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THE MORAL VALUE OF INFORMATION AND INFORMATION ETHICS

Mariarosaria Taddeo

Introduction

The expression 'information societies' may not sound new to the reader, it refers to societies whose economic, political, and cultural welfare depends on the elaboration, communication, and manipulation of information. During the past three decades, the media and the press, academic articles, and even everyday discussions have increasingly focused on the informational, technology-driven turn that characterizes this historical moment, in which widely disseminated and radical changes affect both individuals and societies at the same time. Such changes generate new questions and problems ranging from individual well-being and the management of societies to the regulation of design and deployment of technological artefacts, as well as the definition of "good" and "evil" and our understanding and perception of reality itself.

In an influential paper, Moor (Moor 1985) described the changes that the information revolution was prompting and the need for conceptual analyses to address them properly. In his words: "although a problem … may seem clear initially, a little reflection reveals a *conceptual muddle*. What is needed in such cases is an analysis which provides a coherent *conceptual framework within which to formulate a policy for action*" (Moor 1985: 266; emphasis mine). Three decades later, with contemporary societies turning into information societies, the policy vacuum, and the conceptual muddle underpinning it have become pressing issues to be solved. Understanding and regulating privacy and anonymity, as well as security in the information age offer some examples of the crucial issues that need to be addressed. At the same time, the information revolution is reshaping our understanding of fundamental concepts such as those of identity (Ess 2012), harm/evil (Floridi and Sanders 2001), warfare and state power (Taddeo 2012a), along with the way we act and perceive ourselves and reality (Floridi 2014).

In this chapter I shall focus on the contribution offered by information ethics (IE) to address the changes prompted by the information revolution. I will first describe the moral dimension of information and the implications of the information revolution when observed from an ethical level of abstraction (LoA) (see Chapter 7). This will be the task of the second section. I will then briefly turn my attention to the debate in computer ethics (CE) concerning the nature of the ethical problems related to the dissemination of ICTs, in the third section and its sub-section. In the fourth and fifth sections I will introduce

Floridi's framework for IE as an innovative approach devoted to addressing the ethical problems related to the information revolution. In the first sub-section of the fifth section, I will consider some of the most common criticisms moved to this framework. Finally, the sixth section will conclude the chapter.

The moral value of information

In considering what the moral dimension of information is, one may focus on the relation between moral responsibility and information, as the former cannot be ascribed to an agent for her moral choices if she did not have the relevant information when making her decision. Holding, or ignoring, a bit of information may affect the entire decision-making process; think about how the destiny of both Romeo and Juliet would have been different, had Romeo held the relevant information about Juliet's poison. In this case information would be (i) the epistemic source of a moral action. *Availability*, *accessibility,* and *accuracy* of information are all crucial issues when focusing on (i), they have been widely discussed in CE: consider the problems related to the ethics of informational resources, their trustworthiness (Turilli *et al.* 2010), and the value of access to information in contemporary societies (van den Hoven and Rooksby 2001; Mathiesen 2012).

Information can also be (ii) the result of a moral decision as remarked in Cavalier (2005). Consider, for example, Alice intentionally distributing false messages to protect her friends. Information warfare (Libicki 1996; Floridi and Taddeo 2014), understood as the dissemination of information (propaganda) among the enemy's civil population so to promote rebellion, offers an example of (ii) (see Chapter 27). Ethical problems pertaining to accountability, liability, and deception arise in this case, as well as issues concerning the sharing and circulation of information, for example problems related to peer-to-peer (P2P) (Taddeo and Vaccaro 2011) and protection of intellectual rights. Advertising, spamming, and viral messages also are instances of (ii).

When we think of actions whose implications affect the informational environment, it becomes evident that information can also be (iii) the target of a moral action. Cyber-attacks offer a good example. Consider the case of distributed denial of service (DDOS)[1] attacks; even when they have specific targets they may still affect the entire set of communication going on in a specific region of the cyber-sphere, in doing so they disrupt the informational environment. (iii) refers to the cases in which the informational environment (more about this in the fourth section) is the receiver of Alice's actions.

Points (i)–(iii) indicate different ways in which moral value can be ascribed to information. However, there is a more fundamental moral dimension of information to be considered. Such a dimension is related to the information revolution and the changes that it has prompted. At first sight, the changes engendered by the breakthroughs in ICTs seem to affect only the way in which we conduct our private and social lives. Smartphones and social networks offer two evident examples. Nonetheless, a more careful analysis shows new and deeper levels of transformation involving the very way in which human beings perceive themselves and the environment. The information revolution now goes hand in hand with a conceptual revolution, which is reshaping our understanding of the world, our metaphysics, anthropology, and ethics.

This is not an unprecedented phenomenon. Following Freud's interpretation of scientific revolutions (Freud 1917), Floridi argues that throughout history, scientific and technological discoveries have contributed in a determining way to the redefinition of our understanding of ourselves and of the universe (Floridi 2014). More specifically, Freud identified three scientific revolutions that, in the course of human history, have also prompted conceptual revolutions: the Copernican revolution, which brought us to acknowledge that human beings

are not at the center of the universe; the Darwinian revolution, which showed that human beings are part of the animal kingdom; and the Freudian revolution, which for the first time unveiled that the human mind is far from being transparent to itself. The information revolution is the latest of this kind and Turing is its father. Floridi refers to it as to the *fourth revolution*, to indicate the reshaping of the human nature and the reassessment of the place of human beings in the universe brought about by the informational turn.

By interpreting the information revolution as a conceptual revolution we recognize that the design, development, and implementation of new technological artefacts is part of a bigger process which prompts radical transformations of the intrinsic nature, or ontology, of the environment in which we live, of the agents and objects existing therein. *Re-ontologization* (Floridi 2007) is the word used to describe such a process. It refers to an increase of the informational space as well as to the transformation from analogue to digital data that occurs in the environment. However, the re-ontologization process also highlights the informational nature that is common to all existing entities and to the interactions occurring among them as well as to the environment in which they exist (see Chapter 18).

The re-ontologization process should not be mistaken for a futuristic vision. It is happening before our eyes, and individuals living in information societies experience it on a daily basis. The *blurring* of the boundary between the cyber-sphere and the physical environment offers one of the most common instances of such a process. It has been noted and analyzed by social scientists (Price 2002) and psychologists (Hasebrink 2008), as well as by philosophers (Coole *et al.* 2010; Taddeo 2012b; Floridi 2013; Taddeo 2014b; Floridi and Taddeo 2014). The blurring has widened the range of what we consider "real," of the ultimate nature of reality. The existence of an entity is no longer identified with its physical, in the Newtonian sense, presence. Reality has come to include intangible entities and environments along with physical ones, and existence is no longer related to tangibility as much as to *interactability* (Floridi 2013). Think for example at the way in which Alice and her grandfather Bob enjoy their music: Bob may still own a collection of his favorite LP records in vinyl, while Alice simply logs into her favorite streaming service (she does not even have the files on her computers); books, movies, pictures all serve as good examples of the re-ontolgization process.

In this scenario, also the intrinsic nature of human beings – *inforgs* – and of the environment – the *infosphere* – that they inhabit is being redefined. The former should not be mistaken for the sci-fi stereotype description of a human being – cyborg – nor should it be mistaken for an individual data shadow, or digital alter ego, typically one's online profile or avatar. Rather, inforgs are the product of the re-ontologizing process, when this involves human beings who, by living in the age of the information revolution and conducting their existence in a synchronized, delocalized, correlated reality (Floridi 2006), discover their intrinsically informational nature.

The term "infosphere" has two interpretations: environmental and metaphysical. The environmental understanding identifies the infosphere with the environment along with all existing things, be they digital or analogue, physical or non-physical, and the relations occurring among them, and also the relations between them and the environment. One may recall the LoAs (see Chapter 7), and consider the infosphere as the environment, along with all the entities populating it as well as their relations, observed from an informational LoA. It is worthwhile noticing at this point that the infosphere should not be confused with the cyber-sphere, for the latter is just a portion of the former. Metaphysically, the infosphere refers to the whole realm of reality, the Being, and rests on the assumption of an informational ontology (see Chapter 18) (Floridi 2008a). In this case, the infosphere is the totality of what exists once its informational nature is unveiled.

Ethical problems related to the moral dimension of information, both in the sense of (i)–(iii) and in the one related to the re-ontologization process, are at the center of the debate concerning CE and IE, though the two differ in the visions underpinning their analysis of these problems.

From cybernetics and computer ethics to information ethics

CE and IE have their origins in the 1940s and 1950s in the work of Wiener, who introduced the term "cybernetics" (Wiener 1965) to refer to an interdisciplinary research field dedicated to the study of information feedback both in natural and artificial systems and who, for the first time, focused on the potential impact of ICTs on humankind and society. Famously he stressed: "long before Nagasaki and the public awareness of the atomic bomb, it had occurred to me that we were here in the presence of another social potentiality of unheard-of importance for good and for evil," (Wiener 1948: 27–28). The ethical concern raised by Wiener remained marginal and largely ignored for more than a decade, before it was brought to the fore again between the 1960s and the 1970s, when CE emerged as a new field of study.[2]

IE and CE are tightly related. As we shall see in the rest of this section, IE as an ethical theory offers the conceptual foundations needed by CE as a research field. To clarify this point, a step back is required. Since the mid-1980s, CE has been characterized by a debate over the novelty and uniqueness of the problems with which it is concerned. The so-called *uniqueness debate* (Tavani 2002).

The answers to these questions vary depending on one's view of the problems at stake. Some have regarded these problems as "new versions of standard moral problems and moral dilemmas, exacerbating the old problems, and forcing us to apply ordinary moral norms in uncharted realm" (Johnson 1999). Scholars such as Johnson and Miller (Johnson and Miller 2008) for example do not deem radical, or totally novel, the changes brought about by the information revolution and consider CE to be a research field focusing on specific issues related to the management of information (see points (i)–(iii) in the second section above). For those agreeing with this position, CE endorses a decision-oriented approach and is devoted to offering applicable solutions on a case-by-case basis. This approach has led to addressing specific problems, develops *ad hoc* solutions, and in doing so it focuses on one moral dimension of information at the time; the reader may recall the three moral dimensions of information described in the second section. Criticisms have been made of this approach. For example, Floridi (2013) argues that it has supported the development of CE as a *micro-ethics*. The ethical analyses of ICT-related problems are micro-ethical insofar as the focus is on a smaller problem space than the one that may be addressed by considering all three dimensions of information together (see Figure 29.1).

CE as a micro-ethics is questioned by those scholars who see in the ethical problems pertaining to the development and deployment of ICTs not simply a new version of old ethical conundrums but radically new issues engendered by the specific nature of computers and ICTs (Moor 1985; Mason 1986; Maner 1996; Floridi 2013). In this respect, the analysis proposed by Moor (1985) pioneered this way of considering ICT-related ethical problems. Moor's article stressed for the first time that computing machines were universal tools that can ideally perform any operation as long as this is defined in terms of input, output and logical operators, and that this would lead to unprecedented changes, which would cause difficulties in the management and regulation of the use of such technologies, i.e. the policy vacuum, which posed the need for innovative conceptual analyses. In Moor's words

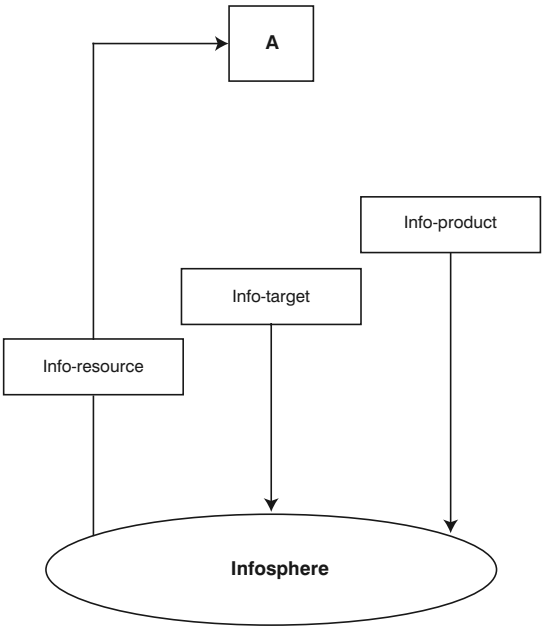


Figure 29.1 The three moral dimensions of information (Floridi 2013: 20)

> one difficulty is that along with the policy vacuum there is often a conceptual vacuum. Although a problem in CE may seem clear initially, a little reflection reveals a conceptual muddle. What it needed in such cases is an analysis that provides a coherent conceptual framework within which to formulate a policy for action.
>
> *(Moor 1985: 269)*

IE rests on this side of the debate and proposes an innovative approach concerned with the scope of the enquiry and the conceptual foundation of CE. Let me begin with the scope of enquiry, I shall deal with the conceptual foundation of CE in the fourth section. IE is presented as a *macro-ethics*: a theoretical, domain-independent, applicable ethics that is concerned with all the moral dimensions of information identified in the second section. In doing so, IE shifts the approach, for it does not focus on information-related problems, e.g. information warfare, privacy, or transparency; rather it analyses the moral scenario *informationally*, that is, it endorses an informational LoA by considering the entities under scrutiny also in relation to their informational environment.

This position rests on an analysis of the shortcomings of CE as a micro-ethics, two of which are noteworthy. Ethical problems addressed by CE may pertain to one or the other moral dimension of information; however clear-cut distinctions are mostly unlikely. Consider for example censorship, which may affect one both as a producer and as a user of information, or testimony. Alice's testimony can be regarded as a product (ii), which then becomes a source of moral decision (in the sense of (i)) when communicated to Bob. The second drawback refers to those problems that cannot really be placed in any of the dimensions of information highlighted in the second section, for they emerge from the interactions among the agents and the environment – pervasive surveillance and cyber-warfare being two notable examples.

A few approaches have been proposed during the past decades to broaden the scope of CE frameworks so to address the need for a macro-CE. The next section focuses on one such a framework proposed in van den Hoven and Rooksby (2001).

Information as a primary good

van den Hoven's and Rooksby's analysis relies on Rawls' theory of distributive justice (Rawls 1999). It rests on an understanding of information as a necessary condition for the well-being of both individuals and societies and proposes two ethical principles ensuring a fair distribution of information among the members of society.

Before analyzing in more detail van den Hoven's and Rooksby's framework, let me briefly introduce some key aspects of Rawls' theory. Rawls' theory offers two principles to shape the design of the basic institutions of a fair society. The principles are such that they would be accepted in the "Original Position," that is a hypothetical scenario, in which rational and mutually disinterested parties acting behind the "veil of ignorance" – i.e. unaware of their social situation, interests, and needs – decide the principles that ought to guide society. The proposed principles are as follows, the first principle being more fundamental than the second one:

- first principle: each person is to have an equal right to a fully adequate scheme of equal basic liberties compatible with a similar system of liberties for all [the liberty principle].
- second principle: social and economic inequalities are to satisfy two conditions. First, they must be attached to offices and positions open to all under conditions of fair equality of opportunity [the opportunity principle]; and, second, they must be to the greatest benefit of the least advantaged members of society [the difference principle] (Rawls 1999: 53).

Rights and liberties are distributed following the first principle, while the second principle focuses on the distribution of opportunities and social primary goods. Primary goods are those goods that are deemed necessary for individual well-being, for they are required by any human agent to make rational decisions and plan his/her life. As Rawls put it "primary goods are singled out by asking which things are generally necessary as social conditions and all-purpose means to enable persons to pursue their determinate conceptions of the good and to develop and exercise their two moral powers" (Rawls 1999: 307). Rawls specifies four categories of primary goods, namely: rights and liberties, opportunities, income and wealth, and the social bases of self-respect.

van den Hoven's and Rooksby's analysis distinguishes between information as true semantic content and informative objects, such as for examples books, websites, and newspapers. While the former cannot be distributed, for its acquisition depends on the effort of the individual agents, the latter are all considered a resource that can indeed be dispensed among the members of societies, just like wealth for example. Hence, the proposed framework focuses on the *access* to informative objects as to a primary good.

More specifically, access to informative objects shows three features that allow it to qualify as a primary good according to Rawls' theory. These are: having access to informative objects is generally desirable and a better condition than being denied access to informative objects, this holds true irrespective of the specific goal one may have; it is desirable to have more access to informative objects; access to informative objects would be useful to an agent whatever her plans for life are.

van den Hoven's and Rooksby's analysis proposes two principles for the distribution of access to informative objects in societies. While the first principle poses access to informative objects as a basic liberty, the second one ensures fair opportunities to exercise information liberties.

1 the freedom to acquire information relevant to rational life-planning qualifies as a basic liberty under the first principle of justice; and
2 opportunities to acquire information are like opportunities for education and health care, afforded under the opportunity principle.

The proposed principles and approach are meant to offer a broad perspective to address ethical issues related to information, including problems such as the digital divide and the trustworthiness of information resources. This framework also offers one of the first attempts to develop a macro-ethical approach to CE. Indeed, it broadens the focus of the analysis moving from ICT-related issues to *information*-related problems and their impact on society at large. Nonetheless, the proposed analysis is still very much centered on the value of information as a resource (in the sense of (i) specified in section 2) to be able to properly address the ethical problems concerning the overall moral value of information and, hence, to expand the scope of enquiry of CE.

At the same time, by relying on Rawls' distributive justice to address information-related problems, the framework embraces Johnson's position about the non-unique nature of such problems. Like Johnson's argument, also this framework is then amenable to the objection of failing to addressing the novelty and the radical changes brought about by the information revolution. As Floridi puts it:

> although the novelty of CE is not so dramatic as to require the development of an utterly new, separate and unrelated discipline, it certainly shows some limits of traditional approaches to the ethical discourse, and encourages a fruitful modification in our metatheoretical perspective.
>
> *(Floridi 2013: 97)*

The analysis of Floridi's framework for IE will be our next task.

The innovative approach of IE

Floridi's framework for IE rests on three conceptual moves, which make its contribution to the analysis of ethical issues related to ICTs more innovative than the ones described so far. These are:

a from an action-oriented ethics to an ethics of *care*;
b from agents to patients;
c from an anthropocentric and biocentric approach to an *ontocentric* approach.

The three moves differentiate quite radically IE from *standard* macro-ethical theories, i.e. consequentialism, deontologism, and virtue ethics, all endorsing an anthropocentric approach. Standard macro-ethical theories, in particular consequentialism and deontologism, focus on actions as the center of their analyses. As such they are also *relational*, insofar as an action establishes a relation between the agent and the receiver of the action. Both consequentialism and deontologism do not focus so much on Alice and Bob as the source

and the receiver of the action as much as they do on the nature of the actions and the choice Alice makes. These ethical theories ask the question "What ought I to do?" and are standard macro-ethics, as they have an anthropocentric bias.

IE moves away from this approach and asks quite a different question: "What ought to be respected or improved?" In doing so it shifts the focus from Alice's actions and choices to the *respect/care* that is due to Bob. IE inherits the concept of care from medical and environmental ethics: the agent has the moral duty to care for the receiver of her actions and an action is morally good only when it rests on the care for the patient's sake. The first move prepares the ground for the second one, from agent to patient.

The focus on the patient is also grounded in the approach common to medical and environmental ethics and rests on the view that any form of life has some, although minimal, moral interest and as such deserves respect. The resulting well-being of the patient of a given action is both the measure of the moral standing of the action and the criterion guiding Alice's actions and choices.

The patient, the receiver of the action, is at the center of the ethical discourse, whereas the agent moves to the edge. In doing so, IE widens the scope of moral prescriptions, for rational, informed agents are no longer the only referents in assessing a moral scenario. This leads us to the last move, which sees IE endorsing an ontocentric approach.

(c) is the most complex of the three moves, but it is also the one that allows IE to provide an innovative and sophisticated framework for addressing ethical issues pertaining to ICTs. With this move, information goes from being an epistemic requirement for any morally responsible actions (see (i) in the second section) to being the primary focus (in the sense of (b)) of any moral action.

IE endorses a non-anthropocentric approach for the ethical analysis. It attributes a moral value to all existing entities (both physical and non-physical) by applying the principle of ontological equality, "[which] means that any form of reality … simply for the fact of being what it is, enjoys a minimal, initial, *overrideable*, equal right to exist and develop in a way which is appropriate to its nature" (Floridi 2006: 28). The principle is grounded in an information-based ontology, according to which all existing things can be considered from an informational standpoint and are understood as informational entities, all sharing the same informational nature. At first glance, an artefact, a computer, a book or the Colosseum seem to enjoy only an instrumental value. This is because one endorses an anthropocentric LoA; in other words, one considers these objects as a user, a reader, or as a tourist. In all these cases the moral value of the observed entity depends on the agent interacting with it and on her purpose in doing so. The claim put forward by IE is that these LoAs are not adequate to support an effective analysis of the moral scenario that the information revolution has brought to the fore.

The anthropocentric, or even the biocentric, LoA prevents us from considering properly the nature and the role of ICT artefacts in the reality in which we live. The argument is that all existing things have an informational nature which is shared across the entire spectrum of reality – from abstract to physical and tangible entities, from rocks and books to robots and human beings – and that all entities enjoy some *minimal initial* moral value *qua informational* entities.

IE argues that universal moral analyses can be developed by focusing on the common nature of all existing things and by defining good and evil with respect to such a nature. The focus of ethical analysis is thereby shifted, since the initial moral value of an entity does not depend on the observer (the reader may recall move (a)), but is defined in absolute terms and depends on the (informational) nature of the entities.

Following the principle of ontological equality, *minimal and overrideable rights* to exist and flourish belong to all existing things and not just to human or living things. The Colosseum,

Jane Austen's writings, a human being and computer software all share *initial* rights, as they are all informational entities. A clarification is now in order. IE endorses a minimalist approach; it considers informational nature as the minimal common denominator among all existing things. However, this minimalist approach should not be mistaken for reductionism, as IE does not claim that the informational one is the unique LoA from which moral discourse is, or should be, addressed. Rather, it maintains that the informational LoA provides a *minimal starting point*, which can then be enriched by considering other moral perspectives (I shall return to this point in the first sub-section of the fifth section). Having clarified the conceptual groundings of IE, we can now focus on the normative prescriptions of this ethical framework.

Informational evil and informational good

"*IE adopts a LoA at which Being and the infosphere are co-referential*" (Floridi 2013: 65; emphasis mine). The reader may recall that the first sub-section of the second section referred to this way of understanding the infosphere as to the metaphysical one, the definitions of informational evil and informational good follow from such an understanding.

Floridi refers to informational evil as to *metaphysical entropy*. The choice of this term was admittedly confusing (Floridi 2013), because it would bring about the concept of physical entropy or entropy as defined by Shannon, which are both not relevant when it comes to IE. Metaphysical entropy has a very specific meaning, for it refers to any form of destruction of information and as such of Being. It indicates the opposite of semantic and ontic information (see Chapter 6), as such metaphysical entropy refers to the decay, the corruption, of content of the infosphere and of the entities inhabiting it, and hence it is a form of impoverishment of Being. Insofar as Being is co-referential to the infosphere, metaphysical entropy is analogous to the metaphysical concept of *nothingness*. Corrupting a file or damaging a piece of art, violating someone's privacy and killing a living being are all examples of metaphysical entropy.

Informational good, as the opposite of the metaphysical entropy, is any form of flourishing of informational entities and of the infosphere. IE endorses an environmental approach, which rests on moves (a) and (b) described in the fourth section. The ultimate patient, whose well-being ought to be at the center of the moral concern of any agent, is the informational environment. This is a key point of IE, which can be also traced in authors such as Adeney and Weckert (1997); Rowlands (2000) and Woodbury (2003).

The environmental connotation of IE explains the centrality of the infosphere. For, according to IE, the enrichment, extension and improvement (without any corresponding ontological loss) including its reshaping and the implementation of new realities in the infosphere is the ultimate good. The reader may recall that the infosphere has both an environmental and a metaphysical meaning. In defining IE as an environmental ethics devoted to supporting the flourishing of the infosphere, one also refers to the ontological commitment of IE toward the flourishing of Being (the opposite of metaphysical entropy).

The environmental focus also places IE in the tradition of non-standard macro-ethics, which endorse a non-anthropocentric approach, like bioethics and land ethics, and in doing so aim at enlarging the boundaries of moral discourse to include non-living entities such as water, air and soil. IE implements this approach and takes it to the extreme by adopting a universal ontology, which excludes nothing from its moral prescription. As such, IE offers four universal ethical principles to identify right and wrong and the moral duties of an agent. These are:

0 entropy ought not to be caused in the infosphere (null law);
1 entropy ought to be prevented in the infosphere;
2 entropy ought to be removed from the infosphere;
3 the flourishing of informational entities as well as of the whole infosphere ought to be promoted by preserving, cultivating and enriching their properties.

The four principles clarify, in very broad terms, what it means to be a responsible and caring agent in the infosphere. They are listed in decreasing order of importance. Breaking rule number 3 is less despicable than breaking rule number 2. Breaking rule number 0, the null law, is the worst an informational agent can do, so the blame is the highest. Accordingly, an action is unconditionally praiseworthy only if it never generates any entropy in the course of its implementation; and the best moral action is the one that succeeds in satisfying all four principles at the same time.

Most of the actions that we judge morally good do not satisfy such strict criteria, for they achieve only a balanced positive moral value; that is, although their performance causes a certain amount of entropy, we acknowledge that the infosphere is in a better state on the whole after their occurrence.

Criticisms to IE

Having introduced the main aspects of IE, I shall now devote my attention to considering three of the most common objections moved against IE and which concern:

1 the intrinsic moral value of *all* (informational) ethics;
2 the reductionism of IE;
3 the applicability of IE.

The first objection questions the possibility of ascribing intrinsic moral worthiness to all informational entities *qua informational entities* (Brey 2008; Floridi 2008b; Vaccaro 2008). The objection rests on the common-sense approach, which easily recognizes as instrumental rather than as intrinsic the value of non-living entities. From this assumption, the criticism moves to stress that it is untenable to address a moral scenario in which all entities share the same moral worthiness. The objection would be correct had it not overlooked the fact that according to IE, entities have *different degrees* of moral value and as such they are entitled to different degrees of moral respect. Such a respect ranges from the minimal, overridable, disinterested and appreciative care due to a stone to the absolute, high-level respect due to a human being. IE does not claim that all entities have the same moral value and hence deserve the same level of moral care. Rather, it claims that since all entities share an informational nature, all entities should be ascribed some *initial, minimal* moral worthiness, which makes all entities participate in the moral scenario. In this way IE develops a comprehensive (universal) moral discourse able to take into account the stance of different moral entities, from artificial and human agents to intangible objects and the de-physicalized environment – all of which, while central in the world as we know it after the information revolution, are not satisfactorily accommodated by other standard macro-ethics (see the third section).

The objection confuses IE commitment to the inclusiveness of the moral discourse with an attempt to create a flat moral scenario where all entities play the same role. In this sense, the criticism betrays a deep misunderstanding of the goals of IE, for it misses both the universality of its approach and the value that IE attaches to diversity and plurality. Ascribing

moral value to all entities allows specifically for including them in the moral discourse but it does not lead to ignore their differences.

The second objection also focuses on the informational nature of the considered entities (Stahl 2008; Floridi 2008b). In particular, it criticizes IE for being reductionist in that it reduces all entities to their informational nature and as such overlooks other aspects of patients, agents and of the environment. The starting point of the objection is indeed correct; human beings, but also the environment, and the entities existing within it, are not just information. The criticism, however, is misguided, for it confuses the method of LoAs, which shapes IE's approach, with reductionism and forgets about the pluralism that characterized this method of analysis (see Chapter 7). IE does not claim that everything is *just* information, the claim is rather that if we endorse an informational LoA, then we will be able to find a common, fundamental aspect to all existing things. To use a metaphor: the objection states that if one looks at the world using a black-and-white camera, then one will believe that the world is in black and white and will overlook all the other colors. However, this is not the claim of IE, whose position is rather that by using a black-and-white camera one discovers patterns that are common to all the observed things. This does not imply that the reality is in black and white, nor does it forbid the use of color cameras. There may be situations where the latter are more appropriate. However, having practiced with a black-and-white camera, one may be able to recognize common aspects characterizing different scenarios and hence be able to unveil new fundamental futures. Abandoning the metaphor, IE endorses an informational LoA because this permits the development of an inclusive moral discourse by unveiling the informational nature of reality. This is not to reduce the universe to information, but to highlight a common substrate on which the differences of the entities inhabiting it can then be further appreciated. Ascribing moral value to informational entities provides only a *minimalist starting point*, which is overridable when moral concerns formulated by other macro-ethical analyses require a more fine-grained LoA.

The answer to the second objection may prompt the third criticism, which is concerned with the relevance and the applicability of IE. The question posed in this case is twofold and has to do with the observation that everyday life and ordinary moral decisions often face overriding moral concerns. If this is the case, then IE seems irrelevant, for it does not specify the level of moral worthiness of different entities. Furthermore, if not irrelevant, it is too metaphysical, too theoretical, to ever be of any help in addressing pragmatic cases and ethical conundrums. Let us address one side of the problem at the time.

The relevancy of IE is not questioned by the possible conflicts with other ethical theories. This objection surmises that different ethical theories necessary conflict one with each other, but this is not always the case. In many cases ethical theories can actually be complementary and mutually beneficial; business and environmental ethics, bio- and medical ethics offer interesting examples in this case. Furthermore, the reader may recall that IE is devoted to addressing a specific problem space, the one opened by the dissemination of ICTs and the fourth revolution, that other macro-ethics do not satisfactorily tackle. IE focuses on the new problems posed by an information-dependent, dephysicalized, digitalized society and environment, and calls for a new ethics to educate not just designers and developers and users, but also individuals living in the information society, in order to live, respect and foster the informational environment. The relevance of IE becomes evident, along with the novelty of its approach, when considering the specificity of the problems that it addresses. The possibility of conflicting and being overriden by other ethical theories shrinks dramatically when the uniqueness of the problem space that IE addresses is considered.

One may still argue that IE remains too theoretical to be useful in tackling any ethical problems that information societies may face. The reader may recall that in the second section the absence of a theoretical framework and the tendency to develop case-by-case analyses were mentioned as two of the weakening aspects of CE. IE has the goal to clarify the conceptual muddle underpinning the policy vacuum that Moor (1985) described, and as such, applicability is one of its goals. Since IE has been proposed, several innovative analyses have been developed to address complex pragmatic cases, proving IE not just applicable but also effective (Burk 2008; Turilli and Floridi 2009; Turilli *et al.* 2011; Turilli *et al.* 2010; Taddeo and Vaccaro 2011; Floridi and Taddeo 2014; Taddeo 2014a).

It is also worth recalling that the metaphysical roots of IE and its theoretical approach provide a solid grounding of the theory, which if anything makes it more refined, not less effective. Because of such grounding, IE can afford to provide universal principles that offer the conceptual foundation for developing a web of consistent ethical analyses. The theoretical infrastructure of IE allows for constructing an ethical framework to help design, shape and live in the informational environment rather than a series of *ad hoc* analyses developed on a case-by-case basis.

Conclusion

The chapter has offered an overview of the key concepts related to the moral value of information and to crucial aspect of CE and IE. Its goals were to introduce the reader to the ethical problems that contemporary societies face after the information revolution, to describe the on-going debate about such problems along to the most significant aspects of IE and its contribution to CE as a research field. Of the many features characterizing this ethical theory, three are pivotal:

1 the metaphysical grounding;
2 the macro-ethics scope;
3 the environmental approach.

The metaphysical foundation anchors the ontocentric principle on a solid ground, for it shows that the informational nature is indeed common to all existing things and as such, moral value, albeit minimal, needs to be recognized by all entities sharing this nature: the whole realm of reality. Such moral value is not ascribed because of an entity's role in the environment; according to IE, moral worthiness comes with the very existence of an entity. It is the *degree* of such worthiness that requires further assessment and which can vary.

The ontocentric principle substantiates the universality of IE, which is what allows it to satisfactorily address the issues posed by the information revolution. For IE, as a non-standard macro-ethics, is free from the anthropocentric bias and proves to be a universal ethics. It focuses on the most minimal aspect, the very existence, of entities in order to define the range of the moral discourse.

The environmental focus follows from IE's non-standard approach, for it identifies the infosphere, and not a specific set of entities, for example human beings or artificial agents, as the patient to which the ultimate respect and care are due. In doing so, IE puts a burden on the shoulders of human agents, making them responsible inhabitants and designers of the informational environment with the moral duties to protect and foster its flourishing. Hence IE unveils the Demiurge's responsibility of human agents in caring, designing, and managing the environment. In this sense, IE is an ethics of stewardship, the ultimate form of cybernetics.

Notes

1 A description of DDOS attack can be found here: http://en.wikipedia.org/wiki/Denial-of-service_attack
2 A historical overview of the development of CE and IE falls outside the scope of this chapter, the reader may find interesting in this respect to consult Bynum (2008).

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