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Normativity, Constructionism, and Constraining Affordances

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> Philosophy of information could be interpreted as a new *philosophia prima*, or *first philosophy*, although not from a *philosophia perennis* perspective.
>
> (Luciano Floridi, *The Philosophy of Information*, 2011)

> The scientific revolution was made possible by the abstraction and mathematisation of phenomena, and the pervasive technologisation of science: *episteme* and *techné* may not have entered into philosophical marriage yet, but they have been bedfellows for centuries now.
>
> (Luciano Floridi, *A defence of constructionism*, 2011)

1. *Introduction*

Many scholars recognize – and even take for granted – the manifold impact of information and communication technologies (ICTs) over our society, which is named, after this impact, the information society. This impact, which is widely assumed to be social, economic, legal, moral, political and so forth, poses the question of normativity (Durante, 2010a): i.e. whether this impact shapes or determines our own society. However, only few scholars recognize that it is also or most of all epistemic. Among them, Luciano Floridi stands out. Let us start, by presenting some views of Floridi on this crucial, preliminary point. First, he points out that this impact is bringing about both benefits and risks (Floridi, 2010, 6-7): "ICTs have been changing the world profoundly and irreversibly for more than half a century now, with breathtaking

scope and at a neck-breaking pace. On the one hand, they have brought concrete and imminent opportunities of enormous benefit to people's education, welfare, prosperity, and edification, as well as great economic and scientific advantages. [...] On the other hand, ICTs also carry significant risks and generate dilemmas and profound questions about the nature of reality and of our knowledge of it, the development of information-intensive sciences (e-science), the organization of a fair society (consider the digital divide), our responsibilities and obligations to present and future generations, our understanding of a globalized world, and the scope of our potential interactions with the environment."

Secondly, he suggests us that the impact of ICTs, that is related to the whole life-cycle of information, is epistemic about both the world and ourselves (Floridi, 2010, 8): "ICTs have made the creation, management, and utilization of information, communication, and computational resources vital issues, not only in our understanding of the world and of our interactions with it, but also in our self-assessment and identity."

Then, on this account, he reminds us that a theoretical lack of balance affects the information society and pushes us to mistake ICTs for merely *enhancing* or *augmenting* technologies, since it prevents us from realizing how profound the transformation of our understanding of reality and of ourselves driven by the ongoing information revolution is. This lack of balance calls for a viable philosophy of information (Floridi, 2010, 7-8): "The information society is like a tree that has been growing its far-reaching branches much more widely, hastily, and chaotically than its conceptual, ethical, and cultural roots. [...] The risk is that, like a tree with weak roots, further and healthier growth at the top might be impaired by a fragile foundation at the bottom. As a consequence, today, any advanced information society faces the pressing task of equipping itself with a viable philosophy of information."

Floridi has promoted and developed, in the recent decades, such a theoretical approach that has been condensed in the book, *The Philosophy of Information* (2011a). What is at stake is whether this approach provides us with a philosophical language capable of dealing with the afore-mentioned lack of balance. The answer requires a conceptual analysis in three steps: 1) how technology is to be devised, in order to prove that it structures our understanding of reality and of ourselves; 2) how epistemology is to be conceived, in order to show that there is one level of explanation of reality and of ourselves consistent with the technological rendition of reality and our technologically-

driven self-assessment; 3) how information is to be thought of, in order to demonstrate that the consistent level of explanation is informational. Furthermore, the analysis will require us to envisage what is the conceptual ground this consistency may be based on. Our hypothesis is that this conceptual ground is offered by Floridi's construction of the informational nature of levels of abstraction, as the *unity* of the irreducible plurality of observers and observations, and his semantic treatment of informational resources as *constraining affordances* by means of a *minimalist* and *constructionist* approach (Floridi, 2011b, 294).

2. *Technology as constraining affordances*

Luciano Floridi's meditation encourages us to realize how radical and profound the epistemic impact of technology over the society and its inhabitants is, not least for the very reason that both of them are already part of the world that ICTs are *re-ontologizing* (a technical term used by Floridi that will be clarified later in the paragraph): "What is in question is a quieter, less sensational, and yet crucial and profound change in our conception of what it means to be an agent and what sort of environment these new agents inhabit. It is a change that is happening [...] through a radical transformation of our understanding of reality and of ourselves. [...] In this sense, ICTs are not merely re-engineering but actually re-ontologizing our world" (Floridi, 2010, 10-11).

This requires us to realize in what terms technology may be said to have an impact over the society. In this perspective, we should refrain from incurring into three typical mistakes with regards to our understanding of technology: 1) instrumentalism; 2) techno-determinism; 3) empiricism. Let us briefly analyse these possible misunderstandings concerning the impact of technology over the society.

2.1. *The limits of instrumentalism*

Technology is not purely instrumental. And this happens for two reasons. First, the relation between means and ends is not entirely depending on the structure of the mean but on the act through which a mean is concretely

oriented towards an end. This means that every mean is *designed* to an end but the use through which the mean is *destined* to a particular end can constantly differ from the use which the mean has been designed to (which includes also *re-purposing*). A screwdriver can be used to kill someone. On this basis, we cannot speak of a mere instrumentality of technology, for it is not possible to define in advance the overall class of ends which a mean can be in reality destined to. Second, every mean is constructed and designed to meet a given class of needs. However, it is difficult, if not impossible, to identify from the start the importance and weight a particular mean will have, that is, whether or not this mean will be able to meet a *wider class of needs* compared to what it has been designed to. Also from this standpoint, we cannot speak of a mere instrumentality of technology, since it is not possible to identify in advance the whole class of needs a specific mean will be able to meet. The idea of non-instrumentalism of technology should lead to a more mature conception of technology, according to which, if technology cannot be merely understood as a set of means we dispose of, it can be understood as the environment we live in. The case of computer-based technology is paradigmatic. Not only the computer is meant to meet a nearly unlimited class of needs in its malleability (Moor, 1985), but it is no longer viewed as a mere instrument. Nowadays, technologies re-ontologize, on the contrary, the environment we live in, which steadily challenges the offline/online distinction (Floridi, 2010, 11-12): "While a dishwater interface is a panel through which the machine enters into the user's world, a digital interface is a gate through which a user can be present in cyberspace. [...] It follows that we are witnessing an epochal, unprecedented migration of humanity from its ordinary habitat to the infosphere itself, not least because the latter is absorbing the former."

This is recognized as the ecological approach of Luciano Floridi's philosophy of information, who has introduced the idea of 'infosphere' (see, *infra*, par. 2.3). In this perspective, it is worth noticing as well that most of the current images concerning ICTs and computer-based technologies (the Net, being online, digital natives, virtual reality, surfing the web, cloud-computing, intelligent ambient, second life and so forth) are spatial rather than instrumental metaphors (see Floridi, 2010, 11). The idea that technology re-ontologizes the world is epistemic (as we will see below: it affects the way we make experience of it at a determined level of abstraction) and it is not *deterministic*. This point deserves a special clarification, as it is often a matter of misunderstanding that underlies the ideas of strict social engineering or techno-

determinism, which underrate *the moment of complexity* (Taylor, 2001) characterizing our globalised world.

2.2. *The limits of techno-determinism*

Technology creates new possibilities: these possibilities can be understood as *affordances* (Wellman et al., 2003; Benkler, 2006; Kallinikos, 2011). People are enabled by new technologies to do what they cannot do before: this does not assure for sure that they will do it. As suggested by Benkler (2006), technology makes it easier (or more difficult) to perform some actions and human interactions. *Ceteris paribus*, Benkler says, the easiest things to do are more likely to be done, whilst the most difficult ones are less likely to be done. However, *the other variables never remain constant*. This is the reason why strict technological determinism – according to which, if provided with a technology t, we can expect the emergence of the social relation or structure s – is false (Benkler, 2006). As pointed it out, strict social engineering and techno-determinism fail to appreciate the idea that complexity is an *emergent property* of our society.

In the complex networked society of information subjects are subjects of relations that establish, along the informational fluxes, throughout their networked connections and interactions. This idea is strongly remarked by Floridi who comes to consider that being interactive becomes the criterion itself for existence (Floridi, 2010, 12): "Finally, the criterion for existence – what it means for something to exist – is no longer being actually immutable (the Greeks thought that only that which does not change can be said to exist fully), or being potentially subject to perception (modern philosophy insisted on something being perceivable empirically through the five senses in order to qualify as existing), but being potentially subject to interaction, even if intangible. To be is to be interactable, even if the interaction is only indirect."

To be a subject is thus to be subject to interaction. This affects the information society and qualifies its complexity. The complexity of society is therefore expressed by the fact that the outcomes of multiple interconnected subjects' interactions are not foreseeable in deterministic terms (Taylor, 2001). This last consideration requires us to endorse a non-deterministic conception of the impact technology displays in society. To endorse a non-

deterministic conception from a socio-technological point of view does not amount however to lessening the importance of such an impact.

On the contrary, technology is correctly viewed as a set of affordances (Welmann et al., 2003; Benkler, 2006; Kallinilkos, 2011), but those affordances are also 'constraining', since they give shape to the environment in which we are engaged to behave, namely, in which we are called upon to decide, act and interact. ICTs bring along both possibilities as well as constraints that shape our environment but do not bias our decisions and behaviors in any deterministic way. Our decisions and behaviors can properly be interpreted as responses – active and creative, and thus not-deterministically biased – to the constraining affordances that shape our own environment: this approach conceived in terms of *constraining affordances*, on the side of technology, and *active responses*, on the side of human agents, defeats both techno-determinism and cyber-optimism and raises the issue of human responsibility to the top of the agenda. Let us point out that the way ICTs give shape to the environment is, once again, epistemological rather than merely empirical: this brings about the limits of empiricism in explaining the complex impact of ICTs over society.

2.3. *The limits of empiricism*

Thirdly and lastly, the practical (social, legal, ethical, political, etc.) impact of ICTs is not to be separated from their epistemological impact: i.e. the way an epistemic agent experiences the reality constructed by information objects (Floridi, 2010). Too often, studies on digitalisation have treated the impact brought forth by the evolution of ICTs simply as a quantitative phenomenon or one of many organizational devices rather than conceptualizing the information revolution as a qualitative phenomenon that entails, epistemologically, a *re-ontologization* of the entire reality that is then conceived as an *infosphere*. This aspect has been highlighted by Floridi's philosophy of information (Floridi, 2007, 61; see also Floridi, 2003): "In order to grasp the ICT scenarios that we might witness and experience in the near future, it is useful to introduce two key-concepts […], those of "infosphere" and of "re-ontologization". *Infosphere* is a neologism I coined years ago […]. It denotes the whole informational environment constituted by all informational entities, their properties, interactions, processes and mutual relations. It is an en-

vironment comparable to, but different from cyberspace (which is only one of its sub-regions), since it also includes off-line and analogue spaces of information. *Re-ontologizing* is another neologism that I have recently introduced in order to refer to a very radical form of re-engineering, one that not only designs, constructs or structures a system (e.g. a company, a machine or some artifact) anew, but that fundamentally transforms its intrinsic nature [...]. Using the two previous concepts, my basic claim can now be formulated thus: digital ICTs are re-ontologizing the very nature of (and hence what we mean by) the infosphere, and here lies the source of some of the most profound transformations and challenging problems that our information societies will experience in the close future, as far as technology is concerned."

Technology (and notably ICTs) is no longer merely concerned with instruments to employ but with a radical transformation that gives shape, chiefly epistemologically, to our environment and hence to our engagement in the world. The idea of technology as (designing) the environment we inhabit in terms of constraining affordances is deeply affected by a conception of informational space (i.e. the infosphere), which is thought of starting from the properties of information (*rectius*: informational resources). Those properties are thus the constraining affordances that give shape to agent's epistemic experience of reality. Before we focus our attention upon this crucial point, we have to understand first what it means for epistemology to be conceived in terms of constraining affordances.

3. *Constraints and affordances: the epistemological principle of complementarity*

We have been speaking thus far of constraints and affordances in a technological perspective. Now, we have to expound those concepts from an epistemological standpoint. To this aim, we will harness Mauro Ceruti's (2009) epistemological investigations that draw attention to the importance of the principle of complementarity as the guiding idea of epistemology.

To start with, we have to remark that the process of *decentralization* that has been brought about by the technological architecture of the Net and, more generally, by the complexity of networks and ICTs – which has promoted larger access to information and participation in the user-generated content (Benkler, 2006) – has also been remarked and explained in epistemological terms. As Ceruti (2009, 5) puts it: "Contemporary epistemological ref-

lection instead refers the concept of decentralization to two equally fundamental facts: the *proliferation* of the real in objects, levels, spheres of reality, and the awareness that such proliferation is always translated in the language and in the communication of *an observer* [*our transl.*]."

This process of decentralization has been stressed also by Luciano Floridi (2011a) and formulated in informational terms, through a cluster of concepts (i.e. proliferation or flourishing of informational objects, the levels of abstraction, the semantic role of the informee, etc.): we will offer some hints of them later in the paper. For the moment, it suffices to notice that, according to Floridi, decentralization endorses an universalistic approach based on the notion of informational object: namely, any entity can be described and experienced by an epistemic agent as a sum of well-formed information. Let us come back to our main question.

The process of "decentralization of the image of the cosmos" comes together and is coupled with an analogue process of "decentralization of our ways of thinking that cosmos" (Ceruti, 2009, 5). Such processes (the role of the observer and a new interpretation of the laws of nature) have brought about an epistemological switch from a "science of necessity" to a "science of game" (Ceruti, 2009, 10): "To talk of game, in order to describe the evolutionary and historical processes of social and natural systems, is to hint to a deeper understanding of the mechanisms guiding the *history of nature*. [...] Evolutionary processes always depend upon insoluble interaction among general mechanisms which operate as constraints – "laws" – and the variety, the individuality, the spatial-temporal singularity of the events. Nature and history all the time play interesting games: i.e. games that do not necessarily have a winning strategy elaborated from the start. The course of the game always occurs within and though the interaction between rules posed as constraints and as constituents of the game, chance, and the contingency of particular events and of particular choices, and the strategies of the players in utilizing the rules and chance so as to construct new scenarios and new possibilities" (Ceruti, 2009, 10) [*our transl.*].

Constraints limit the sphere of possibilities not in the sense of being a cause of a determined, necessary effect, but, rather, in the sense that, by delimiting the sphere of possibilities, they afford new opportunities. This point has been accurately articulated by Ilya Prigogine and Isabelle Stengers (1981, 1076): "A constraint [...] does not merely delimit the possibilities; it is also an opportunity. It is not simply imposed from the outside onto a pre-existing re-

ality, but participates in the construction of an integrated structure and determines in the light of a particular occasion an entire spectrum of intelligible new consequences."

The idea of science as a "game" is thus based on the abandon of the image of science as an asymptotic process of approximation towards a unique and fundamental place of observation and explanation. On the contrary, the game consists precisely in the reintroduction of the observer within the system of observation and explanation (Ceruti, 2009, 39-40). The categorical universe of science ceases to appear as something unitary, homogeneous and fixed once for all; on the contrary, it appears as characterized by an irreducible plurality of observers' viewpoints (Ceruti, 2009, 43). This brings about a chief epistemological consequence: "The irreducibility of the observers' points of view *hic et nunc*, their presence in every description, in every strategy, indeed, in every matter of heuristics, sparks off an image of the development and structure of knowledge according to which the *possible universes of discourse are never defined exhaustively, but are constructed and depend on the network of concrete relations of antagonism, complementarity and cooperation between the multiple viewpoints at play*"(Ceruti, 2009, 43) [*our transl.*].

What does it imply? This epistemological approach not only endorses a necessary pluralism of observers' viewpoints but it asserts that the epistemic question is no longer that of reconciling different points of view; rather, the question is to understand how different points of view produce themselves reciprocally (Ceruti, 2009, 44): "The real reversal in perspective consists in the recognition of the irreducibility of the points of view or, what is more, in the recognition of their proliferation in different directions and at different levels. There is a plurality of points of view belonging to concrete subjects like those adopting different systems of categorical references to judge the same evidence. There is also a plurality of points of view within the same subject endorsing, with regard to some problems and ends, different systems of categorical references, logics and forms of thinking" (Ceruti, 2009, 96) [*our transl.*].

This understanding of knowledge is thus no longer characterized by the need to establish a synthesis between these different viewpoints (that can overrule some points of view in favor of some others). On the contrary, it is characterized by the image of antagonism, cooperation and complementarity between different systems of categorical references: in this perspective, the epistemic attention is rather focused on the conceptual matrices that make these systems or viewpoints antagonist, concurrent or cooperative. According

to this approach, the unity of knowledge is not expressed by synthesis but, rather, by complementarity (Ceruti, 2009, 98) and epistemology can be said to be inspired by a principle of complementarity that is an "essential precondition for every epistemological inquiry" (Ceruti, 2009, 97).

Different points of view as well as different forms of discourse should not be conceived as mutually alternative but rather as antagonist, concurrent or cooperative, according to the differences between conceptual matrices that make them differ from one another. Each one can participate in the construction of knowledge within the constraining affordances that characterize their respective conceptual matrix: this perspective requires us to move from a conception of epistemology based on *representation* to a conception of epistemology based on *construction* (Ceruti, 2009, 103) (which entails, as suggested by Floridi, 2011b, a *maker's knowledge* approach).

This brings about a profound consequence. The irreducible pluralism of viewpoints displayed by the principle of complementarity does not merely imply that antagonist or cooperative discourses concur in the construction of knowledge, according to the interplay between their conceptual matrices: it implies a little more. Precisely, it implies that the whole cognitive universe is constituted as a *polisystemic subject* (Ceruti, 2009, 111) that turns out to be the sphere of antagonism and cooperation between systems that are characterized by different logics, hierarchies, subjects and viewpoints: "This image of the subject as being composed by multiple systems constitutes a mode of thought which decisively orients many of the most interesting contemporary studies into the nature of the subject at whatever level they are placed" (Ceruti, 2009, 111) [*our transl.*].

Such an epistemological perspective is therefore crucial in order to account for what it may be called as the subject or the system of explanation. In fact, it is important to conceive the epistemic foundation of our understanding of the world on the basis of the requirements displayed by the principle of complementarity, according to which the subject or the system of explanation may be understood as a place where do occur antagonism and cooperation between systems that are characterized by different logics, subjects and viewpoints. This not only requires that different levels of explanation (i.e. models that are formed on the basis of different conceptual matrices) can concur in (a) the construction of an heterogeneous basis of information, but also that (b) information are conceived as semantic structures that are necessary in the construction of differences between conceptual matrices. In other

words, differences between levels of explanation are to be traced back to differences between conceptual matrices (i.e. sets of constraining affordances), since the epistemic framework of complementarity is based on the "recognition of the multiplicity of places of observations and explanations" (Ceruti, 2009, 120).

So, the question is to realize whether Floridi's theory of semantic information sets the epistemic conditions for the recognition of a plurality of observers, observables and levels of observation, as semantic differences between conceptual matrices. In this respect, we should not forget a crucial point, which is often missed or underestimated in the analysis of Floridi's philosophy of information, namely, that *all* levels of abstraction are, according to Floridi, *informational*. We will come back on this key point. For the moment, let us formulate our hypothesis in general terms.

Our hypothesis is that Floridi's philosophy of semantic information accomplishes this task, and we will seek to argue that it may be so, as a result of his methodological treatment of *epistemological levelism* (Floridi, 2011a, 47), coupled with his notion of *informational resource* conceived in terms of constraining affordance. If this holds, the consequence is substantial: we are then provided with a philosophical language that bridges philosophy of technology and epistemology, both conceived in terms of sets of constraints and affordances, through the understanding of what are the properties of the informational resources, which give shape (design) to the informational environment, where we are engaged to decide, act and interact.

4. *Floridi's philosophy of semantic information: the understanding of epistemological levelism*

The main method of Luciano Floridi's philosophy of information is *the method of levels of abstraction* (Floridi, 2011a, chap. 3; see also, 2008), which entails the "recognition of the multiplicity of places of observations and explanations" (Ceruti, 2009, 120). Floridi's understanding of levelism – the idea that reality can be studied at different levels – is not ontological but rather epistemological (Floridi, 2011a, 47): "I agree with Heil and Schaffer that *ontological levelism* is probably untenable. However, I shall argue that a version of *epistemological levelism* should be retained, as a fundamental and indispensa-

ble method of conceptual engineering (philosophical analysis and construction) in PI [philosophy of information], albeit in a suitably refined version."

This form of criticism – to opt out ontological levelism and opt for epistemological levelism – resembles Kant's *transcendental* approach, as Floridi remarks (Floridi, 2011a, 58; 2011b, 293), by stating where his assessment agrees with Kant's (Floridi, 2011a, 59): "The attempt to strive for something unconditioned is equivalent to the natural, yet profoundly mistaken, endeavour to analyse a system (the world in itself, for Kant, but it could also be a more limited domain) independently of any (specification of) the level of abstraction at which the analysis is being conducted, the questions are being posed and the answers are being offered, for a specific purpose."

Floridi endorses Kant's transcendental approach, "which considers the conditions of possibility of the analysis (experience) of a particular system", whilst he "does not inherit from Kant any mental or subject-based feature" (Floridi, 2011a, 60). Two aspects are here to be remarked that may lead to confusion about Floridi's transcendental approach. First, Floridi's method of levels of abstraction does not disregard the role of "any mental or subject-based feature", as if it were endorsing some forms of descriptivism or naïf naturalism that are already displaced by Floridi's constructionism (Floridi, 2011a, 75-77; 2011b, 285). Rather, mental or subject-based features may qualify as *gradients of abstraction* but cannot denote the nature of levels of abstraction, which is just informational, as we will see below. Secondly, what is crucial in Floridi's transcendental approach is the idea itself of analysis (*experience*) as something stemming from a set of *questions being posed and answers being offered for a specific purpose*. This problem-based approach should be conceived in terms of a "conceptual constructionism" (Floridi, 2011a, 24), as in Deleuze and Guattari, *What is philosophy*, 1994. We should now take a step back and explain, in short, what a *level of abstraction* (LoA) is, according to Floridi's epistemological levelism.

In general terms, levels of abstraction are "interfaces that mediate the epistemic relation between the observed and the observer" (Floridi, 2011a, 76). They are mediations that articulate and put into communication the different poles (e.g. the observer and the observed, or mind and world) of the irreducible difference which the conceptual core of epistemology seems to consists of. More analytically, levels of abstraction can be described as follows, according to a cluster of definitions: "A *level of abstraction* (*LoA*) is a finite but non-empty set of observables. No order is assigned to the observables, which are

expected to be the building blocks in a theory characterized by their very definition"(Floridi, 2011a, 52); "An *observable* is an interpreted typed variable, that is, a typed variable together with a statement of what feature of the system under consideration it represents" (Floridi, 2011a, 48); "A *typed variable* is a uniquely named conceptual entity (the *variable*) and a set, called its *type*, consisting of all the values that the entity may take" (Floridi, 2011a, 48).

Epistemological levelism, based on levels of abstraction, endorses pluralism without falling into *relativism* or *perspectivism*, since "the explicit reference to the LoA makes it clear that the model of a system is a function of the available observables, and that it is reasonable to rank different LoAs and to compare and assess the corresponding models" (Floridi, 2011a, 75; 2011b, 292). In other terms, this means that the necessary choice between levels of abstraction is not merely subjective but is goal-oriented, that is, it depends on the goal of the *analysis*. We understand now why we have stressed before the idea of analysis: the 'right' level of abstraction is never independent from a set of questions and answers nested around the specific purpose for which it is adopted. Comparison and assessment of different level of abstraction and of their corresponding models are made possible by *gradients of abstractions* that may be defined as follows: "A Gradient of Abstraction (GoA) is a formalism defined to facilitate discussion of discrete systems over a range of LoAs. Whilst an LoA formalizes the scope or granularity of a single model, a GoA provides a way of varying the LoA in order to make observations at different levels of abstraction" (Floridi, 2011a, 54).

If we come back to what we have above remarked as regards to mental or subject-based features, this point can be briefly clarified here. The crucial epistemic dualism of mind and world can be faced along two different perspectives: one which singles out either 'mind' or 'world' as the right explanation of the knowing process; another which focus its attention on the idea that the conceptual core of epistemology resides on an irreducible 'difference' between instances (e.g. mind and world) to be articulated. According to the former, the epistemological discourse becomes a chain of dotted positions between the two poles of mind and world: i.e. from pure mentalism to strong naturalism. According to the latter, the question is at what level this seminal, irreducible difference is set. In Floridi's views, mentalism or naturalism can qualify as *disjoint gradients of abstraction* (Floridi, 2011a, 56), and the fundamental conceptual core of epistemology resides in the informational nature of *all* levels of abstraction, as we will see shortly, since information, as well-formed, mea-

ningful and veridical data, (which is in itself a distinction or a difference that make a difference [MacKay, 1969; Bateson, 1973]), already includes, at its essential level, the notion of an irreducible difference, according to which it is possible to speak of an *informational ontological pluralism*, in order to describe Floridi's epistemological position (Durante, 2010b).

Epistemological levelism endorses also realism without falling into *descriptivism*, since "for a typed variable to be an observable, it must be interpreted, a correspondence that has inevitably been left informal. This interpretation cannot be omitted: an LoA composed of typed variables called simply *x*, *y*, *z*, and so on and treated rather formally, would leave one with no hint of its domain of application" (Floridi, 2011a, 75; 2011b, 282). In plain terms, an observable is an interpreted typed variable, which requires both to *interpret* the typed variable and to previously *choice* which observables and hence which types are appropriate to a phenomenon to be regarded. Do we need to have in advance an account of such a phenomenon? Does this expose us to circularity? "How, then, is that to be determined without circularity?" (Floridi, 2011a, 76). We come closer, here, to a point we judge decisive in the construction of Floridi's semantic philosophy of information. Let us point out what enables levels of abstraction to model the world or its experience, which generate and commit the agent to informational spaces, in a 'realistic' way: "Here, I may stress that the behaviors at a moderated LoA must adequately reflect the phenomena sought by complying with their constraints and taking advantages of their affordances; if not, then either the definition of the behavior is wrong or the choice of observables is inappropriate. When the definitions of observable must incorporate some 'data', the latter behave like constraining affordances and so limit the possible models" (Floridi, 2011a, 76).

All levels of abstraction are thus informational: they allow an epistemic agent to experience the world in terms of informational objects. This does not mean that the informational level is just one among many others levels of abstraction. Rather, it is the informational construction of an object that allows an epistemic agent to *vary* the levels of abstraction at which she can experience the object. Data, which constitute information, require levels of abstraction to be processed and levels of abstraction require data as constraining affordances to delimit the possible range of information constructs. This mutual relation is not that of infinite regress but, on the contrary, defines Floridi's constructionism (2011b, 282-283) and serves us to realize why knowledge

is not some sort of picture of the world, i.e. of the intrinsic nature of the system it analyses. Rather, it is a way to construct models of systems that delimit the range of the consistent answers that might be offered to the relevant questions (Floridi, 2011b, 302). The time has come to expound the seminal idea of data as *constraining affordances*, which underlies the constructionist approach of Floridi's semantic philosophy of information and provides us with a language that bridges together (the normativity of) technology and epistemology.

5. *Informational resources as constraining affordances*

According to Luciano Floridi's philosophy of information, information is conceived, primarily, as semantic information. The approach, which is most commonly expounded in order to understand what is semantic information, is the *data-based approach*, according to which information may be said to consist of data. More analytically, the general definition of (factual) semantic information conceived in terms of data is the following (Floridi, 2010, 50): "[DEF] *p* qualifies as factual semantic information if and only if *p* is (constituted by) *well-formed*, *meaningful*, and *veridical data*."

Syntax, meaning and veridicality are the properties of data that constitute semantic information. Even if our own attempt is here to explain normativity in the semantic terms of informational resources (*data* + *meaning*) conceived as *constraining affordances*, we have to remark that the normativity of syntactical structures ("rules that govern the chosen system, code, or language", Floridi, 2011a, 84) already affects the semantic definition of information. There is no room in the present context to look into the intricacy of a broadly understood syntax ("what determines the form, construction, composition, or structuring of something", Floridi, 2011a, 84) and semantics. So, let us come back to an essential implication of the general definition of semantic information.

Floridi himself suggests that a tight relation exists between information and knowledge. More precisely, one of the advantages of the general definition of information in terms of semantic information is the following (Floridi, 2010, 51): "The second advantage is that [DEF] forges a robust and intuitive link between factual semantic information and knowledge. […] Knowledge and information are members of the same conceptual family. What the for-

mer enjoys and the latter lacks, aver and above their family resemblance, is the web of mutual relations that allow one part of it to account for another. […] Build or reconstruct that networks of relations, and information starts providing the overall view of the world which we associate with the best of our epistemic efforts. So once some information is available, knowledge can be built in terms of explanations or accounts that make sense of the available semantic information. […] In this sense, *semantic information is the essential starting point of any scientific investigation* (we underline)."

Although much debated, information can upgrade to knowledge, according to Floridi, when information is conceived as a building block, which encapsulates truth, in a "web of mutual relations that allow one part of it to account for another". Knowledge upgrades information not because it accumulates the selected information (in this most common perspective, knowledge is what lessens the informativeness of information, its *newness*, and transform it in some stable and durable views of the world) but, first and foremost, because it already conceives an *explanation* as a network of relations. We have already pointed out that the epistemic plurality of explanations (i.e. the principle of complementarity viewed in the par. 3) is rooted in the ontological plurality of informational resources (Durante, 2010b), conceived as data + meaning, since a datum itself is fundamentally defined as follows (Floridi, 2011a, 85): "Dd datum = $_{\text{def.}}$ x being distinct from y, where the x and the y are two uninterpreted variables and the domain is left open to further interpretation."

They are both the distinctiveness and the intertwinement of (the two uninterpreted variables constituting) a datum (what Floridi calls the "diaphoric definition of data", 2011a, 85) the original, crucial source of the informational relatedness (Durante, 2010b) of the web of mutual relations. This also means that a datum is nothing *per se* or, to put it better, that nothing is a datum *per se*. "A datum is a relational entity" (Floridi, 2011a, 87). It is not at all immediately visible what follows from the construction of data in terms of *relata*. For the data being related (i.e. not accessible *per se*), it means that data can never be accessed or elaborated independently of a *level of abstraction*. As Floridi puts it (2011a, 85-86), the presence of data can be "empirically inferred from, and required by, experience" but they cannot be epistemically accessed as such. However, it is exactly the relatedness of data that plays a crucial role (this is a conceptual key point of the analysis), when data are accessed and elaborated at any given level of abstraction, since the relational

nature of data constitutes the *normativity* of the domain of variables left open for further interpretation.

Let us formulate this point, by making use of Floridi's perspicuous terms, that eventually bring us back to our first commitment, that is, to prove that Floridi's philosophy of semantic information elaborates a conceptual language that bridges philosophy of technology and epistemology through his informational conception of constraining affordances and his notion of constructionism as conceptual engineering (Floridi, 2011b, 283). Indeed, it is Floridi that remarks what we may call the *normative* dimension of data, namely that data can be an "external anchor" (Floridi, 2011a, 85) for our information, since: "Understood are relational entities, data are *constraining affordances*: they allow or invite certain constructs (they are *affordances* for the information agent that can take advantage of them) and resist and impede some others (they are *constraints* for the same agent), depending on the interaction with, and the nature of, the information agent that process them" (Floridi, 2011a, 87).

Data are constraining affordances as *relational entities*, being this relatedness the reason why data cannot be accessed or elaborated independently of a level of abstraction. We understand now why semantic information is the fundamental starting point of any scientific investigation, since data, which constitute information, are essential in the construction of a web of mutual relations, *precisely because* they are not accessible per se. In other terms, data understood as constraining affordances are "answers waiting for the relevant questions" (Floridi, 2011a, 77; 2011b, 294).

Here lies the philosophical foundation of Floridi's constructionism, which is rooted in, as we have tried to prove so far, the *relational* nature of data conceived as constraining affordances. This also means that his constructionism is always entrenched with human responsibility (Floridi, 2011b, 300) since data are not understood as *sources* of information but as *resources* for information. This distinction is an important one, since forges a robust, although not always patent, link between constructionism and responsibility. Let us first quote Floridi (2011a, 77) and clarify afterwards this point: "Note, however, that the fact that data may count as *resources* for (namely, inputs an agent can use to construct) information, and hence for knowledge, rather that *sources*, leads to constructionist arguments against mimetic theories that interpret knowledge as some sort of picture of the world. […] Whether empirical or conceptual, data make possible only a certain range of information con-

structs at a given level LoA for a particular purpose, and not all constructs are made possible equally easily."

So, the distinction between resources and sources of information both leads to constructionist views and forges a link between constructionism and responsibility *for the very same reason*, namely, because the informational, epistemic agent cannot have a passive attitude towards data: she is not a passive receiver of information; data are inputs that need to be processed to construct information. However, this construction is not a construction *from the scratch*, since data are not only affordances but also constraints. The informational, epistemic agent bears responsibility for her construction, and this is mostly made visible through the idea of a web of questions and answers, i.e. through a representation of knowledge as a *network of account* (Floridi, 2011a, chap. 12; 2011b, 295).

Almost at the end of our analysis, we figure out that it is his *constructionism*, mediated by the conception of data as constraining affordances, the terrain where Floridi builds a profound, yet not fully explored, connection between techné and episteme (Floridi, 2011b, 283). Floridi's informational constructionism is an epistemic attempt to amend the dichotomy between subjective and objective dimensions of knowing (Floridi, 2011b, 285) and make it less controversial (by implicitly discussing Kant's epistemological dichotomy between intuitions and concepts as, for instance, it is acutely done in McDowell's *Mind and World*, cited in Floridi, 2011a) in terms of affordances and constraints. In this perspective, Floridi states what follows (2011a, 78): "From this perspective, the world is neither discovered nor invented, but designed by the epistemic agents experiencing it. This is neither a realist nor an anti-realist but a *constructionist* view of information."

Floridi's *constructionist* view of information provides us with a conceptual vocabulary that enables us to understand why both (information and communication) technology and epistemology may be said, in a sense, to *construct* (or *design*) the world, where we are engaged to decide and to behave, in a way that neither describes nor dictates us how to decide or to behave (Floridi, 2011b, 285): "So our difficulty is complex, because it consists in being radically moderate: we need to identify and follow the middle course, represented by the *design* of the world. This hardly thrills young minds, smacks of compromise to older ones, and, worst of all, cannot escape the constant risk of being confused with either Scylla or Charybdis, *discovery* or *invention*. [...] Equilibrium requires more energy than resolution, so we can hardly hold firm the

view that *constructionism* is neither *realism* nor *constructivism*, because knowledge neither *describes* nor *prescribes* how the world is but *inscribes* it with semantic artefacts."

In contrast, this construction makes us responsible for the *creative responses* (Durante, 2011) we formulate within the *constraining affordances* that design our environment at different levels of abstraction, i.e. technological, epistemological and informational. The normativity of constraining affordances is consistent with both human indeterminacy (freedom) and accountable behaviours (responsibility). What Floridi makes us to perceive is that such normativity is not just a matter of code (as suggested by Lessig, 1999), law or social norms, but it is already concerned with the relational nature of data and hence it underlies the *construction* of information, which in turn *constructs* ourselves as epistemic, informational agents experiencing the world in terms of well-formed, meaningful and veridical data (Floridi, 2011b, 283).

6. *Conclusions*

We have sought to prove that Floridi's epistemic constructionism is normative in what it articulates together human freedom and responsibility by means of a conception of informational resources (made of well-formed, meaningful and veridical data) conceived as *constraining affordances*. This is just one of the ways in which the philosophy of information may be said, according to Floridi, to be a *philosophia prima*, i.e. a philosophy whose conceptual vocabulary provides us with a broader understanding of our world.

This result is accomplished by Floridi's philosophy of semantic information in three key moves that we would like to sum up here. First, *data are conceived as relata*, relational entities, that cannot be accessed per se but only to a given level of abstraction: this posits a plurality of observers and observations that may turn into relativism or perspectivism, if some sort of unity fails to be associated with plurality. Secondly, *all levels of abstraction are informational*: it is the informational construction of an object (here, in the semantic terms of data + meaning) that allows an epistemic agent to *vary* the levels of abstraction at which she can experience the object. Thirdly, it is the semantic treatment of informational resources as *constraining affordances* that forges the *unity* of the irreducible plurality of observers and observations and

bridges the philosophy of technology and epistemology, thanks to a normative conception of *epistemic constructionism*.

However accurate is Floridi's attempt to single out and tell apart his philosophy of information and his ethics of information, some fundamental tenets of his ethics (like, for instance, the informational treatment of agents, patients and messages, the flourishing of the infosphere, or the direct relation between availability of information and level of responsibility) have been deeply rooted in his *constructionist* view of semantic information.

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