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*An Exploration Into How A Natural Kind Term's Reference is
Determined*

Författare: Emma Linnea Campodonico 881213

Handledare: Martin Jönsson

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1. Introduction

We usually refer to things in nature (tigers, flowers and water, to name a few) by the use of certain general terms. These terms are called natural kind terms. According to the Stanford Encyclopedia of Philosophy, natural kinds are those that are grouped or ordered in a way that does not depend on humans. The question that this essay will focus on is how a natural kind term's reference is determined. Hilary Putnam and Saul Kripke both reject the traditional descriptivist theory of meaning and reference for natural kind terms according to which the meaning of a natural kind term is identical to a description associated with the natural kind. From a descriptivist point of view, the reference of a natural kind term is therefore all samples that satisfy the description we associate with the natural kind. Instead, Putnam and Kripke hold that a natural kind term's reference is part of the meaning of the term, a relation external to the mind. Thus, many have called their respective theories of reference and meaning 'the Putnam-Kripke theory'; something I am eager to avoid due to some important differences between their theories. Distinguishing the two theories is something I believe to be crucial in order to correctly analyze them. I will mostly discuss Putnam's theory as he has a much more complete picture with regards to natural kinds. Various interpretations of Putnam's theory of reference will be discussed and analyzed throughout this essay. From one point of view, we can regard Putnam's theory as decisive in the sense that what determines a natural kind term's reference is partly the shared hidden structure among all the samples of that natural kind. This, I shall argue, has some bitter consequences that are more applicable to Kripke's theory. From another point of view, Putnam's theory can be seen as "interest-relative" in nature, suggesting that it is not always a natural kind's hidden structure that partly determines the term's reference. From the latter point of view, Putnam's theory of reference can account for complicated cases that the former cannot.

This essay will begin with an overview of the descriptivist theory, followed by Putnam's own position, based on his most famous article "The Meaning of 'Meaning'". Next, I will discuss Kripke's theory of reference and will attempt to show how his theory differs from Putnam's. As the reader will sense later on in my essay, I am fairly convinced that Kripke's theory is exposed to a lot of inescapable consequences that makes his theory very fragile. The remaining parts of my essay will be spent discussing various interpretations of Putnam and Kripke's theories, the philosophers' own proposals and my own evaluation of each proposal.

2. Background

2.1 A Descriptivist Theory of Meaning and Reference

The descriptivist theory of meaning and reference holds that we, the speakers, associate certain descriptions to kind terms and that these descriptions determine the reference of the term.

The meaning of the natural kind term, 'lemon' for example, could be the sense that is captured from the following descriptions, "yellow citrus fruit, oval shape, juice, zest", and the cluster of these descriptions would determine the reference, that being to all things associated with these descriptions.

There are two main assumptions originating from the traditional view for meaning and reference:

1. Psychological states determine meaning (a narrow psychological state in the sense that it doesn't presuppose the existence of other minds, thus is solely dependent on the individual's psychological state).¹ The meaning of the term is a cluster of properties, a cluster that is a concept in the mind.
2. The meaning of a term determines the term's extension. The cluster of properties that define the term determines the extension of the term.

2.2 Hilary Putnam

Putnam in his article "The Meaning of 'Meaning'", did not agree with the descriptivist theory of meaning according to which meaning of a natural kind term (i.e. terms that refer to things found in nature like water, tigers, lemons) is a certain psychological state. Furthermore, the two assumptions mentioned above are inconsistent. (Putnam, 1975 p. 136) If both assumptions are right, we have to agree that if two people are in the exact same psychological state when uttering the same word, the extension has to be the same. Putnam shows us that sameness in psychological state does not imply sameness in reference (this will be discussed in more detail later). In other words, being in a certain psychological state does not determine the reference of a kind term. Instead, natural kind terms must get their meanings fixed from a source external to the mind and to language. One of Putnam's most famous quotes, "cut the pie any way you like, "meaning" just ain't in the head", captures his position in a nutshell. (Putnam, 1975 p. 144)

¹ Henceforth 'psychological states'

2.3 Putnam's Twin Earth Argument

Now, let us return to the idea that psychological states determine the meaning of a natural kind term. This is where Putnam's famous Twin Earth thought experiments comes into play. Let us imagine a Twin Earth somewhere in a distant galaxy. Everything is completely identical to that of Earth in that there exists a duplicate you and a duplicate me, and a duplicate everyone else. Nature on Twin Earth is completely identical to that of Earth's nature. Actually, everything is the same on Twin Earth except for one thing. Twin Earth's water has a different composition to our water. "Water" on Twin Earth has a different extension to that of Earth. When twin Oscar utters "water", he is not referring to H₂O water. This is what suggests a difference in meaning. However, Twin Oscar and Oscar are in the exact same psychological state, since they are completely identical. However, twin water is not the substance that Oscar has a causal history with.² Twin water lacks a sameness relation to our water, lacking the chemical composition of our water. Our water refers to the water found on Earth, consisting of H₂O, whereas Twin Earth's water refers to the liquid consisting of XYZ. This is the case even if the psychological states are completely identical. Putnam concludes that the extension of a natural kind term is not determined by a psychological state (Putnam, 1975 p. 139) we can divide the term 'water' into four values of a vector (what the meaning of the term consists of):

World	Syntactic Marker	Semantic Marker	Stereotype	Extension
Earth	Mass Noun	Natural kind Liquid	Colorless, tasteless, transparent	H ₂ O
Twin Earth	Mass Noun	Natural kind Liquid	Colorless, tasteless, transparent	XYZ

This is a slightly modified version of Putnam's table in "The Meaning of 'Meaning'", and is used to demonstrate how everything can be identical on Earth and Twin Earth, except for the extension of the term. (Putnam, 1975 p. 191) Hence, the 'hidden structure' of Earth water is different from Twin Earth water. Since their extension differs, their meaning differs also. In the

² He has noted that he received the idea of a causal chain/history between the kind term and the kind from Kripke, "Kripke's work has come to me second hand; even so, I owe him a large debt for suggesting the idea of causal chains as the mechanism of reference." (Putnam 1975, p. 198)

philosophy of language, such a theory is a version of semantic externalism with regards to meaning and mental content.

3. Two Theories of Reference

3.1 Hilary Putnam's Theory of Reference

Now that we have established the position that psychological states don't determine the extension of a natural kind term, we shall divert our attention to Putnam's theory of reference. In Putnam's view, it is not an individual that determines the reference of a natural kind term. Rather, it is a social cooperation in a **linguistic community** that determines the reference. As Putnam puts it, "it is only the sociolinguistic state of the collective linguistic body to which the speaker belongs that fixes the extension". (Putnam, 1975 p. 146) The social cooperation takes place through a **division of linguistic labor**. Experts in their respective fields usually determine the reference based on scientific investigations. "The ways of recognizing by these experts is also, through them, possessed by the collective linguistic body, even though it is not possessed by the individual member of the body" (Putnam, 1975 p. 145.) The other members can then use the term to refer as the term is passed on from the experts through an **historical causal chain**. In order to understand Putnam's theory of reference, we also need to understand the relation between a sample and the total extension of a natural kind term. In other words, how are we able to refer to the whole extension with a natural kind term if we have only had contact with a small portion of the total extension? This relation will be discussed further in the sections below.

3.1.1 Indexicality

According to Putnam, a natural kind term's reference can be determined through acts of ostension. Ostensive definitions take place when someone points to a sample of a natural kind and utter "this is water". We presuppose that the sample of water we point to bears a sameness relation to the kind of "stuff" our linguistic community call "water". Putnam recognizes that we can mistakenly point to something we believe to be water, but that we later discover not to be water. Thus, Putnam points out that ostensive definitions are "defeasible". (Putnam, 1975 p. 142) The sameness relation of "this stuff" can either be the 'hidden structure' or other identifying properties shared among the samples of the natural kind. The sameness relation

(same L) will usually be studied and decided by the experts that study the natural kinds in question.³

3.1.2 Experts

According to Putnam, experts in their respective fields can determine the reference of a natural kind term. Experts have the authority to decide what criteria to use when they determine the sameness relation (same L). This, obviously, depends on the scientific field. Once the reference has been determined in this manner, the term is passed through in the linguistic community. A dendrologist would know and understand the difference between an elm tree and a beech tree, whereas the normal speaker would not necessarily know the difference, yet we can borrow the term from a dendrologist to refer to the same thing. My concept of an elm tree and a beech tree are indistinguishable, just like Putnam's, yet I use "beech tree" to refer to a beech tree. It is not required that all members of the linguistic community can distinguish between an elm tree and a beech tree. If we return to Putnam's "division of labor", we can liken it to a wood-factory whereby some people have to make the distinction between two types of wood, and others have the role of building furniture out of the wood. The point I want to make is that our linguistic community is set up similar to a division of labor at a factory.⁴ I am not expected to understand the properties of an elm tree in order to refer to the same tree as a dendrologist. If I would be in doubt of whether a sample was a beech tree or an elm tree, I would most likely turn to an expert for assistance. Nonetheless, this is not to say that experts can't be wrong about the sameness relation (same L). Even if the experts would be wrong, we would still refer to the same natural kind because of the shared 'hidden structure' among the samples of the natural kind.

3.1.3 Hidden Structure

According to Putnam, natural kinds have a "hidden structure", and natural kind terms that are partly determined in this manner would then refer to only those samples that share this particular structure (Putnam, 1975, p. p. 153) As we've come to realize from Putnam's thought experiment, something can look like our water without sharing the 'hidden structure' with our water. Water samples share properties on a micro-level (the 'hidden structure'), this is what distinguishes look-a-like water from actual water. This hidden structure is then partly what determines what it is to be a member of the natural kind 'water'. The shared 'hidden structure'

³ The sameness relation (same L) will be discussed further in the upcoming sections.

⁴ This idea derives from Putnam's "gold factory" example. (Putnam, 1975 p. 144)

isn't just applicable in our actual world, but in all possible worlds.⁵ The structure is the 'stuff' that we cannot presuppose counterfactually about the natural kind. In other words, we can't talk of a possible world where our water doesn't consist of H₂O. However, the term "water" can mean something different in another possible world, but water in our world is necessarily H₂O.

3.2 An Interest-Relative Notion

What does 'same L' mean? According to Putnam, x bears a sameness relation to y just in case (as in the case of water):

- 1.) x and y are both liquids
- 2.) x and y agree in important physical properties

As we have come to realize, Putnam believes that the important properties are usually of structural importance. But this is interest-relative. In other words, what counts as important depends on our interests. Putnam imagines a situation where we discover "tigers" on Mars. These "tigers" are identical to our tigers in appearance but are made up of a silicone-based structure. Whether Martian tigers would be referents of our natural kind term 'tiger' would depend on the context. (Putnam, 1975 p. 158) Thus, it is not a necessary condition that samples of a natural kind share a 'hidden structure'. In the case of "jade", for example, Putnam states that it is not the 'hidden structure' that determines the term's reference. In fact, 'jade' refers to two different minerals, jadeite and nephrite that obviously consist of different internal structures. The reason for them sharing the same natural kind term is because they "produce the same unique textural qualities". (Putnam, 1975, p. 160) Sometimes, according to Putnam, there are just too many 'hidden structures' that they become irrelevant and the physical properties become the important ones.

3.3 Saul Kripke's Theory of Reference

Kripke and Putnam agree on many areas with regards to meaning and reference. Kripke accepts the idea that the reference of natural kind terms is not determined by descriptions or defining properties. Kripke explores Kant's idea that properties such as 'being yellow' is part of the concept of 'gold', that 'being yellow' is held a priori of that kind. That we cannot discover the statement 'gold is yellow' to be empirically false and that we should know this a priori. This is something Kripke does not regard as a necessary condition for being a member of the kind 'gold'. (Kripke, 1981, pp. 117) He refutes this by demonstrating an example whereby we

⁵ Putnam isn't too involved with modality and he prefers to focus on our actual world. The only time it seems relevant is when he talks about 'hidden structures', and that H₂O is the hidden structure of water, thus "nothing counts as a possible world in which water isn't H₂O". (Putnam, 1975 p. 151)

discover that it has only been an optical illusion that gold is yellow. (Kripke, 1981, pp. 118) Instead of concluding that gold does not exist, we would say that gold had only appeared to be yellow. Even if the property of ‘being yellow’ was wrong, the term ‘gold’ still refers to gold because it refers to a “certain kind of thing”. There might exist something that has all of the identifying properties of gold but is, in fact, not gold. Kripke uses his ‘gold-iron pyrite’ example to demonstrate such a case. According to Kripke, iron pyrite shares most of the identifying properties with gold. The evident difference between gold and iron pyrite are their respective essences. Gold consists of atomic number 79, whereas iron pyrite does not. This suggests that natural kinds can share almost identical identifying properties with other natural kinds even if they are different substances. This is because gold is necessarily composed of atomic number 79. Thus, Kripke refutes the so-called ‘cluster-concept’ according to which a cluster of properties determines a term’s reference. What is shown is that the descriptions of natural kind terms found in dictionaries do not necessarily have to denote only that particular kind being described. (Kripke, 1981, pp.120) To put it differently, the description of a natural kind is not synonymous with the natural kind. Once the natural kind term has been introduced, other speakers can use the natural kind term because of a causal historical chain being established. In other words, the term is passed on from speaker to speaker, going back to the initial introduction of the natural kind. Thus, Kripke’s theory of reference is very much about a causal chain for both natural kind terms and proper names. This enables a speaker to refer to a natural kind even if he/she has had no direct contact with the kind. The speaker doesn’t have any true beliefs about the natural kind in order to refer to the natural kind. A speaker must, however, intend to refer to the same natural kind when using the natural kind term in order to be part of the causal chain. (Kripke, 1981, pp. 96)

3.4 A Mistaken View

Even though many philosophers have called their respective theories of reference and meaning the “Putnam-Kripke View”, philosophers like Ian Hacking and Åsa Wikforss consider this interpretation to be a mistake. Hacking states that the ‘Putnam-Kripke View’ is mostly based on Kripke’s proposals. Even if Kripke didn’t “spell out an exact theory” for names of natural kinds, he came up with the idea that natural kinds have essences, something that Putnam didn’t advocate in a strict sense. (Hacking, 2010, p. 4) As previously mentioned, Kripke came up with the causal historical theory for reference according to which a natural kind term is passed from one person to another, creating a link between the natural kind and the speaker using the term. This enables us to use natural kind terms like “gold” even if we have never had any direct

contact with gold. In contrast, Putnam calls his theory of reference “the social co-operation plus contribution of the environment theory of the specification of reference”. (Hacking, 2010, p. 8) It is easy to understand why it is such a common error to regard their respective views as one shared theory of reference and meaning. As already mentioned, Kripke and Putnam both hold that samples don't have to share physical properties to be the referents of a natural kind term. A cluster of properties is not a necessary and sufficient condition for a sample to fall under the natural kind term. What is evident is that the theories were motivated by an eagerness to depart from the traditional view. Nonetheless, their desires arose from different practices. Putnam had a background in philosophy of science and wanted to focus on general terms, whereas Kripke was much more concerned with singular terms and had a background in modal logic.

Another noteworthy difference is that Putnam focuses on what the relation of being the same actually means. He answers the question by suggesting that the sameness relation is due to two samples sharing the same physical properties (even if this needn't be the case) and consisting of the same “stuff”. However, Putnam also implies that it is all interest-relative. This is precisely what Kripke despises, according to Hacking. There is now a clear distinction between what Kripke and Putnam are postulating in this regard. Kripke speaks of essences, something that is decisive in nature, whereas Putnam speaks of “hidden structures” and “essential nature” in a more loose sense. From Kripke's point of view, the statement ‘cats are animals’ is necessary. If we found out that what we thought were cats were in fact robots from Mars, it seems enticing to say that what we thought were animals were in fact just robots. But Kripke holds that cats are necessarily animals. Thus, these robot-cats are not cats. Putnam, on the other hand, held (most of the time) that the statement ‘cats are animals’ is ‘less necessary’ than statements like ‘bachelors are unmarried. (Hacking, 2010, p. 6) So from Putnam's point of view, if cats turned out to be robots, the term could still refer to the robot-cats. Kripke's conclusion stems from a metaphysical necessity, something Putnam rejects.

Putnam has previously accepted the notion of possible worlds and necessity in “The Meaning of ‘Meaning’” (something that is very Kripkean in nature). “Once we have discovered that water in our actual world is H₂O, nothing counts as a possible world in which water isn't H₂O”. But, Wikforss says, if water is necessarily H₂O, then Putnam seems to be accepting an element of metaphysical necessity, something that he actually doesn't support. (Wikforss, 2013 p.251) Even if Wikforss has a valid point, one cannot help but to turn to Hacking's interesting remark regarding Putnam's theory; all sections that talk of possible worlds could be erased without

changing his theory of reference or meaning. (Hacking, 2010, p. 16) Obviously, Kripke's theory of meaning and reference would change dramatically without this component.

4. Discussions

4.1 The Qua Problem

The 'Qua Problem' is a problem for a causal theory of reference, something brought into light by Michael Devitt and Kim Sterelny in 'Language and Reality: An Introduction to the Philosophy of Language'. The idea is that when a natural kind term's reference is determined through a purely causal relation, we are not supposed to apply any associated description to it. To put it differently, the introducer of a natural kind term needn't have any true beliefs about that natural kind in order to determine the reference of the term. This causes problems because the sample we are in causal contact with can refer to many different natural kinds. For example, if I am introducing the natural kind term 'tiger', I should know something about tigers so that not all other mammals also fall under the natural kind term 'tiger'. What this implies is that we must know something about what kind we intend to refer to before we can determine the term's reference. In other words, a certain nature of the sample needs to be evident for the application of the natural kind term to be successful. If the sample fails to have this particular nature, the natural kind term will fail to have its reference determined. According to Devitt and Sterelny, such an activity is mental, thus suggesting that a causal theory of reference needs to have a descriptive component in order to survive this consequence.

According to Kyle Stanford and Philip Kitcher in 'Refining the causal theory of reference for natural kind terms', it seems unlikely that reference is fixed through only a causal relation. For example, I should intend for the sample of a tiger I am in direct contact with to fall under the natural kind term 'tiger'. In order for this to be possible, I must have some idea about what the samples need to share in order to fall under the term 'tiger'. This is, again, something brought into light by Devitt and Sterelny. Stanford and Kitcher have named Devitt and Sterelny's theory CTR1: the idea that the speaker knows something about the intended natural kind when fixing the term. If the description that the introducer applies to the samples that fall under the term is wrong, the term will fail to refer. (Stanford and Kitcher, 2000 pp. 101-102)

But, if we generally associate a certain description (e.g. 'yellow') with the natural kind 'gold', what happens if that description is challenged? If we were to discover a green substance with

atomic number 79 (same as gold), wouldn't the natural kind term 'gold' fail to refer to this sample? Or would we have to say that it turns out that not all gold is yellow? If being yellow is part of the description of the term, this substance wouldn't qualify as being gold. This would be the case because we would have to conclude, based on CTR1, that the sample would lack a property that the internal structure is supposed to produce, namely being yellow. Stanford and Kitcher explore the following principle for a causal theory of reference:

"P". If an inner constitution XYZ causes properties PQR in some sample or range of samples, then, whenever something has inner constitution XYZ, the same effect must obtain, in particular, the presence of XYZ must produce PQR. (Stanford and Kitcher, p.105)

'P' implies that what fixes a reference are all the features that are causally relevant to the production of the properties of a sample. This is a principle that CTR1 has to accept. This is because CTR1 states that there are features that need to be evident in order for a sample to fall under a natural kind term. Issues arise here due to the very strong commitment of all the features always having to be present in order to be a part of a natural kind. Stanford and Kitcher use an example of a cigarette causing a fire and then point out that it is not the case that all cigarettes cause fires. Principle "P" has to be abandoned in order to save the causal theory. Sometimes only certain features of a natural kind are relevant for a term's reference to be determined.

According to Stanford and Kitcher, when we can give an explicit description of a natural kind's internal structure, we don't necessarily face 'the qua problem'. This enables the natural kind term to apply to only one natural kind. It is before such a description is possible that we are faced with difficulties of being able to pick out the relevant features. This is because we haven't picked out the relevant properties that fall under the term. Without this, we wouldn't understand in what ways the samples must agree in order to fall under the natural kind term.

Two solutions are proposed:

1. A sample can belong to infinitely many sets. In order to reduce it to only one relevant set we provide enough samples that share the structure and that doesn't share the structure, until we know precisely what it refers to. But can we really include all the wanted referents in this way? The natural kind term would then only pick out a subset of the total set. Stanford and Kitcher suggest that samples can't do the complete job on their own.

2. Another solution, proposed by Putnam, is the idea that there are some important properties that establish a sameness relation between samples, a relation that is responsible for the stereotypes. Stereotypes are generalized knowledge of the natural kind shared in our linguistic community. The problem here is that we can't be wrong about most of the stereotypes if we are to refer with a natural kind term. If we were to be wrong about the stereotype, we can't regard the structure that produces most of the stereotypes as the one that we wanted originally, since it isn't relevant to the natural kind. If we change our minds and say that the term refers to samples that don't have the stereotypes, the usage of the natural kind term would have changed. (Stanford and Kitcher, p.111) To escape this consequence, Devitt and Sterelny suggest that no stereotype is required in order to be a member of a natural kind.

Stanford and Kitcher propose a modified version of a causal theory of reference:

CTR2: "the term refers to the set of those things having the inner constitution that is a common constituent in the total causes of the presence of each of the properties in each of the samples, and that is absent from all of the foils".

CTR2 says that the samples mustn't possess all the properties in order to fall under the natural kind term. An inner structure can, in their view, produce different properties, depending on the 'background conditions'. The observable properties don't have to play the vital role in determining the reference of a natural kind term. As long as the linguistic community is aware of some property, and are able to detect it somehow, any property can be part of reference-fixing. In the case of gold, for example, a speaker would be interested in the internal structure of the samples (that being atomic number 79), as it is just this structure that produces all the properties of the samples belonging to the natural kind gold. However, when someone introduces a new natural kind term, they are making "stab in the dark". In other words, they base the criteria on some regularity of observable properties and conclude that there is some "inner structure" shared among the samples. (Stanford and Kitcher, p.114) Their speculation could be wrong, but if it's right, the term's reference will be determined.

CTR2, in Stanford and Kinsley's view, can do better than Putnam and Kripke's theory of reference. They bring up the case of the natural kind term 'chimpanzee' and ask what this

term actually refers to, as well how the term's reference was determined? Biologists don't necessarily focus on their inner structure, like their cells for example. They tend to use different criteria to restrict natural kind terms to 'organisms like that'. (Stanford and Kitcher, p.121). Two things, they believe, should be kept in mind with regard to descriptions' role with fixing the reference of a term.

1. Some descriptions do not pick out an inner structure when they fix the reference. As we learned previously, chimpanzees are not picked out by the term "chimpanzee" because of their DNA, or other internal structure.
2. A term can have its reference fixed in various ways. Some natural kind terms' references have been determined by a description, whereas others have has their reference determined in a CTR2 manner. (Stanford and Kitcher, p.124)

CTR2 is an important contributor for understanding natural kind terms in science. Kripke and Putnam's contributions have been "refined" to CTR2, however, Stanford and Kitcher do not think we should overemphasize the importance of some inner structure for a theory of reference. Some are simply just descriptions that are not related to some inner structure. When an ostensive definition isn't available, descriptions are the alternative for determining a natural kind term's reference. The kind of description used will vary depending on the context.

I agree with Stanford and Kitcher in that sometimes the 'hidden structure' is irrelevant to reference. The experts (as Putnam himself accepts) determine a term's reference and pass it on to other members of the linguistic community through a causal chain of communication. But when they pick out natural kinds, they don't necessarily have to find an underlying structure that is shared among the members of the natural kind. This suggests that experts can use other criteria when determining a natural kind term's reference. How reference is determined might be relative to the natural kind in question and the scientific field that studies it. So in one sense, we are faced with difficulties with Putnam's theory of reference as 'hidden structure' and the division of labor can conflict with one another. What would happen if, lets say, two natural kind terms shared an almost identical 'hidden structure' but differ in external properties? Humans' hidden structure might be said to be almost identical to a chimpanzee's, but the external appearance is obviously different. A zoologist might therefore take into consideration the behaviors and the appearances of a chimpanzee as the criteria for the term's extension. But if the hidden structure is almost identical to that of a human's, the extension of the term 'chimpanzee' could include humans as well. It has been said that humans and chimpanzees share 98.5% of their DNA. Stanford and Kitcher is right in my view for suggesting that natural

kind terms don't only have to have their reference fixed in virtue of an internal structure that is shared among the samples. In one sense Putnam's context-based ideas might be appropriate to save his theory of reference from Stanford and Kitcher's critique. It seems as though Putnam does, in one way, believe that each case is different. However, in another way he puts a lot of emphasis on the importance of natural kinds' 'hidden structures' for fixing a term's reference. This suggests to me that Stanford and Kitcher arguments against Putnam's theory of reference is valid from the latter perspective, but not from the former. In other words, if we regard Putnam's theory of reference as decisive in that what determines the reference is partly a 'hidden structure', we are faced with difficulties, as the hidden structure is not always the relevant criteria for determining a natural kind term's reference. But if we regard his theory as context-based, Putnam's theory won't be challenged due to each case being interest-relative. Thus, a shared 'hidden structure' is not always relevant for determining a natural kind term's reference.

However, it seems to me that if we know what the 'hidden structure' or the 'essence' is among the samples of a natural kind, 'the qua problem' won't be a consequence just like Stanford and Kitcher point out. But it is, just as they highlighted, not always the case that the 'hidden structure' or essence is what determines a natural kind term's reference. Sometimes, what determines a natural kind term's reference is simply some other property shared among the samples of a natural kind. Again, this is completely in line with Putnam's theory of reference in my view. In regards to Stanford and Kitcher's descriptivist component, if we accept that there must be a description that applies to all samples of the natural kind, wouldn't the description have to be synonymous with the natural kind? This is obviously problematic as it is too strong of a demand as we have already seen. All gold samples needn't have the property of being yellow. This is exactly the consequence that Kripke and Putnam want to avoid. So in one sense, Stanford and Kitcher's descriptivist component is faced with difficulties of its own. If chimpanzees have to live up to a description, what if a particular chimpanzee doesn't fit this description whatsoever with regards to its behavior etc.? Is this chimpanzee not a chimpanzee? I don't think that any field in science would conclude that because the chimpanzee doesn't fit a description, the term 'chimpanzee' fails to refer to this sample.

4.2 A Cluster Idea

In response to Putnam's claim that water is necessarily H₂O, Wikforss proposes in her article "Bachelors, Energy, Cats and Water: Putnam on Kind and Kind Terms", that we could instead

regard the term 'water' as a cluster concept⁶. This means that the cluster "liquid, H₂O, transparent etc" would determine the reference of the term 'water'. That the term 'water' refers to all the samples that have these properties. But if 'water' is just a cluster concept, we have a choice of revising the cluster of properties. If we have a choice of revising the cluster, the property 'being a natural kind' would not necessarily have to be a property in the cluster. If 'being a natural kind' is not a property in the cluster, we can also assume that there is not an essential property that holds everything together (H₂O in the case of water). The reason for this is because the definition of a natural kind is precisely that; an essential feature that holds everything together. According to Wikforss, David Lewis writes in his article "Reduction of Mind", "We are in a state of semantic indecision about whether it (XYZ) should be part of the extension of the term 'water'". (Wikforss, 2013, p.248) This means that the property 'H₂O' might not be a relevant property for the natural kind 'water'. If we accept this proposal, XYZ water would also be the extension of the term 'water'.

There are cases that show situations where a natural kind term refers to two separate kinds. We can either revise the assumption that the term only refers to one natural kind, or we can decide to leave the assumption as is. We had, for example, mistakenly been referring to two different minerals when using the term 'jade', thinking that 'jade' only referred to one kind of mineral. As I mentioned earlier, the term actually refers to nephrite and jadeite. Instead of revising the extension of the term 'jade' so that it only refers to one mineral, we decided to let it refer to both minerals. But this decision was not made at the outset. Wikforss believes that a theory that includes a cluster concept predicts such end-results. In other words, the cluster theory embraces the idea that there is a moment of indecision of what the term will refer to. We then decide to revise the assumption that there was one "underlying property" shared among the members of the natural kind jade. (Wikforss, 2013, p.249) Putnam, she writes, does not see his Twin Earth

⁶ An interesting thought with regards to Wikforss' cluster proposal is that it might be similar to Putnam's 'stereotypes'. Putnam's stereotypes can be seen as some generalized knowledge of the extension of a natural kind. As we saw in a table I presented earlier on in the paper, in order to acquire a natural kind term, one must have some generalized knowledge of the natural kind. But do they determine a term's reference? Stereotypes can be inaccurate but the term will still refer, in Putnam's view. This suggests that stereotypes do not determine a term's reference. However, from what I gathered from Wikforss' text, a cluster concept seems to imply that the cluster of properties determine a natural kind term's reference. The reference of a term would then be all the samples that have most of the cluster of properties. I think that this is an important difference to make explicit to avoid any confusion.

argument as a jade-case. Since Twin Earth water doesn't consist of H_2O , we would revise the assumption that there is water on Twin Earth. Instead of revising and accepting that the term 'water' referred to XYZ, we would conclude that XYZ water would not be the referent of our term 'water' since it consists of a chemical composition we have no historical interaction with. Kripke believes that when a reference has been fixed, the essence of the natural kind is what determines the extension across all possible worlds. Wikforss asks whether we are required to understand what this essence is before they can refer? We might fail to refer if we don't understand the 'microstructure'. Furthermore, it has been recognized by philosophers of chemistry, that this micro-level actually isn't "the same" in the sense that we thought. The microstructure varies between two samples of the same kind. So if we were eager to use an exact microstructure for natural kind terms, we would actually fail to refer.

I think that Putnam would not accept the cluster concept, as he postulates that water is necessarily H_2O , suggesting that there is not a possible world in which water is not H_2O even if there exists a liquid that shares most of the identifying properties with our water. However, it is important to mention that Putnam has changed his mind many times and that, in fact, Wikforss points out that he has mentioned a cluster concept in a different article he wrote the same year (1975), "Mind, Language and Reality", but that post-Twin Earth, has postulated that water is necessarily H_2O . (Wikforss, 2013, p.245) If we regard the term 'water' as a cluster of properties, we are faced with consequences of constantly revising the reference of the term. Before we knew of Twin Earth, we didn't know that XYZ water existed, but if we then discover XYZ water as we discover Twin Earth, we would decide that H_2O wasn't an essential property of water. Even if, like Lewis and Wikforss point out, we would be in a state of semantic indecision of whether the term referred to XYZ water, I believe we would conclude that 'water' would not refer to XYZ water. Just as Wikforss highlights, if we decide that water is not a natural kind, 'water' could very well refer to XYZ water. (Wikforss, 2013, p.249) But I think it is undoubtedly correct to say that water is a natural kind, hence, 'water' would fail to refer to XYZ water. However, where Putnam is validly challenged is in regards to the 'jade' scenario. 'Jade' refers to two minerals, thus, two natural kinds with different chemical compositions. The only difference there is between his Twin Earth argument and the 'jade' case is the fact that we have no historical interaction with XYZ water. Even if we mistakenly thought that 'jade' referred to one mineral, we had always had an historical interaction with the minerals. We have defined 'water' and 'jade' ostensively, and have implied that there is a sameness relation (same L) between the sample we pointed to and to other samples that fall under the same natural kind

term. Wikforss and Lewis are correct when implying that “there is room for semantic indecision” with regards to the concept of ‘same L’. This is perhaps why the ‘jade’ case is accepted. From one angle, Putnam suggests that it is the ‘important physical properties’ that determine the reference (à la jade), but from a different angle Putnam speaks of a hidden structure (à la Twin Earth). Again, suggesting that the way in which a natural kind term’s reference is determined is interest-relative.

4.3 A Peculiar Form of Descriptivism

According to Kuukkanen in “Kuhn on essentialism and the causal theory of reference”, Putnam’s theory of reference is faced with consequences because one essential property (H_2O) does not appear to be enough for ‘water’ to only refer to water. Kuukkanen implies that H_2O denotes not only water, but also ‘steam’ and ‘ice’. Perhaps having the property of ‘being a liquid’ needs to be fulfilled in order for something to be a member of the natural kind ‘water’. Kuhn says that “when two or more properties are needed ... each predicate denotes a larger class than the conjunction does”. (Kuukkanen, 2010, pp.559) Since H_2O also denotes ‘steam’ and ‘ice’, the members of the class ‘ H_2O ’ would be much greater than the class ‘ H_2O and liquid’. ‘The question is raised of how we will resolve the issue of determining the essential and contingent properties, since it appears as though more than just an essential property is needed in order to determine a term’s reference. This is precisely what the causal theory of reference wants to avoid. Thus, an essential property is not sufficient to determine the extension of a natural kind term.

Kuukkanen believes that Kuhn’s theory of reference is a worthy theory to consider even though it hasn’t been brought into too much light in the context of how a natural kind term’s reference is determined. Kuhn recognizes that reference is indeed fixed through ostension. However, according to Kuhn, it is not only the samples that should fall under the term that should be ostended, but members of other natural kinds as well. It is this direct contact with the samples that enable us to categorize the samples into kinds. The way this is accomplished is by categorizing based on similarities and dissimilarities. (Kuukkanen, 2010, pp.553) In Kuukkanen’s view, this method enables the boundaries to be sharp enough to limit what should fall under a natural kind term. The initial dubbing of a natural kind term needn’t any description of any sort as the contact is direct, rather, it is at a later stage the similarity-dissimilarity relations are relevant. It is through this similarity-dissimilarity categorization that we know what properties a natural kind can and cannot have. However, even if Kuukkanen regards

this as a “peculiar form of descriptivism”, the description does not have to be completely fulfilled in order for a sample to be a member of a natural kind. (Kuukkanen, 2010, pp.560) This is a consequence of the traditional descriptivist theory. Kuukkanen believes that Kuhn’s theory doesn’t face the difficulties other descriptivist theories have to deal with in regards to the demand that the description associated with the natural kind term must be synonymous with the natural kind term. This is because the properties are not necessarily true of all samples of a natural kind. For example, the natural kind ‘dog’ has many subkinds of various breeds with different identifying properties. Therefore, a description of properties should not function as a definition of natural kinds. (Kuukkanen, 2010, pp.151)

I think the critique of Putnam’s theory of reference is much more relevant to Kripke’s theory of reference. Firstly, as we have come to understand, Putnam doesn’t accept essentialism in a strict sense. This is, however, an important component of Kripke’s theory of reference. The intended sameness relation between samples of water will enable the natural kind term ‘water’ to refer to only water, and not ‘ice’ and ‘steam’. If I want to name a new natural kind ‘gosh’, and I point to a sample that should fall under the term, I am intending for the term to refer to samples with a certain sameness relation. What we later discover is that ‘gosh’ and ‘gold’ share the atomic number 79, the only difference is that ‘gosh’ is mist. When I say ‘gosh’ I am not intending to talk about ‘gold’ since the sameness relation is not there. It is interesting when considering the similarity-dissimilarity relation among samples. I agree with Kuhn that through enough encounters with samples and non-samples of natural kinds, the reference of the term will be “sharpened”. But how many acts of ostension of non-samples and samples will be needed in order to later understand the similarity-dissimilarity relation? It seems like an infinite task.

4.4 A Discussion About Essences and Hidden Structures

Hanoch Ben-Yami in “The Semantics of Kind Terms“ argues against Kripke and Putnam’s theories of meaning and reference of natural kind terms. Ben-Yami initially criticizes Kripke’s claim that something can possess all identifying properties of a natural kind term, without sharing the same meaning. This is achieved by first mentioning Kripke’s famous gold vs. iron pyrites example. This example shows us that even though iron pyrites resembles gold in that they share identifying properties, iron pyrite is not a member of the natural kind gold. The conclusion Ben-Yami draws is that we can indeed distinguish between the two metals; the identifying properties of gold are not completely shared with iron pyrite. Even if we made the

mistake of believing iron pyrite to be gold in the past, we have the ability to see how they differ with the naked eye.

Ben-Yami thinks that we are usually not completely aware of what the essences of natural kinds are, or how the essence should be determined. According to Ben-Yami, both Kripke and Putnam are talking of atomic and subatomic properties, something that he doesn't see as being appropriate for a linguistic theory. This is mainly due to the fact that a normal speaker of a language doesn't really know of the 'hidden structures' or essence, yet seems to refer to the same thing regardless. Another important point here is that it doesn't seem relevant for understanding the meaning of a term. In Ben-Yami's view, the meaning of a natural kind term in our ordinary language is not the same as in science. The famous "jade" example suggests that we continue to use the same word for two natural kinds, even when we are aware and informed of the scientific discovery that the word had been wrongly referring to two different natural kinds, when their intentions were only to refer to one natural kind. (Ben-Yami, 1999, p. 167) The way we normally use natural kind terms doesn't presuppose any underlying structure in order to give it meaning. Instead, Ben-Yami embraces the idea that "use determines meaning", and he attempts to prove this claim by highlighting the continued use of the term "jade".

Gabriele Contessa in "There are Kinds and Kinds of Kinds: Ben-Yami on the Semantics of Kind Terms", responds to these objections and suggests that Ben-Yami might have, at most, showed us that Putnam and Kripke's theories of reference have some weaknesses on a metaphysical level. Contessa criticizes Ben-Yami for confusing these metaphysical weaknesses with a theory of meaning and reference, and thus, misidentifying the problems. In response to Ben-Yami's critique of Kripke's claim that something can have all identifying properties without being a member of the natural kind, Contessa actually agrees with Ben-Yami when he points out the resemblance between iron pyrite and gold is small. This would not, however, mean that Kripke and Putnam are wrong in saying that something can have all the identifying properties of a natural kind without being a member of it. We might have, at some stage, thought that iron pyrite shared all identifying properties, but then at a later time learned that iron pyrite was not a member of the natural kind gold. The natural kind term 'iron pyrite' designates a different metal to that of 'gold' and consequently refers to the objects that share a sameness relation with other metals we call "iron pyrite". Again, Contessa is pointing out that the issues that arise are of a metaphysical nature. Contessa sees reference as usually being determined through ostension;

and embraces a Putnamian idea about a sameness relation between the sample and other samples that we refer to by the same natural kind term.

In response to Ben-Yami's critique through the jade example, Contessa sees the issue as a time matter; that we thought at a certain period of time that the word 'jade' referred to only one mineral but at a later time discovered it to refer to two minerals. Mineralogists do not refer to jadeite and nephrite when they use the word 'jade', even though non-experts continue to use it to refer to both minerals. This might suggest that, just as Putnam highlighted, experts are the ones that accurately use such terms, implying that the respective experts determine the natural kind term's reference. The reason why we can still refer to both, Contessa points out, is because jadeite and nephrite are sub-kinds of the natural kind 'jade'. In other words, we can still refer to both minerals with the term 'jade' because both jadeite and nephrite belong to the kind 'jade'.

As previously noted, Ben-Yami doesn't quite agree with Kripke and Putnam's view that some essential structure determines the members of a natural kind. This raises the issue of not knowing the reference of a natural kind term because we don't possess the knowledge of this essential structure. Contessa doesn't appear to see the real issue with this claim, when pointing and uttering "this is a tiger" for instance, we imply that there is a sameness relation with other animals we call "tigers". The reference is determined when we point to the sample of a natural kind and utter "this is a tiger". Just because we are unaware of the essential structure, doesn't result in our incapability of pointing out natural kinds. It is due to ostension that the natural kind term is secured to the intended natural kind.

Ben-Yami makes the mistake of suggesting that Kripke and Putnam's theories of reference and meaning are in fact one shared theory, something I have clarified as being a mistake earlier on in this paper. I have corrected this part in order to avoid confusion. In my view, I don't see Ben-Yami's critique as appropriate for Putnam's theory of reference. Putnam doesn't expect all normal speakers to know of the hidden structures. As I have previously highlighted, Putnam state that "the ways of recognizing by these experts is also, through them, possessed by the collective linguistic body, even though it is not possessed by the individual member of the body". (Putnam, 1975 p. 145) The 'jade' example can be used to show that an underlying structure isn't always what determines a natural kind term's extension. Nonetheless, Putnam believes this to be interest-relative. Sometimes it is not to the experts' interest to use a natural kind's 'hidden structure'. In the 'jade' case, as I have already noted, Putnam believes that the

term's reference is determined in virtue of physical properties. From this angle, Ben-Yami's critique would have no impact on Putnam's theory of reference. However, because Kripke speaks of essences as determining a natural kind term's reference, the 'jade' case is a challenge for his theory of reference. In other words, Kripke does not accept an interest-relative notion; the answer to what determines a natural kind term's reference is always the essence. From this point of view, Kripke is challenged once again due to the decisiveness of his theory.

4.5 Determination by Interpretation

According to Koethe, a causal theory of reference is attractive because it is 'naturalistic' in the sense that the reference of a term is determined by a causal relation. When someone utters "water", the semantic content of "water" can be reduced to the actual natural kind water because of the causal relation between the speaker and the natural kind in question. Another reason for its attractiveness is its ability to pick out a speaker's reference more accurately than a traditional descriptivist theory. A descriptivist theory, on the other hand, has a downside of making a term's reference too dependent on beliefs about the referent. In such a case, a change in beliefs would entail a change in reference. This suggests that a descriptivist theory is indeed less naturalistic than a causal theory of reference. The use of a term is part of a chain that goes back to its initial introduction. Because of its causal nature, the chain is not affected by any theory or belief changes about the referent throughout the chain's history. It is this causal chain that determines the reference, a relation that is independent of one's beliefs about the natural kind.

Koethe's view differs from the causal view in the sense that what makes the reference stable is not due to the chain, it is rather the 'correct interpretation' of the term that stabilizes the reference. The causal chain is established because of the consistent interpretation of the term. To put it in another way, when there is a constant interpretation shared among speakers in a linguistic community an "unbroken chain of communication" is established. (Koethe, 1992, p.41) The communication itself is what makes a reference stable, not the causal chain. Koethe believes causal theorists are faced with a difficult question of how we pick out one of many chains of a term's use as the most stable chain. Why not the chain with the most referential shifts? For example, a chain that had been referring to only tigers with the natural kind term 'tiger' at one point in time, and then the reference of the term changed to all cat-like animals+ dogs, to later be shifted to only all cat-like animals. Koethe concludes that the way communication is interpreted is not only based on the causal nature of the communication.

Koethe embraces a “determination by interpretation” view according to which the reference of a term uttered by a speaker is what the term is reasonably and correctly interpreted as referring to. (Koethe, 1992, p.33) Communication is possible because we generally tend to be talking about the same thing. When we share the same reference, we can agree, disagree and debate within our linguistic community. I might say that “that tiger was very friendly”, whereas another speaker might say that “no, that tiger was very aggressive, ” which presupposes that the reference of a term is stable enough for such communication to take place. Koethe considers three relevant principles for a correct interpretation to occur:

1. The interpretation should enable us to attribute to the speakers what we take to be largely correct beliefs about salient aspects about the environment. Again, this suggests that the correct interpretation is the one that is the most commonly shared in a linguistic community. What we consider to be correct beliefs about the external environment should and is most likely shared among our fellow speakers as well. I have a belief that water is liquid and I attribute the same belief to other speakers, as this is the most correct interpretation of water at this time.
2. It should assign the same references to terms used both by us and speakers with whom we are communicating. When I tell you that water is liquid, the correct interpretation should enable the speaker and the listener to be referring to the same liquid, namely water!
3. It should assign the same references to terms used by those speakers on earlier and later occasions. (Koethe, 1992, p.37)

The ‘principle of charity’ is part of Koethe’s theory of reference and meaning, a principle that constrains us to accept that other members of our linguistic community share the same/or similar beliefs to our own. (Koethe, 1992, p.35) These beliefs should be regarded as reliable and reasonable, since most of us have direct contact with the environment in which the beliefs stem from. If we have two interpretations in front of us, and one of the alternatives doesn’t agree one bit with our own beliefs about the environment, it is most likely the other alternative the speaker has in mind. Moreover, we should always choose the strongest and most rational interpretation when in doubt. Since we have the choice of interpreting others’ statements in many different ways, Koethe wants us to see the importance of attributing to the speaker that he/she means the perspective that is the most rational. Thus, the reference the speaker has in mind when uttering a natural kind term is the reference that we interpret the term as having.

Speakers on Earth and speakers on Twin Earth generally share correct beliefs about their respective environments. The speakers on their respective planets have and will refer to the same natural kind when using the natural kind term. In 1790, speakers on Earth referred to the same liquid when uttering 'water' as we do today, and the same goes for Twin Earth's history of use of the term 'water'. But what would happen if I were transported to Twin Earth? It seems that this would be more complex because when I talk about 'water' in past tense, I seem to be referring to H₂O water, which the other speakers are not referring to when using 'water' as their water is XYZ water. Principle 2 would therefore be violated during certain conversations between Twin Earthlings and myself with regards to the past. We would refer to the same thing in most other cases, since by this time I would have been acquainted with their water.

The principle of charity, discussed earlier, requires us to interpret Twin Earth speakers' beliefs about 'water' as reliable and correct. Their beliefs are based on the features they detect from their surroundings. A feature of their water, for instance, is XYZ. Thus, Twin Earthlings refer to something different to Earthlings when they utter "water". This is because each case is interpreted differently! Even before the Twin Earthlings knew of their water's structure, thus easily leaving room for interpreting their 'water' as indistinguishable from our water, the interpretation of the term would still refer to XYZ water. Koethe accepts the fact that there is a sense of 'incompleteness'; we didn't know that water was H₂O in 1790, but this doesn't stop speakers from 1790 to refer to the same substance as we do today. We refer to the same natural kind because the chain of communication goes back to 1790 and the interpretation of 'water' was based on the features they detected in their immediate surroundings, just like us. We assign the principle of charity to enable their interpretation of 'water' to be rational and adequate for their time.

Koethe implies that Putnam tries to escape this 'incompleteness' by stating that the speaker's intentions to refer to natural kinds contribute to secure the stability of the reference. In other words, the introducer of a natural kind term 'water' "intended to refer to anything that turns out to belong to the same natural kind as the samples to which they originally applied it." (Koethe, 1992, p.39) This is something that Koethe doesn't agree with, this intention was more than likely not present at the time of the term's introduction. Instead, Koethe believes that his three principles are applied after the fact. In Putnam's case, the reference would have to be presupposed. Koethe accepts the idea that languages can be incomplete at the time of a term's

introduction, without any explicit definition of the term (and its reference), suggesting that his theory allows for certain indeterminacies with regard to reference. (Koethe, 1992, p.48)

Koethe share a concern with Putnam in that a descriptivist theory is too fragile and sensitive to theory change and personal beliefs. If we imagine the description of a tiger to be the following “being yellow with black stripes” and “having four legs”, but discover a tiger that is albino with three legs, the term ‘tiger’ would fail to refer to the tiger if those descriptions fixed the reference of the term ‘tiger’. What is attractive about Koethe’s theory is the fact that it escapes the problem of explaining how one link in the chain of communication is preferred over other links. It seems as though Putnam doesn’t explain this in “Meaning of ‘Meaning’”. If an expert has introduced a new natural kind term, and a chain is established as the term is passed down, mistakes will likely be made as the chain moves further away from the initial introduction. This might be something that is in need of clarification from a causal theorists perspective. Even if there doesn’t seem to be anything explicitly about this in particular, I think that Putnam’s ‘Meaning of ‘Meaning’ is a good resource for understanding Putnam’s position enough to postulate what his response would be. For example, if I conduct an ostensive definition where I accidentally point to a glass of gin while uttering ‘this is water’, I would not, according to Putnam, intend for my ostensive definition to be accepted if I later discovered this to be a mistake. This suggests to me that it would not be expected to be interpreted as being water. Hence, the term ‘water’ would fail to refer in such a case and a link would not necessarily have been established. What this might entail is that Koethe’s ‘correct interpretation’ view is somehow already expected in Putnam’s theory of reference. For example, one of Koethe’s criteria for a correct interpretation is that the view should be commonly shared in a linguistic community. I think there is not doubt that Putnam embraces this idea in his theory of reference. The term ‘water’ refers to whatever ‘stuff’ the linguistic community call ‘water’. Their respective theories seem to be similar in this regard. I think that Koethe mistakenly thinks that Putnam’s theory of reference puts too much emphasis on the ‘hidden structure’ of a natural kind; that we must know something about the structure in order to refer to the same natural kind. Koethe points out that the ‘determination by interpretation view’ can account for cases that Putnam’s theory cannot. For example, Koethe says that in 1790, our ancestors didn’t know that water consisted of H_2O , yet they still referred to the same natural kind because of the unbroken chain of communication. The interpretation of ‘water’ was based on the features they detected in their immediate environment. However, as I previously mentioned, I think it is a mistake to criticize Putnam for being too decisive with regards to his theory of reference. I think

quite the opposite. For example, Putnam implies that our ancestors were able to refer to the same natural kind as we refer to today because of the sameness relation between the sample we have direct contact and the other samples of the natural kind. Through an ostensive definition, we are not expected to know something about the underlying structure; it is the ‘sameness relation’ and the indexical element that enable us to refer to the same natural kind as our ancestors. I agree with Koethe in that Putnam’s theory of reference implies that the reference is presupposed when introducing a new natural kind term. It suggests that there is an intention to refer to the same ‘stuff’ as the sample the introducer has direct contact with when using the natural kind term. However, Putnam has suggested that there is not always a clear answer to whether a sample is a member of a natural kind. As we have discussed, whether a Martian tiger would be a referent of ‘tiger’ depends on the context. At the time of the term’s introduction, the introducer might have the intention to refer to the same ‘stuff’ as the sample he/she has direct contact with, but the Martian tiger example shows us that the ‘hidden structure’ as well as our intentions do not always determine the reference of a natural kind term. Sometimes these decisions are made after the fact. In other words, after the term has already been introduced.

5. Conclusion

To conclude my essay, I would like to point out that Putnam’s theory of reference is able to account for complicated cases like the ‘jade’ scenario because of the context-based component of his theory. The ‘jade’ scenario is something that Kripke’s theory of reference cannot explain without suggesting that jadeite and nephrite are sub-kinds of ‘jade’. But if we would conclude that jadeite and nephrite are sub-kinds of jade, we also have to accept that the essence is not what determines the reference of the natural kind term ‘jade’, since jadeite and nephrite don’t share the same essence. Hence, Kripke’s theory of reference is faced with difficulties because it should always be the essence that determines a natural kind term’s reference. But if we accept that the experts base their criteria on something else, thus that each case is interest-relative, the ‘jade’ scenario would be unproblematic. I believe that Kripke’s theory of reference has been wrongly incorporated into Putnam’s theory of reference and, hence, has been subject to invalid critique for Putnam’s theory. What I think is rather strange from Putnam’s theory of reference is with regards to Twin Earth. If water necessarily has to be H₂O because we have discovered that its ‘hidden structure’ is composed of H₂O, why is it possible for Martian tigers to be the referent of the natural kind term ‘tiger’, if their make-up is silicone-based? I imagine that Putnam is just pointing out that sometimes the experts will use other criteria, but why does water necessarily have to be H₂O? Is it because our linguistic community has decided that water

is necessarily H₂O? Furthermore, I think that we need to avoid the idea that a description has to be synonymous with the natural kind term. This seems to be an inescapable consequence of many theories with a descriptivist component. I think that Putnam's theory of reference is the most plausible out of the proposals I have put forward because it is interest-relative. But how healthy is it to be interest-relative? Being interest-relative suggests that there is not always a clear answer as to what determines a natural kind term's reference. A consequence of this is that Putnam's theory can escape a lot of the critique because his theory is context-based. But, in order for the issue of how a natural kind term's reference is to be determined to become clearer, shouldn't we choose a more decisive theory? This question is, nonetheless, a difficult one to answer. I think we require a well-defined picture of how experts would determine a term's reference in different situations. Since Putnam's theory is context-based, we need enough contexts to better evaluate it. Maybe this essay has introduced more questions than answers. I hope, nonetheless, to have pointed out some difficulties for a theory of reference for natural kind terms and answered some of the questions that have been put forward.

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