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RESEARCH ARTICLE

Normative Information. Bridging Information Theory and the Philosophy of Normativity

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Abstract

Generally, the focus in the theory of information is almost exclusively on information that can be termed declarative, descriptive, factual, constative, or apophantic, by which is meant information that has a semantic content that can be true or false. Examples of carriers of apophantic information are train timetables, bank account statements, and medical reports. However, alongside apophantic information, there is another type of information that is much less studied but no less important: information that serves a function that is not descriptive but normative, what we could call "normative information". A traffic sign indicating no overtaking, the land-use specifications outlined in a local plan, and the graphic instructions for assembling IKEA furniture are examples of items that convey normative information. The paper investigates this underexplored type of information and seeks to demonstrate the value of studying it for information theory and the philosophy of normativity.

Keywords Data · Norms · Indexicality · Ontology · Rules

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1 Introduction: Apophantic Information vs. Normative Information

In the theory of information, the focus is generally on information that can be termed *declarative*, *descriptive*, *factual*, *constative*, or *apophantic*;[1] that is, information that has a semantic content that can be true or false and whose function is to represent reality.[2] Examples of carriers of apophantic information are train timetables, bank account statements, and medical reports. However, alongside apophantic information, there is another type of information that is much less studied but no less important: namely, information which serves a function that is not descriptive, declarative or constative but primarily normative, and which we may call "normative information". A traffic sign indicating no overtaking, the land-use specifications outlined in a local plan, and the graphic instructions for assembling IKEA furniture are examples of items that convey normative information; that is, information that does not tell us how things are, but how we should behave. This paper investigates this type of information, which has been little studied, and seeks to demonstrate the fruitfulness of its study for both the *theory and philosophy of information* and the *theory and philosophy of normativity*.

The fact that philosophers and information theorists have dealt almost exclusively with apophantic information has been determined by a sort of "description-centrism" that dominated philosophical and theoretical investigations of language and logic until the middle of the last century (Moroni & Lorini, 2021). When logicians and philosophers critically addressed the functions of language, they traditionally focused primarily on description/representation,[3] neglecting the regulative or normative function. Consider, for example, the case of propositional logic: after two millennia of inquiry into the logic of apophantic propositions, it was only in the mid-twentieth century that systematic research began on normative language (Hare, 1949, 1952) and on the logic of deontic propositions (von Wright, 1951).[4] Furthermore, description-centrism has dominated not only the philosophy and theory of language and logic for two millennia, but also the philosophy of drawing. Only recently has an organic philosophical investigation of normative and regulative drawings been developed (Lopes, 2004; Dudek, 2015; Moroni and Lorini, 2017, 2021; Lorini, 2019; Lorini & Moroni, 2020; Loddo, 2017, 2020; Maynard, 2017).

[1] According to Aristotle's *De Interpretatione*, 17 A, 2–4, apophantic discourse (*ἀποφαντικὸς λόγος*) is discourse that can be true or false.

[2] Among the seminal works on this topic, see Carnap and Bar-Hillel (1952); Hintikka and Pietarinen (1966); Hintikka (1970). Other subsequent interesting works include Floridi (2003, 2004, 2005, 2010); Cevolani (2011); D'Alfonso (2011); Sequoiah-Grayson and Floridi (2022).

[3] As Bovelet (2010) notes: "In the development of logic as a discipline, the declarative sentence was the paradigm of logical propositions".

[4] For a reconstruction of the prehistory of the logic of norms prior to the emergence of deontic logic in 1951, see Lorini (2012). Alongside the logical study of (non-apophantic) normative sentences/propositions, new logics emerged in the twentieth century that challenge the primacy of apophantic propositional logic and "description-centrism" in logic. Examples include erotetic logic, which investigates the logics of questions (Harrah, 1963; Åqvist, 1975; Kubiński, 1980; Belnap & Steel, 1976), and pragmatic logic, which builds on Austin's theory of performatives and Searle's theory of speech acts (Austin, 1962; Searle, 1969; Searle & Vanderveken, 1985; Dalla Pozza et al., 2020).

With the aim of placing normative information at the center of attention, it is important to highlight that, in the present paper, information is conceived as a message transmitted from an information source to a receiver through a signal. From this perspective, two clarifications are required concerning both the scope of our investigation and the very notion of information adopted in this study. The first clarification concerns the relationship between data and information.[5] Clearly, data in themselves are not intrinsically meaningful; they become meaningful only when situated within a context of interpretation and through an interpretative process. It is only within such a context that information – *including normative information* – is generated. In light of this, we will show how the very concept of "data" can be further disambiguated and unpacked. The second clarification concerns the type of information on which we focus. In the present paper, we examine information understood as a message that one agent *intentionally* communicates to another. More specifically, we focus on messages of this kind that – differently from apophantic messages and from other types of messages – perform a distinctly normative function. In the present paper, we therefore investigate, for example, cases of normative information intentionally conveyed through words (for instance, the articles of a legal code or the commands issued by a parent or a teacher), images (such as a "No Smoking" sign), or material artefacts (such as a roundabout). By contrast, we do not take into consideration what has been termed "environmental information"; that is, information that arises from data which are meaningful independently of an "intelligent" producer or sender.[6] More specifically, we do not consider forms of information such as physical information, biological information, genetic information, or economic information (Floridi, 2010).[7]

In order to investigate normative information, this paper is organized as follows: Sect. 2 presents preliminary specifications; Sect. 3 discusses the issue of normative information in light of the notion of "direction of fit"; Sect. 4 explores the ontology and phenomenology of normative information; Sect. 5 proposes a typology of forms of normative information; Sect. 6 examines normative information from the perspective of deicticity; Sect. 7 concludes by highlighting the main findings.

The paper is based on an extensive multidisciplinary review of the literature (including theory of information, philosophy of the law and legal theory, philosophy of science and logic) and on a longstanding empirical investigation of normative phenomena in which the authors have been involved.[8]

[5] As is well known, this is a debated topic in information theory, starting from the works of Ackoff (1989) and Rowley (1998). Among the many subsequent discussions, there are Boisot and Canals (2004), Kettinger and Li (2010).

[6] It would be an interesting line of inquiry to investigate whether forms of environmental information that are also *normative* may exist. However, such an investigation falls outside the scope of the present study. As regards instructional information, Floridi (2010, p. 35) suggests that there may be forms of instructional environmental information.

[7] For a philosophical account of data as carriers of environmental information, see, for example, Leonelli (2016). In particular, Leonelli (2016, p. 192) examines data within the philosophy of science, and more specifically within the experimental setting. In this context, data "are commonly identified with the immediate traces left by measurement instruments and the manipulation of samples and, as such, they are taken to document features and attributes of the entities or processes under investigation".

[8] Previous research and publications resulting from this empirical investigation on various kinds of normative phenomena – which started fifteen years ago – will be cited throughout the paper.

2 Preliminary Specifications: Human Beings as Nomorgs

Our approach is very much in line with many of Floridi's insights, building on some of his ideas towards new directions.

First, a distinction between apophantic information and a different kind of behaviour-directed information can already be found in the studies by Floridi (2010) and Chen and Floridi (2013), which distinguish between "factual information" and "instructional information".[9] As Floridi (2010, p. 34) writes: "Information, understood as semantic content, comes in two main varieties: instructional and factual". As regards the former, Floridi (2010, p. 35) explains: "The car's operation manual […] provides semantic instructional information, either imperatively – in the form of a recipe: first do this, then do that – or conditionally – in the form of some inferential procedure: if such and such is the case do this, otherwise do that".[10] Although it is along the same conceptual lines as "instructional information", the notion of "normative information" we introduce is distinct from Floridi's concept, both in terms of intension and extension. In terms of *intension*, the term "instructional information" appears to highlight only one of the three types of normative information that we distinguish in this paper (see Sect. 5): namely, "technical" normative information. It is, therefore, not well suited to capture other types of normative information, for instance "deontic" or "constitutive" normative information. In terms of *extension*, our notion of "normative information" likewise does not overlap with Floridi's notion of "instructional information". Among the examples of instructional information that Floridi (2010, p. 35) provides are stipulations (for instance, "let the value of x be 3"), which we do not include under the umbrella of what we call normative information. Stipulations are neither apophantic information (since they do not describe anything) nor properly normative information, insofar as they lack a normative nature (they perform neither a *deontic* function, nor a *constitutive* function, nor a *technical* function in the sense explained in Sect. 5), but are simply used to set, by convention, the meaning or value of something.

Second, according to Floridi (2010, p. 9), we are *inforgs*, that is, informational agents or organisms, who live in an informational environment. In other words, "we are not standalone entities, but rather interconnected informational organisms or

[9] A conceptual distinction broadly analogous to the one between factual information and instructional information can be found in Fresco (2016, p. 58), who distinguishes between *information-that* and *information-how*: "Two important types of information at the cognitive level are information-*that* and information-*how*. The former is about *states of affairs* whilst the latter is about *action selection*. Information-that, such as 'Not all birds can fly', is used by agents to represent, rather than just react to, their environment. Information-how, such as 'To activate the fire alarm, break the glass and press the button', informs the agent about which action(s) can be performed to achieve a particular outcome." See also Miłkowski (2023, p. 485), who distinguishes declarative information and instructional information on the basis of different kinds of "satisfaction" that can be predicated of them: "A declarative piece of semantic information is satisfied if and only if it is true, and an instructional piece of information is satisfied if and only if it is followed or executed".

[10] See also Floridi (2010, p. 35): "There are many plausible contexts in which a stipulation ('let the value of x be 3' […]), an invitation ('you are cordially invited to the college party'), an order ('close the window!'), an instruction ('to open the box turn the key'), a game move ('1.e2-e4 c7-c5' at the beginning of a chess game) may be correctly qualified as kinds of semantic instructional information".

inforgs, sharing with biological agents and engineered artefacts a global environment ultimately made of information, the infosphere. This is the informational environment constituted by all informational processes, services, and entities, thus including informational agents as well as their properties, interactions, and mutual relations". To this image of humans, we add the idea that humans are "nomic beings", that is, agents or organisms endowed with nomic capacity, insofar as being capable of creating, transmitting and receiving normative information. By "nomic being" we mean an agent endowed with nomic capacity; that is, the ability to generate, interpret, respond to, and act in light of norms (Lorini & Marrosu, 2018; Lorini, 2022). In the case of normative information, it could be said that humans, as *inforgs*, must also be *nomorgs* (nomic organisms) – to coin a new term ("nomorg") modeled on "inforg".

3 Normative Information and Direction of Fit

Apophantic information and normative information are distinguished in terms of their "direction of fit".[11] In the case of apophantic information, the direction of fit goes from the information to the world. This is an *information-to-world* direction of fit: the information must "correspond" to the world. Apophantic information is correct if it corresponds to the world. For example, a geographical map that does not correctly reproduce the geographical area which it represents (i.e. the features of that area, such as buildings, streets, rivers and mountains) must be corrected.

In the case of normative information, the direction of fit is instead the reverse: it is a *world-to-information* direction of fit. It is the world that must "correspond" to the information, as in the case of puzzle-images or pictures of a building, like those on LEGO sets. The puzzle pieces and the LEGO bricks must fit together to reproduce the original image (which sometimes appears directly on the puzzle box or on LEGO boxes). If they do not match, it is obviously necessary to change the arrangement of the puzzle pieces or the LEGO bricks and not to change the template image of the puzzle or of the building. In short, normative information does not aim to reproduce the world, but to influence it. Precisely because of this particular direction-of-fit, this information cannot be *true* or *false*, nor even, to use Floridi's terminology, *veridical* or *non-veridical*.[12]

Floridi (2010) distinguishes factual information (in our terminology: apophantic information) from propositions and beliefs in terms of truth. He argues that "factual semantic information is, strictly speaking, inherently truth-constituted and not a con-

[11] On this, see especially Austin (1953); Anscombe (1957); Searle (1984); Searle and Vanderveken (1985); see also Humberstone (1992); Kissine (2007); Frost (2014).

[12] Note that Floridi suggests using the term "veridical" rather than "true" to designate information that correctly corresponds to the world because he maintains that the term "true" should be used to denote a particular type of information: linguistic information, i.e. information whose data consists of sentences. However, as Floridi (2010, p. 50) rightly notes, the data that carry (apophantic) information may also consist of graphical representations or physical artefacts of a semantic nature: "We speak of veridical rather than true data because strings or patterns of well-formed and meaningful data may constitute sentences in a natural language, but of course they can also generate formulae, maps, diagrams, videos, or other semiotic constructs in a variety of physical codes, and in these cases 'veridical' is to be preferred to 'true'".

tingent truth-bearer, exactly like knowledge but unlike propositions or beliefs, for example, which are what they are independently of their truth values" (Floridi, 2010, p. 50).[13] Factual information is therefore defined in terms of truth or "veridicality". However, if we consider the idea of normative information (and the nature of its direction-of-fit), it becomes clear that truth is not an essential and necessary characteristic of information in terms of semantic content.[14]

4 The Ontology and Phenomenology of Normative Information

The philosophical exploration of normative information requires study of the nature of the data that are carriers of information. As already underscored, our analysis is restricted to data understood as components of *intentional* communication, and more precisely of intentional normative communication. In particular, our exploration in this section divides into two directions of investigation: the first direction concerns the *ontology* of the data that are carriers of normative information; the second direction concerns the *phenomenology* of the data that are carriers of normative information.

4.1 Ontology of Data: D-Data vs. S-Data

As regards the first direction of investigation (the ontology of data), we suggest distinguishing between two different (ontological) levels of what we usually call "data":

(i) data as *dedoménon*[15] (from the ancient Greek *δεδομένον*); that is, data as merely physical-material entities – henceforth referred to as *dedoménon-data* or *D-data*;
(ii) data as *sēmeîon* (from the ancient Greek *σημεῖον*); that is, items of data as syntactic-semantic-pragmatic entities which have their physical-material substrate in the *dedoménon* – henceforth referred to as *sēmeîon-data* or *S-data.*

At the first level of data analysis, that is, at the level of *D-data*, if we examine, for example, one of the three original copies of the Italian Constitution, we are not faced with a legal text composed of sentences, but rather with a variegated set of ink stains on white sheets of paper (Lorini & Loddo, 2017). These are physical-material-phenomenal elements that can, by their very nature, become carriers of information because they have physical-perceptive peculiarities that distinguish them from their

[13] For further reflections on the alethic conception of semantic information, see also Cevolani (2011) and D'Alfonso (2011). For an alethically neutral conception of semantic information, see instead Raphael (1968), Devlin (1991), Fetzer (2004), Lundgren (2019).

[14] As Floridi (2016, p. 44) writes in regard to instructional information: "Semantic content may be instructional. Suppose Bob's car has a flat battery. He calls the garage and Alice tells him over the phone how to use jumper cables to start his car's engine. Such instructional content cannot qualify as either true or false, in the same sense in which imperative (e.g., close the door!) cannot". In this regard, one might also ask what the analogue of truth (or "veridicality") for normative information is – a question that has been extensively explored in the field of norm theory. See Lorini (2012).

[15] The term *dedoménon* (plural *dedoména*) was first suggested by Floridi to refer to data in their rawest and pre-cognitive form. Floridi also calls them "data in the wild" – in other words, data *in potentia*.

physical context. According to Floridi (2010, p. 25), what we call *D-data* are the lacks of uniformity in the world which give rise to what, to informational organisms like us, appear as data. Floridi (2011, pp. 85–86) defines *dedoména* as "data as diaphora *de re*". Examples include a red light on a dark background, a changing electrical signal in a telephone conversation, an ink mark on a white page, sounds or marks on a tape (which might be interpreted, for example, as dots and dashes in Morse code).[16]

D-data, therefore, are elements that *in themselves* are neither well-formed from a syntactic point of view nor bearers of a semantic meaning, but which can be selected so as to become bearers of information if inserted into a suitable syntactic-semantic-pragmatic context that confers meaning upon them. *D-data* correspond to the physical dimension of data, that is, to the differences in states of the world that can be detected but which are not yet in themselves data that convey information, or, put otherwise, sign elements that carry semantic content. This is the rawest level of data in which only physical variations, discontinuities (for example a red spot on a dark background), exist, without any coding or meaning attributed to them.

These *D-data* can therefore consist of any physical discontinuity that can be perceived by the sense organs. More analytically, they can have a (i) olfactory nature, (ii) gustatory nature, (iii) tactile nature, (iv) visual nature, (v) acoustic nature, (vi) proprioceptive nature.

Let us imagine, for example (recalling what Étienne Bonnot de Condillac envisaged in his book *Traité des sensations*: Condillac, 1754), that a certain *inforg/nomorg* to whom we must transmit some information is an entity whose knowledge is limited to the sense of smell. In this case, for example, the *D-data* could consist of various floral scents (rose, carnation, jasmine, etc.), and these scents could be used to convey apophantic or normative information. For example, with regard to normative information, the scent of a rose might signify "Stand up!", while the scent of a carnation might mean "Sit down!".

Similarly, if our receiving *inforg/nomorg* is endowed only with the sense of taste, the *D-data* must consist solely of tastes that could be employed to transmit apophantic or normative information. For example, and again with regard to normative information, we can convey instructions through fruit-flavored candy. A piece of candy with the taste of orange could indicate "Walk!", while a piece of candy with the taste of apple could express the command "Stop!".

Likewise, in the case where a receiving *inforg/nomorg* is equipped only with the sense of touch, only tactile experiences or sensations can be used to convey apophantic or normative information. In the case of Braille texts, we clearly have tactile experiences that transmit information – whether apophantic or normative – that possess a linguistic nature (if we consider the data in terms of *S-data*) even though they lack a visual or auditory form. An example of *D-data* that enable the transmission of normative information through tactile experiences is provided by the Braille edition of the Italian Constitution. However, we can also conceive of simpler tactile experi-

[16] As Floridi (2010, p. 23) writes: "They are pure data, that is, data before they are interpreted or subject to cognitive processing. They are not experienced directly, but their presence is empirically inferred from, and required by, experience, since they are what has to be there in the world for our information to be possible at all".

ences that serve as carriers of normative information. The tactile sensation of a rough surface, for example, might convey the normative message "Stop!", while that of a smooth surface might indicate "Proceed!". Consider also the so-called *Safety Pois* (a kind of floor-mounted traffic light made of large colored circles – green, yellow, and red); this device could be redesigned for the visually impaired by transforming visual *D-data* into tactile *D-data*. For example, the colored circles could be replaced with (podotactile) porcelain stoneware discs glued to the floor. These discs would feature different surface textures, each conveying a specific piece of normative information – essentially, a tactile version of the *Safety Pois* for the visually impaired.

Lastly, with respect to *D-data* of a proprioceptive nature, one could even imagine a wobbly floor conveying the normative information "Do not enter this area of the building", and a firm floor communicating the instruction "You are allowed to stay in this area of the building".

In short, *D-data* are *perceivable* elements of the *physical world* that are used as tools to transmit information.

Firstly, as said, *D-data* are *elements* of the physical world. According to Znamierowski (1921), the physical environment is the medium that makes influence between individuals possible; it is what enables communication among persons. Conscious changes in one individual's mind cannot directly cause psychic changes in another's. Between them there is an impersonal "environment" constituted by the physical world. It is by modifying the physical world that people transmit information, and it is this same physical world that enables not only immediate but also long-term information transmission, doing so through the production of what Znamierowski terms "physical products". He defines these products as "structural changes in the environment caused by the conscious influence of a human being" (Znamierowski, 1921, p. 15). For example, a written note left on a table for an absent friend in order to inform him/her of our presence at a certain place at a certain time constitutes such a structural change in the environment; it "substantialises" the activity and makes it possible to delay the final phase of influence. *D-data* are precisely these "physical products" which, in his theory of the environment, Znamierowski describes as the only instruments of communication within human society.

Secondly, *D-data* are *perceivable* elements of the physical world. *D-data* are perceived by a sentient being; it is essential that these elements of the physical world be perceptible to the receiver. This aspect of *D-data* is significant when reflecting on the *inforg*: that is, the informational organism which receives the information. It is crucial that the *inforg* to which the information is intended to be transmitted is able to perceive the element of the physical world that carries the information. For example, if information is transmitted by means of a certain ultraviolet light or ultrasonic wave, such *D-data* would not be perceptible to humans, whereas they might be perceptible to cats. In this regard, the studies by the ethologist Jakob von Uexküll (1909, 1920) on the distinct sensory worlds of different animal species were truly innovative. These worlds are relative to the species' differing sensory, cognitive, and motor capacities.

Let us now consider *S-data*. At this second level of data analysis, if we examine, as an example, one of the three original copies of the Italian Constitution, we are confronted by a legal text composed of sentences. At this level – at the level of *S-data* – it is possible to distinguish, for example, between, on the one hand, *linguis-*

tic normative information, and, on the other, *non-linguistic* normative information (for example, graphic normative information).[17] The distinction between linguistic signs and non-linguistic signs is possible only at the level of *S-data*, whereas at the level of *D-data*, the difference between the original copy of the Italian Constitution and a no-overtaking road sign can consist only in a physico-chemical investigation of the two objects.

Unlike *D-data*, *S-data* can only be perceived by a symbolic animal. To be perceived, *S-data* require symbolic capacity: that is, as Searle (1995, p. 228) defines it, "the biological capacity to make something symbolize − or mean, or express − something beyond itself". The *infors* must therefore be symbolic animals: that is, animals capable of seeing something as something else – for example, they should be able to perceive ink marks on a white sheet of paper as letters of the Latin alphabet, and hence as words in a particular language, or able to interpret a stone wall as a prohibition against entering a specific area of land.

At this level, therefore, data are not seen as mere elements of the physical world, but as elements of the cultural world – as signs that convey meaning. They are generally required to be syntactically well-formed; that is, they must comply with certain syntactic rules regarding the composition of signs. They have a semantic nature in that they convey meaning. Furthermore, they can perform a pragmatic function: for example, some signs may express a command or a prohibition.

4.2 Phenomenology of Data: Linguistic Normative Information and Non-Linguistic Normative Information

When the distinction between *S-data* and *D-data* is drawn, the question "What data can be the carriers of normative information?" splits into two more specific questions: (i) "What *D-data* can be the carriers of normative information?"; (ii) "What *S-data* can be the carriers of normative information?". These two questions concern the phenomenology of normative information, that is, the ways in which normative information manifests itself.

Let us focus on *S-data*. A first type of *S-data* conveying normative information are normative sentences (for example, the articles of the Constitution or the articles of a civil code or a penal code). However, *S-data* conveying normative information are not only linguistic sentences; two types of normative information can be distinguished:

(i) *linguistic* normative information, and.
(ii) *non-linguistic* normative information.

The investigation of non-linguistic normative information has often been neglected by the theory of norms, which has mostly focused on the investigation of linguistically formulated norms, that is, norms expressed by linguistic sentences. Consider,

[17] As Zhou (2021, p. 307) writes, "it is widely believed that information is more basic than language. Linguistic symbols are just one among many kinds of signs that convey information. Language is a special derived case of information, not a generic one".

for example, what Norberto Bobbio (1958) and others have written on the peculiar and exclusive linguistic nature of norms.[18] But the *S-data* conveying normative information are not necessarily written or oral statements. This can also induce reflection on the nature of norms: there are also non-linguistic norms, norms without linguistic sentences. This is in line with what Hans Kelsen (1965, p. 355; our translation) wrote about legal norms: "That the legal norm does not need to be formulated linguistically is shown […] by the fact that the act, the meaning of which is a legal norm […], can also be a gesture: with a certain movement of the arm a policeman orders us to stop, with another he/she signals that we can proceed".

Two examples of *S-data* conveying non-linguistic normative information are the stop gesture of a traffic policeman and a red traffic light. Here we have two items of normative information that concern the obligation to stop, but the data conveying this normative information do not consist of words and sentences. Therefore, in addition to sentences, gestures, colored lights and drawings can also be carriers of normative information.[19] Besides sentences, gestures and drawings, another type of data conveying normative information are certain material objects, namely "deontic artifacts" (Lorini et al., 2021, 2023). These material objects that convey deontic information can be of very different kinds: in certain situations, a fence, a chair placed in a certain location and in a certain way, or a tactile paving nail, can become *S-data* conveying normative informational content.

Obviously, all *S-data* must be perceivable by the recipient of the information, who perceives them through their material-phenomenal substrate: the *D-data*. However, if *S-data* are to be recognized and interpreted as such, they generally need a syntactic context (in relation to which they can be considered well-formed), a semantic context, and a pragmatic context so that they can be interpreted. If we erase *D-data* we lose information. If we have *D-data* but lose the hermeneutic codes, we lose the ability to see something as a relevant datum, and interpret this item as an *S-datum*, so that in this case too we lose information (in terms of both the informational content and the informational nature of the item that conveys the information).

The fruitfulness of the distinction between *D-data* and *S-data* is illustrated, for example, in the analysis of a curious episode in the recent history of Italian law. In March 2010, a minister of the Italian Republic was photographed by the press while, inside a fire station, he set fire to several cardboard boxes bearing the label "375,000 useless laws". With this staged performance, the Italian minister wanted to publicise the repeal of hundreds of thousands of useless laws that had finally been removed from the Italian legal system. Newspaper articles described the act as "300,000 laws burned". This expression raises the question of the referent of the term "laws" in the phrase "burned laws". In other words, what exactly did this minister of the Italian Republic burn, when he burned 300,000 Italian laws? In this context, the term "law" clearly does not refer either to the *S-data* of normative information (i.e., the linguistic

[18] A similar image of rules was proposed by Ganz (1971, p. 13), when she asked: "To what does the word 'rule' refer?" and replied: "Rules can be utterances as well as inscriptions, and 'rule' refers to both utterances and inscriptions".

[19] Compare with Floridi (2010, p. 21): "Semantic information is not necessarily linguistic. For example, in the case of the car's operation manual, the illustrations are supposed to be visually meaningful to the reader".

sentences expressing the repealed norms) or to the informational semantic content, which, of course, cannot be physically burned. Rather, it refers to the *D-data*; that is, the material elements (such as sheets of paper marked with ink) that constitute the *D-data* of the norms. Only *D-data*, in fact, are burnable.

5 Three Kinds of Normative Information

From a typological point of view, three general types of normative information can be distinguished:

(i) *deontic* normative information,
(ii) *constitutive* normative information,
(iii) *technical* normative information.

This typology of normative information is based on a macro-typology of rules: deontic rules vs. constitutive rules vs. technical rules.[20] In this sense, the categories that apply to normative information are similar in kind to those generally used for linguistic and graphic rules (Moroni and Lorini, 2017; Lorini & Moroni, 2020) and for normative artifacts (Lorini et al., 2021).

5.1 Deontic Normative Information

The first type of normative information consists of *deontic normative information*, which is information that has deontic content. In other words, it is information that expresses deontic rules; that is, rules formulated in terms of deontic modalities (obligatory, permitted, forbidden, etc.), to use the terminology introduced by Georg Henrik von Wright (1951). For example, deontic information includes that which prohibits or imposes a certain behaviour.

S-data conveying deontic information may be linguistic sentences, drawings and images (such as the no-smoking sign), material objects (for example, traffic roundabouts or fences), or gestures (such as a traffic officer's stop signal). Deontic normative information requires deontic concepts (e.g., deontic modalities) and a "deontology" as defined by John Searle (1995, 2010). In order to exist, it requires deontic conceptual structures – such as the ideas of duty and permission – and deontic entities – such as an obligation or a claim. Additionally, deontic normative information requires implicit or explicit "deontic codes" – such as the highway code or the civil code (Conte, 1976). Take, for example, a road sign that prohibits overtaking

[20] On the distinction between *regulative*/deontic/prescriptive rules and *constitutive* rules, see especially Znamierowski (1924); Searle (1964a, 1964b, 1969, 1995, 2010); Carcaterra (1974, 1997); Conte (1983, 1985, 1986, 1988); Gardies (1986); Żełaniec (2013). On *technical* rules, see von Wright (1963); Azzoni (1991); Conte (1993); Lorini (2017).

or the green light of a specific traffic signal – these items carry normative information only by virtue of the (deontic) highway code as a general framework.[21]

5.2 Constitutive Normative Information

The second type of normative information consists of *constitutive normative information*, which is information that performs not a "deontic", but a "constitutive" function. In other words, it is information that expresses constitutive rules; it is information that, through its transmission, in various ways brings new entities into being. It creates new institutional realities. Constitutive normative information is normative information which does not produce an event by directly exerting "pressure" on an individual's behaviour; instead, it alone produces the desired effect, which is its *purpose* and *content*. The effect is produced at the very moment the information is transmitted; that is, at the moment when the nomothetic act is performed.

Also in the case of constitutive information, the *S-data* conveying such information do not necessarily have a linguistic nature: besides being linguistic sentences, they may also take the form of drawings and images, material objects, or gestures. For example, among graphic *S-data*, we may identify what can be termed "constitutive maps". These are maps that neither *describe* objects nor *prescribe* behaviour, but instead *constitute* something. This is the case, for instance, of maps drawn by legal authorities endowed with the power to define the borders between nation-states. For example (by way of a purely analytical illustration, regardless of its substantive historical disputability), when in 1922 Sir Percy Cox – the British High Commissioner – drew lines on a map defining the boundaries of Saudi Arabia, Iraq and Kuwait, "he thereby added new non-physical ingredients to the world" (Smith & Varzi, 2000, p. 485).[22] Another example of constitutive information is provided by the sign indicating the end of a no overtaking zone. In this case – unlike the no overtaking sign, which conveys deontic information – we have constitutive information, because the sign determines the end of the stretch of road where the overtaking prohibition applies. A third example of *S-data* conveying constitutive information is represented by certain boundary stones; that is, specifically shaped demarcation stones determining the boundary of a plot of land. Here, we have in mind cases in which the stones do

[21] Conte (1976) distinguishes three senses in which a deontic code, such as the highway code, is also a semiotic one. First, a deontic code is a code of *deontic qualification*, by which is meant that it is in light of this code that an act such as overtaking is *deontically* qualified and becomes (on that stretch of road and for as long as the sign is present) prohibited, or that an act such as crossing an intersection becomes permitted in that specific place for the duration of the green light. Second, a deontic code is a code of *deontic encoding*, in that it enables the sending *inforg/nomorg* to produce normative information. In other words, it allows the encoding of certain content into a set of data that convey the informational content: for example, the sending *inforg/nomorg* transmits the normative information "No overtaking" by installing the corresponding road sign. Third, the deontic code is a code of *deontic decoding*, in that it allows the receiving *inforg/nomorg* to decode the normative information by perceiving the carrier of the information. For instance, the receiving *inforg/nomorg*, while driving a vehicle, sees a red traffic light and understands that he/she must stop at the road junction.

[22] This constitutive act has subsequently had various effects in conjunction with additional deontic normative information. However, this does not detract from the fact that the act, as such, is (purely) *constitutive*.

not merely indicate a pre-existing boundary but actually bring it into being (Moroni & De Franco, 2025).

5.3 Technical Normative Information

The third type of normative information is *technical normative information*, which is information that expresses technical norms – that is, rules of the form: "If you *want* K, you *must* do W". Technical normative information prescribes behaviors so that the agent's aims can be achieved. In this sense, technical information can be differentiated from deontic information. In the former example, we have a *technical* ought; in the latter, we have a *deontic* ought (von Wright, 1983; Conte, 1991; Lorini, 2017). Many of the graphic instructions for assembling furniture found in the manuals included with IKEA flat-pack products convey this kind of technical normative information. (Only this third type of normative information appears to be close to Floridi's notion of instructional information.)

6 Deictic Normative Information vs. Non-Deictic Normative Information

The distinction between *D-data* and *S-data* is also a fundamental categorical tool to investigate normative information from the point of view of *deicticity* (or *indexicality*).[23] From this perspective, we can distinguish two types of normative information:

(i) *deictic* normative information,
(ii) *non-deictic* normative information.

It is obvious that, in many cases, the location of the *D-data* concerning normative information does not play a significant role for the semantic content of the information. Consider the ink stains to be found on the pages of the original copy of the Italian Constitution preserved in the Historical Archive of the Presidency of the Republic in Palazzo Sant'Andrea in Rome. These ink stains represent the letters that form the words that in turn compose the normative sentences that in turn compose the articles of the constitutional text. Clearly, neither the place where the ink stains that make up the words of the text of the constitution appear (i.e., the sheets of paper of which the original copy of the constitution is made), nor the place where the original copy of the Italian Constitution is kept (i.e., Palazzo Sant'Andrea in Rome), affect the content of the constitutional norms and their "spatial sphere of validity" (to use a phrase coined by Hans Kelsen), which corresponds to the territory of the Italian State. If, hypothetically, this original copy of the Italian Constitution was transferred to other places, the relationship between the norms of the Constitution and their space of validity would

[23] On the theory and philosophy of *deictic* or *indexical* expressions/terms, see, for example, Frege (1892); Pierce (1936, 1958); Burks (1949); Perry (1977); Schiffer (1981); Kaplan (1989); Atkin (2005); Braun (2017).

not be altered. This relationship would not change if the location of its normative signs varied.

Interestingly, in other cases instead, the location of the *D-data* is essential for determination of the semantic content of the normative information and of its spatial coordinates. In these cases, the spatial projection of the normative information is conditioned by the location of its *D-data*. A road sign that has not yet been installed is a piece of data (or a set of data) that carries "unsaturated normative information": normative information whose content is not complete because it lacks the indication of the place where the prescription is in force. Only when it is fixed in a certain place in the city or in a place adjacent to the extra-urban road surface can this *D-datum* become an *S-datum* that carries saturated, complete normative information that, for example, transmits the ban on parking exactly from the place where the road sign is located onwards.

This phenomenon has been studied in particular by Franciszek Studnicki (1968, 1970) in relation to the normative information conveyed by vertical road signage. Studnicki observes that a distinctive feature of road signs is that the normative information they transmit is semantically complete only in relation to the geographical position of the sign. In particular, Studnicki emphasises the role played by the material structure of the road sign in relation to its normative function: the material nature of these objects is essential for the performance of their normative function.[24] Indeed, the stretch of road to which road token-signs refer is determined – given the deictic nature of such signs – by the location in which they are physically installed. For street signs, their spatial placement matters not only for conveying the normative message but also for indicating the spatial area to which the rule applies (Lorini & Loddo, 2017; Lorini et al., 2021, 2023).[25]

In the case of traffic signs, the semantic content of the normative information they convey is complete only in relation to what Karl Bühler calls the *Origo* – the coordinate source – of the sign's deictic field. According to Bühler (1934), in the case of deictic expressions, the *Origo* is determined by the speaking subject (the *I*), the spatial location (the *here*), and the temporal point of the utterance (the *now*). In the case of traffic signs, one might argue that the *Origo* of their deictic field coincides with the spatio-temporal coordinates of their physical installation. The *Origo* of the traffic sign is thus determined by the installed *D-data* that serve as carriers of normative information. In this case, the *D-data* include the steel or aluminium post and the galvanised steel or aluminium panel coated with a reflective film to ensure visibility at night.

The recognition of deictic normative information is particularly important for the theory of norms and for the philosophy of law as it enhances our understanding of

[24] More generally, on the deictic nature of certain material signs, see Bühler (1934); Straus (1956); Olivecrona (1971); Mulligan (1997); Scollon and Scollon (2003); Lorini and Loddo (2017); Stjernfelt (2019); Lorini et al. (2021); Millikan (2017, 2023).

[25] For instance, a traffic sign, as Studnicki (1970, p. 155) points out, "carries information referring to a certain section of a road" and, at the same time, "indicates by its geographical position the section of the road to which that information refers". As Studnicki (1970, p. 155) notes, road signs have a fully defined meaning "only when the geographical positions of the sign of which they are composed are taken into consideration".

legal information by challenging the traditional thesis that normative content is independent of the spatial and material context. In particular, it challenges the idea that a legal text retains its meaning and legal validity regardless of the location of the data that carries it. This thesis overlooks a fundamental aspect: there are forms of legal information that cannot be properly understood or applied without taking into account their material substrate and the spatial placement of their *D-data*. A theory of legal information, therefore, cannot be limited to the syntactic, semantic, and pragmatic dimensions of data, but must also incorporate their spatial and material dimensions.

Moreover, the identification of deictic normative information is also significant for the theory of information, particularly with regard to the issue of *reproducibility*. In the case of deictic information, the location of the *D-data* that carries the information is essential for determining its semantic content. The location of the *D-data* is not merely a feature of certain normative signs, but is partly constitutive of their informational content. Consequently, the reproducibility of such information is constrained by the material and spatial structure of the *D-data*, and any process of reproduction must take this aspect into account. In other words, the deictic nature of information places limits on its reproducibility.

7 Conclusion

As we have seen, in the theory of information, the focus has generally been on apophantic (declarative, descriptive, factual, constative) information, which has a semantic content that can be true or false and whose function is to represent reality. This paper has highlighted a less-studied but equally important type: information that is not descriptive but normative, which we term "normative information". We have examined this form of information, demonstrating its relevance to both the philosophy of normativity and the philosophy of information. A central element of our analysis has been the distinction between *D-data* and *S-data*, which provides a crucial lens through which to study the ontology and phenomenology of normative information. Moreover, this distinction proves to be particularly fruitful for an innovative ontological investigation of norms and normative communication. We have also developed a specific typology of normative information, which distinguishes between *deontic*, *constitutive*, and *technical* normative information. A further development has been the distinction between *deictic* normative information and *non-deictic* normative information. This latter conceptual distinction is particularly important, as it shows how, for a certain type of information (deictic information), the location of the *D-data* bearing the information is essential for determining the informational semantic content itself. This aspect is crucial for the issue of the reproducibility of information.

In general terms, our reflection on normative information highlights that people are not only *inforgs* – informational organisms – mutually connected and part of an informational environment; they are also *nomorgs* – normative organisms – able to act in light of norms (and normative information) and living within a normative environment. In short, to receive, as well as to send, normative information, the recipient

and the sender must be not only an *inforg* but also a *nomorg* – that is, a *nomic* animal, an animal possessing nomic capacities (Lorini, 2022).

Undoubtedly, we live immersed in the infosphere (as Floridi, 2014, terms it), a global environment composed of information, where informational agents coexist and interact by communicating and processing information. But we, as humans, also inhabit the nomosphere. "Nomosphere" is a neologism coined to designate a global normative environment composed of a network of norms and normative information within which normative agents live. Furthermore, one may ask: What kind of *inforg* can be a sender and/or recipient of normative information (i.e., a *nomorg*)? Is it solely a human, or could it also be an animal or even a robot?

Before concluding, one connected issue calls for clarification. In the present paper, the majority of the examples of normative information we have examined are drawn from the analog domain rather than the *digital* one. However, the latter can and should also be investigated in light of the notion of normative information and the associated conceptual distinctions developed here. We intend to explore this point in future research.[26]

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[26] In relation to the digital domain, it seems that two distinct but related questions arise. First, and more straightforwardly, there do appear to be genuine cases in which something like normative information is present in digital environments, insofar as digital systems can mediate the transmission of intentional normative messages between normatively competent agents. Paradigmatic instances are provided by user interfaces (e.g., "required field", "accept the terms"), where normative information originating from human agents is embedded in, and implemented through, the system and thereby addressed to other human agents. In such cases, the digital system does not itself appear to qualify as a normatively competent receiver; rather, it functions as a medium that both conveys and enforces normatively structured content. Second, and more problematically, one may ask whether software code, when considered strictly as a set of instructions executed by a machine, can appropriately be regarded as constituting normative information. This issue seems more complex since, in this context, there is arguably no normatively competent receiver capable of grasping and complying with norms, given that norm-following, in the relevant sense, appears to presuppose *nomic capacity*. It is therefore less clear whether the execution of code should be described in genuinely normative terms or whether it would be more appropriate to characterize it in purely causal terms. For this reason, we believe that it would be particularly interesting to investigate these issues in a dedicated future work. For insightful recent discussions of issues of this kind, see, e.g., Hildebrandt (2015, 2016, 2020), Fresco and Wolf (2016), Primiero (2016), Pagallo and Durante (2016), Pagallo (2018), Loddo (2025).

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Declarations

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