Intellectica, 2002/2, 35, pp. 83-113

Is representation characterized by intrinsicity and causality ?

Gennaro Auletta*

Abstract: In this paper two questions are raised: 1) Under which conditions may we say that an entity is a representation of something else? and, in particular, 2) what is the guarantee that our (mental or internal) representations correspond to or are in accord with external objects? In Hume's opinion, three answers to the second question are possible: There is a causal relationship between represented objects and representations; representations are freely created by the mind; and God guarantees the connection between representation and represented things and events. A short historical examination of these ideas is proposed. In cognitive sciences the two questions are strictly related. In particular, Dretske, Lloyd, and Perner's positions are presented (the causal explanation is here combined with the individuation of intrinsic features in representations that allow a medium to be a representation as such) and criticized. A fourth position is also mentioned (it was historically supported by Leibniz and presently by Jackendoff): Representation is a homomorphism. Finally, a way to solve the problem is proposed: Representations depend on the intentional act that establishes a connection between a physical or mental entity and a referent.

Key words: Representation, mental, Hume, causality, Leibniz, homomorphism, intentional act

Résumé : **Est-ce que la cognition est caractérisée par ses propriétés intrinsèques et par la causalité ?** Cet article pose deux questions : 1) Dans quelles conditions peut-on dire qu'une entité est une représentation d'autre chose ? Et, en particulier, 2) quelle garantie peut-on avoir que nos représentations (mentales ou internes) correspondent correctement à des objets externes ? Selon Hume, trois réponses à la deuxième question sont possibles : i) il existe une relation causale entre les objets représentés et les représentations; ii) les représentations sont des créations libres de l'esprit; iii) la connexion entre les représentations, et les objets ou évènements représentés, est assurée par Dieu. Un bref examen historique de ces idées est proposé. Dans les sciences cognitives, les deux questions sont étroitement reliées. En particulier, les positions de Dretske, Lloyd et Perner sont présentées (l'explication causale est ici combinée avec l'individuation de certains traits intrinsèques des représentations de telle sorte que les substrats en question deviennent des représentations en tant

* University of Urbino – Italy, e-mail: g.auletta@mclink.it.

que telles), et critiquées. Une quatrième position est également mentionnée (historiquement soutenue par Leibniz et actuellement par Jackendorff) : la représentation est un homomorphisme. Finalement, cet article propose une solution au problème : des représentations dépendent de l'acte intentionnel qui établit une relation entre une entité (physique ou mentale) et un référent.

Mot clés : Représentation, Hume, causalité, Leibniz, homomorphisme, acte intentionnel.

1. INTRODUCTION

One of the great puzzles of modern philosophy is representation. Two questions may be posed about this problem: 1) under which conditions may we say that an entity is a representation of something else? And, in particular, 2) what is the guarantee that our (mental) representations correspond to or are in accord with external objects? A large part of the history of modern philosophy can be understood as a collection of answers to the second question – at least from Descartes on (see Rorty, 1980: 45-46; for a review see Cummins, 1989).

For Hume the answer to this question is "inexplicable by human reason" so that "'twill always be impossible to decide with certainty, whether they arise immediately from the object, or are produc'd by the creative power of the mind, or are deriv'd from the author of our being" (Hume, 1739-40: 84).

Of the three possible explanations remembered here, the second one was successively followed by Kant. We will return to it later. The third one is the one supported by the minority of philosophers who have turned to the authority of God to explain how representations can work: Malebranche with the vision of the ideas in God (1712: 338-46), Leibniz with the *harmonia præstabilita* (1702: 538; 1711; 1712), Berkeley with the perception of God's signs (ideas) (1710: I, §§ 29-33, 66). Malebranche and Berkeley's answers reduce the problem of the connection between mental representations and external (material) objects to a further transformation and representation of previous ideas (with our ideas we represent God's ideas), a process that we are able to perform in every moment with our own ideas. However, one could abandon the idea of a specific intervention of God and support the proposal that, in order to solve the problem, one needs somehow to assimilate the material things to the mental life. For instance, this can be done by postulating that matter is in itself only information and by conceiving the mind as an information-processing entity. However, as I will show below, this cannot be a satisfactory answer, though nothing hinders us from conceiving the world as consisting of information-exchanging and -storing. Leibniz's proposal, on the contrary, cannot be very well understood without a theory of correspondence between representations and their objects. As we shall see below, Leibniz

actually proposed a fourth explanation that supports his theory of the *harmonia præstabilita*.

The dominant tendency has been the first and it goes in the direction of establishing some sort of causal relationship between the represented object and its representation. So Locke (1689: II.1 § 3) says that "our senses, conversant about particular sensible Objects, do convey into the Mind, several distinct Perceptions of things according to those various ways, wherein those Objects do affect them" (these are the sensations, which are distinct from the ideas of reflections, but this does not matter for my purposes). And (1689: II.8 § 8): "the Power to produce any Idea in our mind, I call Quality of the Subject wherein that power is. Thus a Snow-ball having the power to produce in us the Ideas of White, Cold, and Round, the Powers to produce those Ideas in us, as they are in the Snow-ball, I call Qualities". Any causal explanation of this type has the (conscious and sometimes unconscious) tendency to fall into a corpuscular or materialist account of the representational relationship and therefore to assimilate the problem of mental representation to a material dependency (at the end the mind is reduced to the brain) (see Rorty, 1980: 140-45). It is, in a certain sense, the inverse attitude with respect to that of Malebranche and Berkeley. In fact, Locke adds (1689: II.8 § 9): "Qualities thus considered in Bodies are (…) inseparable from the Body", and by considering (1689: II.8 § 11) "how Bodies produce Ideas in us, (…) that is manifestly by impulse, the only way which we can conceive Bodies operate in". This causal and materialist explanation does not exclude another possibility, which was taken more seriously by ancient philosophy (for example by atomism): the resemblance - "the Ideas of primary qualities of Bodies, are Resemblances of them, and their Patterns do really exist in the Bodies themselves" (1689: II.8 § 15). However, as we shall see, resemblance cannot be a good answer to the problem of representation.

2. DRETSKE'S ANALYSIS

In contemporary cognitive science, the answer to the problem of representation is also sought in the direction of establishing some causal relationship between represented entities and the representing mind. In this article, this feature of the problem will be discussed in close relation to the first question above, i.e. the problem of representing as such.

One of the most interesting exponents of this school is Dretske. He defines a representational system as "any system whose function is to indicate how things stand with respect to some other object, condition or magnitude" (1988: 52; see also Husserl, 1900: II.1, V §§ 17 and 20) - a definition that partially echoes Peirce's definition of the sign: "A sign, or representamen, is something which stands to somebody for something in some respect or capacity" (CP: 2.228 and 1.540; 1868b: 223). This is not fortuitous: Due to their "standing-

for" nature and to the distinction between this standing-for and the way they stay for, representations are special types of signs - in the sense that any representation is a sign but not *vice versa*. In fact, following Peirce's terminology (see Peirce, CP: 2.92; see also Husserl, 1900: II.1, I § 1), signs have an iconic function and an indexical function. The iconic function is what makes a sign significant, whereas the indexical function is the standing-for aspect. For this reason, there can be signs that only have the iconic function, for instance a lead-pencil streak as representing a geometrical line (see CP: 2.304): In this case, at least explicitly, this lead-pencil streak does not stand for, though it may be an external and unconscious index of some mental state. Another example may be a portrait or a picture of an unknown person. There also are signs that only have the indexical function, i.e. that do not (at lest explicitly) represent, that do not present a "way" of standing-for, for instance, names, an arrow pointing in a given direction, a pointing finger.

According to Dretske, the natural sense of *representation* is strictly associated to that of *indicating*. However, not every indicator is a representation: "It is essential that it be the indicator's function (…) to indicate what it indicates" (Dretske, 1988: 65). In other words, if a thing accidentally indicates another thing (for instance, a branch in a forest that accidentally indicates a given path), this thing it is not a representation because to indicate the path is not its function. The function of a system is then what it is designed for or supposed to do (Dretske, 1995: 50), and this can be naturally acquired or conventionally assigned. There is information, but no representation without a function of this type.

Given the above statements, it is clear that a thermostat, which indicates the temperature or a speedometer that indicates the speed of a car are perfect examples of representational systems (Dretske, 1995: 2). Probably remembering a distinction made by Pylyshyn (1984: 39), Dretske (1988: 53-54, 59-62) distinguishes between: Systems of type I, which have no intrinsic power of representation (no power that is not derived by their creators and users), such as symbols, books, maps, and so on; systems of type II, which are natural signs and derive their indicative power from the way they are objectively related to the conditions they signify; and representational systems of type III, which are intrinsically representational (for example, mental states).

I would like to stress that Dretske (and also Perner, as we shall see), in general, makes use of the concept of representation in a way that covers both the internal (or mental) and the external representations. This is not to say that he does not distinguish between these two forms (the classification in three types of representational systems is already clear evidence of this), only that Dretske believes that it is possible to account for some general features of representations independently of whether they are internal

or external. I will follow this use of the term *representation* and explain below why I do so.

In general, Dretske (1988: 10-11) assumes that there can be representation only if there is enough structural complexity and internal articulation to render plausible a distinction between an internal part and an external part of the representation (or, better still, the representing medium in Perner's terminology - see below).

As I have said, Dretske also supports the idea of a causal dependency between a represented object and representation - a belief apparently also shared by Dennett (1981a-c) - and says (1988: 56) that "the indicator or sign does not mean (indicate) that (some state of affairs) *P* is the case unless the requisite dependency exists between the sign and *P*". In order to see what dependency one is speaking about, let us briefly discuss Dretske's analysis of information.

This causal perspective was already presented by Dretske (1981; 1983). According to Dretske, one can say that the knowledge is caused by the information that an object *s* has the property *P* if and only if those physical properties of the signal by virtue of which it carries this information are the ones that are causally efficacious in the production of the knowledge (in other words, the belief that *s* is *P* is caused by the information that *s* is *P*). For example, if the bell rings three times, I know that it is my friend John (here the information-carrying property is the temporal pattern and not the amplitude or the pitch). If a fly is frightened away, according to Dretske this is not the effect of information because the fly would be disturbed by any sequence of rings or knocks.

Returning to the problem of representation, it would be difficult to understand in what manner a representational content or a meaning may be directly the cause of a representation, if *cause* must be here understood in ordinary terms. For this reason Dretske says (1988: 80) that it is not meaning itself to be a cause but a thing's having meaning or that the fact that a thing has meaning is a causally relevant fact about the thing. In order to know how a system is representing an object, one needs to know what its reaction to that object means, i.e. what value of the property *P* the reaction is a reaction to when the system is functioning the way it was designed to function (Dretske, 1995: 50). For instance, an indicator of the gasoline level in a car must be in the red zone (it is its function to react so) when the moment has come to fill up (the value of the property "level of gasoline" is: "There is almost no gasoline left"). This idea - that there is a normal or optimal functioning of a representational system in which its representational function consists - was first developed by Fodor (1987: 104-105).

It is clear here that a thing carrying meaning can act, in general, as a material thing and another material thing can react to the thing carrying meaning. However, what does the nexus between the material nature of a thing (and of causation) and its meaning consist

of? It must be, as we have seen, a functional nexus. But how does this function come about? The problem is especially relevant for systems of type III, i.e. for our minds. I shall return to the problem in the critical examination below.

In distinguishing between sense and reference, Dretske affirms (1995: 23-24, 30) that there are different ways (senses) to represent the same object (reference) and one can also represent (for example in a painting) a black horse not as a black horse (an example taken by Nelson Goodman). Obviously, according to Dretske, what makes a thing a representation of something else is not how it represents the latter but only that there is a certain external causal relationship between them and that the representing thing is a representational system (something that has the function of indicating something else). And for this reason a representation is always a representation of a given individual event or thing.

An important property of representational systems is that they may misrepresent: According to Dretske, smoke is not a representation of wind because it cannot misrepresent the speed of the wind (Dretske, 1988: 64-70; 1995: 4, 26-28). Misrepresentation depends on two features: the *condition* of the event or thing being represented and the *way* this event or thing is represented, and the latter is determined by what a system has the function of indicating about this event or thing. According to Dretske, an object can retain a function even if it fails to perform it, and this is misrepresentation. For this reason, misrepresentation is always due to intentionality, either to the circumstance (in the case of systems of type I and II) that we read or understand in a false sense the indicator, or to the intrinsic intentionality of systems of type III.

Another important property of representational systems is (Dretske, 1988: 75) that they are property-specific: A representation is always a representation of a property so that a system can represent something having a property P without representing it as having property P', though P may always go together with P'.

In conclusion, the concept of representation combines teleological ideas (functionality and intentionality) with information-theoretic ideas. By contrast, Fodor interprets the teleology exclusively in functional terms since he wishes to exclude any recourse to intentionality as an explicative tool (1987: 105). In fact, for Fodor (1994: 1-26) intentional contents may be reduced to information and these contents causally depend on the external world (I shall return to Fodor's positions below).

3. PERNER AND LLOYD'S ANALYSIS

Perner presents a theory of representation that can be understood as a further development of Dretske's analysis.

First, he distinguishes (1991: 16-19) the representational medium (e.g., a picture) from the representational content (the depicted). Between the two there is a representational relationship. Perner stresses that, when Hume says that what we are thinking of (i.e. the content) is itself an object of thought, he confuses the representational process, i.e. the state of the mind (which is the medium) with the content. A representation represents something (the referent) as being in a certain way (that is, with a certain sense).

According to Perner (1991: 20), the characteristics of representation are the following features, which distinguish it from resemblance. *Asymmetry*: an image is a representation of a thing but not vice versa; *singularity*: a picture, for instance, represents you and not your twin; *misrepresentation*: for any representation there are possible misrepresentations; and *non-existence*: the represented object (for example, a depicted object) need not exist in reality. Apart from the feature of non-existence, whose analysis, together with that of the problem of misrepresentation, represents Perner's most original contribution in this domain, it is not difficult to see in these properties the features already stressed by Dretske.

Similarly, Lloyd (1989: 12-17) stresses the following features: Accuracy, which comprehends the possibility of misrepresentation (errors are here distinguished in two classes: misses and false alarms); focus, which essentially captures the idea of singularity, or, better still, that of specificity and perspectiveness (Lloyd distinguishes between explicit content and extensional content, which can be much wider than the explicit content), asymmetry, and articulation. The latter feature means that a representation may be divided into subitems that could also be taken as representations (they are meaningful). As we shall see from the following examples the latter feature is not sufficiently general, i.e. it is not necessary that parts of a representation are themselves representations.

Perner rejects (1991: 21-25) the possibility that representations can be accounted for in terms of intentionality, because in order to explain why a mental state represents something, we would have to have recourse to some other mental state, intending it to have that representational function, and so on in an endless process. Perner prefers the naturalist account of representation, so that he again follows Dretske by postulating that there is some form of (physical) causality that accounts for representation. However, as Perner himself acknowledges, there are then some difficulties to explain how misrepresentation arises and how it is possible to represent non-existent objects. He can solve the problem by turning to the fact that representations need to be not only caused by the external world but also "interpreted", which in the case of mental representations needs to be understood non intentionally as "causally influencing behaviour". Therefore, if, in a map, with the sign *PH* a church instead of a pub (as it should be) is indicated, then we may say that *PH* misrepresents the church as a pub because of the map users,

since the false notation will cause them to head toward the church in search of a drink.

Moreover, according to Perner one should distinguish between the primary function of representations, which is to reflect the represented environment faithfully, and the secondary functions, i.e. representations of fictional environments, which can be generated by combining representational elements established by the primary process (and in a causal way). As it is well known, Descartes explained in the same way how a representation of a chimera may be produced (Descartes, 1641: 35-42).

A representation can be understood as a model (Perner 1991: 25-40). Establishing which element in the model represents which element in the world is called an *interpretation* of the model. Once a model has been built, we can change elements of the model in order to produce projections, fictional situations and so on. Therefore, like Dretske, Perner also thinks that a misrepresentation can be understood as a representation where there is a conflict between sense and referent. A metarepresentation represents as a representation another representation. But a metarepresentation cannot substitute for internal role assignment, i.e. for designating which model plays the role of the reality model.

Lloyd (1989: 36-86) has a more refined solution of the problem of causality. He prefers to speak of probabilistic dependency on the events of which a representation is a representation. In this way, errors (misses and false alarms) are possible in a natural way.

4. Critical Examination of Dretske's, Lloyd's, and Perner's, Positions

Let us now examine Dretske's, Perner's, and Lloyd's positions. First, Dretske's definition of representation in terms of the function it plays, the fact that this function is strictly dependent on either a derived or an intrinsic intentionality, and that, like signs, representations also show a duality between reference and sense (way of representing), in my opinion, all these features are fundamental elements of any theory of representation and I will extensively discuss them below.

Let us now consider the four features systematized and proposed by Perner.

Asymmetry is actually a property of every representation. It seems that one cannot say, for instance, that Chirac represents a picture of himself. However, if I only know Chirac through pictures and if I see him in the street, surely my first reaction will be to try to identify the person I see in the street by comparing him with the image I have acquired through magazine and newspaper pictures. In other words, in this situation the real person is in some sense a representation of a picture (of that person). It is true that genetically (i.e. causally, for

the proponent of a causal theory of representation) the picture of Chirac was taken as a picture *of* Chirac. However, the fact that a piece of paper can be taken to be a representation of Chirac is only possible in the framework of a complex technological and cultural machinery (and for this reason we can understand that it is a picture of Chirac). In other words, it is not the *fact* itself - for example, that someone sits in front of Chirac and clicks on a device that produces, a paper output - that guarantees that this paper output is a representation of Chirac. The device must be a camera, i.e. a tool built for the *purpose* of producing images of things and there must be a social use and understanding of these images as representations of people (consider the reaction of the Amerindians when confronted with cameras and pictures: They believed that these were tools for taking possession of the person). This is also evident when considering that different pictures of Chirac, taken, say, in different moments or by different people, may play the same role: If one desires to publish an image of Chirac in a magazine, different pictures will be suitable and also a drawing, in certain circumstances, will be good. All these different representations are in fact equivalent for the purpose, and this shows that it is not the material fact of their production, which is relevant for their function as representations. For all these reasons, the fact that Chirac existed before the picture does not give him an ontological status such that he is intrinsically a to-be-represented thing, and the fact that the picture of him exists as an initial dependency on him does not give the picture the ontological status that it can only be a representational item. Once the picture exists, in determined contexts it can also be taken as the represented thing relatively to Chirac, who would then be its representation. Note that it is precisely the fact that Chirac may be considered as a representation of a picture of himself, which is not taken as a representation but as a represented item, which assures us that Chirac is not a metarepresentation.

This duality of the relationship between referent of the representation and the representation itself can be very well seen in the case of personal identification by a police passport control, for example in an airport. The identification procedure consists of comparing a real person with a picture in the passport. It may be, for example, that the picture in the passport is not a picture of the person being checked up on because the real person has stolen it. However, if there are reasons to suppose that the "controlled" person is a known criminal, the policeman can try to compare the real person with an Interpol picture of the wanted person in order to ascertain if the real person has disguised himself. Here, the picture is somehow the "original" to which the person is compared, and by asking what the identity of this person is, the policeman is asking what identity this person stands for. In this situation the real person is clearly understood to be a representation (true or false) of a picture, maybe the only thing that Interpol surely knows about the criminal's appearance.

Another very common example is the use of models, of plans in order to build "real" objects (Jackendoff, 1983: 224). Here again, the model, the "representation", is in reality the original and the built object is somehow a representation of the former. In fact, we may ask if the realization is adequate or not in respect to the model. In other words, according to Dretske's terminology, what we expect from a model is the function to indicate how things stand with respect to some other object, condition or magnitude. For instance, before a company produces a car, in general an abstract computer model is built. When a first functioning prototype is realized, then one seeks to see if it is all right. If not, one modifies the model in order to produce a new, more adequate prototype. This situation is exactly the same (but with a reversed relationship) when a doctor takes a radiograph of your teeth and then chirurgically operates. Only that, in the case of the car, it is the computer blueprint which will be the represented thing and the prototype the representation, whereas in the latter case it is the radiograph which will be the representation and the teeth the represented things. Note that in both cases the representation performs what we very often expect a representation to be for: It is a useful means in order to perform an intervention on a certain state of affairs.

What I am suggesting is that in a given (communicative, interpretative, and so on) context one can say that an object is a representation of something else, but in *another* context it may be that the latter becomes a representation of the former. In both cases the relationship is asymmetric, this is clear, but this asymmetry is *functional* and *contextual* and not ontological. Perner does not affirm explicitly that this feature should be understood in ontological terms, but I think this is a conclusion that may be drawn by his analysis.

In the history of philosophy this asymmetry has always been understood in ontological terms, and it is not by chance that we have alternatively both possible ways to joint representations and represented objects. Clearly, supporters of the idea that representations are models of material things are the Platonists and Neo-Platonists. Supporters of the theory that mental representations are produced by some phantasms of the objects are ancient atomists and, in another form, modern supporters of the causal relationship between material things and representations.

The possibility that, depending on the context, the representational relationship may be reversed is deeply rooted in the nature of signs (and, as I have said, representations are a special type of signs). In the case of signs, we speak of the possibility of reversing the relationship between a referent and a sign. For instance, it is only a matter of convention and of practical utility that the string of letters "Mont Blanc" stands for the so-called mountain and not vice versa (De Mauro, 1990: 9-13). It is not by chance that Peirce (1865: 324) affirmed that a represented object is so far a

representation because it is at least a representation of the same object in itself.

As regards *singularity*, there is little to add to what Perner has already said. It is clear, I think, that *singularity* means in no way the same thing as *individuality*. A representation may in fact also be a representation of a universal character, for example a painting of Truth or of a people (personified somehow) or a representation of a Euclidian rectangular triangle. And, for this reason, one can also represent representations and signs. *Singularity* only means that the referent is a determined one and not more or less similar to others.

The feature of *misrepresentation* is more problematical. The presentation of this aspect of representation is ambiguous. I think that, in general terms, it suffices to say that a representation is not a copy and that it is always a representation from a certain point of view (and, as we have seen, this is also Dretske's position). It is again the context that decides if it is a good representation or not. For example, I can build a plastic model of a country house where the place of two trees at the gate is interchanged (a chestnut is at the place of a nut-tree and vice versa). If the model's scope is to give a general idea of the house's location and of its general features in its environment, this can be a good representation and nobody will notice the difference (or, if someone wanted to stress the point, the answer would be: It does not matter!). And this is again the case if in place of two chestnuts at the gate one has placed two nut-trees or one has placed some generic trees, which do not look like either chestnuts or nut-trees. However, if the purpose is to sell the house as a farm with an exact stocktaking of the trees and so on, then the latter is a misrepresentation.

During a lecture in geometry, I evidently cannot represent a pyramid with a sphere (it would namely be a misrepresentation), but I can represent Rome's pyramid very well with a ball, for example if I am explaining its position in relation to the Saint-Paul door to some tourists. Or, suppose that last night a thunderbolt split the pyramid: I can represent very well this event by using a split stone or a split ball – and this goes against Leibniz's assertion (1699-1709: 576), following which one cannot represent St. Peter's dome by a pyramid. Obviously, with such a representation one can only represent poor properties, whereas, with a more complex structure, one can represent more details. However, I insist that such a poor representation, in a determined context, may be as good as any other and that it will, for this reason, completely suffice. One may also stress that the position of the pyramid is only a relational property. This is not the place for discussing this matter, but I think that the intrinsic/relational properties distinction is a little bit anachronistic (see Auletta, 2003).

In this context, a short examination of a position represented today by Jackendoff (1983: 223-25) and that which historically

proposed by Leibniz (1678; 1687: 112; see also Auletta, 1992) is instructive: In fact, Leibniz's solution to the problem of how the mind can represent is a combination of the theory of *harmonia præstabilita* (for metaphysical reasons) and of a general theory of representation (the fourth possible solution of the problem of representation mentioned in the first section). The representational relationship is here conceived of as a correspondence, as a projection, or better still, as a homomorphism between the represented object and the representing one. It is clear that such a homomorphism cannot be understood in general terms as a bijective homomorphism (isomorphism), i.e. one in which to every element of the represented object an element in the representing medium must correspond - a principle of isomorphism has found some echo in the *Gestalttheorie* (see Kohler, 1920). For instance, a geometrical projection of an object may already hide some elements of it. This is obviously true of any plan or chart (i.e. of any analogical representation). But if so, the question is: What is the criterion on the basis of which we decide which elements are pertinent to a representation and which are not? We are forced again to say: It is a matter of choice, i.e. of the use in a given context, which confers to a certain entity that is - under a certain perspective - homomorphic to another one, the role of a representation of the latter.

This is evident in the case of caricatures. A good caricature may be made up of a few lines. The important thing is that a caricature stresses and shows a trait that, for social and cultural reasons, is understood to be relevant to the person "represented" - I would like to stress that it is not the structure in itself which is relevant but the significance it has for us in a given interpretational or communicative context (see Gemelli, 1934). An accumulation of other traits would in general not make the caricature more efficacious, nor improve its representational adequacy (in general it will make it less efficacious). This is also evident in the case of traffic signals. We only need a very schematic image of children going out of a school in order to understand that the signal is warning us that a school is nearby. It is evident, again, that what is pertinent can only be defined and individuated in the context of a (linguistically or socially) shared codex. However, as we shall see below, this codex must be somehow established and developed by the users' actions and purposes.

Usually, one distinguishes between analogical (pictures, diagrams, planes, maps, charts) and propositional (linguistic or symbolic) representations. It is often said that analogical representations resemble the represented objects (Eysenck & Keane, 2000: 244-46). I think this is a mistake (see also Husserl, 1900: II.1, V § 20: *Beilage*). It is true that diagrams and words represent different ways of encoding information (Paivio, 1986), and that plans aim to be homomorphisms relative to the physical space they represent. However, diagrams and maps are exactly as conventional

as any propositional representation is. This is clear when one sees the difficulty children have in learning to read maps or adults have in learning to read navigation charts. I would bet that a hypothetical person (or, say, an intelligent and alien form of life) who knows nothing about planes could simply not understand what such an object is. Moreover, there can be different charts or maps for different purposes: For instance, one makes use of a Mercator projection in rhumb-line sailing and of a Lambert conformal chart in radio-beacon navigation (Hutchins, 1995: 62-64); in open sea one needs a chart with spherical coordinates that is oriented to the compass, whereas a coastal navigator will make use of a chart oriented relative to the run of the coast (Hutchins, 1995: 109). It is interesting to note that any chart presents its specific distortions and that the process which goes from a chart or plane to the represented situation and *vice versa* (the so-called propagation of representational state) may be very long and complicated (see Hutchins, 1995: 117-74). For this reason, analogical representations are not always easier to understand than propositional ones. It depends on the operational adequateness of the one or the other (see also Bertoz, 2000: 117-19): Very often tourists experience not being able to understand how to reach a certain location in a foreign town when reading a map and are therefore obliged to ask for verbal instructions, i.e. propositional information - it is interesting to note that verbal instructions are very often accompanied by gestural instructions, which partly have a propositional value but partly an ostensive character too, a fact that does not enter in the above scheme. In a general way, it may also be added that, besides visual items, propositional items also contribute to creation of mental images (Kosslyn, 1994).

I also agree about *non-existence*, though it seems to me that Perner's explanations of how we can represent non-existent objects is a little tortuous (I will return to the point later on).

In conclusion, I would also add a fifth feature, which may be called the *multidirectionality* of representation: The same thing (or the same medium) can represent different things - a point stressed by Wittgenstein (1953: p. 249, §§ 194, 389, 424, 429; 1969: § 113) - and this in terms of different senses but also of different referents. It depends on the modes of consideration. For example, a picture of myself, could also be the picture of a party where I was photographed, or the picture of the husband of a certain lady, or the picture of a European, or the picture of a typical exponent of my sex or of my profession, and so on. One cannot say that all these are properties that can truly be said of me, so that a picture of myself comprehends all those things. First, there are many of these states of affairs that are not as such represented in the picture (for example that I am a European). Second (and also for this reason), this answer goes against Dretske and Perner's definition of representing (that I find valid), as representing something *in a certain way* - interestingly

enough, Millikan says (1986: 65) that one cannot describe the action of handing you a dollar bill as "moving my right hand 20 inches northwest" or "handing you a picture of Washington".

The same thing or the same medium can also represent different referents. For instance, I can explain a car crash I saw in the street by using some stones: This big one stands for the truck in this position, this one for the oncoming car from the left and this one for the oncoming car from the right. This is the reason why articulation cannot be a feature of representation, (see Lloyd, 1989: 15-17) and that one does not always need intrinsic structural complexity in order to have a representation, as Dretske believes (the structural complexity may be of the agent who uses a simple item as a representation). In fact, the stone has no representational parts or at least no meaningfully representational parts: It is, *as a whole,* a representation of a truck, for instance. Note that distances, speeds, shapes, can all be arbitrary and this is again in no way a misrepresentation of the event. It can be a representation as exact as the hearers and I need. On the other hand, the *same* stones can be used (by myself) to represent the arrival of the police, the crowd of watching people, and so on. Moreover, the same object can be (and used as) a representation of a certain referent for me and be (and used as) a representation of another referent for you. One may say that it is not the same stone when used in two different contexts. However, this is irrelevant here. The point is: Abstractly, i.e. independently from the metaphysical problem of the identity of indiscernible and of the dependency of all from all, could the same stone, in two different contexts, represent different events? The answer is obviously yes. In other words, anything can be used for representing anything else. It only depends on what the (communicative) context is and in what measure something is or can be taken as a representation of something else (see also Putnam, 1995). The reason for this is clear: Several persons may take a sign as a representation of different objects or events, and I can do the same in two different moments.

However, the most critical point is the causal relationship, which in Dretske and Perner's opinions is supposed to hold between referent and representation. In fact, as we have seen, the relationship between the represented object and the representation can be reversed and this would impossible if there were a causal relationship between them. The formal structure of causality can be seen as counterfactual: (1) if the cause occurs, then the effect will occur, but (2) if the cause has not occurred, then the effect would not have occurred. For this reason, we cannot say that a representation is somehow caused by a represented object and then, in another context, the same representation can cause the represented object to be a representation. It seems to me that what is central to the concept of causality is that the direction of causation must be univocally determined.

Moreover, different representations or different mental states can be referred to the same state of affairs, and it is then difficult to explain how this state of affairs can cause, say, a mental state and eventually what mental state has been caused. For example, take some cars that stop at a red traffic light. The mental states of the drivers cannot be exactly the same (see also Putnam, 1988: 39) and also their specific perception of the traffic light cannot be exactly the same. This is true not only in interpretational terms but also with regard to the mere physical aspects of vision: They cannot see the traffic light in the same perspective nor receive exactly the same number of photons, and so on. The brain states may also be different (Putnam, 1967: 436-37). A way out would be to say that the different mental states and perceptions of the drivers are quite similar. But this is again a theory of resemblance, and one cannot mix a causal explanation with analogy. Moreover, resemblance depends on what one knows and believes (Wittgenstein, 1953) and it is therefore ultimately dependent on the context, the intentions, and the (social) conventions one adopts. Moreover, visual representation of objects cannot be based on similarity (see Ullman, 1996: 10-11). Another possibility would be to say that the differences are determined by the specific and antecedent mental state of any of the drivers, so that the same external state of affairs together with different internal conditions can produce different mental states. But this move is of no help. The point is that the same person could have been in a different position (occupied now by another driver) and nothing would have changed relative to the function of mentally representing the colour of the traffic light. In conclusion, there cannot be a causal chain of events (starting from the "external" event, i.e. the red light until the mind) that is capable of explaining such a situation (Pylyshyn,: 1984 1-45).

As regards Lloyd's position about causality (in terms of a probabilistic dependency on the events whose representation is a representation), my point is that what in a representation is intended as a miss or not depends on the practical finality of a representation and therefore on its interpretation, which, in the frame of the theory proposed by Lloyd, would drive us round in a circle. A colour picture of someone, which does not present the eye colour of this person, may be a miss, but, in a given context, it may not be. (Almost surely not in a modern drawing of the same person.) The same situation also occurs for false alarms. A picture that represents a person in a given environmental context where this person has never been may be understood as a false alarm (a false, in short): Perhaps the subject of a spy story. However, in other contexts again it may not be.

In conclusion to this critical examination, I would say that the mentioned authors muddle up the problem of the causal genesis of a thing that will play the role of a representation with the representational function itself. Let us remember the example of Chirac. One thing is the physical (and psychological) facts, which

have produced a material piece of paper. Another one is the social and contextual process by means of which this piece of paper is taken to be a picture of Chirac.

5. WHAT REPRESENTING IS

Summing up, representation cannot be by itself, i.e. intrinsically, referred to its referent – a point already stressed by Husserl (1900: II.1, V § 20: *Beilage*; see also Putnam, 1988: 21-22). What is it then that assures this relationship? As we have seen, representations are context-dependent. The main question is then: Why are representations so context-dependent? Where does such a feature come from? I would like to suggest the following answer: From the purposes we have when we use a representation. In other words, it is an intentional act to give to representation its role as representation and therefore to specify the exact sense under which it is a representation of something else – to a certain extent this was already recognized by Peirce (1892: CP 3.419). As we have seen, Dretske himself has already attributed a role to intentionality to explain representing, but, it seems to me, that first of all he was inconsequential and secondly his theory of causality clashes with the attribution to intentionality of an explaining role of the representation problem. Instead, any representation (the medium, in Perner's words), taken in itself, is only a physical or mental entity (see Jackendoff, 1983: 222) and in itself it has no relationship with any other thing except those relationships that are ruled either by physical (or chemical, biological, and so on) laws or by psychological ones.

Let us briefly explain this point. A book, a stone, a picture, a model, *in themselves* are only physical objects that are subject to the influences of natural agents and events in the same way as any other object in the world. It is the intentional act of the agent who uses one of these objects as something that stands for another entity, which confers the status of a representation to that object. Independently of such an intentional act there is no possible representation. Obviously a book is not only dependent on the intentionality of the writer but, in order to be understood, one needs to share a common code (a language in this case). However, a language by itself is nothing without the (intentional) speech acts (Grice, 1957; Searle, 1969) that constitute a community of speakers of that language. This is clear for dead languages. Take the example of the Rosetta stone: The text is written in three scripts and two languages: Egyptian hieroglyphs; Egyptian demotic; and Greek. It was very difficult to interpret the hieroglyphs, though Greek and Demotic were already known, and this shows that a text cannot "speak of itself" and it is not by itself a representation of anything else, neither of a part of the "world" nor of texts written in other languages. One needs a referential act in order to associate, for instance, elements of a language with elements of another language. In other words, the problem of the Rosetta stone

could be solved because not all the connections between Egyptian hieroglyphs and other (and ultimately, spoken and living) languages were clear-cut. Also in the case where we are faced with the task of interpreting a language which is absolutely alien to the other ones (let us say that we find an inscription on a distant planet), then we can eventually succeed in (partially) understanding the text only if we are in the situation to understand how the extra-terrestrial form of life that wrote the text could have used the signs (i.e. in referentially and communicatively semiotic acts).

The same is also true for mental representations. Images, projects, ideas, in themselves are only "affections" (i.e. states or "part" of states) of the mind that are ruled by the psychological laws of association and so on. *In itself* an image of an object is not different from a dream (see Llinas, 2001: 6-8, 42-44, Peirce, 1868a: 196 and 1878a: 271; James, 1890: II, 295; see also Descartes, 1641: 37.13-17 and Husserl, 1900: II.1, V § 16). It is the intentional act that guarantees a connection, if any, with something else and therefore can give the status of a representation to this mental affection. Peirce (1885: 164; see also 1888: 212) says that our world cannot be distinguished from a world of imagination by any description: Real things can only be indicated, which here means: Intentionally referred to.

Our minds are full of mental affections. A good part of them are schemata that have been selected in the course of the biological evolution of our species because they have resulted as useful for survival - I use the term *schema* here to indicate forms of perception, conceptual categories, and other mental structures (especially when clusters of less complex elements) that can be somehow referred to some entities. Others have been individually selected through experience.

Another part of schemata is constituted by those products of free association that will never be used (by sane people) as representations in the ordinary sense (though they may play an important role in poetry or in art). However, the reason why some schemata have been selected is because they were practically useful (see also Wittgenstein,1953: §§ 1, 43, 58, 197) and not because they have some resemblance to some "external" object.

For all these reasons, external and internal representations have essentially the same nature when considering their representational status or function - this is an angular point of Peirce's theory of signs from his youth (see 1865: 323-24). It is true that, in the case of external representation, we have two independent things and a relationship between them that eventually turns out to be a representational relation. It is interesting that Fodor (1994: 18-20) says that the distinction between a true dollar and something looking like a dollar is the fact that being a dollar is an extrinsic (causal/historical) property, whereas being a counterfeit dollar is an

intrinsic property. What maintains this distinction is ultimately the action of the police.

Such an external convention seems impossible in the case of internal representations. However, when I use a mental item as a representation of a (maybe external) thing, I expect some possible reaction. It is the reaction that tells me if and to what extent my mental item may be said to be a mental representation of this thing. It is a practical matter and, conversely, this is the way by which we also judge external representations. External representations are taken to be representations only because they satisfy the expectation we associate with them when we use them as representations. For instance, a picture of Chirac is intended to be a representation if a person, say Mary, who knows Chirac, can acknowledge that the person represented in the picture is Chirac. This is the expectation of Mary or of the reporter who took the picture. If it turns out that Mary cannot distinguish the represented person as being Chirac, then the picture has failed in the representational function the reporter assigned to it. If the picture is a bad picture, and for this reason it is difficult to understand that it is a picture of Chirac, I would say that it is a bad representation, and, in certain circumstances, that it is also a misrepresentation of Chirac.

Moreover, there is a stronger connection between external and internal representations: They constitute, in everyday life, an integrated cognitive and operative system, whose nature is social and cultural (see Hutchins, 1995: 175-228, 283, 353-74; see also Havelange, *et al.* 2003). The stream of Artificial Intelligence known as *cognitivism* has on the contrary treated the internal symbols and their manipulation as a system that is completely detached from external things. For this reason it missed the fundamental problem of cognition, that is always a problem of interaction between one or more agents and an environment.

It is interesting now to return to the problem of information. What hinders the conception of things as information senders and the mind (or the brain) as an information-processing unity? This idea has been developed again by cognitivism. The point is that the communication and transformation of information as such cannot provide representation because it cannot provide reference. Sunlight as such cannot be a representation of anything. *For* intelligent or living beings it can be a sign of the sun's activity or it can represent an energetic source to be exploited but surely *not in itself*. In Pylyshyn's words (1984: 15), organisms can respond selectively to properties of the environment that do not pertain to a purely physical or informational level of description. For this reason, information communication and transformation is as such devoid of meaning (Pylyshyn, 1984: 38-74). Millikan (1986; 1989b: 85) also stresses this point: On the contrary to what happens for intentional signs, the production of natural signs (of information) is generally an

accidental side effect of the normal operations of many systems (for example a red face as a natural sign of excitement).

Let us consider Millikan's theses, which are of great interest for our examination. Millikan (1989a) gives the following definition of *proper function*: An item *A* has a function *F* as a proper function (1) if *A* originated as a reproduction of some prior item or items that, due in part to possession of the properties reproduced, have actually performed *F* in the past, and *A* exists (causally historically) because of this or these performances, or (2) as a derived proper function. In other words, a proper function is a function that some ancestors have performed that has helped account for its own existence.

The notion of proper function may be considered as a further development of Dretske's idea that an item can represent another only if it has the function to represent it. In other words, it can be seen as a refinement of the causality explanation of representation. However, Millikan adds that the definition of proper function may be read as a theoretical definition of *purpose*. Here there are two possibilities to understand this nexus between historicity and purposivity.

On the one hand, one could understand it so that it is the historicity itself the ground of the purposivity of a function. Now, I completely agree with Millikan (1989a) that one should consider history in order to understand the function of a representation, for instance. Only that past history cannot completely account for the function of current items. Consider an organ, such as the tail. It surely had a proper function for our ancestors (monkeys) but it surely has none in today humans: The sacrum is only a relic of evolution. Hairs in today humans represent another example. The historical reconstruction cannot explain as such why this or that anatomical feature is no longer used in its proper function. In other words, it is not history as such which can guarantee that an item has a determined function or may be a representation of another. It is clear that history has a fundamental value in ascertaining *ex eventu* the reasons (or causes) that have determined the fact of the use of a certain representation or the realization of a certain function (this is its aetiology); but it cannot have a foundational value in determining why it was (eventually) necessarily so and why it will be so.

For this reason, it seems to me, Millikan establishes a strict connection between the concept of purpose and the concept of norm. A norm is evidently dependent on the social context and on the intentional use of items. Millikan introduces the concept of norm because she is interested in defective function in the same manner as Dretske is for misrepresentation. Take Millikan's example of a can opener: I can acknowledge a useless can opener as a can opener (as something falling under a norm) because I can understand its use, i.e. that it is something that has been built *for* can opening.

Therefore, it seems to me that, when Dretske seeks to find in the function an object the reason for it being a cause as a meaning-

carrying object, he should have recourse to intentionality - which he also partly does - and not to causal explanations, because only intentional acts can associate an object with a meaning and let it act as a meaning-carrying thing. Take Dretske's example of a speedometer: Humans built it with this function. In itself it is only a physical object and, if exponents of a civilization who come, let us say, from another galaxy find it, and if these creatures have no means of understanding that it was built for a specific purpose, they will also not understand that it has a representational function and they will consider it to be a strange type of stone or an animal's carapace. It is true that Dretske speaks of intrinsic intentionality and assigns it to mental states (systems of type III), so that it seems that minds are intrinsically representational, i.e. have intrinsically that function. But by what miracle (if not the action of God) can a mental state be associated to an "external" thing? This is the reason why Dretske is forced to have recourse to a causal explanation.

There are two possible objections to the explanation of representing I have proposed. The first is that advanced by Perner and quoted above: Intentionality must have recourse to other mental states and so on in an endless chain. This only holds if intentionality is supposed to be referred to mental contents. This is the interpretation of intentionality, which was introduced by Brentano (1874) and clearly followed by Perner himself who explicitly quotes him (1991: 109-110). However, I have recently proposed (Auletta, 2003) another interpretation of intentionality. In my opinion, intentionality is an act, which is deprived of contents and to which (but not necessarily) a representation may be associated (see also James, 1890: I, 250-251). Ordinarily, I use some mental schema as a representation of some object or event without being aware of it and in an almost automatic form: It is a habit (see Friedman, 1979). Speaking of words, Peirce says (1896: 3.433): "When an assertion is made, there really is some speaker, writer, or other sign maker who delivers it; and he supposes there is, or will be, some hearer, reader, or other interpreter who will receive it. (…) Some of these signs (or at least one of them) are supposed to excite in the mind of the receiver familiar images, pictures, or, we might almost say, dreams -- that is, reminiscences of sights, sounds, feelings, tastes, smells, or other sensations, now quite detached from the original circumstances of their first occurrence, so that they are free to be attached to new occasions. The deliverer is able to call up these images at will (with more or less effort) in his own mind; and he supposes the receiver can do the same."

However, if my representation fails to be adequate, I must find or produce another schema and intentionally apply it to the referent and, if this representation also fails, I must again find another schema and intentionally apply it to the referent. Therefore, the intentional act itself points, in this case, to the same referent (to which different representations may be attached) independently of this or of that

representation. If it were not so, I could not refer *another* representation to the *same* referent.

As we have seen, a representation is a representation of a referent in a certain way. This way of representing is attached to the referent and this is the work of *interpretation* (and here I agree with Perner). An interpretation is the connection between the referent and the medium of representation that allows this medium to be a representation of the referent, and it allows it to be so from a certain point of view - see PEIRCE CP: 2.92, 2.303, though I do not strictly follow Peirce's terminology. To *establish* this connection is a practical affair. Once established, to *acknowledge* it is an interpretational affair. Errors of interpretation are always errors in the connection between some schemata and some referents (we associate the false schema with a referent) (see Auletta, 2003).

One could say that intentional acts are impossible without representing the object to which they are directed. However, in general it is not so: The individuation of objects, properties and events appears to vary according to the task at hand and not *vice versa* (Varela, *et al.* 1991: 148). Peirce stressed that a major error in philosophy is to assume that the only way to get experience of things is by knowing their properties whereas we also practically interact with them (Peirce, CP: 6.318). This proposal is not far away from Varela's enaction, which is characterized by two features (Varela *et al,.* 1991: 173; see Havelange *et al.,* 2003): (1) perception consists of perceptually guided action, and (2) cognitive structures emerge from the recurrent sensori-motor patterns that enable action to be perceptually guided. However, I would like to stress the fact that in this way cognitive structures are only consolidated and definitively acquired whereas they are in principle freely produced (I shall return to this point in the conclusion). If my explanation is correct, then Perner's objection loses its validity.

Another difficulty consists in the fact that intentionality seems to be strictly related to awareness and to high-ranging animals such as humans, other primates, dolphins (and perhaps others) (Premack & Woodruff, 1978; Premack & Premack, 1983; Russon *et al.,* 1996; Cheney & Seyfarth, 1990, Savage-Rumbaugh *et al.,* 1998). On the other hand, it seems that animals like birds, reptiles, fish (and perhaps many others) are also able to represent something in some way (see Griffin, 1992). Then, we must use a wider term than *intentionality* in order to account for this variety of representational possibilities. Therefore, I propose the use of the term *referring act*: With this term I will indicate an act by means of which we fix or individuate a referent. As I will explain in another paper, I think one can plainly assume that life, in all its forms, is characterized by an active capacity to refer to objects or events (food sources, predators, environmental changes, and so on) (see also Hauser, 1996). In all these cases, every time a schema is attached to a referent by means of a referential act. I am not excluding that animals such as reptiles

or fish or others can show an intentional behaviour. I simply leave the question open by choosing a more neutral term. It will be the matter of empirical research to ascertain if and up to what point other living forms can be said to act intentionally. On the other hand, I find it very interesting that Millikan (1986) does not hesitate to attribute intentionality to bees and also to bacteria (see also Llinàs, 2001: 72-74, 112-113, 212). For her (and also for me) intentionality does not require rationality.

Finally, I return here to the features of representation discussed above.

It is intentionality or the referential act that guarantees the functional *asymmetry* of representations. In other words, when I refer to an object and I attach a representation to it, this is, by definition, an asymmetric relationship. However, in principle I could have also used the referent as a representation of the first representation (and I remember that this does not necessarily mean a meta-representation).

Concerning *singularity*, I think that referential acts are by nature referred to singular (not necessarily individual) things or events.

Regarding *misrepresentation*, I think that the truth or the adequateness of a representation is not an absolute value, but can only be judged in the context of a system, of an interpretation, and finally of a practical (referential) use.

A short commentary of Fodor's position can be useful here. Fodor is another exponent of the causal theory of representation. As we have seen, it is not easy to account for misrepresentation in the frame of a causal theory of representation, and, for this reason, implicitly or explicitly, both Dretske and Perner are forced to have recourse to intentionality in order to explain this feature. For instance, I remember that Perner says that a map can be judged as misrepresenting only when using it (though this explanation is again mixed with a tortuous use of causality). Since Fodor wishes to avoid any use of intentionality, in order to solve the problem of misrepresentation he states (1987: 107-110; see also 1994: 52-54) that one can only have false beliefs about what one can have true beliefs about. The reason is that for Fodor "falsehoods are ontologically dependent on truths in a way that truths are not ontologically dependent on falsehoods" (falsehoods are somehow parasitic on truths) - it is possible that Fodor here echoes one of Dennett's positions (1981a-b).

This platonic hypostatisation of truth is a little bit astonishing. I think, on the contrary, that "truth" and "falsehood" can at least be understood in two ways: In a logical context and in a pragmatic one. In a logical context, it is evident that both truth-values are on a par. For instance, if we say that $p \rightarrow q$ is false in the case in which p is true and q is false and true in the remaining three cases, it is evident

that here there is no ground for establishing an ontological distinction as Fodor wishes.

In a pragmatic sense, only a form of verification can ascertain the truth or the falsehood of a statement (Peirce, 1903: 166-67). If someone says that yesterday morning she or he was in London and so could not have killed a person in Rome, the only way we have to know if this is true or false is to acquire some evidence. If the evidence goes in the direction of proving this statement, we tend to believe the statement as true and, if not, we tend to believe it as false, especially if there is some counter-evidence. Here there is no difference in principle – neither in the statement itself, nor in the verification procedures - between the situation in which such a statement is true and the situation in which such a statement is false. We could also say with Dewey (1929: 310; see also 288-89) that for empirical facts, "not error but truth is the exception, the thing to be accounted for, and that the attainment of truth is the outcome of the development of complex and elaborate methods of searching" (see also Peirce, 1869).

Moreover, Fodor's explanation supposes that there are absolute ontological "truths" that can be experienced as such. However, experience can never be absolute and can never have a privileged access to final realities. In other words, the evidence is always limited and fallible, which means that we can finally decide that the person has said the truth even if in reality she or he did not do so and *vice versa*. On the other hand, if we take into account the scientific developments of the XX century, especially of quantum mechanics (see Auletta, 2003), there are also good grounds for supposing that the very idea that there are ultimate absolute facts (independently from our way of access to them) is a little anachronistic.

Non-existence is due to the fact that referential acts can be directed toward any type of entity, even if it is a contradictory "reality". In fact, suppose that I have a fully illogical dream. However, I can think that this may be important for my psychological economy. Then, I decide to draw it (or some details of it) on a piece of paper in order to fix ideas and to remember some details. This is clearly a representation of some illogical or impossible situation. On the other hand, note that in another sense, it can be said to be a representation of an existent thing, to the extent to which it refers to a mental state *I actually had* (see Dewey, 1929: 20; Peirce, 1869: 269). Here again, *existence* or *non-existence*, when speaking of representation, are relative terms, and the question is always: For what purpose will we use something as a representation? If the mental state as such is important, nobody (surely not a psychologist) would say that a representation (in words, in drawings, and so on) of it is a representation of a non-existent object. But if my dream were taken as a practical guide for planning and acting, my friends would probably say that my plans are about anything or about a non-existent thing.

Finally the *multidirectionality* of representation can be very well explained by the nature of the referential acts that establish only functional and not ontological relationships between representations and represented objects or events.

6. CONCLUDING REMARKS

In conclusion, I return to the second question posed at the beginning of this paper: What is the guarantee that our (mental) representations correspond or are in accord with external objects? In my opinion, there is no correspondence in itself and no need for a guarantee. The "correspondence" is instituted by the intentional act and by the practical consequences (feedback) of this choice.

The difficulty in solving this problem by ascribing to representations an intrinsic representational power or function, i.e. independently of intentional acts, can be seen very well by the following quotation by Perner (1991: 38): "Biological organisms have evolved with perception as the reliable source. Introspectively, we know that what we see *is* real". How should our introspection be a guarantee that what we see is real? Introspectively, I also "know" very well that the table I am writing upon is of solid matter and this notwithstanding the fact that it is "composed" of more than 90% of "emptiness". Obviously, there is no ground for doubting an experience if there are not clear and scientific reasons that run against our every-day evidence (see Peirce, 1868b: 212). But this is not the case for Perner's introspection, since we bypass here what experience is (our perceptions, actions and so on) and try to decide what the world is in itself (if it is in accord or not with our experiences). Moreover, the idea which is behind Perner's affirmation is that the solutions that have survived are the optimal solutions (a modern version of the best of the possible worlds) whereas they are only good solutions (among many other possible ones) that have been selected because they have been practically efficacious and not because they are true in themselves (see Varela *et al.,* 1991: 185-207).

Therefore, if we return to Hume, the solution I prefer is the second one, namely that representations are produced (at least by high-ranging animals) by the creative power of the mind. The production of perceptual and cognitive schemata can be very well simulated through parallel distributed processing (PDP) (see Rumelhart *et al.,* 1986b; Sejnowski, 1987; P. S. Churchland & Sejnowski, 1992). For instance a PDP neural network can spontaneously develop a categorisation in consonants and vowels (Rosenberg & Sejnowski, 1987; P. M. Churchland, 1995: 84-96). The produced categories can be seen as emergent properties. The necessary conditions in order to use a thing as a representation is that there is a structure (either in the agent or in the thing used as the representation) - and, in stressing the importance of structure, Dretske is here right. Inorganic nature already produces a lot of

complex structures. What is typical of life is not the production of structures as such (Ball, 1999) - not only of mental structures, but also of neural or by chemical reactions induced structures - but their *use* in order to represent objects or events. For this reason, there is nothing mysterious in the production itself. My point is only the following: How are these structures related to the referents?

To understand the problem a brief discussion of Kant's theses seems appropriate, since Kant was the first to propose the productivity of the mind as an explanation for the origin of schemata. However, in Kant's work there is no explanation of the relationship between schemata and objects (referents). Kant says that we produce the schemata and that these schemata are attached to the objects of the experience (and these objects are obviously unknown in themselves). The objects are given to us (1787: 74-75). But the problem is: Why do I attach this schema and not another one to this object and why do I use this schema for several objects, which are numerically distinct? As far as I know, no answer to this problem can be found in Kant's *Critics* (see also Wittgenstein, 1921: 4.002). I believe, three answers are possible: First, which schemata we attach to the objects is completely indifferent and arbitrary for the objects themselves because - independently from our forms, i.e. in themselves - they are completely shapeless and unstructured. In other words we are absolutely free in producing the schemata and in associating them with the objects. If so, Kant's philosophy would be a form of idealism and the thing-in-itself a form of "primitive matter" as in Neo-Platonism. However, Kant was surely against this consequence since he made no little effort to refute idealism (1787: 274-87). On the other hand, this answer could be considered in a strong metaphysical sense or in an empirical sense. In the first sense, we completely live in a mental world. However, since we may empirically distinguish between illusions and concepts that have referents, this metaphysical idealism does not matter on an epistemological and cognitive plane. If the answer is considered in an empirical sense, it is contradicted by our experience, which *does* distinguish between illusions and thoughts that are not illusions.

A second possible answer is that there is some form of correspondence between the objects and the schemata. But where does this correspondence stem from? Either we reject the idea that we freely produce the schemata or we cannot employ such an explanation - unless we turn to the *harmonia præstabilita*. It is not a case that Peirce, as a young metaphysician (1861: 83), recurred to the latter concept to solve this problem.

A third answer is that the schemata are arbitrarily produced - and in this strict sense one could say that the mind and the organism in general do not have windows (see Leibniz, 1712-14: § 7; see also Llinàs 2001: 6-8, 42-44, 72-74, 219). However, it is not indifferent, to the objects and to ourselves, which schema is attached to which object. On the contrary, it may be a matter of survival. This is the

answer I prefer. In this case, we freely produce the schemata. Obviously, not in the sense that there are not psychological or biological conditions in their production, but in the strict sense that they are produced independently from the object or event they may represent. We are successively confronted with objects that are already structured in themselves and that can react to us. The *use* of these schemata when some stimuli are present is the test that proves or disproves their adequacy to some experiences. It is then a practical matter to judge if our schema does fit or not: Is the reaction of the object the one that I expected on the basis of my schema? If our action in the environment is rewarded, then the schema is used as a representation of the object or event that caused that stimulus. But, I repeat, the schema remains totally arbitrary in relation to the referent exactly as a word or a sign is relative to its referent. Our mental representations should then be interpreted as instruments by means of which we interact with the world and seek to anticipate some reactions rather than as passive reproductions (see also Llinàs, 2001: 21-42) – a pragmatist view (Peirce, 1877; 1878a-b). Only an intentional-oriented being can perform this. Only an intentional being can attach an arbitrary schema to some referent and then try to interpret how suitable this schema is.

It is not difficult to see in this a kind of analogy with the immune system. For this reason, the solution I propose here can be seen as a further development of a model of mind and brain proposed by Edelman (1992): The brain and the mind as *a-posteriori* selective systems. Moreover, Edelman stresses the centrality of the sensori-motor system, which is in accord with the role I assign to intentionality (see also Auletta, 2003). In this paper I define intelligence as "the ability to construct new interpretations by associating new representations or new schemes to an old referent or to apply old schemes to different and new referents". It is also not difficult to see here essentially the same processes of accommodation and assimilation which for Piaget (1936: 11-13) constitute the adaptation and are common to life and intelligence.

The separation between representation-production and representation-use is one of Millikan's (1986; 1989b) most important contributions. Moreover, she clearly acknowledges the centrality of the use: One can plainly ignore the production of representation (1989b: 93) since (1993a: 108) representation is neither a direct nor an indirect function of the stimulations, empirical evidence, or prior thoughts that induce it. "Its semantic value is determined by whatever mapping relation is in fact doing the work of successfully guiding the organism through it activities in its world when controlled by the representation". For this reason one may also (to a certain extent) ignore differences between several interpretations. However, Millikan has to have recourse to a representational theory of intentionality when she says (1989b: 89) "that the representation and the represented accord with one other so (by a certain rule) is a

normal condition for proper functioning of the consumer device as it reacts to the representation", where with *consumer device* it should be understood the use of a representation by an agent. And (1990: 127): "The representation producer has been designed by selection to produce representations for the consumer that correspond to conditions in the world by the rule of correspondence that figures in the most proximate normal explanation of the consumer's successes. (…) the producer's job is to produce not just a representation - graphically, a `shape' - but to produce a correspondence, a certain relation between `shape' and world". But if so, we are in a circle, because the production of a representation depends on its use and the use on its production. As a consequence, the pragmatic character of representation-use gets lost.

In conclusion, I would like to add an intentional power of the mind to Kant's theory of schemata production. Kant (1787: 75) said that "Thoughts without content are empty, intuitions without concepts are blind". I would rather say that schemata without intentionality are blind and intentionality without schemata is empty – in Peirce's terminology, intentionality is indexical and representation is iconic (see CP: 2.92). In fact, the contents of the schemata do not come "from outside": They are already produced by the mind. However, I repeat, in themselves, without an intentional act, they are not different from dreams and are therefore blind, unable to refer to anything, like a picture of someone whose identity we do not know and so for this reason could also be a photomontage (see again Peirce, 1892).

I hope that the explanation proposed here is much simpler than any explanation that has to find a kind of harmony or correspondence between representations and objects.

ACKNOWLEDGEMENTS: This paper owes very much to several discussions with Professors John Stewart and Lia Formigari.

Bibliography

Auletta, Gennaro 1992 « Sémiotique et problématique corps-esprit chez Leibniz et les Occasionnalistes », *Histoire Epistémologie Langage* **14.2**: 85--106

- 2003 "Some Lessons of Quantum Mechanics for Cognitive Sciences", *Intellectica*

Ball, Philip 1999 *The Self-Made Tapestry: Pattern Formation in Nature*, Oxford, University Press, 1999, 2001

Berkeley, George 1710 *A Treatise Concerning the Principles of Human Knowledge*, Dublin, 1710, London, 1734; Penguin, 1988

Berthoz, Alain 2000 *The Brain's Sense of Movement*, Cambridge, MA, Harvard University Press (engl. tr.)

Brentano, Franz 1874 *Psychologie vom empirischen Standpunkt*, Leipzig, 1874; Leipzig, 1924; Hamburg, Meiner, 1973

Cheney, D. L./Seyfarth, R. M. 1990 *How Monkeys See the World: Inside the Mind of Another Species*, Chicago, University of Chicago Press, 1990, 1992

Churchland, Paul M. 1995 *The Engine of Reason, the Seat of the Soul*, Cambridge MA, MIT Press, 1995, 1996, 1999

Churchland, P. S. / Sejnowski, T. J. 1992 *The Computational Brain*, Cambridge MA, MIT Press, 1992, 1996

Cummins, Robert 1989 *Meaning and Mental Representation*, Cambridge, MA, MIT Press

De Mauro, Tullio 1990 *Minisemantica*, Bari, Laterza

Dennett, Daniel C. 1981a "True Believers: The Intentional Strategy and Why It Works", in A. F. Heath (ed.), *Scientific Explanation*, Oxford, University Press; rep. in Dennett, 1987: 13-35

- 1981b "Three Kinds of Intentional Psychology", in R. Healey (ed.), *Reductionism, Time and Reality*, Cambridge, University Press; rep. in Dennett, 1987: 43-68

- 1981c "Making Sense of Ourselves", *Philosophical Topics* **12**; rep. in Dennett, 1987: 83-101

- 1987 *The Intentional Stance*, Cambridge, MA, MIT Press, 1987, 1989, 1998

Descartes, René 1641 *Meditationes de prima philosophia*, Paris; in *Œuvres* (ed. C. Adam/ P. Tannery), Paris, Vrin, 1907—1913; 1964—74, v. VII

Dewey, John 1929 *Experience and Nature*, 1929; New York, Dover, 1958

Dretske, Fred I. 1981 *Knowledge and the Flow of Information*, Cambridge, MA, MIT Press, 1981; CSLI Publications, 1999

- 1983 "Précis of *Knowledge and the Flow of Information*", *Behavioral and Brain Sciences* **6**: 55—63

- 1988 *Explaining Behavior: Reasons in a World of Causes*, Cambridge, MA, MIT Press, 1988, 1991, 1997

- 1995 Naturalizing the Mind, Cambridge, MA, MIT Press, 1995, 1997, 1999

Edelman, Gerald M. 1992 *Bright Air, Brilliant Fire. On the Matter of Mind*, New York, Basic Books

Eysenck, M. W. / Keane, M. T. 2000 *Cognitive Psychology*, Psychology Press, Hove, 2000, 2001, 2002

Fodor, Jerry A. 1987 *Psychosemantics: The Problem of Meaning in the Philosophy of Mind*, Cambridge, MA, MIT Press, 1987, 1998

- 1994 *The Elm and the Expert*, Cambridge, MA, MIT Press, 1994, 1995

Friedman, A. 1979 "Framing Pictures: The Role of Knowledge in Automatised Encoding and Memory for Gist", *Journal of Experimental Psychology: General* **108**: 316-55

Gemelli, Agostino 1934 "La psicologia della percezione", *Acta Pont. Acad. Rom. S. Thomae Aquinatis* **2**: 80-119

Grice, H. P. 1957 "Meaning", *Philosophical Review* **66**: 377—88

Griffin, Donald R. 1992 *Animal Minds*, Chicago University of Chicago Press, 1992, 1994

Hauser, Marc D. 1996 *The Evolution of Communication*, Cambridge, MA, MIT Press, 1996, 1997, 2000

Havelange, V./Lenay, C./Stewart, J. 2003 "Les représentations: mémoire externe et objets techniques", *Intellectica*

Hume, David 1739-40 *A Treatise of Human Nature*, London, 1739—40; 1888; Oxford, University Press, 1978, 1992

Husserl, Edmund 1900 *Logische Untersuchungen*, Tübingen, M. Niemeyer, 1900; 2nd ed. 1913, 1980, 1983

Hutchins, Edwin 1995 *Cognition in the Wild*, Cambridge MA, MIT Press, 1995, 2000

Jackendoff, Ray 1983 *Semantics and Cognition*, Cambridge MA, MIT Press, 1983, 1985, 1995

James, William 1890 *The Principles of Psychology*, H. Holt, 1890; 1918; New York, Dover 1950

Kant, Immanuel A *Kants Werke. Akademie Textausgabe*, Berlin, W. de Gruyter, 1968

- 1787 *Kritik der reinen Vernunft*, II ed. 1787: III v. of Kant, A

Köhler, W. 1920 *Die physischen Gestalten in Ruhe und im stationären Zustand*, Braunschweig

Kosslyn, Stephen M. 1994 *Image and Brain*, Cambridge, MA, MIT Press

Leibniz, Gottfried W. PS *Philosophische Scriften* (ed. Gerhardt), Halle, 1875; rep. Hildesheim, Olms, 1978

- 1678 "Quid sit Idea", in PS VII, 263-64
- 1687 Leibniz an Arnauld (September 1687), in PS II, 111-28
- 1699—1709 "Addition à l'Explication du système nouveau touchant l'union de l'âme et du corps, envoyée à Paris à l'occasion d'un livre intitulé Connoissance de soy même", in PS IV, 572—90
- 1702 "Extrait du Dictionnaire de M. Bayle article Rorarius p. 2599 sqq. de l'Edition de l'an 1702 avec mes remarques", in PS IV, 524—54
- 1711 Leibniz an Hartsoeker (February 6th, 1711): in PS III, 516-21
- 1712 Leibniz an des Bosses (May 26th, 1712): in PS II, 444-45
- 1712-14 *Monadologie*: in PS VI, 607-623

Llinàs, Rodolfo R., 2001 *I of the Vortex: From Neurons to Self*, Cambridge, MA, MIT Press, 2001, 2002

Lloyd, Dan 1989 *Simple Minds*, Cambridge, MA, MIT Press

Locke, John 1689 *An Essay Concerning Human Understanding*, 1689; 2d ed. 1694; 4th ed. 1700; Oxford, University Press, 1975, 1979, 1987, 1990

Malebranche, Nicolas Œ *Œuvres* (ed. G. Rodis—Lewis), Paris, Pleiade, 1979

- 1712 *De la recherche de la vérité*, I ed.: Paris 1674-78; VI ed.: Paris 1712; in Œ I, 1-1126

Millikan, Ruth G. 1986 "Thoughts without Laws", *Philosophical Review* **95**: 47—80; rep. in Millikan, 1993b: 51—82

- 1989a "In Defence of Proper Functions", *Philosophy of Science* **56**: 288—302; rep. in Millikan, 1993b: 13—29
- 1989b "Biosemantics", *Journal of Philosophy* **86**: 281—97; rep. in Millikan, 1993b: 83--101
- 1990 "Compare and Contrast Dretske, Fodor, and Millikan on Teleosemantics" *Philosophical Topics* **2**: 151—61; rep. in Millikan, 1993b: 123—33

- 1993a "On Mentalese Orthography, Part 1", in Bo Dahlbom (ed.), *Dennett and His Critics*, Blackwell, 1993; rep. in Millikan, 1993b: 103—121
- 1993b *White Queen Psychology and Other Essays for Alice*, Cambridge, MA, MIT Press, 1993, 1995

Paivio, A. 1986 *Mental Representations: A Dual Coding Approach*, Oxford, University Press

Peirce, Charles S. 1861-62 *A Treatise on Metaphysics*, in *W* I, 57—84
- 1865 *Logic of the Sciences*, in *W* I, 322-336
- 1868a "Questions Concerning Certain Faculties Claimed For Man", *Journal of Speculative Philosophy* **2**: 103-114; in *W* II, 193-211
- 1868b "Some Consequences of Four Incapacities", *Journal of Speculative Philosophy* **2**: 140-57; in *W* II, 211-42
- 1869 "Grounds of Validity of the Laws of Logic: Further Consequences of Four Incapacities", *Journal of Speculative Philosophy* **2**: 193-208; in *W* II, 242-72
- 1877 "The Fixation of Belief", *Popular Science Monthly 12*: 1--15; in *W*: III, 242-57
- 1878a "How to Make Our Ideas Clear", *Popular Science Monthly* **12**: 286-302; in *W* III, 257--76
- 1878b "Deduction, Induction, and Hypothesis", *Popular Science Monthly* **13**: 470--82; in *W*: III, 323--38
- 1885 "On the Algebra of Logic: A Contribution to the Philosophy of Notation", *American Journal of Mathematics* **7**: 180-202; in *W*: V, 162-90
- 1888 "Trichotomic", in *W*: VI, 211-15
- 1892 "The Critic of Arguments", *The Open Court* **6**: 3391-94, rep. in *CP*: 3.404-424
- 1896 "The Regenerate Logic", *The Monist* **7**: 19-40; rep. in CP: 3.425-55
- 1903 "The Categories Defended", in *EP*: II, 145—59
- *CP The Collected Papers*, Vols. I-VI (eds. Charles Hartshorne/Paul Weiss), Cambridge, MA, Harvard University Press, 1931-1935; vols. VII-VIII (ed. Arthur W. Burks), Cambridge, MA, Harvard University Press, 1958
- *EP The Essential Peirce*, Bloomington, Indiana University Press, 1998, vols. I—II
- *W Writings*, Bloomington, Indiana University Press, 1982-

Perner, Josef 1991 *Understanding the Representational Mind*, Cambridge, MA, MIT Press, 1991, 1993

Piaget, Jean 1936 *La naissance de l'intelligence chez l'enfant*, 1936; 2d ed. 1947; Neuchâtel (Swiss), Delachaux et Nestlé, 1977

Premack, D. / Premack, A. J. 1983 *The Mind of an Ape*, New York, Norton

Premack, D. / Woodruff, G. 1978 "Does the Chimpanzee Have a Theory of Mind?", *Behavioral and Brain Sciences* **1**: 515—26

Putnam, Hilary 1967 "Psychological Predicates", in W. H. Capitan/D. D. Merrill (eds.), *Art, Mind, and Religion*, Pittsburgh, University of Pittsburgh Press; rep. under the title "The Nature of Mental States", in PP: II, 429-40

- 1988 *Representation and Reality*, Cambridge, MA, MIT Press
- 1995 *Pragmatism: An Open Question*, Oxford, Blackwell
- PP *Philosophical Papers*, Cambridge, University Press, 1975-94

Pylyshyn, Zenon W. 1984 *Computation and Cognition*, 1984; Cambridge MA, MIT Press, 1986, 1989

Rorty, Richard 1980 *Philosophy and the Mirror of Nature*, Princeton, University Press, 1980; Oxford, Blackwell, 1980, 1990

Rosenberg, C. R. / Sejnowski, T. J. 1987 "Parallel Networks that Learn to Pronounce English Text", *Complex Systems* **1**

Rumelhart, D. / McClelland, J. L./The PDP Research Group 1986a *Parallel Distributed Processing: Explorations in the Microstructure of Cognition*, Cambridge MA, MIT Press, 1986, 1999

- 1986b Rumelhart, D. E. / Smolensky, P. /McClelland, J. L./Hinton, G. E., "Schemata and Sequential Thought Processes in PDP Models", in Rumelhart *et al.,* 1986a: II, 7—57

Russon, A. E. /Bard, K. A. /Parker, S. T. (eds.) 1996 *Reaching into Thought: The Minds of the Great Apes*, Cambridge, University Press, 1996, 1998

Savage--Rumbaugh, E. S. /Shanker, S. G. /Taylor, T. J., 1998 *Apes, Language, and the Human Mind*, Oxford, University Press

Searle, John R. 1969 *Speech Acts. An Essay in the Philosophy of Language*, Cambridge, University Press

Sejnowski, Terrence J. 1987 "Computational Models and the Development of Topographic Projections", *Trends in Neurosciences* **10**: 304—305

Ullman, Shimon 1996 *High Level Vision: Object Recognition and Visual Cognition*, Cambridge, MA, MIT Press, 1996, 2000

Varela, F. J. /Thompson, E. /Rosch, E. 1991 *The Embodied Mind: Cognitive Science and Human Experience*, Cambridge, MA, MIT Press, 1991, 1993, 2000

Wittgenstein, Ludwig 1921 *Tractatus Logico-Philosophicus*; rep. in W: I, 7-85

- 1953 *Philosophische Untersuchungen*, Oxford, Blackwell; rep. in W: I, 225-580
- 1969 *Philosophische Grammatik*, Oxford, Blackwell, rep. in W: IV
- W *Werkausgabe*, Frankfurt a. M., Suhrkamp, 1984