whole. Individual words, etc. are embodiments of it, if only partially. But all we ever have are these partial embodiments. Deleuze does not argue that these virtual wholes/structures are an intelligible essence to which appearances refer. Instead, bytes have to be understood as virtual only in the sense of being made up of negative differential elements and relations. But anything that is, whether a word or tree or building, is also made of bits, as a pattern. Computer code on the screen is not virtual, but the structure of which this code is an actualization is. But that does not mean we need to posit a virtual whole. Rather, the world is made up of actualities only. The holy Name of God is that actuality, the mark and pattern that elaborates the world into what it is. It is not a whole, even if one not given when referring to parts. The entire language of French is not a virtual whole. The French language is transfinite in nature. This means there is no whole except as a transfinite set that can itself be exceeded by its subset. Yet one can isolate it is a model.

Deleuze’s model, then, is still too epistemological and not sufficiently ontological. It offers us a way of comprehending things, but not of detailing the universe of beings as they are. Nothing lies behind our
screens or the things that make up created being. But our screens do not also consist in the actualization of the virtual because there is not a whole, incomplete or otherwise, on Deleuze’s terms or a set of Ideas. These Ideas are only ever models that we articulate as much as we articulate texts of philosophy. But we would not say that the philosophical text constitutes one half of reality itself. Rather, the screen is information itself as a screen, as much as what appears on the screen is code, both as computer code and the atoms that compose it. The actual takes precedent over any potentiality or virtuality. The actual holy Name of God is the primordial bit and primordial actual existing pattern that in its complications gives rise to the world and the universe as computer. Recall that the holy Name and God are not one. It is not a realization of some possible thought of God, but what arises from the tzimtzum itself. And even if God were to be seen as thinking in actuality of all the infinite natural numbers for example, what we have in this world as number is not realization of these numbers as they too arise via the holy Name, rather than as expressions of God who himself withdraws. That is to say, even God for us would not be the site of Deleuze’s Structure-Ideas in terms of explaining what is. And if they do obtain there, they obtain there as actual domains, but not with a relation to what is created itself, as that is done by the elaboration of only one element, the holy Name. For us the only way in which these Ideas of Deleuze could occur would be for them to be actually encoded as per Susskind’s elaboration holographic principle. Or perhaps, they could exist in an infinite dimension of time. But there they would obtain actually. Let’s consider a part of Deleuze’s own

27 In this way, we echo some of the key points of Badiou’s own critique of Deleuze as elaborated in Deleuze: The Clamor of Being (1999).
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theory, the Bergsonian idea of the pure past, as a potential candidate for this dimension. For Bergson, the distinction of the possible and real in this manner indicates that the possible is always “less than the real” and involves judging that things are possible prior to their realization (CM 99). However, Bergson argues that the opposite is true. The real precedes the possible as the possible only forms “the addition of an act of mind which throws its image back into the past” (CM 100). The possible then does not precede the real, but is an abstraction of the real. Such an abstraction leads to the illusion that things existed in some possible state prior to their realization, prior to their givenness, when it is the case that this is merely a retroactive illusion. Given realities are retroactively posited as part of the past so that they are seen as possible, but this retroactive illusion depends on thinking that Being is “given once and for all, complete and perfect,” so that realization involves adding existence to an already completely constituted possibility (CM 104). But Being is never given completely as such a totality since time as duration forms a pure flux: “time is what hinders everything from being at once” (CM 93). Time, the passing of things, proves that there is an “indetermination in things” which time itself is (CM 93). When one treats every-thing as given at all at once, one is not dealing with time, but with space or the spatialization of time, simultaneity. Since time implies passing, change, movement, it cannot be reconciled with everything all at once simultaneously being in a static manner. Of course, simultaneity is a form of a time, but it is precisely a spatialization of time since time involves flux, the passing away of things and coming into being of others.

The movement of things, the pure continuity of becoming, is what Bergson calls duration, and things as much as consciousnesses are involved in duration.
All that is given to consciousness gives way to something, so that the givenness of things involves flux and becoming, but the constant supersession of givenness does not only characterize consciousness (duration is no more simply inside than it is simply outside). Time implies that things move and pass, and, in this way, time is in a sense *always already past* (MM 137). The present names, it would seem, the moment in which this passing takes place. But while one can idealize the present as a pure “mathematical instant” (which involves a retroactive illusion similar to the erection of the possible), the present is subject to duration as “the indivisible limit which separates past from future” (MM 137). As subjected to duration, the real (as opposed to idealized) present is precisely a limit always passing away into the past and giving way to the future. The present is then constantly passing away.28

But how does the present pass away? If the present marks such an “indivisible limit” which divides the past from the future,” then when the present is about to come into being, it is *not yet* (MM 150). But when the present exists, it is *already gone*, no longer now (MM 150). The present is always caught between its being *not yet* and *no longer*. It is always precisely missing. It is seemingly never in existence. Since the present is *always already* past and *not yet* the future at the same time, how does a new present...

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28 Note the overlap between Bergson’s determination of time and that of Augustine (*Confessions* Book XI). While Bergson follows Augustine in criticizing conceiving of time as a function of movement and of thinking of time simply as present, past, and future, Bergson furthers an ‘Augustinian’ understanding of time by accounting transcendentally for the passing of time itself (other than putting it down to the functioning of mind) and by developing the notion of an *a priori* past.
replace an old one? To think that the present becomes past when it is replaced with a new one involves wondering how “a new present comes about if the old present did not pass at the same time that it is present” (B 58). The paradox of the old present having to be both present and past simultaneously in order for something new, for a new present, to arise means that the past would never arise unless it *always already was*. An old present could not give way to a new one unless it was always already part of the past, unless the past already was. In other words, for Bergson, the ground for the present truly to pass away is the past in general, an *a priori* past that is always contemporary with the present that is passing.

There is actually a better model than Bergson’s that achieves this idea, as Bergson’s virtuality seems to be only a temporality capable of holding together what was, but not adding to it or elaborating on it. This is David Bohm’s, in which the implicate order is the more primary level of reality. Such an implicate order would have to contain in and of itself the Idea-Structures of which Deleuze speaks. Another model is that of Karl Pribram. Here, the idea of the hologram is used differently than as in Susskind’s model. For Pribram, memories are not located in one part of the brain. Even if a person has part of their brain removed, memories said to be associated with the excised part are still accessible for a person. Now, every part of a holographical piece of film contains all the required information to make up the whole image. In this, every part contains all that is needed to recall the whole (Talbot 1992, 17). For us, this would mean that any particular instance or being would enable the nature of the incomplete whole to be elaborated and understood on its basis. For Deleuze, there is a virtual whole, and virtual wholes as Ideas, that are not given, but still obtain as wholes virtually. For us, the created world is incomplete insofar as it is marked by the
transfinite and the signifier itself in its very character. It is thereby a matter of an actual created world.

One should also note that bits themselves, as this idea is used in reference to computers, are always actual. Computer-mediated phenomena, cyberspace and all such related phenomena (the Internet, e-mail, VR, etc.), are all “comprised of information in the form of binary numbers which either resides in computer memory or on some other storage medium such as hard disks, floppy disks, optical disks, punch cards, or magnetic tape” (Koepsell 2000, 80). The binary numbers referred to here are “Bits,” “BInary digiTS” (Koepsell 2000, 78). A Bit is “the smallest unity of information” and forms the state of the switches which are either in the on or off state (O or 1) (Koepsell 2000, 78). In this way, Bits make up the digital series and form the “fundamental unit of cyberspace” (Koepsell 2000, 78). Since all computer-mediated phenomena are made up of Bits, the various storage media for Bits, for Koepsell, make up the “substrate within or upon which the various” computer-mediated phenomena “subsist” (Koepsell 2000, 80). Since these storage media are common, everyday objects (perceptible, “take up space”), any and all cyber-phenomena “are ontologically dependent upon storage media for their existence,” so that if these media are not in place, there is no cyberspace (Koepsell 2000, 80). Cyberspace then is only “by virtue of storage media” (Koepsell 2000, 80).

Such phenomena as email, the Internet, and VR and what is related to these phenomena have their dependence on these storage media since they cannot exist without them. And since these storage media “have extension” in common perceptible space, there can be “no reason to doubt that cyber objects have extension” (Koepsell 2000, 80). For this reason, computer-mediated phenomena do not differ from other objects in common, everyday space because they
are bound up with and are only by way of storage media in which they are stored. In this way, for example, “real world analog information which exists in forms which we may directly experience” are transformed “into binary form by output devices,” but this perceptible information, for example the images presented to one on one’s computer screen or while wearing the goggles of VR, “are simply pictures composed of bits and translated into analog images” (Koepsell 2000, 81-82). What appears on one’s screen is entirely reducible to bits (Koepsell 2000, 82).

However, Koepsell is wrong when he says that these considerations show computer-mediated phenomena are illusory or have illusory substance. For him, these phenomena are illusory and only have substance by way of the storage media in which the bits they consist in are stored (Koepsell 2000, 82). All things are made of bits. Even what is on our screen is information and bits. There is only a “difference in degree” “between digitally coded and expressed information and that which is encoded and expressed in analog forms” since there exists “no good reason to believe that an expression is significantly different when it is stored or transmitted in digital form than when it is sorted or conveyed in analog form” (Koepsell 2000, 87). Ultimately, according to Koepsell, the difference between the analog and digital being only one of degree rests upon the fact that the analog is only by virtue of the digital.

What appears to one perceptually while wearing VR goggles and the corresponding digital series stored in some medium such as the hard drive are not simply different in degree, for all the reasons that the analog-digital distinction itself forms a distinction between two mutually exclusive domains. The two are simply not isomorphic and the analog does not consist in a “representation of the digital” (it does not resemble the digital, it is not a likeness of the series of 0s and
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1s, it is not in some proportion to the Bits). The fact that the analog image or picture is comprised of Bits and dependent on some substrate for its existence does not mean that it is reducible to this substrate for its meaning and sense. In fact, the true difficulty with such computer-mediated or cyber-phenomena is that they involve coding in their very actuality and substantiality. Because the analog in many ways is irreducible to the digital (see our discussion of Chalmers below), the two form two heterogeneous orders, and yet one is dependent on and comprised of the other. In this way, one sees that the issue consists in such aspects and involves primarily the question of how one can reconcile such aspects.

Koepsell seemingly recognizes this point by arguing that even though “digitized expressions and analog expressions are distinct in their form (but of the same substance), they serve the same function—namely, each conveys meaning” (Koepsell 2000, 86). In this manner, it is not a question of simply reducing one form to the other, because as two forms the digital and the analog make up heterogeneous and non-isomorphic orders. Rather it is a question of reconciling this heterogeneity while showing that they do not make up two distinct ontological orders resulting in a dualism, since they are of the same actual substance of information and never separable.

This actuality can be seen in its own articulation via a look at topology. In topology, one studies the nature of space. For Deleuze and DeLanda, there is a set of all possible phase spaces and states of things. It exists virtually. While both want to say that such a phase space is not logically or ontologically prior to actual physical states, they do want to isolate it as part of an ontologically different order of reality. A fully cosmic consciousness would then be one that can envision all the possible universes and phases that objects can undergo. Deleuze would never allow for
the idea of a transcendent God. His own view of God, if he were to elaborate one, would follow from his work on Spinoza. Here, he would buy into a cosmic pantheism wherein each thing that exists is an expression of the whole of the things, the set of all possible states, the ultimate phase space (the plane of immanence). For this reason, opposing the virtual/actual distinction as elaborated by Deleuze and DeLanda also involves rejecting a version of pantheism.

A topological space is a collection of points with some coherence and structure. Topology wants to study the invariant properties of any extended thing, any spatial object. In this way, there are no absolute properties of any objects in terms of its spatiality since these properties are part and parcel of a set of relational items (such as edges, points, etc.). It studies the qualities of objects that remain invariant even as the object undergoes transformations. The standard example is that topology shows how a doughnut can be transformed into a coffee mug. The two objects can be considered equivalent as various invariant structural traits remained the same through the transformation. In this way, one could isolate a phase space, a set, of the structured relations that both have and that enable the transformation.

What is interesting here is that all is based on the internal structure of neighboring relations and that two things that to the naked eye appear to be two completely different shapes and things from the perspective of topology are fundamentally equivalent. Due to this equivalence, the fundamental structure informing both objects can be found by looking at either. In this way, each being contains and refers to the whole structure by itself. Even if in the world we just had coffee mugs, we would be able to elaborate them into doughnuts and comprehend them insofar as the topological space can be founded on the basis of
the coffee mug alone. In this way, we do not need any virtual space. *We only need the actual thing.* We only need an actual coffee mug to understand a large number of structural principles that can give rise to its equivalences. The topological space is thus an epistemological model that we elaborate. A coffee mug can be expressed as a set of mathematical relations. Those relations geometrically can be transformed to show how given certain invariant properties the donut is spatially equivalent to a coffee mug. But one does not need to project any virtual being to do so.

The coffee mug itself is already that structure. It is fully actual in and as the coffee mug. This is why an ontology of information does not ultimately need the notion of virtual to do any more than epistemological work. Coffee mugs, like all else, are composed of difference and structural relations. A doughnut is a variation on a coffee mug and a coffee mug a variation on a doughnut. But that does not mean each is just an actualization of a virtual space. Rather if one were to be twisted into another then it is via actual actions and via the very structures themselves in their actuality translating themselves. This is what happens in the very earliest stages of human life, for instance, as the embryo develops. But one need not posit a virtual phase space of which the embryo is an actualization other than to epistemologically comprehend how structurally one embryological shape could transform into another.

Ontologically, one simply has a structural shape that transforms into another. The structure is itself already actually pertaining and constituting the living being. To speak about language in the same terms one could say that once one has spoken, one has exhibited the basic structures of the language even in speaking one sentence. If one here posits a virtual space, one does so in order to try to show there is no eternal essence of what a coffee mug is and to show that
things are elaborations of structure. But that does not require that the structure itself be given its own ontological realm.

The mind can take what is actual and vary it as well. But mental variation is itself comprehended by another structure. There are no essences as all things can be seen as the unfolding and elaboration of the most basic structures of information. There is no Platonic heaven. This accords with how the transfinite itself can be based on the pure logic of the signifier. One need not posit anything more actual than the signifier itself or the holy Name of God in order to maintain the actual domain that makes possible Cantorianism and its insights. The worry here is that by making all things an elaboration of such basic structural ideas, one makes many things appear identical whether they are doughnuts or coffee mugs.

§24. INFORMATION INSIDE-OUT: MIND AND MATTER

In order to avoid making all seem like perfect equivalents despite our varied experience, we need to introduce a distinction within being (and not the virtual/actual distinction) in order to comprehend specific properties that do not seem to be expressible fully mathematically and also to account for how structurally equivalent things involve different appearances. Structure alone can account for these things. For instance, the numbers 4 and 5, just based on inclusions of the empty set, were differentiated. But the problem still remains if we are going to support the topological idea that in terms of their mathematical nature, coffee mugs and doughnuts are homeomorphic.

Here, we will have recourse to David Chalmers’ theory of consciousness, which itself is tied to a “conception of the world on which information is truly fundamental, and in which it has two basic aspects, corresponding to the physical and the
phenomenal features of the world” (Chalmers 1995). For Chalmers, the perception of things like color patches in a visual field is “not so different in kind from the structure of binary digits” insofar as there are structural relations between them (Chalmers 1997, 284). In this way, Chalmers argues that “when human experience realizes an information state the same information state is realized in the experience’s physical substrate” (Chalmers 1997, 284). A phenomenal conscious experience of differential relations means then there is a physical structuration of things in terms of information, bits, etc. as well. The perception of things as structurally related is something we are not just consciously aware of, but also something realized in the world outside of mind, such as in the brain. If the brain is itself structured by information, differential relations, etc., then the experience we have consciously also has this same structure (Chalmers 1997, 286).

For Chalmers, this idea also explicates the law-based nature of phenomena—the manner in which phenomenal experience and physical phenomenon have structure. But it is important to note that the one and the same information space can be embodied in both conscious experience and non-conscious purely physical processes. In this way, one shows how consciousness relates to something like the brain by showing how each explicitly unfolds structural relations (Chalmers 1997, 287). This isomorphism shows how matter and consciousness are part of the same reality without one being reducible to the other insofar as they both exhibit patterns of difference and can express structurally the same relations (Chalmers 1997, 288). The world is one of “pure information” wherein each part and expression of it is an expression of an information space made up of differences (Chalmers 1997, 303). This also means that the “same experience will arise” invariantly if the

所有状态可能有这种品质，因为所有东西都是信息的。通过这种方式，一个恒温器是信息（一个指示冷却和一个指示加热，例如）这样的东西它也证明了一个状态不可归因于组成它的信息。因此，Chalmers倡导“泛意识论”因为“自然的物理经验的浮现”在所有情况下（Chalmers 1997, 299）。因此，所有信息都是物理上和现象学上表达的。所有信息都既作为意识又作为物质过程。现象学意识，然而，揭示了无法被解释为与信息空间中等同的结构所发现的物质属性。在物理上，我们将不得不找到物质属性，这些属性无法被解释为如何
that physical process embodied pure structural differences, whether this property be “mass and charge” or another related purely to extension and materiality (Chalmers 1997, 305).

This view leads Chalmers to formulate his view in a particularly insightful slogan:

The ontology that this leads us to might be called double-aspect ontology. Physics requires information states but cares only about their relations, not their intrinsic nature; phenomenology requires information states, but cares only about their intrinsic nature. This view postulates a single basic set of information states unifying the two. We might say that the internal aspects of the states are phenomenal, and the external aspects are physical. Or as a slogan: Experience is information from the inside; physics is information from the outside. (Chalmers 1997, 305)

This view neatly fits our previous view and expands on it. All phenomena are composed of information, bits. All beings whether mental or material express structural principles, are expressible mathematically. But there are things that we experience, specific qualities, which cannot be reduced to these mathematical equations, for instance, that express these phenomena. Such properties are only experienced by the mind, whether it is softness of a color or the itchiness of a growing beard. This is precisely what consciousness in essence captures for Chalmers, as seen by the earlier parts of his book and his Zombie argument. But on the material side, there are also such properties. The heaviness of bodies or their persistence is not something that can be reduced to information. To take the most famous example,
Galileo could express falling stones in mathematical terms, but could not capture the quality of resistance that it experiences while falling. The very resistance in its materiality would be a material *qualia*.

We then have a monism of information that has an inside and an outside. It is interesting to compare this view with Spinoza on substance. For Spinoza, there was but one substance, but it had an infinity of attributes of which humans are only aware of two (mind and extension). Now, perhaps also the created world comprehended by information has other possible fundamental attributes, but we along with Chalmers, only seek to isolate two, that which is on the inside via mind as consciousness and the proprieties irreducibly related to it (a good example again is *qualia*). And on the outside, information also has irreducible properties, just as extended physical existence. This distinction is itself internal to information, part of its very being. The very being of information includes that it has two fundamental attributes that are irreducible to each other as much as they are not reducible to the information that they are internal to. That is, mind and extension are themselves different in kind.

While *qualia* are part of this mental dimension, to fully flesh out this idea we would have to discuss all purely mental phenomena. For instance, in dreams and imaginations one sees all sorts of things. One might be able to express mathematically the brain activity and/or the way in which one’s eyes move and react. But there will be some irreducible dimension of things (beyond the mere feeling of being in the dream) such as the receding of a space in a dream. But this will only be the irreducible inside of information. On the outside, one could speak to, for example, the irreducible flickering of the eye rubbing against the eyelid.
Another way Chalmers helps us to understand this distinction between the two fundamental attributes is that consciousness is how the first-person feels the world, whereas extension involves a third-person viewpoint on things. One might here then point out how the world of matter as extension Descartes revealed also reveals a world of volume and shape that also has properties not reducible to this geometrical expression and embodiment. For instance, bodies of different densities not only have different mechanical properties and in their very density express something that is not reducible to the geometrical information they are composed of. Here, we can explain the difference between the coffee mug and the doughnut despite their being identical from the perspective of geometrical information. It is from the perspective of mind and matter, physics and phenomenology, as the two irreducible attributers of the monistic created world of information, that they are perceived as different. Our hands touch these two items and it is the roundness of the doughnut that stands out. On the side of extension, the sheer cylindrical density of the coffee mug helps differentiate it from the doughnut.

Chalmers follows Saul Kripke in saying that (given the irreducibility of consciousness) “when God created the world, after ensuring that physical facts held, he had more work to do. He had to ensure that the facts about consciousness held” (Chalmers 1997, 124). I think we can now make sense of what this ‘extra work’ consisted. Since consciousness is not reducible to the physical, it would appear that it needs an extra act to bring it about. However, we can now clarify this remark that it is not just that God needed to do something more to create consciousness, but that consciousness is itself an internal attribute of a created world of information.
Let’s return to the example of my voice to further explain the fundamental ontological distinction we are introducing and the work it does. My voice can be expressed simply and is made up of information. For this reason, it can be recorded on a computer and replayed. Without this possibility of reducing my voice to the bits of the information, phone calls would not be possible. Just as writing, as a series of symbolic letters, can be reduced to bits, so auditory symbols such as phonemes can. My voice’s sound waves are themselves understood in their amplitude. But what cannot be embodied in information is my voice’s deepness that one hears. Chalmers helps us by discussing the quality of a ring: “I hear a ring. Nothing about the quality of the ring seems to correspond directly to any structure in the world, although I certainly know it originated with the speaker, and that is determined by a waveform. But why should that wave form, or even these neural firings, have given rise to a sound quality like that?” (Chalmers 1997, 7). The very shrill quality of a ring for instance is not something that is embodied in the ring itself as information, as waveform. That would be a phenomenal qualia that only consciousness perceives and forms the mental aspect of my voice. From the side of pure extension, the sound waves themselves of the voice lay themselves out. In the same way that a rusty fan grates on one, these sound waves undulate in their brute amplitudes.

Now it is interesting that the proper software for emulating voices has not yet been made. That is, while one can record a voice and reproduce it as such without any quality being lost, the technology for then having the recorded voice produce new sentences as the speaker would has not been perfected. In the recordings, one no more encounters a representation of voice or quasi-voice over the phone than one does in speaking ‘face-to-face’. A voice over the phone can
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command and have real effects in its telephonic presence. In addition, to say that it is ‘as if’ one were present assumes that voice at one location is fully present. But such an assumption is undercut by the very phenomenological fact that voice can be present elsewhere and not simply ‘here and now’. One may initially think that telephonic voice was a mere appearance that is made possible by some real or fully present voice, when telephonic voice is just as much voice as it is in a ‘face-to-face’ discussion. One has the very body of the speaker in another location.

Telephonic voice is not a representation of one’s voice—it is one’s voice as much as at any other time. One is disembodied without leaving one’s body and through one’s very body. While the virtual or telepresence might initially appear to name some ‘as if’ quality of phenomena, telephonic voice shows, once again, how the virtual is not ‘less real’, but rather exhibits a reality and actuality unto itself. One cannot as of yet have a computer invent new sentences that sound exactly like how one would speak of them. But this seems more so like a technical barrier that one day will be crossed, since the voice is in its very being information. While the sadness of a voice will still be something only consciousness is aware of, the voice itself will be able to be emulated one day.

That one’s voice is bits of information also keys us in on how the oneness of the voice is noted—that the voice one hears in person is the same voice as one heard on the phone. That experience is also part of the mental expression of information. The mental attribute of information notes how the voice repeats itself, not just insofar as the same waveform with the same structural relations is repeated, but insofar as consciousness is aware of a repeating qualia. Here, we can also think of Neo in the movie *The Matrix*. In that movie, all Neo experiences is a function of pure information. The whole world is composed of bits. But
Neo experiences people, spoons, jackets, sunglasses, etc. These objects may not refer always to the same set of bits, but it is consciousness that picks up on the mental expression of the information in order to see them as such.

We can also find another aspect of this mental attribute in terms of the type of object Lacan called objet a. One might say that one’s voice over the phone is a representation since it is translated into electrical pulses in order to be conveyed. But voice like any another phenomenon is fundamentally information in its being such that these electrical pulses are one’s voice. Now one’s voice and breath are thereby not simply the ‘living here and now’ of what is perceived, but the perceptible voice heard in relation to the electrical pulses or digitization of the voice that allows one just to see the inside and outside aspects of information, rather than being opposed to information as such (the relation between the analogical voice and the digital series which compose it). Also, one need not here speak of the apparatus as necessary, since it is the informational nature of voice already that makes the use of this apparatus possible. One does not need to speak of electrical pulses or digitization to understand the nature of voice and its disembodiment, since voice is separable from oneself due to a more fundamental, constitutive ‘digitization’—one’s subjection to the signifier or language, as much as all creation is subject to it via the tzimtzum.

The telephone is not the first instrument to separate the voice from the perceptible body of a person, rather speaking itself makes this constitutive of voice. While the telephone transported the voice and allowed it to be in more than one place, language itself makes of voice something separable from the body or presence. As Mladen Dolar argues in his fascinating essay “The Object Voice,” Saussurean linguistics and phonology (i.e., structural linguistics
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or Structuralism) instituted a new understanding of voice by questioning a naive or simply empirical understanding of voice and the relation between voice and meaning:

The Saussurean turn has obviously a lot to do with the voice. If we are to take seriously the negative nature of the linguistic sign, its purely differential and oppositional value then the voice—as the supposedly natural soil of speech, its seemingly positive substance, its firm substratum—has to be put into question. The voice has to be carefully discarded as the source of an imaginary blinding that has hitherto prevented linguistics from discovering the structural determinations that enable that tricky transubstantiation of voice into the linguistic sign. The voice is the impeding element that one has to be rid of in order to initiate a new science of language. (Dolar 1996, 7)

The focus on voice or sound as empirically heard blinded one to the structure that allows for meaning and the intelligibility of voice.

In this way, beyond the heard voice, one penetrates to something that does not appear and yet structures the meaning and appearing of voice and meaning:

Beyond the voice ‘with flesh and bones’ (as Jakobson will say; some decades later), there lies the fleshless and boneless entity defined purely by its function—the silent sound, the soundless voice. The new object demands a new science: high hopes are now vested in phonology instead of traditional phonetics. The question of how
the different sounds are produced is seen as obsolete; what counts are the differential oppositions of phonemes, their purely relational nature, there reduction to distinctive features. They are isolated by their ability to distinguish the units of signification, but in such a way that the specific signifying distinctions are irrelevant, their only importance being that they take place, not what they might be. The phonemes lack substance, they are completely reducible to form, according to one of the most famous of Saussure’s dictums, and they lack any signification on their own. They are just senseless quasi-algebraic elements in a formal matrix of combinations, and it is ultimately only to them that the Saussurean definition of sign fully applies (such will be Jakobson’s criticism of Saussure): they are the only stratum of language which is entirely made of purely negative quantities, their identity is ‘a pure alterity.’ They are the senseless atoms that in their combination ‘make sense.’ (Dolar 1996, 7-8)

The phoneme, as a purely relational notion, is the voice reduced to its basic elements. A phoneme is itself a purely differential element. In speaking, we hear the sound ‘b’, but not the phoneme b. Since the phoneme is the actual letter as information.

Derrida articulates this difference nicely in his Of Grammatology by way of differentiating between the “sound heard” and “the being-heard of the sound” (Derrida 1976, 63). The being-heard is purely structural and “radically dissimilar” to the sound heard (Derrida 1976, 63). The “sound appearing” [le son apparaissant] is then differentiated from “the
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structure of the appearing of the sound” [l’apparaitre du son] (Derrida 1976, 63). The “appearing sound” and the “appearing of the sound” must then be distinguished in order to make sense. Such a distinction neatly maps onto the mind/extension distinction (Derrida 1976, 64). The appearing sound is the one of consciousness, wherein one can hear that it is grating or mellifluous, while the appearing of the sound might refer to the sound as pure extension as sound waves bouncing off other things and spreading out. The two are distinguished and ontologically distinct, yet expressions of the same information. This “unheard difference between appearing and the appearance [l’apparaissant et l’apparaitre] . . . is the condition of all other differences of all other traces, and it is already a trace” (Derrida 1976, 65).

Now, the phoneme exists only as differential meaning in a mutual relationship to another phoneme, b/p. But such a relation is not simply negative in quality. It is not simply a question of saying ‘b’ is not ‘p’ and ‘p’ is not ‘b.’ This mutual determination allows for language and words to be differentiated (for instance, ‘back’ and ‘pack’). They are what allow human speech to be distinct from mere noise. They are what allow one’s own language to be intelligible while a foreign language appears as mere noise. These phonemes as purely relational entities are not substantial in and through themselves, but only ever found in their actualizations, in the enunciations of a language.

Here, sense arises from non-sense, from what is not in itself meaningful. In this manner, all the perceptible sounds of a language, of speaking, can be reduced to a set of differential relations. One can then map the sounds of speech by way of a table of differential relations. One can then map the sounds of speech by way of a table of differential relations. Voice is already digitized by way of phonemes. Speech is then seen as being intelligible by way of a set of differential relations, which also
accounts for how empirical variations (for instance, an accent) can arise without meaning changing (Dolar 1996, 8-9).

The empirical variations of voice make up a “surplus” that is added onto the purely signifying dimension of speech and voice (Dolar 1996, 8). The tangible voice is in its very being the structured language of which any speech act forms holds within itself (Dolar 1996, 9). Voice is a grid of differential relations. The real substance of voice, as signifying, is not the sounds heard which is in its qualia part of the mental attribute of information, but the structure itself. In this way, following Jacques Lacan’s second graph of desire, from his essay “Subversion of the Subject and the Dialectic of Desire” (E 306), Dolar attempts to show how given the reduction of voice to differential relations, voice now becomes an object, a partial object, a left-over (Dolar 1996, 9). What is left over after the mapping of voice in its intelligibility, its reduction to phonemes, what could not be reduced, is not some “positive feature,” but simply voice qua object as what remains after the mapping, the non-meaningful surplus (Dolar 1996, 9-10). Voice qua left-over is the “nonsignifying remainder” that resists intelligibility. It is that part of voice that exceeds the intelligibility of what is sounded and heard.

Voice qua remainder “has nothing to do with some irreducible individuality of the voice,” the personal aspects of voice, rather, if this left-over emerges by way of the differential relations, then this voice embodies an excessive presence (Dolar 1996, 10-11). The differential relation is not actual, not explicitly or empirically heard, so that the voice qua left-over embodies in an excessive manner the purely relational nature of the phoneme and thereby gives body to meaning as an excess: “So the voice seems to endow this empty and negative entity with a counterpart, its ‘missing half,’ so to speak, a
‘supplement’ that would enable this negative being to acquire some hold in positivity, a ‘substance,’ a relationship to presence” (Dolar 1996, 11). There is then a dimension of voice which exceeds its signifying aspect and remains irreducible to it. It can exist as an object, as a partial object in the specifically Lacanian sense—an objet a.

Such partial objects are representatives of a lost ontological plenitude and thereby consist in the presence of absence. They are a function of one’s own alienation in the signifier. Here, voice as the excess and embodiment of purely differential relations forms an embodiment of what is not actual and cannot strictly be. It is the embodiment of oneself as empty set. Voice is then detached as a partial object, as something heard in what is spoken beyond meaning, as an excessive presence. Once one speaks, one’s voice is part of language, speaks through language as it were, as if through a megaphone. One’s sounds are not intelligible because of oneself, but because of the virtual structure which informs them. This structure is trans-individual and located nowhere in particular. We speak through something else in order to be intelligible.

Now, as Dolar emphasizes, it is Derrida who made voice the fundamental object of philosophical inquiry, insofar as he showed that ‘hearing-oneself-speak’ formed the basic ‘experience’ from which all ideal notions emerge (Dolar 1996, 12). Voice, from a Derridean perspective, is the source of the illusion of full presence and ontological plenitude. It founds the philosophy of pure ideality. However, voice qua object, a voice not simply that of full presence, but of an excessive presence, escapes intelligibility (Dolar 1996, 15). This very excessive remainder voice also disrupts any notions of presence by embodying an irreducible non-signifying dimension, by presenting
voice as surplus object. Voice qua object is the flip-side of the critique of voice qua full self-presence.

Dolar, like Derrida, wishes to show how full ontological plenitude is not found in voice. But for Derrida, in his analysis of Husserl’s theory of meaning in *Speech and Phenomena* (better translated as *Voice and Phenomena*), it is not simply that ‘hearing-oneself-speak’ founds the idea of self-presence; it also founds the idea of disembodiment, a soul, something non-material. In ‘hearing-oneself-speak’, in interior monologue, one seemingly establishes an other-worldly dimension: “The phenomenological voice would be this spiritual flesh that continues to speak and be present to itself—to hear itself—in the absence of the world” (SP 16). Without the world, the voice of interior monologue hears itself and exists. It creates a purely solipsistic space. For Husserl, the voice of interior monologue does not require signs or marks since “it is immediately present to itself” (SP 43). One does not communicate with oneself since this would imply one is divided from oneself and not fully present to oneself (SP 48). Such a position would seem to contradict the basic transparency constitutive of the *cogito*. Hearing-oneself-speak is consciousness and marks the minimal condition for consciousness.

That ‘hearing-oneself-speak’ does seem to erect a purely auto-affecting full presence to self follows from the fact that the signs one uses seem “to fade away the very moment it is produced” and seem already to be idealized (SP 77). The sign, the signifier, effaces itself at the moment it is enunciated in interior monologue. The sign one uses to communicate immediately seems to become something non-worldly as the “opacity of its body” is transformed “into pure diaphaneity”: “When I speak, it belongs to the phenomenological essence of this operation that I hear myself [je m’entende] at the same time that I speak. The signifier is animated by my breath and by the meaning-
intention” (SP 77). Hearing-oneself-speak means that one speaks and hears simultaneously, such that the sign and its ideal meaning coincide in order to make it appear that one does not even use signs or that one merely auto-affects oneself and is fully present to oneself. One hears oneself seemingly instantly, at once, without any mediation, obstacle, or interruption.

When one sees oneself, one has to pass through something exterior to oneself (a mirror, water, any reflecting surface, etc.), but when one hears oneself speak there seems to be nothing exterior or alien separating the self from itself (SP 78-80). One apparently purely affects oneself through oneself. One does not have to expose oneself to the world or to experience oneself as part of the world. Also, when one writes or makes a sign with one’s hands or face, one once again does not seemingly have the pure immediacy of hearing oneself speak: “The signifier would become perfectly diaphanous due to the absolute proximity to the signified. This proximity is broken when, instead of hearing myself speak, I see myself write or gesture” (SP 80). The bodies of the signifiers used seem to efface themselves in their very enunciation with hearing oneself.

This seeming immediate presence gives rise to, and is the source of, the illusion of disembodiment, the idea that one could be a disembodied mind, a pure consciousness, a soul without a body. In hearing oneself speak, in auto-affecting oneself, one seemingly has no worldly body, but only “a spiritual flesh” due to the self-effacement of the signifiers or any mediation involved (SP 81). But, of course, there is always iterability. Any sign one uses even in interior monologue is constitutively iterable, such that the meaning and ideality of those signs is constituted by a fundamental repetition which allows for them to be trans-individual, occur in multiple contexts, and never to achieve full ontological presence. In this way,
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hearing oneself speak gives rise to the illusion of full self-presence and disembodiment because it is an immediate, spontaneous disavowal of iterability. Even in hearing oneself speak, one must use signs subject to iterability in order to be intelligible. One is never fully self-present, since the signifier one uses is iterable and thereby trans-individual and intelligible in one’s absence. One relates to oneself then by way of something exterior to oneself. One is always already mediated.

The possibility of disappearance and absence inherent in the meaning of signs means that hearing oneself speak is founded on absence and not full presence. Hearing-oneself-speak is then the origin of the illusion of being disembodied or being able to be disembodied, but this illusion is always undermined by what makes it possible—the iterability of the signs involved. One could say that with the telephone what makes voice disembodied is precisely what makes it fully embodied—iterability. Iterability gives rise to the illusion of disembodiment and perhaps to the only type of disembodiment we know here and now. The belief in any other form was premised on a ‘hearing-oneself-speak’.

Although the Internet and other computer-mediated phenomena have given rise to the belief in potential disembodiment, what makes this belief possible also shows how there will always be a body involved. One cannot exist purely disembodied as digitized any more than one can by hearing-oneself-speak. Perhaps this is why hearing-oneself-speak on a sound recording device is so disturbing and one always misrecognizes one’s voice (‘is that how I sound?’). We would not even recognize ourselves as disembodied because disembodiment is in part predicated on the illusion of a lack of otherness within the self. It is then voice as information that shows the soul itself is pure information and that mind is an internal
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irreducible attribute of information. Also, we can say that mind here is an expression of our being subjected to the signifier.

Badiou only uses the concept mind in one section when discussing the empty set:

The set of subsets of the void is the set to which everything *included* in the void *belongs*. But only the void is included in the void . . . Therefore, \( p(0) \), set of subsets of the void, is that multiple to which the void, and the void alone, belongs. Mind! The set to which the void alone belongs cannot be the void itself, because *nothing* belongs to the void, not even the void itself. It would already be excessive for the void to have an element. One could object: but given that this element is void there is no problem. (*BE* 88)

In this way, mind is another way of stating that the empty set includes itself. Mind is an expression of the mind’s self-belonging. This is then another reason why mind appears as a function of information. It is not simply by hearing oneself speak that mind is founded, but mind itself is a function of information. This is why mind finds itself confronted not just by qualia but also *objects* *a*, like voice, that fill out the subject. Thus, even though we need to see consciousness as being an attribute of information, that does not mean we need to think of consciousness as itself a plenitude.

Jacques Lacan’s conception of the subject proves to be a powerful corrective to this position (of consciousness as plenitude). The difference between the subject of the enunciation and the subject of the enunciated is rendered by Lacan by way of a re-reading of the well-known liar’s paradox. The subject
alienated into language, and thereby the subject of the unconscious (since the unconscious arises from one being subjected to language), is fundamentally and ineradicably divided. Subjected to the signifier, subjected to language, the subject is subject to the unconscious, is a decentered and split subject, a subject divided against itself, precisely because the subject is alienated in language. This split is brought out by distinguishing between the subject of the enunciation, the act of enunciating, and subject of the enunciated, the content of what is stated. This differentiation is brought out by the ancient paradox of ‘I am lying’, which after this differentiation is no longer seen as self-contradictory, but actually can be seen to be a true statement (as common sense has always understood it being able to be).

For Lacan, one can distinguish between “the level of the enunciation,” the place from which one speaks, the ‘I’ as shifter that refers only to the act of speaking, to the act of enunciating, and “the level of the statement,” the content of what is spoken, its meaning (FF 138). While previously a statement like ‘I am lying’ seemed paradoxical because the content was true and yet asserted a falsity, by distinguishing between enunciation and enunciated one can see how the ‘I’ “of the enunciation is not the same as” that “of the statement” (FF 139). Only a “shifter” designates the ‘I’ who is lying, so that it merely designates the act of speaking while the content of the statement ‘am lying’ is determined transindividually as part of the lexicon of meaning (FF 139). The very act of enunciation is differentiable from the content and meaning of the statement ‘I am lying’. Even the ‘I’ of the statement, the shifter which designates the subject of the content as whoever is speaking, is different from the very act and place from which the statement is issued. While the one who utters the statement is designated by the shifter, the very act of enunciating
the statement is differentiated from what the statement contains, just as a set can be distinguished from the members of the set.

This is particularly apt to an enunciation, since the meaning of the content is not determined by the act of uttering, but objectively \((FF\ 139-40)\). The distinguishing of these two levels shows how the act of enunciation does not determine the meaning of the statement and the ‘I’ of the statement is part of the content determined objectively. Instead of seeing the subject as identical with what it states, the content of the statement, the division between the two levels shows the subject as split. The Lacanian subject, the subject subjected to the signifier, alienated into language and the subject of the unconscious (the speaking subject), is not identifiable with either level, but rather “the subject is nothing but this very split” (Fink 1995, 45). The subject is neither the ‘I’, the shifter, nor simply the act of enunciation (Fink 1995, 37). The subject does not appear in the content of what is uttered since the content is given meaning by being part of the stock of syllables and is not the act of stating. Instead, the content takes the place of the subject and represents the subject objectively.

It is in this way that one can understand the Lacanian thesis: ‘the signifier represents the subject for another signifier’. The subject does not appear in and is not identifiable strictly with the content of what is said, but rather is represented and given meaning by something objective. One is always already caught in a self-referential medium wherein one only appears without appearing. All appearing is governed by the non-given subject. The fact that the subject is not identifiable with either the act of enunciation or the content does not mean, however, that the Lacanian subject, the speaking subject, is “some kind of underlying substance or substratum” (Fink 1995, 41). The subject is the division between the two levels and
“has no other being than as a breach in discourse” (Fink 1995, 41). The content is the stand-in for the subject which does not appear in what is said. In this way, one does not take on new identities in chat, but rather, believing one does is a way of disavowing the fundamental void of subjectivity, that the subject is the split in discourse.

One disappears from one’s speech. Voice as objet a then appears to fill in the space one disappeared from as pure mind. The Lacanian notions of alienation and separation articulate even more precisely what Lacan means by the subject as split or decentered, the subject as barred, $, and how this relates to fantasy formation.29 With the notion of the “lamella,” Lacanian theory articulates how one is finite and lacking merely from the fact that one must reproduce sexually (FF 197). Instead of being an ‘immortal’ and indestructible life, as an amoeba would be, this immortality is “subtracted” from one by having to reproduce in a sexual way (FF 197). While the objets a are the representatives of this immortal life substance, this full, ontological plenitude, it is also the case that it is in this way that the subject can be understood as lacking. The objets a are the representatives of this ontological plenitude that one ‘loses’, losing paradoxically what one never had, that incite desire, since desire is partly understood as orientated around

29 The Lacanian terms ‘alienation’ and ‘separation’ can be understood as Lacan’s rendition of the ‘Oedipus-complex.’ But instead of giving a genetic and historical account of subjectivization as Freud does, Lacan here gives a structural (and to some extent transcendental) account. Instead of positing a confrontation with the father or external authority, an act of renunciation, or act of internalization, Lacan renders renunciation as always already the case (as a consequence of finitude). In this way, Lacan’s account will appropriate the Freudian account by giving a transcendental account of what Freud renders in genetico-historical terms.
a desire for plenitude. However, since the subjective is constitutively split, desire is a desire for what one never had. And since this ontological plenitude is also understandable as das Ding (since it is characterized in a homologous way as that which one constitutively ‘loses’, as being the always already lost full ontological plenitude), the objets a hold out the promise of jouissance as the enjoyment of full ontological plenitude.

The subject is represented only in what it articulates, in the chain of its content, in the chain of signifiers. This chain is what can be made present of the subject since the subject is neither the act of enunciation nor the enunciated content, but rather the split between them, the absent cause. Language precedes the subject and the subject is represented through it. The organism can only arise as subject and become subject by being represented in the chain of signifiers (FF 203). One emerges into a world in which there is already speech and writing, in which one already has a place and has already been understood. One becomes subject thereby by being caught up in the discourse that precedes one. Since the subject does not appear in the chain of signifiers in either speech or writing or any other form a chain of signifiers can take, the subject is not reducible to this chain or even to the act of articulating it. Instead it is the split between these two levels.

But in being caught up or alienated in language, “two lacks overlap” (FF 204). The real lack of the subject as sexually reproducing, the constitutive ‘loss’ of what one never had, and the lack instituted by becoming a speaking subject or in general subjected to language as a chain of signifiers:

The first emerges from the central defect around which the dialectic of the advent of the subject to his own being in the relation to
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the Other turns—by the fact that the subject depends on the signifier and that the signifier is first of all in the field of the Other. This lack takes up the other lack, which is the real, earlier lack, to be situated at the advent of the living being, that is to say, at sexed reproduction. The real lack is what the living being loses, that part of himself qua living being, in reproducing himself through the way of sex. This lack is real because it relates to something real, namely, that the living being, by being subject to sex, has fallen under the blow of individual death. (FF 204-5)

What Lacan calls “the Other” with a capital ‘O’ here means and represents the objective status of language and the fact that language precedes the subject as already being constituted and having objective meaning. “The Other” is the word-stock of language that has an objective status and meaning outside of the subject. The establishment of the subject begins with the subject being caught up in the field of the Other.

The Other is the set of signifiers structured in an oppositional and synchronic manner that precedes the subject and has an objective status. The Other as this set is also not completely external to the subject, but rather estimate, since the subject is caught up in it and internalizes language (although the Other still has its objective status). The constitution of the subject thereby arises when one is caught up in the field of the Other in an estimate way. Neither subject nor Other can be reduced to each other, but they are extimately related. The very chain of signifiers that represent the subject is in the field of the Other, and in this way the subject is represented “in an other place” [ein andere Schauplatz].
But while the signifier resides in the field of the Other, this other place is internalized into the subject and thereby both internal and external. In this way, the subject as caught up in the field of the Other and represented therein is the subject of the unconscious, since for Lacan ‘the unconscious is the discourse of the Other.’ To be the subject of the unconscious is to be subjected to the Other, the entire set of signifiers. To say that ‘the unconscious is the discourse of the Other’ is another way of saying that ‘the unconscious is structured like language’ since the Other is the entire set of signifiers structured in a way homologously to a Structuralist (Saussurean and Jakob-sonian) understanding of language.

Since each signifier is differentially opposed to all the others, it positively emerges from absence, and each signifier’s self-identity and positivity rests on its being articulated to its place. However, this implies a difference between each signifier and its place. The absent place that precedes each signifier and each signifier fills in is constituted by the subject. The subject is the name for this absence. It is the absent cause responsible for allowing a chain of signifiers to be articulated. It is the absent place that allows for one signifier to arise after another. As the absent place, it causes the chain to slide from signifier to signifier. Here, this absent cause structures what appears, one’s discourse, by not being able to appear. The absent cause is mind.

The signifier can be separated from its place for the same reason one can distinguish between a set and its members. The subject is neither the set of signifiers nor its members, but the very difference between the two. As the absent cause of a chain of signifiers, it is the lack between the two and the lack that allows a signifier to emerge in its place. The subject is thereby
the empty set. In other words, “the zero is the presence of the subject” (FF 226). And it is the subject as zero that allows a series of numbers to be articulated since “the series of numbers can only be figured by introducing the zero, in a more or less masked way” (FF 226). It is neither the set nor the members of the set but the difference between the two, just as it is the very split between the level of enunciation and enunciated.

In this way, the subject itself is the void place as zero. We are made in the image of the Name of God. It allows for one signifier to be articulated after another, just as the zero for Frege was the concept non-identical to itself that allowed for the series of numbers to be articulated and for counting one after the other to occur. The subject as empty set is the absent cause, the lack, that causes and allows for one signifier to be articulated after another. It is the lack that clears the space in which a signifier can emerge, the space to which a signifier can come. The subject is thereby the very spacing that allows for one signifier to be articulated after another. However, as this lack, the subject is non-identical to itself. This non-identity is of course the subject as desiring, the subject as split and divided, the subject as subject of the unconscious. It is this desire that animates and causes the chain of signifiers to slide. The signifiers stand in for the subject as constitutively absent and represent the subject while the subject as lack allows for the spacing

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30 See Jacques-Alain Miller, “Suture” (1977/1978), for a detailed reading of the subject as empty set and its relation to the chain signifier. This essay gives the fundamental logic of what I am spelling out here as the lack initiated by the subject as speaking subject.
in which the signifier can emerge and fill in and retain its identity.

It is in this way, as subject of language, that the subject lacks and ‘is’ this lack since it is the subject as divided, as being finite and split, and it is desiring that allows it to be this absent cause. This lack transfigures the real lack. The two lacks thereby overlap. The subject has the real lack as having lost something and thereby being divided, and this real lack allows the subject as empty set to absently cause one signifier to be articulated after another. These two lacks fold over each other, but it is the lack that emerges due to one being caught up in language that organizes and configures the real lack. This logically prior, but really second, lack assumes the real lack as the desire that absently causes the chain to slide. In this way, the real lack will have been assumed by the subject as lack in the Other (but the real lack is always heterogeneous to the Other, to the symbolic).

The speaking subject thereby assumes the real lack: *Wo Es war, soll Ich werden*. The subject’s very being is reconstituted and reconfigured by being caught up in language and speaking. By speaking, one becomes where the real lack was. One emerges as speaking subject from the very locus of one’s being and assumes it. One’s being as really constituted is thereby assumed in the act of speaking.

The subject is thereby either meaning, the objecttive meaning its stand-ins have, or existence, the want-to-be of desire. The subject, although it is the split between the two levels, is broken up and halved into these two levels. The subject of enunciation and the subject of the enunciated content are therefore the two halves of the subject. One half is being (or really desire as non-being, as existence) and the other meaning, thinking as chain of signifiers (or really being, being as essence, as what one is, as opposed to that one is). Alienation is this either/or of being, desire
as ‘want-to-be’, or meaning (FF 211). The subject as being, as really lacking, is only the absent cause of the chain of signifiers and only ever appears there in its stand-ins; it is heterogeneous and cannot appear in the field of the Other. In this way, it either has being as the absent cause of the sliding of the chain or ‘is’ the meaning that it becomes in the field of the Other. This either/or is then an either/or between meaning (being as essence) and being (being as ‘want-to-be’, existence).

Becoming a subject is thereby the same as this forced choice. In becoming subject, in speaking, one chooses meaning, but meaning deprived of being. If one chooses full ontological plenitude and refuses finitude, refuses to speak and have one’s meaning articulated in the field of the Other, one gets neither meaning nor being. One can either become social or anti-social, autistic. There is thereby an imperative that obligates one to make a certain choice here: to speak, to assume one’s finitude, to give up on ontological plenitude by articulating one’s desire for the impossible in and through signifiers.

One answers this question by choosing what one is for others, what one is in the field of the Other, what one is. This choice stops the sliding of desire from signifier to signifier by choosing one signifier that ultimately represents one. One says implicitly ‘I am this’, ‘I am this for others’. One answers for what is lacking in the field of the Other and oneself, the place where the two lacks overlap, by offering an answer to this question. One constructs oneself and a substitute form of enjoyment.

Such a construction gives one the formula of fantasy: $a (FF 209). The “little losange” signifies the joining of the split subject to an objet a (FF 209). It signifies the split subject joined to a by way of alienation and separation (the lower half being the ‘v’ of the vel of alienation and the top signifying
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separation) (FF 209). Alienation constitutes the subject as split and lacking, while separation fills out this lack by stuffing it up (E 314). The objet a is this stuffing.\(^{31}\) One answers the lack in the field of the Other and the lack in the real (the subject being both these lacks both in the symbolic and real senses) by choosing a as a substitute form of enjoyment and choosing a chain of signifiers, one’s symptom as a set of signifiers defining what one is.

Since the objets a are the representatives and equivalents of das Ding, the constitutively lost nature of the thing of jouissance, of ontological plenitude, causes one to answer the constant sliding of desire by filling in the lack in the set of signifiers, the lack where what is constitutively lost is felt as absent. One thereby chooses how one will enjoy in lieu of full ontological plenitude. But fantasy attempts to cover over alienation by giving the subject a substitute form of enjoyment. This fantasy is organized around one of the objets a in such a way as it organizes the way one enjoys and desires. The sliding of desire through signifiers is thereby arrested by constructing a substitute form of enjoyment.

This fantasy is not simply one of the many daydreams one has, but the underlying fantasy that organizes all fantasies and desires. It signals the way in which one has responded to the question ‘what am I?’ by answering for the constitutive lack in the field of the set of signifiers. In this way, it cannot be a signifier, but instead a representative of the thing of jouissance. Fantasy thereby covers over the subject as

\(^{31}\) Deleuze has already hinted at how Lacan’s partial objects can be seen as “shreds of pure past” and thereby constitute virtual objects (DR 101-5). For a discussion of Deleuze on Lacanian partial objects, see Dorothea Olkowski’s Gilles Deleuze and the Ruin of Representation (1999), 152-62.
lack, as desire, by giving the subject as lack, as ‘want-to-be’ being.

In answering the question ‘what am I?’, the basic answer for Lacan reads as follows: “I am the place from which a voice is heard clamouring ‘the universe is a defect in the purity of Non-Being’” (E 317). Fantasy and the symptom thereby give one the being that one constitutively loses as a speaking being. One’s very Dasein is within this phantasy and symptom, for it is here that one stops the sliding of desire and offers an answer to lack, to ‘want-to-be’. Fantasy then is a fundamental part of consciousness and one expressed internally by the monism of information characterizing the world as much as consciousness is also involved with qualia.\(^{32}\)

There is one more role consciousness will have to play here, one that may be surprising to attribute to it given our realism. Quantum physics is infamous for suggesting that all things are in superposition until consciousness arises and perceives things, thereby disentangling what is into distinct states. This implies that “before consciousness evolved,” one cannot say the universe existed as such (Chalmers 1997, 340). The creation of consciousness itself caused a collapse of the universal wave function and the superposition to end. The universe thus comes into being as it were when consciousness does. As Chalmers notes, this view seems “incompatible with the view” that sees consciousness as a fundamental attributer to information itself, and Chalmers himself rejects the idea that consciousness brings about a collapse of the

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\(^{32}\) Some here might ask why a qualia is itself not information. But recall that we are using information in the syntactic and not semiotic sense. Qualia might be information as signs, but that sense we have maintained all along is derivative and in this case an irreducible dimension based on the syntactic.
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wave function (Chalmers 1997, 340). Chalmers rather prefers Everett’s many-worlds interpretations of quantum physics insofar as the superposition would affect mind as much as anything else: the “brain of a person” “itself being a superposition” as much as anything else (Chalmers 1997, 346). For Everett, it is not that consciousness collapses the wave function of Schrödinger’s cat such that it is due to consciousness that we see the cat as alive rather than dead. Instead, one mind experiences a live cat, another a dead one, etc. Each time the wave function is collapsed and superposition ends, a new world is created with a new experience. Superposed states are then parts of one world that divides itself for Chalmers. The world just splits infinitely into many different worlds with different minds. A new mind is made with each splitting (Chalmers 1997, 347). There are then an endless number of distinct experiencing consciousnesses. We then have in even a short period of time “a large number of minds that have an equal claim to count as me” (Chalmers 1997, 356).

But I think that Chalmers is wrong. Mind is not the brain, as he himself has shown. In this way, while brain is entangled with the rest of the world, there is no reason to say mind is as well. Only mind as a non-physical system can collapse a wave function. Only a consciousness that involves something not comprehended by physics from the mental side can collapse a wave function. The physical side does not do it. The objects we encounter are not therefore where we found them. Our apprehending them causes them, as it were, to be there. Mind itself, once God allows it to arise in the image of his divine name, reveals the very structure of the universe whether it be the tzimtzum or shvirah. It is only after mind as self-referential, as itself related to the empty set arises, that one can discover the realism of creation itself. The mind before this self-referential mind was only
capable of seeing qualia. But self-referential mind created in the image of God, insofar as it is withdrawn and in the image of the divine name insofar as it relates to the empty set, enacts consciousness both as related to *objets a* and to a collapsing of the superposition of the world and reveals its creation by God.

§25. **Is Stephen Wolfram's New Kind of Science a Science of Kabbalistic Creation?**

This creation by God might seem however to exclude one key aspect of mind and consciousness—free will. This impression might arise due to our contention that reality itself arises out of and as an elaboration of the holy name. In order to demonstrate that we also want to maintain that at least for humans there exists free will, we will have to differentiate our view from that of Stephen Wolfram, who offers a fully deterministic view of the universe as a computer. Wolfram articulates his views in his lengthy, but brilliant treatise *A New Kind of Science*. It is surprising that, given Wolfram's radical new theses concerning the nature of space, time, and reality itself, his work has not been given more attention by philosophers. This may be due to the fact that Wolfram's work builds on previous insights by William Fredkin on the universe as computer, John von Neumann on cellular automata, Alan Turing, and others. However, despite Wolfram's work presupposing the work of others (and Wolfram's often surprising lack of acknowledgement of this fact), Wolfram lays out more so than any other figure before him some of the fundamental principles of the idea that the universe itself is a computer.

The universe on this view runs and is in its very reality a computer program that generates all the reality we know as it computes itself and iterates its basic instructions. Wolfram refers to the most basic
type of computer program (although not too basic to illustrate the key principles of any program)—cellular automata. Many will recall John Conway’s “Game of Life,” wherein each game evolves from its initial starting point. This starting point is simply a series of grids and instructions on how to fill in one line of those grids. The program then repeats itself over and over again and iterates the instruction in order to fill line after line of grids. In doing so, this game produces patterns that most of the times reveal larger patterns. Ladyman and Ross note that this game allows one to see how objects emerge out of more basic patterns, as one sees

‘gliders’, ‘eaters’, ‘spaceships’, etc. that have only virtual persistence (That is, two successive instances of ‘the same’ glider share only structure, and common participation in structures larger than themselves. A glider is clearly mereologically composed of a smaller number of illuminated cells. However, its successive instances are composed of different cells, and successive instances a few steps apart have no cells in common). (Ladyman and Ross, 2009)

Anyone using this game then sees objects in the same way we see trees, coffee mugs, buildings, etc. except the game helps one to see how these objects are the results of patterns and made up of them. It is part of the mental dimension of information that we can recognize such objects. These isolated objects can be treated as sets. But they will always be patterns inside of patterns just as our individual genetic code is a pattern inside a larger pattern of physical patterns (and these patterns also of course can be divided all the way to bits/differentials). It is then not objects or things that persist over time or underlie appearances
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that are primary, but the patterns that give rise to them.

One of the new things Wolfram discovered was that if one allows such cellular automata to run endlessly (and only at a certain point did computers become computationally powerful to enable this to arise), one sees that they lead to random patterns. That is, while most cellular automata even after a very large number of iterations show only a repetition of the same patterns (even if such patterns show nesting of the same patterns within such as in fractals), Wolfram discovered that the thirtieth program he ran (what he refers repeatedly to as ‘Rule 30’ throughout his text) displayed at a certain point purely random patterns and repetitions. Rule 30 did so despite consisting of iterations of the same basic set of rules for filling in grids like any other cellular automata this. Wolfram’s lengthy text is ultimately his attempt to spell out the implications of what occurs when one accepts that Rule 30 truly does at one point show us randomness.

First, such programs can help us explain the complexity and randomness we witness in the universe itself. It is by repeating a very simple rule that a perhaps infinite amount of complexity arises from pure relations alone. One does not need the complicated to achieve complexity. Everything from the formation of snowflakes to the patterns on mollusk shells can be seen as themselves evolving out of a simple set of repeating rules. Except, since these things like all others are made of information, the pattern here is the repetition of how water molecules freeze in relation to each other rather than how grids are filled in. In this way, the very structuration of the world is patterning. There is no substrate here. Even an atom like that of carbon is a configuration of bits that enable it to appear and function as it does. The very laws of nature are algorithms that produce and compute physical systems rather than independent
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Platonic forms that things exemplify or incarnate. It is not that things embody some higher order, but rather that physical systems are themselves processing and computing in the same way a computer program does.

Some have criticized Wolfram, claiming that when he uses cellular automata to show how snowflakes are generated by simple rules governing how water molecules freeze, or are lost around a seed, that his program only uses a few hundred cells when billions of molecules are involved in reality (Weinberg 2002). However, this critique overlooks ‘the principle of computational equivalence’ (NKS 715-26). Just because nature develops the snowflakes out of billions of molecules patterning with each other does not mean that, given the same rules, it can be shown using a simpler program. In this way, in the program, Wolfram does not have to say each cell refers to a specific water molecule. The issue is how and why computation gives rise in simple rules to such complex patterns. Regular arrays can themselves simply repeat like fractals such that billions and billions of steps can be involved and at each level repeated. One would only need a few steps to show this. The rule here is how water molecules freeze forming a piece of ice added to this snowflake or how heat is released in that process disallowing other ice particles to form alongside it (NKS 370). In this way, the key is capturing the simple rule for the patterning of how this freezing along with heat-release works. The rule itself may be shown in a few steps even if

33 The criticisms I am articulating here of Wolfram are best articulated in the only two real attempts prior to this text to engage philosophically with Wolfram (and I rely here on what is said in these two texts): David Naiditch, “Divine Secrets of the Ya-Ya Universe” (2003) and Ben Carter, “God in Stephen Wolfram’s Science” (2003).
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billions of small pieces of ice are formed on an actual snowflake.

While these criticisms raise important points, they overlook some key points that a metaphysics based on Wolfram’s new kind of science will entail (and Wolfram is for us what Galileo and Newton were for a previous metaphysical conjuncture). These two issues relate to the rules of which Wolfram speaks. First, while Wolfram has shown us how simple rules can in their iterations give rise to maximal complexity and randomness, he has not shown how the iteration of rules can give rise to new rules. That is, if Wolfram’s vision is to be taken as comprehensive, it seems to me that the simple rules at the heart of the universe (what we call the Name of God) would not only have to give rise to everything that is, but in doing so give rise to new rules. Since our world is complex and exhibits randomness, it is not just a fractal—a nested repetition of the same. The only model Wolfram gives that is not even implicitly a deterministic running of one permanent set of rules is sexual reproduction, where change is produced through a mixing of programs rather than just random mutations (NKS 386). In this way, when we see things like trees or planets, we are not just seeing a fractal repetition of the simple program. But trees and planets would seemingly have different programs involved in them were we to simulate them at some level. In this way, rules must also be able to give rise to subsets with new rules. I say this occurs because the Name of God in its iterations is itself a writing of God. We can think here of the trace of God already delineated. This trace itself is already more complicated than single bit. even if it can in and of itself be treated as such.

This problem overlaps with the second one. Where do these rules come from originally? As already noted in an endnote, we are arguing that such rules must be immanent and implied in the letters,
numbers, and bits through which God creates. That is, what we have is a string of letters that repeats. But in such a string, we have rules. And in the repetition new rules can arise based on how those strings are divided and segregated from each other. God allows for the permutation and combination of the letters.

Wolfram may already be at work on these issues in his latest research. But one way these issues will find confirmation and expression is in our own understanding of how human language arises in its complexity. Freud believed the kernel of our entanglement with the signifier was found in the fort/da relationship famously described in his ‘Beyond the Pleasure Principle’ essay. What this relationship implied was that all the complexities of language including its many grammatical rules begin with a simple oppositional relationship. If we can understand how language arises in children, then we will better understand how the program computing the universe itself works. This claim might shock some (that we will understand the universe itself by understanding linguistic development), but if we accept the principle of computational equivalence, then systems like human language can achieve the same complexity (NKS 845). The mind itself, like any other sufficiently complex system, is a microcosmos of the universe, not in the sense that it necessarily must reflect the universe (be a fractal nested pattern) (NKS 1196), but in the sense that it achieves a universe in and of itself while being part of the overall program.

In any event, it is our contention that one cannot go back beyond the holy Name of God such that in it already one must have a complicated enough set of rules to give rise to things. While Wolfram’s own work makes it appears that rules are simply primitives beyond which we cannot go, we are arguing that rules themselves are part and parcel of the universe being determined by bits (letters/numbers). Take the very
simple rule ‘If x, then y’. It must already presuppose the elements upon which the rule works. Wolfram does not engage with this issue as we have.

Now Wolfram, like Fredkin before him, thinks that one eventually will be able to find one single rule that explains the behavior of all processes, mental, physical, or otherwise, that are elaborated in this world. We of course agree and have already named this rule and principle the holy Name of God. This ultimate program would be something simple (not more computationally complex than a cellular automata) and not some overly elaborate and unanalyzable construct. The information processing that this one rule allows for elaborates everything knowable about existence itself.

A problem does arise with this view. We can only know we have the right rule by allowing it to run, in order to see that it truly gives rise to the processes that inform our world. For Wolfram, in fact, we cannot know ahead of time what the rule or program will produce. He calls this throughout his text the principle of ‘computational irreducibility’ (NKS 737-50). Wolfram could not have known before running endless iterations of Rule 30 on a computer that it would end up becoming random, rather than simply repeating the same overall pattern as so many other programs did before. Likewise, we can only know what will happen in the universe by allowing the program to enable itself. As we earlier mentioned, the view that all is information means that we need a computer the size of the universe to emulate it. And here we see also that we would need a program that would run through as many iterations as have been

34 Another way of formulating this thesis will be in relationship to the fundamental ontological thesis that Wolfram has introduced to us: “All is computation” (NKS 1125).
undergone in the universe to understand all its processes and that would run as long as the world will last to know anything about what would happen in the future. But given the billions of years our world has been developing, it is not clear we could humanly see a computation of all the steps needed to reveal such things. We would certainly need a computer that processes itself much faster than the universe itself does.

In any event, even if we did not lack the time, we cannot predict what the ultimate outcome of things is. But that does not mean we cannot get an idea that we have isolated the right program. Even the very large number of iterations current computers can do would show us how the early universe originated, even if the program would never reach a point simultaneous with us. But despite this lack of foreknowledge, Wolfram’s view is still deterministic, insofar as all is just a matter of iterations of the fundamental rule.

Another implication of Wolfram’s view is that history also is irreducible. Given that to know how things are we have to allow a computation of the very program itself, things have to go through the very historical process they did and how things are today is a direct result of that history. For example, even something as seemingly universal and abstract as mathematics, Wolfram argues, is the result of how mathematics was idiosyncratically conducted in ancient Babylon. In this way, even though, axiomatically, we could invent many ways to do mathematics, the actual way we do it is a cultural outcome of historical evolution.

Yet another implication of Rule 30 is what Wolfram calls the principle of ‘computational equivalence’. This principle allows us to say that any computer is capable of illustrating for us how the complexity of the world arose. It shows us why even the computers we have can simulate and emulate at
least some of the key ideas and processes involved here, even if we may not have a computer able to generate the entire universe itself as it was up to now. However, all systems depend on the same simple rules, so that any one system (even one like ‘The Game of Life’) can produce the same complexity as any other.

Wolfram has been taken to task for arguing that the models he illustrates via the use of programs like cellular automata do not have to operate exactly like physical processes—even the very processes he claims to be explaining. But there are many ways that such processes might work. All Wolfram needs to do is show how an equivalent process can unfold. It may be easier to use a simpler program that does the work more efficiently than the natural process does but allows one to see the same results. Wolfram also has been taken to task since these rules seemingly cannot be verified. If he were to offer an equation explaining phenomena, one could then see if this equation does predict and explain how a process works. But if his programs can do the equivalent work as the natural processes, then he has thereby verified that he has explained how the phenomenon works in principle. We take Wolfram to be putting forth a philosophical view at this point rather than actually always laying out the specific mechanism involved in a particular phenomenon.

In any event, Wolfram needs the ultimate rule of the universe itself to explain all. For this reason, he is mostly attempting to prove that such a rule could exist rather than trying to find the specific and actual rule used in the case of all phenomenon such as for snowflakes. From a scientific point of view, at this stage the computer programs Wolfram presents need to be able to reproduce the behavior of a system. Having such a presentation means one can study the system itself and even see how it will develop. The
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shapes on mollusk shells do follow simple rules, even if we do not exactly know how physically the pigment is secreted at one point and not at another. The tissue of the mollusk cell grows step-by-step unraveling itself. Wolfram’s own presentation of how a computer program can simulate it proves the most basic ontological point: that the phenomenon is at its basis an act of computation.

This view also indicates that the laws of physics will show the same complexity as what our own minds show, such that even divine intelligence “permeates the universe” (NKS 1192). Because even the most basic and low scale phenomena are produced by the same rule, there can be just as much complexity when it comes to how molecules are arranged as with how human thoughts are. But what is more important here is that Wolfram sees the divine, as we do, as arising not in the designed sophistication of the human body for instance, but in the irreducible basic relations of patterns (NKS 838).

Now, Wolfram is not a theist. In fact, his model is so deterministic it allegedly eliminates “miracles or divine intervention” that are incompatible with the laws of things (NKS 1025). However, insofar as Wolfram argues that things are irreducible, he cannot preclude, as we will argue following Meillassoux, that these laws can change at any moment. It is also important to distinguish Wolfram’s model from that of chaos theory and from the idea that complexity comes from influences outside of a system (like a boat swaying due to the complexity of the waves) (NKS 300-1). Wolfram shows us how systems develop by iterations of fundamental rules and structural relations. It is these rules and relations that determine things rather than what chaos theory calls ‘initial conditions’, wherein complexity at the level of initial conditions will emerge in the behavior of the system (NKS 13). The chaos does not come from external
influences on a system. Chaos theory was able to show how randomness arises when one looks at how initial conditions play a role (if one pushes a roulette wheel with a hand, one does not know what the initial conditions of the hand push are), but Wolfram shows us something new—how the iterations of rules themselves can lead to randomness. The complexity at stake is generated by the evolution of structural relations themselves. Chaos theory contends that chaos arise because one cannot have accurate measurement of the basic conditions informing things. Wolfram is contending almost the opposite—that even in knowing the basic program one cannot know what will happen (NKS 155, 381).

Wolfram sees all things as being made of the same thing—information. But given that his information is itself embodied in rules and relations, it is ultimately space itself that becomes what the entire universe is an elaboration of (NKS 536-37). Space does not precede things created as some sort of empty container. Rather, space arises out of the relation between the nodes and through the network of processes that are elaborated by the program itself (NKS 508). The universe is then a giant network of space-time that unfolds itself (NKS 482-86). Time itself is just a product of the iterations of the program. One is updated, as it were, as one receives the information from these updates (NKS 481-88). As it unfolds the unfolding itself generates a sense of time, as one sees the passage from one step to the next.

Wolfram’s view is reminiscent of the Hindu notion of Indra’s net. This idea shows how emptiness itself, interconnection, and origination arise. All phenomena arise out of a single rule. The mutual structuring relations are repeated, such that all that exists is but a part of the great net. But insofar as it is just a matter of differences themselves, the net itself is composed out of iterations of nothing. This network is
as simple as possible. Before the network elaborates itself there is nothing—not even space. Space is a collection of discrete nodes in a network. Space is made by indicating how the nodes should be connected to each other. All that is built into things is the structural relations themselves that unfold, forming networks with nodes that enable space itself to arise.

Why cannot space be an absolute and eternal background, as it was for Newton and for many physicists even today? First, this view was needed for Newton in order to have a constant frame of reference. Not only did Einstein show how one can have frames of reference without absolute space, but in this view of Wolfram’s, the network itself produces frames of reference and relation. More importantly metaphysically, I think we can say that an eternal empty space itself will not give rise to anything, as argued earlier with reference to the false vacuum.

I think this view articulates how Wolfram’s conception of things is also Pythagorean, precisely insofar as it says that all can be shown to be a program unfolding. What the Pythagorean call the “Tetractys” shows how the “dimensions of the universe were created”: “1 is the point, its dimension is zero . . . and it generates other dimensions: 2 points define a straight line, with 1 dimension, 3 points form a triangle, with dimensions 2, 4 points linked between form a tetrahedron, with dimensions 3” (Ouaknin 2004, 211). Here, the universe is spatially created by the rearticulation of points/nodes. For the Kabbalah, existence itself begins in a concealed point via the tzimtzum. These points spread out into all dimensions. Information is itself a form of connectivity. The complicated nature of reality cannot be explained by equations per se (which is again why a representationalist model will not work), but only by way of programs iterating and computing relations.
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Nature must follow rules to be intelligible, but that does not mean those rules have to be embodied only in equations like those Newton formulated. Wolfram’s view thereby is also eminently Kabbalistic. The ultimate program that Wolfram is searching for would itself write the book of the world (NKS 465-71). We call it the holy Name. Interestingly, the Kabbalah likes to emphasize how the words for book and name in Hebrew have the same numerical value. The sefirot themselves would function as the processes in this mode. The sefirah count (that is, compute).