METAPHILOSOPHY

Published by Blackwell Publishing Ltd, 9600 Garsington Road, Oxford OX4 2DQ, UK, and 350 Main Street, Malden, MA 02148, USA
METAPHILOSOPHY
Vol. 43, No. 4, July 2012
0026-1068

WHAT IS A DIGITAL OBJECT?

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Abstract: We find ourselves in a media-intensive milieu comprising networks, images, sounds, and text, which we generalize as data and metadata. How can we understand this digital milieu and make sense of these data, not only focusing on their functionalities but also reflecting on our everyday life and existence? How do these material constructions demand a new philosophical understanding? Instead of following the reductionist approaches, which understand the digital milieu as abstract entities such as information and data, this article proposes to approach it from an embodied perspective: objects. The article contrasts digital objects with natural objects (e.g., apples on the table) and technical objects (e.g., hammers) in phenomenological investigations, and proposes to approach digital objects from the concept of "relations," on the one hand the material relations that are concretized in the development of mark-up languages, such as SGML, HTML, and XML, and on the other hand, Web ontologies, the temporal relations that are produced and conditioned by the artificial memories of data.

Keywords: digital objects, phenomenology, metadata, Stiegler, Simondon.

In this article I attempt to outline what I call digital objects, showing that a philosophical investigation is necessary by revisiting the history of philosophy and proposing that it is possible to develop a philosophy of digital objects. I consider first the question of the digital, then the question of objects, and finally the question of the digital again. What I call digital objects are simply objects on the Web, such as YouTube videos, Facebook profiles, Flickr images, and so forth, that are composed of data and formalized by schemes or ontologies that one can generalize as metadata. These objects pervade our everyday life online, and it is in fact very difficult for us to separate what is online and offline anymore, as indicated decades ago by the action of "jacking into cyberspace."[1]

[1] A phrase used frequently by William Gibson in *Neuromancer* (1984), which nicely describes the separation between two worlds that one tended to imagine in the 1980s and 1990s.

It is not only that we become addicted to different trendy gadgets, but also that they constitute a ubiquitous milieu from which we cannot escape. Digital objects are not simply bits and bytes, as proposed in the digital physics or digital ontology in the works of Edward Fredkin and Stephen Wolfram. Digital ontology consists of two main concepts: first, that bits are the atomic representation of the state of information; and second, that the temporal state of evolution is a digital information process (Floridi 2009). The second point embodies a long historical debate between humanism and cybernetics. Nevertheless, both concepts ignore the fact that we are interacting with digital objects: they are actually objects that we drag, we delete, we modify, and so on. The Web is acting both as an interface between users and digital objects and as a world in which these digital objects conceal and reveal—in both physical and metaphysical terms. But I am not suggesting here that the previous propositions about the digital are simply wrong; to use an analogy, we now know that the world consist of atoms, but to think only in terms of atoms won't help us to explain the world. That is to say, such a digital philosophy is insufficient to help us reach an understanding of everyday life amid technological acceleration, not to mention a deeper reflection on existence.

In this article, I propose first to move the investigation from the digital to objects, and continue from there. Then I want to contrast digital objects with past investigations into natural objects and technical objects, and finally I will extend the analysis to digital objects. First of all, I want to make a not-so-modest claim here that Western philosophy from Aristotle to Edmund Husserl concerns only natural objects, or more precisely how the objects appear or are shown to us. So first let us look at the question of natural objects. When speaking of natural objects, we don't mean objects given by nature, such as vegetables or animals. A natural object here refers to the category in which every object, whether natural or fabricated, is analysed in the same natural manner. This method proposes that an object can be understood by grasping its essence, which determines its particular appearance. This process of knowing, at first glance, already supposes the object itself and the object for knowledge. This leads to the development of a scientific knowledge that works towards an absolute certainty, which guarantees the correspondence between the thing itself and consciousness. In his *Categories* Aristotle proposes to understand being in terms of substance and accident. He says: "That which is called a substance most strictly primarily and most of all—is that which is neither said of a subject nor in a subject, e.g. the individual man or the individual horse" (Aristotle 1984, 2a13–2a18). Substance itself is the subject. Accidents are the predicates of the subject. Clearly, in his *Categories* Aristotle designates the subject-predicate pairing both as a grammatical structure and as a system of classification. The relation between language as classification and things as physical beings is already established.

Aristotle gives a more detailed, while somewhat divergent, account of substance in *Metaphysics* (book Z), where he says that the question "'what is being?' really amounts to 'what is substance?'" (Aristotle 1956, 168). He then proposes to understand the substance of the substratum. The substratum can be described in terms of sensible form and matter. Sensible form is concerned with "what kind of thing" something is, and matter concerns "what it is made of." Aristotle proposed to decide which of the three elements, form, matter, or the composite of form and matter, can be called substance. He rejected matter and the composite of matter with form, the first because it can be a predicate of the subject, the second because it is "posterior in nature and familiar to sense" (Aristotle 1956, 172). He finally decided that form is the sole understanding of substratum. Sensible forms raise the question of essence. There are two points we have to note here: first, the question of substantial form became a long-lasting philosophical question concerning the essence of things and their representation; and second, the distinction between subject and object did not come to be made until Descartes, and so the thing under contemplation is a subject but not an object. The concept of subject moving away from thing to the ego that contemplates it is characteristic of a separate yet constant mediation between subject (consciousness) and substance (essence) (Rotenstreich 1974, 2).

The subject-substance question can be understood as the core of the philosophical conceptuality of natural objects (Rotenstreich 1974, 1). We can follow a long historical trajectory from Hume through Kant, German idealism (including Fichte, Hegel, and so on), and later Husserl, which one can call the phenomenological tradition. These philosophers proposed different models for understanding the relation between subject and substance, and it is obvious that one cannot generalize their thought, since each of them requires considerable investigation. However, if there is something one can say these philosophers have in common it is that they all want to find out how the subject allows substance to manifest itself as such, and how the subject takes a more and more active role (for Hume, the subject is almost passive). As we cannot undertake a thorough examination of the thought of each philosopher one by one here, I would like to exemplify this tradition through Husserlian phenomenology, since Husserl is the one who made "Back to the things themselves!" the slogan of phenomenology. Husserlian phenomenology is known as descriptive phenomenology. The very word "descriptive" clearly distinguishes Husserl from Hegel. For Husserl, phenomenology is a descriptive process, which goes back and forth to depict the object through the knowing consciousness, while for Hegel phenomenology is a speculative process in which multiple stages of self-consciousness are attained through dialectical movements and sublations. They are not totally separated, however, since Husserl's phenomenology is another investigation into consciousness and is an attempt to provide the absolute foundation

of all science. From this perspective Husserl and Hegel share the same ambition.[2]

Husserl's phenomenology rejected Kant's thing-in-itself (*das Ding an sich*), which states that human beings can know only the phenomenon of things; knowledge of thing-in-itself demands an intellectual intuition which is absent in human beings (Kant 1996). Husserl denounced the thing-in-itself as a mystery, and he proposed that we can actually know the object through the movements of intentionality. Since Husserl starts as an arithmetician, then becomes a philosopher of logic and consciousness, and finally ends as a philosopher of culture, it is almost impossible to summarize a theory of the object in a way that captures his entire understanding. But in a nutshell, Husserl regards everything as a possible intentional object; for example, a number or an apple is an object. Husserl's project is directed against what he calls naïve realism and relativism. An object for Husserl is not what is given; rather, this given is constituted by a genesis of the senses. In order to relinquish naïve realism, the phenomenologist starts with *epoché*, meaning bracketing any presupposition and bias, which already constitutes the object as such. The bracketing process, to Husserl, is also a process of returning to an absolute Ego, which is free from any presupposition. In this sense the subject takes a much more active role. An intentional act then comes into being, directed from the subject to the object, and the reflection that this act effects constitutes a horizon on which the ideality of the object appears. This ideality is only possible through a process of ideation,[3] which reconstitutes the horizon.

The trajectory of the modern metaphysics of objects opens up several general directions for the investigation of objects. First, there is a wavering scepticism regarding the concept of substance. The transcendence of substance finds its location in God; in other words, substance and God are on the same plane, since they are beyond human experience. The risk involved in an absolute knowledge of the object easily leads to the destruction of the whole plane by bringing it down to the plane of immanence. This philosophical trajectory also accompanies the scientific spirit in working towards the discovery and reassurance of the power of scientific methods, which create an exclusive system of knowledge. Second, consciousness is the ultimate mystery, and no authority can describe for itself the ultimate truth for ever. These multiple models attempt to comprehend the mind, and they assign different mechanisms to it. This is important, since the mind is the same as the object of inquiry (even if it is much more complicated), and we can also pose the question of the thing-in-itself of

[2] Husserl's connection with Hegel, in my view, can be made through Heidegger, especially through his understanding of Hegel's concept of "experience" and Husserl's notion of "categorial intuition."

[3] Ideation here takes a Platonic sense, meaning how the ideality can be deduced through a mediative process such as recollection; for Husserl, it consists of different cognitive functions such as explication, negation, and so on, that seek the essence of the object.

the mind just as we may do for a fillet of steak or a cauliflower. In Hume, Kant, Hegel, and Husserl, consciousness is imbued with specific functions, which are also systemized as part of an *organon* of knowing (although none of them would admit the word "organon"). Third, the role of knowing falls totally on the mind. The other side of the coin is that objects are always objects of experience. The predicates of the objects are qualities that can be experienced, so all of the above-mentioned philosophers are eager to find the structure of consciousness that would allow it to know the object, but there is among them less investigation into the object's own existence, and how its existence conditions the process of knowing and being itself.

Technical Objects

Within the dialectics of substance and subject, there is no place for technical objects. Ignorance of these objects in philosophy has meant that it has failed to absorb the rapid development of technology and social change after the industrial revolution. The idea of the philosopher as a figure who stands outside as mere critic and defends the purity of thought and inquiry into human nature has been washed away in the flux of technological progress. It is possible to argue that most of the philosophers of phenomenology except Husserl came before the industrial revolution, so they dismissed technical objects. Yet technical objects are not necessarily complicated machines; a hammer or a knife is also a technical object. Indeed, Husserl the philosopher witnessed the rapid proliferation of machines after the industrial revolution but didn't bring them into his phenomenological theory.[4] A new philosophical attitude as well as a new philosophical system must be constituted in order to comprehend the changes that this process entailed. If ontology starts with the question of being, then there is a problem that the understanding of being is not on the right path if it does not take into account the nature of technology. And this is very clear if we follow Heidegger's proposition that the beginning of cybernetics is the end of metaphysics (Heidegger 2001). I will therefore propose two figures who may bring the concept of technical objects to light and prepare the ground for our investigation of digital objects: the French philosopher Gilbert Simondon (1924–1989) and the German philosopher Martin Heidegger (1889–1976). They may appear at first glance to be incompatible, because Simondon is an admirer of modern technology, while Heidegger is known as a philosopher who was opposed to it.

Simondon's 1958 doctoral thesis, later published as *On the Mode of Existence of Technical Objects* (1980), proposed what he calls a "mech-

[4] The absence of technical objects in Husserl is further elaborated by Bernard Stiegler in *Technics and Time*, vol. 1 (1998) and vol. 2 (2009). Stiegler shows that Husserl was able to talk about primary and secondary retention but not tertiary retention, which is one of the most important elements of technical objects.

anology." Mechanology investigates the existence of technical objects through their movement towards perfection. Simondon demonstrates their lineage from the origin of technology to the point where it provides an increasingly concrete object through the example of the evolution from diodes to Lee de Forest triodes. The diode is a device that controls the flow of current in a single direction. In its simplest form, within a vacuum tube, the cathode is heated and hence activated to release electrons. The anode is positively charged so that it attracts electrons from the cathode. When the voltage polarity is reversed, the anode is not heated, and thus cannot emit electrons. Hence there is no current. A triode places a grid between the anode and the cathode; a DC current can give a bias to the grid: if it is negative, it will repel some of the electrons back to the cathode and hence serve as an amplifier (see figure 1). Simondon proposes that the absolute beginning of the triode is not the diode but is to be found "in the condition of irreversibility of the electrodes and the phenomenon of the transport of electric charges across the vacuum" (Simondon 1980, 36).

The diode or the triode is what Simondon calls a technical element, and the ensemble of these elements constitutes a technical individual. But one shouldn't simply understand it as a collection of components; a technical individual is a technical object that supports the functioning of its inner structure at the same time as it is able to adapt an external milieu to its functioning. This view differs from the views of some other theorists on technical compositions, such as Herbert A. Simon. Simon approaches

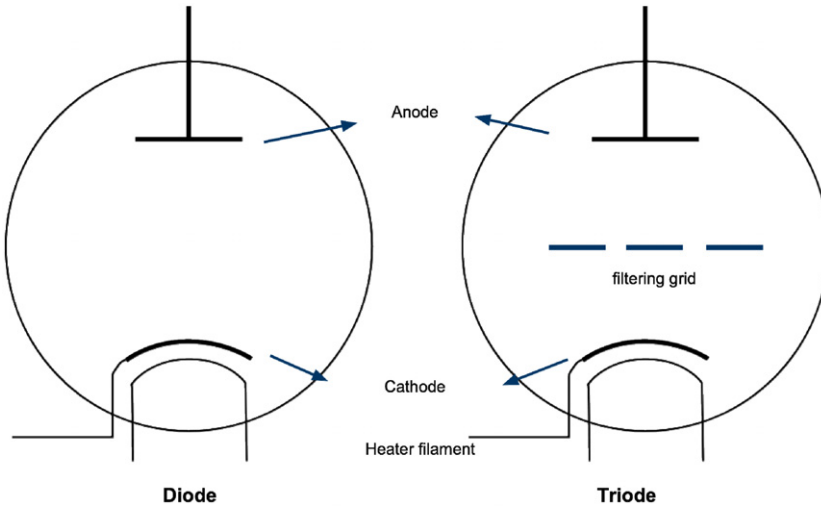

FIGURE 1. An indirect heated vacuum tube diode and triode.

technologies through systems and subsystems, and the interface that allows subsystems to communicate with each other (Haugeland 1993). Simondon goes deeper down to the modes of existence of technical objects and derives a theory of system from different "orders of granularities" ranging from technical elements, to individuals, to systems. What is the most intriguing and most interesting thing in Simondon's theory of systems is the idea of an "associated milieu" that provides a stabilizing function to restore the equilibrium of the system itself. For example, Simondon often spoke of the Guimbal turbine (named after the engineer who invented it), which, to solve the problem of loss of energy and overheating, uses oil to lubricate the engine and at the same time isolate it from water; it can then also integrate a river as the cooling agent of a turbine (Simondon 2005). The river here is the associated milieu for the technical system; it is part of the system but not a component of the machine. Simondon's approach to technical objects differs from that of previous philosophers and phenomenologists in that he didn't reduce the technical object to the intentional defect of consciousness and hence make it an object for knowledge. He proposed to study the genesis of the technical object itself, less in a biological sense than in a mechanical one. A technical object regains its materiality and attains a different degree of concreteness or perfection in contrast to what cybernetics term "control."

In contrast to Simondon, I believe, Heidegger provided a new way of understanding relations (although Heidegger himself would immediately reject the above proposal). Heidegger's contribution to the understanding of technical objects can be found in *Being and Time*, dating from 1927, where he talks about the "ready-to-hand." Heidegger (1967) proposes two categories: "ready-to-handness" (*Zuhandenheit*) and "present-at-handness" (*Vorhandenheit*). We can understand present-at-hand as a mode of comprehension that renders a thing an object for consciousness and attempts to arrive at the essence of that object (as in the case of a natural object). Ready-to-hand is a mode of interaction, in which we put aside the question of ideality and objectivity and let the object appear to us according to its functionalities. We see a similar impulse in Simondon and Heidegger here, characterized by a move from substance to external milieu, which allows the object to be defined.

The difference between them is that Heidegger bypassed the technical milieu and concentrated on the social milieu, and he interpreted the object's self-manifestation within its milieu in terms of human *Dasein*. For example, Heidegger illustrates the way we use a hammer: we don't really need to achieve an ideality of the hammer (as present-at-hand) before we use it; we just grasp it and use it to hit the nail into the place it is intended. This daily practical activity moves away from the concept of experience as a mere activity of consciousness, arguing that the previous understanding of objects which subsumed them under cognition ignores the world of both objects and *Dasein*. For instance, according to Heidegger, Husserl's

concept of intentionality when properly understood is nothing but the awareness of being-in-the-world; that is to say, it is not a ray projected from the ego but a field from which the ego cannot escape (Heidegger 1988). Heidegger's approach towards technical objects was taken up by philosophers such as Maurice Merleau-Ponty and Hubert Dreyfus, and later by AI researchers as a challenge in the design of intelligence.

Digital Objects

Both investigations into natural objects and technical objects in the phenomenological tradition show us different directions in which objects could be studied. Digital objects are visible to us in different forms. We can treat them as natural objects. They demand the engagement of our consciousness to furnish concepts for their appearance and our experience with them. Following the phenomenology of Kant, Hegel, and Husserl, we can investigate the movement of reason and intentionality. The previous theories regarding natural objects still have their place. But if these kinds of investigation are still possible, are they sufficient to address the question of digital objects? What can we think about the "substance" of a digital object? Digital objects appear to human users as colourful and visible beings. At the level of programming they are text files; further down the operating system they are binary codes; finally, at the level of circuit boards they are nothing but signals generated by the values of voltage and the operation of logic gates. How, then, can we think about the voltage differences as being the substance of a digital object? Searching downward we may end up with the mediation of silicon and metal. And finally we could go into particles and fields. But this kind of reductionism doesn't tell us much about the world.

Following the Simondonian approach, we can produce a genesis of digital objects by studying the evolution of technical apparatus, for example, metadata schemes; with Heidegger, the objects constitute the milieu that we are living in, giving us a new interpretation of being-in-the-digital-milieu. But first of all we must grasp the specificity of digital objects and from there make these connections clear. I want to go back to the question of the digital again, and propose that one fails to see the whole landscape if one simply understands the digital as only a 0 and 1 binary code; rather, one should grasp the digital as a new technique to manage data in comparison with the analogue. The French philosopher Bernard Stiegler follows the French anthropologist Sylvain Auroux in proposing the idea of grammatization, which "designates more general the passage from temporal continuous to spatial discrete, a fundamental form of the exteriorization of flux to" tertiary retention.[5] Stiegler further classifies three discretenesses of grammatization, namely: literal, analogue, and digital. These levels of

[5] "Grammatisation," at http://arsindustrialis.org/grammatisation

discreteness designate different systems of writing and reading, and, more important, the ways of exteriorization and the possibilities opened up thereby. Thinking in terms of exteriorization gives us a significant clue to move away from the analysis of natural and partially technical objects.

When we look at the term "data" we hardly recognize that its Latin root *datum* originally means "[a thing] given"; the French word for data, *donnée*, has this meaning as well. If data are the things given, what gives them? This is the question for both investigations into natural objects and technical objects: for natural objects, the given is closely related to sense data; among the theorists of technical objects mentioned above, Heidegger attempts to propose givenness as the condition of the appearance of the world that gives rise to a new interpretation of the relation between human beings and things. But we have to recognize that since 1946 the word "data" has had an additional meaning: "transmittable and storable computer information."[6] This second sense of "data" suggests a reconsideration of the philosophy of objects, since the givenness can no longer be taken as sense data or a mode of being together of man and nature; instead, one has to recognize its material transformation. The significance of the new technique of data processing we now call the digital is not only that with computers we can process large amounts of data but also that by operating with data the system can establish connections and form a network of data that extends from platform to platform, database to database. The digital remains invisible without data, or traces of data. With the population of Web-based applications (further amplified by social networking), the production of data is increasing in a manner that one can hardly imagine. Let me quote Berkeley computer science professor Michael Franklin on the production of data by a single user, from which we can get a glimpse of the universe of data we are living with:

> Most tweets, for example, are created manually by people at keyboards or touchscreens, 140 characters at a time. Multiply that by the millions of active users and the result is indeed an impressive amount of information. The data driving the data analytics tsunami, on the other hand, is automatically generated. Every page view, ad impression, ad click, video view, etc. done by every user on the web generates thousands of bytes of log information. Add in the data automatically generated by the underlying infrastructure (CDNs, servers, gateways, etc.) and you can quickly find yourself dealing with petabytes of data.[7]

Users are producing tremendous amount of data, physical objects are becoming fact-based data, by digitization, RFID tags, and so on; fact-

[6] Online Etymology Dictionary, http://www.etymonline.com/

[7] Quoted by Ben Lorica, "Big Data and Real-Time Structured Data Analytics," www.radar.oreilly.com/2009/08/big-data-and-real-time-structured-data-analytics.html, accessed 14 December 2011.

based data are becoming digital objects, meaning that data must be conceptualized as graspable entities by both the human mind and the computational mind. These two processes are what I call the *datafication of objects* and the *objectification of data*. The question in the engineering sense is, What is the best way to manage data? Transformed into a philosophical question, How concrete should the objects be? We can see that Web ontologies that present in the form of GML, SGML, HTML, and XML and more recently Web ontologies under the name Semantic Web are endeavours to create different levels of concreteness (Berners-Lee 2001), and networks in which each relation can be articulated and calculated. This evolution process is not linear at all; every progress is conditioned by the technical milieu. From GML to HTML we actually see a loss of concreteness: since HTML tends to be a lightweight language, it tends to reduce objects to representations and use only hyperlinks as relations in the networks. From HTML to XML and Web ontologies, the objects are becoming more and more concrete, if by concrete here we mean that the concepts of the objects are more well defined and the relations between parts of the objects and between objects are more explicit—that is, no longer limited by hyperlinks but by parsing and comparing well-structured data.

Horizontally, we can see that as the associated milieu enlarges in terms of quantities through the progress from GML (for compatibility between programs within a machine) to ontologies (across the Internet between machines), it involves more and more objects, machines, and users to maintain its functionality and stability. We can also think of the associated milieu as a measurement of interoperability and compactability here. *Vertically*, digital objects are always in a process by which they become more concrete and individualized. Concretization for Simondon also means increasing levels of abstraction; in ontologies, we find that there is ambiguity between a computer programme and a text file. HTML is simply a formatted text file full of data, but RDF (resource definition framework) defines complicated documents with programming and logical capacities. Ontologies in the RDF or OWL (Web ontology language) format become similar to an object in OOP (object-oriented programming), which has three important properties, namely, abstraction, encapsulation, and inheritance (a class can be overridden to generate new classes, which inherit certain properties and functions of the parent class), and we can identify all of these in an ontology.

The function of structured data is to produce formal relations between each relation in RDF no matter how arbitrary these relations are. For example, even "difference" can become a formal relation for comparison. As we have seen, a digital object is also a natural object, which possesses different qualities. These qualities are represented in the form of data and metadata. The relation between data and metadata has to be further distinguished. By definition metadata are data about data. That is to say,

they are a description of something else. But this description can extend infinitely and may end up as circular. It is also this infinite extension of "data of data" that constitutes a different network. Being also computational objects, digital objects are subsumed under calculation. The affectivity and sensibility of the objects are calculable. The metadata of a digital object can grow in time if the database assigns more attributes to it. But at least its relation to other digital objects will increase, even though it remains the same. When there are more digital objects, there are more relations, hence the networks either become larger or new networks are actualized. An object is meaningful only within a network; for example, a Facebook invitation is meaningless if there is not a network that is mediated by the data of the users. The multiple networks, which are connected by protocols and standards, constitute what I call a digital milieu. (See figure 2.)

Not Yet a Conclusion

Let me provide a brief summary of what we've been discussing. Digital objects appear in three phases, which are interdependent of each other but cannot be reduced or generalized into oneness: *objects*, *data*, and *networks*. If the investigation of natural objects is concerned with the dialectics of subject and substance, and the investigation of technical objects is concerned with the relationality between the object and the milieu, then the investigation of digital objects must obtain a new direction by pushing these two investigations further. This does not mean that the previous investigations lose their significance; it simply indicates that the question of substance is no longer at issue, since it is not only undemonstrable, as Hume showed, but also unthinkable. The investigation of digital objects must find a new relation between object and mind. Furthermore, the relationality within technical objects and their relationality to the world are not independent of each other. Technical objects are not only symbols as they appear in the world, nor are they simply tools for use; their internal relations are materialized and codified, which in turn conditions the opening of the world. This opens up many different inquiries towards a philosophy of digital objects, and here I want to specify two of them.

The first concerns what Bernard Stiegler calls tertiary retention, Andy Clark and David Chambers's idea of the extended mind (Clark and Chambers 1998), John Haugeland's embedded mind (Haugeland 1993), and Fred Dretske's externalism (Dretske 2004). More specifically, we are talking here about digital objects as externalized memories that condition our retrieval of the past and anticipation of the future. If traditional phenomenology, especially that of Hegel and Husserl, gives the subject an active role of knowing and experience, then the reconsideration will bring the subject back to its passive mode and give us a higher position to digital objects. This doesn't deprive the subject of its role of cognition, it attempts to understand the condition of cognition. I single out Stiegler's theory because, by

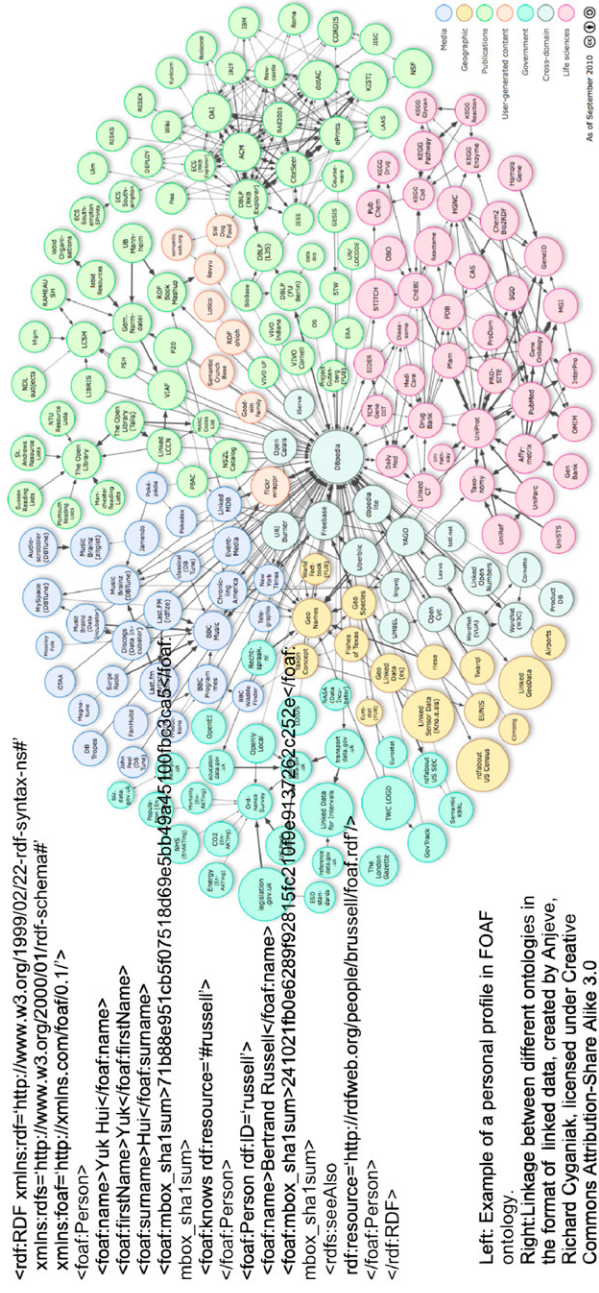

FIGURE 2. Objects are data, data are sources of networks. A personal profile in the format of FOAF (friend of a friend) ontology, and ontologies in the format of linked data connected to form networks across multiple domains.

comparison with the others, it poses the political question of externalities. Philosophers such as Clark, Chambers, Dretske, and Haugeland come from an AI perspective, especially one that is haunted by Heideggerian AI. As we briefly saw in some of the propositions of Heidegger in the section above on technical objects, Heideggerian AI argues that the good old-fashioned AI went totally wrong because it understood cognition through a Cartesian approach, seeing the mind as the source of the production of all meaning and its essential part as responsible for creating representations of the world. Instead, Heideggerian AI holds the view that the world itself is the source of meaning that conditions human actions, and the way human beings interact with the world is not necessarily mediated by representations, for example, the use of a hammer as described by Heidegger. Identifying with a Heideggerian or pseudo-Heideggerian spirit, Clark proposes the idea of scaffolding to describe how the mind operates beyond the skull and the skin; Dretske proposes that what is important for a tool is not that something is represented by it but rather "how it represents the world" (Dretske 2004, 397); Haugeland seizes the concept of "affordance" from J. J. Gibson's ecology of perception, which suggests looking at meaning given to us by the environment, rather than derived from our human speculation (Haugeland 1993).

By comparison, Stiegler's theory of externalities is much more informed by Husserl rather than by Heidegger, and among others especially by the anthropologist André Leroi-Gourhan, who explores the physiological development of human beings in relation to the use of tools. In order to look into Stiegler's tertiary retentions, we must go back to Husserl's system of time consciousness (*Zeitbewusstsein*). To explain Husserlian time consciousness in a nutshell here, let's imagine that we are listening to a melody; we are experiencing a flux of consciousness, which is the passing of the "nows." The "now" that is retained immediately in my mind is what Husserl calls primary retention, the melody that I can recall tomorrow is called secondary retention; these retentions condition protentions as well, which also means anticipations and projections. Tertiary retention supplements the finitude of the first two kinds of retention with an infinite repertoire of memories, made possible by digitization. But on the other hand, the tertiary retention is also the source of the primary retention, and the support of the secondary retention, which is also the source of protention. The causality of intentionality is taking on a new configuration. Hence Stiegler writes that digital technology "creates a new organization of the circulation of the symbolic. Within this new mode of organization, suddenly the production of the symbolic becomes industrial, subject to industrial processes. Here you encounter the production of symbols on the one hand, and the consuming of such symbols on the other—an aporia because it is impossible to consume a symbol. The symbol is not an object of consumption; it is an object of exchange, of circulation, or of the creation of circuits of trans-individuation. So

this situation suddenly produced what I call short-circuiting—of trans-individuation" (Stiegler and Rogoff 2009).

This systematic view sees retentions and protentions as circulations that are subject to control, manipulations that add political and economical considerations to digital objects; on the other hand, it also implies a reconsideration of the position of subjects and objects. Digital objects together with algorithms become the control of retentions (which can be short-circuiting and long-circuiting); the subject that contemplates natural objects or operates technical objects in factories or workshops could articulate causalities of perceptions and now becomes a processor of information. This approach takes the investigation of a classical question about cognition and AI and transforms it into social and political questions.

The second question concerns relationality, which is closely related to the first question, yet it is rather a metaphysical one than a political one. And by digital objects, I want to propose here an opposition between the relationality and the substantiality. The key point at which a digital object differs from a technical object can be summarized as follows: A theory of digital objects demands a synthesis between Simondonian individualization and the Heideggerian interpretation of ready-to-handness (Heidegger would reject the idea that Simondon's thesis regarding technical objects poses any ontological questions, while Simondon would very much like to separate the technical from the social).[8] In the case of Simondon, in a mechanical system the contact point is the action of the relations—for example, the physical contacts between wheels and pulleys, the flow of electrons in electronic devices such as diodes. The relations that were once in a physical form are now turned into another material form, which is code or data. What was intangible before now can be made tangible and explicit, and be visualized in different forms. These relations are mobile and homogeneous. Data become objects and also the source of relations; this means the objects can join together materially through transmission networks, codes, and so on. The second point is that relations in Heidegger's technical objects are not material but temporal, since for Heidegger being can only be understood through time. The world is the spatiality that composes matrixes of relations, while these relations must be understood in a temporal sense, which Heidegger calls "care" (*die Sorge*). The problem with Heidegger is, how can we understand the new system of time with information machines that operate through digital objects? How can these two types of relation be understood in a technical system that is also digital?

[8] Jacques Ellul quotes Simondon: "It is the ensemble, the interconnection of technologies, that makes this both natural and human polytechnical universe. . . . In existence, for the natural world and for the human world, the technologies are not separated, because there does not exist a thinking developed highly enough to permit theorizing about this technical network of concrete ensembles. . . . Beyond technical determinations and norms, we would have to discover polytechnical and technological determinations and norms. There exists a world of the plurality of technologies, with its own peculiar structures" (Ellul 1980, 82).

We see first of all that these digital objects are also programmable, and they are themselves in the process of becoming computer programs. Relationality is the point where algorithms act, and at which data are related to each other. The evolution of technical standards from GML to XML to Web ontologies blurs the distinction between a simple text file and a structured computer programme. One can rewrite the whole code of a digital object, change its identity, and delete it in a second: what, then, is the substance of a digital object when its nature and identity are totally changed from point A to point B? One has to go down to the level of signals and voltages, but as we saw in the previous paragraphs, at that level objects become inconceivable. The question of substance proves bankrupt here. The problem of substance reveals the collapse of a universal monism. The transcendence of the object thus totally collapses in digital objects. In technical objects, we already encounter this problem, since these objects are man-made objects, but we can still insist on the substance of the material, the perfectness of mathematical formulae, and so on. With digital objects, the transcendent aspect is further weakened, since virtually anyone can make and destroy these objects by pressing a key on the keyboard or clicking a mouse. In what is called the technological form of life, we are witnessing the flattening of the transcendent,[9] and objects fall into the field of total immanence. A new theory must therefore move away from the question of substance, and that for me is a theory of relations.

This article far from fully demonstrates a philosophy of digital objects; the investigation it proposes covers only a small part of the research I have done in recent years. It serves as an open invitation to engage with the philosophy of the Web and a phenomenology of digital objects. But for a philosophy of the Web to exist at all, one must move beyond the engineering principles and architecture of the Web itself, though one must always fully bear them in mind. For philosophy is not a representation of reality but reality itself, not one that gains its meaning from the mind of a thinker but one that comes out of the minds of thinkers through the significations of the world. We can certainly envision the expansion of the Web and future "breakthroughs" of technologies, but though a philosophy of the Web is on its way, it will never attain fullness without a theory of digital objects.

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[9] Scott Lash (2002) uses "transcendental" instead of "transcendent." Here I follow the distinction made by Kant: transcendental means *a priori*, which doesn't need empirical evidence, while transcendent means an effect of supposed experience that exceeds the cognitive faculties of human beings.

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