Reinterpreting Rigidity

Rigid and Non-Rigid Reference of Proper Names in Alethic,

Doxastic, and Mixed Contexts

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Tiivistelmä – Referat – Abstract

Työni tarkastelee erisnimien asemaa mahdollisuuksien ja uskomuslauseiden konteksteissa. Sen lähtökohtana on nykyisin yleisesti hyväksytty teoria, jonka mukaan nimet ovat "jäykkiä" aleettisten tai metafyysisten mahdollisuuksien suhteen. Mahdollisten maailmojen semantiikan kehyksessä tämä tarkoittaa sitä, että nimi viittaa samaan olioon jokaisessa mahdollisessa maailmassa. Jäykkyys käsitetään tavallisimmin erisnimien semanttiseksi ominaisuudeksi, mikä tuottaa uusia ongelmia konteksteissa, joissa nimet eivät käyttäydy odotusten mukaan. Tunnetuimpia esimerkkejä ovat propositionaaliset asenteet kuten uskomuslauseet. Oletus jäykkyydestä nimien semanttisena ominaisuutena johtaa hajanaisuuteen, jossa poikkeamia on käsiteltävä tarpeettoman monimutkaisilla teorioilla, jotka voivat erkaantua vahvastikin aleettisen logiikan mallien yksinkertaisuudesta. Sen sijaan jäykkyyden näkeminen modaalisten kontekstien ominaisuutena mahdollistaa propositionaalisten asenteiden ja aleettisten modaalisuuksien yhtenäisemmän käsittelyn.

Argumenttini jakautuu kahteen osaan: negatiiviseen teesiin, jonka tarkoituksena on osoittaa, että teoria jäykkyydestä nimien semanttisena ominaisuutena on ristiriidassa monien luonnollisen kielen ilmiöiden kanssa, sekä positiiviseen teesiin siitä, miten erisnimiä voidaan kohdella yhtenevästi useissa epäsuorissa konteksteissa. Vastaesimerkkini keskittyvät erityisesti yksinkertaisiin luonnollisen kielen lauseisiin, joissa filosofit kuten Saul Kripke ja Scott Soames ovat väittäneet nimien esiintyvän aina jäykkinä, sekä erisnimien "demonstratiiviseen" ja "attributiiviseen" käyttöön. Oman teesini kehyksenä on Kathrin Glüerin ja Peter Paginin suhteellisten modaliteettien (relational modalities) semantiikka, joka mahdollistaa kaksitasoisen (aktuaalisen tai mahdollisen) evaluoinnin erisnimille. Tämä semantiikka on uskomuslauseille tietyssä mielessä alimäärittynyt: nimien jäykkyys yksinomaan uskomuskonteksteissa voidaan määrittää kvanttorien avulla, mutta vain puhujan intentio määrittää oikean tulkinnan. Täydennän puhujan intention roolia soveltamalla Jaakko Hintikan individuoinnin teoriaa. Hintikan mukaan nimet eivät voi suoraan viitata jäykästi: puhujan on kyettävä ensin jossain viitekehyksessä tunnistamaan se henkilö tai asia, josta hän puhuu. Nimen referentti on siis tietyssä mielessä tunnettava. Toisin kuin Hintikka, rajaan individuoinnin roolin vain propositionaalisiin asenteisiin tai muihin puhujan suhteen subjektiivisiin konteksteihin. Sen tarkoitus on tarjota pragmaattinen metodi suhteellisten modaliteettien mallien rinnalle täydentämään erisnimien semanttista alimäärittyneisyyttä uskomuslauseiden sekä muiden propositionaalisten asenteiden yhteydessä.

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Introduction

The semantics of proper names has been extensively studied by analytic philosophers: in contemporary research, they have been paid more attention to than any other part of speech. The birth and development of modern modal logic and possible world semantics changed the way proper names are seen. The modal perspective highlighted an aspect of proper names that had been overlooked in the past and that seemed to separate proper names from other types of singular terms such as definite descriptions. This made many philosophers abandon the Fregean theory of meaning, which allegedly held names as synonymous with the defining descriptions of their bearers. This descriptivist theory, which originally seemed to solve many of the problems created by the directly referential Millian view, was widely agreed to be refuted, at least in its classical form.

The core of the argument for the new theory of reference, a descendant of the Millian theory, was the modal behaviour of proper names. Proper names are rigid designators in the sense that they refer to the same object in every possible situation. Definite descriptions, on the other hand, are usually contingent and change their referent from one possible world to another. The metalinguistic argument for rigidity of proper names, originally made well-known by Saul Kripke, is convincing. It is widely seen as evidence for the failure of the descriptivist theories and an indirect confirmation of the theory of direct reference. Some philosophers such as David Kaplan[1] have even used a similar argument as a direct proof for the theory of direct reference, thus making direct reference and rigidity almost synonymous.

However, giving up Frege's theory obviously meant that the problems that plagued Millianism would return and would need to be answered. The most well-known issues concern propositional attitudes, empty proper names, and empty existential statements with proper names. The first problem, although often attributed to the theory of direct reference in particular, should perhaps be more adequately called a problem with rigidity in general. In this thesis, I will be concerned with the question of modalities and propositional attitudes, which is perhaps the most challenging of the three issues. The challenge is exemplified with what has been called "the Hintikka-Kripke problem", which compares

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[1]See Kaplan 1989.

alethic and epistemic or doxastic statements of identities between proper names. The standard logics of belief and knowledge are thought to function much like standard alethic logic: when talking about someone's beliefs, to give an example, we are talking about the doxastic worlds that are accessible to him. Propositional attitudes of all kinds are notoriously problematic when it comes to the behaviour of names. There are convincing everyday examples of names that do not function rigidly in propositional attitude contexts. A theory that says that proper names are intrinsically rigid does not in itself offer any explanation for these cases of non-rigidity.

To answer the question about occasional non-rigidity, either the theory has to be patched to somehow accommodate for deviant cases of propositional attitudes and the like, or the requirement of intrinsic rigidity has to be dropped. Perhaps not surprisingly, direct referentialists have often taken the first option while descriptivists have attempted to devise theories that explain rigidity and its failures in other ways. The attempts to accommodate for apparent rigidity failures inside a theory of direct reference have often brought descriptive elements into the picture, creating theories that attempt to combine the best of both worlds.[2] Few have even attempted to maintain the rigidity of proper names *tout court*, explaining the unintuitiveness of this conclusion by resorting to pragmatics.[3]

This work is divided into three main parts. After an introduction to the contemporary history of the question of rigidity which serves as a brief literature review of the most important works in the area, a more specific exposition of the Hintikka-Kripke problem and mixed modalities follows. This comprises the first two chapters. The substantive part of this work consists of a negative and a positive thesis. The negative thesis criticizes the idea that names are intrinsically rigid and gives grounds for presenting an alternative account of modalities and propositional attitudes. This account, which comprises the constructive part of the thesis, is based on a contemporary account of the semantics of modalities, complemented with a version of Hintikkan theory of individuation.

The objective in this thesis is to keep the issues of direct reference ver-

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[2]Such as role semantics and some theories of mental files. For different types of approaches, see e.g. Crimmins and Perry 1989, Forbes 1990, Récanati 2012.

[3]E.g. Salmon 1986, Soames 1987.

sus descriptivism and rigidity separate, at least for the most part of the work. The criticism of the Kripkean theory only concerns the idea of rigidity as an in-built, intrinsic semantic property of proper names. This aspect is not a consequence of the metalinguistic argument, for the rigidity of proper names can be explained by other mechanisms. It is a further assumption, taken up by Kripke and Soames among others in order to criticize the wide-scope descriptivism as a theory of modalities.[4] This assumption has never been rigorously defended and has often been attributed to speaker "intuitions" about proper names in simple sentences. But while Kripke's intuitions in the metalinguistic argument seem to be confirmed by the everyday use of language, there is empirical evidence from language use that is not consistent with Kripke's and Soames' further arguments about rigidity. There are uses of genuine, nondescriptive proper names that have sometimes been called "attributive" or "non-referential" that are clearly not rigid by default.[5] If these examples do in fact feature proper names (and not e.g. hidden descriptions), then the argument about direct intuitions cannot be correct.

Chapter 3 first outlines and critically examines the arguments for the "direct intuitions" of rigidity. Furthermore, the evidence against these intuitions is presented as natural examples of language use. Although the intention is not to defend any one theory of meaning, many examples in the literature have been brought up in defense of descriptivism. It is far from clear whether they succeed in refuting the theory of direct reference, but what they do establish is that rigidity cannot be a semantic feature of proper names themselves. This result is enough to justify the search for another explanation of rigidity, regardless of which theory of meaning is to be preferred.

The suggestion that I will sketch in Chapter 4 is that rigidity is to be understood as a semantic feature of modal contexts, not of proper names. As a basic framework, I will use the relational modalities or "switcher semantics" system developed by Glüer and Pagin in a series of recent articles.[6] The formal idea is to use two modes of evaluation that different types of modal operators (e.g., alethic, doxastic, epistemic) can switch on or off. Glüer and Pagin's view is very neutral, and they do not go deep into explaining what triggers rigidity

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[4]See Kripke 1981 (especially Preface), Soames 1998.

[5]Martinich 1977, Devitt 1981, Bach 2002a.

[6]Glüer and Pagin 2006, 2008, 2012.

in some modal contexts and non-rigidity in other contexts. It is a virtue of the system that it is not attached to any specific theory of meaning but is compatible with many ideas. But at the same time, some account of "speaker intentionality", which according to Glüer and Pagin explains not only the evaluation switch but also substitutivity and scope issues in propositional attitude contexts, needs to be given in order to complete the picture.

Therefore, before going into the Hintikka-Kripke problem, a few sections are devoted to an analysis of Hintikka's own account of modality and his notion of individuation and "knowing who". To individuate something is to be able to recognize it as the same thing in various different situations, be the situations moments of time or counterfactual states of affairs. In other words, identifying an individual in this way is to give it a place in our cognitive framework. Individuation is a natural capacity of human beings and is based on the capability to track continuity in time and space, and to recognize relevant similarities and differences in physical qualities. There are different methods of individuation which can be roughly divided into two types: one is object-centred and turns on the public or shared physical framework, and one is subject-centred and turns on the particular perspective of an agent, that is, the causal relations between him and his environment.[7]

I will then show how Hintikka's ideas can be adapted to the doxastic part of Glüer and Pagin's switcher semantics as a pragmatic complement to the semantic underdetermination in the interpretation of scope in doxastic sentences. The other purpose of this account is to link it more closely to some of the simple sentence examples in Chapter 3. It should be noted that although I want to stay neutral about the correct theory of meaning, some of the examples, if they in fact feature proper names, do not seem capable of explanation from the point of view of direct reference theory. It is up to the direct referentialist, then, to show why he thinks that they are not genuine names after all. Combined with an explanation of speaker knowledge and intentionality, the switcher semantics framework can then be used to solve the Hintikka-Kripke problem along with some more challenging problems in mixed modal contexts.

The final section of Chapter 4 concerns the issue of linguistic meaning. Instead of endorsing any one theory, the focus of this discussion is the relation

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[7]Hintikka and Symons 2007.

of rigidity and direct reference, and the possibility of maintaining a theory of direct reference in a non-rigid semantics. The theory of direct reference is not only useful for explaining rigidity in alethic contexts. It has also been proven superior to descriptivist theories in many other contexts, e.g., in philosophy of science, since natural kind terms are usually considered to belong to the class of rigid designators. It gave an answer the Kuhnian challenge of incommensurability of scientific theories. The reference of a scientific term could stay constant in different theories because it referred to the same physical object or phenomenon, regardless of which description is associated with it.[8] For this reason, the theory of direct reference should not be immediately rejected.

Many have thought, however, that non-rigidity and direct reference cannot coexist. The reason why this pairing seems almost to be considered blasphemy might have arisen from equating different types of theories of direct reference, some of which are not separable from rigidity. I will argue that this codependence of rigidity and direct reference is not universally necessary, given that one makes a distinction between direct reference of the Millian type and what could be called direct contribution.[9] Only the latter doctrine is conceptually dependent on rigidity. Considering that Kripke himself seems to have been a proponent of direct referentialism of the first type only, his theory of meaning is not, after all, incompatible with the semantics suggested here in anything else than its presupposition of intrinsically rigid proper names. The conclusion is that even with the added level of Hintikkan theory of individuation, the switcher semantics framework stays neutral with respect to the theory of linguistic meaning.

1   Proper Names and Rigidity

This chapter is a brief introduction to the classical Fregean view of proper names and the development of modal logic that led to its rejection. The relationship between rigidity and direct reference in the work of two early developers of the new theory of reference, Ruth Marcus and Saul Kripke, is also examined. Another section is devoted to some of the best known defenses of descriptivism, including the

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[8]See e.g. Fine 1975.

[9]The distinction has originally been made by Crimmins 1992. Martí 2003 makes a similar distinction using different terms, and it is the latter work that will mainly be examined.

wide-scope conventionalism and Dummett's assertoric content/ingredient sense distinction as further developed by Stanley. These views too have been criticized, and the attempted refutations of descriptive accounts of rigidity will be discussed here as well.

The purpose of this exposition is to put the more specific Hintikka-Kripke problem into a broader setting. Essentially, the problem is a challenge for both Millian and Fregean theories. Where the Millian view succeeds, the Fregean view faces problems, and vice versa. In addition to the usual descriptive and direct reference approaches, there have been attempts to combine the two to get the best of both worlds and solve the problem without their characteristic weaknesses. In order to better understand the motivations behind these solutions, the different strengths and challenges of both theories will first be examined.

1.1 Frege's Problem

Names are not lexical items like common nouns. If asked to say something in French, replying "Paris" does not count as an answer, just as being able to correctly use the name "Hesperus" does not add anything to one's English vocabulary. John Stuart Mill's theory of meaning respects these initial intuitions by claiming that reference exhausts the meaning of names.[1] This means that there is no additional (semantic) mediating content between a name and its referent: the name simply refers.

According to the Millian picture, the sentences "Hesperus is Hesperus" and "Hesperus is Phosphorus" are both true in virtue of the fact that the terms "Hesperus" and "Phosphorus" refer to the same planet. This seems indeed correct. But evaluating a simple indicative sentence containing a proper name is deceptively easy, since such contexts are direct or extensional, i.e., the truth value depends upon the referent of the term regardless of the way it is described. Problems arise when one considers indirect or intensional contexts. In modal contexts, substitutability of co-referring names sometimes seems to fail. Compare the following sentences:

(1)   John believes that Hesperus is Hesperus

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[1]See Mill 1906: 19-25.

(2)   John believes that Hesperus is Phosphorus

If it is assumed that John is a competent speaker who nevertheless does not know that "Hesperus" and "Phosphorus" are two names for the same planet, then (1) is true but (2) is false. An account that gives no other meaning to a name than its reference does not seem capable of explaining this. It cannot explain why understanding a statement such as "Hesperus is Hesperus" does not give any real knowledge, while understanding the statement "Hesperus is Phosphorus" does.

The problems of cognitive significance of identity statements between names and their intersubstitutability in intensional contexts were noticed by Frege, and they are often both called "Frege's puzzle". Frege pointed out the epistemic issue that a statement of the form $a = a$ differs from a statement of the form $a = b$, even if both true, in cognitive significance.[2] Any person who understands the rules of the language knows that $a = a$ is true. On the contrary, $a = b$ cannot necessarily be known without empirical investigation. It seems that this fact plays a part in the problem of substitution in attitude contexts.

Frege developed his theory of sense (*Sinn*) and reference (*Bedeutung*) as a response to this problem. Whether Frege's original notion of *Bedeutung* can be correctly translated as "meaning" or "reference" has been a debated issue[3], but the term, in any case, has to do with the named object's contribution to the truth of a sentence. The reference of Hesperus, as well as Phosphorus, is the planet Venus itself. The sense of an expression is related to its cognitive significance or "mode of presentation; it "illuminates a single aspect of the referent".[4] It has often been attributed to Frege that he thought of a sense as a description, but he was not himself clear about this, only mentioning the idea in a footnote.[5]

The most crucial theses of the classical Fregean theory are that (i) sense is the cognitive significance of an expression (what is understood when one understands an expression), (ii) sense determines reference, and (iii) every expression that has a reference has a sense as well. Fregeans also usually accept that there can be different senses for the same expression, so that the sense can vary in dif-

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[2]Frege 1948: 209.
[3]See Tugendhat 1970, Dummett 1973: Chapter 5.
[4]Frege 1948: 210.
[5]Ibid.

ferent occasions of use.[6] According to Frege, indirect contexts trigger a switch in the reference of an expression. In such contexts, expressions refer to their customary senses which serve as their "indirect referents".[7] This blocks one from fallaciously inferring (2) from (1), since although "Hesperus" and "Phosphorus" have the same reference, they have different senses. Only if John knows that the two senses belong to the same object can he believe that Hesperus is Phosphorus.

Russell's theory of ordinary proper names, which largely resembled the Fregean theory, stated that names are truncated definite descriptions. Russellian and Fregean theories are often grouped together under the general category of descriptivism, even though not all Fregeans believe that the sense of a name is a general description. For the purposes of this thesis, which is concerned with modal questions, Frege's and Russell's theories' standpoints are very similar. Russell agreed with Frege in that the meaning of a name is some sort of criterion of identification, but in his case, the name itself is literally a shorthand for that criterion, which is a general description. Russell does not deny that there could be Millian directly referential names, but he notes that those names have to be such that the reference is *guaranteed*. Consider the true sentence "Pegasus does not exist". If the sentence is taken to consist of a logically proper name and a predicate saying of it that it does not exist, of what is non-existence predicated? This problem led Russell to claim that all ordinary proper names are in fact definite descriptions and thus all statements such as "Pegasus does not exist" or "Pegasus has wings" are actually existential statements ("there are no things identical with the winged horse", "there is something such that it is the winged horse and that it has wings").[8]

Therefore, according to Russell, if there are logically proper names at all, then they have to denote something that the speaker can be directly acquainted with which secures the reference in any situation. Reference to any normal physical objects would not do:

> Now such things as matter (in the sense in which matter occurs in physics) and the minds of other people are known to us only by denoting phrases, i.e., we are not acquainted with them, but we know

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[6]Chalmers 2002: 141.

[7]Frege 1948: 211-212.

[8]Russell 1905: 491-493; Russell 1917: 216-217.

them as what has such and such properties.[9]

The only logically proper names in our language, then, had to refer to the real objects of acquaintance, i.e., sense data. In Russell's terms, therefore, the simplest demonstratives like "this" would be the only logically proper names that feature in the language, and all other names would be reduced to disguised definite descriptions.[10]

The aspect that unites the Fregean and Russellian theories is that they claim that names have semantic content that is at least partly descriptive. They consequentially deny that the meaning of the name can be given solely in terms of its reference. However, neither Frege nor Russell was particularly concerned about (alethic) modalities. Exploring these contexts created the most deadly counterarguments to descriptivism, forcing descriptivists to modify their theories in response to the criticism.

1.2   Modality and Direct Reference

Questions of necessity and contingency have been explored by philosophers ever since philosophy was born, but there had been no formal framework for them before the birth of modal logic on the first part of 20th century. In 1932, Lewis and Langford presented a formal interpretation for propositional modal logic[11] which is often called the first axiomatization of modal logic.[12] Fourteen years later, Ruth Barcan Marcus published the first axiomatization of a quantified modal logic, which was an extension of the system S2 introduced in Lewis and Langford's book.[13] The idea of possible worlds as a device of modal reasoning is in itself much older, but the modern possible world semantics are usually attributed to Jaakko Hintikka[14] and Saul Kripke[15], who seem to have come to similar conclusions independently. Marcus, however, already foreshadowed the development of the linguistic thesis of rigidity of proper names often attributed to Saul Kripke.

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[9]Russell 1905: 492-493.

[10]Russell 1917: 224. Russell writes that strictly speaking, "I" and "this" would be the only logically proper names in natural language.

[11]Lewis and Langford 1932: 178-198.

[12]Although the earliest relevant source, as Negri 2011 notes, would probably be MacColl 1906.

[13]Marcus 1946.

[14]Hintikka 1962.

[15]Kripke 1963.

Early modal logicians such as Smullyan, Fitch, and Marcus were proponents of the so-called new theory of reference or the theory of direct reference.[16] They stated, *contra* Frege, that names' only function was to serve as placeholders for objects. This was a return to the Millian view of names and also to the problems in philosophy of language that Frege had tried to solve with his sense-reference distinction. Interestingly, some of the new theorists of reference seem to have adopted the Russellian view of proper names while disposing of its epistemic thesis of acquaintance and insisting that all ordinary proper names are logically proper names. Logicians such as Fitch and Smullyan were less interested in ordinary language, putting aside questions of ordinary language and especially metaphysics. Marcus also leaned more towards logic than philosophy of language, although her views on modal logic were based on the Millian conception of proper names, which she called "identifying tags".[17]

The notion of a rigid designator, although perhaps first used by Kripke, has been an important part of the debate about the nature of proper names. A term is a rigid designator if and only if it designates the same thing in every possible world (let us not yet take a stand on those worlds in which it does not exist). The relationship between direct reference and rigidity is an interesting one. The argument from rigidity has often been used as an indirect argument for the theory of direct reference. For if it were true that all identities between names are necessary, i.e., names denote what they denote *rigidly*, then it could not be that names refer via Fregean senses or are equal to descriptions, because those senses and descriptions are merely contingent. But it could also be thought that if names refer directly in the strongest Russellian sense, then they would have to be rigid designators as well.

There is an easy derivation of necessary identity in standard quantified modal logic.[18] In its simplest form, it proceeds as follows, from the initial assumptions of Leibniz' law of the indiscernibility of identicals (II) and the rule of necessary self-identity (SI):[19]

(1) $\forall x \Box x = x$ SI

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[16]See Smullyan 1948, Fitch 1949, Marcus 1960.

[17]Marcus 1993: 33-34.

[18]Kripke 1971: 136.

[19]The conclusion (3) can be derived from (1) and (2) in all classical systems.

(2) $\forall x \forall y (x = y \rightarrow (\Box x = x \rightarrow \Box x = y))$ II

(3) $\forall x \forall y (x = y \rightarrow \Box x = y)$ 1,2

Traditionally interpreted, the argument from indiscernibility of identicals concerns the necessary identity of *objects*.[20] It is clear that if two objects are identical, i.e., they are the same object, then they have to be (or it has to be) (self-)identical in all possible circumstances, or at least those in which they exist. As a logical thesis, all principles from which the conclusion was derived are acceptable in most formal systems.[21]

If one makes the additional assumption that proper names can be substituted for variables, i.e., the rule of instantiation (to constants) is accepted, then it follows that names denote whatever they denote out of necessity. However, this assumption cannot be taken for granted.[22] For in order to freely substitute names for objects, one has to presuppose that they *are* directly referential, and thus using this argument alone to justify the theory of direct reference would be circular.[23] The behaviour of ordinary proper names is a matter of language, not logic.

Neither Smullyan nor Fitch was particularly interested in linguistic matters (although they seem to have thought that not all ordinary names can be thought of as logically proper names, but rather as descriptions).[24] Marcus did defend her thesis in terms of natural language, but she seems to have held slightly

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[20]See e.g. Fitting and Mendelsohn 1998: 146-147.

[21]Whether the principle of necessary self-identity can be derived from the more basic formula of self-identity, $x = x$, depends on the system used. This requires applying the rule of necessitation (RN) to $x = x$ to derive $\Box x = x$ and then $\forall x \Box x = x$, which neither Kripke's original system nor Marcus' early system based on S2 allowed, for the former did not allow application of RN to open sentences and the latter did not contain RN. Marcus' proof for necessity of identity is rather complicated and requires the system to have both Barcan Formula $\forall x \Box F(x) \rightarrow \Box \forall x F(x)$ and its converse as theorems (see Burgess 2014). With the rule of necessitation *and* the converse Barcan formula, one can of course get easily from the more basic thesis $\forall x x = x$ to $\forall x \Box x = x$.

[22]Burgess 2014: 1576.

[23]Strictly speaking, this holds for objectual interpretation of quantification. Substitutional quantification, which was favoured at times by both Kripke and Marcus, might technically avoid the idea of replacing names for objects. In any case, to get to the conclusion that names are rigid, one still has to assume at a meta level that names denote whatever they do directly in order to make sense of them being rigid in the first place.

[24]Soames 1995: 196-197.

different views at different times.[25] It is not clear whether she really thought names are Russellian proper names, i.e., directly referential *in every context*. In the speech she gave at Boston in 1961, she does give the impression that identities between proper names are both analytic and a priori.[26] During the discussion following the presentation, she makes a point to Quine that strongly suggests that this is indeed her view:

> Presumably, if a single object had more than one tag, there would be a way of finding out, such as having recourse to a dictionary or some analogous inquiry, which would resolve the question as to whether the two tags denote the same thing.[27]

Claiming that necessity of identity between co-referential proper names is necessary also in the sense of analytic and a priori would justify the substitution not only in alethic contexts, but also in epistemic ones.[28] However, this is a rather inconvenient consequence. As Frege pointed out, the fact that two names refer to the same object, even if such an identity is necessary, does not mean that a person should know that they do. A statement of self-identity might be knowable without empirical investigation, but an identity statement featuring two different names cannot be known prior to experience. Furthermore, Marcus' arguments do not offer a strong enough justification for such a radical thesis.

1.3   Rigidity and the Argument against Descriptivism

It was not Marcus but Kripke who took up the project of giving a non-circular argument for the rigidity of proper names. His argument simultaneously served to support the theory of direct reference by dealing a critical blow to the classical descriptivist theory. Interestingly, Kripke seems to have endorsed Marcus' ideas in the discussion at Boston Colloquium[29]; however, he seems to have changed

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[25]Burgess 2014: 1583.

[26]Marcus 1993: 33-34.

[27]Ibid.

[28]Since Marcus does not make much of a distinction between (metaphysically) "necessary", "analytic", and "a priori", at least in the case for identities of proper names, this would indeed mean substitutivity across the board. As we will see, Kripke thought that there are metaphysical necessities that are neither analytic nor a priori.

[29]See Marcus 1993: 34-35. Kripke says that Marcus' dictionary example seems like "a perfectly valid view". A few moments later, he himself equates necessity with analyticity. In Kripke 1981

his mind shortly afterwards. In *Naming and Necessity*, he clearly denies the idea that identities between names are necessary in the sense that they are analytic or a priori.

The three different forms of "necessity" - (metaphysically) necessary, analytic, and a priori - had often been confused in the work of Kripke's predecessors: Carnap, to take an example, explicitly defined alethic necessity as analyticity.[30] This is perhaps the reason why Quine's criticism[31] of modal logic was, in part, justified: there *was*, to some extent, a confusion between language and the world. Kripke made it clear that alethic logic concerns metaphysical necessity which is not coextensive with either analyticity or a priori.[32] This clarification of concepts was an undeniably important advancement in the new theory of reference.

Kripke also saw the problem of using a logical derivation of necessary identity to prove rigidity for natural language.[33] Indeed, the difficulty in Marcus' conclusions about the nature of proper names is that they seem to be driven more by her formal framework than facts about natural language. Marcus' early works were lacking the kind of linguistic explanation that was needed for the jump from logic to language. Kripke's arguments in *Naming and Necessity* have a different (and better justified) direction of explanation, moving from language to its logical representation.

In the *Naming and Necessity* lectures and an article published shortly after the lectures, "Identity and Necessity", Kripke presents several modal arguments. In "Identity and Necessity", Kripke first gives his definition of rigidity. A term is a rigid designator, he says, if it designates the same thing, if the thing exists, in every possible world, and if it does not exist, designates nothing. Stronger versions of the rigidity thesis have been given in the literature e.g., Kaplan's sense of "rigid designator" (or a directly referential term, which, to him, is essentially a

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(100-101) he states that the dictionary example must be wrong.

[30]See e.g. Carnap 1947. Carnap's view was Tarskian; his definition for necessity was that a necessary statement in an interpretation is true if and only if it is true in every *interpretation*. This definition connected necessity with language rather than the world, making analyticity equivalent with necessity.

[31]See e.g. Quine 1943, Quine 1976a.

[32]Kripke 1971.

[33]Kripke 1981: 3-4.

synonymous expression) is a term that designates the same object in every possible world regardless of whether it exists or not.[34] In what follows, the notion of rigidity is interpreted as Kripke rigidity, not Kaplan rigidity.[35]

Kripke then proposes "a simple, intuitive test" for determining when a term is a rigid designator and when it is not:

> We can say, for example, that the number of planets might have been a different number from the number it in fact is. For example, there might have been only seven planets. We can say that the inventor of bifocals might have been someone other than the man who in fact invented the bifocals. And it seems that we cannot say, though, that the square root of 81 might have been a different number from the number it in fact is, for that number just has to be 9. If we apply this intuitive test to proper names, such as for example 'Richard Nixon', they would seem intuitively to come out to be rigid designators.[36]

What Kripke's argument establishes is a different and a weaker conclusion than Marcus' tag theory of names, although it has exactly the same conclusion with respect to the behaviour of names in alethic modal logic. He argues that the type of necessity he is concerned with is metaphysical necessity, and that is what his argument shows - it says nothing about the analyticity or apriority of identity statements. Kripke, therefore, is not attempting to make the statement that names are rigid also in epistemic or doxastic contexts, even if he does not give much thought to why rigidity fails in those contexts either.

Kripke also emphasizes that when counterfactuals are considered, they are considered from the point of view of the actual world, and the language as we use it in the actual world. The fact that 2+2 might not have been identical with something that is called "four" is irrelevant to the rigidity of the terms "2+2"

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[34] See e.g. Kaplan 1989.

[35] Kaplan (1989: 492-493) does note that Kripke still seems to be implicitly assuming the stronger reading, namely that the term designates the same thing in every possible world *whether it exists or not*. However, it does not matter much for the purpose of this work which reading is assumed. The distinction between Kripke's and Kaplan's notions of *direct reference*, the latter of which is in particular connected with the idea of rigidity, however, will be of greater importance and will be discussed later in this thesis.

[36] Kripke 1971: 148-149.

and "4". When referring to Nixon, we are talking about the person who, as things turned out to be, was given the name Richard Nixon. The fact that his parents might have named differently does not refute the thesis of rigid designators.[37]

In essence, the stages in Kripke's modal argument against descriptivism are as follows:

1. Proper names designate rigidly.

2. Usually, sentences such as "The F is G" and "*n* is G", where the referents of a definite description "The F" and a name "*n*" are actually the same, might have different truth values in different possible worlds. While the name is rigid, the definite description is non-rigid.

3. Therefore a name cannot be synonymous with a definite description.

Kripke did not deny that descriptions could never be used rigidly. Some descriptions, like his example "the square root of 81" are indeed rigid. His crucial point was that it is an intrinsic property of ordinary proper names that they are rigid designators: they are rigid *de jure*. As Stanley puts it, "[the] intuitive content of *de jure* designation lies in the metaphor of "unmediated" reference. A rigid *de jure* designator is supposed to denote what it denotes without mediation by some concept or description."[38] "The square root of 81" is, on the other hand, *de facto* rigid, i.e., it refers mediately but nevertheless it denotes the same object (the number nine) in every possible world. Actualized descriptions (such as "the actual president of France") would be, according to Kripke's categorization, *de facto* rigid as well. Proper names are special because rigidity is built into their semantics.

It should also be noted that Kripke does not claim that names have no descriptive content, but that such content would only be relevant for *fixing* the reference. What he objects to is that there are descriptions that are synonymous with, or give the meaning of, a name.[39] He criticizes Russell and Frege for holding the latter view, and accuses Frege on conflating the two notions.[40] The fact that there can be cognitive significance, descriptive or non-descriptive, to a proper

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[37]Kripke 1981: 76-77.
[38]Stanley 1997a: 557.
[39]Kripke 1971: 156.
[40]Kripke 1981: 57-58.

name, is independent of the fact about whether the name refers directly or is mediated by a sense.

1.4 Descriptivist Answers and Further Anti-Descriptivist Intuitions

The usual descriptivist responses to Kripke's challenge admit that names are rigid, but deny that they are rigid *de jure*, which allows names to have non-rigid senses. Another strategy would be to argue that names have senses that are themselves rigid. One of the earliest responses to Kripke, by Michael Dummett, was of the first type. Dummett suggested interpreting the rigidity of names as a syntactic, not a semantic feature of them in modal contexts.[41] According to Dummett, rigidity is a matter of the scope of the proper name. Consider, for comparison, ordinary definite descriptions. Usually, it is intuitive to say that "the President of France is the President of France" is a necessary sentence, but there is an interpretation under which it is contingent. If someone utters the sentence "the President of France might have not been the President of France", he could mean that the person who is in fact the president of France might have not become the President. It is a contingent property of the person who is the President that he is the President.

In this interpretation, the first "president of France" takes a wide scope over the modal operator which "rigidifies" (the first occurrence of) the description. The sentence, interpreted this way, can be formalized as $\exists x(x = \imath xPx \land \Diamond \neg x = \imath xPx)$. However, to say that "it is possible that whoever is the president of France is not the president of France" is obviously false, because the first description occurs inside the scope of the modal operator as well as the second, i.e., $\Diamond \exists x(x = \imath xPx \land \neg x = \imath xPx)$. As Dummett put it, we can talk about possible states of affairs or possible properties.[42] Extending the idea to proper names, then, it can be said that names work in exactly the same manner, but they tend to take the wide scope by convention.

Kripke did acknowledge the possibility of explaining rigidity by scope

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[41]Dummett 1973: Chapter 5, Appendix. Sosa 2001 is a more recent proponent of the wide scope view.

[42]Dummett 1973: 125-126.

in *Naming and Necessity*, but he thought it was not a sustainable view.[43]   Both he and Soames[44] have given another type of a modal argument against the wide scope conventionalist theory, which can be roughly outlined as follows. The main idea of the argument is to "force" the name in the embedded sentence inside the scope of the modal operator and ask about our intuitions in that case. And it seems that our intuition is that even in narrow scope, the name refers rigidly while the description does not. Consider, as an example, the following two sentences:

(3)   François Hollande is François Hollande.

(4)   François Hollande is the president of France.

Suppose that the wide-scopist argues that "the president of France" is indeed the sense of "François Hollande".[45] Then the two *simple* sentences (3) and (4) should be equivalent, since the names themselves are synonymous and no modal operators are involved. To the wide-scopist, rigidity becomes an issue only in modal contexts due to the possible scope differences of proper names and corresponding descriptions.

But if sentences (3) and (4) do not differ from each other in semantic value, then there are difficulties in explaining why the following sentences do not seem equivalent:

(5)   (3) expresses a necessary truth.

(6)   (4) expresses a necessary truth.

The impossibility of explaining why (5) seems to be true and (6) false seems to refute the idea that the difference of the behaviour of proper names and descriptions in modal contexts could be just a syntactic issue of scope.

Of course, the intuition about our evaluation of (3) and (4) in contexts

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[43]Kripke 1981: 11-13.

[44]Soames 1998.

[45]Depending on the particular descriptivist theory, "the president of France" can be substituted by a suitable description or a union of all such descriptions. E.g., to modify the argument according to Searle's cluster theory of proper names, the single definite description would be replaced by some sort of a disjunction-sentence of different properties by which Hollande could be identified.

such as those in (5) and (6) could be challenged. What Kripke and Soames rely on is that there are direct intuitions about the modal profile of proper names.[46] The wide-scopist could answer that speakers would automatically interpret (5) with the name taking a wide scope, even if it would seem, on the surface, to be a *de dicto* sentence.[47] There has also been some protests against Soames' treating sentences of the form (5) and (6) as if they contained a modal adverb (such as "necessarily") while they in fact contain a modal predicate.[48] But the wide-scope solution still leaves open questions about the interpretation of syntactically *de dicto* sentences. For if it is claimed that all modal sentences of natural language that involve names have a logical structure where the name takes a wide scope over the modal operator, then syntactically correct structures such as $\Box \exists x (x = a \wedge F(x))$, where a is a proper name, do not seem to mean anything at all. If it meant "necessarily, a is F" then it would, according to the wide-scopist, have the form $\exists x (x = a \wedge \Box F(x))$, which is not (for the wide-scopist) equivalent to $\Box \exists x (x = a \wedge F(x))$.[49] So it cannot mean that. Is the bare *de dicto* form then somehow syntactically forbidden? Or is the *de dicto* sentence simply meaningless? These questions, I think, are not irrelevant.

Wide-scopism is not the only possible defense that a descriptivist can reach out for. E.g. Jason Stanley, having noticed the problems with wide-scopism, has suggested another solution based on another idea of Dummett's, making a distinction between the "assertoric content" and the "ingredient sense" of a sentence.[50] He describes the two notions as follows:

"The assertoric content of an utterance of a sentence is what is said by that utterance. The assertoric content of an utterance of a sentence

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[46]E.g. Kripke 1981 12-14.

[47]E.g. Sosa 2001 mentions this line of defense.

[48]Hunter 2005 expresses this type of opinion, although it seems that his grounds are not as solid as they could be. Caplan 2005 criticizes Hunter's view, attempting to show that whether a sentence has a modal adverb or a modal predicate does not change the fact that the wide-scopist has to commit on the name taking a wide scope over the operator.

[49]Assuming that the wide-scopist denies that any natural language sentences of necessity would have proper names in narrow scope, regardless of their surface structure. If he would accept that there are true narrow scope occurrences of proper names, then he would have to face the Soames/Kripke argument once again in explaining why the narrow-scope occurrences of names would *not* be rigid.

[50]Stanley 1997a: 574-578; see also Stanley 1997b.

also is the object of belief, doubt, and other propositional attitudes. Assertoric contents are the fundamental bearers of truth-value. [...] The ingredient sense of a sentence is what that sentence contributes to more complex sentences of which it is a part. The ingredient sense of a sentence is thus that sentence's compositional semantic value. It is the semantic value we must assign to a sentence in order to predict correctly the conditions under which more complex constructions in which it occurs are true.[51]

It is possible, Stanley argues, that these two aspects of sentence meaning could come apart: sentences with same assertoric contents might have different ingredient senses, and ingredient senses might not be able to serve as assertoric contents.[52] Clearly, this would be what happens in alethic modal contexts.

Even if such a distinction can be made, in order for Stanley's argument to go through, he has to assume that assertoric contents cannot be evaluated in alethic modal sentences. But this is not a given: if Kripke and Soames are right about there being direct intuitions about the semantics of proper names, then it is indeed the assertoric contents of the embedded simple sentences that are evaluated modally. As Kripke puts it, his view is "a doctrine about the truth conditions, with respect to counterfactual situations, of (the propositions expressed by) *all* sentences, including *simple* sentences."[53] The claim that assertoric contents are not what simple sentences contribute to modal contexts is incompatible with this idea, and therefore it can only be justified if Kripke's and Soames' intuitions are incorrect. The intuitions, as will be later shown, are indeed not as strong as they could be, and they are contradicted by some direct evidence from actual language use. But this is not yet enough to confirm Stanley's theory.

In a more recent criticism of descriptivist theories, Everett directly argues that Stanley cannot prove that assertoric contents would be *never* evaluated modally.[54] The argument, which I will give a somewhat simplified version of, has a similar strategy as Soames' argument against wide-scopism. Everett's aim is to show that there are contexts where the assertoric content of a simple sentence is

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[51]Stanley 1997a: 575.

[52]Ibid.

[53]Kripke 1981: 12.

[54]Everett 2005.

"forced" into the evaluation of a modal contexts. Everett first notes that sentences of the form

(7)   Hesperus is not Phosphorus. John believes it but it is necessarily false.

are perfectly grammatical (even if slightly clumsy), and furthermore, they *do not* have the awkward feel of sentences that are cases of syllepsis, e.g. "some of the banks were highly eroded away and some closed for the holiday".[55] Thus it seems that "it" actually refers to the same thing in the sentence following "Hesperus is Phosphorus". But what is evaluated in the belief statement has be the assertoric content. This seems to support the intuitions that assertoric contents (or Kripke's "simple sentences") can indeed evaluated modally.

Everett's argument is a rather nasty twist on the Hintikka-Kripke problem which will be introduced in the next section. As long as our intuitions support the fact that the two occurrences of "it" have the same reference, it does not matter whether the thesis of intrinsic rigidity is refuted. If John is to have a belief at all, also the thesis of *de facto* alethic rigidity needs to be given up, and this makes the problem a more difficult one than that of mixed modal contexts. This issue, that can be shown to apply also to the switcher semantics model that is in this thesis presented as a solution to the Hintikka-Kripke problem (whether or not a descriptivist theory of meaning is endorsed), will be returned to in the final chapter of the thesis.

A different tactic would be to argue that names have rigid senses, which makes them indeed inherently rigid regardless of scope. The meanings of proper names are given in terms of *actualized* or rigidified descriptions. Thus, the sense of the name is not only a general description, but contains an indexical element. To give a simplified example, the sense of the name "François Hollande" could be "the *actual* President of France". The description is rigid exactly as the name is, picking out the same person - that is, the man who is Hollande - in every possible world. This would require interpreting the rigidity of names in Kripke's, not Kaplan's, way, necessarily designating the same object in the worlds *in which the object exists*.[56] Actualized descriptions are clearly not Kaplan-rigid. This is a small objection compared to Soames' more powerful argument against rigidified

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[55]Everett 2005: 131.

[56]Soames 1998: 14.

descriptions.[57] It is based on the idea that not only actual-world inhabitants, but also inhabitants of other possible worlds can have beliefs about Hollande. In those cases, it is conceivable that those people existing in the realm of possibilia have thoughts and belief about Hollande without having any thoughts about the actual world. The meaning of "Hollande", then, is no longer the same as "the actual President of France".[58]

Whether another variety of the rigidified description theory can overcome these difficulties is another question. Soames notes that rigidifying the description in the style of Kaplan's *dthat*-operator might work[59], and there are some more contemporary varieties of the theory that are less loyal to the classical Fregean view of sense.[60] In any case, Soames' example underlines the difficulties that arise especially in mixed modal contexts. These contexts are not problematic only to descriptivist theories, however: also direct referentialists need additional tools of explanation to make sense of them. Giving a unified theory of alethic modal contexts and propositional attitudes is so far one of the hardest problems for both descriptivists and direct referentialists. The rest of this thesis will focus on the particular problem of making sense of combined alethic and doxastic modalities.

2   The Hintikka-Kripke Problem

Frege's puzzle took propositional attitudes as its starting point and concluded that names must have senses. Kripke's metalinguistic argument started from a convincing intuition about (alethic) modal reasoning and concluded that names must be intrinsically rigid, and therefore they cannot have Fregean senses. But while Frege's theory does not seem to be able to explain the behaviour of names in alethic contexts, it is quite obvious that the Kripkean intuitions are no longer correct when propositional attitudes such as belief are considered. The dispar-

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[57]Soames 1998: 14-15.

[58]A variant of this argument, as will be seen, can also be constructed against the switcher semantics view. It is discussed later in this work together with Everett's argument, although unlike the latter, it can be quite easily solved, provided that one is not a classical descriptivist.

[59]Soames 1998: 17.

[60]See e.g. Nelson 2002. Nelson endorses a mental file type of approach combined with the idea that some mental files can be indexed to the actual world.

ity between alethic and epistemic or doxastic contexts is sometimes called "the Hintikka-Kripke problem" after the two great developers of epistemic and alethic logic.

Let us exemplify the problem with the following two sentences:

(8)   If Hesperus is Phosphorus, then it is necessary that Hesperus is Phosphorus.

(9)   If Hesperus is Phosphorus, then John believes that Hesperus is Phosphorus.

Doxastic logic is often modeled in possible world semantics. In terms of these semantics, the first sentence says that if Hesperus is Phosphorus, then in all (metaphysically) possible worlds Hesperus is Phosphorus. The second says the same in doxastic terms: if Hesperus is Phosphorus, then Hesperus is Phosphorus in every doxastically possible world (for an agent).[1] The two sentences can be expressed more formally as

(10) $Hesperus = Phosphorus \rightarrow \Box Hesperus = Phosphorus$

(11) $Hesperus = Phosphorus \rightarrow B_j Hesperus = Phosphorus$

If Kripke's metalinguistic argument is accepted, then (8) should indeed be always true, and correspondingly, (10) should be valid. But (9) clearly is not always true, and thus (11), if it is the correct interpretation of (9), should *not* be valid. It should not follow from the fact that Hesperus is Phosphorus that John believes it to be true. He might not even know what "Hesperus" and "Phosphorus" are! But it follows from the fact that (10) is valid and (11) is not that i) if Hesperus is Phosphorus, there are no alethically possible worlds in which Hesperus is Phosphorus and ii) even if Hesperus is Phosphorus, there can be doxastically possible worlds where this is not the case. Since Hesperus and Phosphorus are in fact identical, this means that there can be doxastically possible worlds that are not alethically possible. But what does it even mean for there to be a possible world that is not

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[1]See Appendix I for a brief introduction to relational or "possible worlds" semantics for modal logic. Although the term "relational semantics" is probably a better one, I will use the latter term more often to distinguish between standard modal semantics and the specific idea of relational modality models in standard semantics.

metaphysically, i.e., alethically possible?

There are three general approaches to the problem. Direct referentialists, who tend to hold on to rigidity - direct reference and non-rigidity are often seen as incompatible[2] - would have to accept that both (10) and (11) are valid and then explain away the counterintuitiveness. The descriptivist has the choice of maintaining the invalidity of (11), but if the validity of (10) is to be accepted, the "special semantics" for propositional attitudes, and the case of metaphysically impossible doxastic worlds, needs to be explained.[3] Finally, there is the possibility of trying to get the best of the both worlds and claiming that (9) contains unarticulated constituents that must be taken into account when formalizing the sentence: therefore (11) is not the correct formalization of (9). Because of the difficulties of the descriptivist theories illustrated above, the directly referential approach and the unarticulated constituents approach have perhaps been more popular than descriptivist accounts. In this chapter, the direct reference and descriptivist views and their challenges will be briefly considered, and a longer section will be devoted to unarticulated constituents view, which seems to escape many types of problems that the former two theories have to face. Despite its virtues, there are other types of problems with the theory that make it theoretically unsatisfying. These problems can be easily seen to arise precisely from the attempt to maintain the intrinsic rigidity thesis. Once this feature is disposed of, a more efficient theory that respects the intuition behind the unarticulated constituents theory while containing no unnecessary linguistic entities can be constructed.

2.1   Are "Special" Semantics Needed?

If the first route of accepting both sentences as valid is taken, then the counterintuitivity of (9) has to be explained with appeal to pragmatics, possibly along the lines of Gricean conversational maxims.[4] It could be said that even if (11) can be said to be valid, it would be misleading to attribute beliefs to a person only because there are true identity statements involving proper names. (9) is,

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[2]Whether they actually are is another question which I will briefly take up in the latter part of this thesis.

[3]The term "special semantics" has been borrowed from Holliday and Perry 2014.

[4]For Russellian-Gricean kind of analyses of propositional attitudes, see e.g. Salmon 1986, Soames 1987.

therefore, not the full story. There is a vast contextual background which explains why one would not attribute the belief that "Hesperus is Phosphorus" to the agent on the sole ground that the statement is necessary. However, even if the pragmatist approach were accepted as a plausible thesis in the particular case of the Hintikka-Kripke problem, it would produce many results that are unsatisfactory to the modal logician. Consider Kripke's puzzle, in which a person has two contradictory beliefs about the city London.[5] The Frenchman, failing to see that the city Londres is the same as the city London, believes that London (as Londres) is pretty, and that London (as London) is unpretty. A pragmatist who wants to assimilate the semantics of alethic and doxastic logic would have to say that $B_a(P(l) \land \neg P(l))$ (where $P(l)$: "London is pretty") is true[6], amounting to there being a doxastically possible world in which the logical contradiction is true.[7] In classical logic, this is an unacceptable consequence, since a contradiction has a property of "spreading" throughout the system, making true every proposition whatsoever. In order to avoid the explosion world created by the contradiction, substantial changes to doxastic logic have to be made.

There are clearly cases where epistemic and doxastic logics have to "idealize". After all, the exact behaviour of natural language is incredibly difficult to replicate in a formal language without sacrificing clarity and functionality. The problem of logical omniscience, perhaps first mentioned by Hintikka[8], is one of the problems that result from the idealized nature of these logics. Its general form is this. Let us suppose that (i) a believes that φ, and suppose also that (ii) $\varphi \rightarrow \psi$ is a logical truth. Now, it is perfectly possible that (iii) a does not believe that ψ. From (iii) it follows that there has to be a doxastically possible world v for a such that ψ is false in v - and thus $\neg\psi$ has to be true in v. Since $\varphi \rightarrow \psi$ is a logical truth, it is true in all possible worlds, and thus also in v. But by (i), φ has to be true in all possible worlds accessible to a, and therefore also in v. If both φ and $\varphi \rightarrow \psi$ are true in v, then by Modus Ponens, ψ is true. Since it was established that $\neg\psi$ is

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[5]See Kripke 1979.

[6]By the theorem $(B_a p \land B_a q) \rightarrow B_a(p \land q)$ of the modal logic K.

[7]Of course, one could reject the Translation Principle by which "London" in English means the same as "Londres" in French. However, there are variants of Kripke's puzzle which do not invoke this principle. One of them (the "Paderewski case") is given in Kripke's original article about the puzzle.

[8]Hintikka 1962.

also true in v, we have $\psi \wedge \neg \psi$ true in v, which means that v has to be a logically impossible world at least by the principles classical of logic. In order to get rid of the impossible world, it simply has to be assumed that agents know all logical tautologies, and thus do not believe contradictions.

However, there is more at stake in the Hintikka-Kripke problem. A sentence of the type $a = b \rightarrow B_a a = b$ is necessary but not *a priori*. Therefore, an agent's believing any true identity statement $a = b$ where a and b are proper names is not a matter of logical omniscience as it is commonly understood.[9] Linsky notes that if an agent should know all such statements then he would be *metaphysically* omniscient, making him not only a perfect logician but also something of a god.[10] This is no longer an idealization but a complete distortion of human knowledge.

But accepting (10) as valid and (11) as invalid is troublesome as well. First of all, the idea of there being impossible worlds can be seen as problematic in itself. Linsky describes one analysis of the case as follows:

> Hesperus (= Phosphorus) is (are?) two objects in the world described by the sentences. It is not just that 'Hesperus' and 'Phosphorus' are names of different objects, for that is easily enough understood. The problem is that in this world Hesperus (= Phosphorus) is not Phosphorus (= Hesperus). That cannot be understood at all.[11]

There is something suspicious about talking about "metaphysical impossibility" in the case of someone having a mistaken belief about identity between two proper names. The assumption behind the concretist account is that belief contents represent states of affairs, and that belief contents that are impossible represent *possibly existing* states of affairs that are impossible. But this does not

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[9]$\forall x \forall y (x = y \rightarrow \Box x = y)$ is, if we accept Leibniz' law, a theorem of modal logic and should thus be believed by any agent, making it a case of logical omniscience. However, as was explained in the previous sections, it is not a matter of pure logic that we can proceed to the instantiation $a = b \rightarrow \Box a = b$ where a and b are ordinary proper names. This is an empirical matter, distinguishing it from knowledge of logical truths. To justify the move from necessary identity to necessity of identity statements between names *in doxastic or epistemic contexts* would need a metalinguistic argument in the style of Kripke's analogous argument for alethic contexts. As the Hintikka-Kripke problem shows, it is much more controversial if there if any such argument can plausibly be given.

[10]Linsky 1979: 93.

[11]Ibid.: 92.

seem completely proper way to talk about issues that are, in the end, semantic. In order to get from non-necessary identities between names to splitting objects, one has to assume that names are directly referential in the strongest sense, i.e., in the sense that *they contribute nothing else to the proposition they are embedded in than their designated objects*. But this, as we saw, cannot be simply taken for granted, and it is not even clear whether Kripke would have agreed with this definition of direct reference.[12]

Without taking a stand on the metaphysical issues which may or may not be present in the problem, the whole idea of "special semantics" for doxastic logic gets troublesome when one considers mixed modal contexts. The problems in interpreting such contexts show why there cannot be "special" semantics for propositional attitudes, since there is no possibility of combining such semantics with "normal" alethic semantics in a logic that contains both types of operators. Since it is theoretically dubious to have a separate semantics for alethic mixed-context cases, an approach that can give a unified account of alethic logic both on its own and as a part of a multimodal system is preferable. I will argue that an approach that gives up universal rigidity of proper names is better than an approach that maintains rigidity but uses unarticulated constituents to explain issues with doxastic and mixed contexts. My argument will have more to do with Kripke's conception of rigidity than the idea of unarticulated constituents *per se*; however, one such account and its problems will be briefly considered in the following section.

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[12]Holliday and Perry (2014) seem to argue that the only alternative to the concretist approach of the problem is the *interpretational* (as opposed to the *representational* approach that they take Linsky to describe) interpretation (see Etchemendy 1990), i.e., that the problem is only about the possible uses of language. As Kripke insists, the talk about modalities cannot be talk about possible languages. Although I agree about the "representational" character of alethic modalities, I am doubtful whether this black-and-white distinction between heavy concretism and any other kind of account is correct, and whether there is a way to make a clear-cut division between "the world as it stands" and "the language". In any case, the account I am going to present shares many similarities with Holliday and Perry's semi-descriptivist theory, which will also be briefly introduced, and thus probably falls outside the scope of their criticism.

2.2 Mixed Modalities and Unarticulated Constituents

When doxastic and alethic operators are combined in a sentence, names in alethic contexts seem to inherit features from names in doxastic contexts when embedded in such a contexts. Consider two examples:

(12)   It is possible that John believes that Hesperus is not Phosphorus.

(13)   John believes that it is possible that Hesperus is not Phosphorus.

(12) is not problematic for special semantics theories. If it is formalized as $\Diamond B_j Hesperus \neq Phosphorus$, then it says that in some metaphysically possible counterfactual situation, in all of the belief-worlds accessible to John, Hesperus is not Phosphorus. Because such theories would allow for the existence of such worlds, however they are interpreted, the sentence is perfectly acceptable. Sentence (13), on the other hand, cannot be formalized as a satisfiable sentence. A formalization corresponding to the logical form of (13), $B_j \Diamond Hesperus \neq Phosphorus$, says that in all of John's belief-worlds, there is some alethically possible world in which Hesperus is not Phosphorus. But the special semantics theory denies the existence of *such* impossible worlds. Clearly John can have such a belief, and therefore there has to be something wrong with the special semantics approach to bimodal contexts.

The conclusion of considering these types of examples is clear: one has to either accept that names are rigid all the way, or possibly non-rigid with respect to both alethic and doxastic worlds. Interpreted in the standard way, the first option was shown to be highly counterintuitive and logically problematic. The second option involves denying the *de jure* rigidity, as well as *de facto* rigidity, of proper names across the board. There is a third possibility that has not yet been considered. This approach maintains rigidity in alethic and doxastic contexts but nevertheless avoids the Hintikka-Kripke problem by appealing to speakers' "cognitive fix" being a part of a belief sentence. In a recent article, Holliday and Perry formalize a system that is based on the idea of such unarticulated constituents in belief statements.[13] The main idea of Holliday and Perry's is that what contributes to the Hintikka-Kripke problem is that the standard for-

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[13]Holliday and Perry 2014.

malization of doxastic statements erroneously omits an irreducible unarticulated constituent to beliefs which is the cognitive fix of the believer.

This idea is familiar from Perry's work on roles or role-networks. Crimmins and Perry have earlier characterized cognitive fix as that which is attempted to be captured by notions such as senses, mental files, or language of thought, all of which "[reflect] a firm intuition about the mind, namely, that having beliefs about an individual means having beliefs involving an internal something that is one's cognitive "fix" on the individual."[14] However, Holliday and Perry argue that rejecting direct reference of proper names is too high a price for intensionalizing belief, and instead aim for a solution that can maintain the best of both worlds.

The proposed solution divides doxastic logic into two levels. First of all, there is the world as it stands, represented by the commonly agreed use of language. Then there is the subjective viewpoint of the agent, contributing to how he interprets the world. The authors' objective is to retain the semantics of alethic logic in their bimodal solution while altering the syntax for belief statements to explain the cognitive fix.

Holliday and Perry utilize Fitting's interpretation of intensional logic to formalize these ideas.[15] Their bimodal intensional model structures for quantified modal logic are of the form $\mathcal{M} = \langle W, R_a, R_d, D_o, D_i, I \rangle$. They are exactly like the normal modal models, except for the added intensional domain D_i of functions from W to D_o.[16] Furthermore, there are two accessibility relations R_a and R_d representing alethic and doxastic alternatives respectively. It is crucial that all doxastically possible worlds are also assumed to be alethically (metaphysically) possible. The system has two kinds of variables to be quantified over, objectual variables and intensional variables or role variables, as Holliday and Perry call them. Object variables x_i are given an assignment $\mu(x_i) \in D_o$ and intensional

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[14]Crimmins and Perry 1989: 694.

[15]Fitting 2006. For the sake of consistency with the rest of the thesis, my notation follows Fitting's; the differences to Holliday and Perry's system are superficial.

[16]This kind of structure of intensional logic for Kripke models has been used by many recent logicians, e.g. Fitting and Garson; e.g. Montague has worked in slightly different models but by the same principle (see Garson 2005, Montague 1970). The same idea dates back to Carnap's conceptual framework of modal logic (see Carnap 1947), although its original structure has been given up for the more convenient possible world semantics of Kripke and Hintikka.

variables f_i some $\mu(f_i) \in D_i$. Interpretations of names are always *individual objects*, i.e., $I(c) \in D_o$. Similarly, all predicates only contain objects as in normal objectual models, except for the denotation predicate, which is a binary relation of the type $D(t_i, f_i)$ where t_i is a name or an object variable and f_i is an intensional variable. This is interpreted by Holliday and Perry as "the term t_i plays the role f_i for the agent". The fact that the interpretation of a name is always an object is especially crucial to their system. It reflects the idea that proper names stay rigid in doxastic logic as well as alethic logic. Truth conditions for the language are as in a normal quantified modal logic, and intensional quantifiers work exactly in the same way with respect to the domain of intensions as objectual quantifiers do with respect to the domain of objects.[17]

As we can see, Holliday and Perry's approach keeps the semantics of objectual quantification intact, adding only a layer of intensional variables on top of it. In their logic, the only genuine terms are names and object variables, with intensional role variables only occurring in the denotation predicate. However, proper names do not feature independently in any belief statement: they are always paired with an intension by the denotation predicate. In order for the agent to have a belief about some thing or person, that thing or person has to play some role for the agent. Because of this, there is no longer any need to postulate impossible worlds in order to make sense of the Hintikka-Kripke problem. What is a doxastic possibility can be a metaphysical possibility as well.

Because of the uniform rigidity of names in alethic and doxastic logic, Holliday and Perry's system has no problem in interpreting mixed sentences. The translation of (13), in their language, would be roughly equivalent to

(14) $\quad \exists f \exists g (D(Hesperus, f) \land D(Phosphorus, g) \land B_j \lozenge \exists x \exists y (D(x, f) \land D(y, g) \land x \neq y))$

The formula is rather complicated, but it is perfectly consistent with "Hesperus" and "Phosphorus" being rigid designators and John holding the belief that the stars are not identical.

In other words, the solution manages to retain the rigidity of names in all contexts while allowing for the cognitive fix of agents. But this indepen-

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[17]For a more detailed description, see Holliday and Perry 2014.

dence of proper names of intensional variables comes at a price. In Holliday and Perry's logic, since sentences such as *Hesperus = Phosphorus → B_aHesperus = Phosphorus* are valid, it is still doxastically necessary that Hesperus is Phosphorus, even if the agent did not believe it. The fact that there are such statements containing "bare" names is a direct consequence of the fact that alethically possible worlds overlap with doxastically possible worlds. These bare names, despite occurring in some doxastically necessary statements, do not mean anything for the agent unless they are paired with an intension. In short, doxastic necessity by itself no longer means belief.

This problem resembles the difficulty of wide-scopism described earlier. Both syntactic solutions raised question about seemingly valid propositions that do not appear to have an interpretation in the system. Neither wide-scopists nor Holliday and Perry would like to say that such forms are somehow forbidden. But to say that they simply lack meaning is not a particularly satisfying solutions. If bare names have no role in doxastic statement, then why even use them there?

Holliday and Perry obviously acknowledge the seeming weirdness in the idea, but they argue that it is nevertheless not necessary that there should be a one-to-one correspondence between ordinary language sentences and sentences in logic. They quote Lewis: "why must every logical form find an expression in ordinary language?"[18] Their problem, however, is not as innocent as the quote makes it seem. The question is, is there *any* real function for bare proper names? On the basis that they do not ever feature *in beliefs*, it is fair to say that there is not. Whatever semantic role they claim to have is redundant in doxastic logic: the denotation predicate could be eliminated in favour of interpreting names as intensions, for that is how they essentially operate in belief statements.[19] In addition to the problem of bare names in doxastic contexts, Holliday and Perry cannot explain how their role functions relate to the alethic part of their logic. In effect, their alethic logic speaks of bare names and their doxastic logic speaks of intensions, since that is what role functions paired with names, the only kind of entities

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[18]Lewis 1977: 360, quoted in Holliday and Perry 2014: 614.

[19]This is of course a solution that requires some additional conditions on the system due to its possibly containing non-rigid terms. What is relevant is that even if less simple in syntax, the semantics for such an approach would portray belief without postulating additional entities without any *de facto* function.

allowed into belief statements, represent.

The ideal of conserving *de jure* rigidity in doxastic logic while building additional layers on top of it is problematic. It seems that such systems are motivated only by the desire to assimilate and merge doxastic logic to the more simple and straightforward form of alethic logic. This creates artificiality and semantic slack, as shown in Holliday and Perry's system. They avoid non-rigid names for the fear of giving up the theory of direct reference. At the same time, they are tempted to retain the less troublesome part of the description theory, namely the first thesis of intension being the cognitive content of the name, while rejecting the stronger thesis that intension determines the reference of the name. While the theory is clearly better than the special semantics descriptivism, its semantic problems could be seen as an indicator that maintaining *de jure* rigidity of proper names is perhaps a misled goal.

I suggest that this goal should be given up. To see why it is safe to do so, we must return to the root of the problem with rigidity. The metalinguistic argument of Kripke's is very compelling and seems to describe our modal intuitions correctly. However, the conclusion usually drawn, that names need to have rigidity built into their semantics, does not simply follow from the plausibility of the argument itself. As I mentioned earlier, these "direct intuitions" need to be separately justified. While it is true that the standard way to use names in (alethic) modal reasoning is rigid or *de re*, this is not evidence for rigidity being an intrinsic property of names. In fact, the direct intuitions about simple sentences that are quoted in arguments against wide-scopism are based on relatively simple cases, and once one considers a wider variety of examples, the idea that names could never be non-rigid seems too strict.[20]

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[20]To clarify what has already been mentioned before, Kripke never claimed that names are rigid in epistemic contexts. All in all, he said very little about proper names in propositional attitude contexts. However, formalizations such as Holliday and Perry's seem to assume that names must be rigid in any context whatsoever, which is precisely the reason for their having to adopt additional intensional variables to make sense of apparent non-rigid occurrences of proper names.

3 Improper Names and Improper Uses

The fact that proper names are rigid designators is commonly considered to be "an empirical discovery".[1] The evidence supporting this discovery is, in essence, the metalinguistic argument introduced in Chapter 1.3. The argument is supposed to rest on our "common intuitions". While the argument indeed seems highly intuitive, it is less clear whether the intuitions in question concern the semantics or proper names or something else. Why does it seem intuitive that Aristotle could not have failed to be Aristotle? The further claim that there are intuitions about the rigidity of names in simple sentences is less obvious than the initial argument. Many philosophers, often descriptivists, have consequentially accepted *de facto* rigidity (which is what is proven by the metalinguistic argument) more easily than *de jure* rigidity.

To which extent one can take linguistic intuitions of native speakers - or linguists and philosophers of language - as straight evidence about semantics is a difficult issue. They are important, but it is not always the case that speakers can correctly identify their theoretical intuitions about some linguistic issue. Therefore it is important to explicate the intuitions in the metalinguistic argument (and further "direct intuitions") first in terms of which types of sentences would be accepted by speakers, and then which semantic explanations they give for the acceptability or unacceptability. It is clear that the former can be taken as more reliable than the latter, and that if the two clearly conflict, then it is probably the latter that is erroneous.

My aim is not to deny the existence of correct semantic intuitions of proper names and modal contexts; that would require a much longer study in philosophy of language and linguistics. However, if there were intuitions about *non-rigidity* in simple or modal sentences, it would directly challenge Kripke's and Soames' claims. In particular, if there were *non-theoretical* speaker intuitions about the correctness of non-rigid uses of proper names, this would provide a strong case against Kripke's and Soames' further intuitions about simple sentences. The aim, then, is to examine the evidence supporting non-rigid or "non-referential" uses of proper names in rather natural contexts other than propositional attitudes.

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[1]Stanley 1997a: 555.

Showing that names allow for non-standard uses like this is an important part of the main argument of this thesis, since it will give the justification of separating between two modes of evaluation, rigid and non-rigid, for proper names in modal contexts. If speakers truly had reliable intuitions about the intrinsic rigidity of proper names, then there could not be any non-rigid interpretation of them. But there are many ordinary cases where there is some degree of indeterminacy about the referent, and thus also natural non-rigidity. Many of these examples have been called "non-referential" or "attributive" uses of proper names, analogous to the attributive use of descriptions. It is not certain whether this is an analogue that is perfectly accurate, and whether these examples can then be used as a refutation of *direct referentialism* has been questioned in the literature. I believe that the perceived non-referentiality (or, as I would prefer, indeterminacy of reference) of such uses of names comes from their presumed non-rigid modal profile. Regardless, this kind of examples show that our direct intuitions of *rigidity* are not always so clear.

3.1   The Metalinguistic Argument Revisited

The first "intuitive test" involving Nixon in "Identity and Necessity", and the similar example in *Naming and Necessity*, concern speakers' intuitions about proper names in explicitly modal contexts. In the preface to *Naming and Necessity*, Kripke also claims that there are similar intuitions with respect to names in *simple*, non-modal sentences.[2] But are there? While it was hard to argue against the intuitions about rigidity in alethic modal contexts, the case at hand is far less clear. Dummett, against whom Kripke's criticism was mainly targeted, simply denied the existence of these intuitions.[3] Even if Dummett's response was perhaps unfair, Kripke does demand quite a high level of sophistication from ordinary speakers, and his second argument has not been accepted by everyone.

The modal argument against wide-scopism relies exactly on the second type of intuitions. When Soames[4] adds the "it is necessary that" in front of the simple sentence, he presupposes that the speaker can actually read the name in a narrow scope and express his intuitions about *that* case. But this is just to pre-

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[2]Kripke 1981: 12-14.
[3]Dummett 1981: 582.
[4]Soames 1998.

suppose that speakers do have direct intuitions about proper names in simple contexts. If they did not, one could say that speakers interpret the narrow-scope constructions in wide scope.[5] Therefore it is not clear whether the argument in fact proves, without any sort of circularity, the existence of direct intuitions about proper names.

Do speakers - apart from Kripke and Soames themselves - indeed have these intuitions? If they truly do, can they be trusted at face value? There is an extensive literature on speaker intuitions as evidence in general linguistics.[6] What is the role of intuitions as linguistic evidence is a difficult question. To take an example from linguistics: on one hand, questions such as what constitutes a grammatical sentence are, and should be, weighed in terms of native speakers' intuitions. On the other hand, interpreting such intuitions is very difficult. It is one thing to trust a native speaker when he calls a sentence ungrammatical, and another to trust his explanation of *why* it is ungrammatical. Speakers are not necessarily capable of making highly theoretical distinctions between semantics of names and semantics of modal contexts in general, distinctions between pragmatic and semantic issues and the like.[7]

A native speaker's semantic intuitions are important data, but whether they should be taken "at face value" is not as clear. Cohnitz and Haukioja make a useful distinction between (ordinary people's) intuitions having an evidential or constitutive role.[8] People's intuitions with respect to physics might convey some correct information of how middle-sized physical objects work, but giving these intuitions a *constitutive* role would amount to a theory of folk physics, which is not a particularly fruitful theory. Even the intuitions of the experts - linguists, physicists, and so on - should be used as a starting point for inquiry and subject to careful evaluation as further evidence is collected. Kent Bach draws an instructive analogy:

> To "preserve intuitions" in our theorizing about what is said would be
> like relying on the intuitions of unsophisticated moviegoers about the
> effects of editing on a film. Although people's cinematic experience is

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[5]Due to it being the convention. This is what was suggested in Sosa 2001.

[6]See e.g. Fodor 1981, 1998; Schütze 1996; Devitt 2006.

[7]Bach 2002a, 2002b.

[8]Cohnitz and Haukioja 2015: 620-621.

dramatically affected by such factors as cuts and camera angles, there is no reason to suppose that their intuitions are reliable about what produces what effects. Intuitions about what is said may be similarly insensitive to the difference between the contribution that is made by the semantic content of a sentence and that made by extralinguistic factors to what an utterance communicates.[9]

Interestingly, as Bach notes, speakers' insensitivity to theoretical differences is referred to by both Salmon and Soames as a reason why substitutivity seems to fail in propositional attitude contexts.[10]

The moral is, perhaps, that one should not put too much trust on theoretical intuitions. As expressed by Fodor: "informants, one-self included, can be quite awful at saying what it is that drives their intuitions. [...] It is always up for grabs what an intuition is an intuition of."[11] Furthermore, what intuitions - theoretical or not - people have about a particular case might vary depending on how much information they are given about the case.[12] One should be cautious when citing intuitions as evidence, be they theoretical (semantic) or direct. Nevertheless, linguistics has to be based on empirical evidence. The best basis for evidence about the correct theory of reference (or modalities) is more likely to be found from the *use* of names, not in how people *think* they use them (i.e., which theory of reference they prefer). As Martí notes, even if Russell and Mill disagreed about the correct theory of reference, they nevertheless have used language in exactly the same way.[13]

The direct evidence that the "intuitions" about the metalinguistic argument seems to establish is at least this. It is rather clear, even without empirical data, that speakers tend to see sentences such as "n might have not been n", where n is name, false and sentences such as "n might have not been d", where d is an actual description of n, usually as true. No other types of statements are mentioned in the argument itself. It is in fact interesting that Kripke does not consider examples with different but co-referential names, such as "Aurore Dupin" and "George Sand", in his metalinguistic argument. Do we have such clear intuitions about

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[9]Bach 2002b: 24.
[10]Bach 2002a: 86. See e.g. Salmon 1986, Soames 2002.
[11]Fodor 1998: 86. Quote in Bach 2002b.
[12]Williams 2001: 15-16.
[13]Martí 2009: 45.

"Aurore Dupin might have not been George Sand"? In Kripke's defense, it could be said that there are few people who have several different names (nicknames aside), and *noms de plume* are, in a sense, a special case. In any case, our intuitions should also generally confirm that "*n* might have not been *n'*", where *n* and *n'* are two coreferential names, is false.

This picture, however, might be too simplistic. In the next section, I will examine a variety of cases of "deviant" uses of proper names that do not conform to Kripke's and Soames' direct intuitions. Moreover, these cases go beyond the usual suspects of descriptive names and propositional attitudes. It has been acknowledged by most philosophers that the so-called "descriptive names" do not function quite like ordinary proper names, but this together with the artificiality of most example cases has led many to deny that descriptive names are a subtype of proper names in the first place. But the fact that the most ordinary proper names can have improper uses cannot be explained away in the same manner. I will argue that in the face of this evidence, the right thing to do is to give up the rigidity requirement of proper names themselves and turn to the semantics of modal contexts, which is where the problem originated in the first place.

3.2   Using Proper Names Improperly

An additional issue with many examples of the direct referentialists, even when considered solely from the point of view of language use (such as the basic metalinguistic argument), is that they are quite narrow and rather simplistic. As Bach notes, "referentialists tend to survive on a lean diet of examples".[14] A majority of the most famous examples in the literature concern people's given names, and many less orderly types of proper names are disregarded. Unfortunately, also the examples that are intended to oppose the common view of proper names, such as descriptive names, are often rather artificial.

Many of the earlier arguments against rigidity have used what could be called improper names as an example, perhaps because the inventors of those arguments have been more focused on attacking the new theory of reference and not the idea of rigid designators *per se*. Their aim is to show that there is a subcategory of proper names that simply have to have descriptive semantic content.

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[14]Bach 2002a: 77.

The best known examples concern descriptively introduced names, e.g. Evans' Julius.[15] Linsky has noted that there are plenty of in-between proper names that have descriptive elements, such as "The Pope", "The Holy Roman Empire", "George IV", "*War and Peace*", and "∅" used as a name for the empty set.[16] There are some types of names that lack other features common to descriptions but also lack *de jure* rigidity. The earlier example of *noms de plume* and the case of arbitrary names - *if* they are indeed names - are like this.

However, many examples of descriptively introduced names are rather artificial - besides the few real-life examples such as Leverrier's "Neptune" and "Jack the Ripper" - and have been thought to be a marginal issue.[17] Moreover, it is not obvious whether these names should really be treated as proper names and not truncated descriptions.[18] Indeed, there still seems to be a quarrel about the status of descriptive names.[19] Maybe the distinction between descriptive, improper and proper names is vague: maybe there are genuinely proper names, some name expressions that are in fact descriptions, and some terms that are a mix of both. Maybe non-rigid improper names fall into one of the latter categories. But the aim of this chapter is not to show that there might be some class of (quasi) names that are non-rigid, but that no name is intrinsically rigid. From this point of view, the interesting phenomenon is that even the most proper of proper names can be used in improper ways, and not only in attitude ascriptions but in simple sentences as well.

Given names of people are one of philosopher's favourite examples, perhaps because such names rarely have improper features (in the sense just described). Nevertheless, the referential/attributive distinction[20] that was supposed to distinguish definite descriptions from names and demonstratives, seems

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[15]Evans 1982.

[16]Linsky 1977: 69.

[17]See e.g. Kripke 1981: 79-80; Evans 1982: 48.

[18]There are some reasons to avoid translating descriptive names as descriptions, e.g., the situations where the referent of a descriptively introduced name also becomes known by acquaintance. But the problem seems to be the same with to the whole idea of descriptive names having (reference-determining) descriptive content. Récanati (1993: 177–180) argues that because of this, descriptive names cannot be essentially descriptive: it would be absurd to think that "Neptune" would somehow radically change its meaning after its discovery.

[19]See e.g. Jeshion 2004, Reimer 2004, Kanterian 2009.

[20]See Donnellan 1966.

to also be present in the uses of all kinds of proper names[21] *and* demonstratives.[22] Martinich argues that there are indeed attributive uses of names that exactly fit Donnellan's original criteria, such as "Jane Smith" in the following sentence

(15)   Jane Smith has won the grand prize.

in the context of the drawing for the grand prize where the chairman of the raffle committee announces the winner.[23] He could as well say "Jane Smith, whoever she is..." The occurrence of "Jane Smith" is essential in the sense that it could not be replaced by any other descriptive expression, and thus fits Donnellan's condition for attributive use. It is essential because the only description that could possibly take its place is "the winner of the grand prize", but making the substitution would render a clearly meaningful sentence and an *a posteriori* fact an *a priori* one.

It is not particularly exceptional for names to occur with indeterminate articles ("I know a Jane Smith") or even as count nouns ("I know four David Kaplans"[24]). Consider, for another example, the following conversation:

(16)   (Looking at a guest list) It seems that François Hollande, whoever he is, is going to come royally late tonight.

(17)   Do you mean *the* François Hollande?

(18)   No, for heaven's sake, it must be another François Hollande.

These cases illustrate the fact that there are different types of legitimate non-referential uses of proper names that do not fit the common picture of proper names as something that only contribute their actual designated object to any proposition, that is, they do not fit the picture of rigidity and direct referentiality in the strong sense. Again, it can be objected that these are, as well, shorthands for descriptions. But in some cases, like Martinich's example, it seems that there simply is no available description that could be substituted for the name. Given that almost any name can be used in the ways exemplified above, another expla-

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[21]Martinich 1977, Devitt 1981.

[22]Bezuidenhout 1997.

[23]Martinich 1977: 161.

[24]The latter example is from Bach 2002a.

nation needs to be given. The explanation I want to suggest is that rigidity is a part of the semantics of proper names. This would explain why, even if speakers might have intuitions about the rigidity of names in alethic contexts, there are not always intuitions about their rigidity in simple sentences.

Of course, all of this could be explained in pragmatic terms. But the fact that the above examples are reasonable does establish that the "direct intuitions" referred to by Kripke are not universally true. The pragmatic account would then have to explain why, even if the speakers do not have any direct intuitions of rigidity, and even if they used language as if they did not consider proper names intrinsically rigid, names are nevertheless rigid *de jure*. Given that pragmatic approaches already have problems with propositional attitude contexts, this attempt does not seem particularly satisfying. Pragmatics might play a role in unpredictable cases such as propositional attitudes - it seems that proper names sometimes have *de re* occurrences and sometimes occur *de dicto* - where the speaker intentions play a role in how the sentence should be interpreted. But the general division between rigidity and non-rigidity is best accounted for by building it into the semantics of modal operators.

4 Reasoning about Modalities

Kripke's metalinguistic argument is very compelling. Indeed, after the argument was introduced it seemed so obvious that names could not have descriptive content that Kripke was puzzled that Russell, for example, had held the view he did. It must have been, Kripke thought, because Russell did not consider modal questions.[1] But it seems that Kripke himself has been too quick in drawing the conclusion that names have the intrinsic semantic property of rigidity. Perhaps his line of thought was that since the argument *does* show that names cannot have classical Fregean senses, it shows that the theory of direct reference has to be right - and then it is, admittedly, somewhat natural to conclude that names have to be rigid in themselves.[2] But as we saw, the metalinguistic argument does not prove the latter thesis, and in fact there is evidence against it.

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[1]Kripke 1981: 14.

[2]Natural but not necessary. The dependencies between rigidity and direct reference will be discussed towards the end of this thesis.

What is needed to make sense of the situation, perhaps, is a change of perspective. If rigidity and non-rigidity are seen as a property of modal contexts, then the intuitions behind the metalinguistic argument can be respected without commitment to there being any further intuitions about the semantic status of proper names in simple sentences. Glüer and Pagin, whose framework is used a basis for the account to be constructed in this chapter, sum up the situation as follows:

> We agree with Kripke that in ordinary modal thinking we operate with concepts of *de re* modality. That is, we are interested in the objects we refer to, no matter how they are designated. [...] The intuitions made use of in Kripke's modal argument testify to this feature of ordinary modal reasoning; these are data to be accepted and explained by any good semantic theory. However, we do not agree that the best way of explaining them is by means of a thesis concerning (nothing but) the intension of *names*. The observed phenomena, we claim, are essentially due to the *de re* nature of ordinary modal thinking and are, therefore, better explained in terms of a semantics for *modal expressions*.[3]

Glüer and Pagin's own works[4], while giving a very useful semantic system, do not go very deep into the actual mechanics of modal contexts. They admit that the unpredictability of the behaviour of proper names in certain contexts has something to do with speaker intentions, but they do not press the issue further. A philosopher who did make these intentions the cornerstone of his logic of belief was Jaakko Hintikka. In order fill in the details in Glüer and Pagin's program, it is useful to start with an exposition of Hintikka's theory of individuation. While the theory has difficulties when treated as a theory of all modalities, it offers a good explanation for the somewhat erratic behaviour of names in propositional attitude contexts. Hintikka's view, which paid plenty of attention to speaker intentions, can be used to complement Glüer and Pagin's theory to make it richer and more explanatory. Furthermore, I will attempt to explain why the theory of individuation is, in the end, not relevant in alethic contexts. This should be all

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[3]Glüer and Pagin 2006: 508.
[4]Glüer and Pagin 2006, 2008.

that is needed for reconstructing Hintikka's ideas as a part of the pragmatics for the semantic framework of relational modalities.

4.1   Relational Modalities

The core idea of relational modalities or "switcher semantics" is that rigidity is to be explained in terms of evaluation in modal contexts.[5] Proper names and other such terms, as Glüer and Pagin put it, "interact with (*de re*) modal operators in a peculiar way".[6] On a technical level, this means that proper names have two evaluation functions when - and only when - it comes to modal contexts. The two modes are called the *standard* or *possible-world* evaluation and the *actualist* evaluation. The different truth conditions for atomic sentences in the two modes of evaluation can be expressed in standard relational semantics as follows:[7]

(P) $M, w \vDash P(t_1, ..., t_n)$ iff $\langle I(t_1, w), ..., I(t_n, w) \rangle \in I(P, w)$

(A) $M, w \vDash P(t_1, ..., t_n)$ iff $\langle I(t_1, a), ..., I(t_n, a) \rangle \in I(P, w)$

In simple terms, the possible-worlds mode of evaluation picks out the referent of a name with respect to each possible world. In the actualist evaluation, the referent is picked from the actual world and kept constant with respect to other possible worlds, although whether it belongs to the intension of the predicate varies from one world to another depending on the intension of the predicate *in that world*.[8] According to Glüer and Pagin, the possible-worlds mode of evaluation is always used for evaluating simple sentences. This is why the authors call it "standard evaluation". The alternative term "possible-worlds evaluation" will be used here, but it is important to keep in mind that this mode of evaluation is indeed the more basic of the two. Modal operators function as evaluation switchers in the sense that they can turn on one or another mode of evaluation. Glüer and Pagin argue that the alethic operators turn on actualist evaluation and the usual propositional attitude operators possible-world evaluation. Therefore

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[5] Glüer and Pagin 2006, 2008, 2012.

[6] Glüer and Pagin 2012: 161.

[7] See Appendix II for a more detailed presentation of models for relational modalities.

[8] This, Glüer and Pagin (2008: 312) note, distinguishes their actualist evaluation from simply applying an actualist operator to the sentence.

in alethic contexts, as Kripke argued, names do occur referentially. It is only the mechanism behind this that Kripke and the two authors disagree.

Glüer and Pagin are very neutral with respect to the correct theory of meaning. The relational modalities framework is obviously well-suited to combining descriptivist features with the direct reference theory. However, the authors do not commit to any particular view about the descriptive content of proper names.[9] They do not explain what determines the possible-world intension of a proper name. The authors should not be blamed for these reasons, as it is their intention to give a very general framework applicable to different theories of meaning and reference. One could argue that trying to maintain the theory of direct reference is pointless if proper names are proven not to be rigid and that therefore the theory of relational modalities requires a descriptivist conception of meaning. The question of meaning will be considered in the end of the next chapter; so far, no presuppositions about the correct theory of meaning will be made.

The relational modalities view is obviously not compatible with the idea of many direct referentialists that proper names are intrinsically rigid. This view was already challenged in the previous chapter. It also differs from Kaplan-type direct referentialism in that it defines the ordinary reference of a name as its possible-world intension. This difference is not apparent when simple sentences are evaluated in the actual world, but it does show if different possible worlds are considered. I do not see this issue as particularly interesting from metaphysical or from technical perspective. It simply underlines the view that Glüer and Pagin hold about semantic properties of proper names: they do not include modal properties. The semantic profile of proper names themselves only has to do with this one world and not any possible referents in other worlds. Interestingly, the account seems to be compatible with Stanley's[10] interpretation of Dummett's idea of assertoric content and ingredient sense, which was based exactly on the idea that different contents are evaluated in simple and in embedded sentences.

The mechanics of modal operators as evaluation shifters is not fully explained in Glüer and Pagin's articles. The reason is that while alethic contexts,

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[9]In Glüer and Pagin 2006 the authors do postulate that linguistic meaning could be represented as a pair of actualist and possible-world intensions. They do not go further into discussing the nature of this meaning.

[10]Stanley 1997a, 1997b.

as can be seen from the metalinguistic arguments, tend to turn on the actualist evaluation as a rule, propositional attitude contexts and mixed contexts are much more unruly. When discussing mixed contexts, Glüer and Pagin note that they tend to be unpredictable in whether co-referring names are intersubstitutable "in mixed contexts, you sometimes can substitute, while at other times you cannot."[11] In a footnote, they further speculate that pure doxastic contexts are unpredictable like this, and dependent on speaker intentions as well.[12] This indeed seems to be the case. Suppose John happens to know that Hesperus is Phosphorus. Then it seems perfectly fine to go from

(19)   John believes that Hesperus is bright.

to

(20)   John believes that Phosphorus is bright.

Glüer and Pagin note that substitutability can be restored by wide-scope interpretation. But as it stands, they give no way to predict the correct interpretation of scope reading for such contexts, and only suggest that the indeterminacy arises from the fact that speaker intentions are involved in determining the right interpretation. They consider the issue no further.

A few questions arise here. What are the speaker intentions referred to? Why exactly do names fail to refer rigidly in propositional attitudes? And is this kind of framework directly inconsistent with the theory of direct reference? The objective in the rest of this thesis is to complement Glüer and Pagin's framework with an account of individuation which connects to both the general level of evaluation and to the speaker intentions that determine the right interpretation of propositional attitudes and mixed modal contexts. Furthermore, I will show how this type of account manages not only to give a solution to the Hintikka-Kripke problem, but also to the counterexamples to intrinsic rigidity that were introduced in the previous chapter.

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[11]Glüer and Pagin 2006: 524.

[12]Glüer and Pagin 2006: 524 (footnote 25).

4.2 Trans-World Identity and Knowing Who

In order to explain why rigidity fails in propositional attitude contexts, I will have to go back to Hintikka's early writings on modalities. Kripke and Hintikka disagreed on whether the problem of "trans-world identity" is relevant to modal logic. How can we "track" an object that is an inhabitant of several possible worlds? Kripke thought of this as a pseudo-problem, "putting the cart before the horse."[13] The objects, he argued, are there exactly because we stipulate, on the basis of the actual world, that they are there.[14] In alethic logic, this does make sense. But Hintikka's viewpoint, unlike Kripke's, was always epistemic to a degree. In doxastic or epistemic logic, the picture is not as clear as Kripke suggests. Suppose I have a belief about Emmy, but I am not certain about who she actually is: I know that she is one of the few women in my math class, but I do not exactly know which one. If I want to entertain a belief about Emmy, I cannot *stipulate* that some particular person exists in all different belief-worlds of mine, because there is no one object about which to make a stipulation. This case bears some resemblance to the examples presented in Chapter 3.

Hintikka's solution was to make the "knowing who" an essential part of modal reasoning. This identifying of a person or a thing, often called "individuation" by Hintikka, is a key concept in his theory of modalities.[15] One cannot have a belief about an individual unless he has successfully identified this individual, i.e., he knows who this individual is. If he cannot identify the individual, he picks out different things in different possible worlds, in which case the "individual" referred to is ill-defined (and probably cannot even be called an individual in the usual sense of the word). Successful individuation, so to speak, allows to connect the dots representing the manifestations of an individual in different possible worlds.

Individuation is relevant because individuals, Hintikka maintained, are not simply given to us. The borderlines of bare physical objects do not necessarily correspond to what we call individuals; and this fact becomes crucial when dealing with individuals in non-actual states of affairs. We cannot, he notes "ob-

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[13]Kripke 1981: 42-44.

[14]Ibid.: 44.

[15]The most important thoughts of Hintikka from 1960's to 1970's are covered in Hintikka 1962, 1969, and 1975.

serve bare particulars, only particulars clothed in their respective properties and interrelations."[16] Kripke's picture of modal logic is that constant terms directly pick objects from a pool which is shared by all possible worlds. Moreover, the underlying assumption is that once an object is named, the name sticks to the object itself, which, as a member of several possible worlds, carries that intrinsic label throughout all the different worlds. But this is, according to Hintikka, too simplistic. Worlds might come with a certain physical structure, but they do not come with a predefined stock of individuals. Hintikka's view could be called a type of relativity of ontology. Similar thoughts have been expressed by e.g. Wittgenstein[17] and Searle,[18] although neither author was as heavily focused on modalities as Hintikka.

According to Hintikka, the plurality of possible worlds of which an objects might be a member of blurs the correlation between individuals and objects in modal logics.[19] When quantifying into a modal construction, there is multireferentiality, i.e., the individual that is quantified over actually consists of several manifestations of the object in different possible worlds. Hintikka argued that this problem plagues any modal logic, including alethic logic. His solution was to make syntactically explicit the condition on which one can quantify into a modal context.

Briefly put, Hintikka's basic system does not have constants that are rigid by default. Only terms whose referents are individuated or identified in every accessible world, function "rigidly". Let us take doxastic logic as an example. The referent of some name n is well-defined for an agent a when

(21) $\exists x B_a x = n$

holds.[20] The expression (23), according to Hintikka, might be said to mean "a has an opinion about who n is" or "a is certain about who n is". The alethic analogue, $\exists x \Box x = n$, would restore well-defined reference in those contexts. Obviously, this causes problems with the classical quantifier rules, but so does the varying

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[16]Hintikka 1970a: 410.

[17]Wittgenstein 1953, e.g. §§27-36.

[18]Searle 1995: 160.

[19]Hintikka 1969: 97-98.

[20]Note that this does not guarantee that there is something that actually is n, or that a has correctly identified n. It only means that he has individuated something that he believes to be n.

domain condition in general. Like with the latter, the rules can be augmented, e.g. $\forall x \Box^n \varphi, \exists x \Box^n x = c \vdash \Box^n \varphi[x/c]$, where n is the number of box operators preceding the non-modal formula α, can be used as a rule of universal instantiation for modal formulas.

Obviously, this is not the same idea of rigidity as Kripke's conception. Hintikka's idea of an individuating function, which is supposed to be a representation of an individual with respect to a set of worlds can be expressed by $\exists x (\Box^i x = b \wedge ... \wedge \Box^k x = b)$. This function gives a well-defined individual with respect to a set of worlds and sentences containing an occurrence of b under $i, ..., k$ modal operators. But Hintikka still cannot capture the notion of rigidity of the direct referentialists. As Sandu[21] points out in a short critique of his and Hintikka's earlier article "The Fallacies of the New Theory of Reference", a definition of rigidity by the presupposition that the name necessarily refers to whatever it refers to is still context-sensitive in the way that Kripke's conception of rigidity is not.[22]

This is perhaps non-problematic in doxastic contexts, since the only kind of rigidity that is really wanted is precisely the kind of "local rigidity" that (21) guarantees. Having universal rigidity of proper names is what led to the Hintikka-Kripke problem. I will soon explain why I think that the mechanism of individuation is needed only in the case of propositional attitudes, and leave the problem unattended for the time being. I will now turn to Hintikka's definition of the mechanism of individuation instead.

4.3   Mechanisms of Individuation

In his early works, Hintikka does not give a unitary account of how successful individuating or cross-identifying in fact happens. The basic idea of his seems to be that in order to speak of a well-defined individual, one has to identify that individual in all his accessible possible worlds by cross-comparison. It is in many ways similar to identifying and re-identifying the same person at different moments in time. On one hand, Hintikka writes that while it is obvious that people

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[21]Sandu 2006: 549.

[22]It is perhaps easiest to picture this on a more formal level. Consider some model in a non-cohesive frame, i.e., a frame with several clusters of worlds that do not have any connections to the other clusters. Then in this model, names can be made "locally rigid" inside all the clusters but yet they might refer to different things in different clusters.

have the ability to identify something as the same individual at different times or different counterfactual situations, how people in fact identify individuals is a matter of psychology, not logic.[23] On the other hand, he does give some general criteria for individuating, often summarized as "continuity plus similarity".[24] Spatiotemporal continuity seems to be given a conceptual priority to individuation. It gives the necessary condition to individuation, much like Kant's intuitions of space and time come prior to categories.[25]

In one of his more specific characterizations of individuation, he argues that these methods "turn on such facts as bodily continuity, continuity of memory, certain obvious features of the behavior of material bodies vis-à-vis space and time (one and the same body cannot be at two places at the same time; it takes time for it to get from one place to another; it does not change its shape or size instantaneously, etc.), and many similar physical and psychological regularities."[26] He also emphasizes the idea of comparing between worlds, often taking up an analogue between individuation and comparing the characters in a *roman à clef* to real-world people, or comparing fictional characters in different novels.[27]

Hintikka's method of individuation raises plenty of questions. First of all, the idea of cross-world comparison - which is not made any more accessible by Hintikka's metaphor of comparing fictional characters in novels - as a requirement for well-defined reference seems overly complex. The nature of the criteria was also a problematic question, since it seemed to rely on there being some necessary or essential qualities on the basis of which to identify.[28] Describing the criteria was clearly problematic for Hintikka for the additional reason that "knowing who" is notoriously context-dependent.[29] Furthermore, equating *de re* with knowing who could be seen as dubious, since sentences such as "there is someone who the police do not know to be the murderer of Smith" seems to make perfect sense.[30]

Suppose, for the time being, that we accept that "knowing who" does not

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[23] Hintikka 1969: 169-170.

[24] E.g. Hintikka 1970a: 412.

[25] Hintikka and Hintikka 1989: 88-90.

[26] Hintikka 1969: 170.

[27] E.g. Hintikka 1975: 127.

[28] Chisholm 1963, 1967.

[29] See Boër and Lycan 1986 8-11.

[30] Examples like this are presented in e.g. Carlson 1988.

require comparing worlds, but rather, picking out the actual individual, as Kripke suggested. Suppose that we also accept that when the referent is *not* known, there is genuine multireferentiality. (One has not been able to single out any referent, so the indeterminacy creates multireferentiality.) Even if we accept all this (as I will argue we should), the question remains: what is it to *succeed* in actually identifying some individual? Being able to uniquely describe the thing turns out to be neither necessary nor sufficient. The fact that it is not necessary is shown by our capability to use names even if we possess a very vague description of their referents; and there is no reason why we could not be able to use them rigidly as well. One does not need to have an intimate connection to Gödel in order to refer to him specifically, or to entertain a *de re* modal thought about him.[31]

The fact that a uniquely identifying description is not sufficient can be illustrated by an example. Suppose that I happen to know that Emmy is the person who graduated from the same university as I with the highest grades last year. This is definitely a uniquely identifying description. A friend mentions that Emmy is organizing a party this weekend and I should definitely come along. Now, if I have a belief I am going to Emmy's party on Friday, can my belief be characterized as one in which the name refers rigidly? Not necessarily. For suppose that I do not know who the woman is who graduated with the highest grades. I can think of three people that might be, as far as I know, Emmy. Again, when I talk of Emmy, I do not have an intention to refer specifically to any of them.

This is perhaps why Hintikka argued that there can be different methods of individuation: it might be that I, in a sense, *do* know who Emmy is - she is the person who got the highest grades - but I have not personally identified her with any woman on my math course. A fair amount of articles and books has been written about different modes of individuation, particularly the special method of perceptual individuation.[32] Hintikka originally distinguished between the two methods of perceptual and public individuation.[33] Stretching concepts a bit, the first could be called individuation by acquaintance and the second individuation by description.[34]

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[31] Kripke 1981: 91-92.

[32] E.g. Howell 1972, Bacon 1979, Niiniluoto 1982.

[33] Hintikka 1970b.

[34] Hintikka uses these definitions in "On the Logic of Perception" (in Hintikka 1969), but he

As defined in earlier section, individuation, in general, means that one successfully locates something in his (context-dependent) cognitive framework. The criteria of bodily continuity, continuity in memory, etc., which were described earlier, were what Hintikka identified with physical or public methods of individuation.[35] Consider, however, a case in which someone perceives a man, but does not know who he is, i.e., has not publicly individuated him. In the accessible possible worlds of the perceiver, there are different people that could be identified with the man he sees. However, there is an object that can be traced through the different possible worlds for the perceiver in virtue of its occupying the same place in his field of vision. In a sense, these different individuals that could occupy the same place *are the same man* - that is, the man who is standing in front of him.[36] This kind of direct individuation is called perceptual. The individual is located with respect to some framework, but unlike with public individuation, this framework is dependent on the perceiver's visual situation. In the logic of perception, these two kinds of individuation can be represented by using two different kinds of quantifiers; the usual quantifiers $\exists x$ and $\forall x$ for public methods of individuation and $\mathsf{E}x$ and $\mathsf{A}x$ for perceptual methods.[37]

The existence of a perceptual method of individuation suggests that not only is the information needed for "knowing who" context-dependent, but that different *kinds* of information give different ways in which one can know who someone is. Many puzzles of belief arise because the believer identifies someone or something twice. Pierre knows *Londres* from the stories he has heard in his childhood; but when he moves to the city he does not realize that he has already identified it once, and thus identifies "London" for the second time, failing to see the identity of the two cities. Moreover, perhaps only acknowledging two ways of identifying, public and perceptual, is too rigid. Not all of us have the capability of visually perceiving objects. Is tactual individuation different from visual individuation? Clearly we can individuate the same thing tactually and visually, or auditively and visually; these double-identification cases happen very

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himself says that they are not completely satisfactory.

[35]Hintikka 1969: 170.

[36]Hintikka 1970b: 874.

[37]I am diverging from Hintikka, who uses the two pairs of quantifiers the other way round, i.e. $\mathsf{E}x$, $\mathsf{A}x$ standing for public individuation and $\exists x$, $\forall x$ for perceptual individuation. This is for the sake of continuity with the rest of the thesis.

often in real life.

I am not suggesting that our formal presentation of doxastic logic should be clogged with several different types of quantifiers to match the way different individuals can be identified. I am only trying to illustrate the difficulty of coming up with a neat criteria that would determine when one knows enough to individuate. It is enough to notice that when people are uncertain of the referent of the name they are using, and if they cannot rely on the existence of a linguistic background, substitution with an actually co-referential name is not possible, and so the name has to be in a narrow scope. Where exactly to draw the line between successful individuation and "not being quite certain enough" is an interesting question, but answering the question in detail is not needed to justify the principle.

In the following sections, I will try to make sense of individuation as a method of fixing the reference. My aim is to show that Kripke is right in that, in alethic contexts, it is enough to stipulate that the actual individual we are talking about exists in accessible possible worlds. This makes actualist evaluation in Glüer and Pagin's schema possible. However, possible-worlds evaluation is genuinely multireferential, i.e., different individuals are picked out as referents of a name in different worlds of evaluation. Here, the "speaker intentions" that allow us to pick the right interpretation in a propositional attitude or mixed sentence, are *intentions to individuate*. In these contexts, the wide-scope interpretation ("knowing who") resembles actualist evaluation in that what is identified is the actual individual. Once one has, so to speak, located the actual world, he can in fact stipulate the existence of the referent of a proper name in other worlds. The crucial aspect in which my view differs from Hintikka's is that I do not believe that successful individuation is *trans-world* identification. It is actual-world identification. However, when the speaker is uncertain, the name ceases to refer anything in particular and is evaluated in other possible worlds instead (narrow scope or "not knowing who"). In particular, I want to (i) clarify why individuation is not an issue in alethic contexts, (ii) how speakers can refer to individuals and (iii) when they cannot. The first question is the topic of section 4.4 and the latter two are discussed in section 4.5.

4.4 Why Speakers Do Not Need to Individuate

Identification, at some level, is necessary for reference. In fixing the reference of the name, the thing named must be a thing that can be somehow identified. Whether the act of naming is an "initial baptism" of Kripke's (criteria of identification are given indexically) or a descriptive definition (criteria are given descriptively) is not relevant. In a world where there is no telling two things apart, or where things do not tend to stay together very long, giving names makes very little sense. I take it to be obvious enough that in order to give a name, there has to be a presupposition that the thing that is named can be somehow individuated. That is, reference-fixing presupposes individuation. Even if the criteria of individuation connect directly to the individual and not the name, the link between the name and the criteria is this initial presupposition.

Even more obviously, this does not entail that the meaning of a name is its identifying description, or that this description is necessary for determining the reference. Furthermore, it is not necessary for successful reference that an individual speakers possesses such criteria of identification, as most of the names we use are defined quite vaguely for ourselves and yet refer perfectly fine.[38] It seems that identifiability is necessary for naming but identification is rarely needed for proper use of names. It is needed precisely when what is meant by a sentence becomes dependent on speaker intentions.

Identification, even if necessary for fixing the reference, is not relevant in ordinary speech. This is because our language use, and especially our use of proper names, relies on the "division of linguistic labour". This idea was originally made famous by Putnam.[39] Putnam described his "sociolinguistic hypothesis" as follows, using as an example a natural kind term "gold":

> [Speakers] engender a division of linguistic labor: every one to whom gold is important for any reason has to acquire the word 'gold'; but he does not have to acquire the method of recognizing whether something is or is not gold. He can rely on a special subclass of speakers. The features that are generally thought to be present in connection with a general name - necessary and sufficient conditions for mem-

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[38] As Kripke shows in his Gödel example: see Kripke 1981: 82-85.

[39] Putnam 1973.

bership in the extension, ways of recognizing whether something is in the extension, etc. - are all present in the linguistic community considered as a collective body; but that collective body divides the "labor" of knowing and employing these various parts of the "meaning" of 'gold'.[40]

Putnam's main point is to show that meanings are not in the heads of individual speakers. An individual speaker rarely possesses anything that could fix the reference of a term such as a proper name or a natural kind that he uses. It is rather, says Putnam, "the sociolinguistic state of the collective linguistic body to which the speaker belongs that fixes the extension."[41]

The division of linguistic labour thesis is nowadays accepted by most philosophers, descriptivists and direct referentialists alike. As Dummett has noted, Putnam does not actually argue that names could not have any kind of descriptive content, but only that, if such content exists, it is not necessarily a part of the individual speaker's knowledge but rather a part of the knowledge of the linguistic community.[42] What is clear is that a speaker can rely on the background of commonly agreed meaning or referent of the word, whatever that correct meaning or referent is based upon, even if he himself does not fully grasp it.

The fact that this kind of division of labour exists supports Kripke's idea that a speaker's having a way of individuating, or being able to uniquely identify[43], the referent is not necessary for rigid reference in alethic contexts. Moreover, the idea that the thing spoken about can be stipulated to exist in other possible worlds as well, is very plausible at this general level of language in a community. What is relevant is that the actual referent is, in a collective sense, known.

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[40]Putnam 1973: 705.

[41]Putnam 1973: 706.

[42]Dummett 1978. Putnam does argue, in the same article, that what fixes the reference is an *indexical* definition - although as Searle (Searle 1983: 285) has argued, even this is not necessarily anti-descriptivist - but this second thesis is based on other grounds than the linguistic labour argument.

[43]Hintikka (1969: 104) actually uses this phrase. It is, in any case, fair to note that his idea of possible worlds of comparison in the process of individuation was that they are "small worlds" or world-pieces which describe the speaker's view of the world rather than entire universes (see Hintikka 1998). However, Hintikka did not carry this idea into the actual semantics of modal logic, where he still usually views possible worlds as something like complete world-descriptions.

The fact that there is something identical to the thing in other possible worlds is not another discovery that needs to be made at the time of fixing the reference of a name.

Alethic modalities are in this sense largely similar to ordinary non-modal discourse. How the speaker thinks of a name is not relevant to truths of metaphysics, and thus the speaker's certainty or uncertainty of reference is not relevant either as long as he can rely on the background of the conventions in the linguistic community that he is a part of. The reference is guaranteed by this background. Since, as the metalinguistic argument undeniably shows, the common mode of speaking about modalities is *de re*, this reference is guaranteed to be rigid as well.

The explanation for why individuation is not relevant in alethic contexts is rather straightforward. The slightly bigger challenge comes in explaining why, despite the division of linguistic labour, individuation is still sometimes necessary for proper (rigid) reference. As the examples in the Chapter 3 suggested, it seems that reference can sometimes be left indeterminate by using the name "attributively". Likewise, it seems that speaker's uncertainty of the referent of the name can lead to situations where the name is used non-rigidly. In the next section, I will try to make a case for the necessity of individuation - at the level of an individual speaker - in certain contexts where the guarantee of proper reference by the linguistic community is canceled.

4.5   When Speakers Do Need to Individuate

To summarize, the picture of modal contexts that I have attempted to paint is this. Modal operators function as evaluation-shifters. Alethic modal operators, and possibly similar operators such as temporal ones, turn on the actualist evaluation. This case was rather simple and easy. Propositional attitude operators in e.g. doxastic and epistemic logics turn on the possible-worlds evaluation, where names are non-rigid. In these contexts and in mixed contexts involving alethic and propositional attitude operators, substitution of proper names with actually co-referential names sometimes seems to be possible and sometimes not. Glüer and Pagin suggested how to handle mixed contexts by altering the scope of quantifiers and modal operators, and referred in passing that the same idea can be

used for beliefs. Take the three formulas:

(22) $\quad \exists x(x = n \wedge B_a F(x))$

(23) $\quad \exists x B_a(x = n \wedge F(x))$

(24) $\quad B_a \exists x(x = n \wedge F(x))$

All of these might be said to codify a sentence of the type "a believes that n is F" in natural language. But due to the role of the doxastic operator as an evaluation shifter, all of the above get a slightly different interpretation. Suppose the sentences are evaluated in the actual world. (24) is probably the simplest: it is true iff, for any B-alternative v of a, there is some $d \in D(v)$ such that $d = I(n, v)$ and $d \in I(F, v)$. Here, the name clearly cannot be substituted with an actually co-referring name. On the other hand, (22) allows for such substitution. Since the sentence is evaluated in the actual world, it is true iff there is some $d \in D(a)$ such that $d = I(n, a)$ and for any B-alternative v of a, $d \in I(F, v)$. When evaluated with respect to the actual world, the wide-scope construction in (22) mimics the actualist evaluation used with alethic operators.

(23) is a case in between. $\exists x B_a(x = n \wedge F(x))$ is true iff there is some $d \in D(a)$ such that for all belief-alternatives v of the actual world, $d = I(n, v)$ and $d \in I(F, v)$. Note that $\exists x\, x = n$ does not follow from this statement. A name n' can be substituted for n if and only if $\exists x \exists y B_a(x = n \wedge y = n' \wedge x = y)$. This is because nothing in the relational modalities system prevents the object being referred to by different names in other possible worlds - the fact that this does not necessarily happen is the whole point of relational modalities. Therefore, in (23) we might say that the name is rigid *for the believer*, resulting in a kind of localized rigidity that is familiar from Hintikka's modal logic.

Glüer and Pagin argued that the correct choice of quantifier scope in a sentence such as "a believes that n is F" seems to depend on the intentions of the speaker. The natural language sentence itself is, in a sense, semantically underdetermined. Hintikka interpreted all modalities in this manner, and he argued that the intentional state in question is knowing who someone is, or being capable of individuating that person. But Hintikka's account, which was supposed to be applicable for all modalities, seemed too complex because it demanded this step of individuation even in agent-independent alethic contexts. He also argued that

correct individuation is the result of cross-world comparison by what seemed to boil down (as the *roman à clef* analogue suggested) descriptions, which many philosophers considered problematic.

So far, I have suggested that in alethic logic, Kripke's view is correct. Individual speakers do not need to "know who", because rigid reference is guaranteed by the conventions of the linguistic community. Individuation is a prerequisite for reference, but it does not determine the referent. Furthermore, the act of individuation that is relevant is recognizing the individual in the actual world; there are no other worlds around to be looked at through a telescope. However, this cannot be the whole picture. In propositional attitude contexts, the presupposition of individuation (by convention) is clearly sometimes canceled, and what the *individual* speaker knows or does not know becomes relevant again. The speaker's ignorance, as Hintikka noticed, can cause a situation where the name cannot be interpreted to refer rigidly. What in fact happens, as was suggested in Chapter 3, is that a speaker intends to refer in a way where *it does not matter*, or *it is not known* who the referent is. This cognitive state of the speaker becomes relevant when propositional attitudes are considered. There is now, in addition to the language itself and the linguistic community, a point of view of the one who believes, hopes, knows, and so on. In this sense, it could be said that there *is* a descriptive element of a sort, if not in names, at least more generally in epistemic and doxastic constructions.

The difference between an ordinary context of conversation and talk about beliefs is that while the first can rely on a commonly shared linguistic background, the second localizes to the believer and his perspective. One can outsource meanings, but one cannot outsource beliefs. Burge[44], who went further than Putnam and attempted to take beliefs out of people's heads as well, might have disagreed. But he does not seem to make much difference between literal meaning and speaker meaning; furthermore, he does not consider individual speakers' beliefs about language use.[45] Maybe one could say that what one's

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[44]Burge 1979.

[45]In Burge's arthritis case, for example, it seems to be quite relevant that the individual who (in the real world) believes that he has arthritis in his thigh *thinks* that arthritis can refer to a type of muscle pains. In the situation where the community indeed uses the word in a way that is consistent with this individual speaker's use, the truth value of the belief, with respect to the conventional meanings of language, obviously changes, but it would be rather misleading to say

beliefs *mean*, in one sense, are not up to him. But certainly one cannot rely on the linguistic community in what he *believes*. It is a different question to refer to the theory of general relativity in conversation, trusting that *someone* knows what it actually means, than to say that one knows how the theory of general relativity works just because there is *someone* who certainly knows.[46]

Of course, one could decide that how the believer uses language does not matter: if he has a belief about Hesperus, he has a belief about Phosphorus, whether he knew that the planets are identical or not. This "objective" use of *de re* - "relational belief", as Quine called it[47] - might not be in itself a wrong interpretation, but it would result in the same consequences as the "Heroic Pragmatists" approach to belief statements, i.e., contradicting beliefs. Furthermore, this does not seem to be consistent with the common view of interpreting belief sentences in natural language. The relational belief interpretation seems to be an exceptional use and has to be made clear in the context of conversation. ("He believes that Superman is a weak loser." "Oh, does he?" "Well, he believes that of *Clark Kent*, but he doesn't really *know* that Clark Kent is Superman.")

Whether the speaker knows who or what he is talking about affects the correct interpretation of proper names in reports of his beliefs. When someone has to get to know whom he is talking about, he wants to locate this person or this object in the actual world; or, to put it in other terms, locate the actual world with respect to this name's referent.[48] What exactly is needed to locate the person varies depending on the precision demanded of the context. This relativity is typical to any kind of knowledge; in this sense, almost any philosopher would agree that knowledge is relative to a context.[49] "Knowing who" might be a par-

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that he now has a completely new *belief*.

[46]Admittedly, the distinction between (conventional) meaning of a belief and the belief as the speaker himself understands it is not obvious. However, an extensive examination of the concept of belief is beyond the scope of this thesis, which is focused on the semantics of belief sentences. What is clear, I think, is that many philosophers who have used arguments similar to Burge's have not paid much attention to this distinction either, perhaps because anything that might be going on in the believer's head would be overlooked as internalist and irrelevant by the hardcore externalists.

[47]Quine 1976b.

[48]The second definition would be more in line with e.g. Stalnaker's (see Stalnaker 2001) two-dimensionalism, which shares some similarities to Glüer and Pagin's account.

[49]And it would not make him a contextualist; epistemic contextualism is a rather special kind of

ticularly context-dependent notion, but this does not mean it could not serve as a necessary condition for wide-scope interpretation of belief.[50]

Let us summarize what has been established so far as well as what has not been established. To begin with the negative, what type of knowledge is involved in identifying a person or a thing is, I think, not a question for the philosopher. I believe that Hintikka's referring to neuropsychology and empirical sciences was a better move than his remarks about comparing fictional novels. Of course, plenty has been written about "knowing who".[51] For the purposes of this thesis, I think it is enough to acknowledge that the cognitive state of the believer does affect the interpretation of the belief, and that "knowing who" might happen in several different ways (methods of individuation), as was shown in the previous sections. Furthermore, it was argued that the sort of "identification" that would apply to alethic, agent-independent contexts, is only relevant in fixing the reference. Due to the division of linguistic labour, it need not be relevant for determining the reference in alethic contexts, and perhaps need not be relevant for the semantics of proper names apart from those initial acts of reference-fixing.

I have already stated that I do not believe that individuation is trans-world identification, but identification in the actual world. This might be a merely semantic point, since Hintikka, despite often using the term "comparison", probably did not believe in the existence and objectivity of other possible worlds any more than Kripke did. Unlike Kripke, however, Hintikka was also concerned with the cases where one cannot identify the referent of a name in the actual world, and thus cannot stipulate the existence of any one thing in other possible worlds. In these situations, the name refers to different things in different possible worlds. This is the one case where there is genuine multireferentiality, which happens, not because one did not succeed in cross-world comparison, but because he did not succeed in actual-world identification.

One final note about "successful" individuation. As was noted, $\exists x B_a x = n$ does not entail $\exists x x = n$. Therefore successful identification can be misidentifi-

view where the belief attributor's (not the believer's) psychological and/or conventional situation gives the conditions for knowledge (Rysiew 2011).

[50]In the case of belief, "having an opinion about who someone is" might be a more accurate notion. The difference is that is needed for "having an opinion" is not necessarily correct identification, but determinate (unique) identification of an individual.

[51]One of the most comprehensive accounts is probably Boër and Lycan 1986.

cation, which is different from an identification failure which causes multireferentiality. When $\exists x B_a x = n$ is true and $\exists x x = n$ is false, the set of accessible worlds for the agent happens to be a set of worlds where the name n refers to a different thing than in the actual world, but nevertheless to the same thing in all the accessible worlds. Since the doxastic operator turns on standard, possible-world evaluation, this is a perfectly possible situation. Thus we have three options for identification: correct and successful individuation, incorrect but successful individuation (misidentification), and unsuccessful individuation (no individual is uniquely identified).

5   Solving the Puzzles of Reference

In Chapter 2, the Hintikka-Kripke problem of apparent disparity between alethic and doxastic contexts was introduced. In Chapter 3, similar issues of the reference of proper names in simple sentences were examined in order to show that there are simple sentences that do not seem to have intrinsically rigid proper names. In Chapter 4, I attempted to construct a thesis about belief contexts, using Glüer and Pagin's relational modalities as a basic semantics and adding Hintikka's mechanisms of individuation to complement the semantic underdetermination of belief sentences. In what follows, this thesis is applied to the Hintikka-Kripke problem and mixed (alethic/doxastic) modalities. Furthermore, I will return to the case of improper uses of proper names in simple sentences. It has been claimed by some philosophers that these cases show that names are non-rigid in alethic and doxastic contexts alike. While it has been argued here that rigidity is not a property of proper names, the relational modalities framework nevertheless has names rigid in alethic contexts. The whole framework was built in order to maintain that Kripkean intuition *while* denying the problematic intrinsic rigidity requirement. I will briefly consider some arguments that have concluded the non-rigidity of names in alethic contexts from the evidence of improper uses of names in simple sentences. I will also show how to interpret the phenomena from the relational modalities point of view.

The theory that has been sketched so far is not a descriptivist theory. In fact, it has been a conscious decision to stay as neutral about meaning of proper names as possible. However, due to the non-rigidity and operators as evaluation-

switchers in the relational modalities framework, some of the objections to descriptivism taken up in Chapter 1 can be, with some modifications, turned against the relational modalities view as well. Therefore I will re-examine Soames' second argument against descriptivism as well as Everett's argument against Stanley's theory and show that the approach that was constructed in Chapter 4 need not fall for these traps.

It might be argued that it is not correct that this view is not descriptivist; even if nothing has explicitly been said about meaning, the view is simply not compatible with the theory of direct reference. The dominant view seems to be that direct reference cannot be consistently combined with non-rigidity. Hintikka himself was adamantly against the new theory of reference, and even though he did not ever explicitly talk about his theory of meaning, he assumed that his theory is inconsistent with Kripke's.[1] I believe that these judgments have been too hasty. I argue, admittedly controversially, that the theory considered here, despite having non-rigid names, is compatible with *some* forms of direct reference theories, including Kripke's own view.

5.1 The Hintikka-Kripke Problem and Mixed Modalities

The original puzzle, given in the beginning of this thesis, was to make sense of the two sentences

(25)   If Hesperus is Phosphorus, then it is necessary that Hesperus is Phosphorus.

(26)   If Hesperus is Phosphorus, then John believes that Hesperus is Phosphorus.

The suggested formal interpretations of (25) and (26), respectively, were

(27) $Hesperus = Phosphorus \rightarrow \Box Hesperus = Phosphorus$

(28) $Hesperus = Phosphorus \rightarrow B_j Hesperus = Phosphorus$

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[1] In a reply to Chisholm's criticism, he sympathizes with Searle (Hintikka 1967: 44). It could be rather fairly said that Hintikka's theory was descriptivist to a degree, although he never explicitly referred to "senses" or "intensions" (as descriptive meanings).

The intuition is that while (27) is valid, (28) is not. In the relational modalities framework, (27) is true (in the actual world) but neither of the sentences is valid. Unlike the unarticulated constituents view, the relational modalities approach does not, therefore, deny that (27) and (28) are correct formalizations of (25) and (26). Unlike the pragmatist view, and even some descriptivist accounts, it denies that proper names have the semantic property of rigidity, whether it follows from direct referentiality or rigid senses. Rigidity is simply a matter of modal contexts, no more and no less. Since the different modal operators function as evaluation shifters, the modal consequents (27) and (28) get evaluated in a way that corresponds to our intuitions.

Consider, first, the belief sentence. Suppose that the evaluation of the sentence happens in the actual world a. Then the antecedent of (28), evaluated in the standard (i.e., possible-world) mode of evaluation, is true if and only if $I(Hesperus, a) = I(Phosphorus, a)$. (The fact that this does look like actualist evaluation simply results from our possible world in consideration being the actual world.) (28) contains a doxastic operator in the consequent of the implication which turns on (or in this case, maintains) the possible-worlds mode of evaluation. The doxastic statement, therefore, is true if and only if, for all w such that aRw, $I(Hesperus, w) = I(Phosphorus, w)$. Clearly, if names are not inherently rigid, this can be false while the antecedent is true, so the implication is invalid.

The antecedent of (27), being a simple sentence, is evaluated as before. The identity statement in the consequent of (27), since it is in the scope of an alethic operator, is evaluated in the actualist mode: it is true if and only if, for all w such that aRw, $I(Hesperus, a) = I(Phosphorus, a)$. If the truth of the sentence is considered in the actual world, (27) is indeed true since both its antecedent and consequent are true. The statement is still not universally valid. Consider the actually false statement $Hesperus = Sirius$. Take some possible world w where the sentence is true. In this possible world, the implication $Hesperus = Sirius \rightarrow \Box Hesperus = Sirius$ is false, since the consequent is evaluated in the *actualist* mode of evaluation and $I(Hesperus, a) \neq I(Sirius, a)$. Even the weaker schema $\Box b = c \rightarrow b = c$ is not, as was mentioned, valid (substitute Hesperus and Phosphorus for the variables and consider the sentence from the point of view of a world where Hesperus is not identical with Phosphorus).

How about the mixed contexts that were problematic for all types of

accounts? Let us first reconsider doxastic contexts once more. We noticed that altering the scope of the proper name in a doxastic construction allows for more sophisticated interpretation which depends on whether the speaker refers indeterminately, or whether he is uncertain of the referent. There is a difference, in the relational modalities framework, between the two sentences

(29) $\quad B_j \exists x \exists y (x = Hesperus \wedge y = Phosphorus \wedge x = y)$

(30) $\quad \exists x \exists y B_j (x = Hesperus \wedge y = Phosphorus \wedge x = y)$

Obviously, (29) is evaluated similarly to the consequent of (28). (30), on the other hand, picks the referents of "Hesperus" and "Phosphorus" from the actual world and keeps them constant when evaluating the accessible worlds for the agent. It is the type of "local rigidity" that is triggered by successful individuation. If the agent knows (has an opinion on) what Hesperus and Phosphorus are, i.e., he has individuated the planets (or the planet), substitution is possible.

Mixed contexts are unpredictable in the same way as doxastic contexts. Our original problem sentence "John believes that Hesperus might not be Phosphorus" can be interpreted with the names taking different scope:[2]

(31) $\quad \exists x \exists y B_j (x = Hesperus \wedge y = Phosphorus \wedge \lozenge x \neq y)$

(32) $\quad B_j \exists x \exists y (x = Hesperus \wedge y = Phosphorus \wedge \lozenge x \neq y)$

(33) $\quad B_j \lozenge \exists x \exists y (x = Hesperus \wedge y = Phosphorus \wedge x \neq y)$

With respect to the belief, (31) would be the case where the referent is individuated, and (32) would represent an individuation failure. But a construction such as (33) rigidifies the name again, since the alethic operator switches the mode of evaluation. If John holds the fallacious modal belief that possibly, Hesperus is not Phosphorus, the only correct interpretation can be (32). (31) and (33) are necessarily false, so John cannot hold such beliefs.

Curiously, if John *misidentifies*, a reading of the type (31) cannot be the correct one, for it would require that two actually identical objects are not actually identical, which is a contradiction. The presence of the alethic operator blocks

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[2]I am interpreting both names taking the same scope. Obviously, allowing them to vary in scope, different combinations creates two more different options.

John from misidentifying. Why misidentification with respect to beliefs about modalities is impossible is probably more of a question a technical nature than metaphysical. Nevertheless, the third option between correct individuation and an individuation failure is not available in mixed cases.[3]

5.2 Improper Names and Intuitions of Non-Rigidity

If definite descriptions are added as terms, they would be evaluated in possible-worlds evaluation regardless of the situation, unless, of course, they happened to contain an indexical or modal component ("the actual F", "this F here"). Naturally, they can also be rigidified (with respect to the possible world of evaluation) in the same way as proper names in belief sentences, that is, altering the quantifier scope. Descriptive names, as well as Katz' improper names, seem to function exactly like other proper names, which suggests that they indeed are different from definite descriptions at least in modal behaviour. Arbitrary names are a curious group, since they are most definitely not rigid. If I say, "let n be an odd number greater than 11", it is clear that n, since not even clearly defined in the actual world, cannot be rigid in other possible worlds. Perhaps this is part of the reason why arbitrary names are not very often considered "real" names but rather hidden quantifier expressions or a special class of names referring to "arbitrary objects".[4]

The intuitions against the intrinsic rigidity of proper names, as consid-

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[3]I wish to thank Professor Sandu for suggesting me that the "might", when occurring in the scope of the belief operator, could be in fact an epistemic "might". This option is never considered by Glüer and Pagin, but in fact, it could be made consistent in their framework. It feels natural to allow for the *epistemic* possibility of Hesperus not being Phosphorus; and it makes sense that the alethic operator would get an epistemic coloring in the scope of a doxastic operator. Interpreting the situation in this way, misidentification would again be possible in mixed modal contexts. Translated into switcher semantics, this would mean that the alethic operator in the scope of a modal operator inherits the properties of the doxastic operator, turning off its normal actualist mode of evaluation. The exact formulation of the function of these occurrences of alethic operators needs a lengthier explanation which will not be considered here. Nevertheless, tweaking the interpretation of ordinary mixed modal sentences in this way might be an interesting addition to Glüer and Pagin's theory of relational modalities.

[4]See Breckenridge and Magidor 2012 for a brief introduction to different types of approaches to arbitrary names.

ered in Chapter 3, are perhaps a more interesting case. I suggest that the intuitions arise from the fact that proper names in simple sentences are evaluated in the possible-worlds mode of evaluation, and thus are not inherently rigid. This is barely a negative thesis: it says that names *do not* have, by default, a modal component to their semantics. It does not say anything about their evaluation in alethic contexts, and thus nothing about their rigidity in alethic contexts. It is true, however, that there is some sort of epistemic intuition that in cases of "whoever", it does not matter who the referent is, i.e. the referent is somehow indeterminate. As Hintikka has noted, the cases of not knowing who are very similar to "whoever" used in the attributive use of names and descriptions.[5] But does this mean that the names would be evaluated non-rigidly in *alethic* contexts? An affirmative answer would mean that the relational modalities framework cannot be correct about the evaluation of alethic sentences. And if it were not correct, then the theory would essentially boil down to wide-scopism, which has a fair amount of problems of its own.

Glüer and Pagin never consider this possibility. But the correct answer to the question, I believe, is no. Consider the sentence

(34)   Aristotle (whoever he is) might not have been Aristotle.

Despite the seeming falsity of the sentence, it has been claimed by some philosophers, on the basis of similar examples to those in Chapter 3, that proper names do not need to be rigid in alethic contexts either. They have suggested that there is, indeed, an interpretation under which a sentence such as "Aristotle might not have been Aristotle" is true. Sosa, for example, suggests that one could meaningfully say something such as "You know, if it had not been for Plato, Aristotle would have never become *Aristotle*", where the second occurrence of Aristotle is in narrow scope and non-rigid.[6] Kent Bach also argues that there is a non-rigid (narrow scope) reading of "Aristotle". It is what he calls a "predicative reading" of "is".[7] He further explains his view:

If we consider Aristotle and the bearer of 'Aristotle' and whether the former might not have been identical with the latter, then given

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[5]Hintikka 1967: 47-48.
[6]Sosa 2001: 23.
[7]Bach 2002a: 84.

who Aristotle is and who the bearer of 'Aristotle' is, ["Aristotle might have not been Aristotle"] is false, since the former and the latter are identical and identity is necessary. But if we consider Aristotle and the property of bearing the name 'Aristotle' and whether Aristotle might not have had that property, obviously [the sentence] is true. In this case, it is read predicatively.[8]

However, whether there is such a predicative reading depends on there being a predicate synonymous with the name Aristotle, which needs not be necessarily the case. In fact, that is exactly what the direct referentialists deny. Bach himself is a proponent of what he calls the "nominal description theory". He argues that "Aristotle" does have a nominal, non-substantive sense "the bearer of 'Aristotle'". If "the bearer of 'Aristotle'" *could* be freely substituted for "Aristotle", i.e., if it was synonymous with the name, then clearly making this substitution to (34) would result in a true statement. But not everyone would agree that "Aristotle" and "the bearer of 'Aristotle'" are synonymous, or that (34) has a reading on which it is true. The examples of "attributive" or "predicative" use in alethic contexts seem to be very unusual, apart from alethic sentences occurring in mixed contexts. The fact that the attributive use is nonstandard can be seen from the stress put on "Aristotle", as expressed by italics, in Sosa's example. But even if one can say "Aristotle might have not been Aristotle" and *mean* that Aristotle might have not been the bearer of the name "Aristotle", does it follow that the *name* must have that meaning?

I believe that the intuition of indeterminacy in certain simple sentences does not come from the fact that the names would, if occurring inside alethic contexts, be evaluated in possible-world evaluation. Instead, I argue that it comes from another *metalinguistic* intuition, namely that in the simple sentence

(35)   *x* is Aristotle

x gets different values in the domain when the sentence is uttered in different possible worlds. But this just represents the intuition that names are evaluated in the standard, non-rigid, mode of evaluation in simple sentences. The fact that it is a very abnormal use of "might" that would make the sentence "Aristotle might

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[8]Bach 2002a: 84-85.

have not been Aristotle" true supports the idea. Therefore, the type of "modality" Bach is considering in his true interpretation of (34) is in fact metalinguistic, not metaphysical (alethic). In fact, it could possibly amount to Aristotle not necessarily being the bearer of "Aristotle", since the bearer of "Aristotle" is different in different possible worlds. In alethic contexts, however, we are not interested on the possible bearers of the name, but the possible properties of the person who actually is (this is the "is" of identity) Aristotle. This is what Kripke repeatedly insisted on in *Naming and Necessity*, and seems to be well in line with our general use of language, as the unfamiliarity of Bach's and Sosa's examples showed.

5.3   Some Possible Objections to Relational Modalities

I want to briefly consider two objections against descriptivism that were already mentioned in the first chapter. The relational modalities account is not a descriptivist theory, but stays neutral on the issue of meaning. Nevertheless, due to non-rigidity of proper names, some of the objections against descriptivism can be, at least if slightly modified, also presented against the relational modalities view. The first is Soames' criticism against rigidified description theory and the second is Everett's recent criticism of Stanley's distinction between assertoric content and ingredient sense.[9]

Soames argued that the idea that senses of names are rigidified descriptions is problematic from the point of view that inhabitants of other possible worlds might also have modal beliefs without having any thoughts about the actual world. Since the evaluation of modal sentences in the relational modalities approach is tied to the actual world, a similar objection could be made against the theory. Soames' argument seems undoubtedly problematic if one takes a Lewisian view of possible worlds. According to this type of view, the fact that our world is "actual" does not make it special in any way. Rather, "actual" simply has an indexical function to refer to the world in which a statement is made.[10] But Stalnaker type "ersatzism" about possible world needs not accept that there are any real, concrete inhabitants of other possible worlds. Stalnaker does not deny that the possibilia exist, at least in some sense of the word. But the possible worlds

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[9]See Soames 1998, Everett 2005.
[10]Lewis 1986: 92-96.

are, he argues, ontologically dependent on the actual world.[11] The ersatzist view, as well as the anti-realist views, justify the picture in which the actual world *is* special. But one could say that this is merely semantic play: even if possible worlds are not real, Soames' argument is valid. Let us just *hypothetically* consider a counterfactual possibility in which things have different attributes than in the actual world. Are the (rigidified) senses of the names then different? And if they are, are they even senses?

The rigidified *descriptivist* theory might have problems with these questions, but the relational modality theory does not. It does not claim that there are senses of proper names, nor does it claim that those senses are rigid descriptions. In fact, it could not even consistently make the latter claim. The relational modality models simply happen to be always centered in the actual world.[12] It is perfectly possible to devise another model where some counterfactual world is appointed as "actual" in which case the proper names in modal statements expressed in the "actual" world are evaluated with respect to that world. If the point of view is changed to that of inhabitants of some other world, whether they exist or not, then the "center" of the model has to be changed to that possible world. That is, there has to be a change in models. This is perfectly in line with the ersatzist view of possible worlds (and there is no reason why it should conflict with the Lewisian view either), and it is not vulnerable to Soames' criticism.

Everett's criticism of Jason Stanley's argument is similar to Soames' criticism of wide-scopism. Stanley, as one can recall from Chapter 1, argued that sentences have both an assertoric content and ingredient content. Assertoric content is what is meant when the sentence is asserted; one could say that the meaning of a simple sentence is its assertoric content. When the sentence is embedded in a modal construction, it then contributes to the sentence its ingredient content, not its assertoric content. Everett first asks what should be made out of sentences of the type[13]

(36)   The sun is shining. That is actually true but possibly false.

In cases like this, Stanley has argued that the demonstrative "that" refers to the in-

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[11]Stalnaker 1984: Chapter 3.

[12]See Appendix II.

[13]Everett 2005: 130.

gredient sense.[14] This was his way out of the Soames' challenge to wide-scopism. But then Everett gives a more challenging puzzle, his actual example being

(37)   Arithmetic is undecidable. It is denied by Hilbertians but necessarily true.

It seems that "it" refers to one and the same thing that is both necessarily true but nevertheless denied by Hilbertians. According to Stanley, the object of a propositional attitude such as denial should be the assertoric content, not the ingredient content. But if the pronoun "it" would refer to different things in the two different sentences, the sentence should have an odd feel to it (as in all cases of syllepsis, e.g. in Searle's often mentioned example "They cut the cake, the grass, and the taxes.")

The relational modalities account is similar to Stanley's view in that it says that proper names contribute different things to simple and to alethic sentences. As was noticed, sentences of the type

(38)   Hesperus is Phosphorus. That is necessary.

are usually understood as statements of necessity, where the whole sentence is in the scope of the modal operator. Then the sentence should be formalized simply as $\Box Hesperus = Phosphorus$ (the fact that "that is necessary" follows the sentence should not be an issue here). But (38) could also be interpreted as a metalinguistic statement saying that the simple sentence always has the same truth value in different possible worlds. That, according to the relational modalities view, is false, since simple sentences are always evaluated with respect to the possible world of evaluation and names have different referents in different possible worlds.

Here is the example, first encountered in the Section 1.4, which is analogous to (37).

(39)   Hesperus is not Phosphorus. John believes it but it is necessarily false.

It seems that the exact same sentence is both impossible and believed by John. But $\Box Hesperus \neq Phosphorus$ and $B_j Hesperus \neq Phosphorus$ are evaluated differently with respect to the proper names. If (39) is treated as a metalinguistic statement concerning the truth values of a simple sentence in different types of

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[14]Stanley 1997a: 577.

possible worlds, there is no problem of different references. Then the sentence should simply be false whether we consider alethically or doxastically possible worlds (and in fact, the relational modalities theory can hold that these are exactly the same worlds). The difficulty is that there seems to be no way of interpreting the necessity in (39) in the ordinary (that is, not metalinguistic) way without agreeing that "Hesperus" and "Phosphorus" refer to different things in the alethic and the doxastic statements, and thus strictly speaking, the sentence that is impossible is not the same as the sentence that is believed by John.

Given that (39) clearly has an ordinary reading in which both necessity and belief is predicated of (what seems to be) the same sentence, the only option for the relational modalities view seems to be to accept that "Hesperus" and "Phosphorus" have different referents in the two statements.[15] Nevertheless, I do not think this is yet a casualty to the view. Obviously, (39) does not have all the usual features of syllepsis. But it is not perfectly clear either whether it implies that John is truly thinking of the same objects that the names in the sentence *actually* refer to. It is impossible that Hesperus would not be Phosphorus, so how can John believe that? Because he does not know the actual referents of the names - he is mistaken about which world is actual. So it could be said that he does not *really* have a belief the content of which is the same as the sentence that is referred to in the alethic statement. If he knew which objects Hesperus and Phosphorus are, he would not hold such a belief.

I do admit that this explanation is still not perfectly unproblematic. Even with the explanation, the first impression of (39) is not that the names have different references when necessity is predicated and when belief is predicated of the sentence. Perhaps there is no such clear intuition about the different referents because the sentence *could* be read as predicating a "relational" belief, put formally as

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[15]Here, the option of interpreting "might" as an epistemic might that was briefly suggested in the section on mixed modalities could be invoked, but it too might not be a completely satisfactory solution in this case. One could say that the fact that the usual qualities of syllepsis are missing in the example because we naturally interpret the "might" as representing an epistemic property. But then the sentence "Hesperus is not Phosphorus" would not be necessarily (in an epistemic sense) false; and we clearly do not have any intuition about *that*. Quite the contrary, it seems that it is true, which suggests that we do interpret the "necessarily" as codifying alethic necessity.

(40) $\exists x \exists y (x = Hesperus \land y = Phosphorus \land \neg \Diamond x \neq y \land B_j x \neq y)$

in which case the referents of "Hesperus" and "Phosphorus" stay constant. This sentence would be impossible - John cannot have such a belief, in which case this simply cannot be the interpretation that correctly describes the situation. There is no way in which John can believe that the object that is Hesperus and Phosphorus is not identical with itself. But note that Everett does not have an explanation for how the belief or another propositional attitude can have a metaphysically impossible sentence as its content either. So if he, or anyone else, can present an alternative reading which can explain why John believes *the same sentence* (syntactically and semantically) that is impossible, then the relational modalities view is indeed threatened. Since the Heroic Pragmatism was shown to be a unsatisfactory and unrealistic solution, I doubt there can be one. The reason why the sentence does not initially seem odd (unlike the statement about cutting grass and taxes) is still, admittedly, left unexplained.

5.4   A Few Words about Meaning

So far, not much has been said about meaning. My objective has been to defend an account of modalities that is consistent with the intuitions in Kripke's metalinguistic argument but also with the intuition that names do have some non-rigid occurrences and thus are not intrinsically rigid. Furthermore, I have tried to bring more light into the non-rigidity of proper names in doxastic contexts and show why Hintikka was correct about propositional attitudes, even if his account could not be as plausibly extended to alethic modalities. But does this mean that the descriptivist picture is right?

I argued that the *existence* of criteria of individuation at the level of the linguistic community is necessary for modal reasoning - or, for that matter, for any reasoning about proper names whatsoever. If we cannot tell one thing apart from the others, we cannot meaningfully name it, i.e., fix the reference of the name. Although we can, in ordinary speech, delegate the identification of the reference to the linguistic community, this is not always guaranteed. Individuating or failing to individuate, for an individual speaker, determines whether he can have a *de re* belief about the thing identified. But clearly, the criteria of iden-

tification cannot serve as a sense of a name. In Hintikka's account, the criteria are directly linked with the *individual* but not with the proper name. What links them to the name is the necessity of being able to somehow single out the thing that is being named in order to make sense of naming. But this still goes into the reference-*fixing* category, and thus does not function as a meaning in the classical Fregean sense. The basic idea of there being a criteria of identification associated with the referent of a proper name is not against the Kripkean view. Kripke said that such criteria might well exist, but that in that case, it would not be relevant to determining the *meaning* of a name. It might play a similar role to the initial baptism in the far end of Kripke's "causal chain" connecting the uses of a proper name to its referent (where the referent is the only "meaning" passed on in the chain of communication).

Hintikka himself was clearly against the theory of direct reference. In most of his work, however, he only argues against the idea that names are rigid designators. Kripke used the metalinguistic argument to show that names are rigid, and seemed to think that since he had refuted Fregean-Russellian descriptivism, the theory of direct reference must be correct. But can non-rigidity, then, be viewed as a refutation of the theory of direct reference? Furthermore, if it cannot, could Hintikka's view (or at least the account presented here) be compatible with direct reference after all?

The answer depends on what kind of connection there is between rigidity and direct reference. Clearly, not all terms that are rigid refer directly. But there seems to be a consensus that a term that refers directly has to be a rigid designator as well. E.g. Kaplan has argued to the effect that the link between rigidity and direct reference is conceptual: the question of what it takes to refer directly necessarily links to its reference in counterfactual situations.[16] Indeed, Kaplan's thought experiments in "Demonstratives" that are meant to support his version of direct referentialism all rely on comparing actual and counterfactual situations. Some philosophers have suggested that it might be metaphysically possible that names are directly referential but yet somehow change their referents from world to world.[17] But this type of view would be, to say the least, controversial, and

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[16]Kaplan 1989.

[17]E.g. Salmon (1981: Chapter 3) mentions this idea.

often dismissed altogether as an idea.[18]

The claim that Hintikka's idea of individuation does not rule out the direct reference theory as a theory of meaning is bold; and it seems that to say that non-rigid directly referential terms exist is even more blasphemous. On these grounds, one could conclude that the only theory of meaning compatible with the account given in this thesis is descriptivist to some degree. Clearly, the criteria of individuation will not do as a mediating sense, but there must be something else that can serve as a sense of the name. But I am doubtful whether this *must* be the case, given that descriptivist theories have so many problems on their own. Therefore I want to briefly consider the controversial question about non-rigid directly referential names.

Genoveva Martí suggests that whether there can be directly referential and non-rigid terms depends on what is meant by direct reference. She argues that there are two different conceptions in the literature that have both been grouped under "theories of direct reference".[19] She calls these two conceptions the Millian direct reference and the propositional direct reference. This distinction seems to be influenced by Crimmins' idea of direct reference versus direct contribution.[20] The former, she argues, is independent of rigidity, while the latter view - exemplified by Kaplan's account in "Demonstratives" - is conceptually dependent of the notion of rigidity.

The difference between the two views is that they emphasize different features of the "directness" in direct reference. For the Millian, it is crucial that there is no semantic mediators between a name and its reference. On this approach, "the distinguishing mark of direct reference is the absence of a semantic mediator, the absence of a mechanism (be it a rule, a procedure, a mental representation or a qualitative profile) whose role is to adjudicate, to determine the referent on a given occasion of use."[21] This is the original thesis of Mill, as well as Saul Kripke and (possibly) Ruth Marcus. The main thesis of the propositional direct referentialist is that a directly referential term only contributes its referent

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[18]E.g. LaPorte's (2006) article on rigid designators in the Stanford Encyclopedia acknowledges this idea but notes that it would be controversial even as a thesis of possible languages, not to mention actual spoken languages.

[19]Martí 2003: 168.

[20]Crimmins 1992: 11-15.

[21]Martí 2003: 168.

(an object) to the proposition in which it occurs.[22] This is how Russellian logically proper names might be thought to function.[23] What is problematic is that these characterizations are often used as if they meant the same. As we saw earlier, it was not clear whether Marcus, in addition to arguing for her tag theory, wanted to maintain the thesis of direct contribution. But regardless of the confusion around the idea of "direct reference", the distinction seems reasonable.

On the propositional view, being directly referential means that once the referent is fixed, the object it contributes to the proposition is not changed by any alterations in the circumstances of evaluation.[24] It is quite obvious that then, direct reference cannot be separated from rigidity. It is a more interesting question whether the Millian idea of direct reference can hold if names are non-rigid. Martí argues that this is indeed possible: a Millian could think that names are non-rigid. She describes the case as follows:

> [...] this Millian thinks that the object relevant for the evaluation of what is said by an utterance of "Hesperus is bright" varies from world to world. But, unlike the descriptivist, this Millian does not think that the reason for the variation is the presence of a semantic mechanism associated with "Hesperus." The reason, for this Millian, has nothing to do with the semantics of "Hesperus" but with the metaphysics of which objects are connected with which other objects in different possible worlds.[25]

For someone who held, for example, a Lewisian conception of possible worlds, this would not be too far-fetched a position. And perhaps not too odd, either. One can of course start wondering how the referent can vary from world to world if there is nothing but the object determining the referent. But the case for empty names is very similar, and direct referentialism has not been abandoned because

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[22]Martí 2003: 163.

[23]Russell (1917: 219) states that "[every] proposition which we can understand must be composed wholly of constituents with which we are acquainted". Since according to Russell's view, it is essentially sense-data that we are acquainted with, then propositions are *composed of* sense-data, i.e., the referents of his logically proper names. This would make Russell's account of logically proper names a propositional one. Of course, this is a rather special case, since Russell's class of logically proper names was extremely limited.

[24]See e.g. Kaplan 1989: 512-513.

[25]Martí 2003: 169.

of empty names. How does one refer directly to something that does not exist? Direct reference to possibilia, in my opinion, is not *much* more miraculous than non-rigid direct reference, even if the latter is considered far more controversial.

Kripke himself never explicitly endorsed the thesis of direct contribution. His view of direct reference, coupled with the causal theory of reference, is more subtle. One could say that he took a Millian approach in the way it is described by Martí, along with the idea that the reference is guaranteed by the initial act of naming, after which the referent is "passed along" from one speaker to another in a chain of communication.[26] This idea in itself does not commit Kripke to rigidity: he could have said that causal relations being different in different possible worlds, the same name might end up referring to another person. Of course, Kripke did not accept this, for he thought it would be a merely linguistic thesis about someone having been *named* differently. He was right in the sense that this is not what people do when they engage in alethic modal reasoning. But he failed to see that the possibility of different referential relations between names and individuals is, in fact, relevant to other kinds of modalities.

The conclusion is that while Hintikka would not have accepted Kripke's theory of meaning, nothing in his theory of individuation is strictly inconsistent with the idea. Likewise, although Kripke's causal theory of reference and his version of direct reference are compatible with non-rigidity, he probably would not agree with the theory of relational modalities. Both descriptivist theories of meaning and the Millian variants of direct referentialism can, at least theoretically, be adapted to the basic framework sketched in this thesis. However, I will not take any further stand on the issue.

Conclusion

Ascribing rigidity to modal contexts rather than to the semantics of proper names in themselves can accommodate for non-rigid uses of proper names, as well as respect the intuitions behind attributive uses of proper names. The relational modalities view is also consistent with the conclusion of Kripke's metalinguistic argument, i.e., that the correct mode of (alethic) modal reasoning is *de re*. Moreover, it allows for a more flexible approach towards doxastic and mixed contexts.

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[26]Kripke 1981: 96.

Accompanied with a theory of individuation, it can bring some lawfulness to the seemingly unpredictable behaviour of names in propositional attitudes and mixed modalities while maintaining this flexibility.

The proposed account would limit the applicability of individuation only to contexts where the individual speaker's intentions are relevant to interpretation. Individuation *is*, as Hintikka argued, a prerequisite for modal reasoning - and any sort of reasoning with proper names - but its relevance is usually limited to fixing the reference. Once a thing has been named, it can be assumed to be individuated and stipulated to "exist" in other possible worlds. This possibility relies on the fact that one speaker alone does not have to do all the linguistic work, but that there is division of labour. An individual speaker can rely on the background of the linguistic community and its conventions, and thus individuation is only ever relevant in acts of naming.

However, what a speaker knows or does not know about the world or about language becomes crucial when reports of mental, intentional states are considered. In these cases, it would be wrong to attribute the knowledge of the collective linguistic background to an individual. What matters for the reference of proper names, now, is whether the speaker has enough (descriptive, visual, etc.) knowledge to, with respect to the situation, identify the actual individual he is talking about. Individuation is now his personal responsibility, so to speak. While the amount of information is highly context-sensitive, it is clear that when one fails in identifying something, there will be multireferentiality, and thus normal substitution between co-referring names is no longer possible. It is only when the speaker has correctly identified the referent of the two co-referring proper names that substitution is possible. Even then, only "localized" rigidity is attained: the name behaves as if it were rigid *for the agent*.

The choice of a theory of meaning was left open. Unlike the theory of rigid designators, the relational modalities view is compatible with descriptivism. I also argued that it is compatible with certain "Millian" types of direct reference, including Kripke's own theory. The relational modalities framework is perhaps more inviting to descriptivists, who have trouble adapting their approach to standard semantics with intrinsically rigid proper names. But also direct referentialists could benefit, considering the problems of maintaining both direct reference and direct contribution without any descriptive elements such as

roles or guises. In Chapter 2, this kind of approach was shown to be unintuitive as a theory of propositional attitude statements and, moreover, prone to semantic paradoxes.

The direct referentialist should not be uncomfortable with the weakened Hintikkan theory of individuation in doxastic contexts, either. (The descriptivist, especially if taking an epistemically motivated stance like Dummett and Searle, would naturally be quite comfortable with it.) There is nothing particularly controversial about the fact that one needs to individuate in order to give a name, whether the correct mode of individuation is indexical or descriptive or whether both are accepted. The idea that one cannot always rely on division of linguistic labour, and that something else needs to be taken into account in doxastic cases, should not be too queer either. After all, the unarticulated constituents type of views - which often try to *conserve* direct reference and rigidity - begin from the same presupposition. But compared to the formalization of these types of views, as exemplified by Holliday and Perry's account, the relational modalities semantics has the advantage of not containing valid but seemingly meaningless statements.

It is quite easy to add definite descriptions and other naturally non-rigid terms to the logic of relational modalities.[1] It is another question, and an interesting one, whether other types of rigid terms can be treated in this manner. In a recent article, Glüer and Pagin argue that the same framework works for natural kind terms as well.[2] Considering that, as they note, the suggestions for the semantics of natural kind terms are less satisfactory, and that the field has been less thoroughly examined than the semantics of proper names, this is an interesting application. It has been rather convincingly shown[3] that demonstratives exhibit similar behaviour to proper names and descriptions in having both "attributive" and "referential" interpretations. Indexicals and modalities, especially propositional attitudes, are a notoriously messy terrain. Whether relational modalities would have an application there is not clear, but might be worth further research.

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[1] Glüer and Pagin 2006, 2008.

[2] Glüer and Pagin 2012.

[3] Bezuidenhout 1997.

Appendix I: Classical Modal Logics

Modal logic adds the two modal operators, $\square$ (read "it is necessary that") and $\lozenge$ ("it is possible that"), to standard propositional or first-order logic. The basic semantics are first given here for classical propositional modal logic and then extended to first-order logic. Intuitively, for something to be necessary is for it to be the case in every possible situation. Defined in a similar manner, possibility is being the case in at least some possible situation. Possible situations are represented by what are called possible worlds, which can be for our purposes thought of as maximally consistent sets of sentences. That is to say, for any possible world and for any sentence, either the sentence or its negation (but not both) is true the world. Another feature of modal logic is that it is often not desirable that every possible situation be a possible alternative for a given situation. Thus conditions governing the relations between possible worlds have to be added to the systems of modal logic as well.

This gives us the following semantics. Given a language $\mathcal{L}$, a relational or Kripke model (not to be confused with the relational modality models discussed in Appendix II) $\mathcal{M} = \langle W, R, V \rangle$ for propositional modal logic consists of a set of possible worlds W, an accessibility relation R, and an evaluation V. The members of W are possible worlds. The accessibility relation R is meant to capture the idea that not every logically possible situation is a relevant alternative to some state of affairs. The pair $\langle W, R \rangle$ is called a frame. Different systems of modal logic are differentiated by which conditions govern R. The weakest normal modal logic known as **K** gives no specifications for the accessibility relation. Different extensions of **K** add restrictions such as reflexivity, transitivity, Euclideaness, etc. V is a function which assigns to every proposition some $V(p) \subseteq W$, representing the set of possible worlds in which p is true.

Satisfaction in a model (and a world) in quantified modal logic is defined similarly to classical propositional logic, the only addition being the truth conditions for modal operators $\square$ and $\lozenge$. The conditions can be defined as follows:

$\vDash_{M,w} p$ iff $w \in V(p)$

$\vDash_{M,w} \neg\varphi$ iff $\nvDash_{M,w} \varphi$

$\models_{M,w} \varphi \wedge \psi$ iff $\models_{M,w} \varphi$ and $\models_{M,w} \psi$

$\models_{M,w} \Box\varphi$ iff for all $w' \in W : wRw', \models_{M,w'} \varphi$

Other connectives can be defined, as usually, in terms of $\neg$ and $\wedge$. $\Diamond$ can be defined in terms of $\Box$ and $\neg$: $\Box\varphi \leftrightarrow \neg\Diamond\neg\varphi$. This shows that $\Box$ and $\Diamond$ resemble the two quantifiers $\forall$ and $\exists$ in their behaviour, the difference being that $\Box$ and $\Diamond$ can be seen to quantify over *worlds*, not individuals.

The most common deductive systems for modal logic are still axiomatic (as opposed to e.g. natural deduction systems and sequent calculi). This is also the approach assumed in this thesis in the few cases where syntactic matters are referred to.[1] In the case of **K**, what is added to the standard axioms and derivation rules of propositional logic is the axiom K: $\Box(\varphi \rightarrow \psi) \rightarrow (\Box\varphi \rightarrow \Box\psi)$ and the rule of necessitation $\vdash \varphi \Rightarrow \vdash \Box\varphi$ (i.e., if φ is a *theorem*, then so is $\Box\varphi$). Different axioms can be added to a modal system that have the effect of constraining the accessibility relation. If it is required that the accessibility relation is reflexive, i.e., every world is accessible to itself, the proper axiom is T: $\Box\varphi \rightarrow \varphi$. Other well-known axioms are 4: $\Box\varphi \rightarrow \Box\Box\varphi$ (corresponds to the condition of transitivity), 5: $\Diamond\varphi \rightarrow \Box\Diamond\varphi$ (Euclideaness) and B: $\varphi \rightarrow \Box\Diamond\varphi$ (symmetry). When talking about alethic and doxastic modalities in this thesis, no assumptions about the accessibility relation will be made unless explicitly stated.[2]

In the case of first-order modal logic, standard relational models are of the form $\mathcal{M} = \langle W, R, D, I \rangle$. There are two alternative views to how the domain should be related to the possible worlds. The first view is that the domain should stay constant from world to world; the second is that domains can vary between worlds. In varying domain models, we add a function which assigns each possible world w its own domain $D_w \subseteq D$. In constant domain models, $D_w = D$ for all $w \in W$. The proponents of constant domain models are often called possibilists,

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[1] This is not to say that other systems could not be adapted to suit the needs of modal logic, although this too has been suggested (see e.g. preface to Blackburn, de Rijke and Venema 2001). Recently, labelled systems for natural deduction and sequent systems have been developed that can handle the context-dependency of the rule of necessitation (see Viganò 2000, Chapters 3-4 for labelled natural deduction and Negri and von Plato 2011, Chapters 11-12 for labelled sequent calculus for modal logics).

[2] For a detailed examination of standard systems of modal logic, see e.g. Fitting and Mendelsohn 1998: Chapter 1.

since their one domain of quantification usually has to contain "possible objects" (unless possibilia are banished from the language altogether), and the varying domain theorists actualists, although the terms might not perfectly correspond to the two views about domains.

In the varying domain option, the existential quantifier corresponds, with respect to a possible world, to existence *in that world*, which might make it a more "intuitive" interpretation.[3] However, the same effect can be simulated by defining an existence *predicate E!* that contains, with respect to each possible world, the set of things that actually exist in that world. Varying domain quantification, on the other hand, cannot express everything that constant domain quantification can express. When quantifiers have their actualist readings, it cannot be stated in the language that all possible objects possess some property.[4] If one is not too concerned about the metaphysics of modal logic, constant domain models can often be a simpler choice. Here, varying domain models are nevertheless used for the sake of flexibility, with the exception of the exposition of Holliday and Perry's intensional logic, where the authors' choice of using constant domain models is followed.

The interpretation function I assigns some $I(c, w)$ to every constant term c such that $I(c, w) \in D_w$, and to any n-place relation symbol P^n an n-place relation $I(P^n, w)$ on D_w. The assignment μ attaches some $\mu(x) \in D$ to each variable x. The interpretation of a term in a world under an assignment, $I_\mu(t, w)$, is $I(t, w)$ in case t is a constant, and $\mu(t)$ in case t is a variable. An assignment μ' is called an x-variant of an assignment μ if and only if μ and μ' differ at most in their value assignment to x.

The conditions of satisfaction for atomic formulas $P^n(t_1, ..., t_n)$ and quantified formulas are defined as follows:

$\vDash_{M, w, \mu} P^n(t_1, ..., t_n)$ iff $\langle I_\mu(t_1, w), ... I_\mu(t_n, w) \rangle \in I(P^n, w)$

$\vDash_{M, w, \mu} \forall x \varphi$ iff for all x-variants μ' of μ such that $\mu'(x) \in D(w), \vDash_{M, w, \mu'} \varphi$

Connectives behave similarly to propositional modal logic, and the exis-

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[3]But this is not necessarily so: Williamson 1998 gives some quite convincing arguments for why actualism, when thoroughly analysed, is in fact no more intuitive than possibilism. Williamson 2013 extends this discussion on a metaphysical level.

[4]Cresswell 1991: 276-277.

tential quantifier can be defined in terms of the universal quantifier and negation, as usually.

Alethic logic, the logic of metaphysical modalities, is only one type of a system that can be represented in this framework. Deontic logic, for example, uses "it is obligatory that" and "it is permissible that" as modal operators. The same semantics can be easily adapted to the purposes of epistemic and doxastic logics as well. In the logic of knowledge, K_a takes the place of the necessity operator (read "a knows that") and in doxastic logic, B_a ("a believes that") serves the same purpose. In doxastic logic, for example, if some world is accessible to an agent, that world represents a situation that the agent cannot *rule out*, given all that he believes. Accessible worlds represent situations that, for all the agent knows, might be actual. Thus for someone to believe that something is the case, he has to see it as being the case in all possible worlds accessible to him. This makes plenty of sense: for if one could think of a relevant counterfactual situation in which something might *not* be the case, he would probably not believe it until he has been able to rule out that particular counterfactual situation.

The accessibility relation must be of course weaker in epistemic and doxastic logics than in alethic logic. Not all possible circumstances are actual options for the agent in the given context. For doxastic logic, we might, e.g., assume that what someone believes, he believes that he believes (positive introspection); therefore we might choose to include the axiom 4, $B_a\varphi \rightarrow B_aB_a\varphi$. Beliefs are could assumed to be consistent, that is, it could be assumed that D $\Box\varphi \rightarrow \Diamond\varphi$ is an axiom as well. These rules require some degree of rationality from the agent, and it has been debated whether Kripke semantics give a too idealized picture of doxastic logic. However, we will accept these idealizations and not examine alternative semantics in this thesis.

Appendix II: Models for Relational Modalities

Glüer and Pagin use pointed model structures of the form $\mathcal{M} = \langle W, R, a, D_w, D, I \rangle$ where W is a set of worlds and R is the accessibility relation, as usual, and a is the "privileged" actual world. D is the domain of individuals, and D_w is a function from W to $\mathbb{P}(D)$, giving each possible world its own domain. Lastly, I is an interpretation function, which gives all non-logical constants c and all worlds $w \in W$ some $I(c, w) \in D_w$, and all n-place relation symbols P^n an n-place relation on D_w.

It is required that for any non-modal formula φ to be defined in w, the constants and variables must have an interpretation in the domain of w, i.e., for every constant c, $I(c, w) \in D(w)$ and for every variable x, $\mu(x) \in D(w)$. In the case of actualist evaluation, we require that $I(c, a) \in D(w)$. Otherwise, the formula is undefined. For a formula $\Box\varphi$ it is required that φ is well defined in all accessible worlds.[5] The definedness of other complex formulas can be given recursively.

Let us first define validity under actualist evaluation.[6] Interpretation of terms in a model with respect to a world is as follows: $I_\mu(t, w) = I(t, w)$ in case t is a constant, and $I_\mu(t, w) = \mu(t)$ in case t is a variable.

$\vDash^a_{M,w,\mu} P^n(t_1, ..., t_n)$ iff $\langle I_\mu(t_1, a), ... I_\mu(t_n, a) \rangle \in I(P^n, w)$

$\vDash^a_{M,w,\mu} t = u$ iff $I_\mu(t) = I_\mu(u)$

$\vDash^a_{M,w,\mu} \neg\varphi$ iff φ is defined in w and $\nvDash^a_{M,w,\mu} \varphi$

$\vDash^a_{M,w,\mu} \varphi \wedge \psi$ iff $\vDash^a_{M,w,\mu} \varphi$ and $\vDash^a_{M,w,\mu} \psi$

$\vDash^a_{M,w,\mu} \forall x \varphi$ iff for all x-variants μ' of μ such that $\mu'(x) \in D(w)$, $\vDash^a_{M,w,\mu'} \varphi$

$\vDash^a_{M,w,\mu} \Box\varphi$ iff for all $w' \in W : wRw'$, $\vDash^a_{M,w',\mu} \varphi$

We can now define validity in alethic relational models. The definition is rather familiar except for the clause for necessitated formulas.

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[5] Glüer and Pagin 2008: 314-315.

[6] I will use the term "relational models" for Glüer and Pagin's models for relational modalities, following the authors' own use of the term. The term "classical models" is used for standard models in relational or possible worlds semantics. Hopefully, this use of words is not overly confusing.

$\vDash_{M,w,\mu} P^n(t_1, ..., t_n)$ iff $\langle I_\mu(t_1, w), ... I_\mu(t_n, w) \rangle \in I(P^n, w)$

$\vDash_{M,w,\mu} t = u$ iff $I_\mu(t) = I_\mu(u)$

$\vDash_{M,w,\mu} \neg\varphi$ iff φ is defined in w and $\nvDash_{M,w,\mu} \varphi$

$\vDash_{M,w,\mu} \varphi \wedge \psi$ iff $\vDash_{M,w,\mu} \varphi$ and $\vDash_{M,w,\mu} \psi$

$\vDash_{M,w,\mu} \forall x\varphi$ iff for all x-variants μ' of μ such that $\mu'(x) \in D(w)$, $\vDash_{M,w,\mu'} \varphi$

$\vDash_{M,w,\mu} \Box\varphi$ iff for all $w' \in W : wRw'$, $\vDash^a_{M,w',\mu} \varphi$

Unlike in classical models, obviously, there is no rigidity requirement for the class of constant terms, and therefore necessary identity statements between proper names are not always true. But this is not the only difference between relational and classical models. Even though non-rigid classical models do not validate $c = b \rightarrow \Box c = b$, they *do* validate the weaker $\Box c = b \rightarrow c = b$ which fails to be valid in relational models.[7]

It is clear that the classical models and the relational models have the same evaluation with respect to the actual world. There is a difference when simple sentences in other possible worlds are considered. In "Relational Modalities"[8], Glüer and Pagin dedicate a long section to comparing the definition of logical consequence (and validity) in classical and relational models. In what follows, I summarize their most central points.

The notions of (universal) classical consequence and *actualist* relational consequence turn out to match each other, if certain restrictions are added. Actualist consequence is here defined to be logical consequence under the actualist evaluation. The required restrictions concern both quantification and modal operators. First of all, since it is demanded in relational models that every term in a model has a denotation in the actual world, then if $\forall x P(x)$ is true in the actual world, then so is $P(t)$. But this is not a classical consequence unless the restriction to non-empty domains is added. Similarly, the inference from $\Box P(t)$ to $\neg(P(t) \wedge \neg P(t))$ is a relational consequence (since t is, again, required to have

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[7]A countermodel would be one in which, for some c and b, $I(b,a) = I(c,a)$ but for some $w \in W$, $I(b,a) \neq I(c,a)$. Then in this model, $\Box c = b$ would be satisfied in w - as its satisfaction is linked to the actual world by actualist evaluation of alethic operators - but $c = b$ would nevertheless not hold.

[8]Glüer and Pagin 2008.

denotation in the actual world) but is a classical consequence only in reflexive frames.

With these restrictions, the actualist consequence in relational modalities and the universal consequence in classical semantics can be shown to coincide.[9] Furthermore, the equivalence still holds if, e.g., transitivity is added to the frame conditions.[10] If the domains are assumed to be constant, then obviously the equivalence holds also in K, since then by definition, every term has a denotation in the actual world.

Although Glüer and Pagin do not consider multimodal logics, combining alethic and doxastic modalities in one system is quite straightforward. Let us denote the doxastic accessibility relation (for the agent) by R_d. The actualist evaluation for doxastic formulas, then, is:

$$\vDash^a_{M,w,\mu} B_d \varphi \text{ iff for all } w' \in W : wR_dw', \vDash_{M,w',\mu} \varphi$$

and the general definition of validity in relational modality models is

$$\vDash_{M,w,\mu} B_d \varphi \text{ iff for all } w' \in W : wR_dw', \vDash_{M,w',\mu} \varphi$$

which is simply to say that doxastic statements are always evaluated in the standard possible-worlds evaluation. No special class of doxastically possible worlds needs to be added, since all alethically possible worlds are also doxastically possible and vice versa. What distinguishes alethic and doxastic modalities is only the modes of evaluation. Models would then have the form $\mathcal{M} = \langle W, R, R_d, a, D_w, D, I \rangle$ where the only addition to the pure alethic models defined above is the second accessibility relation used in evaluating doxastic statements.

In this type of a bimodal logic, we can see that consecutive alethic and doxastic operators in a mixed modal sentence switch the actualist evaluation on and off, as should be expected. To give a simple example, the sentence $\Box B_a F(b)$ is satisfied in a world w in a bimodal model $\mathcal{M}$ under an assignment μ

iff for all $w' \in W : wRw', \vDash^a_{M,w',\mu} B_a F(b)$

iff for all $w' \in W : wRw'$, for all $w'' \in W : w'R_dw'', \vDash_{M,w'',\mu} F(b)$

[9]Glüer and Pagin 2008: 318-321.

[10]Ibid.: 321. At least symmetry and (consequently) Euclideaness can be shown, similarly to transitivity, to belong to the conditions under which actualist and classical consequence are equivalent. The proof can be found in Glüer and Pagin 2008 and will not be not detailed here.

iff for all $w' \in W : wRw'$, for all $w'' \in W : w'R_d w''$, $I(b, w'') \in I(F, w'')$

i.e., the sentence is true if for all doxastically possible worlds w'' that can be reached from any alethically accessible world w' for w, whatever is designated by *b in w''* is *F* (in w''). The interpretation of mixed sentences in section 5.1, expressed in slightly more informal terms, proceeds by the same principles.

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