

Requirement shifters

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Abstract. Requirement shifters are context-dependent operators. The basic idea is to consider objects as items which, as regards at least some of their components, are functionally dependent on the perspective from which they are viewed. There may therefore be a plurality of requirements relative to the same object, with the corresponding possibility that the changes of requirements may be made to depend on the use of appropriate operators. Four different types of requirements shifters operators are distinguished (grouping, round-going, approaching and distancing, and base-highlighting). The long term idea is to enlarge the basic Lyee methodology by adding the family of requirement shifters operators. The actual paper presents a first purely conceptual analysis of the requirement shifters operators.

1. Introduction

One of the main meta-principles adopted by Lyee is that the user alone knows what s/he intends [1]. According to Lyee methodology, the final user alone decides for the correct organization of words (Lyee's basic units) and of their qualifications. This methodology may nevertheless run into serious troubles as soon as (1) the user himself do not know which decisions are the best for his/her own tasks; (2) there are many users with potentially or actually conflicting requirements (think about IR from the net).

If Lyee aims at being a really general methodology for software construction, regardless of the specificity of any domain application, it should be enlarged so that the above cases 1-2 can be dealt with.

It may therefore be reasonable to maintain the actual Lyee methodology as a *core methodology for default situations*, those where the final user is available and knows what he wants, and to add a series of new modules dealing with non default situations, as those listed by the two points above.

This paper presents a first purely conceptual analysis of some of the possibly many "requirement shifters" that may arise in dealing with non default situations.

The paper's title refers to the problem of contextual dependence, and therefore to the problem of the object as an item which, as regards at least some of its components, is functionally dependent on the perspective from which it is viewed. In a situation of this kind it is obvious that there may be a plurality of requirements relative to the same object, with the corresponding possibility that their change may be made to depend on, or at any rate be connected with, the use of appropriate operators. The paper shall analyze both *operators* which alter a requirement (the 'shifters' in the title) and *operations* which alter a requirement. Although the difference is a subtle one, it is important nonetheless: as we shall see, there are cases in which operations do not have a corresponding operator. The cases in question are essentially of two different types.

The first comprises situations in which there is no operator because the operation in question is only apparently *one* operation, whereas in reality it resolves into a *multiplicity* of different operations, eventually at diverse levels. In these cases, therefore, one should speak, not so much of an operator, as of a set of operators which jointly yield the result sought.

Secondly, there may not be an operator corresponding to an operation because the operation may be embedded in the structure of the reference field. In this case, the object

may change in consequence of a change in the field. Here, therefore, one should speak of ‘field modifiers’ rather than of ‘object modifiers’.

The paper is conceptually divided into two sections. The first is devoted to presentation of various requirement shifters. The second section connects a number of aspects that emerge from analysis of the requirement shifters with some more general issues.

We shall see in particular that at least some of the cognitive structures discussed require an ontological *anchoring* if they are to function properly. If they did not possess this ontological anchoring, it would be impossible to explain how they operate. Note the unusual terminology used. I have not spoken, in fact, of ontological *foundation* but of ontological *anchoring*, by which I mean a weaker form of connection than the traditional concept of foundation.

I distinguish four different types of requirement shifters, which I call (1) grouping shifters, (2) round-going shifters, (3) shifters of approaching and distancing, and (4) base-highlighting shifters.

I shall provide an outline of the first three types, concentrating in more detail on the fourth.

2. Grouping

The first category of cognitive operations comprises those which alter the perspective through processes which profile a figure with respect to a ground.

From his *Philosophie der Arithmetik* (1890) onwards, Husserl distinguished at least four different forms of grouping:

1. the *kollektive Verbindung*, or the grouping produced by the thinking together of various elements;
2. relations of spatial and temporal juxtaposition like contiguity and succession;
3. the *figurale Momente*, or those types of individual relations which connect geese into flocks, trees into avenues, dots into patterns, and so on;
4. the dependence relations between mutually correlated contents, as between colour and space ([2: 35], with inversion of the 3rd and 4th cases).

These four types of grouping display different levels of complexity: the third and fourth seem distinctly more complex than the first and second.

The types of grouping listed above display the following characteristic. As one passes from the first to the fourth type, the range of choices progressively diminishes. In the first case (that of the *kollektive Verbindung*), the group has the maximum amount of freedom, or the minimum amount of structuring; the next grouping (by juxtaposition) requires the appropriate form of spatial or temporal connection; the grouping by *figurale Momente* requires a further supplement of structure tied at least to the *positions* of the parts; the fourth case seems to be wholly constrained as regards its dependences structure.

It therefore seems evident that the range of action of possible perspective shifters is greatest in the case of the *kollektive Verbindung* and then progressively diminishes from one case to the next. For this reason, the discussion that follows will be restricted to the first and occasionally second type of grouping.

However, on careful consideration, there is a level even more primitive than the *kollektive Verbindung*. The latter, in fact, presupposes that the elements to be connected are already given; it is not concerned with how the initial elements grouped together by the operation of *kollektive Verbindung* have been cognitively constituted. If we consider this aspect as well, we must conclude that the initial cognitive situation cannot have any objectual valence. Pre-cognitively, that is to say, there are no objects to connect. The above is a reasonable rendering of Mr Negoro’s “unknown space”.

This raises the question as to how one passes from this initial pre-cognitive situation to one in which the elements are placed against a ground so that they can be connected by a cognitive act of *kollektive Verbindung*.

The constitution of the figure as the effect of a grouping operation – and this brings us to the second case – is that the figure proceeds in parallel with our perspective on it. Thus, having described the operations of the first category of requirement shifters as grouping

operations, I shall refer to those of this second family of requirement shifters as round-going operations.

3. Round-going

Whatever the outcome of the grouping, the figure that emerges is an incomplete figure. The phenomenological terminology talks in this regard of *Abschattung*, or that part of the object which is effectively given in a possible perception. A figure of this kind is constructed from a certain vantage point and orientation of the cognitive subject; it has its directionality, a background, etc. Modifying any of these factors changes the resulting figure. It is only possible to speak of an actual object if there is some principle which unifies the various *Abschattungen* into something that possesses the features of a whole. In this sense, every point of view is partial and must be coordinated with other views of the object. The *Abschattungen* are thus the images that derive from *round-going* (in the sense of circling around) the object.

Three series of observations are relevant in this regard. The first concerns the difference between incomplete object and absent object, the second the difference between explicit and implicit, the third the problem of objectivity. I begin with the difference between incomplete object and absent object.

3.1. Complete and absent objects

Generally speaking, it is evident from what we have seen regarding *Abschattungen* that all *represented* objects are intrinsically incomplete objects, and this is because every represented object is intrinsically or essentially connected to a specific perspective [3: 206-208].

Given that we are never able simultaneously to grasp all the perceptive and cognitive aspects of an object, even an actually presented object is always at least partly (or even largely) absent. From these premises, it follows that the concept of external or represented object is more an element experienced with the *character of completeness* than something *effectively* experienced in all its sensory and cognitive dimensions. In the strict sense, indeed, an external object is never *completely present*.

The object, moreover, is experienced as complete even though our access to it is always and exclusively through *Abschattungen*. Thus the completeness of the object assumes the character of an *implicit* closure function embedded in every *Abschattung* and which has the task of governing the *objectivity* conditions of the object. To proceed, therefore, we must consider the categories of ‘implicit’ and of ‘objectivity’.

3.2. Implicit object and explicit object

‘Implicit’ has two meanings. Under the first meaning, implicit can mean ‘unnoted’ and explicit can mean ‘noted’. Unnoted elements in the perceptual field, in spite of their being unnoted, have nevertheless a functional meaning, i.e., “have a function in the constitution of the meaning of the figure or area of focal awareness”. That things are so is proved by the fact that “this functional meaning changes when these elements are brought to specification, i.e., explicitly noted. Hence in a real sense the analysis which effects this explanation is introducing new elements rather than merely resolving a complex into its parts”. This point seems to have some relevance, because it is one of the possible reasons that explains “why Gestalten resist topological analysis” [4: 310].

The second meaning of ‘implicit’ is more difficult to explain because it involves general options of a metaphysical nature. For some, this simply signifies that these are concepts that are not yet scientifically reliable. In short, ‘implicit’ in this second sense refers to all the procedures that unify the multiple *Abschattungen* into something that has the valence of a whole. Here the two fundamental options are well known: on the one hand there is the Kantian option, according to which the unification is governed by the cognitive subject; on the other, there is the option that I shall call, hopefully without causing offence, Aristotelian, and on the basis of which at least some unifications have an ontological

foundation. For the moment I shall restrict myself to this remark, resuming to the attack later.

3.3. Objectivity

The third aspect to consider is objectivity. The objectivity of the object is the aspect which stabilizes the cognitive situation by systematically coordinating the various perspectives. There are two main possibilities here: the first is that of reciprocal coordination (or the mutual translation) among the *Abschattungen*; the second requires the coordination of the various perspectives with the so-called perspective ‘from nowhere’. In the former case, the object is knowable by means of a set of *Abschattungen* formally unified by a purely functional, intrinsically unknowable bearer. This, of course, is the Kantian X. In the latter case, we know the object not also by means of its *Abschattungen* but also in the apparently paradoxical form of the object from nowhere – that is, the object as it would be if it were devoid of any perspective. This position is often erroneously taken to be a form of Platonism, whereas in fact it has nothing to do with it. It is not a Platonic position because it states neither that the object from nowhere is an ideal object nor that the *Abschattungen* are appearances. This position in effect amounts to a modern version of Aristotelianism in which the object is primarily the material bearer of its *Abschattungen* and secondarily an object formally characterized as an object from nowhere. The object as the material bearer of its *Abschattungen* is a version of the Aristotelian theory of the prime substance, while the object from nowhere performs the role that in Aristotle’s philosophy is undertaken by the theory of the second substance (i.e. the theory of natural kinds). Here I certainly do not intend to reiterate Aristotle; even less do I intend to do so in one of the diverse and systematically misleading interpretations that still enjoy such high repute. For the moment, I shall merely point out the connection between my present discussion and certain aspects of Aristotle’s own theories, a connection moreover which is not so far-fetched if one considers the presence of similar notions in authors like Leibniz, Bolzano, Brentano and Husserl. Whatever the case may be, let us return to the problem of objectivity.

In this regard, at minimum we may state, with René Thom, that those objects which possess at least a minimum of structural stability [5] are objective and are therefore categorizable. It is on the basis of this minimum condition of stability that the various perspectives on the object can be developed.

In this sense, we may hypothesise that the objectivity of representation is ensured by the intervention of a principle of holonomy; that is, a law whereby different aspects (representations) of the same object depend on the different positions of the subject(s) viewing it. Holonomy states that there is a connection between the change in the observer and the change in the (represented) object. If the connection is not holonymous (as in quantum mechanics), or if there is no connection, objectivity becomes difficult to define.

4. Approaching and distancing

The third group of operations, which intervene after the forms of grouping and their stabilization by some closure mechanism activated by round-going operations, are those of approaching and distancing. At a first level, relevant to this group of operations are issues like the windowing of attention and granularity. The windowing of attention allows what is thrown into relief to be separated from what remains in the background. Granularity likewise selects a pertinent level of detail. In both cases it is not difficult to hypothesise the intervention of operators which serve to shift the focus of attention (for example, from one part to another of the profiled object or from one part of the whole to the whole itself) and to adjust the granularity. These are important components of this third group of operators. I shall return to them later, but first I must consider a deeper-lying aspect of the operations of cognitive approaching and distancing. If they are not carefully analysed, in fact, the operations which shift the attention window and adjust granularity may obscure an important qualitative difference: not all attention windows and not all granularities, in fact, have the same cognitive pregnancy. Some of them are more informative, fundamental or meaningful than others.

A good point to start from in clarifying this aspect is the theory of the sculptor Hildebrand concerning the difference between vision from close up and vision from a distance [6]. Close-up vision is that in which the object is the product of an aggregate of representations and movements. Vision from a distance – which for Hildebrand is the authentically artistic sort – is that form of vision which allows unitary apprehension of the object, with a single act, and in which the volumetric characteristics of the third dimension are rendered into surface.

This is a development of the distinction introduced by Zimmermann – a pupil of Bolzano – between tactile visual representation and optical visual representation [7]. In the former case, the eye sees objects as if it were touching them (whence ‘tactile’ representation), whereas in the latter the object is presented as a whole, with the effects of which it is capable. Although it is not possible to dwell on Hildebrand’s ideas here, I shall use them at least to show that the difference between vision from a distance and vision from close up does not reduce to the fact that from close up we see details that we cannot see from a distance. The problem, that is to say, is not one of a greater or lesser amount of *local* information. The difference between the two types of vision, in fact, is not quantitative but *qualitative*. In more contemporary terms we may perhaps distinguish them as analytic vision and holistic vision.

Given this difference between vision from close up and vision from a distance, we may resume analysis of attentive selection and of granularity. Regarding granularity in particular, it is worth noting that it is typically understood to be an articulation of the problem of the levels of description. But this problem relates to and subsumes the much more fundamental one of the levels of reality [11]. This I shall discuss shortly, but first we require some further specifications.

5. Base-highlighting

I shall use the term *base-highlighting* to refer to the fourth type of requirement shifters. The reason for choosing this designation will become evident when these shifters have been seen in operation.

Unlike the previous cases, I shall exemplify this type of shifter with linguistic phenomena. The shifters in this case are eminently represented by so-called *as-phrases*, of which examples are *as a teacher* or *as a prime number*. Friedrike Moltmann has claimed that perspective shifters such as *as-phrases* “have the function of specifying the ‘basis’ for the application of the predicate” [8: 74]. When I say

John as a teacher is good

the phrase ‘as a teacher’ specifies that John is good regarding his teacher qualities. In this sense, the operator *as* “restrict the properties one may attribute to John to those he has on the basis of being a teacher” [8: 72].

Note that *as-phrases* may provide more than one basis, therefore jointly considering an entity from several points of view. Consider for instance:

John is good as a teacher and bad as a father

As-phrases may also specify the dimensions of integrity of an entity, as in

Kurdistan as a cultural unit has more integrity than Kurdistan as a political unit [8: 79].

We have in this case a clear example of a multimodal entity which possesses dimensions characterized by different degrees of integrity. This signifies that an entity like a whole is not necessarily and to the same extent a whole in all the dimensions in which it has value.

Consider furthermore that not all the basis are suitable for all the predicates. Moltmann [8: 77] provides the following examples:

John as a teacher was born in France

John as a teacher is forty years old

John as a teacher knocked at the door yesterday

In many cases, bases of the type *as a teacher* or *as a father* refer to situations which in the sociological literature are termed 'roles'. In this case the social agent is an entity which admits a multiplicity of different roles – with various facets – tied to different contexts of reference. The same agent displays different aspects and features according to his various life-situations: as a father, husband, professor, citizen, football fan, and so on.

This latter observation becomes of central importance to my topic as soon as one realizes the surprising correspondence between the roles and the *Abschattungen* of an entity. I obviously use the term 'correspondence' and not 'identity' because *Abschattungen* are intrinsically tied to the individual perceptive act, while roles are intersubjective structures which result from a much more complex process of formation. Nevertheless in both cases the same questions can be asked.

As regards *Abschattungen*, I asked earlier whether they require a purely formal unification of a Kantian X type, or whether they instead admit to both a material unification in an underlying bearer (or prime substance) and a parallel formal unification of typicality displaying the features of Aristotle's second substance. In entirely similar manner we may ask whether roles are formally synthesised in a bearer analogous to the Kantian X or whether they require both a material bearer and a parallel formal synthesis.

All this may seem to be a pointless complication until one notes that living systems – and therefore also social systems – have the distinctive characteristic of being able to reproduce the elements of which they are composed. It thus becomes of particular importance to identify the elements that make up social systems and which a social system, as a living system, should be able to reproduce. It is obvious that social systems – as we know them – require bearers which are simultaneously biological systems and psychological systems, but that they do not reproduce either organisms (biological systems) or minds (psychological systems). At the level of social systems that which is reproduced are roles, not organisms or minds [9].

In other words, if, as seems natural, we assume that social systems are communication-based systems, then it follows that roles – which govern communicative expectations – act as constitutive elements of social systems themselves.

The points just briefly outlined are significant for at least two reasons. First, they highlight that certain systems require other systems as their bearers, and that every system at its own level requires adequate conditions of unification. Second, they show that the entities that make up systems are stratified and have numerous internal dependence relations.

I am aware that the foregoing arguments have been outlined so briefly that they may seem somewhat impenetrable. In less intimidating terms, the following conversation between the mathematicians Gian Carlo Rota and Stanislaw Ulam sets out the nucleus of the discussion so far in colloquial terms.

Ulam: "Now look at that man passing by in a car. How do you tell that it is *not just a man* you are seeing, but a *passenger*?"

"When you write down precise definitions for these words, you discover that *what you are describing is not an object*, but a *function*, a *role* that is *inextricably tied to some context*. Take away the context, and the meaning also disappears".

"When you perceive intelligently, as you sometimes do, *you always perceive a function*, never an object in the *set-theoretic or physical sense*".

"Your Cartesian idea of a device in the brain that does the registering is based upon a misleading analogy between vision and photography. Cameras always register objects, but *human perception is always the perception of functional roles*. The two processes could not be more different".

"Your friends in A.I. are now beginning to trumpet the role of contexts, but they are not practicing their lesson. They still want to build machines that see by imitating cameras, perhaps with some feedback thrown in. Such an approach is bound to fail since it starts out with a logical misunderstanding."

To this words, Rota replies: "Do you then propose that we give up mathematical logic?"

"Quite the opposite. Logic formalizes only *very few* of the processes by which we think. The time has come to enrich formal logic by adding some other fundamental notions to it. What is it that you see when you see? You see an object *as a key*, you see a man in a car *as a passenger*, you see some sheets of paper *as a book*. It is the word 'as' that must be mathematically formalized, on a par with the connectives 'and,' or,'

‘implies,’ and ‘not’ that have already been accepted into a formal logic. Until you do that, you will not get very far with your A.I. problem” [10: 57-59].

If we now turn to our requirement shifters, it is immediately evident that my general reflections and Ulam’s remarks relate to entirely manifest phenomena. Consider for example a statement like

John as a teacher was born in France.

This statement is not acceptable because the basis *as a teacher* does not sustain the predication *born in France*. A statement of this kind can become acceptable in one of the two following ways. The first is to cancel the reference to a basis. In this case we obtain

John was born in France

which is obviously entirely acceptable. However, the drawback to this manner of resolving the difficulty is that the reference to the basis is lost. The most important aspect of as-phrases is in fact that they furnish us with a basis that is able (if the statement is acceptable) to support the ensuing predication. An as-phrase acts as a prism which divides predicates into classes of membership and thus makes the structure of the object somewhat more explicit. Accordingly, instead of removing the reference to a basis, we may reformulate the statement in question by looking for an alternative basis able to give meaningfulness to the statement. If

John as a teacher was born in France

is not acceptable, what we can do is to proceed, not by removing the as-phrase but by replacing the basis which does not work with one that does. That is to say, what we must do is ask ourselves what term can substitute ‘???’ in

John as a ??? was born in France

so that a meaningful statement is obtained. In this case, one need only experiment with a few expressions to realise that no term that refers to roles can replace ????. Roles, in fact, are modifiers which typically restrict or enlarge the set of admissible predicates, whereas what is required here is a term which at minimum *does not restrict* and *does not enlarge* the set of predicates applicable to John. This means that there are predicates that attach to John independently of the roles that he may assume.

If this is true, then we have found a criterion with which to distinguish predication with as-phrases from predication without as-phrases.

The first of these forms of predication, that with as-phrases, is performed on qualifications connected with some role. The second of them concerns qualifications which are independent of roles – that is, ones *intrinsic* to the object qualified. But this is not all. By varying the examples, one notes that intrinsic qualifications – i.e. those not tied to roles – are qualifications which pertain to the physical, biological or psychological dimensions of John, but not to his social dimension. In other words, they are qualifications which do not pertain to John as a social actor but to John as a biological or psychological entity. What we now need, therefore, as we also saw in the above discussion of shifters of approach and distancing, is a theory of the layers of reality, and not solely a theory of the levels of description of reality. Unfortunately, this brief mention will have to suffice, for it is a theory too complex to be presented *en passant* [11].

6. Reduplication

While discussing the fourth type of perspective shifters, I pointed out the important role performed by as-phrases. Using a Latin expressive form, these are sometimes presented in the guise of *qua*-phases, as in

John *qua* teacher is good.

The function '*qua*' – used in expressions like 'A *qua* B is C' – has a long philosophical pedigree. In fact, the word '*qua*' is the Latin translation of the Greek '*he*' in the expression '*on he on*' which in the seventeenth century gave origin to the term 'ontology'.

In the philosophical literature, *qua*-theories are usually referred to as reduplicative-theories or as theories of reduplication. Since Aristotle, *qua*-theories have been intensively used, although only in very few cases has there been explicit analysis of the theory as such.

Generally speaking, the problem of reduplication is one of the many facets of the problem of *context dependence*. There is more, however. Reduplication proves useful in clarifying the idea of the perspective from nowhere. It is obviously appropriate to call *reflexive* that form of reduplication in which the canonical structure 'A *qua* B is C' assumes the form 'A *qua* A is C' [12, 13]. At this point it is evident that the reduplication operator acts as a derelativization (or decontextualization) operator in which the basis highlighted by the expression 'A *qua* A' is the object viewed according to the canons of the perspective from nowhere discussed above.

7. Conclusions

I may now sum up at least a part of what has been said so far. In these final notes I shall concentrate on a single concluding topic, that of the relationship between perspective dependence and objectivity.

On the one hand it seems indubitable that perspectives are intrinsically related to the point of view adopted. On the other, the objectivity of an object seems to be in some way independent of the perspectives on it. Interestingly, and despite the contentions of numerous authors, our perceptive apparatus is the instrument that more than any other objectifies the world. Of this we all have striking evidence as long as we consider the shape of a coin. When someone is asked to describe the shape of a nickel, the conventional answer is that it is round. In fact, however, only a moment's reflection is required to realize that there is only one situation in which we actually see a round coin: when it is at an appropriate distance from us and when we view it head-on, at the same height as the eyes and at the same distance from both of them. A situation which almost never occurs. In all other cases, what we should see is an ellipsoid object.

From the point of view that interests us here, the 'objectual' dimension of objects is precisely that structural invariant that unifies and underlies all its possible perspective-based variants. This is precisely the second substance of Aristotelian memory so frequently mentioned in this paper. Note that it is a valence directly embedded in perception and cognition; it is not an abstract and ideal objectuality located in some implausible celestial sphere.

It should also be noted that, unless we allow ourselves to be caught out by a superficial reading, Gibson's ecological approach acknowledges this objectuality from nowhere. In the synthesis provided by Heft, it is as if we perceive – quote – "objects and environmental layout from all sides at once" [14: 124]. A similar proposal is to be found in Merleau-Ponty [15]. Here I continue drawing on the synthesis by Heft [14: 125]. Quote: "I see the next-door house from a certain angle, but it would be seen differently from the right bank of the Seine, or again from an aeroplane: the house itself is none of these appearances; it is, as Leibniz said, *the flat projection* of these perspectives and of all possible perspectives, that is, the *perspectiveless* position from which all can be derived, *the house seen from nowhere*" (my emphasis). Two remarks are in order. First, as Heft points out, "the house seen from everywhere at once is a house seen from nowhere in particular" [14: 125]. Second, in order to obtain a view from nowhere we must 'neutralize' the perspectival components. If this is so, an objective view is an intrinsically non-perspective-based view. The problem is, how do we obtain one?

Consider the pen in front of me on my desk, next to the keyboard with which I am writing this paper. What type of object is this pen? How should I model it?

First of all, I may say that the pen is an object made in a certain way, with its own shape, colour and material. In saying these things, I use concepts that serve to describe the physical world of things. The pen must also perform functions: it has been designed to

write. This reference to function, to the activity of writing, introduces a different dimension into the analysis. Writing, in fact, is not something that I can model using only concepts describing the physical world. Writing is an activity typically performed by humans. By virtue of being constructed to fulfil the function of writing, the pen is in some way connected with this aspect of the world. But when I observe the pen, it tells me many other things. It tells me, for example, that it has been constructed by somebody, and that this somebody is my contemporary. The pen conveys information that informs me that it is not an object from the Roman age or from ancient China. On the contrary, the material of which it is made, its manufacture, its shape, the way it works, tell me that it belongs to the contemporary epoch. For all these reasons, the pen also tells me that there must somewhere be an organization that produces things like pens. If we now shift our focus to this organization, the pen must be an object designed, manufactured and distributed so that it can be sold and end up on someone's desk. In their turn, the points of view of the designer, of the production department and of the distribution department are different, and they describe my pen using different concepts. For the designer the pen is essentially an aesthetic and functional object; for the production department it is the outcome of materials processed in a certain way; for the distribution department it is something else besides. For the company producing the pen it is all these things together. For the shopkeeper who displays the pen on his shelves and seeks to sell it to customers, it is again different. To return to myself, the pen is also an object to which I am particularly attached because it reminds me of the person who gave it to me [16].

All these multiple and diverse descriptions are correct. Each of them manifests an aspect of the object before me. Yet all these descriptions are descriptions of the *same* object. Hence, one of the fundamental tasks is to find a way to *integrate those different descriptions of the same object*.

Some of these descriptions have an ontological basis; others have cognitive or epistemological bases. We must learn to distinguish among them. Ontologically, the example of the pen teaches us two important lessons: (i) reality is organized into strata (material, psychological, social); (ii) these strata are organized into layers (the physical and chemical levels of the material stratum; the intentional and emotive levels of the mental stratum; the productive, commercial and legal levels of the social stratum). For every (type of) object there must be a schema or template which coordinates and synthesises the admissible descriptions of it. And for every object the template that best characterizes it must be elaborated. This, in the case of my pen, might be the template 'artifact', which comprises the fact that the object is above all social in nature and consequently has social components ('is made by', 'for', 'costs so much'). However, these dimensions do not account for the ontological structure in its entirety. The artifact also has a material basis, and there may also be components embedded in its structure which evoke psychic components (these are the 'affordances' proposed by Gibson [17]).

For obvious reasons, an epistemology does not have the capacities of coordinating those aspects. For at least some of them we need an ontology. Only an ontology, in fact, may find a way of coordinating those aspects [18, 16, 11, 19].

In the case of the pen, various viewpoints are concretized in a single object. But this is not the only possibility. If we consider a complex like a hospital, this comprises various agents (doctors, nurses, patients, administrators, auxiliary staff) who carry out very different and complex operations and tasks. In a system of this kind, the various agents of which it is composed perform different tasks, and they have different functions and responsibilities. But they must somehow understand each other and integrate into a unitary whole. In the case of the pen, the various viewpoints converge in the object 'pen', and they do not operate independently of the object. In the case of the hospital, however, the viewpoints converge on a dimension which is apparently less concrete and which is something akin to the institutional *function* or *role* that the object 'hospital' must perform. Secondly, this function or role may be given different interpretations by the agents who make up the institution. Their various viewpoints may also generate conflicts internally to the institution, so that it can achieve its goals more efficiently if the viewpoints are adequately synthesised, or lapse into paralysis and breakdown if they are not.

This gives rise to a highly variegated pattern, a multi-dimensional panorama with which we are only minimally acquainted. The general architecture of the situation, in fact, is in many respects still unknown.

Whatever the case may be, it is crucial to distinguish the ontological and the cognitive dimensions of objects. Let us consider the following. Suppose that four walnuts are arranged in a rough square on a table. I may say that the walnuts form a square, or I may say that they form a cross, or I may again say that they are arranged in an 'x'. The particular constituted by the pattern assumed by the walnuts is a cognitive particular *founded* on an ontological base. The important fact is that the base permits some interpretations and not others. As a second example, let us consider a uniformly red surface (of a material object or part of a material object). If we say 'the central part of the surface' or 'the top right-hand area', these are cognitive off-cuts which are grounded on objectively given data. Between 'almost purely ontological' objects and 'almost purely cognitive' ones there will obviously be ambiguous, blurred and perhaps even undecidable cases.

Having reached this point, I may now conclude with a final observation. If we seek to divide the various components that make up a representation, we may state that any representation whatever is the representation of (1) something, (2) in a certain way, (3) from a certain perspective. We may substitute (1) with: object, process, event, organ, function, situation, institution, or with many other terms of the same type. For (2) and (3) we must draw on similar lists of modes and points of view. Leaving aside (2), we have seen at least some of items of (3). This proves that, even if it is unlikely to provide an exhaustive list of modes and viewpoints, it is nonetheless possible to identify at least some of them. In this situation, the 'perspective from nowhere' is that canonical global reading that underlines and unifies all the various perspectives on the object under description.

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