Four Basic Theses about Identity Criteria

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RIASSUNTO

Obiettivo del lavoro è quello di fonire un chiarimento della nozione di *criterio d'identità.* S'intende sostenere, in negativo, che i criteri d'identità (1) non sono esplicativi dell'identità, (2) non forniscono un metodo per decidere la verità degli eunciati d'identità e (3) non hanno una funzione di legittimazione ontologica. In positivo, si sostiene che (4) i criteri d'identità possono essere informativi ed *a posteriori.*

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FOUR BASIC THESES ABOUT

IDENTITY CRITERIA

Introduction

In a loose and philosophically popular view, derived from Quine, *identity criteria* are needed to confer ontological respectability: entities are ontologically acceptable if and only if their identity criteria are clearly determined. Many attempts have been made to honour such demand for entities like properties, events, abstract and material objects. Consider, for example, the case of properties: according to Quine properties are to be deplored because we (allegedly) lack an adequate criterion for property-identity. Recently, M. Jubien also [Jubien 1996] questioned the legitimacy of demanding criteria of identity with respect to any sort of entity. His goal was to argue that such a demand is ill conceived. The notion of identity criterion is, for him, a philosophical "myth". Criteria of identity have no function at all.

In order to verify if a criterion of identity has no function at all and to label it as a "philosophical myth" some different ways of conceiving the notion of *criterion of identity* will be carefully taken into account (for a general introduction to the issue see [Lowe 1989a; Lowe 1997; Lowe 1998a, pp. 28-57]). This is the main goal of our paper. We will argue that:

1. Identity criteria are not explicative of identity;
2. they do not give us a method of decision for identity sentences;
3. they do not give ontological legitimacy;

Thesis (1-3) amount to the negative part of our paper. The positive thesis that we argue for is that:

4. identity criteria can be informative and *a posteriori.*

We move on in the following way. We will start with a Fregean quotation of the *Grundlangen* where the expression "criterion of identity" is introduced. A *prima facie* analysis of the quotation will allow us to distinguish two meanings, expressing two functions, usually ascribed to identity criteria. Roughly, the first one provides the

ontological conditions for identity. It expresses an ontological function of identity criteria. The second one provides epistemic conditions for identity judgements. It expresses an epistemic function of identity criteria. We argue that neither the epistemic function nor the ontological function are free of difficulties. This negative part of our paper is developed in paragraphs 2 to 6. We argue for theses (1), (2), and (3). Paragraph 7 concerns the *pars costruens* of our paper. We outline how identity criteria can still be useful, even if they no longer give ontological legitimacy. Thesis (4) is elucidated here.

1. Ontological and epistemological function of identity criteria. A preliminary characterisation

The credit for introducing the notion of identity criteria is attributed to Frege. In the *Grundlagen* §62 he wrote:

> If we are to use symbol *a* to signify an object, we must have a criterion for deciding in all cases whether *b* is the same as *a*, even if it is not always in our power to apply this criterion [Frege 1884, §62].

The example of identity criterion, proposed by Frege, concerns directions of lines in

terms of parallelism. He remarked:

> The judgement 'line *a* is parallel to line *b*'… can be taken as an identity. If we do this, we obtain the concept of a direction, and say: 'the direction of line *a* is identical to the direction of line *b*' [Frege 1884, §64].

Prima facie, the proposed example suggests that the question to be answered by an identity criterion can be stated in the following general way:

> (OQ) If *a* and *b* are Ks, what is for the object *a* to be identical to *b*?

We call (OQ) the "ontological question". Usually, an answer to this question should give the necessary and sufficient conditions for *a* to be identical to *b* under a sort K.

If we review the first passage quoted from Frege one could observe that the ontological reading is not the only one. From Frege we could take the suggestion that there is a second function of an identity criterion, and it is to answer the following question:

> (EQ) If *a* and *b* are Ks, how can we know that *a* is the same as *b*?

We call (EQ) the "epistemic question". The identity criterion, in this perspective, concerns the knowledge of identity between entities *a* and *b* of a sort K. Usually, the epistemic function seems to be required when we talk of the identification of an

object through time. Consider a typical question concerning identification through time like this one:

> How can we *know* whether the table that is here now is the same as the table that was here yesterday?

This question is just an instance of (EQ) (on this issue see [Jubien 1996, pp. 345-346], but also [Merricks 1998]).

Sometimes there is an equivocation of (EQ) and (OQ). Someone observed that Frege, for example, in the final clause of the first quotation points to an ontological reading without blocking off an epistemic one. This is, for example, Williamson's opinion [Williamson 1990, pp. 148-49]. Consider the following as an example of the kind of equivocation in question. There could be an algorithm which could decide all the arithmetical problems of a certain kind, even if we are not always able to apply it. However the algorithm is just a way of knowing the answers to the arithmetical problems of the kind in question. It is not that in virtue of which the answer is the correct one. The ontological reading seems to harmonise better with the use made by Frege of the notion of criterion and with his overall realism. Nevertheless the epistemic reading seems to be more literal if we restrict our attention to the first quotation above[1]. Let us focus first on the business of the epistemic function.

2. The epistemic function of identity criteria

There is a reading of the epistemic function of identity criteria which immediately raises a problem.

If identity criteria are infallible recipes for working out the problem of recognition of an entity then there are none. In fact, it is impossible for a criterion of identity so understood to provide a general method for determining the truth of any identity statement concerning objects of a kind K. Let us suppose that a criterion of identity for the Ks provides a way of discovering whether *any* sentence of the form $a=b$, when a and b are Ks, is true or false. It would provide a way of discovering whether any sentence whatever is true or false. But this is absurd [Lombard 1986, p. 246].

Here is the argument. Take the identity statement: $a = (\iota x)\ (x=a \wedge \mathrm{S})$, where S is any sentence. It is logically true that:

$$\mathrm{S} \text{ if and only if } a = (\iota x)\ (x=a \wedge \mathrm{S})$$

(Case left-right: S is true. Then $(a=a \wedge \mathrm{S})$ is true. Hence there is an x such that $(x=a \wedge \mathrm{S})$ and a is the only object satisfying the condition: $(x=a \wedge \mathrm{S})$, i.e. $a=(\iota x)(x=a \wedge \mathrm{S})$. Case right-left: $a=(\iota x)(x=a \wedge \mathrm{S})$ is true. Then a satisfies the condition: $(x=a \wedge \mathrm{S})$ and so S is true). It follows that, since a criterion providing a way of discovering whether

an identity sentence is true or false will provide, in particular, a way of discovering whether an identity sentence of the form $a=(\iota x)(x=a \wedge S)$ is true or false, the same criterion will provide a way of discovering whether any sentence whatever is true or false.

So we have to exclude this reading of the epistemic function. Identity criteria are *not* infallible recipes for working out the problem of recognition of an entity. Nevertheless, one could simply argue that identity criteria are fallible recipes for working out the problem of recognition of an entity. But, what does it mean? Let us postpone the answer to this question after the analysis of the ontological function of identity criteria.

3. The ontological function of an identity criterion. Does it provide a definition of identity?

The second reading of the first Fregean quotation is the ontological one. The question is (OQ) and its answer could be stated in this way:

(AOQ) Identity criteria explain what identity sentences mean.

A first way of interpreting (AOQ) is to take identity criteria as providing a definition

of identity. But, is identity definable?

The condition – already considered by Leibniz and Frege as a possible definition of identity – is to share all the properties. More recently, the possibility of defining identity in this way has been considered by Brody in [Brody 1980, p. 8]. He defends it against this objection: reference to all the properties is circular because it involves, in particular, reference to properties presupposing the identity itself. According to Brody, such a criticism makes the definition impredicative, but not circular. Actually, there is no formal circularity in such a definition, but it seems to us difficult to disclaim that impredicativity is a kind of conceptual circularity. As concerns the identity definition at issue, it is at least not obvious that quantifying over all properties does not presuppose that a reference to identity is involved in (the formulation of) some properties.

The difficulty concerning the circularity of the definition of identity has a long story. It has been thought that it is possible to avoid it by narrowing the domain of quantification to properties not involving identity, for example to properties expressible in a language without the identity predicate. However, it has been observed that in this way a relation of indiscernibility is defined, which depends on what properties are quantified over. Being aware of this objection, Quine claims that the defined relation of indiscernibility may be taken as identity among suitable

entities.

In general we might propound this maxim of the *identification of indiscernibles*: objects indistinguishable from one another within the terms of a given discourse should be construed as identical for that discourse. More accurately: the references to the original objects should be reconstructed for purposes of the discourse as referring to other and fewer objects, in such a way that indistinguishable originals give way each to the same new object [Quine 1953, p. 71]. Wiggins' objection was that such entities are not, in general, those grasped by the language speakers. Moreover, speakers' intentions cannot be grasped by a suitable extension of the language, because the explication process could be endless. Wiggins criticises a possible, weaker, attitude, i.e. that: «In any given situation and any given context, all the identities of things involved are fixed or fastened down from some arbitrarily large sufficiency of information about all the various other predicates and relations that are instantiated there. … Identity must *supervene* on other properties and relations» [Wiggins 2001, p.10]. Wiggins' criticism is grounded on this thesis: issues concerning what is true of, i.e. about exemplification of properties and relations, presuppose that objects are already individuated, and therefore issues of identity are already settled.

We accept Wiggins' conclusion that identity is primitive and it is presupposed by

the reference to objects. So, we deny that identity criteria, whatever they are, can give a definition or an explication of identity not presupposing the identity itself. This does not imply what Jubien claims, i.e. that the notion of identity criterion is a "philosophical myth" and identity criteria have no function at all. Frege himself assigns a relevant philosophical role to identity criteria, while maintaining that identity is primitive.

4. Frege and the ontological function of identity criteria

Frege explicitly supports the priority of identity on identity criteria, even when identity criteria are suggested as explications of the sense of some specific identity sentences. In the passages above quoted from *Grundlagen* Frege seems to suggest that reference to objects presupposes the availability of identity criteria for the objects referred to.

He thinks of the identity criterion for numbers, as an explication of the sense of:

1) The number which belongs to the concept *F* is the same as that which belongs to the concept *G*.

To give an idea of what he is looking for, Frege considers the definition of:

2) The direction of line *a* is identical to the direction of line *b*,

by:

3) line *a* is parallel to line *b* [Frege, 1884, §64, §65].

Frege's criterion of identity for directions is, for Williamson, an example of a two-level identity criterion. [Williamson 1990, pp.145-146]. In his opinion there are two types of identity criteria. The first type is exemplified by the *axiom of extensionality* (AE) for sets:

$$(\text{AE})\ \forall x \forall y\ (x{=}y \leftrightarrow \forall z\ (z \in x \leftrightarrow z \in y))$$

In (AE) the identity sign is flanked by terms for sets, and the right-hand side states a relation equivalent to identity between sets. (AE) is an example of *one-level* identity criterion. The second type is exemplified by Frege's identity criterion for directions:

(O=) Lines have the same direction if and only if they are parallel.

Formally:

$$(\text{O}{=})\ \forall x \forall y\ (ox{=}oy \leftrightarrow \text{P}(x, y))$$

where '*x*' and '*y*' range over lines, '*o*' is a letter for "the direction of" and 'P' for "is parallel to". In (O=) the identity sign is flanked by terms constructed with a functional letter, and the right-hand side of the biconditional introduces a relation among entities different from the entities for which the criterion is formulated. (O=)

is an example of a *two level* criterion of identity. Lowe suggested that a *two-level* identity criterion can be recast as *one-level*. For example (O=) can be reformulated thus:

(O1=) $\forall x \forall y$ ((Direction(x) $\wedge$ Direction(y)) $\rightarrow$(x=y $\leftrightarrow$ $\exists$ w $\exists$ z (L(w) $\wedge$ L(z) $\wedge$ Of(x, w) $\wedge$ Of(y, z) $\wedge$ P(w, z))))

where 'Direction' is "to be a direction", 'L' "to be a line", and 'Of' "to be of" [Lowe 1991, pp.192-193; Lowe 1997, pp. 619-622]. Williamson observes that if (O1=) is true:

(O2=) $\forall x \forall y$ ((Direction(x) $\wedge$ Direction(y)) $\rightarrow$(x=y $\leftrightarrow$ $\exists$ w (L(w) $\wedge$ Of(x,w) $\wedge$ Of(y, w))))

is true. In (O2=) we say that directions are the same if and only if there is some line of which they are (directions). (O2=) would be true if we change "directions" with "lengths". Williamson argues that if a criterion of identity for directions has to distinguish them from lengths (O2=) is not an identity criterion for directions [Williamson 1991, p.194]. Williamson concludes that this very argument shows that (O1) is not a criterion of identity for directions either. We understand that the interpretations in terms of "lengths" makes (O1) true too, provided that the relation of parallelism be suitably specified for "lines". This would show that (O1) does not

distinguish “directions” from “lengths”.

Williamson’s argument against Lowe seems to justify the conception of two-level identity criteria. For in such criteria the conditions of identity concern objects which are not the same kind of objects for which the identity criterion is provided. The idea seems to be that the condition of identity can be explicative only if one quantifies objects and applies relations which can be presupposed as already given. Otherwise, if the objects for which the identity conditions are provided are members of the domain of quantification, nothing can be presupposed, and the identity criterion could pertain to different entities depending on the given interpretation. However, as a matter of fact, Frege criticises his own conception of identity criteria, the conception that he himself seems to propose and Williamson tries to clarify.

Frege observes that in:

> The direction of line *a* is identical to the direction of line *b*:
>
> > The direction of *a* plays the part of an object, and our definition affords us a means of recognising this object as the same again, in case it should happen to crop up in some other guise, say as the direction of *b*. But this does not provide us with a means in all cases. … It says nothing as to whether the proposition:

"the direction of line *a* is identical to *q*"

should be affirmed or denied, except for the one case where *q* is given in the form of "the direction of *b*". [Frege, 1884, §64, §65].

In Frege's opinion, the nature of certain objects is entirely clarified only if one can find a way to refer to them in such a way that it allows us to decide the truth-value of any identity sentence concerning the given objects, and not only those which that identity criteria state as equivalent. On the basis of the above quotation and the subsequent remark, we can reformulate (OQ) in this way:

(OQ1) If *a* is K,what is for the object *a* to be identical to *b*?

Let us observe that this question is not answered by a two-level criterion of identity for objects of the kind K. So even if the example of identity criterion Frege starts with is based – as Williamson claims – on the two-level distinction, Frege is led to thinking something which implies that a unique domain of quantification is needed. This demand is surely satisfied by Lowe's notion of one-level criterion. However there is another demand which is not satisfied by the one-level notion. In principle, it should be possible to decide any identity question between an object of the kind K and any object, but, even in Lowe's one-level formulation, an identity criterion provides a criterion of identity only for objects of the kind in question. What do we

need to get the universal decidability of identity questions concerning a K? Frege is absolutely clear about that: we need the concept of K ("What we lack is the concept of direction" [Frege 1884, §66] and he explains why). But this amounts to acknowledging that a criterion of identity for objects of the kind K does not provide the concept of K which it was supposed to provide. In fact Frege gives up the plan of getting the concepts of direction and of number from the corresponding identity criteria for such objects.

A problem arising in reading Frege's attempt to exploit an identity criterion for Ks in order to get the concept of K concerns what the sense in which he speaks of deciding identity sentences is. We think that, for Frege, "to decide *p*", where *p* is an identity sentence, means that the relevant information logically implies *p* or logically implies $\neg p$.

Of course, what information is relevant may depend on *p*, *a posteriori* information could be needed and, obviously, neither *p* nor $\neg p$ should be included in it. Stating these requirements in a satisfactory way is difficult, perhaps, impossible. But this is not a Fregean problem. In fact Frege was certainly only worried about certain abstract objects. For this kind of objects only general, *a priori* information, is relevant.

Moreover, it is very likely that Frege did not feel committed to providing a full

explanation of the notion of identity criteria, since, very soon, he gave up the idea of exploiting this notion in order to introduce the concept of number.

Finally, let us focus on the fact that in his attempt to exploit an identity criterion for Ks in order to get the concept of K, Frege does not give up identity as a primitive notion. This comes out in the Fregean statement that the definition of identity among directions helps «to adapt the relation of identity, taken as already known, to a special case» [Frege 1884, §65], and in a preceding passage, where Frege argues that the goal of searching for an identity criterion for numbers is: «to use the concept of identity, taken as already known, as a means for arriving at that which is to be regarded as being identical» [Frege 1884, §63].

It is manifest that he takes the notion of identity as presupposed in the formulation of the identity criteria. This is not Quine's position.

5. Quine on the ontological function of identity criteria. Some (Kripkian) doubts

Quine – as analysed in §3 – is prompted to consider identity as supervenient on some other properties and relations. The criterion of identity, for Quine, allow us to decide, in principle, whether *a* is the same as *b*, where "*a*" and "*b*" refer to objects of the kind

in question.

This is essentially the Fregean notion of identity criterion stated by Frege before he observed that it does not allow us to decide identity sentences where one of the terms refers to any object. In other terms, an identity criterion, in Quine's perspective, is not required to discriminate an object of the kind of objects for which it is proposed from any other object of whatever kind. Moreover it is very likely that identity among objects of the kind for which the criterion is proposed is not allowed to occur in the identity condition. So, for Quine, an identity criterion has to answer – in a non-circular way – to the (OQ) question and it does not answer the (OQ1) question.

As for Frege, it is plausible to assume that "to decide *p*", where *p* is an identity sentence, means that – on the basis of the relevant information – *p* is logically implied or ¬*p* is logically implied, but in this case it seems to us that the logical implication could be understood in the usual model-theoretic sense. The notion of relevant information raises at least all the problems connected with Frege's analysis, but, as for Frege, let us consider the particular case in which all the relevant information is *a priori* available.

If such information is specified in the first order language and it contains numbers theory, on the basis of the semantic completeness of first order logic, decidability – in

the sense specified above – implies deductive decidability, i.e. for each identity sentence p, p is formally deducible *or* $\neg p$ is formally deducible. So, since for a such a theory deductive deducibility implies recursive decidability, on the basis of Lombard's argument any sentence is recursively decidable, against the existence of problems which are recursively indecidable. We should conclude that identity criteria cannot be such that they logically imply p or logically imply $\neg p$, for every identity sentence p. This conclusion follows when descriptive terms are allowed to occur in the identity sentences, where descriptive terms are terms built by means of the description operator or names introduced in connection with suitable conditions[2].

There are some other problems in Quine's proposal which were pointed out by Kripke (in particular in [Kripke 1978]). He claims that such a case as the well-known problem of the Ship of Theseus gives us an example of a problem concerning ordinary physical objects not decidable on the basis of the relevant information. It seems to follow that for the ordinary notion of physical objects a criterion of identity, in the Quinean sense, is not available. However, Kripke argues that the existence of sentences which cannot in principle be decided does not delegitimate the ordinary notion of physical object. If this notion were delegitimated, the scientific notion of physical object would be analogously delegitimated by the existence of issues of identity concerning elementary particles which are not in principle decidable [Lowe

1994]. If we accept the above criticisms to the Quinean notion of identity criteria, we can conclude – at this stage – that identity criteria do not give us a method of decision for identity sentences (Thesis (2) formulated in the *Introduction* of this paper). Moreover, doubts have arisen about the possibility that identity criteria provides an explicative, non-circular, introduction of the concept of the objects for which they are formulated (Theses (1) and (3)). Let us further analyse some other Kripkian difficulties concerning the explicative function of identity criteria in connection with the notion of identity.

6. Impredicativity and identity criteria

Kripke considers some identity criteria such as:

(O=) Materials objects are identical if and only if they occupy the same place at any time.

(E=) Events are identical if and only if they have the same causes and effects. [Davidson 1969]

(N=) Natural numbers are identical if and only if numbers less than them are identical

These criteria can be given formulations which are not formally circular, where the predicate of identity does not occur in the right part of the biconditional:

(O=F) $\forall x \forall y\ (x=y \leftrightarrow \forall p\ \forall t\ ((x \text{ occupies } p \text{ at } t) \leftrightarrow (y \text{ occupies } p \text{ at } t)))$

(E=F) $\forall x \forall y\ (x=y \leftrightarrow \forall z\ ((z \text{ causes } x \leftrightarrow z \text{ causes } y) \wedge (x \text{ causes } z \leftrightarrow y \text{ causes } z)))$

(N=F) $\forall x \forall y\ (x=y \leftrightarrow \forall z\ (z < x \leftrightarrow z < y))$

However, Kripke remarks that to establish if an object *a* always occupies the same place as an object *b*, or respectively, an event *e* has the same causes and the same effects as an event *e*' or, again, a number *m* and a number *n* are bigger than the same numbers can depend on the solution to a question of identity concerning entities of the same kind. So he concludes by noticing that identity is already presupposed [Kripke 1978, p. 27].

Kripke's criticism seems to deny that it is possible to formulate an explicative criterion of identity for objects of a certain kind, for the reason that the formulation of such a criterion would involve a quantification over *all* the objects for which the criterion is specified and quantification presupposes the identity of the objects which are quantified over. However, Lowe observed that some criteria incorporate an universal quantification over the objects for which criteria have been introduced on

the right-side of the biconditional [Lowe 1998a, p. 43]. That is the case of (E=), (N=), and even of the axiom of extensionality for sets (AE):

(AE) $\forall x \forall y\, (x{=}y \leftrightarrow \forall z\, (z \in x \leftrightarrow z \in y))$

In such cases it seems that quantification is used not only to refer to the objects at issue, but even to characterise the identity among them. This for Lowe is a different kind of impredicativity, and is stronger than the first one.

The weaker form of impredicativity is already enough to prevent the possibility of taking identity criteria as explicative of identity in the sense specified by the theses of definability or supervenience of identity. The stronger form of impredicativity has been objected to by Quine in the following way.

In his opinion impredicativity of (E=) compromises the possibility of considering (E=) as an acceptable criterion of identity for events. He thinks so not because impredicativity must be avoided, but because «we cannot individuate impredicatively» [Quine 1985, p. 166].

In [Lowe 1989b, pp.178-181], Lowe rightly observes that this criticism applies also to (AE). However, Quine seems to accept (AE) as a good criterion of identity for sets. Why does Quine dismiss the impredicativity in the explanation of individuation? And why does he nevertheless seem to accept the impredicative individuation for sets?

The two problems are closely connected. The banishment of impredicativity could be motivated by the demand of explaining identity among Ks without presupposing the notion of K. On the other hand the very statement of the problem of explaining identity among Ks seems to suggest that identity for objects of the K-kind depends on the nature of objects of the K-kind. Then, the following objection could be raised: why could not the reference to objects of the K-kind be acceptable in the explanation of the identity between objects of the K-kind? It could be claimed that the direction of the explanation is the opposite: the goal is to explain the nature of the K-kind objects giving an explanation of the identity of the K-kind objects, and so the nature of the K-kind objects cannot be presupposed. Such a perspective can develop – in a natural way – in a reductivistic ontological conception, a conception according to which, for example, a table is just a bundle of sense-data. However, Quine declares himself anti-reductivistic. So, the answer to the above question has to be different.

Quine's goal is to give an explanation of the identity among K-kind objects without requiring that such an explanation would also be an explanation of the nature of K-kind objects, since the notion of the nature of objects of a given kind is banished. His purpose is simply to demonstrate that identity among objects of the K-kind is completely fixed by facts concerning objects already well individuated. So, the legitimacy of sets cannot be stated on the basis of the axiom of extensionality

(AE). A set is well individuated only if its elements are well individuated, but this requirement is not expressed in (AE).

7. Reduction and identity criteria

According to Kripke, Quine takes identity criteria as principles reducing issues of identity of a given kind to relations between objects of a more basic kind. Such a conception is attributed to Quine after an analysis of the Quineian exposition of the identity criterion for rivers proposed by Quine in [Quine 1953].

Kripke formally represents the notion of identity criteria used by Quine in this way:

> $\overline{x} = \overline{y}$, but $\overline{x}$ is the entity of the new kind associated with x, and $\overline{y}$ is the entity of the new kind associated with y if and only if x and y, which are admittedly distinct objects (at least they can be distinct objects; of course they could be the same object) stand in the relation R. R will in general be some equivalence relation among the unbarred entities. [Kripke 1978, p.36]

This is the Fregean form of the identity criterion for directions. From a formal point of view not every association relation is such that the criterion holds. Trivially, the

identity $\overline{x}=x$ does not validate it in the direction case. Moreover, the assumption of the uniqueness of the associated object cannot be eliminated. If there are distinct associated objects the criterion will not hold for all of them because it would imply that they are the same. So, the relation of association has to be such that the associated object is only one.

Quine's association relation appears to be a relation of logical-ontological dependence of the associated object on the objects to which it is associated. Kripke speaks of a reductivistic conception of identity criteria just because identity among objects of a certain kind depends on relations occurring among more basic objects. Similar considerations seem to be at the basis of Williamson's notion of *two-level* identity criteria. «The idea of a two-level criterion of identity — Williamson points out — has an obvious advantage. No formula could be more basic (in any relevant sense) than '$x=y$', but some might be more basic than '$ox=oy$', by removing the symbol 'o' and inserting something more basic than it» [Williamson 1991, p. 147].

There are two main criticisms proposed by Kripke to this kind of reductivistic conception of identity criteria[3].

First objection. If identity criteria have to provide an analysis of identity, we have to admit objects for which there are no reductive criteria of identity and from whom we move on in order to give identity criteria for less basic objects [Kripke 1978, p.

38]. Otherwise we run into an *infinite regress*. Consider this example of identity criterion:

(MO=) Materials objects are identical if and only if they occupy the same place at any time

One could ask a criterion of identity for the notion of *place* and this criterion has to be given in terms of entities different from which the first ones are reducible to. It is not clear what these entities can ever be, but there should be some, if identity among places is to be reduced to identities among more basic entities. Then, keeping on applying the same kind of demand, one gets involved in an *infinite regress*.

In order to stop this infinite regress, a reductivistic philosopher could introduce some *scientific standards* and suppose that a criterion of identity is adequate if and only if the right-hand side of the criterion is an ontological reduction of the left-hand side in terms of the selected scientific standard. This seems to us to be, more or less, for example, Sellars' answer. He argues that "chairs" do not really exist. There are objects that really exist and which answer to what the layman calls "chairs", but the objects called "chairs" by the layman are part of a pre-scientific, intuitive, picture of the world. Chairs really are... and here the reduction follows on the basis of the scientific standard adopted. For example, if the scientific standard adopted is a physical theory, the reduction will be in terms of a bundle of particles and so on.

Such a kind of explanation makes the whole question of the adequacy of identity criteria depend on the *reference standard* adopted. Now the problem is: which standard?

Second objection. It specifically concerns some notions considered more basic than others, such as, for example, the notion of *momentary-thing* or the notion of *time-slice*. Concerning the notion of *momentary-thing*: Kripke claims that such a notion is not understandable without presupposing the notion of an enduring object, and so the last one is not conceivable as a notion derived from the first one.

Finally one can address a more general criticism of the concept of reduction – a concept that seems to be implied in the quineian conception of identity criteria – in agreement with some Kripkian remarks and with some of the thesis developed by Wiggins in [Wiggins 1980].

The understanding of the association relation presupposes at least an idea of the kind of objects constituting the domain of such a relation, and this coincides, on the other hand, with the kind of objects for which the identity criterion is proposed. So, the formulation of an identity criterion presupposes at least one partial understanding of the objects for which the criterion is proposed.

It could be argued that one starts with an intuitive understanding of what certain objects are and then goes on looking for an identity criterion in order to get more

precise and detailed understanding of what the objects are. Then, if continuants are spoken of, why not use the notion of *momentary-thing* or *time-slice*, once it has been made clear that it is not conceived as more basic and it is just a result of an abstraction? We think that some people like Wiggins would claim that not only does such a notion not provide a basis for an ontological reduction, but, more strongly, has no role at all in the ontological understanding. We are not so extreme. An identity criterion in terms, for example, of time-slices, does not provide any ontological understanding of a continuant, but to say that a continuant is not reducible to time-slices is, after all, a useful way of using the notion of time-slice to understand the notion of a continuant!

To conclude: identity criteria do not give ontological legitimacy (Thesis (3) formulated in the *Introduction* of this paper), but as a matter of fact the difficulties met in the formulation of identity criteria are useful for *ontological clarification*.

In the next paragraph we argue for the stronger thesis that identity criteria can have a more positive function from an ontological point of view.

8. On the usefulness of identity criteria

Identity criteria could be useful in two ways: they are explicative and informative.

An identity criterion is explicative when it contributes to a specification of the

identity questions. This is the case when the criterion is based on an equivalence relation. Then, a natural move is to think that the entities for which the identity-criterion is proposed are equivalence classes of objects on which the equivalence relation is defined. Criteria of identity, so conceived, are *a priori*. They are a logical-set-theoretical consequence of the admission of the entities on which the equivalence relation is defined. However, the reduction of questions of identity among certain objects to questions of identity among well individuated objects, does not justify the notions used to make the reduction. In particular the reduction does not imply that the existence of the reduced entities is only justified on the basis of the existence of the entities taken for granted. It does not follow, for example, that the admission of sets of physical objects is forced by the admission of physical objects, as it does not follow that the admission of material objects of a given kind is forced by the admission of space-regions and temporal instants.

Another problem raised by the identity criteria for equivalence classes is that it is not so obvious that such equivalence classes are to be identified with the objects intended in the intuitive and possibly common-sense understanding. One could just ask if the properties of such equivalence classes are in some sense transferable to the intended objects. This is a different problem which in some cases could be also evaluated on the basis of empirical evidence.

Quine himself does not think identity criteria supply a logico-set-theoretic reduction of objects for which they are introduced (see for example [Quine 1981]). Quine only seems to require that questions of identity be clearly meaningful, and in principle solvable. If rightly understood, this requirement is hardly questionable. What is more debatable is to consider its fulfilment as a proof of ontological legitimacy [4].

However, it is well known that for many kinds of entities we do not have equivalence relations by means of which it is possible to formulate adequate identity criteria. This has been the subject of great discussion in the philosophy of science, mainly in the perspective of logical empiricism [5].

With regard to informativity, a criterion of identity may state something relevant to the individuation of the entities it is proposed for. Such a relevance can be appreciated and evaluated when we consider what is excluded rather than what follows from it. For example, Davidsonian criterion for events removes the possibility of distinct events without causes and effects. This is surely relevant information for the individuation of events, even if the criterion does not reduce questions of identity among events to questions among already well individuated entities.

Moreover, there is an intuitive sense in which informativity depends on context.

Compare for example identity criterion for events (E=) and the the axiom of extensionality (AE) and consider Zermelo-Fraenkel (ZF) set theory. In ZF set theory (AE) is given together with some other axioms: they supply a substantial part of the relevant properties of the "membership" relation. On the contrary, Davidsonian criterion (E=) is not given together with some other axioms supplying a substantial part of the relevant properties of the "cause" relation. The absence of a theoretical context in which the notions used in the criterion are characterised makes (E=) not so informative as (AE) in ZF set theory.

Whether identity criteria can be informative in an empirical sense is a difficult question. For, on one hand, they must be framed by means of general notions which do not appear to depend on specific, factual information. On the other hand, they should be open to include scientific information supported by empirical evidence. Take, for example, the criterion for "piece of gold". Surely, the notion of *piece* should result from a specification of the general notion of physical object which can be achieved by using the theoretical tools of, for example, mereotopology[6]. As for *gold*, some general features of the mass concepts have to be taken into account, but if the criterion should also discriminate what is gold from what is not gold it is natural to require that it also conveys information about its atomic structure. This presupposes the acceptance of some theory of the atomic structure. There is no *a*

priori guarantee about the adequacy of the identity criterion refined on the basis of such a theory. It can only be said that if the theory is true then the piece of gold *a* is identical to the piece of gold *b* if and only if *a* and *b* share such and such general features and such and such atomic structure. If identity criteria cannot be fully specified without relying on *a posteriori* information one could argue that they are fallible recipes for working out the problem of the individuation of an entity; they can be wrong for empirical reasons. Moreover, they do not need to provide a successful way of recognising entities.

The conception of *identity criteria* suggested by the above remarks is the following:

(i) entities of a certain kind are grasped on the background of some general intuitive notions, including a general notion of a kind.

(ii) They are to be individuated not only with respect to the entities of their kind, but also with respect to any entity which is admitted in the domain of quantification.

(iii) The search of identity criteria is carried out in the context of a clarification of the nature of the entities already intuitively grasped.

(iv) This search does not need to lead to a reduction of the questions of identity but simply to an elucidation of identity.

8. Conclusions

Our main conclusion is that identity criteria do not provide ontological legitimacy. Nevertheless, identity criteria have a positive role in two respects. First, they can be useful for *ontological clarification* providing information about the individuation of the entities for which they are stated. They are not enough to ground individuation, but they show how individuation can be elucidated in the background of some general notions. Second, they indicate a way of coping with identity questions. They do not allow us to answer the identity questions, but they show us what is possible to look at in order to answer them.

A final point. The general notion of identity is correlative to the general notion of entity. In which relation are these notions with the notion of *kind of an entity*? Here we only claim that this question does not concern identity criteria and that the corresponding function for identity criteria has to be answered in the following way. Identity criteria presuppose and are not presupposed by the general notions of identity, entity, and kind.

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Notes

[1] However, this is not a generally subscribed viewpoint of the quoted passage.

[2] Let "*a*" and "*b*" be names for distinct entities and *p* any sentence. With reference to *p*, *a* and *b* can represent truth and falsity in the way specified by the following open sentence:

(*) $(p \rightarrow x=a) \wedge (\neg p \rightarrow x=b)$

This condition is satisfied by *a* if and only if *p* is true and is satisfied by *b* if and only if *p* is false. Let us observe that:

$\exists x ((p \rightarrow x=a) \wedge (\neg p \rightarrow x=b))$

is true if p is true, since $\exists x\ (x=a)$, and is true also if p is false, since $\exists x\ (x=b)$. Moreover in both cases the entity satisfying (*) is unique, respectively a or b. So:

$$\exists !x\ ((p \rightarrow x=a)\ \wedge (\neg p \rightarrow x=b))$$

Let "c" be a name for such an entity. In virtue of the way in which "c" is introduced, the sentence:

$$(p \rightarrow c=a)\ \wedge (\neg p \rightarrow c=b)$$

is true. Then it is evident that if all identity sentences, so in particular "$c=a$" and "$c=b$", are decidable, p too is decidable. This argument is taken from [Giaretta2000].

[3] Some other Kripkian criticisms proposed in [Kripke 1978] are not so general.

[4] Even if Quine does not think entities for which criteria are introduced in terms of classes of equivalence, one could ask if when he thinks in terms of mereological sums of entities for which a given equivalence relation is defined, a kind of reductionism is at work. An answer to this question depends on the nature of mereological sums, but this topic is so difficult that we do not and we cannot consider it in this paper.

[5] Is there a solution to this problem? Let us briefly summarise an attempt to solve the problem. In [Williamson 1986], Williamson takes for granted that for many kinds of entities there are no objects and equivalence relations to provide adequate identity-

criteria and tries to find ways of approximating suitable relations of equivalence on the basis of relations which are not of equivalence, but are relevant, or seem to be relevant for the individuation of entities, for which we are searching for an identity criterion. His research is technically very interesting, but it does not allow us to reach clearly positive conclusions about what concerns the possibility of capturing an adequate notion of identity criteria. A different proposal which we do not discuss here is in [Guarino and Welty 2000].

[6] See [A.C. Varzi 1996].

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