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THE PHILOSOPHY OF INFORMATION: TEN YEARS LATER

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Abstract: This article provides replies to, and comments on, the contributions to the special issue on the philosophy of information. It seeks to highlight convergences and points of potential agreement, while offering clarifications and further details. It also answers some criticisms and replies to some objections articulated in the special issue.

Keywords: information ethics, levels of abstraction, philosophy of information, semantic information, structural realism, veridicality thesis.

This is a collection of very fine articles. Their scope, depth, and insightfulness are testimonies not only to the brilliance and scholarship of their authors but also to the remarkable maturity reached by the philosophy of information (PI) during the past decade. In the late 1990s, I was searching for an approach to some key philosophical questions: the nature of knowledge, the structure of reality, the uniqueness of human consciousness, a satisfactory way of dealing with the new ethical challenges posed by information and communication technologies, to list some of the topics discussed in this issue. I had in mind a way of doing philosophy that could be rigorous, rational, and conversant with our scientific knowledge, in line with the best examples set by the analytic tradition; non-psychologistic, in a Fregean sense; capable of dealing with contemporary and lively issues about which we really care; and less prone to metaphysical armchair speculations and idiosyncratic intuitions. I was looking for a constructive philosophy which would provide answers, not just analyses, that would be as free as possible from a self-indulgent, anthropocentric obsession with us and our super-duper role in the whole universe, and respectfully sceptical of commonsensical introspections and Indo-European linguistic biases. It was a recipe for disaster, but then, sometimes, fortune favours the irresponsible. During that period of intellectual struggle and confusion, I realised one day that what I had in mind was really quite simple: a philosophy grounded on the concept of information. I was not on my way to Damascus but in Oxford, at Wolfson College, sitting on the bank of the river Cherwell, when I

discovered that the spectacles I was looking for were on my nose. It was the summer of 1998. Six months later, I gave a talk in London, at King's College, entitled "Should There Be a Philosophy of Information?" The question was of course rhetorical, and I soon started working on the essay that became "What Is the Philosophy of Information?" It was published in this journal in 2002 (Floridi 2002).

Almost a decade later, it is reassuring to see that the project for a philosophy of information as a discipline in its own right was not ill conceived. Witness the fact that it would be impossible to do full justice both to the quality of the contributions in this special issue and to the value of the new and exciting area of research to which they belong. For this reason, in the following pages I shall not try to summarise or discuss every interesting issue raised by the contributors. Rather, I shall briefly highlight and seek to clarify some critical points, with the goal of at least reducing our disagreement, if not achieving a full convergence of views. As I remarked in a comparable context (Floridi 2008a), philosophy deals with problems that are intrinsically open. Intellectual disagreement is therefore an essential part of its conceptual explorations. When it is informed and reasonable, it should be welcome, not eradicated. It is a very sad restaurant, soon to be out of business, in which you can order only the same dish, no matter how delicious it is. At the same time, the controversies contained in this special issue should not eclipse the fact that there is a great deal about which we all agree, in terms of importance of topics, priority of problems, and choice of the best methods to be employed to address them. We would not be engaged in this lively dialogue if we did not share so much intellectually.

Let me now add a final word before closing this introductory section. There will be no space below to summarise the main lines of my research. So the reader interested in knowing more about my work might wish to have a look first at a very gentle introduction to the nature of information, written for the educated public (Floridi 2010a). The more adventurous reader might be interested in knowing that most of the essays referred to in this special issue were part of an overarching project and have now found their proper place, as revised chapters, in a single, more technical book (Floridi 2010b).

Comments and Replies

I shall be extremely brief in my comments on Hendricks's and Roush's interesting essays. Hendricks shows how *minimalism* might be useful in tackling the problem of "pluralistic ignorance," where ignorance is to be understood as lack of information, rather than lack of knowledge. I might have overlooked some error, but I must confess that I fully agree with both the analysis and the proposed solution. Roush follows a similar pattern, although in her case it is the *knowledge game* that she finds

valuable in order to approach the "swamping problem," that is, the question of what added value knowledge might have, over and above mere true belief, or, I would add, mere information. What both essays share, methodologically, is a careful approach to formal details; a problem-solving orientation that allows the selection of the right information-theoretical tools; and a treatment of informational agents, their environments and the issuing processes free from psychologistic features. This is where PI most fruitfully joins forces with recent trends in formal epistemology. In both essays, for example, the agents involved could be companies, political parties, or individual human beings; it does not matter. In terms of contents, there is one more feature that I would like to stress: the central role played by *equilibria*, both negatively, when in Hendricks's essay we need to disrupt pluralistic ignorance, and positively, when in Roush's article we need to discover what stable conditions lead to an optimal epistemic relation with the world. Impeccable.

The next essay, by Bringsjord, also focuses on the *knowledge game* (KG). As often when reading Bringsjord, my temptation is to treasure his insights and keep quiet. Given the circumstances, I will have to resist it. So let me start by saying that Bringsjord's mastery of KG is not only flawless but impressive. I might have invented the game, but he certainly knows how to play it elegantly. Bringsjord and I agree that—given the *current* state and understanding of computer science—the best artefacts that artificial intelligence (AI) will be capable of engineering will be, at most, zombies: artificial agents capable of imitating an increasing number of human behaviours. In most cases (I am sure Bringsjord agrees), such agents will also be better than the fragile and fallible humans who provide the original templates. In some cases—here Bringsjord might disagree, but see below—human capacities will remain unmatched. I have in mind primarily our semantic abilities. In any case, and for a variety of converging reasons, neither of us is convinced that human-like minds might be engineered artificially. We also agree that current, off-the-shelf, artificial agents as we know them nowadays cannot answer self-answering questions and pass the test.

Where we seem to part company is in deciding whether this holds true also for *foreseeable* artificial agents. I think so, but Bringsjord offers a proof that this is not the case. In other words, he can foresee and forecast artificial agents that will pass the KG test. I am happy to concede the point. He might be right. Or maybe not. *Partly*, it is a matter of *details*, which Bringsjord, absolutely rightly, could not fully provide in his essay. Not his fault, but they remain the preferred hiding places for devilish disappointments. *Partly*, it is a matter of *implementation*. Sometimes what looks plausible on paper turns out to be unfeasible on the ground, thus proving to be only a logical and not an empirical possibility. *Partly*, it is a matter of *interpretation*. Passing a test means being able to pass it

regularly and consistently, according to qualified judges, not occasionally or only thanks to a favourable setting. Think of a reading test: if you could read only sometimes, and only when looking at a text you previously memorised, you would not quality as a reader. Now, Bringsjord acknowledges that "current logic-based AI is able to handle some self-answering questions. Notice, though, that I say 'some' self-answering questions. There is indeed a currently insurmountable obstacle facing logic-based AI that is related, at least marginally, to self-answering questions: it is simply that current AI, and indeed even foreseeable AI, is undeniably at-out impotent in the face of any arbitrary natural-language question—whether or not that question is self-answering." So it seems that my cautious attitude is vindicated. However, let us forget about all these inclusions of "partly." Let us assume, for a moment, that all possible reservations turn out to be de facto unjustified: details are provided, the implementation works, and there is no hermeneutic disagreement about what is going on. Test passed. This is the real point at which I may not be able to follow Bringsjord any further. For, as I wrote in "Consciousness, Agents and the Knowledge Game," the KG was never meant to provide a "Floridi challenge" for AI. Let me quote the relevant passage (emphasis added):

> What is logically possible for (or achievable at some distant time in the future by) a single articial agent or for an articial multiagent system *is not in question*. I explained at the outset that we are not assuming some science ction scenario. "Never" is a long time, and I would not like to commit myself to any statement like *"articial agents will never be able (or are in principle unable) to answer self-answering questions". The knowledge game cannot be used to argue that AI or AC (articial consciousness) is impossible in principle*. In particular, its present format cannot be used to answer the question "How do you know you are not a futuristic, intelligent and conscious articial agent of the kind envisaged in Blade Runner or Natural City?" As far as articial agents are concerned, the knowledge game is a test to check whether AI and AC have been achieved.
>
> (Floridi 2005a, 431)

So much so that the article ends by showing a slightly puzzling result: the test can also be passed by a multi-agent system made of zombies. This is one more reason why I would not be surprised if Bringsjord were completely right. A challenge is usually a negative modal statement of the form (c) "x cannot ϕ", for example, "John cannot run the marathon" A test is usually a conditional (possibly modal) statement of the form (t) "if x (can) ϕ then x qualifies as y," for example, "if John (can) runs the marathon then John is fit." It is true that the same ϕ, for example, running the marathon, enables one to meet the challenge and pass the test. This is where Bringsjord's and my line of reasoning run parallel. But then, he seems to believe that I am arguing in favour of a specific interpretation of (c), whereas I am interested in (t). The purpose of the

KG is that of providing a test whereby you may show, given that you are conscious (not a zombie), how you know that you are (not a zombie). If that is achieved, that was the challenge I wished to meet.

The essay by Scarantino and Piccinini and the essay by Adams form a perfect diptych in which the former provide some criticisms that are well answered by the latter. Adams himself, of course, has his own reservations and, as we shall see presently, they are to be taken seriously, but let me comment first on Scarantino and Piccinini's contribution.

Scarantino and Piccinini are right in stressing the need for a *pluralist approach* to the many different uses of "information." If I may phrase such pluralism in my own words: "Information 'can be said in many ways,' just as being can (Aristotle, *Metaphysics* Γ.2), and the correlation is probably not accidental. Information, with its cognate concepts like computation, data, communication, etc., plays a key role in the ways we have come to understand, model, and transform reality. Quite naturally, information has adapted to some of Being's contours. Because information is a multifaceted and polyvalent concept, the question 'what is information?' is misleadingly simple, exactly like 'what is being?'" (Floridi 2003, 40). As a consequence, any thesis about the nature of information, including the one about the *veridicality* of *semantic* information, should be handled with extra care. It would be daft, for example, to identify a piece of software as information—as we ordinarily do in IT and computer science—and then argue that, since information must be true, so must be that piece of software. "True about what?" would be the right sceptical question. Likewise, it would be unduly pedantic to insist that, given the veridicality thesis, cognitive scientists should stop speaking about information processes. Sometimes, they may be talking about information in a non-semantic sense; some other times, they may just be using a familiar synecdoche, in which the part (semantic information) stands for the whole (semantic information and misinformation), as when we speak in logic of the truth-value of a formula, really meaning its truth or falsehood. Often, they are using information as synonymous for data, or representations, or contents, or signals, or messages, or neurophysiologic patterns, depending on the context, without any loss of clarity or precision. The reader looking for an initial map of the varieties of senses in which we speak of "information" can find it in Floridi 2010a.

Since I agree that information "can be said in many ways," I also subscribe wholeheartedly to Scarantino and Piccinini's invitation to adopt a *tolerant attitude* towards the uses to which the concept of information can be put. Bananas are not fruit, and tomatoes are not vegetables, but we know where to find them in the supermarket, and not even a philosopher should complain about their taxonomically wrong locations. So why, given their pluralism and tolerance, are philosophers so keen on rejecting the veridicality thesis?

The thesis in itself seems to be fairly harmless and most reasonable (Floridi 2005b, 2007). When you ask for some semantic information—about when the supermarket is open, for example—you never specify that you wish to receive truthful information. That goes without saying because that is what semantic information is. So if you get "false information" and go to the supermarket when it is closed, you may rightly complain about your source for having provided you with no information at all. Some semantic content *c* qualifies as semantic information *i* only if *c* is truthful. If it is not, then *c* is misinformation at best, disinformation at worst (this being misinformation wilfully disseminated for malicious purposes). Simple.

The veridicality thesis is also hardly original. It has been treated as obvious by several philosophers who have handled semantic information with all the required care, including Grice, Dretske, and Adams. It does make life easier when dealing with difficult and controversial issues such as some paradoxes about the alleged informativeness of contradictions (they are not informative now because they are false [Floridi 2004]); the link between semantic information and knowledge (knowledge encapsulates truth because it encapsulates semantic information, which, in turn, encapsulates truth, as in a three-doll matryoshka [Floridi 2006]); or the nature of relevant information [Floridi 2008b]). Despite all this, it would be ungenerous to dismiss the contribution by Scarantino and Piccinini as a fruitless mistake. Let me try to explain why.

Imagine that Mary is told by John that "the battery of the car is flat." This is the sort of semantic information that one needs to consider when arguing in favour of the veridicality thesis. The difficulty is that such semantic information is the result of a complex process of elaboration, which ends with truth but certainly does not start from it. Indeed, one of the great informational puzzles is how physical signals, transduced by the nervous system, give rise to high-level, truthful semantic information. When John sees the red light ashing, there is a chain of data-processing events that begins with an electromagnetic radiation in the environment, in the wavelength range of roughly 625–740 nanometres, goes through John's eyes and nervous system, is elaborated by him in terms of a red light ashing in front of him, is combined with regular associations on the physical side (the light being red is coupled to the battery being flat by the engineering of the system) as well as with background knowledge on John's side (e.g., concerning signals of malfunctioning in cars). It all ends with Mary receiving John's message that "the battery is flat." Some segments of this extraordinary journey are known (again see Floridi 2010a for a simple introduction to it), but large parts of it are still mysterious. Now, if one wishes to talk rather loosely of information from the beginning to the end of this journey and all the way through it, that is fine. We know our way in the supermarket, we can certainly handle loose talk about information. There is no need to be so fussy about words: the

tomatoes will be found next to the salad, and the bananas next to the apples. So I am fully convinced by Scarantino and Piccinini: from such a "supermarket approach," the veridicality thesis is untenable, since truth or falsehood plays absolutely no role in "information" for a long while during the journey from electromagnetic radiation to "Sorry, dear, the battery is flat." Of course, this leaves open the option of being conceptually careful when dealing with semantic information itself, the end product of the whole process. Botanically, tomatoes and courgettes are fruit, and bananas are female flowers of a giant herbaceous plant. Likewise, in philosophy of information semantic information is well formed, meaningful and truthful data. If you still find the veridicality thesis as counterintuitive as the fruity tomatoes, just assume that Grice, Dretske, Sequoiah-Grayson, Adams, I and anyone else who endorses it are being botanically precise and talking about *premium semantic information*. As we saw above, some pluralism and tolerance will help.

A final comment before turning to Adams's essay. I believe Scarantino and Piccinini might be on to something interesting, namely, a project concerning the various uses and meanings of information in cognitive science. If I am not mistaken, then this is most welcome, as their investigations will provide a much-needed insight into an area still under-investigated. Of course, it is to be hoped that such a project will complement and build upon the fundamental research by Barwise and Seligman on the logic of distributed systems and the analysis of information flow, and hence be consistent with their results, including the fact that "the proposal agrees with Dretske's in that it makes information veridical. That is, if *a* is of type α and this carries the information that *b* is of type β, then *b* is of type β" (Barwise and Seligman 1997, 36). I shall return to this point in a moment, in connection with Adams's rejection of the *distributive thesis* (information closure).

Adams's elegant and insightful essay deserves to be studied carefully. There is much about which I completely agree, and more that I have learnt. When I wrote above that Adams provides a useful answer to issues raised by Scaratino and Piccinini, I had in mind things like his clear and correct distinction between "a semantic notion of information . . . [understood as] information that *p* or about state of affairs *f* that exists in one's cognitive system (one's beliefs, or perceptions or knowledge)" and "information in the sense of natural sign or nomic regularity, where information can exist outside cognitive agents." This is only an example, and the essay merits close analysis. Here I shall deal only with Adams's two objections.

The first concerns the possibility of having a system acquire some semantics (ground at least some of its symbols) through supervision. According to Adams, helping a system (whether human or artificial, it

does not matter) to acquire the meaning of a symbol *s* might be a case of *causal derivation*, not of what I would call semantic cheating, that is, a case in which the trainer has the meaning pre-packaged and transfers it to the trainee, who not only would have been unable to acquire it except for such a present but above all still does not master it. I must admit that I remain unconvinced. We know that artificial systems with semantic capabilities are not yet available. Leave to one side whether they will ever be. The fact that currently they are not shows that the symbol-grounding problem remains unresolved. And I suspect that this is so because causally inducing a system to behave as if it had acquired and mastered the meaning of a symbol *s* is useful but still insufficient to guarantee that that system actually has gained a semantics for *s* and the capacity to use it efficiently. I agree with Adams that causal derivation might be *sufficient to teach* a potentially semantic system (e.g., a dog or a human being) the meaning of *s*, given the right circumstances (but see below the case of the slave boy). I also agree that the same causal derivation might be *sufficient to transmit* the meaning of *s*, from a system that enjoys its semantics to a system that might acquire it. I even agree on the fact that causal derivation might play a *role, perhaps crucial, in creating* the meaning of *s*, as when ‘‘nature teaches’’ a system the meaning of *s*. Where Adams and I might (but I am not sure) disagree is that causal derivation is sufficient in generating the meaning of *s* ex nihilo, without presupposing any previous semantics of *s* or another system proficient in handling its meaning. The problem is as old as Plato: does the slave boy (the close equivalent to a robot or ‘‘animated instrument’’)[1] really understand that the diagonal of any square is the base of a square of double the area? Or is it only because Socrates knows Pythagoras’s theorem that he is able to induce the slave boy, gently but firmly, through causal derivation, to say what Socrates wishes him to say, like a dumb but well-trained parrot? I am sceptical about the slave boy’s actual acquisition of the right semantics. But even if you do not share my scepticism, and side with Plato, note that ultimately the Platonic solution is to make the slave boy’s semantics innate. Either way—the semantics is not really there or the semantics has been there all along, because pre-implanted—I remain unconvinced by Adams’s position and his comments regarding the zero-semantic commitment (see his footnote 3).

The second objection is a different case. I believe here Adams is right, and that he is so in an important sense. He argues that we should reject

[1] ‘‘*So a slave is an animated instrument*, but every one that can minister of himself is more valuable than any other instrument; for if every instrument, at command, or from a preconception of its master’s will, could accomplish its work (as the story goes of the statues of Daedalus; or what the poet [Homer] tells us of the tripods of Vulcan, ‘that they moved of their own accord into the assembly of the gods’), the shuttle would then weave, and the lyre play of itself; nor would the architect want servants, or the [1254a] master slaves.’’ Aristotle, *Politics*, book I, chapter V, trans. First Last Names (City: Publisher Name, 0000).

information closure, that is, the *distributive thesis* according to which, if a is informed both that p and that $p \rightarrow q$ then a is also informed that q. As Patrick Allo kindly reminded me, in general the problem is (at least) twofold (see Allo forthcoming). One might wish to reject information closure

(i) either because a may not be informed that p;
(ii) or because p does not count as semantic information;
(iii) or both, of course.

I understand Adams as being concerned only with (i) in his contribution. His support of a tracking theory of knowledge, his references to Dretske, and his examples involving Chris all point in this direction unambiguously. So I shall dedicate much more attention to (i). On (ii) (and hence [iii]), let me just add that it is sufficiently open to interpretation to allow different views on the value of information closure, but that Adams and I appear to agree on the following. Recall the quotation above from Barwise and Seligman 1997. Suppose two systems a and b are coupled in such a way that a's being (of type, or in state) F is correlated to b being (of type, or in state) G, so that $F(a)$ carries (for the observer of a) the information that $G(b)$. Information closure in this case means that, if $F(a) \rightarrow G(b)$ qualifies as information and so does $F(a)$, then $G(b)$ qualifies as well: if the low-battery indicator (a) flashing (F) indicates that the battery (b) is flat (G) qualifies as information, and if the battery indicator flashing also counts as information, then so does the battery being flat. Where Adams and I might disagree (but see below) is in relation to (i). As Adams acknowledges, I reject the *distributive thesis* in cases in which the kind of information in question is empirical (seeing, hearing, and so on), but not when it is semantic. He would like to see a more uniform approach, I resist it, but we might not be at variance. Consider the following case.

In the left pocket of your jacket you hold the information that, if it is Sunday, then the supermarket is closed. Your watch indicates that today is Sunday. Do you hold the information that the supermarket is closed today? The unexciting answer is maybe. Perhaps, as a *matter of fact*, you do not, so Adams is right. You might fail to make the note in the pocket and the date on the watch "click." Nevertheless, I would like to argue that you should, that is, that as a matter of *normative analysis*, you did have the information that the supermarket was closed. So much so that you will feel silly when you are in front of its closed doors and realise that, if you had been more careful, you had all the information necessary to save you the trip. You should have known better, as the phrase goes. Now, I take logic to be a normative discipline. From this perspective, the *distributive thesis* seems to me to be perfectly fine. Still from the same perspective, the *distributive thesis* is not always applicable to empirical

information. Adams is talking about the performance of actual players, I am talking about the rules of the game. Consider the same example. This time you *read* the following e-mail, sent by the supermarket: "The shop will be closed every Sunday." You also read the date on your computer, which correctly indicates that today is Sunday. Have you read that the supermarket is closed today? Of course not, as we assume that there were no further messages. Should you have read that it was? Obviously not, for where was the text that you should have read? Should you have inferred that the supermarket was closed today? Surely, for that was the information that could easily be inferred from the two texts that you read. If Adams's thesis is that information closure is at best only a matter of normative logic and certainly not an empirical fact, I am convinced.

Like Adams's, Colburn and Shute's essay is another contribution from which I have learnt much. I believe Colburn, Shute and I fully converge on roughly the same conclusions, even if coming from rather different perspectives. I find this most reassuring, as evidence of a robust and convincing indication of a sound methodology. In light of this agreement, I would like to take this opportunity to stress two aspects of the method of levels of abstraction (LoAs).

First, it is true that once it is imported into a philosophical context, it is harder to re-apply the method in computer science in precisely the same new format. Some of the exact formalisms are inevitably lost, in order to make room for conceptual and qualitative flexibility, and this justifies the fact that it is a one-way adaptation. However, computer science must be credited for providing the conceptual resources that have led to the philosophical approach based on LoAs. We can do better philosophy by learning such an important lesson from our colleagues in the computer science department, and this much is to be acknowledged. It is a matter not of pedigree but of giving to Turing what is Turing's.

The other aspect concerns exactly the roots of the method of abstraction in computer science, a science that, in so far as it is also a branch of engineering, builds and modifies its own objects, exactly as economics, law, and the social sciences may build and modify social life and interactions. LoAs do not represent only a hermeneutic device; like Dennett's stances, they are the conditions of possibility of informational access to systems and hence what determine our models of them. In this sense, they have an ontic value that stances or other forms of "perspectivism" cannot but lack.

Colburn and Shute's essay ends with some considerations on the possibility of an ontology based on informational structures. This is where the thread of the conversation is picked up by Bueno's essay. His contribution is a welcome expansion in the number of options favourable

to some form of structural realism. It seems to contain, however, just a couple of unfortunate misunderstandings of my position, which might be worth dissipating here in order to leave the reader with a set of clearer alternatives.

Bueno seems to accept the veridicality thesis. Excellent news. However, he is a bit cautious in some cases. He need not be. Everyone defending the veridicality thesis would agree with him when he writes that "information can be used successfully, but it need not be true for it to play a successful role. Truth is not required for empirical success, not even novel empirical success involved in the discovery of a new planet," for the following reason: "It is easy to be confused about both 'relevance' and 'misinformation' ['false information']. . . . That misinformation may turn out to be useful in some serendipitous way is also a red herring. False (counterfeit) banknotes may be used to buy some goods, but they would not, for this reason, qualify as legal tender. Likewise, astrological data may, accidentally, lead to a scientic discovery but they are not, for this reason, epistemically relevant information. Of course, there are many ways in which misinformation may be indirectly, inferentially or metatheoretically relevant, yet this is not what is in question here" (Floridi 2008b, 84–85).

Bueno speaks of Bode's law instead of astrological data, but the reader can see where the problem lies: understanding the veridicality thesis as if it were inconsistent with the usefulness of false content (misinformation) would be a mistake, not least because the usefulness of misinformation can be presented as a case of *ex falso quodlibet*. In a different context (Floridi 2005b), I also explained why some misinformation—for example, to be told that there will be three guests for dinner tonight when in fact only a couple is coming—might be much preferable to vacuous semantic information—for example, to be told that there will be fewer than a hundred guests tonight. Again, it is a simple exercise left to the reader to draw a similar conclusion about Newtonian physics. All this is really not a serious issue, and could be disposed of as just marginal details that can easily be rectified. Much more interesting is to try to understand what sort of theory of truth would allow us a robust approach to strictly speaking false but still valuable theories (or semantic misinformation). If I am told that the train leaves at 12.15 when in fact it leaves at 12.25, I might be slightly annoyed, but I can still catch it. In other words, an informee should prefer semantic information, but, short of that, she could still settle for, and exercise plenty of tolerance towards, valuable misinformation, that is, false content that still allows her to interact with the targeted system successfully. I must confess that I am not keen on "quasi-truth," since it seems to me to be a label under which one might hide the difficulty rather than clarify it. But I take the problem as seriously as Bueno, and I have tried to solve it through a correctness theory of truth that might deal with such cases (Floridi submitted). Even a short outline of it would take

us too far away here, but let me just say that the basic idea is to analyse truth in terms of correctness, and correctness in terms of a commutative relation (in the category theory's sense of "commutation") between the model under discussion and its target system, that is, between the proximal access to some semantic information and the distal access to its target system.

It seems that a correctness theory of truth places Informational Structural Realism (ISR), a bit closer to Bueno's Structural Empiricism, yet Bueno is concerned that I might actually be a sceptic. Allow me to put myself in excellent company: this was, and still is sometimes, the same accusation moved against Kant. He who denies epistemic access to the ultimate nature of things in themselves must be a friend of Sextus Empiricus. Absolutely not. Scepticism, when properly understood, is a family of philosophical arguments in favour of the impossibility of establishing, with total certainty, whether we have reached the truth about some particular matter. Translated into informational terms, it is an attack against the possibility of determining whether some semantic content c about a target system s might actually be a case of semantic information i about s. Is $c_s = i_s$? The sceptic does not argue in favour of a negative answer but seeks to show that one can never tell. ISR, on the contrary, is in favour of the possibility of answering an endless number of occurrences of such type question, although from a fallibilist position of course, since we might be, and have been, wrong in the past (see Floridi 1996 and forthcoming). So the real divide is not between my sceptical and Bueno's anti-sceptical position but a constructionist understanding of knowledge, which is essential to grasp ISR but which Bueno disregards. This is not surprising, since Bueno seems to favour some representationalist theory of information/knowledge, which I do not endorse. To put it very simply, I support a maker's knowledge approach (Bacon, Hobbes, Vico, Kant, Cassirer) and hold that gaining information and hence knowledge about the world is a matter of data *processing*, where "processing" is taken very seriously. As with cooking, the end result of our cognitive (including scientific) elaborations is absolutely realistic, since without ingredients and proper baking there is no cake; but the outcome does not represent or portray, or x-morph, or take a picture of the ingredients or of the baking. Knowledge delivers conceptual artefacts, which are as real and objective as the cake you are eating. This anti-representationalism should not be confused with any version of anti-realism.

A final remark before closing. So far, I have been talking as if ISR concerned information only understood semantically, epistemically, cognitively, or methodologically. It does not. ISR defends primarily an *ontological* thesis, namely, an informational understanding of reality. This seems a significant difference from Bueno's structural empiricism. It is well captured by Steven French (forthcoming):

> In effect what Floridi's approach allows us to do is separate out the commitments of ESR [Epistemic Structural Realism] from both Worrall's agnosticism and Poincaré's espousal of 'hidden natures'. At the first order LoA [level of abstraction], ESR—as the name suggests—offers us an epistemic form of realism to the effect that what we know in science are the relevant structures (and if we are to follow this line of analysis, we should perhaps drop or at least modify the afore-mentioned slogan). Beyond that, Poincaré, Worrall *et al.* should remain quiet; there should be no talk of natures, hidden or otherwise, no adoption of forms of agnosticism, but rather a 'quietist' attitude to any further commitments. To make those is to proceed to the next level, as it were, and here the appropriately metaphysically minimal attitude is that offered by OSR [Ontic Structural Realism], which reduces the amount of humility we have to swallow by reconceptualising the underlying (putative) objects themselves in structural terms.

In a popularization of his views on the ultimate nature of reality, Frank Wilczek (2008) presents ordinary matter as a secondary manifestation of what he calls *the Grid*, namely (what we perceive as mere) empty space (but that is actually) a highly structured entity. Wilczek was awarded the Nobel Prize in physics in 2004 for his contribution to the discovery of asymptotic freedom in the theory of the strong interaction. I shall not pretend to understand the sophisticated physics that led him to his views about matter. Metaphysically, however, I am very sympathetic, because it seems to me that Wilczek's Grid is the physicist's counterpart of what I have defined as the *infosphere*: a non-materialist view of the world as the totality of informational structures dynamically interacting with each other. This is the ontology I defend in ISR.

The final essay on which I shall comment looks at my work on the ethics of the infosphere. Volkman's main contention is clearly stated at the beginning of his contribution: information ethics (IE) is too foundational, impartial, and universal to "do full justice to the rich data of ethical experience." The use of "data" might have been a Freudian slip, but the point is unmistakable: IE is partly useless, partly pernicious. Reading the article, one has the impression of a Manichean dichotomy between two moral discourses: the good one, which is warm, human, careful about the richness of life and the complexity of our difficult choices, bottom-up, with roots in real cases and full of *phronesis*; and the bad one, which is cold, objectifying, abstract, unable to capture the nuances of everyday experience, top-down, detached and algorithmically calculating. Virtue ethics (VE) versus IE, in case you had any doubts. If only things were so simple. The outcome of such a Manichean view is that Volkman's essay contains many insightful remarks, but very few of them concern IE. Anyone interested in an informed and reasonable discussion of IE might prefer reading the essay by Terry Bynum that provides the Epilogue to this special issue, or the excellent essay by Charles Ess (2008).

The problem with Volkman's approach is that it seeks to build a conflict of views at the cost of unfairness and lack of objectivity, when a more constructive and fruitful dialogue between IE and VE could have identified many convergences, as well as potentially bridgeable disagreements and complementary divisions of interest, thus acknowledging what each theory might be better positioned to provide. Personally, I have often argued that the distance between IE and VE is small, since both call our attention to the need to develop morally good constructions of agents and their societies and of the natural and artificial environments. *Poiesis* is a fundamental activity that requires careful ethical investigations, and it is fair to claim that it is IE that has stressed its crucial ethical importance in the current debate (cf. the concept of *homo poieticus*). The increasing interest in the ethics of design is proof of such timely focus. But this is how far Volkman is prepared to be friendly towards IE. Having grasped this point, he adopts the Manichean dichotomy illustrated above and tries, unsuccessfully though strenuously, to transform differences in focus, emphasis, and scope into a deep and irrecoverable fracture.

Interest in the essay as a critical discussion of IE starts waning once it charges IE with the patently impossible pretence of "incorrectly suppos[ing] that there are judgments regarding the being and ourishing of information entities that are not bound to the perspective of some agent, and that these judgments can enter into human decisions about what to do and who to be." This straw man, the cold and dry view from the sky that Volkman is keen to slap onto IE, is nowhere to be found in my or indeed other colleagues' work on IE. Not least because, as Volkman acknowledges, IE firmly holds that ethical investigations must be developed by adopting and specifying the levels of abstraction (LoA) at which they are conducted, and therefore the context and purposes for which a LoA is privileged. If the reader is put off by "levels of abstractions," as something that sounds too close to a cold logical formalism, let me suggest replacing them here with warmer "human views." What IE argues is that our intrinsic animal biases, our egocentric drives, and our anthropocentric inclinations can be withstood, mitigated, and rectified, through reflection, education, social pressure, and a progressive improvement in our understanding of our roles in the universe. We start as selfish egoists interested only in ourselves, Hobbes is right, but we can and must hope to become unselfish and altruistic stewards of the world. Failure along the way is inevitable, especially at the individual level, but whatever small degree of success is achieved, it should be most welcome. We can become better agents by progressively balancing the demands of the shouting "me, always me, only me!" with the demands of the other, both biological and artificial. This is why, for example, IE is regularly compared to Buddhist ethics. Of course, we must "start where we are," as Volkman repeatedly recommends. Yet this is trivial. There is no other place where we could start. The interesting question is whether staying

where we accidently find ourselves thrown by natural evolution is good enough. IE argues that it is not (Hongladarom 2008). The alternative is an ego-colonialism that is unappealing. We read in the essay article that "although I cannot succeed in my life by becoming someone else, it is equally true that my own success depends on extending my self by including others in my very constitution." It is on this well-meant inclusiveness from within, rather than respectful acceptance from without, that some of the worst deeds have been justified. Especially nowadays, it seems irresponsibly self-indulgent to enjoy the reassuring scenarios in which there are only friends and loving agents in ethics, while the rest is politics. What happens when the world neither wishes nor consents to be included in our "very constitution" but asks respectfully to remain other from us? How can we deal with conflicts between polarised agents, all bent on "starting where they are" and unwilling to step out of their egocentric predicaments? IE rejects the option "Go out into the highways and hedges and force them to enter that my house may be filled" (Luke 14:23). Augustine was keen on that passage, which provided textual justification for the Crusades.

Unfortunately, having made the crucial false step of misunderstanding IE for a cold, objectifying, abstract approach to human morality, the essay stumbles on several other points. The contemporary shift of the ethical discourse, from being entirely agent-centred to being progressively (and at least equally if not) more patient-centred is disregarded at a cost, although it represents a crucial novelty in such areas as medical ethics, bioethics, environmental ethics, or indeed information ethics. Accusations of *historicism* (or, alternatively, *anachronism*, if the historical development fails to support a theory) leave the conceptual debate untouched. The list of other missed opportunities to debate IE in its real nature rather than as a caricature is too long not to become tedious. For example, pluralism is intrinsic to IE, which also defends the crucial importance of the *overridable* nature of the respect to be paid to informational entities, a feature that explicitly makes IE both willing and able "to discriminate between the information entities that merit respect and admiration and those that have not earned this status." Or take Volkman's misrepresentation of the boy in the junkyard example. I provided it as an excessively simplified thought experiment to illustrate pros and cons of different ethical theories. Volkman uses it as a target to which he addresses rhetorical questions: "Is the boy really just getting mindless kicks, or is he rehearsing his shot? How much time are we talking about? What are the alternatives open to him? What brought him here, and where is he going? There are myriad coherent stories in which it would be perfectly O.K. to smash things." But the rhetorical game of adding "richness" to an intentionally streamlined example is trivial, and anyone can play it: "Nobody grants that breaking windscreens necessarily leads to a bad character, life is too short to care and, moreover, a boy who

has never broken a car windscreen might not become a better person after all, but a repressed maniac, who knows? Where did David practice before killing Goliath? Besides, the context is clearly described as ludic, and one needs to be a real wet blanket to reproach a boy who is enjoying himself enormously, and causing no apparent harm, just because there is a chance that his playful behaviour may perhaps, one day, slightly contribute to the possible development of a moral attitude that is not praiseworthy" (Floridi 1999, 54).

I fully subscribe to the view that "if impartialism and universalism turn out to be undesirable in themselves, at least when carried beyond their appropriate domains, then much of ethics since the Enlightenment has been a mistake, with IE as the most recent and most glaring example." It is exactly because I believe that much of ethics since the Enlightenment has been a success and that IE is the most recent development of such a worthy tradition that I wholeheartedly hope that ethics will maintain a reasonable defence of both impartiality and universality. A fair and tolerant society depends on them, and we are getting more global by the day. We need to find a way to dialogue impartially and universally. What one might argue is that the impartial and universal application of morality needs to be consistent with the diversity of the agents and patients involved, and the variety of their predicaments. This is not a point made by Volkman, but I doubt anyone would disagree about it.

In conclusion, the essay represents a missed opportunity. Since it opens with a famous and beautiful quotation from Emerson, allow me to close my few remarks with a classic one by Shakespeare:

> HORATIO: O day and night, but this is wondrous strange!
> HAMLET: And therefore as a stranger give it welcome.
> There are more things in heaven and earth, Horatio,
> Than are dreamt of in your philosophy. (*Hamlet*, act 1, scene 5)

Conclusion

Information has been a subject of philosophical interest for a very long time. In a way, one could read the whole history of philosophy as containing a thin electric-blue line that runs from the pre-Socratic philosophers to us. Obvious developments in our technology, society and culture have brought to light such continuous, uninterrupted thread, which I have characterised in my work as the philosophy of information (PI). PI has opened up a very rich area of conceptual investigations. Now, the development of new philosophical ideas seems to be more akin to economic innovation than we usually acknowledge. For when Schumpeter (1943) adapted the idea of "creative destruction," in order to interpret economic innovation, he might as well have been talking about intellectual development. This is the way I understand the metaphor of

the digital phoenix used by Bynum and Moor (1998) (see the next essay). This special issue shows how much creative destruction has been caused by PI. I hope it is only the beginning.

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