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THE INTUITIVE CONCEPT OF INFORMATION: AN ANALYSIS

Abstract. This paper seeks to determine the intuitive meaning of the concept of information by indicating its essential (definitional) features and relations with other concepts, such as that of knowledge. The term “information” – as with many other concepts, such as “process”, “force”, “energy” and “matter” – has a certain established meaning in natural languages, which allows it to be used, in science as well as in everyday life, without our possessing any somewhat stricter definition of it. The basic aim here is thus to explicate what it amounts to in the context of its intuitive meaning as encountered in natural languages, what the subject of cognition implicitly presumes when using the term, and to which ontological situations it can be applied. I demonstrate that the essential features of the notion of information include the presence of a material medium, its transformation, the recording and reading of information encoded in the medium, and the grasp of what is recorded, coded and transmitted as an intentional object, where the latter is construed in terms broadly in line with the ontologies of Husserl and Ingarden. Along the way, a number of issues relating to the notion of information are also pointed out: the problem of informational identity, of the existence of virtual objects, and of the choice of an adequate information carrier, as well as formal-ontological problems, including those which concern relations between information carriers and intentional objects.

Keywords: information; definition of the concept of information; knowledge; intentional object; reconstruction of the hermeneutical horizon; intuitive analysis of concepts; phenomenology.

1. Preliminary methodological remarks

Experience tells us that the term “information” can be employed by people who have never encountered any definition of it – something which implies, in turn, that it carries with it a certain intuitively graspable meaning and range of possible applications. My aim here will be to establish what

such a meaning or sense amounts to, and to accomplish this goal it will be necessary to analyse the links and relations between this concept and other notions that are related to it in some sort of essential way. If only because of these connections, the analysis is thus required to pay attention to the wider phenomenological structure in which the constitution of the intuitive sense of each and every such concept is arrived at: what I call its “hermeneutical horizon”; see below for a more detailed explanation. The aim of this text is therefore to explicate such a meaning for the term “information”, using the method of analysing concepts intuitively as they show up within precisely this horizon. More specifically, my intention is to present findings that have to some extent already emerged as a result of my having employed such an approach in the past, as distinct from only deploying it *in statu nascendi*, so to speak, as the present investigation itself unfolds.

The hermeneutical horizon – i.e. the phenomenal structure within which the understanding of, amongst other things, the meaning of intuitive concepts takes place – is a certain phenomenal fact whose presence we may come to grasp by means of phenomenological methods.¹ Such a horizontal structure of connections and dependencies is manifested in our experience in the form of some sort of established structure of logical dependencies obtaining between intuitive concepts in this or that particular natural language: for example, one that concerns dependencies between more and less general concepts, concepts with intersecting scopes of reference, etc., where these are amenable to being detected, reconstructed and studied.² As a rule, horizontal structures remain active in the process of understanding, even though they fall below the level of conscious awareness of cognitive subjects. This is analogous to the possibility of using a language fluently in practice without becoming aware of the grammatical rules of syntax, inflection, etc. The hermeneutical horizon also contains a number of beliefs and commitments of an ontological nature.

In previous work I have described the method of intuitive analysis of concepts within the hermeneutical horizon by employing, as an illustrative example, the analysis of the intuitive notion of a polyhedron (Król, 2007; Król, 2007a). Moreover, I have then gone on to use it to analyse intuitive concepts of infinity, sethood, and a number of concepts presented in historically arising forms of mathematics (e.g. the notion of number as it appears in these) (Król, 2018; Król, 2018a; Król, 2010). I shall not enter into deeper methodological analysis of the issues that have arisen there, but this is hardly something that need detain us anyway, as the method of intuitive analysis of concepts is basically used by almost every scientist (including mathematicians and scientists working creatively) in a non-

conscious and usually non-verbalised way. Therefore, instead of discussing this method, I shall just be offering a further example of its application, this time specifically connected with the analysis of the concept that forms our primary concern here. I refer the reader interested in methodological details to other works.³

Even so, it is still necessary to explain, if only briefly, the difference between this method and that used by analytical philosophers engaged in studying the linguistic use of a given term in various language-involving contexts, including those associated with everyday language or with science. Although based on different principles, the two approaches can in fact lead to partially convergent results. Thus, the study of the most common colloquial uses of a term corresponds to what goes on when, in the context of the method of intuitive analysis of concepts, we provide so-called “archetypical” examples of the expression in question. I think it is sufficient to provide one example in this regard. In the method of intuitive analysis of concepts, when asked what a polyhedron is, we first give intuitively determined examples of such objects: thus, we mention cubes, quadratic prisms, pyramids, and so on. In the analytical method, meanwhile, we note that the term “polyhedron” is employed to describe cubes, quadratic prisms, pyramids, etc. However, the analytical method does not seem to lead to the discovery of new properties of a given expression: rather, it merely reports facts pertaining to its existing usage. To be sure, it is possible to use the analytical method to determine “archetypical” examples, but this does not itself suffice to fully analyse a given term. With intuitive analysis, we may discover something new, as the so-called core of the intuitive concept itself evolves (Król, 2007a). (In the case of a polyhedron such a core is defined at the beginning of the investigation as “a solid with polygonal faces, edges and vertices”⁴). Furthermore, the method serves to highlight hidden, non-actual, non-verbalised beliefs that define the meaning of a given concept, so that it also employs methods of phenomenological observation and description of what is given in respect of the intuitive concept under scrutiny, and how it is so. An example of such a tacit or hidden belief was – in the case of Euler’s original definition – the belief that a polyhedron must be “in one piece”: i.e. that – for example – two cubes necessarily make up two polyhedra, and not one with multiple parts. It was therefore necessary to add to the original core of this concept another essential feature: that of connectivity. The method of the intuitive analysis of concepts, unlike the purely analytical method, allows us to penetrate right down to the very essence of a given concept, expression or phenomenon, prescribing basic ontological commitments relating to these.⁵ Its significance is not confined to just show-

ing in what context(s) a certain concept or expression is used. Ontological assumptions are usually invisible with the use of analytical methods.

Many concepts make intuitive sense quite apart from their technical meaning and use in scientific theories. And, indeed, there are a huge number of examples to confirm that this is so. These include the terms “energy”, “force”, “field”, “substance”, “particle”, “good” and “world”. Another such term is “information”. I shall not be dealing here with the technical uses and meanings of this last term in computer science, information theory, physics, telecommunications, genetics, and so on; rather, I shall just try to understand and explain in what sense the term “information” functions on an intuitive level in common usage.

Many such concepts already possess intuitive meanings before being introduced to science, while their subsequent scientific applications tend to relate to or pull against these. Introducing a concept into science, as with Newton’s use of the term “gravity”, is not usually sufficient in and of itself to explain either its significance or what the corresponding phenomenon amounts to; rather, it only furnishes us with some operational or quantitative definitions, and ways of measuring quantities. The same holds for the term “information”.

Einstein, in his famous work of 1905 entitled “On the electrodynamics of bodies in motion” (Einstein, 1905), clearly indicates that he does not intend to speculate about what the terms “time” and “space” mean – these being, of course, terms familiar to us for thousands of years. At the same time, though, he states that it is enough to define “time” as something we measure with clocks, and “space” as something measured with a ruler. Yet it is obvious that the original, intuitively encountered subject matter expressed by these concepts must have been the starting point of his Special Theory of Relativity. On the other hand, as a result of Einstein’s analyses, the core significance of these concepts, which had gone unchanged for several centuries, has altered. After all, it was only the old version that exhibited such features as “absoluteness”, “uniformity”, “homogeneity”, “isotropy”, “infinity”, etc.

Analyses of intuitive concepts are important for determining the mechanisms through which scientific theories come to be created and developed, in that science does not develop in an intellectual or historical vacuum, but rather uses, and in a way grows out of, knowledge and concepts already functioning in everyday terms.

In the case of the intuitive concept of “information”, a full analysis would have to include tracing the historical contexts of its use, its emergence, and the way in which it functions in various scientific theories. How-

ever, these issues will not be the subject of the present work, as it is impossible to consider them properly in a relatively short text such as this one. For this reason, aside from phenomenological context implicitly adopted here, the results achieved will overlap to some extent with those achievable through the linguistic-analytical method. Yet the fact that I intend to assume, for present purposes, knowledge of the phenomenological conceptual apparatus developed by Roman Ingarden in his work *The Controversy over the Existence of the World*, does itself represent a significant difference, and this is especially the case with regard to the notions of acts of consciousness and intentional objects (Ingarden, 2013). For a brief account of Ingarden's ontology of intentional objects, cf. also (Skowron, 2020).

2. The intuitive concept of information

Where our particular target concept is concerned, there is a set of terms, such as “knowledge”, “message”, “message transmission”, etc., that are clearly essentially related to it. It turns out that “information” is most often referred to in the context of “message delivery”, “information transfer”, “storage” or “information gathering”, “receiving” or “sending”, and “information processing”. We are also frequently faced with information that is “encoded”, or “contained” in something. The most important – albeit only preliminary⁶ – finding in this regard, though, is that wherever something is, or could come to be, an object of knowledge, we are dealing with information, where this in turn highlights the fact that the latter is itself the result of certain cognitive acts of consciousness. The key to recognizing this is the concept of “information processing”, which serves to make explicit the fact that while information can exist without the conscious subject, and independently of the latter, it always does so in some relation to consciousness, just because information is precisely everything that sooner or later (or even just as a pure potentiality) can be realized as data to be apprehended by a consciousness – data revealed, for example, in the form of knowledge.

We find here an important difference between knowledge and information, in that knowledge cannot exist without awareness. Moreover, this holds for all forms of knowledge – no matter whether they be hidden, implicit, tacit, inert, or whatever.⁷ Certainly, knowledge and information are concepts whose referential scopes intersect. Information may be something given in acts of consciousness, but need not be something of which we are consciously aware at that moment and, indeed, may never come into conscious view at all. On the other hand, there is no such thing as knowledge

that is not “known” to anyone. It is worth adding that “messages”, “announcements”, etc., differ from the classical concept of “knowledge” in this respect as they are not required to be true, it being possible to transmit messages consisting of false information.

Not wishing to embark upon a discussion of the classical conception of knowledge as justified true belief (JTB), I will just state that false messages also have to be “known” to the recipient, and therefore constitute objects of knowledge.⁸ Moreover, most of the scientific theories we now recognize – or have recognized – as foundational for our knowledge have proved, or are, quite simply false from a logical point of view. For example, we know that Quantum Mechanics and the General Theory of Relativity are not true, just as we know that Newtonian Mechanics is not true – although we learn them and certainly “know” much about them. (The theory of phlogiston, or the Bohr model of the hydrogen atom, might equally well serve as subjects of knowledge.) We know and understand many things that are objectively not true, and we do not have criteria in such cases to distinguish what is just hypothetically true from what is false. It is safer to speak of “true knowledge” and “false knowledge”, if only potentially true or false. JTB does not prove of much use when it comes to analysing the historical forms and transformations of actual science.

Returning to our main topic, we may therefore state that it is an obvious truth that mankind learns to read information encoded in the world: for example, the genetic code, or information encoded in “relic radiation”. The information is there waiting to be read, and after such a reading becomes an object of knowledge. It is, and has been, “processed”, “transmitted”, etc., without the participation of human beings – even long before they appeared on the scene. We detect in this as an essential feature of the notion of “information”: namely, the fact of the necessary binding of information with some material carrier. Information cannot exist without a *possible* material medium. It is precisely this medium that is *de facto* passed on, processed – in which something is stored, etc. This “processing” or “transmission” can be done by non-conscious devices, natural objects, organisms, and so on. One and the same item of information can be successively encoded, saved, and passed on, in increasingly different carriers, without any awareness at all. For example, a piece of music can be “saved” on a traditional gramophone record, a CD, as electrical signals, electromagnetic waves, sound waves, and so on. There are whole systems of successive forms of coding, reading, processing, transmission, etc., of this sort – such that in their final phase the conscious subject is able to constitute, through acts of consciousness, an intentional object called, for example, “Beethoven’s

Ninth Symphony”. However, **information only counts as such if the subject has, even if only potentially, the ability to read it: i.e. if the information has the potential to be captured in specific acts of consciousness.** Thus, **information is all that is in the world around us that, thanks to its being written into it in coded form, we can be made aware of – i.e. that can be subsequently captured and interpreted in specific acts of consciousness, as an intentional object.**

Usually, nowadays, we talk about information in circumstances where someone encodes knowledge in a specific material (“physical”) medium in order to pass it on and enable it to be read by, or reproduced for, another conscious subject. Examples of this include computer systems for encoding images, photographs, drawings, the human voice, etc. In the case of information encoded or stored in some physical medium, it is not necessary for the conscious subject to have direct intellectual access to the stored information at each stage of encoding and processing. What is important, however, is that, through subsequent processes of transformation, coding and processing, he or she will come to possess, at least potentially, the possibility of accessing the recorded information in the form of some intentional object given via certain acts of consciousness – ones through which the relevant sources are themselves presented to awareness. For example, the transmission and processing of television signals may, in most of its stages, be inaccessible to human consciousness, even though it is “understood” in some other acts of a “significatory” nature (i.e. ones that are purely conceptual (Husserl, 1900–1). Yet the overall processing sequence is aimed at allowing certain signals to be seen and grasped directly in the acts of consciousness that occur at the final stage (usually as a so-called “virtual object”). At this point we make a certain interpretation, and in so doing grasp the experienced physical stimulus: for example, a set of pixels on a monitor screen is interpreted, and thus grasped intentionally, as “an image of the Wilanów Palace”. However, this “palace” exists only as a correlate of certain acts of intentional consciousness, not as an object actually perceived in the real world.

The above example concerns information intentionally recorded “at the input stage”, and subsequently processed, as planned, “at the output stage” by a human being. However, it is also possible to extract information not consciously encoded by any human being. In such cases, where processes occurring naturally in nature (in the real world) are concerned, human beings intentionally process certain natural processes or signals and build special devices to depict something natural. A good example here might be the

so-called “imaging” of certain processes: for example, a thermal imaging camera allows us to process heat waves invisible to human sight, making it possible for us to see them in certain acts of consciousness, no matter whether we happen to be observing the interference picture in the Davisson-Germer experiment (involving traces of waves connected with electrons not observed directly) or just reading off a voltage measurement on a voltmeter scale. In this way, empirical scientific knowledge can itself be considered to be a result of activities of processing and interpretation that use the theoretical apparatus corresponding to natural-world information: the whole world thus becomes a source of information. Once again, **everything that can become available to consciousness as a result of such processing, interpretation and imaging constitutes information**. In practice, what we know about the world through the empirical sciences is coextensive with the amount information we are able to process and make accessible via acts of consciousness.

Any encoding, recording, transmitting or processing of information must therefore be strictly determined by the physico-chemical properties of the medium used, and is therefore undoubtedly an appropriate subject for precise analysis using the methods of the mathematically enabled natural sciences. Moreover, it is in relation to just such a context that almost all existing definitions of the term “information” in computer science, telecommunications and cybernetics show up. Such definitions are purely quantitative: i.e. they for the most part address quantitative aspects of the issue, such as how many messages can be written in a specific medium, how many different pieces of information can be sent through it using, for example, a specific optical fibre, and so on. These quantitative aspects are objectively binding, so that in science the intentional, conscious aspect tends to remain in the background and may not even be raised at all.⁹

Human beings have the ability to interpret certain phenomena in a way that allows us to create an intentional reality – one that does not exist objectively outside of our minds. Thus we have the ability to find information even in places where no one has put it or intentionally encoded it. For we ourselves give meaning to the world in which we live: in effect, we domesticate it by constructing various interpretations. The world of information is therefore a manifestation of a purely human reality. A good example here is the recording of sounds emitted by certain devices or organisms: for example, insects. In the case of crickets, it is possible to record the sounds emitted by them and reproduce them in slow motion, slowed down in proportion to the time of cricket and human life, respectively. The sounds reproduced in this way resemble a musical piece composed by a conscious “human”

composer, even though no one has composed such a “piece”. In this sense, the work has been encoded in the signals generated by the crickets and only “came to life” as a result of an interpretation brought about via certain intentional acts on the part of human consciousness. Hence, it is as a result of interpretation that in such instances we are able to read off the information involved – meaning that we ourselves add something to reality. Reality *per se*, one might say, becomes reality-for-us: i.e. a reality that only we humans (or some other comparably conscious subject) can experience.

We should consider one more matter, which relates to treating so-called “pure thought” as information processing.¹⁰ It seems that the intuitive notion of information is also influenced by situations connected with certain theorems in mathematics. The conscious subject carries out certain intellectual operations which – as it seems – ought to be described from an intuitive point of view as “processing certain information”, and in this case we do not have a clearly defined material medium. Therefore, it would appear that in relation to this situation the working definition of information given earlier is inadequate. However, this is not the case. From a phenomenological point of view, during episodes of pure thinking the subject actually carries out certain intellectual operations, and during these operations no material medium is given directly to him or her within the acts that are involved. Moreover, there is no need to consider any material medium to justify the results: such a medium simply does not show up at all in the relevant acts of consciousness. In the sense specified by our definition, we are not dealing here with information processing at all. I would not wish to regard the concepts of “thinking” and “information” as pertaining somehow to one and the same thing, especially in respect of their intuitive meanings. After all, that would imply that the concept of “information” was more general than the concept of “thinking”, which seems rather contrary to intuition.

The solution to this dilemma is to realize that in the mathematically informed natural sciences we most often treat thinking as a certain function of the brain, and assume the hypothesis that the carrier of thinking and other intellectual activities consists in the impulses transmitted across the neural network of the brain, or some other similar physical processes. The process of thinking, thus construed and investigated, is indeed a “processing of certain information” in the sense of the definition under discussion here. However, there are problems with determining even just the supposed parallelism between certain physical processes and their intellectual counterparts. Moreover, we are not in a position to know if every form of thinking or consciousness corresponds to some kind of brain activity. Therefore, there are no obstacles to accepting the definition as given, or to our refusal, in line

with our intuitions, to identify at an *a priori* level the concepts of “information” and “thinking”. In turn, pure thought – in the sense of our definition – still becomes information inasmuch as it can be recorded and communicated to another conscious subject using a certain medium: for example, when some proof is encoded in the form of the text of a scientific work, or even just in notes jotted down for our own personal use. Thus, we may try to extend the definition to situations where pure thinking is only *potentially* recordable in some material medium, yet even if we succeed in doing so, this will not imply any solution regarding the dispute about the nature of our thinking itself.

The basic conclusion emerging from the analyses just pursued points to the Janus-faced character of the notion of information and its possible definition, which reflects the following duality of aspects: on the one hand, information is just what is realizable in those intentional acts of consciousness whose own objective basis is our reading and grasping of certain intentional objects on the basis of material aspects of reality, or when a certain intentional layer is expressible, notateable, and can itself be conveyed as information using some material medium, while on the other hand, any such “material base” can itself be processed, transmitted, encoded and stored without the involvement of conscious human awareness. Nevertheless, the condition for such a transfer of information is that the same intentional object be constitutable “at the input stage” (i.e. the initial point of the encoding process) and “at the output stage” (i.e. within the consciousness of the recipient). Therefore, **information is**, properly speaking, **everything that lends itself to being recorded and then read, reproduced, and in some way animated in the consciousness of the recipient – the conscious subject**. That is why, when we speak of information, we usually have in mind an intentional object – an intentional reality – which we intend to record, store or convey. Moreover, this corresponds nicely to the very etymology of the word “information”, whose Latin source (*informare*) denotes “putting” a certain form into something, forming or defining something. (*Informatio*, on the other hand, is an image, a representation of something – a representation, notification or explanation.)

Sticking with this as our working definition, we may say that a work of art is the information recorded and contained in its medium: for example, in a picture, a statue, an electronic medium, a traditional book, etc. Information is, *de facto*, precisely some intentional object which *lends itself to being* encoded in various material carriers (as with, say, the varied reproductions of a certain image) in a way that then enables its reproduction in consciousness. Also, while it may be incomplete or involve a surplus of fea-

tures, a certain set of essential characteristics of a given intentional object must nevertheless be identical (between the original and the reproduction) for it to be recognized and “revived” in our consciousness of the object. Mere transmission of something via a medium without this intentional layer will not be a case of the transmission of information. For example, sending a kilo of beetroot to someone may be a way of saying “I consider you a beetroot” (i.e. “I think you’re a peasant”), or it may be just a case of sending them a kilo of beetroot.

A final and highly important part of our intuitive analysis of the concept of information consists in our drawing attention to its relationship with the concept of “control”. It would seem that in the case of such man-made devices as airplane autopilots, thermostatically-controlled heaters, or, indeed, thousands of other similar items without which we cannot imagine our everyday lives, we are also dealing with information processing. The analysis of the notion of “control” appears to provide a counterexample to our definition of the notion of information, because such machine-based transformation of information does not, at first glance, seem to require any consideration of an intentional layer at all, it being enough to limit oneself to describing the strictly material aspects of what is going on. Also, it seems that there is no need to point to any intentional objects at “the input stage” or “the output stage” where such devices are concerned. Yet such devices do not come into being naturally: rather, they are intentionally designed and manufactured, and both their operation and their causes are incomprehensible without this intentional layer. We are simply not able to design and produce these devices without investing an intentional significance in certain material phenomena. Typically, they embody some of our scientific, purely theoretical beliefs. So, when something switches over in an autopilot, this is not a *de facto* purely natural process, but rather – for us – the action of “electric current”, “a relay”, etc., these themselves being intentionally interpreted objects. What goes on “in” such devices does have an intentional meaning after all, and therefore counts as information processing in our sense.

3. Consequences of the definition adopted, and problems resulting from this

The above outline of certain aspects of the intuitive concept of information obtained via the method of intuitive analysis of concepts opens up a number of further problems and issues whose proper consideration, how-

ever, lies beyond the scope of this article. I will therefore merely point these out, without attempting any more thoroughgoing analysis.

A. The problem of informational identity. Since we are talking about successive encodings, transformations, etc., of information, it becomes natural to define those encoding conditions minimally required to ensure that the transfer and encoding processes do not themselves “lose” or “distort” the information specified according to the original intentions of the initiator of the message. This issue can be addressed alongside the definition of the term “information” in two ways. The first consists in the adoption of a purely quantitative approach, and as such forms an important part of the considerations operative in computer science, telecommunications, cybernetics, etc. The other, meanwhile, involves a consideration of what it is that guarantees the identity, or at least similarity, of the intentional object at the input and output stages of the processing. Identity is ensured here through the transferral of a set of intentional characteristics such that the conscious subject “at the output stage” is able (in the case of intentional coding “at the input stage”) to reconstruct the intentional object that has been input in, or (in the case of reading off natural information) create an intentional object adequately capturing the natural characteristics of the object “at the input stage”. Moreover, it appears that in order to determine such conditions of identity for certain intentional objects, it is necessary to consider their phenomenological identity. However, this issue again takes us beyond the scope of the present article.¹¹ In short, it becomes necessary to point to the presence of certain essential features that constitute intentional objects, and secondary features that constitute the so-called “fulfillment” of the intention of the act. Not everything that is a part or a property of the intentional object serving as an object of information need be recorded in the medium and communicated to the recipient literally. As a rule, we only pass on certain “fragments”, and the whole intentional object is brought to life and “supplemented” in acts of consciousness of the recipient of the information. For example, the author of a literary work need not write in the text of some novel that a particular character has a back, or ears. Such matters are usually jointly presumed by author and readers alike, and in a way automatically completed, if only implicitly for the most part, by the latter. The message conveyed by a certain material medium carrying encoded information does not already determine exactly what information will be given, as it can be read in diametrically different ways by recipients. Certain things, as we know, can be understood in multiple ways that are different or even contradictory, yet still rational. Information therefore always corresponds also to a certain interpretation of

its intentional object (Lubacz & Król, 2020). Such an interpretation may depend on many factors: for example, the historical epoch, culture, or social conventions. In order to read information from the non-near historical past, it is usually necessary to reconstruct – within an appropriate range or scope of concern, at least – the relevant hermeneutical horizon pertaining to it.

B. The problem of choosing an adequate information carrier.

The problems of the identity, adequacy, and preservation of identity of intentional objects that are the subject of coding and transmission are ones that are connected with the necessity of choosing a medium of transmission – the carrier of information – appropriate to the nature of the information in question. It turns out that not everything can adequately be inscribed in anything; rather, a conscious choice of medium is required, which will depend on the nature of that information. There are better and worse media for a given message, as well as ones that are entirely inadequate. This issue is connected with a number of longstanding and familiar philosophical problems: for example, whether everything can be said or is expressible in words, speech, etc. It can be seen at this point that recording information often requires a number of intermediate means, which are not objects of the material world, but certain auxiliary intentional objects. These can even be described as “intentional media”, and they include, for example, certain cultural coding systems. Examples of this are the alphabet, writing, language, and so on. On the other hand, without certain auxiliary intentional objects or “intentional media”, it can prove impossible to read off information. As we can see from the case of reading the writings of ancient cultures, the system of intentional media must first be reconstructed if we are to be able to gain access to the encoded information. In fact, it is most often the case that we do not inscribe in some material medium the intentional objects themselves (information), but rather just such indirect intentional media. Hence, information may be said to possess a polyphonic structure in the specific sense pointed out by Ingarden in connection with literary works of art (Ingarden, 1965).

C. The issue of virtual objects. The problem of virtual objects is closely related to issues relating to information (Skowron, 2020). Generally speaking, a virtual object is precisely an intentional object of the kind that belongs (as an essential component) to the concept of information, but it is not an intentional medium used to convey that information (unless the object of information is the intentional medium itself). Virtual reality, like a work of art (painting, film, theatre, etc.), is composed of intentional objects brought back to life – so to speak – on the basis of transmitted information in acts of consciousness of the recipient of that same information. To

avoid any misunderstanding, it should be noted that not every intentional object exists as a result of the transmission of information (i.e. as a virtual object): rather, there will be “more” intentional objects than virtual ones. Similarly, not every intentional object that is the basis of some information will be a virtual object. Only some will be, and for these, it seems that they will be intentional objects consisting in information having the form of an object either in a sense posited by a formal ontology of sorts, or in one corresponding to what can be given in instances of sensory perception.

D. Classification problems. At this point in our deliberations, we are obliged to attend carefully to the various possible typologies of information that might plausibly be thought to ride on the back of the criteria adopted here. It is quite obvious, for example, that information can be and is classified according to the type of medium or coding signal (i.e. the material medium) involved: e.g., audio, light, electronic, biological or genetic information, and so on. On the other hand, it is rather less obvious how we should classify types of information according to the type of conscious acts involved in its capture – examples here might be information classified as visual, auditory, purely intellectual, etc. Further classificatory possibilities appear, as well, if we consider the types of intentional media available: then we can distinguish, for example, between information that is verbal, graphic, and so on. All the same, my intention is not to deal with the issue of informational typologies here, as this would take us well beyond the scope of what is acceptable in the present context. I am also unable to describe the typology of acts of consciousness in any more detail. Instead, I shall just refer the interested reader once again to the key works in this area, which are (Ingarden, 2013) and the *Logical Investigations* of Husserl (Husserl, 1900–1).

E. Formal-ontological problems. The main aim of the present considerations has been to explicate the content of the intuitive meaning of the concept of information. Within the latter, however, a number of what might be called “points of definitional underdetermination” (bifurcation, forking) have shown up (Król, 2006; Król, 2007). These consist in the possibility of supplementing and explaining the relations between the essential components of the given concept as encountered in our intuitive analysis in at least two (and, in fact, usually several) different directions. More particularly, the intuitive meaning of the notion of information does not of itself furnish a definitional resolution for a number of formal and ontological issues that arise. For example, one can immediately see that there is a need to provide a formal-ontological theory of intentional objects and their dependence on information carriers. Here one can refer once again to

the conceptual apparatus developed by Ingarden, which distinguishes primary from secondary intentional objects.¹² At first glance, it may seem that information should be associated with the latter. However, secondary intentional objects are only sufficient to characterise certain types of information: e.g. that relating to certain kinds of art object. In order to fully encompass information, such a formal classification would have to be extended to include further types of intentional object. This is because the structure of information ought to also include intentional objects founded on other intentional objects – i.e. on the intentional layer corresponding to intermediate intentional media. And at this point a number of possibilities appear. In particular, there does seem to be a point to distinguishing intentional cultural objects and, within these, subgroups pertaining to conventional sign systems such as language, alphabet and writing: the letters of the alphabet, and other conventional signs, are intentional objects, too. (This is the only reason why the Latin alphabet is said to possess 24 letters, meaning exactly one “a”, “b”, etc., and not as many letters of the type “a” as there are, say, printed in some book or other – the latter being just physical representations, in the sense of carriers of intentional signs). Moreover, in the case of the problem touched upon in the previous section, of whether or not at the time of proving a certain mathematical theorem an episode of pure thought is itself an instance of information processing or not, Ingarden’s ontology demands additionally that we take into account so-called “ideas”: i.e. those objects included in acts of consciousness over which the essential content of the conscious subject has no influence. Thus, such ideas possess content that the subject only recognizes – and not, as in the case of primary and purely intentional objects, content that he or she freely creates. Such formal-ontological issues, however, would take us far beyond the scope of our current deliberations.

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Certainly, it is the present author’s hope that **such a reconstructed essence of the intuitive concept of information will permit that concept to be applied in circumstances where the conscious subject encounters situations whose own essential character is such as to imply the existence of two principal ontological layers: namely, the intentional layer and the information-carrier layer (and where the latter often, though not necessarily in every case, will contain not just the layer of the material carrier itself, but also that of any intentional media associated with conventionally determined intermediary sign forms)**. Moreover, these active – though not actually

consciously entertained – features of our concept of information are, I believe, just what makes it possible to apply it in specific situations in the absence of a clear definition, simply on the basis of our intuitive recognition of the ontological structure of the situation in question.

Finally, summarizing the above considerations while at the same time leaving a number of issues open for further investigation, it seems reasonable to assert that phenomenological methods, and the findings that emerge when these are adopted, are indeed what is called for when seeking to explicate the problem of what information is, and what virtual objects amount to. I also hope to have shown here that the conceptual apparatus developed within the context of Ingarden's ontology is particularly useful in this regard.

NOTES

¹ For a reader who does not know the basics of phenomenology, the methods it uses and Ingarden's philosophy, I refer to publicly available philosophical dictionaries and Internet sources; cf. <https://plato.stanford.edu/entries/phenomenology/>; <https://plato.stanford.edu/entries/ingarden/>, and <https://plato.stanford.edu/entries/husserl/>. Cf. also (Ingarden, 1967).

² An example of such an existing logical structure is afforded by the possibility of searching out concepts more and less general than the one initially given, creating logical divisions, systematizations and classifications of certain objects in the natural world and the corresponding concepts – as with, for example, taxonomies of living organisms. Also, in the context of natural languages, we can and do state that the term “quadrilateral” is more general than the terms “square”, “rectangle”, “rhombus” and “trapezoid”, yet subordinate in his regard to “geometric figure”, “geometric object on a plane”, etc. “Something” is more general than “cow” and “living organism”, while “fish” has a scope logically distinct from that of “mammals”. There are usually also certain concepts, non-trivially related to the term under consideration, whose analysis will lead to the discovery of important definitional features. For the concept of information, this will be the case with such terms as “knowledge”, “control”, “information transfer”, “information processing”, and so on.

³ The approach presented in this paper can be considered complementary to the one presented in the paper (Lubacz & Król; 2019).

⁴ Cf. the first definition of Euler from 1758, given in (Euler, 1758). Cf. also (Lakatos, 1976).

⁵ A full analysis of ontological issues requires, of course, the tools of formal ontology.

⁶ As we shall see in due course, only *potentially transferable and codifiable* knowledge is information, while there are some kinds of information that are not knowledge.

⁷ Cf. for instance (Król & Lubacz, 2020).

⁸ However, the assumption has been contested that information can be false (Dretske, 1981), (Gibson, 1979).

⁹ Pointers to the relevant subject literature and classical quantitative definitions of information are given in (Król & Lubacz, 2020).

¹⁰ I would like to thank Bartłomiej Skowron and Józef Lubacz for bringing this and a number of other issues to my attention.

¹¹ For the conditions of identity of intentional objects, see (Husserl, 1900–1). Cf. also (Ingarden, 1973; Ingarden, 1989).

¹² “The *first* contains acts to which belongs the ‘free’, poetically inspired, dreamy fantasy, acts that are exhausted in forming intentional objects – and are so-to-speak satisfied with that; the objects, like fleeting dreams, pass along with these acts themselves, yet still favor us with various benefits in their fleeting existence. The *second* group, in contrast, contains acts whose achievement and rationale for existence is indeed also the creation of purely intentional objects, but these acts also gravitate toward something else *over and above* that. In effect, two different variants need to be distinguished among the acts of the second group. The one variant tends toward making the purely intentional objects themselves that are created in them into somehow lasting objects, toward ‘ensconcing’ [*fixieren*] them somehow, and indeed doing so by founding these objects in some sort of existentially stronger basis that enables them to continue to exist beyond the duration of the acts creating them. They are severed by this means from the purely subjective substratum in which they originated, and attain to an intersubjective objectivity [*Objektivität*] in which they can show themselves perfectly well to numerous subjects of consciousness, without thereby revealing their existential foundation. The second variant consists of acts that from the outset treat the purely intentional entities created by them only as models [*Vorbilder*] (as ‘designs,’ ‘blueprints’) for something else that is supposed to imitate them. And indeed certain autonomous entities that are supposed to ‘embody’ those ‘blueprints,’ to realize them, are fashioned in accordance with these models or designs” (Ingarden, 2013, vol. II, p. 201).

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