Chapter 23
Ontophany Theory: Historical Phenomenology of Technology and the Digital Age

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Abstract For over 20 years, the concept of the *virtual* has prevailed in French digital studies. Yet two decades of daily cultural integration with interfaces have demonstrated that virtuality is only one of many aspects of our interactive experience with digital devices. A need therefore exists for new concepts more apt to address the philosophical complexity of the digital phenomenon and the significance of our interactions with calculated matter as they are true existential experiences of phenomenological significance. In this chapter I explain why I have suggested introducing the phenomenological concept of *ontophany* (manifestation of being). In close relationship with a comprehensive and broadened understanding of Bachelard's notion of "*phenomenotechnique*," I examine the hitherto unidentified technicality of this manifestation process. Prior to their existence as tools in uses, technologies are first the perceptual structure of our existence; they are the "devices" or the invisible matrixes, produced by culture and history, into which our potential experience-of-the-world is cast. Not only do the following theoretical propositions seek to contribute, philosophically, to *Internet Studies* and to a better understanding the Digital Age, they also hope to give rise to a broader deliberation on technology and perception, as they relate to an approach I would characterize as a *historical phenomenology of technology*.

Keywords Digital media · Digital studies · Design · Environment/milieu · Internet studies · Historical phenomenology · Ontophany · Virtual

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We have learned to take things at interface value. –Sherry Turkle

This chapter is the outcome a dual intellectual filiation and a dual professional expertise.

Intellectually, its influence is rooted both in existential phenomenology, from which I have chosen to adapt a number of fundamental concepts (including the notion of being-in-the-world), and in the French tradition of a "historical epistemology" of science (Lecourt 1969) whose key figures include Gaston Bachelard, Jean-Claude Beaune, Bertrand Gille and Jean-Pierre Séris.

Professionally, I have drawn upon the twofold experience fostered as an interaction designer at LEKTUM, the Paris-based web design agency I founded and managed from 2009 to 2014, and as an educator and design researcher, originally as a philosophy professor at École Boulle, a Paris-based school of Art and Design, and currently as Associate Professor of Design and Digital Media at the University of Nîmes.

L'être et l'écran (Vial 2013) is both the synthesis and the fruit of these filiations and experiences. Its objective, both phenomenological and epistemological, is to provide the philosophical analysis of technology, in general, and of digital technologies, in particular, with a conceptual renewal that relies upon the observation of experience (phenomenological component) and the history of technology (epistemological component).

For over 20 years, French digital[1] studies (Quéau 1993; Lévy 1995; Missonnier and Lisandre 2003; Tisseron 2008, 2012) have seen the *virtual*, as a *philosophical* concept, prevail. My work postulates that although the above concept is *philosophical* in origin, it fails to be relevant at grasping the nature of the digital phenomenon, *philosophically*. Two decades of daily cultural integration with interfaces have demonstrated that virtuality (or simulation), is one of many aspects of our interactive experience with digital devices. A need therefore exists for new concepts; ones more apt at penetrating the philosophical complexity of the digital phenomenon, and more likely to enlighten us as to the significance of our interactions with interfaces, given that these encounters constitute a phenomenological and existential experience.

Thus, I have suggested introducing the concept of *ontophany*, whose etymology merges (without any particular hierarchical distinction) the dimensions of being (*ontos*) and of appearance (*phaïnô*). It bears witness to my profound attachment to Bachelard's notion of "*phenomenotechnique*," which I believe the term "ontophany" revives and broadens into a form of comprehensive phenomenotechnique. I wish to examine the hereto unidentified technicality of the manifestation process through the prism of the contemporary digital field. Not only do the following theoretical propositions seek to contribute, philosophically, to *Internet Studies* and to a better understanding the Digital Age, they also hope to give rise to a broader deliberation on technology and perception, as they relate to an approach I would charac-

[1] Until now, French digital studies have been developed outside of the field of philosophy, with a loose, and often awkward, appropriation of the latter's concepts.

terize as a *historical phenomenology of technology*. According to this approach, technology is no longer a body of objects isolated from their subject; technical nature becomes an intrinsic aspect of subjectivity (among others) which varies in relation to its historical context. Man is as much part of the machine as the machine is part of man. This marks a departure from post phenomenology (Ihde 1990), which stipulates that technologies mediate our relationship to things according to four broad categories of "Human-Technology Relations": Embodiment Relations (e.g. eyeglasses), Hermeneutic Relations (e.g. thermometers), Alterity Relations (e.g. robots), and Background Relations (e.g. automated heating systems) (Ihde 1990). The techno-transcendental phenomenology put forth hereafter seeks to render the overall transcendental technical nature of appearance, as historically determined by an era's technical culture, more perceptible. As a new ontophanic milieu, the *Digital* Age therefore represents an optimal field of observation.

23.1 Ontophany As an Hypothesis, or Comprehensive Phenomenotechnique

23.1.1 Another Look at "Phenomenotechnique"

Gaston Bachelard first introduced the notion of phenomenotechnique in 1931, in a short article entitled "Noumène et microphysique" (*Noumenon and microphysics*) (Bachelard 1931–1932). This entirely fabricated concept sheds light upon one of the fundamental characteristics of modern science: scientific work consists not in describing phenomena as if they preceded their dedicated theories, but in constructing them wholly, using technological devices that afford them an appearance and an existence as phenomena per se. Nuclear physics offer an excellent illustration. In 1911, Ernest Rutherford surmised that an atom's mass is concentrated in its central core, the nucleus, and that electrons determine only the atom's size. However, because an atomic nucleus is made of matter one million billion times denser than ordinary matter (an atomic nucleus is a thousand times smaller than an atom, yet contains 99.97% of its mass), a phenomenal observation of the nucleus seemed impossible. So it remained until 1932, when John Cockcroft and Ernest Walton suggested projecting particles, electrically accelerated to high speed, onto the nucleus in order to disintegrate it, and thus, observe it. The first particle accelerator was born, and it became a foundational instrument in nuclear physics.

As a scientific reality, the atomic nucleus first existed theoretically as a hypothesis; a technical instrument then brought it to exist phenomenologically. Therefore, "in modern science, an instrument is truly a reified theorem," (Bachelard 1933: 140) in the sense that, as our example demonstrates, the particle accelerator is the theory of the atom, technically embodied. Hence, "a measuring instrument always ends up as a theory: the microscope has to be understood as extending the mind rather than the eye." (Bachelard 1938a, b: 240) In other words, technical instruments developed

through scientific reasoning are at the heart of the active theoretico-practical phenomena elaboration process.

> Phenomena must (…) be carefully selected, filtered and purified; they must be cast in the mould of scientific instruments and produced at the level of these instruments. Now instruments are just materialized theories. The phenomena that come out of them bear on all sides the mark of theory. Truly scientific phenomenology is therefore essentially a phenomenotechnology. Its purpose is to amplify what is revealed beyond appearance. It takes its instruction from construction. (Bachelard 1934: 13)

What we must essentially understand is that – as phenomena – scientific realities do not exist beyond of the devices capable of revealing them: in order to *appear*, they require an *appliance* (or *device*). "Therefore, here, the phenomenon is a device-dependent phenomenon." (Bachelard 1951: 5) Instead of discovering exogenous phenomena, science builds them from within, when it creates the instruments capable of materializing theories. Hence, phenomenotechnique refers to the constructivist technique of phenomena expression. The major philosophical lesson to be retained here is: technological materialization is a criterion for phenomenal existence. In modern science, a phenomenon must be technologically, or at least plausibly, fabricated in order to exist per se. In other words, technology is able to engender phenomenality, or the potential to appear.

23.1.2 Ontophany, or the Transcendental Technicity of Appearance

Although they encompass scientific phenomena, universal phenomena are not device-dependent: their appearance does not rely upon the use of devices. Quite the contrary, it seems as though the latter are already in place. Nonetheless, I wish to demonstrate that they are not quite natural and independent, appearing at their own licence. Just as knowledge forms through interactions with its object, perception is also the result of interactions with the phenomenon. Analogously, just as science's terms of application are technological, perception relies upon equivalent technical conditions of execution.

My hypothesis is the following, if technical feasibility is a criterion for phenomenal existence, then this must apply beyond the boundaries of scientific phenomenon; universal phenomena also owe their phenomenality to technical factors. Technical determination is indeed one of phenomenality's overlooked foundations; technical influence should not be interpreted as exogenous, as if phenomena were affected extrinsically. I seek to demonstrate that appearance is in itself a phenomenotechnical process, one which is technically determined and intrinsic to the phenomenality of phenomena.

The phenomenality of phenomena refers to the way being (*ontos*) appears (*phaïnomenon*), and holds the particular characteristic of feeling-of-the-world. I elect to call this *ontophany* which, according to the etymological sense initiated by Mircea

Eliade (Eliade 1965), means that something is revealing itself to us. Thus, if we suppose that all ontophany is by definition technical ontophany,[2] or possesses, at the very least, a technical dimension, then, we may postulate that perception's a priori conditions are not transcendental, as suggested by Kant, but technical, as posited by Bachelard. Consequently, technology can be defined as an ontophanic matrix, a general perceptual structure that determines how beings appear. As such, this structure is not a component of our cognitive aptitude's inner framework (it does not structure knowledge a priori); it contributes instead to the outer framework of our technical culture (which I choose to call a techno-transcendental structure).

The idea of ontophany is therefore no more than the idea of a comprehensive phenomenotechnique which encompasses all phenomena; meaning, that all phenomena, not just scientific phenomena, are phenomenotechniques. In turn, a transcendental technicity of appearance exists, implying that every phenomenal manifestation or "phany" possesses an a priori technical feature. Thus technologies, prior to their existence as the tools that form our uses, are first the perceptual structure of our existence; they are the "devices" or the invisible matrixes, produced by culture and history, into which our potential experience-of-the-world is cast. Consequently, all perception is the result of a technical scheme which inconspicuously determines the very manner we feel-in-the-world at a given time.

23.2 From Technical System to Ontophanic Milieu

23.2.1 The Phenomenological Structure of Technical Revolutions

Although my focus is primarily phenomenological, it rests upon an epistemological foundation essential to its meaning. This foundation is the historical theory of technical revolutions, which arises with the confrontation of two great works: Bertrand Gilles' *Histoire des techniques* (1978) and Thomas Kuhn's *The Structure of Scientific Revolutions* (1962).

At a time in contemporary French philosophy of technology, when most base their work upon Simondon (1958, 1960-1961), I have chosen instead to base mine upon Gille. The latter, besides pre-empting the dogmatic incantations of the former, extends beyond the boundaries of history. In my opinion, Gille's history of techniques possesses philosophical value, owing not least to his notion of a "technical system," which, in approaching the history of techniques through a problematized bias, advances a genuine philosophy of history. Thus, even its author concedes that it is more "technical epistemology" (Gille 1979) than history of techniques. Also, in order to avoid any confusion, my use of the term "technical system" bears no affiliation to Jacques Ellul's "technician system," which suggests that technology is a com-

[2] One must not mistake the notion of ontophany as we suggest it here with that of "technophany," dear to Gilbert Simondon, whose elaboration was also based upon Mircea Eliade.

prehensive system responsible for its own growth in a quest for maximum efficiency. It refers instead only to the expression as defined by Bertrand Gille; a "technical system" is the cohesive whole forged by a period's dominant techniques (e.g. the first industrial technical system was made up of a coal/steam engine/metal alliance).

Analogical reasoning then allows us to apply Thomas Kuhn's interpretation framework to Bertrand Gille's historical model in order for the latter to project itself as a philosophy of technology. The correlation can be expressed thus: just as the *scientific revolution* represents a shift in "paradigm," as imagined by Thomas Kuhn; a *technical revolution* represents a shift in "technical system," as apprehended by Bertrand Gille. In this light, the history of techniques can be viewed as a history of technical revolutions, or the part-substitutive part-cumulative succession of different technical systems.

However, the theory would be incomplete without its phenomenological layer. My position is that at each technical revolution, both a *systemic revolution* (i.e. a shift in technical systems) and an *ontophanic revolution* (i.e. a renewal of the structures of perception) occur. In the transition from one technical system to another, unfamiliar materials (wood, steel, petroleum, electricity, information) or novel inventions (the scotch yoke, the steam engine, the particle accelerator, the computer, Internet, etc.), alter not only the object of our perception, they also adjust the act of perceiving from within its core phenomenological dynamic. The technical culture redefines and renegotiates the phenomenality of beings (their ontophany) itself.

Observing the sky in the active silence of the Renaissance's wood and water mechanisms ("eotechnic" ontophany, Mumford 1934) or observing it from within the first Industrial Revolution era of steam engines and omnipresent metal (mechanized ontophany), bear little in common with the qualitative experience of the sky in a time of near constant immersion in interactive situations (digital ontophany). The being-in-the-world inherent to eotechnic ontophany, notable for its bodily proximity to nature and the silence of its instruments, is not that engendered by mechanized ontophany, marked by the violence of machines and the comprehensive mechanization of existence, nor is it the being-in-the-world particular to digital ontophany, determined by swift calculations, fluid procedures, and immersion in interfaces.

Hence, we must consider that for every technical system shift, a corresponding ontophanic shift occurs, which is then followed by the qualitative renewal of our sentiment of being-in-the-world.

23.2.2 The Ontophanic Sentiment or Technology As "Umwelt"

What emerges from the preceding analysis is that an era's technical system, behaving akin to a techno-transcendental structure, shapes the phenomenal quality of the world we experience. It is not so much the object of perception, but the act of perception, which changes; when the ontophanic quality of an experience-of-the-world

is transformed, the manner of feeling-in-the-world is itself reiterated. By this, I mean the qualitatively registered, or felt, aspect of the being-in-the-world experience. Henceforth, it shall be referred to as the *ontophanic sentiment*, which is understood as the perceived feeling and the experienced sentiment of the world's presence. The ontophanic sentiment should be deemed the result of a process which possesses both a subjective psychological dimension and an objective techno-historical one.

The subjective psychological component can be theoretically linked to *qualia*. Qualia refers to the different qualitative and subjective aspects of our mental states which are ineffable, intrinsic, private and directly accessible (Leyens 2000). They are "the qualitative and phenomenal characteristics of sensitive experiences, by virtue of which these resemble and differ from each other as they do." (Dennett, 1992; as cited par Leyens, 2000: 773) In short, they are what we feel *in a unique manner* whenever we perceive something, and they constitute the first dimension of the ontophanic sentiment. The second is the techno-historical dimension, which is the result of the group's objective conditions of life at a given time.

This latter dimension is of particular interest to me; my hypothesis being that within this dimension, the technical culture inside of which we exist (i.e. the mechanical culture of the early twentieth century, or the digital culture of the early twenty-first century) possesses a phenomenological influence over the *qualia* we perceive. Why would this be? Because reality or being are always particular and fortuitous; they respond to a period's technical context. Being-in-the-world or being-here (*Dasein*) is not a disconnected metaphysical condition, alienated from a century's context and anchored into the spirit as if the spirit itself were unchanging and isolated. Being-in-the-world or being-here are fundamentally different whether we inhabit the eotechnic technical system or the digital technical system.

This justifies why *technical systems* are not only superior levels of technical coherence and consolidation but must also be understood as genuine *ontophanic milieus*. By this, I do not mean "technical milieus" in the sense that it seems to have acquired within the French "simondonian" mind-set but rather that of perceptual milieus (*Umwelt*), as introduced in Jacon von Uexküll pioneering works. The latter's milieu theory holds, in my opinion, and as I will strive to demonstrate, more phenomenological than biological significance. Uexküll's *Umwelt* is often mistakenly translated as "environment," yet from the beginning of *Mondes animaux et monde humain* (A Foray into the Worlds of Animals and Humans), after his description and analysis of the "the tick's world," the author establishes a firm distinction between "milieu" or "self-world" (*Umwelt*) and "environment" or "surroundings." (*Umgebung*) The first is an animal's species-specific perceptual world, and depends entirely on a species' sensory devices; the second is "the surroundings we observe around him" (Uexküll 1934: 29), as made up of elements drawn from our own perceptual world (Fig. 23.1).

Once the ideas of Gille and Uexküll are combined, they allow me to support the following: just as animals live out their existence in their own perceptual milieu, which is determined by their *speci*fic (in the sense of *species*-specific) sensory devices, humans exist within their own perceptual milieu, which is qualitatively correlated with the systemic technical devices of their times. These *ontophanic milieus*,

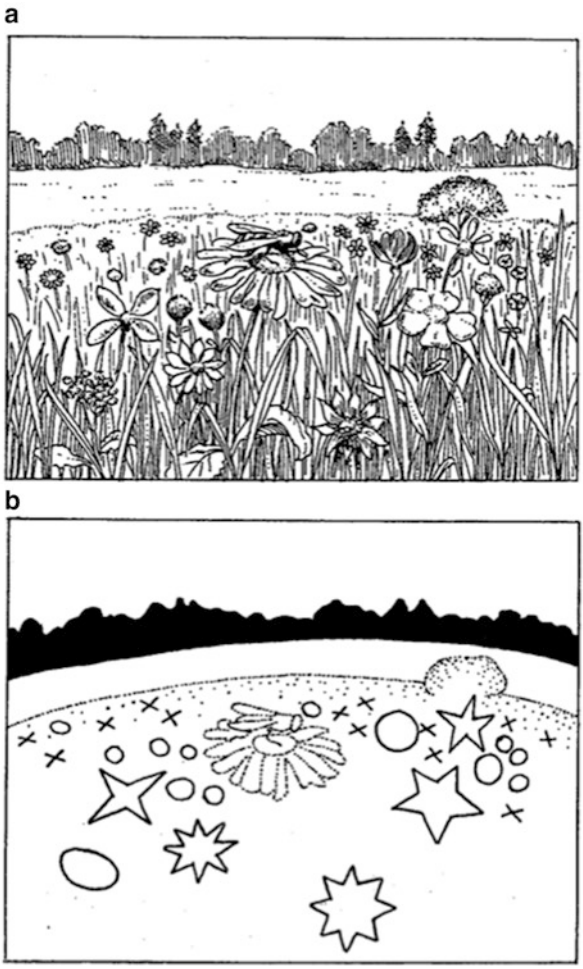

Fig. 23.1 *Umgebung (environment)* and Umwellt (milieu). (Source: J. Von Uexküll, *Théorie de la signification,* plates 5a et 5b)

are essentially technical *Umwelts*, or techno-perceptual milieus. Although "there is a link between Uexküll's *Umwelt* and the concept of a technical milieu," (Petit 2013) one can see that my understanding of milieu, as a concept, rests upon a novel phenomenotechnique significance that grants it the phenomenological weight insufficiently present in Simondon's "milieu" and Bernard Stiegler's "technical milieu."

Just as Uexküll urged us to imagine each animal as surrounded by "a sort of soap bubble that represents its milieu, and fills itself with all the characteristics the subject need access," we must imagine human beings from a given historico-technical period as occupying a sort of phenomenological soap bubble, or techno-perceptual vessel that is profoundly unique and characteristic of that period. Every given ontophanic milieu possesses its own particular ontophanic sentiment, made up of unique and singular qualia, which cannot be replicated in a different ontophanic milieu. We

can no more fathom "what is it like to be a bat," (Nagel 1974) than what it would be to perceive the world in an eotechnic ontophanic context such as that which prevailed during the Renaissance. Just as, according to Uexküll, animals discern "a whole new world taking shape in every bubble," humans also experience a new world in each ontophanic milieu.

Thus, each generation learns to perceive the world from within its own phenomenological bubble, establishing its perceptual relationship to reality by means of existing technical devices. As such, we are all *Technological Natives*, that is, phenomenologically speaking, natives of the structuring and dominant technology that configures our psycho-cognitive mechanisms relative to the world: railroad and photography natives, electricity and telephone natives, computer and internet natives, etc. If the expression *Digital Natives* is to have meaning, it must be phenomenological; as being born and raised in the digital soap bubble is phenomenologically different from being born and raised in the mechanical soap bubble. Being is therefore " being tech-born:" existence is a techno-perceptual emergence into the presence of things. To capture the techno-perceptual dimension of presence is to gain access to the *ontophanic sentiment*, and discover how our technical devices fashion the marrow of our world.

23.3 Digital Ontophany and Its Categories

The digital technical system has induced an unprecedented ontophany. We are faced with new ways of being: the algorithmic and interactive procedures we navigate through in the interfaces, icons and avatars we employ in our various simulated environments; the uncountable connection, navigation and notification actions we accomplish on our networks; or, the multiple interactions used to exchange daily with connected objects and other intelligent devices. Digital artefacts modify our perceptive habits, gradually establishing a new phenomenological "soap bubble" around us.

This new *ontophanic milieu*, which we progressively culturally integrate, is that of *digital ontophany*. The virtual is an undeniable attribute of this new *Umwelt* – digital devices produce digitally simulated beings – but it is merely one among many others. In order to consider the digital's phenomenological complexity, one must transcend the virtual and invent new concepts. In this section, I suggest we analyse *digital ontophany* by means of 11 categories, more logical than phenomenological. These do not intend to objectively describe how the digital phenomenon appears, technically and scientifically (though this viewpoint deserves consideration). Instead, the categories aim to reveal what the digital phenomenon subjectively establishes from an ontophanic perspective, that is, to consider it as it is experienced by the subject, from the point of view of its unique phenomenal response.

23.3.1 Noumenality: The Digital Phenomenon Is a Noumenon

Every technical revolution is a one of matter. The digital revolution is that of calculated matter. Part-mathematical, part-electronic, calculated matter is made up of electronic signals coded as binary data, or numbers. This singular state of matter, which operates at an invisible level, matches what Kant called a noumenon: a phenomenon deprived of phenomenality, imperceptible to humans as it is situated beyond the boundaries of plausible experience. Like quantum processors, digital processors are first and foremost noumena.

23.3.2 Ideality: The Digital Phenomenon Is Programmable

Calculated matter is above all an ensemble of idealities, or reasonable beings reliant upon programming languages. The latter can be defined as formal languages made up of symbols which allow a problem to be reduced to an algorithm. Everything a computer is able to do, be it a mainframe or a pocket device, is the result of lines of code. Calculated matter is, by nature, logical; this is why, as Lev Manovich (2013) described it, the digital age is one where *Software Takes Command*. Additionally, this explains why programming, which Pierre Levy (1992) labelled a "one of the fine arts," is one the most influential activities of our time.

23.3.3 Interactivity: The Digital Phenomenon Is an Interaction

The digital noumenon is not an obscure phenomenon, accessible only to programmers. Its programmable quality renders calculated matter fundamentally interactive, it can be actioned by a user, whose move leads to a systematic reaction, or response. Interaction is just that: reacting to a reaction which provokes a new reaction one must react to. To live in the digital era is to live in the midst of interactions, to be immersed in a potentially infinite relationship with calculated matter, as if it were a partner who always bounces something back. To design a digital interface is to design these interactions (Moggridge 2007).

23.3.4 Virtuality: The Digital Phenomenon Is a Simulation

The virtual describes digital devices' (particularly those equipped with a graphic interface) ability to produce *computer-simulated* realities. From a perceptive standpoint, it marks our move from a "culture of calculation" to a "culture of simulation."

(Turkle 1995) In the digital era, we work on a virtual *desktop*, file virtual files, draw with virtual paintbrushes… all of which are *computer-simulated*. The virtuality of digital interfaces is the most obvious part of the mould into which our perception is cast; at the phenomenal level, it is the *visible* agent of the calculated matter operating invisibly at a noumenal level. This explains the persistent, and inaccurate, amalgamation between the digital and the virtual.

23.3.5 Versatility: The Digital Phenomenon Is Unstable

No programmer in the world is capable of writing a program that will function bug-free on its first try. This is why numerous tests and "debuggings" occur prior to the launch of a new software or application. The bug and calculated matter are consubstantial, it is the digital phenomenon's versatility. Living within digital ontophany means living with unstable matter that one must occasionally reboot or restart. Having grown accustomed our machines' functional contingencies, we have gradually integrated that "bugs happen" into our perceptions and adapted accordingly. Floridi (2017) recently called that "the unsustainable fragility of the digital."

23.3.6 Reticular Nature: The Digital Phenomenon Is "Other-Phanic"

Potentially available social links within a group depend upon the devices that accept their activation, and when they are activated, allows them to be phenomenalized in a way that bears the ontophanic stamp of the device. Like the telephone (which enabled us to speak without seeing each other), the Internet engenders a new ontophany of others (or "otherphany"), making it possible to communicate directly without speaking to or seeing each other (text messages, tweets, instant messaging). Digital otherphany is therefore radically new (Vial 2014a, b), and consists in a paradoxical ambivalence which blends presence with absence: the other is here without being here (Missonnier et Lisandre 2003).

23.3.7 Instant Reproducibility: The Digital Phenomenon Is Replicable.

It has become so commonplace that we have already forgotten its extraordinary quality. Calculated matter makes it technically possible to *instantly* create a potentially infinite number of copies of a single element (text, image, sound, etc.); whatever the element may be, the processor deciphers it as a deliberate sequence of 0 s and 1 s. Not only is this, in the history of matter, a previously unseen property; from

a phenomenological perspective, it is a prodigious perceptual characteristic. Let us simply recall the time Renaissance printers required to complete a single copy of Homer's *Odyssey,* as compared to that which is today necessary to duplicate the same text a hundredfold and email it to a hundred recipients.

23.3.8 Reversibility: The Digital Phenomenon Is Retractable

The entire physical universe is subject to entropy, in other words, to growing disorder. On the scale of life, death is an illustration of the universe's fundamental irreversibility. However, one of the digital phenomenon's ontophanic properties is the potential to backtrack. In the land of calculated matter, it is always possible to "undo" (ctrl-z) or "redo." (shift-ctrl-z) From the perspective of phenomenological reception, this places before the user an event of near-supernatural proportion: it appears to overturn the irreversible essence of our physical world. Having grown accustomed to this ontophany of reversibility, we occasionally come to regret its absence from our non-digital experiences.

23.3.9 Destructibility: The Digital Phenomenon Can Be Annihilated

Calculated matter can vanish. It takes no more than an electrical power outage for that which has not been registered into memory to literally disappear from the realm of reality. Where has the data gone? It was no more than a sequence of 0 s and 1 s awaiting registration; it volatilized the very moment the electrical current ceased to flow through the microprocessors' millions of transistors. It has vanished. Calculated matter is decidedly odd, introducing into our experience-of-the-world an ontophany of disappearance that our faculties of perception are beginning to fathom and work with.

23.3.10 Fluidity: The Digital Phenomenon Is Thaumaturgical

Digital thaumaturgy is the near-miraculous phenomenology wherein things have lost their previous heft in order to become light and fluid, magically complying with our desires and expectations. Not only are our text messages sent and delivered more speedily than by post, but it has become easier, simpler, and more expeditious to write and transmit a message. All that can be accomplished digitally can be done with greater fluidity and ease. The digital phenomenon frees us from an important

portion of reality's resistance capacity. Like a thaumaturgical king, it accomplishes miracles, or simply works wonders.

23.3.11 Playfulness: The Digital Phenomenon Is Game-Like

Things that spontaneously stimulate amusement and spark a "playsurable" experience can be deemed playful (Vial 2014a, b). Playfulness is a technological device's (the realm of objects) ability to create a playful attitude (realm of the subject), that is the capacity to stimulate play within a psyche. The adoption of a playful attitude is natural and near-immediate when opposite an interface. The digital realm is not merely subject to the gamification processes (Genvo 2011), it is intrinsically playful: based upon all the preceding characteristics (interactivity and reversibility, in particular) it spontaneously favours a playful attitude and stimulates our aptitude for play. Play is an essential component of every digital phenomenon; and for this reason, we live in an increasingly gamified world.

23.4 Conclusion

Under no pretence do these 11 categories constitute an exhaustive analysis of digital ontophany, which deserves to be further developed. These 11 categories are merely a first conceptual foray into understanding the unprecedented phenomenality of digital beings. They allow us to rise above "digital dualism," a belief according to which "the digital and the physical are separate spheres." (Jurgenson 2012: 84) Such an exceedingly metaphysical belief splits the contemporary world in half along an invisible boundary. On either side of this limit, two spheres exist: the first would be the digital/online/on-screen domain; the second would be the physical/disconnected/off-screen domain. The word *virtual* is used to qualify the former, and *real* is attributed to the latter. Ontophany theory offers an efficient conceptual filter for deconstructing the profane metaphysics of reality and virtuality. Despite a lack of heuristic properties (it has produced no knowledge, nor does it bear any scholarly weight), the latter remains widespread not only among most of the digital era's users, including the media and public authorities, but also within the greater scientific community, in the humanities, who continue to distinguish between the real and the virtual as if evidence of their distinction was scientifically available.

In addition, ontophany theory offers designers and computer scientists elements of vocabulary destined to better orient a number of fundamental choices related to the design of digital products. Thus, I have included below, with my most heartfelt thanks, a simplified version of logician and computer scientist, Jean Sallantin's, work: a logical model that offers a rational, comprehensive view of digital ontophany's

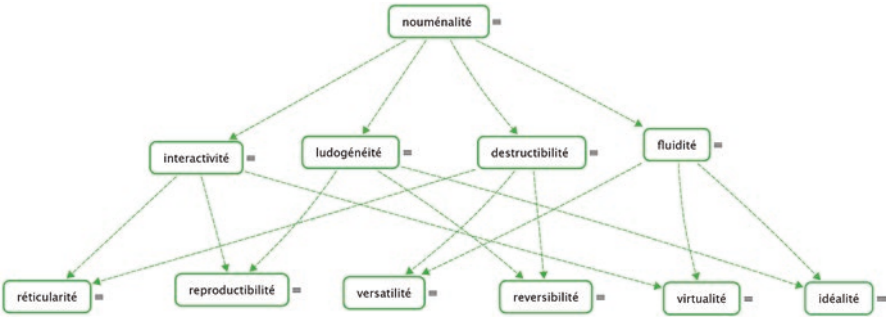

Fig. 23.2 Logical model of digital ontophany: Jean Sallantin's contribution (Jean Sallantin is a computer scientist and research director emeritus at the CNRS. He founded *Forum des Débats pour le bien commun* (Forum of debates for the common good), an association whose intent is to produce digital engineering for high level ethical debates, most notably it has developed the tools *Hypostasis* et *Dialoguea*. More information online: http://forum-debats.fr)

categories, that is, the means by which digital matter appears to humans, and their interdependencies (Fig. 23.2).

This diagram reveals the dependence structure between the categories of digital ontophany. Arrows signify that notions are dependent for either the proof or the negation. The presence of noumenality implies that of all other categories, its absence implies that of the four categories which depend upon it, and hence of all categories.

Digital design is currently the most innovative form of design; it dictates the shape of digital ontophany. Without design's creative spark, a number of calculated matter's most fundamental properties would not exist; the virtuality of graphic interfaces, is a, example. At a time where interactivity is widespread, the future of our being-in-the-world has never been so connected to design. Henceforth, its task is the creative exploitation of calculated matter's ontophanic capacities in order to produce hitherto undreamt meaningful human experiences. For those wondering whether they should participate in the digital revolution, the answer is simple: we must participate in its design. Therein lies the responsibility of digital design, it must better our experience of digital ontophany, regarded as a perceptual environment whose digitally centred phenomenality is fundamentally hybrid: digital and non-digital, online and offline, on-screen and off-screen. This is the environment our children are being raised in and, as they absorb new perceptual structures, where they acquire a sense of reality – their own.

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References

Bachelard, G. (1931–1932). Noumène et microphysique. *Recherches philosophiques*, I, 1931–1932, pp. 55–65. In Bachelard, G. (1970). *Études*. Paris: Vrin.

Bachelard, G. (1933). *Les Intuitions atomistiques*. Paris: Boivin.

Bachelard, G. (1934). *Le Nouvel Esprit scientifique*. Paris: Presses Universitaires de France, Quadrige. English edition: Bachelard, G. (1984). *The New Scientific Spirit* (trans: Goldhammer, A.). Boston: Beacon Press.

Bachelard, G. (1938a). *La Formation de l'esprit scientifique*. Paris: Vrin. English edition: Bachelard, G. (2002). *The Formation of the Scientific Mind*: *A Contribution to a Psychoanalysis of Objective Knowledge* (trans: McAllester Jones, M.). Manchester: Clinamen Press.

Bachelard, G. (1938b). *Psychanalyse du feu*. Paris: Editions Gallimard, Folio. English edition: Bachelard, G. (1987). *The Psychoanalysis of Fire* (trans: Ross, C. M.). Boston: Beacon Press.

Bachelard, G. (1951). *L'Activité rationaliste de la physique contemporaine*. Paris: Presses Universitaires de France.

Dennett, D. C. (1992). *Consciousness explained*. New York: Back Bay Books.

Eliade, M. (1965). *Le Sacré et le Profane*. Paris: Gallimard. English edition: Eliade, M. (1987). *The Sacred and the Profane: The Nature of Religion* (trans: Trask, W. R.). Harvest/HBJ Publishers.

Genvo, S. (2011). Penser les phénomènes de "ludicisation" du numérique: pour une théorie de la jouabilité. *Revue des sciences sociales*, n°45.

Floridi, L. (2017). The Unsustainable Fragility of the Digital, and What to Do About It. *Philosophy & Technology* 30(3), 259–261.

Gille, B. (1978). *Histoire des techniques*. Paris: Editions Gallimard, Bibliothèque de la Pléiade.

Gille, B. (1979). La notion de "système technique" (essai d'épistémologie technique). *Culture technique*, n°1, Centre de recherche sur la culture technique, Neuilly-sur-Seine.

Ihde, D. (1990). *Technology and the lifeworld: From garden to earth*. Bloomington/Indianapolis: Indiana University Press.

Jurgenson, N. (2012). When atoms meet bits: Social media, the mobile web and augmented revolution. *Future Internet, 4*, 83–91.

Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago: The University of Chicago Press.

Lecourt, D. (1969). *L'épistémologie historique de Gaston Bachelard*. Paris: Vrin.

Lévy, P. (1992). *De la programmation comme un des beaux-arts*. Paris: Editions La DÉcouverte.

Lévy, P. (1995). *Qu'est-ce que le virtuel?* Paris: Editions La DÉcouverte.

Leyens, S. (2000). La conscience imaginée. Sur l'éliminativisme de Daniel Dennett. *Revue philosophique de Louvain, 98*(98–4), 761–782.

Manovich, L. (2013). *Software takes command*. New York: Bloomsbury Publishing.

Missonnier, S., and Lisandre, H. (Eds.). (2003). *Le Virtuel: la présence de l'absent*. Paris: EDK.

Moggridge, B. (2007). *Designing interactions*. Cambridge, MA: The MIT Press.

Mumford, L. (1934). *Technics and civilization* (2010th ed.). Chicago: The University of Chicago Press.

Nagel, T. (1974). What is it like to be a bat? *The Philosophical Review, LXXXIII*(4), 435–450.

Petit, V. (2013). Le concept de milieu en amont et en aval de Simondon. *Cahiers Simondon*, n°5, Paris: L'Harmattan.

Quéau, P. (1993). *Le Virtuel: vertus et vertiges*. Seyssel: Champ Vallon, coll. Milieux.

Simondon, G. (1958). *Du Mode d'existence des objets techniques*. Paris: Aubier. English edition: Simondon, G. (2016). *On the Mode of Existence of Technical Objects* (trans: Malaspina, C.). Minneapolis: Univocal Publishing.

Simondon, G. (1960–1961). Psycho-sociologie de la technicité. In Simondon, G. (2014). *Sur la technique*. Paris: Presses Universitaires de France.

Tisseron, S. (2008). *Virtuel, mon amour: penser, aimer, souffrir, à l'ère des nouvelles technologies*. Paris: Albin Michel.

Tisseron, S. (2012). *Rêver, fantasmer, virtualiser. Du virtuel psychique au virtuel numérique*. Paris: Dunod.
Turkle, S. (1995). *Life on the screen. Identity in the age of the internet*. New York: Simon & Schuster Paperbacks.
Uexküll Von, J. (2010 [1934]). *A foray into the world of animals and humans: With a theory of meaning*. Minneapolis: University of Minnesota Press.
Vial, S. (2013). *L'être et l'écran: comment le numérique change la perception*. Paris: Presses Universitaires de France.
Vial, S. (2014a). Pour introduire le "playsir": pourquoi les appareils numériques sont "ludogènes". *Interfaces numériques, 3*(1), 149–161.
Vial, S. (2014b). Ce que le numérique change à autrui: introduction à la fabrique phénoménotechnique de l'altérité. *Hermès, 1*(68), 151–157.