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Putnam's View on Reference Change Is Different from That of Kripke's

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ABSTRACT: A usual objection put forward against the causal theory of reference is that it cannot explain the reference changes that terms may undergo. The main aim of this paper is to examine the position on reference change of one of the classic supporters of the causal theory, Hilary Putnam. It is usually claimed that Putnam's causal theory of reference of natural kind terms is closely related to Kripke's theory and can be conceived as a development of the same. The motivation of this paper is to allege that there is at least one important difference between both theories, consisting of their explanation of reference changes or at least in the way in which those theories make reference changes possible. After dealing with the problem of reference change within the framework of Kripke's theory and reconstructing Kripke's proposal to account for it, we will allege that there are components of Putnam's theory which make reference changes possible, although they are different from those present in Kripke's theory.

KEYWORDS: Causal theory – change – natural kind term – physical magnitude – reference.

1. Reference change in Kripke's theory

One of the objections usually put forward against the causal theory of reference is that it does not enable the explanation of the reference changes that our

terms can experience.[1] The aim of this section is to present the problem of reference change and to reconstruct Kripke's position in that respect. However, for this problem to be adequately dealt with, it is appropriate to present Kripke's theory of the reference fixing of proper names and natural kind terms.

According to Kripke's theory (see Kripke 1980), a term – proper name or natural kind term – is introduced in an *initial baptism* in which its reference is fixed by ostension or description, although Kripke concedes the possibility of subsuming the ostensive introduction under the descriptive introduction (Kripke 1980, 97). The terms are transmitted by the introducers of the term to other speakers, thus establishing *causal chains*, although for a speaker to be a link of a chain[2] it is required that, when he learns the term, he *intends* to use it with the *same reference* as it was used by the speakers from whom he learnt it. However, since the reference of a term is fixed in an initial baptism and its reference is, in principle, maintained *constant* in its transmission through causal chains, it does not seem likely that the reference of a term may change.

At this point, the question arises as to whether the causal theory of reference, in Kripke's version, could explain the changes of reference that our terms have undergone or may undergo or, at least, whether it would make such changes possible.

It is noteworthy that Kripke himself accepted that proper names are subject to *changes of reference* admitting that the same can happen with natural kind terms. In order to illustrate the changes of reference that proper names may undergo we can resort to one of the most famous examples, that of the name "Madagascar" presented by Evans in his criticism of causal theories of reference and especially of Kripke's theory (see Evans 1973, 11). It was also taken

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1 This objection has been presented by different authors; two of the first ones to put it in writing were G. Evans and A. Fine; see Evans (1973) and Fine (1975).

2 Kripke often expresses himself as if the links of a causal chain were speakers themselves (see, e.g., Kripke 1980, 91), instead of uses of terms by speakers, but the causal connections in a chain take place between uses of terms. For this reason, it would be more appropriate to regard uses of terms as the links of the chain. However, for simplicity's sake, and as I have already begun to do, I will often make use of the first, briefer, way of exposition. In this case, a speaker becomes a link of a causal chain when he firstly uses the term that he has acquired from its use by other speakers, under the assumption that the requirement concerning the intention of the speaker who learns a term is fulfilled, as indicated in the continuation of the sentence in the body text to which this footnote is appended.

into consideration by Kripke in section (e) of the Addenda of his (1980), initially published in 1972.[3] The example of the change of reference undergone by the name "Madagascar" can be exposed in the following way. At the beginning the name "Madagascar" (in the strict sense, presumably a name from which it has derived) was used by native speakers to designate a part of mainland Africa. Let us suppose that this entity was the one involved at the initial baptism of the name and thus at its reference fixing. However, Marco Polo, who learnt that name from speakers who used it with such designation, misunderstood those speakers, and though he intended to use the name "Madagascar" to refer to the *same* entity to which they referred, he came to use it to refer to the island to which we presently refer by this name. In this example Marco Polo fulfils the condition required by Kripke in (1980) for a speaker to become a member of the same causal chain to which the speakers from whom he learns the name belong. This condition is that the speaker in question, when he learns the term, *intends* to use it with the same reference as it was used by those speakers. Precisely in the aforementioned example it is assumed that Marco Polo had such *intention*, but this does not prevent Marco Polo from using the name to refer to a *different* entity. Hence, Kripke's theory would not provide *sufficient* conditions for the reference of proper names.

Kripke himself, alluding to the example presented by Gareth Evans, comes to recognize, in the mentioned section of his (1980)'s Addenda, the existence of reference changes and he proposes an explanation of them:

> Real reference can shift to another real reference, fictional reference can shift to real, and real to fictional. In all these cases, a present intention to refer to a given entity (or to refer fictionally) overrides the original intention to preserve reference in the historical chain of transmission. (Kripke 1980, 163) [4]

Thus, Kripke makes a proposal to explain reference changes, according to which those changes take place when the intention of a speaker to use a term (proper name or natural kind term) with the same reference as the speakers from whom he learnt it – the "original intention" – fails. This is due to the fact that a present intention to refer to a specific entity overrides the original one. After

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[3] Thus, Kripke should have known Evans's objection before Evans (1973) was published.

[4] As it happens in this passage, Kripke sometimes alludes to a causal chain as a "historical chain of transmission".

making this proposal to explain reference changes, Kripke admits that "[t]he matter deserves extended discussion" (Kripke 1980, 163).[5] In the same section (e) of the Addenda, after the quoted passage, Kripke outlines another proposal to explain reference changes, although he presents it as a supplement to the former one. In this regard he asserts that "we must distinguish a present intention to use a name for an object from a mere present belief that the object is the only one having a certain property, and clarify this distinction" (Kripke 1980, 163).

However, those proposals to explain reference changes are different and thus the second can hardly be considered as a supplement to the former. The former one is based on the distinction between a present intention and the original intention, in the sense already mentioned, while the second, on the distinction between a present intention and a present belief. After sketching this second proposal Kripke adds: "I leave the problem for further work" (Kripke 1980, 163). Nonetheless, he never developed the second proposal, and his main proposal seems to be the former one, since in further writings Kripke resorts to the distinction between two sorts of intentions to explain reference changes, although he does not use the notions of original and present intentions.

In Kripke (2013), which contains the revised transcription of *John Locke Lectures* delivered by Kripke in 1973, that is, one year after the first edition of "Naming and Necessity", he proposes an explanation of the reference change of the name "Madagascar" resorting to the distinction between semantic reference and speaker's reference. This distinction was already alluded to by Kripke in the first edition of "Naming and Necessity", published in 1972 (see Kripke 1980, 25, note 2) – without using explicitly the denomination of "speaker's reference" –,

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[5] However, given "the predominantly social character of the use of proper names" (Kripke 1980, 163), he sketches tentatively, also in the section (e) of the Addenda of (1980), a possible account for that proposal to explain reference changes, applicable in particular to the "Madagascar" case. This is the following. According to that social character, as a rule a speaker intends to use a name in the same way as it was used by the speakers from whom he learnt it – this intention corresponds to the original intention already mentioned –, but in the case of the name "Madagascar" that "social character dictates that the present intention to refer to an island overrides the distant link to native usage" (Kripke 1980, 163). Here we have also the distinction between two sorts of intentions, as it happens in the proposal corresponding to the quoted passage in the body text, and the difference between both passages seems to be mainly that in this second one it is emphasized the social character of the use of language as a reason for the difference of reference corresponding to the original intention and to a disagreeing present intention.

where he indicates that the notion of reference that he deals with in that writing is that of semantic reference. The explicit distinction between the two notions of reference mentioned is put forward in his contribution to Harman et al. (1974) and especially in Kripke (1977), where he outlines the proposal contained in his (2013) to explain reference changes, which is the following.

The *semantic referent* of a term (without indexicals) is determined by linguistic conventions and hence, in the case of a proper name, the referent is the object that by virtue of those conventions becomes the bearer of the name. The semantic referent of a term, as used by a speaker, is given by the *general intention* of the speaker to refer to the object that is the referent of the term according to the linguistic conventions. The *speaker's referent* of a term is given by a *specific intention* of a speaker, on a particular occasion, to refer by means of the term to an object, which can be different from the semantic referent of the term. In general, the speaker believes that said object is the semantic referent of the term, but this belief can be mistaken. Thus, the speaker's referent of a term can be an object different from its semantic referent. Leaving aside the end notes of Kripke (1977), he finishes this paper with the following words:

> I find it plausible that a diachronic account of the evolution of language is likely to suggest that what was originally a mere speaker's reference may, if it becomes habitual in a community, evolve into a semantic reference. And this consideration may be *one* of the factors needed to clear up some puzzles in the theory of reference. (Kripke 1977, 271)

Although Kripke does not indicate in that passage which other factors could be required to solve those puzzles, one of the puzzles mentioned by Kripke in the end notes to that paper is that of the reference change of the name "Madagascar" (see Kripke 1977, 276, n. 39). In fact, in Kripke (2013) his proposal to explain such reference change is that the use of "Madagascar" by Marco Polo to refer to an island was a case of speaker's reference, which eventually has become the semantic reference of the name. Thus, Marco Polo could be regarded as an initial baptizer of the referent of the name "Madagascar" as we use it at present (see Kripke 2013, p.137, n. 4), in which case we are members of the causal chain beginning with that baptism.[6]

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[6] This is a slightly different sort of initial baptism from the one considered by Kripke in (1980), according to which that baptism involves the *first* use of the name in which the reference of the name is fixed, ostensively or descriptively. According

Let us summarize some of our considerations: Kripke recognizes in the Addenda of his (1980) that there is no guarantee that the reference of proper names and of natural kind terms remain invariable throughout the flow of history. One of the conditions that appeared to imply the invariability of the reference through causal chains is that the speaker intends to use the term that he acquires with the same reference it had in its use by the speakers from whom he learnt it. The fulfilment of this condition however, does not guarantee that the reference of the term in its use by the new speaker should be the same as the one in its use by previous speakers. Thus, Kripke's reference theory enables the reference changes that our terms may go through; furthermore he has put forward a proposal to explain such changes, based on the distinction between semantic reference and speaker's reference.[7]

2. Reference change in Putnam's theory

Putnam is also one of the advocates of the causal theory of reference, although his theory does not focus on proper names but only on natural kind terms. The aim of this section is to examine whether Putnam's reference theory makes reference changes possible. Our answer will be affirmative, although Putnam does not resort to the distinction between semantic reference and speaker's reference, as Kripke did.

In order to deal with Putnam's theory, it is convenient to divide natural kind terms into two groups. First, those through whose usage we refer – or, at least, we propose to refer – to non-observable entities, such as the terms "hydrogen"

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to the remark just mentioned from Kripke (2013) we can also speak of an initial baptism when the reference of a term is fixed to a different object from the one referred to by the term in the past and that introduction of the term originates a different casual chain.

[7] Kripke claims that proper names and natural kind terms are rigid designators, and Putnam also maintains that natural kind terms have that feature. A term is a rigid designator if it refers to the same entity with respect to all possible worlds or at least with respect to all possible worlds where the referred entity exists. However, rigidity does not conflict with reference changes, since these changes do not exclude that the term in its former use rigidly designates the entity that was its referent and that in the later use it rigidly designates the entity that has come to refer to.

or "oxygen" and physical magnitude terms like "electricity".[8] Second, those that designate observable entities, like the terms "water" and "gold". For the sake of brevity, we will allude to the first ones as "theoretical terms" and to the entities referred by them, i.e., belonging to their extension as "theoretical entities", while we shall refer to the second ones as "observational terms" and to the entities belonging to their extension as "observational entities". Although the concept of observability is historically relative, as it is therefore the division in question, such division can prove useful to our aim.

2.1. The reference of theoretical terms

Putnam's first considerations concerning the reference change of theoretical terms are contained in Putnam (1962), where he maintained that "*the reference of theoretical terms is preserved across most theory change*" (Putnam 2015, 21), thus rejecting the thesis of referential incommensurability, according to which theory changes involve changes of reference in the central terms common to respective (successive or competing) theories or, for short, theory changes involve reference changes. In that article, Putnam conceives theoretical terms as law-cluster concepts, i.e., concepts whose identity is determined by a cluster of laws (where the notion of law is understood in a broad sense) in such a way that the rejection of one of those laws does not affect the identity of the concept. Even if we abandon one important law of the cluster he claims that "the meaning has not changed enough to affect 'what we are talking about'" (Putnam 1962, 53). In this regard, Putnam puts the example of the term "kinetic energy" in Newtonian mechanics and in Einsteinian physics, where in the latter the law $e=1/2mv^2$ (the Newtonian definition of kinetic energy) is replaced by a more complicated law (cf. Putnam 1962, 44). However, we will leave aside Putnam's (1962) view, since he is not explicit about under which circumstances there could be a change in the reference (and meaning) of a theoretical term. We shall focus on his view of theoretical terms, mainly of physical magnitudes, in Putnam (1973), where he appeals to a specific procedure of introducing theoretical terms and fixing their reference.

Since we postulate the existence of theoretical entities to explain certain observable events, it is plausible to assume that in order to fix the reference of theoretical terms we need to look at the observable events involved. In fact, Putnam

[8] Putnam includes physical magnitude terms into natural kind terms (see, e.g., Putnam 1983, 71).

claims that the reference of theoretical terms is determined by means of *causal descriptions*, more precisely, of descriptions in which the referent of a theoretical term is characterized as the entity that causally produces certain observable effects.[9]

This is the framework for Putnam's explanation of the reference of physical magnitude terms, concerning which he says:

> This account stresses causal descriptions because physical magnitudes are invariably discovered through their effects, and so the natural way to first single out a physical magnitude is as the magnitude responsible for certain effects. (Putnam 1973, 202)

In this passage, Putnam appeals to the introducing events, similar to the initial baptisms in Kripke's theory, in which the reference of physical magnitude terms is "first" determined. In any case, Putnam maintains certain theses which supplement – or are a consequence of – their proposal concerning the determination of the reference of theoretical terms. One of them is that the reference or extension of theoretical terms does not – generally – shift by changes in the theories to which the terms belong. The plausibility of this thesis is linked to the proposal about how the reference of theoretical terms is determined, that is, through *causal descriptions*.

The form adopted by causal descriptions used to fix the reference of theoretical terms is, according to Putnam, the following:

> the reference of T = the entity responsible for certain effects O (in a certain way)

The instances of this schema would be obtained by substituting the name of a theoretical term for "T"[10] and, for "O", some statement which describes

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[9] Besides this primary sense of the notion of causal description, Putnam admits what we can regard as a secondary sense of this notion (see Putnam 1973, 202), according to which causal descriptions are those which in spite of not being causal in the strict sense, determine the reference of a term with the help of other terms whose reference has been fixed through causal descriptions. Nevertheless, in the following we will confine ourselves to the primary sense of the notion of causal description.

[10] Depending on the sort of theoretical entity designated by the term "T", instead of the generic term "entity", a more specific general term, such as "magnitude", "kind", "particle", etc. could appear in the description in question.

observable effects caused by the entity designated by the theoretical term[11] – supposing that the term substituted for "T" has reference.

However, Putnam does not require that the descriptions in question are correct, but only that they are approximately correct. Taking as example the term "electricity", he requires that in the "*introducing event*" of the term "electricity" be given an "*approximately correct definite description* of […] [that] physical magnitude" (Putnam 1973, 200; his emphasis); this is required to fix the reference of the term "electricity" – and to acquire the ability to use that term.[12] Thus, Putnam's view of the reference fixing of physical magnitude terms and of natural kind terms in general involve descriptive components.

Now, returning to the form of the causal descriptions used to fix the reference of theoretical terms, it is noteworthy that in the causal description that constitutes the right member of that identity no explicit indication appears regarding the properties of the entity that causes such observable effects. It should be assumed that the reason for such restriction in the causal description's content consists precisely in avoiding that the referent of the description in question, and hence of the corresponding theoretical term, should be modified by changes in our theories.

In order to prevent the content of causal descriptions being influenced by our theories concerning the entities (supposedly) designated by such descriptions, Putnam makes the following assertion. In case someone appeals in the causal description of an entity – in addition to the observable effects produced by it – to certain properties the entity lacks, we could be justified in claiming that the description in question – instead of not describing anything, and hence not having reference – describes, though wrongly, the entity in question. Moreover, according to Putnam we could be justified in claiming that the reference of the theoretical term as – wrongly – characterized by such description and as

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[11] In the specification of the form of the causal descriptions I have inserted the phrase "in a certain way" between parentheses because, though Putnam includes those words in the statement of the form adopted by such descriptions, exemplified with the term "electricity" (cf. Putnam 1973, 200), in another passage (see Putnam 1973, 201) he does not take into consideration the way in which electricity causes the observable effects in question and pays attention exclusively to such effects. The same happens in the quoted passage above corresponding to Putnam (1973, 202; and 1975c, 274).

[12] However, although Putnam accepts that descriptions are used to fix the reference of terms, he would reject that those descriptions are synonymous with the terms (see Putnam 2015, 35 and 104, n. 62).

– rightly – characterized by other description is the same (cf. Putnam 1973, 201).

Putnam justifies such claims appealing to a methodological principle of interpretative charity which he calls *The Principle of Benefit of Doubt*, whose aim is to preserve the reference across theory change. This principle stipulates that when an expert, i.e., *par excellence* a scientist introduces a term through a description, we have to concede him the benefit of doubt, assuming that he "would accept reasonable modifications of his description" (Putnam 1975c, 275). One of the aims of this principle is to question the thesis of the incommensurability of theories in its referential version, i.e., the thesis that theory changes involve reference changes. This thesis, at least in some of its main versions, is based on a version of the descriptivist theory of reference according to which the reference of the central terms of theories is determined by the principles of the theories in which they appear. As a result of this, to the extent that successive or competing theories contain different and even incompatible principles and hence associate different descriptions or properties with such terms, the reference of the terms in question will be different.[13] In order to neutralize the above thesis, it should be held that the reference of the central terms of our theories is not determined in the way mentioned. Or even partially accepting this way of determining the reference – by means of descriptions, although probably not with such scarce content as the causal descriptions proposed by Putnam – it should be alleged that in many cases reasonable modifications of the descriptions associated with terms by earlier theories make them equivalent to descriptions corresponding to later theories and more specifically to present prevailing theories. As already said, it is only required that the former descriptions be approximately correct.

However, since the modifications or reformulations in question have to be carried out according to the theories dominant in each historical period, it is presumable that through the application of the Principle of Benefit of Doubt it can be sustained that the reference of terms common to former theories and to present prevailing theories is the same. In this regard, the resulting problem is that the notion of *reasonable* modification or reformulation is not liable to a precise

[13] The cases in which different descriptions determine the same referent will be presumably isolated cases. Of course, the identity of reference is excluded if the descriptions in question are incompatible, because they are based on laws or principles with such character.

analysis and furthermore it is difficult to establish, perhaps with the exception of certain limit cases, when the reformulation of a description and hence the application itself of the Principle of Benefit of Doubt is reasonable or non-reasonable. One kind of examples in which the reformulation of a description could be reasonable is that in which the description in question, belonging to a former theory, is from the point of view of a present prevailing theory approximately correct, as it happens, according to Putnam, with the description of the electron by Bohr (see Putnam 1975c, 275).[14] However, in judgements of that sort, in which adopting our present theories the descriptions belonging to former theories are evaluated as *approximately* correct, the notion of reasonability is being implicitly resorted to.

Nevertheless, there will be cases in which the reformulation will not be so reasonable, as, for instance, in the following case:

> What in the years 1880 Stoney baptized as 'electron' was not at all an elementary particle, but the minimal quantity (non-corporeal) of electricity that is transported in the electrolysis […] [and] the intersection of the extension of that concept with the extension of the present concept of electron is the empty set. (Moulines 1995, 222; my translation)

The modifications to be introduced in that description so as to assimilate it to the present descriptions associated with the term "electron" would be certainly drastic, and in this example the application of the Principle of Benefit of Doubt seems to be unreasonable. Examples like this support the thesis that there are cases in which theory changes are accompanied by reference changes.

Therefore, excepting certain cases that we can consider as *limit cases* – exemplified by the one mentioned by Putnam concerning Bohr's conception of the electron and the one pointed out by Moulines – the reasonable or unreasonable character of the application of the Principle of Benefit of Doubt is de-

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[14] When Putnam comes to justify this assertion he gives the utmost importance to the fact that such as electrons are conceived at present they are considered responsible for the main effects that Bohr attributed to the entities satisfying his description of electron, but Putnam points out too that in the description of electron by Bohr it was also resorted to the fact that the electrons had a determinate mass and a determinate charge, which coincide with the ones assigned at present. Therefore, Putnam should concede that the description of electron formulated by Bohr possesses more content than the one gathered in the form of the causal descriptions he proposes.

batable. Furthermore, Putnam qualifies that when the experts who have introduced or introduce a term by means of a description intend this to be taken literally, it is not possible to attribute to them a *reasonable* doubt (Putnam 1975c, 275). But this qualification raises an additional problem, since concerning earlier experts we do not know in many cases what their intentions were or, more precisely and using Putnam's words quoted above, whether they "would accept reasonable modifications" of their descriptions and therefore whether we should concede them the benefit of doubt. Thus, it will be the present experts who will have to decide on the reasonability of the application of the Principle of Benefit of Doubt to descriptions formulated by earlier experts, in many cases, without counting on evidence concerning what their intentions were. And here a debate may arise between the advocates of referential incommensurability and their opponents, and therein the Principle of Benefit of Doubt can be of little help, since the question has to do precisely with the reasonability of its application to particular cases. As a rule, there will be no cases where both contenders agree, except perhaps for the ones corresponding to those like the two above-mentioned limit cases.

According to the preceding considerations, and as far as *theoretical terms* are concerned, there will be theory changes regarding which Putnam could accept that there have been – or could have been – *reference changes*. These cases will be, on the one hand, those in which the descriptions associated with a term by experts advocating dissimilar theories are very different and hence the application of the Principle of Benefit of Doubt becomes unreasonable. On the other hand, those in which the descriptions associated with a term by experts who sustain dissimilar theories are different and these experts intend – or there is a clear evidence that they intend or intended – that such descriptions would have to be taken literally, without any modifications in that regard.

2.2. The reference of observational terms

At this point, it is advisable to take into account the natural kind terms we have denominated "observational terms", i.e., those that refer to observable entities, since the reference change that observational terms could undergo will support the reference change that theoretical terms are capable of – as we have pointed out, the reference of theoretical terms is determined on the basis of its observable effects. Thus, the question can be posed as to whether Putnam's reference theory enables the reference changes that observational terms have, or

could have, undergone. In this respect, we would concentrate our considerations on the natural kind term "water" – a prototypical observational natural kind term – though *not* in its ordinary use, but only in its use in chemistry.

On this matter, according to Putnam's theory of (observational) natural kind terms put forward in Putnam (1975b), the reference or extension of a natural kind term such as "water" is fixed by the relation of kind-identity with paradigmatic samples of the kind. This identity will be constituted by underlying properties shared by such samples – i.e., by their internal structure. In this regard, it is generally assumed that the delimitation of the paradigmatic samples of a natural kind, which in principle will take place through properties concerning their external appearance, is not problematic. Furthermore, it is supposed that such delimitation, as well as the relation of kind-identity is independent of our theories concerning the kind. In this way, neither the paradigmatic samples of a kind nor the relation of kind-identity would be affected by changes in our theories about the kind.

Although in my view both claims could be questioned I will focus only on the second one – see however note 17 concerning the first claim. In this regard, it can be argued that the relation of kind-identity will depend, partly, on the *metascientific* conceptions of the experts regarding the notion of kind-identity. This will be contained in their theories on the natural kind in question, on account of which changes in those conceptions *could* bring about changes in the extension of the corresponding natural kind term.

In order to illustrate this assertion, it is suitable to resort to a historical example presented by Kuhn concerning the use of the term "water" in chemistry (see Kuhn 1989 and 1990).

According to present chemistry, water is a natural kind whose chemical composition is H_2O and can be in solid, liquid or gaseous state. Therefore, the extension of the term "water" consists of samples whose chemical composition is H_2O, independently of their being in solid, liquid or gaseous state. However, Kuhn points out that this was not so according to the chemical theory prevailing around 1750. Kuhn asserts that at that time, that is, before the "Chemical Revolution", to different states of aggregation – that is, to the solid, liquid and gaseous states – there corresponded different chemical kinds. A chemical kind could *only* be in one of those states, and in the way water was conceived in 1750, an *essential* property of water consisted, according to Kuhn, in being a liquid. Therefore, the reference of the term "water" as this term was used in the chemistry of 1750 would not be determined in the language of present science simply by H_2O, but

by H_2O *in liquid state*. Given this fact, Kuhn concludes – and I would conclude with him[15] – that the extension of the term "water" as it was used in the chemistry of 1750 and as it is used at present is *different*. According to the metascientific conception of the notion of kind-identity prevailing in the chemistry of 1750, a piece of ice and a sample of water in liquid state would be instances of *different* kinds, and hence they would not be in the kind-identity relation,[16] although they are in such a relation according to the conception of kind-identity prevailing in present-day chemistry.[17]

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[15] At least if we leave aside the possible application to this case of the Principle of Benefit of Doubt.

[16] As already said, according to Putnam's theory put forward in (1975b), the reference of a natural kind term like "water" is determined by the internal structure of paradigmatic samples of the kind, and in the case of water he identifies it with its molecular composition, i.e., H_2O. In this regard a referee made the remark that according to Putnam's view it could be claimed that around 1750, or even before that year, the term "water" was properly applicable by speakers at that time to anything with the molecular structure H_2O, not only in liquid, but also in solid or gaseous state. He added that this is the best thing we can do, from *our* present point of view, to respect *their* referential intention connected with *their* use of the term "water". Although this point is well taken, I disagree, since even if we could travel back in time and demonstrate to the scientists of that era that a drop of water and a cube of ice shared internal structure, according to their referential intention connected with their use of the term "water", it is an essential property of water to be a liquid; thus a drop of water and a cube of ice would be distinct substances. Concerning the claim that, even according to Putnam (though in his post 1970s writings), the views on kind-identity play a role in the reference of natural kind terms, see Putnam's passage corresponding to note 18. On the other hand, I would allege that the best way to understand the history of science is not to impose on it our present point of view, although it is something Putnam does in (1975b), specially in the case of the natural kind term "gold" (see Putnam 1975b, 235 ff.).

[17] Concerning the paradigmatic members of a kind it has to be stressed that in these considerations we are taking into account only the use of natural kind terms in science. If the "introducer" of a natural kind term needn't be the first person who introduced the term, but can be someone else, though it has to be an expert, the possibility has to be left open that different experts – or, if preferred, different "relevant experts", as Putnam said in Putnam (1975c, 287, n. 1) – carry out different introductions of the term and give rise to different chains of transmission of the term. In these introductions the experts will appeal to paradigmatic members of the kind. But it could be alleged that their delimitation

Nevertheless, we do not intend to make use here of Kuhn's authority as a historian of science. If someone were to question the historical veracity of Kuhn's example, we would ask him to carry out a thought experiment in which he imagined that in about 1750 a scientific community had proposed such a theory of water, of course not as a mere stipulation. In that case, it seems reasonable to assert that in its use of the term "water", the extension of this term would be partially different from that corresponding to the use in present-day chemistry.

We can summarize a part of our preceding considerations as follows. According to Putnam's reference theory, the reference of a natural kind term is fixed *by* the relation of kind-identity with paradigmatic objects of the kind, but in the use of such terms in *science* the paradigmatic objects in question will be those involved in uses of the terms by experts. Furthermore, the relation of kind-identity will depend, partly, on the metascientific conceptions of experts about the notion of kind-identity, which will be implicitly contained in such theories, if it is not explicitly incorporated into them. Therefore, modifications in our *theories* can bring about *changes of reference*. And a later and more consistent pluralist Putnam than the one of some of his writings of the 70's would possibly assent to the foregoing considerations; in his own words, "different descriptions of the 'nature' of a natural kind should lead to not quite coextensive criteria for membership in the kind" (Putnam 1993, 77).[18]

The conclusion to be drawn is that the reference of natural kind terms is determined by the relation of kind-identity with paradigmatic members of the kind and hence by the properties constituting that relation and, at the linguistic level,

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of the paradigmatic members, which will have to possess the internal structure of the members of the kind which constitutes the relation of kind-identity, could be influenced, at least in part, by their view of kind-identity included in their *theories*. On account of this, a change of theory *could* bring about changes in the delimitation of the paradigmatic members of the kind and ultimately changes of reference, although these changes will not be as a rule drastic, since otherwise the experts who support successive or competing theories would be talking about different things.

[18] In this regard, it is noteworthy that Putnam asserts that the relation of species-identity sustained by an evolutionary biologist and by a molecular biologist is different, which will cause that the corresponding criteria for membership into a species will not be completely coextensive (see Putnam 1994, 75 ff.).

by the corresponding descriptions, as well as by the theories in which they appear, and hence changes in them *can* bring about changes in the reference of natural kind terms.[19,20]

References

EVANS, G. (1973): The Causal Theory of Names. *Proceedings of the Aristotelian Society* 47, Supplementary Volume; reprinted in: Evans, E. (1985): *Collected Papers*. Oxford: Clarendon Press, 1-24.

FINE, A. (1975): How to Compare Theories: Reference and Change. *Noûs* 9, 17-32.

HARMAN, G. et al. (1974): Second General Discussion Session. *Synthese* 27, 509-521.

KRIPKE, S. (1977): Speaker's Reference and Semantic Reference. In: French, P.A. et al. (eds.): *Contemporary Perspectives in the Philosophy of Language. Midwest Studies in Philosophy*, II. Minneapolis: University of Minnesota Press, 255-276.

KRIPKE, S. (1980): *Naming and Necessity*. Oxford: Blackwell. (Revised and expanded edition; first published in Davidson, D. and Harmann, G. (eds.) (1972): *Semantics of Natural Language*. Dordrecht: Reidel).

KRIPKE, S. (2013): *Reference and Existence*. Oxford: Oxford University Press.

KUHN, T. S. (1989): Possible Worlds in History of Science. In: Allén, S. (ed.): *Possible Worlds in Humanities, Arts, and Sciences*. Berlin: Walter de Gruyter, 9-32.

KUHN, T. S. (1990): Dubbing and Redubbing: The Vulnerability of Rigid Designation. In: Savage, C. W. (ed.): *Scientific Theories. Minnesota Studies in the Philosophy of Science*, vol. 14. Minneapolis: University of Minnesota Press, 298-318.

MOULINES, U. (1995): Realismos e instrumentalismos. *Theoria* 10, 217-224.

PUTNAM, H. (1962): The Analytic and the Synthetic. In: Feigl, H. and Maxwell, G. (eds.): *Minnesota Studies in the Philosophy of Science*, vol. III. Reprinted in: Putnam, H. (1975a): *Mind, Language and Reality. Philosophical Papers*, Vol. 2, Cambridge: Cambridge University Press, 33-69.

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19 Nevertheless, it is appropriate to emphasize that the above conclusion does not entail, as already indicated, that scientists who maintain successive or competing theories are speaking about quite different things. Let us bear in mind that, in general, there will be a significant overlapping in the extension of the terms in the way they are used by supporters of such theories and it is this common part of the extension which will serve as a basis, at least to start with, for the comparison and choice of theories.

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PUTNAM, H. (1973): Explanation and Reference. In: Pearce, G. and Maynard, P. (eds.): *Conceptual Change*. Dordrecht: Reidel. Reprinted in: Putnam, H. (1975a): *Mind, Language and Reality*. *Philosophical Papers*, Vol. 2, Cambridge: Cambridge University Press, 196-214.

PUTNAM, H. (1975a): *Mind, Language and Reality*. *Philosophical Papers*, Vol. 2, Cambridge: Cambridge University Press.

PUTNAM, H. (1975b): The Meaning of 'Meaning'. In: Gunderson, K. (ed.): *Language, Mind and Knowledge. Minnesota Studies in the Philosophy of Science*, vol. 7. Minneapolis: University of Minnesota Press. Reprinted in: Putnam, H. (1975a): *Mind, Language and Reality*. *Philosophical Papers*, Vol. 2. Cambridge: Cambridge University Press, 215-271.

PUTNAM, H. (1975c): Language and Reality. In: Putnam, H. (1975a): *Mind, Language and Reality*. *Philosophical Papers*, Vol. 2. Cambridge: Cambridge University Press, 272-290.

PUTNAM, H. (1983): *Realism and Reason*. *Philosophical Papers*, Vol. 3. Cambridge: Cambridge University Press.

PUTNAM, H. (1994): *Words and Life*. (Edited and with introduction by J. Conant). Cambridge (Mass.): Harvard University Press.

PUTNAM, H. (2015): Intellectual Autobiography of Hilary Putnam. In: Auxier, R. E., Anderson, D. R. and Hahn, L. E. (eds.): *The Philosophy of Hilary Putnam*. Chicago: Open Court, 1-110.