Antirealism and Artefact Kinds

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Abstract
Many realists on kinds deem it highly controversial to consider artefact kinds real kinds on a par with natural ones. There is a built-in tendency in realism to conceive of artefact kinds as merely a conventional classification used for practical purposes. One can individuate three main different approaches characterizing real kinds and accordingly three different types of arguments against viewing artefact kinds as real kinds: the metaphysical, the epistemological and the semantic arguments. The aim of this contribution is to undermine the thesis that it is possible to trace a clear distinction between artefacts and natural kinds in each of these approaches. As a consequence there are no metaphysical, epistemological and semantic bases for claiming that artefact kinds as opposed to natural ones are not real kinds.

1. Realism and artefacts

The realist perspective to which I refer in the present discussion is characterised by the following theses:

(1)   There is a world existing *independently* from human thought and language.
(2)   This world is divided into kinds existing *independently* from human thought and language – these are called "real kinds" or "sortal kinds".
(3)   An individual object O is a real entity if and only if there is a real kind S such that O belongs to S.

The central role is played by the independence theses (1) and (2). These theses are not meant to exclude the trivial possibility of real entities being products of human actions and in that sense dependent on human thought; what realists want to exclude are those entities that are nothing more than projections of our thoughts and which thus lack an independent nature. The fact that something depends, for its existence, on human thoughts channeled via human intentional actions, cannot be considered a sufficient basis for taking such an entity to be a non-real entity. In Michael Devitt's words:

> Finally, in asserting the independence and objectivity of the world, the realist does not mean to deny certain familiar causal relations involving minds. Beliefs, desires, sensations, and so forth cause behaviour which affects external reality, even creating some items. (1997, p. 16).[1]

Many of the authors who accept (1), (2) and (3), and try to draw the line between sortal (real) kinds and nominal (non-real) kinds, consider kinds of artefacts to be non-real nominal kinds. Let (N) be their thesis:

(N)   Kinds of artefacts are not real kinds.[2]

What may "artefact" mean in (N)? Unfortunately the definition of "artefact" is not straightforward and many problems arise when we try to distinguish natural from artificial objects. Nonetheless, there seem to be objects that we clearly consider to be artefacts, like chairs, cars, cakes etc. The following is the classical characterization:

> (A)   An artefact is an object or a substance that is the intentional product of intentional actions.[3]

Consider, for instance, the case of an artist carving a statue from a piece of wood. The artist intends to create a statue but when carving the piece of wood he will also produce a lot of shavings. According to (A) the statue is an artefact while the shavings are not, because even if both the shavings and the statue are products of the same intentional action, only the statue was meant by the artist to be the final product of his work. Despite some problems concerning agricultural products and artificial substances this distinction between intentional products – the statue – and mere results of intentional actions – the shavings – seems to correspond quite well to our intuitions.

Nonetheless, (A) is not universally accepted by antirealists. David Wiggins, for example, does not adopt it. In his words:

> [...] it is not the question of whether a thing was fabricated but rather the difference between satisfying and not satisfying this *condition* that makes the fundamental distinction. (2001, pp. 89-90).

Here Wiggins is speaking about the condition of having a principle of activity founded in law-like dispositions. Unfortunately, as we will see, Wiggins also uses this condition to trace the distinction between real and non-real kinds. Clearly someone aiming at arguing in favour of (N), as Wiggins does, cannot simply use this condition to draw the line between artefacts and natural objects without rendering (N) trivially true by definition. Of course, we could decide to apply 'artefact' and 'natural' according to such a distinction but here the problem at stake is clearly not that of being coherent in the use of the terms but rather of making an inquiry into the differences between the nature of artefacts and natural objects.

If (N) indeed holds, then it follows with (3) that objects such as tables, chairs, cars, cakes and cities are not real objects *qua* tables, chairs etc. The kinds to which these objects belong are not real kinds but mere conventional classifications and what they allow to individuate are not real objects. When speaking of tables, chairs, etc., we are really referring only to quantities of matter shaped in certain ways.

In the next three sections I will consider three main arguments in favour of (N): a metaphysical argument, an epistemological argument and a semantic argument. These arguments correspond to three main different approaches to characterizing real kinds. My aim is to undermine the thesis that it is possible to trace a clear distinction between artefact and natural kinds in each of these approaches. As a consequence there are no metaphysical, epistemological and semantic bases for claiming that artefact kinds as opposed to natural ones are not real kinds.

2. Metaphysical argument

Metaphysical arguments in favour of (N) are based on Aristotle's idea that there is not a real principle of unity for artefacts;[4] they do not have their own nature or form, that is to say, they are not substances.

Wiggins, for instance, gives such an argument in *Sameness and Substance* (1980; 2001), which can be analysed as follows:

> (M)
> (i)   If a kind S is a real kind, then there are clear principles of individuation for objects belonging to S;
> (ii)   there are no clear principles of individuation for artefacts;
> (iii)   artefact kinds are not real kinds.

In my discussion of this argument I shall accept (i) as an expression of a fundamental metaphysical thesis of the kind of realism under discussion. A real kind – "sortal kind" in Wiggins's terminology – collects objects that share a common nature, and that can be traced in time and space according to some common principles of individuation. These principles of individuation are based on what Wiggins calls "principles of activity" that specify the typical way in which objects of the same kind behave, interact with the environment and change. In Wiggins's words "they are law-like norms of starting to exist, existing, and ceasing to exist by reference to which questions of the identity and persistence [...] can be arbitrated." (2001, p. 83). Such principles correspond to regularities of behaviour that could be known or unknown to us, so such regularities can either be described in terms of law-like norms or they still have to be discovered.

Any problem of identity for objects belonging to real kinds is founded only in our ignorance about fundamental facts concerning the nature of such objects. Our knowledge of the principles of activity of a real kind can be incomplete or even wrong but we can always obtain more scientific facts. Disputes concerning the identity of real objects can be resolved by new achievements in scientific inquiry. A distinctive mark of real objects is that it is never up to us to decide between conflicting statements concerning their identity.

The truth of the second premise is based on the fact that it is not possible to formulate principles of activity for artefacts analogous to those for natural objects. Therefore, while natural kinds satisfy the metaphysical requirements for being real kinds, artefact kinds do not. Typical problems concerning the identity of artefacts are due to the fact that artefacts can persist through radical mereological changes, interrupting their functioning, and completely dismantling and rebuilding. The result is that the principles of identity for artefacts are so weak that it seems there is no fact of the matter at all about identity claims for artefacts. But even if we can in some way improve the principles of persistence for artefacts, we cannot avoid identity puzzles like the Theseus' ship puzzle, because for many artefacts it is easy to individuate circumstances in which we are compelled to simultaneously apply two different principles of persistence, thus arriving at the unpleasant result of identifying one object with two different objects.

A first principle of continuity that seems to be specific to artefacts is that of continuity of matter or mereological continuity. According to this principle, an artefact that is dismantled and rebuilt, using the same original parts arranged in the same original structure, is still the same artefact. Despite the intuitive appeal of this principle, some problems arise when we try to apply it. It is

not clear if the artefact's existence persists during the whole process of dismantling and rebuilding, whether it can exist even in a dismantled state, or whether we have to admit that there is intermittent existence and, in the last case, in which state exactly does it cease to exist and when does it again start to exist. A second principle of continuity that can be applied to artefacts is the principle of continuity of form or functional continuity. According to this principle, an artefact can undergo the gradual substitution of all its parts and still continue to exist. If we do not accept the application of such a principle, we face the following dilemma: either we deny – against well established common practice – that an artefact could survive the loss of even the smallest of its parts, or we allow the object to persist only through a certain number of substitutions and in such a case we are again stuck with the problem of finding the threshold of its survival. All these well known problems seem to be irresolvable in terms of scientific research; they seem to permit only conventional or even arbitrary solutions.

Situations in which rebuilding and substitution occur simultaneously give rise to identity puzzles. In such cases both the principles of mereological and form continuity can be applied and this leads to an identification of the original object with two different objects, thus leading to contradiction. The conclusion drawn is that there seems to be no fact of the matter concerning the identity of artefacts; principles are so undemanding that it is simply up to us to decide when an artefact starts or stops its existence.

According to Wiggins such a despairing situation for artefact identity principles derives from the fact that there are no principles of activity, no law-like sentences describing the form and behaviour of artefacts. This is not due to a lack of knowledge, but rather to metaphysical matters, that is to say, there are no common laws governing the behaviour of artefacts belonging to the same kind. Consider the example of clocks: a clock is simply, in Wiggins's words, "any time-keeping device". There are many different devices that can perform such a function, devices with different structures that function in different ways so no regularity in behaviour and form can be individuated for all clocks.

A key role is played by the principle of classification that is adopted; it is often said that artefact kinds are mere functional kinds which means that for artefact kind S it holds that:

> (F)   An object O belongs to S if and only if O has the function F.

Unfortunately, we are not told what a function of an artefact is, or what the truth conditions of a sentence like "O has the function F" are. Does that mean that O can perform F? Or that O can be used for F? Or does it mean that O has a certain selection history? Or that O has been designed for F?

Indeed, this is not the only reason for denying the existence of regular behaviour for artefacts. This would simply amount to the problem of finding a sufficiently fine-grained classification for artefacts. It is easy to develop a way to specify functional criteria of classification so that the only artefacts that perform the same function according to the same principle of functioning belong to the same kind. According to Wiggins this would be sufficient: all available solutions to problems concerning identity of artefacts would remain and would have an arbitrary or conventional character. In order to solve such problems, we cannot appeal to any fact concerning the artefacts themselves for the simple reason that there are no such facts.

2.1. Criticism

Wiggins presents some evidence in support of (ii). The idea is that it is not possible to individuate persistence conditions for artefacts unless we appeal to conventional decisions because artefacts do not have their own nature. Tables are simply quantities of matter that we decide to trace in time and space as continuous existing objects in line with our own interests.

Any property referred to for the purposes of explaining why natural objects are real objects while artefacts are not, has to determine a direct ontological difference between artefacts and natural objects. That is to say: the property has to be one that artefacts definitely have and natural objects definitely lack, or *vice versa*. If we take seriously the ontological task of recognizing when our categories are able to capture real objects and when they are not, we have to be able to detect clear and sharp differences; it seems difficult to allow vagueness to exist in the distinction between real and non-real entities.

As illustrated above, there is a wide range of mereological and structural changes that artefacts can undergo. They can be dismantled piece by piece in a long process or all at once in a single unity of time. They can be rebuilt in the same fashion, their components can be partly or completely substituted by other components, or even by slightly different components, while the whole object still persists in time.

On intuitive grounds it is clear that our chance to control changes with the intention of preserving or destroying artefacts is quite complete, while in the case of natural objects we only have limited opportunities to enter into and control the autonomous processes that determine persistence in time. Moreover while for natural entities we can individuate autonomous regular processes of transformation, we cannot do that most of the time for artefacts. The conclusion is that the persistence of artefacts seems to depend on our decisions to an extent that the persistence of natural objects does not. Is this sufficient for making a distinction between the nature of artefacts and the nature of natural objects that is substantial enough to justify the alleged radical ontological difference?

The fact that artefacts can undergo changes like those described above without ceasing to exist does not qualify as evidence because, in view of our knowledge, we cannot tell whether this depends on the nature of the objects themselves or on the skills and techniques we have at our disposal. It is not at all clear if, even from a biological point of view, there is any general veto on the possibility of comparable changes of parts in the case of living beings – it is true that in the case of simple organisms it is already experimentally possible.[5]

According to Wiggins what makes the difference is the 'activity' or, in a more Aristotelian vein, the 'internal principle of change'. The *activity* of natural objects is something so closely related to their existence that, given a law-like description of such an *activity*, we are able to determine the condition of persistence of natural objects. For artefacts it is not possible to individuate any *activity*, at most we can individuate a function, but whatever a function is supposed to be it is not intimately related to the persistence of artefacts in the same way in which *activity* is related to the persistence of natural objects. An artefact can cease performing its function and even lose the capacity to perform it for a considerably long period of time and nonetheless retain its identity.

Wiggins is not clear as to what precisely an *activity* is, what he is clear about is the relation that there must be between the principle of activity and principles of persistence. As he states:

> All the doctrine implies is that the determination of a natural kind stands or falls with the existence of law-like principles, known or unknown, that will collect together the

extension of the kind around two or three representatives of the kind [...] to be something of (a) kind is to exemplify the distinctive mode of activity that they determine. (2001, p. 80).

Wiggins explicitly refers to Leibnizian[6] and Aristotelian doctrines. The following are the relevant references:

Things which exist by nature [...] such as animals and the organs of these or plants and the elementary stuff [...] have in them a principle of change or rest (in respect of place or growth and decline or alteration generally) [...] the nature of a thing being the source or cause of non-accidental change or rest [...] [7]

An activity is a chain of internal and/or external causal interactions describable through law-like claims, a kind of process able to determine the persistence of the object. The prototypical examples of such an activity can be all the metabolic processes of the human body. Alternatively life itself can be described as a single complex process resulting from a synergy of different processes. No doubt it is a kind of process describable through law-like sentences. If we adopt such an interpretation of "activity" then what seems to have a central role is the notion of *internal change*. An object endowed with activity has the capacity to change its parts while retaining its proper form and identity. If this is the intended meaning of "activity", can we really use this notion to trace the distinction between natural objects and artefacts?

Before trying to answer this question, it is worth considering a further specification of what an activity is deemed to be. Wiggins explains in a note:

The Leibnizian echo made by 'activity' is deliberate but, outside the monadological framework, it does not have to import anything very different from 'way of being, acting and reacting' – something a stone might have. (2001, footnote on page 72).

With respect to our previous interpretation, this is definitely a less demanding notion of activity facilitating the inclusion of real objects of living beings and all other natural objects. Wiggins explicitly refers to the following natural entities: lakes, rivers, volcanoes, springs, seas, and glaciers. Indeed, it is possible to describe in law-like sentences how a stone or a river behave in certain circumstances, but it is not clear at all if such principles are really closely allied to the persistence of those objects to the degree that the doctrine of activity seems to require. Let us consider the case of the volcano mentioned by Wiggins. Of course there is, even literally, an activity of volcanoes describable in law-like sentences but a volcano can suspend its activity for hundreds of years and then start again without ceasing to exist, in much the same way that a clock can stop and restart again, thus fulfilling its function. Rivers and lakes can dry up completely and then be replenished with water without this causing new rivers or lakes to come into existence. It is inappropriate in such situations to even say that a new river or a new lake has come into existence. What is relevant is that such problems cannot be settled by scientific research so that even in these cases we seem to face identity statements that can only be decided in conventional or arbitrary ways. Hence the reason that the activities of lakes, volcanoes and rivers, if they are activities at all, are not able to provide principles of persistence for these natural objects. Furthermore, such a broad notion of activity would enable us to individuate activities for artefacts as well.

We are left with only two possibilities: either we take into account what Wiggins says in the footnote mentioned above or we ignore it. In the second case we are left without a clear idea of

what, in general, an activity is supposed to be in the case of natural beings. The reason for this is that only the processes involved in life seem to match the Leibnizian-Aristotelian descriptions. This narrow interpretation thus excludes from real existence all natural non-living things. Instead, if we take into account a broader interpretation of *activity*, we are able to attribute activity even to non-living entities but in such cases we cannot establish any criterion of persistence for them and, above all else, in exactly the same manner we can also ascribe an activity to artefacts. If displaying activity, according to the less demanding notion of activity, is the only property that anchors the difference between instances of real kinds and instances of non-real kinds, then there seems to be no good reason to maintain that artefact kinds are not real while lakes or volcanoes do qualify as real kinds.

One more string to Wiggins's bow is the Theseus's ship puzzle. Wiggins seems to see this kind of puzzle as a symptom of the particular weakness of the identity conditions of artefacts: in the end it is through the weak and undemanding constraints placed on artefact identity that puzzles like that of Theseus's ship become possible. So the existence of these kinds of puzzles could be seen as a further way of detecting the difference between real and not real kinds.

In biology one may find similar puzzles. Let us consider the case of tubers. Tubers are the parts of roots of some kinds of vegetables from which new plants can grow. In some cases it is even possible to obtain new plants from just part of the tuber. Suppose one takes a tuber T and plants it in the ground so that a new plant P grows. Suppose that one then takes the very same tuber T, cuts half of the upper part away, destroys it and puts the other part in the ground so that P^I grows. Can we then say that $P=P^I$? We may have reasons to consider T and its upper part as two distinct entities, so the plants that grow from them would be considered to be distinct plants.[8] This would lead to the conclusion that the tuber did not survive the loss of one of its parts. This is not, of course, acceptable if we consider a tuber from the point of view of what may reasonably be considered to be its *activity*, in fact even when deprived of half of its constituent tuber part, it can still produce a new plant. On the other hand, if we accept that a tuber does not survive the loss of one of its parts, we are left with the problem of accepting a sort of mereological essentialism for tubers or of establishing the threshold of mutilations so as not to compromise their persistence. If, to break this impasse, we accept that T is the same tuber in both situations we are bound to say that $P=P^I$. Then imagine a third situation in which a third plant P^{II} grows from the upper part of the tuber while the bottom section is destroyed. Can we say that $P=P^{II}$? If we have accepted the identification of P and P^I, there seem to be no valid grounds for not identifying P and P^{II}. In a fourth situation in which both the halves of P are planted in the ground and two distinct plants result, P^{III} and P^{IV}, the identification of P^{III} and P^{IV} with P^I and P^{II}, respectively, remains straightforward. Hence, for the transitivity of identity, we are bound to identify P with both P^{III} and P^{IV}. The common problem underlying the Tuber puzzle and the Theseus's ship puzzle is that we cannot solve either of them without paying a high price in terms of intuition. The weak point of this puzzle is clearly the first step, once we accept identification of P and P^I, it is difficult to find reasons to reject the other identifications. Can we really find clear, unequivocal reasons to avoid that first identification on the basis of our botanical knowledge? Does biology tell us what to think about such identity? Can we really think in terms of a kind of empirical research that allows us to obtain new scientific data in order to settle such a problem? The point seems to be that botany and biology are perfectly insensitive to the problem of identity between tubers and parts of tubers and this could suggest that there is no fact of the matter basis to such identities at all. Ultimately, these are the very sciences that are supposed to find the solutions to such problems concerning tubers. So even in this case it seems that a solution may merely depend on conventional or arbitrary decisions. But we do not use puzzles like this one to infer anything concerning the nature of tubers. In any case, as is well known, double identification puzzles do

not confirm any clear distinction between natural and artefact beings so they cannot be used to assert any ontological difference between artefacts and natural beings.

What seems to affect metaphysical arguments of this sort is both the tendentious notion of *natural beings* and the adoption of naive notions of *artefact*. While the explicit intent behind discussing the nature of artefacts is to confront artefacts with natural beings, the principle adopted for the distinction does, in many cases, clearly lend itself better to living beings than to natural objects in general. This is what happens with the doctrine of the principle of activity discussed above. It seems to be perfectly in line with the Aristotelian doctrine, but this doctrine has to prove its own reliability and it offers no alternative than to accept the ultimate conclusion that only biological entities exist.[9]

On the other hand, the discussion on artefact kinds is based on a too naive conception of artefact types. Let us return to the example presented by Wiggins: a clock is any time-keeping device, a pen is any rigid ink-applying implement. These cannot be considered, even from the point of view of everyday language, adequate characterizations of what clocks or pens actually are; a lot of objects that satisfy such descriptions would never be considered as candidate items for the categories of clocks or pens.

The point is that while in the case of natural entities we are zealous in admitting that science provides us with the best conceptual instruments for sorting objects into real kinds, in the case of artefacts we seems to be perfectly happy with a classification directly drawn from common terminology like "pen" and "clock". We seem to forget that artefacts are products of scientific research as well: that they rely on the different possible solutions to what we can call functional problems. Different solutions can give rise to different kinds of artefacts. There is, for artefacts as well as for natural objects, the aspect of a taxonomy based on a scientific technical approach and not simply on the loose common sense categorization.

3. Epistemological argument

The following statement is illustrative of the reasons provided in favour of (N) in epistemological arguments:

> Members of nominal kind do not share a common hidden nature, and we can give an analytic specification in terms of form and function of what it is to be a member of the nominal kind. One reason for distinguishing nominal kinds is that they do not support inductions in the following sense: the fact that several examined chairs are upholstered, say, does not support the claim that all the chairs are upholstered. The fact that several chairs are wooden does not support the claim that all the chairs are wooden and so on. In fact if a scientist were interested in chairs as a subject of scientific study and got himself a good specimen and started to examine it closely in order to discover the nature of chairs, we would think that he was crazy. (Schwartz 1980, p. 189).

The main reason here adduced for (N) is that artefact kinds do not support induction. As Schwartz put it, we cannot infer any truth about other chairs (*qua* chairs) from the observation of some exemplars. This thesis seems to have two corollaries:

(a)   The only acceptable inductions on artefact kinds are those founded on the nature of the material composing the artefacts, so it is the natural kind that corresponds to the material supporting the induction and not the artefact kind.

(b)   There is nothing new to discover about artefact kinds. That is to say, no new law-like generalizations are possible.

It is important to bear in mind that the epistemological argument – as well as the semantic argument given below – is aimed at proving the metaphysical thesis according to which there is no common nature for objects that fall under the same artefact kind. So the argument would take the following form:

(E)
(i)   If a kind is a real kind, it can be trusted for induction;
(ii)   artefact kinds cannot be trusted for induction;
(iii)   artefact kinds are not real kinds.

Under the assumption that kinds are either real or nominal, it follows that artefact kinds are nominal kinds.

3.1. Criticism

I will address the following two questions concerning the epistemic argument: in what respect is (ii) true if it is true at all? Can it really be taken to show that artefact kinds are not real kinds?

At face value (ii) seems to be convincing, but I maintain that its intuitive appeal is misleading and merely due to the examples chosen for supporting it. We all agree that it is not possible to infer that all chairs are made of wood simply from the fact that some chairs are made of wood. Schwartz claims that in general we do not trust categories such as *chair*, *computer* or *telephone* in terms of universal induction because we know that the objects that fall into such categories do not share a common structure.

Perhaps the intuitive appeal of Schwartz's example lies in the particular properties and categories mentioned. Let us first consider the following examples: we would never take the quality white-skinned to be a projectable property of the kind *human being*; we would never presume, taking the tiger as the basis for our induction, that all mammals have stripes. *Human beings* and *mammals* are kinds of a higher level with respect to those upon which *being white* and *having stripes* can be projected. In much the same way, the examples concerning artefacts could be misleading because the material of which a chair is made or other details of its structure could be mere incidental properties with respect to the nature of chairs. A classical position in the literature is to take the nature of artefacts and allow that to coincide with their function. Indeed, it is a stance that Schwartz seems to adopt. If we accept such a thesis, it is not surprising that a property such as *being constituted of wood* cannot be projected onto such categories. What these examples therefore prove is that either induction of artefact kinds is generally not possible or that the strategy of characterizing artefacts through such a generic functional description (by, for instance, stating that a chair is an object that has the function of being used for sitting upon) is not the right strategy.

A further possibility is to accept a generic functional characterization for artefact kinds but deny that such physical properties can be projected onto such kinds. We may need to seek different projectable features. Speaking on purely intuitive grounds, it seems possible, for example, to project the minimal physical requirements for an object to function as a chair: such as having a structure that allows human beings to maintain a certain posture and having certain dimensions and certain proportions in its component parts. Naturally this strategy has to face the problem of

the relation between the function and physical structure of an object. Nonetheless, promising as it is, this strategy may fail for another reason. Artefact kinds also support malfunctioning statements which implies, as is widely conceded, that the function attributions involved in the sorting of artefacts have to be normative attributions. In other words, even if the function of pens is to write, there might be pens that cannot be successfully used for that purpose.

Concerning (a) we all agree on the impossibility of inferring from the fact that some chairs are made of wood that all chairs must be made of wood. But it seems possible to draw conclusions about more restricted kinds, such as *wooden chairs*. For example, we can infer from the fact that a wooden chair burns in certain conditions that all wooden chairs will burn in the same conditions. Indeed this does not seem to be an induction concerning the kind *wooden chair*. The fact that a wooden chair burns in certain conditions seems rather to be directly deduced from what we know in general about the properties of wood and all wooden objects. So the real induction seems to be supported by the natural kind *wood* and not by the artefact kind *wooden chair*.

If all the possible inductions on artefact kinds can be rewritten as deductions from the properties of the materials they are made of, then there are no properties that can be exclusively attributed to chairs as such or to wood as such. This seems to be plainly false. We frequently seem to accept inductions for structural properties on artefacts that have the same source of design and also inductions of functional properties on artefacts that have the same structure. Obviously the structural properties of an object cannot depend exclusively on the materials of which it is composed whilst functional properties[10] depend on the material in question as well as on the structural properties. For example, the fact that the chair I am sitting on at this moment is able to hold my weight, partly depends on the properties of its materials and partly on its structure. The belief that all objects that have a structure similar to that of a certain chair can hold the same weight and the belief that all objects intentionally produced according to the same design can also support the same weight seems sufficiently warranted.

It may be that the whole idea behind this thesis is that once we know what materials an object is made of and once we know its structure, we can then explain all the physical and functional properties of the whole artefact. All the relevant properties of artefacts, including their functional properties, do not emerge with their structural and material properties which means that they do not give rise to a new ontological level. The reducibility of artefact properties to their materials and structure leads to the thesis that artefacts are indeed ontologically superfluous. The argument thus takes on the form of an application of Ockham's Razor principle on the basis of epistemological considerations.

As far as the metaphysical argument is concerned it cannot establish a difference between artefacts and natural kinds that would support the thesis that the latter but not the former are real kinds. Even in the case of many of the biological functions characterizing biological entities – that of pumping blood, for example – it is possible to explain them on the basis of their structural and material properties.

Ultimately I think that it is possible to claim that there are properties that play a major role in artefact classifications into kinds but are not so easily reducible, namely normative functions. A major feature of the notion of *artefact* adopted here is that there is something that artefacts of certain kinds are expected to perform, that is their normative function or the use to which they are put.

Many different criteria can be adopted to account for these notions and we can roughly divide them into two different groups: those confirming the existence of a selective history for artefacts and those that pertain to human intentions. In both cases it is clear that a straightforward reduction of the kind described above is not possible.

Concerning (b), the idea is that with existing artefacts there is nothing new to be discovered. Yet tests may actually have to be done on artefacts to verify their behaviour in particular circumstances and often new unpredicted properties will be discovered in the process. A simple knowledge of the properties of materials and their structure does not provide us with a suitable epistemic basis to deduce all the properties of artefacts.

4. Semantic argument

By "semantic argument" I mean all those arguments that set out to demonstrate (N) on the basis of claims about the semantics of general artefact terms. The idea is that while terms for natural kinds "refer" according to the direct theory of reference, artefacts terms do not, and this is taken to be a clear indication of the nominal nature of artefact kinds.

According to a specific version of realism, one of the main metaphysical points of the direct theory of reference is that it can accommodate the fact that general terms for natural kinds continue to refer to the same kinds of natural entities, even if our knowledge and conception of them radically changes in the light of new scientific achievements. We need natural kind terms to refer, according to this theory, so as to guarantee that reference to kind terms remains the same despite possible radical changes in our conceptions.

We can depict a naively standard process of improvement of our knowledge and classification of the things existing in the outside world. At the beginning they are only collected because of a certain similarity in their exterior and superficial qualities. Then, through more precise and experimental examinations of their inner structure, we improve our knowledge by discovering the common causes responsible for their separate similarity, that is to say, by discovering the common nature of objects classified as being objects of the same kind. Of course, things are not always so straightforward, and our initial categorization can be completely misleading as we can collect objects that appear similar but are of a completely different nature. The discovery of such differences leads to a rearrangement and improvement of our classification which is such that the boundaries of our kinds match those of real kinds.

I shall distinguish two main theses concerning the semantics and the use of natural kind terms which are taken as prototypical examples of real kind terms:

> (A)   The reference to a natural kind term is not determined through a description that specifies the meaning of that same term.
> (B)   The use of natural kind terms presupposes the existence of an underlying nature that makes something the kind of object that it is.

Artefact kind terms satisfy neither (A) nor (B). Here there are three theses that seem to come together: the thesis of the direct theory of reference for real kind terms, that of the common inner structure of objects belonging to the same real kind, and that of the necessity of scientific inquiry if new knowledge is to be acquired on the nature of these objects. The fact that the real nature of a thing does not depend on our conventions implies that we have to get to know it through study and inquiry. In this case a direct theory of reference guarantees that throughout all these inquiries

the reference of the term we use remains constant. If artefact kind terms do not function according to a direct theory of reference we will not need such continuity because we do not need any inquiry into the nature of artefacts. We already know all that there is to know about artefacts because their nature depends on our own decisions.

To provide an argument for the metaphysical thesis we not only need to say that artefact kinds do not refer, according to a direct theory of reference, but that they inherently do not do that. Otherwise, either we admit that it is possible to have artefact kinds that are real kinds, or we have to admit that the semantics of general kind terms is not a reliable indication of the metaphysical status of the corresponding kind. The first conclusion seems to be absurd: the fact that artefact kinds are not real kinds seems to be a necessary truth, if indeed it is a truth at all. The second option would be self-defeating for antirealists using the semantic argument. Hence the thesis that artefact kind terms do not actually refer according to a direct theory of reference but rather according to a descriptive theory of reference which is not sufficiently strong to show that artefact kinds are not real kinds. I will try to show that it is false to maintain that artefact kind terms necessarily refer according to a descriptive theory of reference. The point is that if the analysis given at the beginning of the paragraph is correct, the semantic behaviour of artefact terms will seem sensible within the context of our epistemic position with regard to artefact kinds.

4.1. Criticism

It is commonly held that once we have a description that enables us to select a certain class of artefacts, for example "objects used for drinking, normally made of a sufficiently light material and in a shape and dimension that allows us to handle them", namely glasses, we do not question the inner structure or real nature of these objects and we do not try to advance our knowledge on such objects. That is to say, we do not need artefact kind terms to function in the way that natural terms do. The reason for that, it is argued, is because there is not an inner structure or real nature to discover. Nonetheless, it is not clear if the reason why artefact kind terms normally behave like abbreviations of descriptions is metaphysical at all. More precisely, is not clear if this depends either on the nature of artefacts or on the status of our knowledge at the time of introduction of new artefact kind terms.

Schematically, the structure of the argument is as follows:

(S)
(i)   Natural kinds are prototypical examples of real kinds.
(ii)   In order to give an account of the improvement of our knowledge of natural kinds we need a direct theory of reference for natural kind terms.
(iii)   In order to give an account of the knowledge of artefact kinds we do not need a direct theory of reference for artefact kind terms.
(iv)   Artefact kinds are not real kinds.

There are general terms such as 'bachelor' or 'widow' that are traditionally taken to refer, in line with a descriptive theory of reference. A bachelor is simply any human adult male who is not married, a widow is any human female whose husband is dead. There is nothing more or different to discover about bachelors and widows. We introduce these terms as abbreviations of certain descriptions which facilitate the formation of true analytic statements. According to some authors artefact terms are terms like 'bachelor' and 'widow', that is to say, they are used as abbreviations for descriptions. I will try to demonstrate that it is perfectly possible to conceive a use of artefact kind terms which remains analogous to the use of natural kind terms.

Let us consider the case of manufactured items from an ancient civilization which have been discovered in a grave. There is no doubt about the fact that these are artefacts. Archaeologists do not have any idea about the possible function of these objects, but by observing their physical structure and on the basis of information derived from other civilizations they conclude that the objects were used for medical ends. They are more or less oval, one inch square, flat, thin, made of metal and have a blade on one side. It becomes a thesis that is accepted by the entire community of competent archaeologists and historians. These objects are named 'glabre'. Now we have a new term for artefact kinds and, according to the previous theory, we are supposed to use 'glabre' as an abbreviation for the description of the function and at least some of the main features relating to the objects found. Years pass and some new graves are discovered in the same area. New glabres emerge from these graves, along with some written documents. From these documents it becomes apparent that these objects do not have the function previously attributed to them and also that there are many different types of glabres. For example, they can be devices used for sacrifice in certain ceremonies and they can be of different shapes and dimensions. What would archaeologists conclude in such a case? That glabres do not exist? Or that glabres have a different function to that previously supposed? Would they not say that they had been wrong about the glabre? It is unlikely that archaeologists would collectively conclude that glabres do not exist, instead they would probably announce that they have discovered what glabres really are, what was their real function and what are their typical features.[11]

It would be possible, if the previous theory were right, for 'glabre' to start functioning as an abbreviation of a description but the glabre would almost certainly not have behaved in such a way in the circumstances described in the example. What is clear is that with respect to glabres archaeologists will have found themselves in the same epistemic situation that we were once in with respect to gold.[12] What is thus clear is that what determines whether 'glabre' behave according to a direct theory of reference or not are epistemic more than metaphysical facts. The semantic behaviour of 'glabre' does not depend on the nature of the glabres but on the initial state of ignorance of the archaeologists.[13] We could say that we normally know in conjunction with artefacts precisely what we do not know about natural objects, that is to say, we know about their inner structure, their common nature, what makes them the kind of artefacts they are.

Let us now compare water and polyethylene. We know that the molecular structure of water is H_2O but 'water' is not an abbreviation for 'substance with the molecular structure H_2O' because we could just as well have discovered that the molecular structure of water was XYZ. Putnam called this "epistemic possibility". Given our initial knowledge about water it could have turned out that water has a completely different molecular structure had we perhaps been ignorant about its molecular structure. Where artificial substances such as polyethylene are concerned – granted that we know from the beginning everything that is essential to its chemical structure – it seems that we lack the same type of epistemic possibility we possess for water. Nonetheless, I cannot see how this difference between water and polyethylene could depend on the nature of these substances rather than the difference between our epistemic position with respect to them. I am sure that no chemist would draw the line between real chemical kinds and nominal chemical kinds and I can see no metaphysical reason to substantiate such a claim.

5. Conclusion

The epistemological and semantic arguments do not seem to be real autonomous arguments. They tend rather to be used by antirealists as tools for persuasion, persuasions that I have claimed can be misleading. Only by distinguishing them from the main metaphysical argument, can one fully

reveal their weaknesses. The metaphysical argument is thus ultimately presumed to carry the burden of the distinction between real natural kinds and nominal artefact kinds but it is not able to individuate the criteria for a clear-cut difference between the two. I think the conclusion ought to be that the distinction between artefacts as intentionally-produced objects and natural entities as non intentionally-made objects is metaphysically irrelevant with respect to the realist versus the antirealist debate on artefacts, while all the other attempts considered here that have aimed at providing an alternative and relevant way of distinguishing between artefacts and natural entities fail.

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Endnotes

1   This position is only acceptable if we assume a certain privileged position for entities such as minds, thoughts, language and persons. Such an assumption may be problematic for realism but this is ignored in the arguments provided for this contribution.
2   From now on 'antirealist' will be used to refer to those authors and theories that endorse (N). I take (N) to be equivalent to the thesis that artefact kinds are nominal kinds.
3   This definition corresponds to the definition offered by Dipert (1993) and Hilpinen (1992; 1993).
4   Aristotle's position with regard to artefact substances is controversial. For a detailed examination see Katayama (1999). There are other important metaphysical arguments that I do not take into account here: for example van Inwagen's (1990) argument dealing with problems of composition and Merrick's (2001) argument dealing with problems of causal supervenience. They are based on general approaches that are not sensitive to the natural/artefact distinction nor to the problems of kinds.
5   It is sufficient to consider the well-known technique of nuclear transfer in cells, widely used in cloning experiments, that involves taking the nucleus out of an unfertilised egg and replacing it with one from an adult cell.
6   Wiggins (2001, p. 81) quotes Leibniz *On Nature Itself, or on the Inherent Force and Actions of Created Things*, (translated by Loemker (1969)).
7   Aristotle Physics Book II, Wiggins (2001, p. 81).
8   The idea that non-identification of the two halves forces us to deny the identity of the resultant plants seems to rely on essentialism concerning origin. That is to say, two object are identical if and only if they originate exactly under the same conditions. Obviously we could question such a thesis and claim that even if the two halves are not identified we would still have the same plant. It is clear that in both cases the argument holds and so I am not concerned about the choice of the right position to be endorsed on this point.

9   This thesis is defended, for example, by van Inwagen (1990) on the basis of mereological arguments but I think that the belief that only objects involved in the process of life can create new objects combined with the ideas surrounding activity and internal change adopted here by Wiggins, have more in common than one might at first sight think.

10   When referring to functional properties I do not use a normative notion of function, but a dispositional one that we might call capacity.

11   A similar example is discussed by Kornblith (1980).

12   The same point is made by Thomasson when she discusses the semantic and epistemic dependence relative to a social group. "But one must be cautious, for properly speaking, the issue of what epistemic relation or theory of reference is appropriate for a given kind is relative not only to the kind, K, of entities, but also to a certain group, G, of people" (2003, pp. 583).

13   A similar point of view is defended by Elder (1989) but he adopts the inverse strategy. He tries to show that it is possible to conceive of terms such as 'gold' that behave according to a descriptive theory but do simultaneously refer to real natural kinds such as a kind of gold.