On negative antecedents in deontic conditionals

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Abstract

This paper investigates the semantics of deontic modals. It focuses on the interplay between primary and secondary duties. The paper pays particular attention to secondary duties reported in conditionals with negative antecedents. It is claimed that this kind of example provides relevant insights into the semantics of deontic modals, shedding light on the relation between facts and ideals that is relevant to the evaluation of deontic claims. The paper proposes a semantics for deontic modals (exemplified by *should*). At the heart of the proposal is a notion of revision (similarity) that is argued to be analogous to that found in counterfactuals. Building on work by Kratzer and Veltman, it is claimed that there is a common core to the semantics of deontics and counterfactuals.

1 Introduction

This paper investigates the semantics of deontic modals. It will be argued that deontic modals bear certain similarities to counterfactual modals (*would* in English). Both deontics and counterfactuals have a semantics that pays attention to facts in the evaluation world. It will be argued that they both pay attention to the relations between facts in the evaluation world (where the relations are identified by the laws in the evaluation world). It has long been noted in the literature on counterfactual modality that, in order to get the semantics of counterfactuals right, it is necessary to track relations between facts in the evaluation world (e.g. Kratzer 1989, 1991, 2002, Veltman 2005). In this paper, it will be argued that in order to get the semantics of deontics right, it is also necessary to track relations between facts in the evaluation world. A similar characterization of r*evision* (similarity) will be argued to play a role in both types of modality.

Standard Lewis-Stalnaker style semantics for counterfactuals place similarity with respect to actual world facts at the centre of the analysis. An example illustrating the need to take into account the relations between facts in counterfactuals, and not just facts in isolation, was provided in Tichý (1976), and discussed by Veltman (2005). The relevant scenario is provided in (1):

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(1) Consider a man, call him Jones, who is possessed of the following dispositions as regards wearing his hat. Bad weather invariably induces him to wear a hat. Fine weather, on the other hand, affects him neither way: on fine days he puts his hat on or leaves it on the peg, completely at random. Suppose moreover that actually the weather is bad, so Jones is wearing his hat.

In the scenario described in (1), we would judge the sentence in (2) false:

(2) If the weather had been fine, Jones would have been wearing his hat.

Tichý's point was that a semantics for counterfactuals that pays attention to similarity with actual world facts and naïvely ignores the relations between facts will get the interpretation of counterfactuals like this one wrong. If we pay attention to similarity with actual world facts in a naïve manner, in interpreting (2) we will quantify over the worlds that best match the actual world with respect to facts in which the weather was fine. Given the actual facts regarding Jones's hat, those worlds will be worlds in which Jones was wearing his hat. The prediction is that (2) should be judged true (contrary to our intuitions). We obtain the wrong interpretation for (2) because we evaluate similarity without paying attention to the relations between facts in the actual world. When we consider the worlds quantified over by the counterfactual modal, we will take into accounts worlds that differ from the actual world with respect to the bad weather. But this was the very reason why Jones was wearing his hat! If we allow variation with respect to the weather, we should also allow for variation with respect to the wearing of the hat (predicting that example (2) is false in this scenario).

Both Kratzer and Veltman have proposed semantics for counterfactuals in which similarity is not evaluated in a naïve manner, but instead is evaluated in a way that pays attention to the relations between facts. In this paper, it will be argued that the semantics of deontic modals should also be formulated in a manner that pays attention to the relations between facts. I will use *should* as an example of a deontic modal,[1] and propose a semantics that builds on Veltman's (2005) analysis of counterfactuals (an alternative analysis could also be proposed on the basis of Kratzer's proposal for counterfactuals, a comparison between the two alternatives lies outside the scope of this paper).

Data supporting the need to allow for relations between facts to play a role in the semantics of deontic modals will come from our intuitions regarding the interaction between primary and secondary duties. Primary duties are the obligations that arise unconditionally, while secondary duties are the obligations that arise in less-than-ideal circumstances. Secondary duties are usually spelled out in a type of conditional known as *Contrary to Duty Imperatives* (CTDs) (following Chisholm 1963, see also Åqvist 2002 and Carmó and Jones 2002). An example of a primary duty and a secondary duty spelled out in a CTD is presented in (3):

(3) a. There should be a fence around the house. (primary duty)
b. If there isn't a fence, there should be a guard dog. (CTD).

Now consider examples (4) and (5), with the assumption that there is no fence around the house and there is no guard dog:

1 I will not be able to address differences between deontic modals in this paper. For some discussion, the reader is referred to Copley (2006) and von Fintel and Iatridou (2008).

(4) a. Housing inspector: There should be a fence around the house.
b. House owner: There was no more wood in the store!
c. Housing inspector: Well, there should be a guard dog.

(5) a. Housing inspector: There should be a fence around the house.
b. House owner: I didn't feel like following regulations!
c. Housing inspector: #Well, there should be a guard dog.

The housing inspector's reply in (5) is odd, but it is perfectly reasonable in (4). This may appear unexpected given the CTD in (3b). According to the CTD, if there is no fence, there should be a guard dog. Why are we reluctant to accept as true the housing inspector's reply in (5)? This paper will provide an answer to this question, showing that we can make sense of the contrast between (4) and (5) with a semantics for *should* that pays attention to the relation between facts in the same way that the semantics for *would* does.

The structure of the paper is as follows. In Section 2 I will discuss contrary to duty imperatives and secondary obligations, focusing on features that will be relevant later on. In Section 3 I will lay the groundwork for the proposal, discussing some of the background assumptions and previous proposals. In Section 4 I will spell out a semantics for *should* that builds on work by Kratzer and Veltman, making use of a notion of revision proposed by Veltman for counterfactuals. Conclusions will be presented in Section 5.

2 *Contrary to duty imperatives* and secondary obligations

CTD conditionals provide important evidence that we need a semantics for *should* that pays attention to the relations between facts. In this section I will present a brief overview of the facts about CTDs and secondary duties that will be relevant for our discussion in later sections of the paper (see Arregui 2010 for a more thorough discussion of CTDs).

CTD conditionals serve as a kind of 'back-up plan'. They are important *for most of us need a way of deciding, not only what we ought to do, but also what we ought to do after we fail to do some of the things we ought to do* (Chisholm 1963: 35-36). I will not be able to discuss what kind of deontic modality exactly is associated with CTDs. I will take for granted a general 'ought-to-be' deontic modality (Feldman 1986). In some cases, there appears to be a temporal dimension to CTDs. These truly seem to indicate what is the best thing to do after we have failed to do what we ought to do. An example of a CTD in which the secondary duty seems to 'kick in' at a time that follows the time of the primary duty is provided in (6):

(6) a. She should return the library book on time.
b. If she returns the book late, she should pay a fine. (CTD)

There appears to be a temporal distinction between the primary duty in (6a) and the secondary duty presented in (6b). We could not felicitously assert (6a) after she has returned the book late. At that point, we would move on to claim that she should pay a fine. However, not all secondary duties follow primary duties in time. Prakken and Sergot (1996) have provided several examples that illustrate that primary and secondary duties can co-occur in time (they can hold together). Some examples are provided in (7) and (8):

(7) a. The children should not be cycling on the street.
b. If the children are cycling on the street, they should be cycling on the left side of the street.

(8) a. There should be no fence.
b. If there is a fence, it should be a white fence.

In the examples above, both the primary and secondary duties are about stative eventualities and the duties are oriented towards the speech time. There isn't really a temporal distinction between the primary and secondary duty. If we see the children cycling on the right side of the street, for example, it is both true that they should not be cycling on the street, and that they should be cycling on the left side of the street.

The same point can be made with example (3), discussed above. If we come across a house with no fence, we may choose to assert that there should be a fence, but we may also choose to assert that there should be a guard dog. The conditions for the secondary duty spelled out by the antecedent of the CTD in (3b) are conditions in which we could also assert the primary duty. The important feature of deontic conditionals like this one, with a stative negative antecedent, is that the antecedent describes circumstances in which the primary duty seems to hold. The antecedent does not appear to discriminate between the circumstances in which one or other duty holds (raising questions as to how we decide which one to assert).

The discussion above indicates that we need a semantics for deontic statements that (in some sense) allows primary and secondary duties to co-exist. But the two types of duties are not equivalent. As we have seen, in some cases we appear happy to fall back on a secondary duty (illustrated by (4c)), while in others we are not (illustrated by (5c)). Intuitively, the important difference between examples (4) and (5) is that in (4) circumstances are such that there 'cannot' be a fence. When the primary duty cannot be fulfilled, we fall back on the secondary duty (this was also the intuition reported in Prakken and Sergot 1996). When it is possible to fulfil the primary duty, as seems to be the case in (5), we are not willing to fall back on the secondary duty. There seems to be extra modal force driving our willingness to fall back on the secondary duties laid out by CTDs (i.e. if there *cannot* be a fence, there should be a guard dog). This does not appear to be part of the meaning of the antecedent of the conditional itself. We would like to know where this modal force comes from.

3 Towards a counterfactual analysis

In Section 2 we reached the conclusion that we needed a semantics for *should* that allows primary and secondary duties to co-exist (i.e. a semantics according to which primary and secondary duties are compatible), as well as an understanding of why in some cases we seem willing to fall back on secondary duties whereas in other cases we are not. In this section we will formulate a preliminary proposal for the semantics of *should* taking as a starting point a simplified semantics of counterfactuals. We will examine advantages and potential shortcomings. This will lay the groundwork for the proposal to be defended in Section 4.

3.1 Preliminaries: Kratzer (1981, 1991)

Our first attempt at the semantics of *should* will build on the treatment of modality in Kratzer (1981, 1991). In this section I will provide a brief overview of some of the basic features of that proposal (the reader is referred to Kratzer's work for a more sophisticated and thorough discussion).

Kratzer spells out a theory of modality according to which the 'flavors' of modality depend on context. The semantics of modals lays down the modal's quantificational force, and context-dependent parameters work together to identify the kind of modality relevant in each case. I will consider the modal *should* to be a necessity modal (but see von Fintel and Iatridou 2008). Kratzer's proposal for necessity modals is given in (9):

(9) A proposition p is a *necessity* in a world w with respect to a modal base f and an ordering source g iff the following condition is satisfied:
For all $u \in \cap f(w)$ there is a $v \in \cap f(w)$ such that $v \leq_{g(w)} u$ and for all $z \in \cap f(w)$: if $z \leq_{g(w)} v$, then $z \in p$. (Kratzer 1991)

According to (9), a necessity modal is a universal quantifier over possible worlds. The quantificational domain of the modal is identified on the basis of the interaction between a (contextually given) modal base and a (contextually given) ordering source. Both the modal base and the ordering source are functions from worlds to sets of propositions.

Given (9), the modal base and ordering source act together to identify the domain of quantification of the modal. Intuitively, quantification takes place over the 'best' worlds corresponding to the modal base. As Kratzer notes, the definition in (9) has certain complexity to avoid making the 'limit assumption': *This definition is in the spirit of Lewis (1981). Roughly, it says that a proposition is a necessity if and only if it is true in all accessible worlds which come closest to the ideal established by the ordering source. The definition would be less complicated if we could quite generally assume the existence of such 'closest' worlds.* (Kratzer 1991). In what follows, I will simplify matters and assume that it is possible to make the limit assumption and find the closest worlds to the ideal:

(10) Given an ordering source g, and possible world w', w' is a g(w)-closest world iff there isn't a world w" such that $w" <_{g(w)} w'$. (i.e. w' is a g(w)-closest if there isn't a world that is closer).

With this definition in hand, we can then simplify *necessity* as follows:

(11) A proposition p is a *necessity* in a world w with respect to a modal base f and an ordering source g iff the following condition is satisfied:
$\forall w' \in \cap f(w)$: if w' is a g(w)-closest world, then $w' \in p$.

Working with Kratzer's framework, context is crucial in determining the type of modality associated with a modal. In discussing deontics, Kratzer considers two possibilities: (i) the modal is interpreted with respect to an empty modal base and a normative ordering source (where a normative ordering source is function from possible worlds to sets of propositions that correspond to what is 'good' in the context, e.g. the laws, library regulations, moral duties, etc.), or (ii) the modal is interpreted with respect to a circumstantial modal base and a normative ordering source (where a circumstantial modal base is a function from possible

worlds to sets of propositions true in the possible worlds, e.g. propositions that describe what is going on in the evaluation world). In the first case, all possible worlds will be ranked by the norms and the modal will quantify over the best possible worlds given the norms. In this interpretation, the deontic modal will make a claim regarding what is best that is independent of facts in the evaluation world. In the second case, only possible worlds that match the evaluation world with respect to the facts encoded in the circumstantial modal base will be considered. The modal will quantify over the best such worlds given the norms. In this interpretation, the deontic modal will make a claim regarding what is best given contextually relevant facts.

Neither of these two interpretations straightforwardly captures our intuitions regarding the interplay between primary and secondary duties. Consider the housing inspector's reply in the scenarios described in (4) and (5): *There should be a guard dog*. The claim that there should be a guard dog will not be true with an interpretation of the modal according to which the modal base is empty. The presence of the guard dog is not the best option in an absolute, fact-independent, way. The best thing really would be a fence (the 'primary duty'). Whether the claim that there should be a guard dog comes out true or not with a circumstantial modal base depends on the propositions in the modal base. If we do include the proposition that there is no fence, then the claim that there should be a guard dog will be true. However, note that there is nothing in the semantics that forces us to include that proposition in the modal base (it is a context-dependent matter). Nothing guarantees that the proposition that there is no fence has to be part of the circumstantial modal base (as is suggested by our intuitions in (4c)). And nothing explains why, in spite of the fact that it is true that there is no fence, in some cases we do not appear to 'take it for granted', and include the corresponding proposition in the modal base (as is suggested by our intuitions in (5c)). In order to capture our intuitions regarding the interplay between primary and secondary duties, we would need to elaborate on the proposals for the interpretation of deontic modals described above.

3.2 Revising the premise set

As the previous discussion illustrates, in order to judge the claim that there should be a guard dog true, we need a semantics for deontic *should* that is sensitive to facts in the actual world, in particular, the fact that there is no fence around the house. We fall back on secondary duties driven by facts in the actual world (the evaluation world). In this section I will sketch a preliminary 'simple' semantics for *should* that is sensitive to facts and use the discussion to motivate a more sophisticated approach, in which the semantics for *should* is not only sensitive to facts but also to relations between facts.

The puzzle posed by secondary duties (such as *There should be a guard dog*) is how to set up a semantics for *should* that 'sees' the facts in the world that drive us to fall back on the secondary duty in the appropriate way. One way of guaranteeing sensitivity to the relevant facts is to set up a semantics for *should* that see all facts in the world (thus seeing all relevant facts). We could achieve this in a Kratzer-style framework by choosing a modal base that is not merely circumstantial, but also totally-realistic (a modal base that assigns to a world a set of propositions that characterizes it uniquely). With such a modal base we could make sure that all the facts that lead us to fall back on secondary duties are 'visible' to the deontic modal. This would be so because all facts would be 'visible' to the deontic modal. However, this proposal is clearly problematic. Consider again the example above: *There should be a*

guard dog. In (4), we judged this true. But note that in the actual world, there is no guard dog. A totally realistic modal base will only allow the deontic modal to quantify over the actual world (since this is the only world corresponding to the modal base, the ordering source will identify it as the best world given the norms – it is the only world under consideration!). With a totally realistic modal base, the prediction is that the claim that there should be a guard dog is false, contrary to our intuitions in (4).

It is clear where we have gone wrong. Our modal base contains too many true propositions. We want to quantify over worlds that match the facts in the actual world as much as possible (to make sure that the facts that push us to secondary duties remain visible to the modal) but at the same time we want to make sure that some facts are left out (in the example above, we want to make sure that we leave out the fact that there is no guard dog).[2] To achieve this result, we could start off with a totally realistic modal base and revise it so as to make it compatible with the proposition embedded under the modal (removing the proposition that there is no guard dog). Intuitively, this means the deontic modal would have access to the worlds most similar to the actual world except for the facts pertaining to the absence of a guard dog (and the ordering source would identify the 'best' worlds amongst this set). In looking at worlds that are like the actual world except for some facts, we set up a semantics for *should* that is reminiscent of the semantics for counterfactuals (where quantification takes place over the most similar worlds in which the antecedent proposition is true). Our first attempt to achieve this result is presented in (12):

(12) Semantics for *should* (preliminary)
[[***should ϕ***]]$^{\text{f-rev-}\phi,\, g}$ is true in w iff
$\forall w' \in \cap f_{\text{rev-}\phi}(w)$: if w' is a g(w)-best world, $w' \in \phi$

The important feature of (12) is the choice of modal base. The modal base $f\text{-}_{\text{rev}\phi}$ is a totally realistic modal base minus the propositions inconsistent with ϕ. Given this modal base, *should* will quantify over the best worlds (given g) in which all the propositions true in the actual (evaluation) world compatible with the proposition embedded under the modal are true. With this proposal, the statements of primary and secondary duties will receive the interpretations below (for a discussion focused on detachment patterns in CTDs, see Arregui 2010).

(13) a. [should [there be a fence]].
b. [[(13a)]]$^{\text{f-rev, g}}$ is true in w iff
$\forall w' \in \cap f_{\text{rev}}(w)$: if w' is a g(w)-best world, then there is a fence in w'.

(14) a. [should [there be a guard dog]].
b. [[(14a)]]$^{\text{f-rev, g}}$ is true in w iff
$\forall w' \in \cap f_{\text{rev}}(w)$: if w' is a g(w)-best world, then there is guard dog in w'.

In (13b) and (14b), f-rev is a revision of a totally realistic modal base to a modal base compatible with the proposition embedded under the modal (i.e. in (13b) we remove from the totally realistic modal base the propositions incompatible with the proposition that there is a fence, and in (14b) we remove from the totally realistic modal base the propositions

2 There are other proposals in the literature that tackle the issue of diversity in the domain of quantification of modals (e.g. Frank 1997, Condoravdi 2002, Zvolenszky 2002, 2006). I will not be able to do full justice to this debate here.

incompatible with the proposition that there is a guard dog). This means that in evaluating the secondary duty (14a), quantification will take place over worlds in which there is no fence (the proposition that there is no fence, present in the totally realistic modal base, will remain in the revised modal base, since it is not incompatible with the proposition that there is a guard dog). With this modal base, we ensure that all the facts relevant to the evaluation of secondary duties remain visible to the modal, and at the same time we ensure that actual facts incompatible with the proposition embedded under the modal do not trivialize the interpretation.

Importantly, the proposal in (12) allows primary and secondary duties to be compatible with each other. We can see this in examples (13) and (14). In principle, both (13a) and (14a) could be true in the actual world. Given the proposal for *should* in (12), we quantify over different worlds in evaluating (13a) and (14a), and nothing prevents the best worlds to be worlds in which there is a fence in the evaluation of (13a), and the best worlds to be worlds in which there is a guard dog in the evaluation of (14a). The worlds corresponding to the modal base are different in each case, and so the best worlds may also be different. The proposal in (12) thus accounts for Prakken and Sergot's observation that primary and secondary duties may be compatible. While this is a welcome result, it is true, however, that the conjunction of primary and secondary duties at times sounds strange. Even though both primary and secondary duties can be true in (13a) and (14a), it would be rather surprising if a housing inspector, coming across the fence-less house, were to tell the owner (15):

(15) There should be a fence and there should be a guard dog.

I would like to suggest, however, that this could be attributed to performative effects associated with the utterance of deontic statements. In the context above, the claim made by the housing inspector would be interpreted as corresponding to what the inspector wants the home-owner to do (or the reproach the inspector wishes to make), and this would be strange. If we set up a context where such performative effects are discarded, it seems easier to conjoin primary and secondary duties:

(16) Housing inspector 1: Ok, let's make a list of all the violations this house owner has incurred and figure out the fine
Housing inspector 2: Well, there are lots! There should be a fence, so let's fine him $10 for that, there should be a guard dog, so let's fine him another $10 for that, there should be a fire hydrant, let's fine him an additional $10, ….

To make a strong argument regarding this point it would be necessary to have a theory of the performative effects associated with deontic statements, missing at this point. But I hope to at least have shown that a semantics for deontic modals that allows primary and secondary duties to be compatible, together with a theory of the performative effects associated with deontic statements, has a good chance of accounting for our intuitions.

While the proposal in (12) provides us with good results in making deontic modals sensitive to the facts in the evaluation world, it cannot be the whole story. The account in (12) does not explain the contrast in our intuitions regarding (4c) and (5c). Why are we willing to fall back on the secondary duty in one case but not in the other? In both scenarios, it is the case that there is no fence around the house. Given the CTD in (3b), this appears to be the relevant condition for the secondary duty. The contrast in our intuitions, however, indicates that this is not all that matters. Whether there is no fence because there was no wood or because the

owner does not follow regulations seems to play a role too. The semantics in (12) does not yet give us an account of that. In the next section, we will modify the analysis and put at the core of the interpretation of *should* a notion of revision that pays attention to such relations between facts.

4 A counterfactual analysis of deontic *should*

The proposal for *should* presented in (12) is a first step towards an analysis for deontic modals that builds on the semantics of counterfactuals. As with counterfactuals, the evaluation of the modal requires revising a premise set corresponding to what is going on in the evaluation world. However, the approach in (12) was too naïve. We did not take into account the complexity of the interpretation of counterfactuals. In this section we will present an analysis of counterfactuals that pays attention to relations between facts, and use it to build a more sophisticated semantics for *should.* The proposal will be built around the analysis of counterfactuals in Veltman (2005) (a comparison with the options made available by other analysis of counterfactuals lies outside the scope of this paper).

4.1 Veltman (2005)

Veltman (2005) spells out a semantics for counterfactuals within a dynamic semantics framework. Veltman's objective is to propose a semantics for counterfactuals that can handle relations between facts. As illustrated by Tichý's example (discussed by Veltman), a semantics for counterfactuals that pays attention to similarity without factoring in the relations between facts will get things wrong. Veltman's insight is that, in a premise-set style semantics for counterfactuals, relations between facts need to be taken into account when revising premise sets. Veltman's proposal is to identify the set(s) of 'basic' independent facts in a world and define revision with respect to this set(s), allowing the laws that operate in the world to 'fill in' the rest and bring along the dependent facts. I will briefly present Veltman's proposal below, and build on it to propose a semantics for *should* in Section 4.2. In presenting Veltman's proposal, I will make a series of simplifications. Veltman proposes a semantics for counterfactuals in a dynamic framework. Part of Veltman's interest lies in identifying the mechanisms that bring about context change in counterfactuals. I will not be interested in the dynamic dimension here, and will simplify the proposal to set aside the dynamic aspects (future work would be needed to explore context change for deontic statements).

I will illustrated Veltman's proposal with Tichý's scenario in (1) and counterfactual in (2) (repeated below):

(2) If the weather had been fine, Jones would have been wearing his hat.

I will begin with some of Veltman's terminology. A *world* is a valuation function on a finite set of atomic sentences. A *situation* is a proper subset of a possible world. A *proposition* is a subset of the set of possible worlds. The *modal horizon* of a possible world is the set of possible worlds U that obey its laws (I will refer to the modal horizon of the actual world ($w_@$) as $U_@$). Some useful auxiliary definitions are provided in (17):

(17) a. A situation s *determines* a world w in $U_@$ iff
for all w' in $U_@$ such that $s \subseteq w'$, w' = w.
b. A situation s is a *basis* for a world w iff
s is a minimal situation that determines w in $U_@$.
c. A situation *forces* a proposition P within $U_@$ iff
for every world w in $U_@$ such that $s \subseteq w$, P is true in w.

Let us illustrate these definitions with Tichý's example above. Suppose that p = 'the weather is bad', q = 'Jones is wearing his hat', and r = 'Jones lives in Amsterdam' (a random sentence to illustrate how the system works). Suppose moreover that the actual world is subject to a law that states that *if p is true, q is true* (i.e. *if the weather is bad, Jones is wearing his hat*). Then, the actual world will be a set corresponding of three facts: $w_@ = \{<p. 1>, <q, 1>, <r, 1>\}$ (where we write <p, 1> to indicate that p is true). The modal horizon of the actual world ($U_@$) is made up of worlds that obey the laws of the actual world. So, for example, worlds like $w_1 = \{<p, 0>, <q, 0>, <r, 1>\}$ and $w_2 = \{<p, 1>, <q, 1>, <r, 0>\}$ are members of $U_@$, but worlds like $w_3 = \{<p, 1>, <q, 0>, <r, 0>\}$ are not members of $U_@$ (since w_3 violates the laws of $w_@$). The actual world has a single basis: $s = \{<p, 1>, <r, 1>\}$ (for all $w' \in U_@$, if $\{<p, 1>, <r, 1>\} \subseteq w'$, $w' = w_@$).

With this vocabulary in place, we can now turn to Veltman's semantics for counterfactuals. The interpretation of counterfactuals requires that we make a 'counterfactual hypothesis'. This proceeds in two stages: we first identify a set of worlds on the basis of the facts in the actual world that are compatible with the counterfactual assumption taking into account the relevant laws (I will call this set of worlds the 'revision set' built on the basis of the counterfactual hypothesis). We then update the revision set with the proposition corresponding to the counterfactual hypothesis. We are particularly interested in the first stage, since this is where revision takes place and Veltman deploys machinery that is able to handle not only facts but also relations between facts.

To identify the revision set for the antecedent proposition, Veltman defines an auxiliary set. The intuition is that the auxiliary set will correspond to the maximal set(s) of independent facts in the world compatible with the antecedent proposition. Given a proposition P and a world w, $w{\downarrow}P$ is the set of situations s such that $s \subseteq w$ and there is a basis s' for w such that s is a maximal subset of s' not forcing P. In this way we can identify the maximal sets of independent facts in w compatible with P. With this auxiliary definition in hand, we can now tackle the task of defining the revision set for a world w and a proposition P (which I will abbreviate as $Rev_{w/P}$): a world $w' \in Rev_{w/P}$ iff $w' \in U_w$ and there is some $s \in w{\downarrow}P$ such that $s \subseteq w'$. Intuitively, given a world w and a proposition P, the revision set will be those members of the modal horizon of w that 'extend' maximal sets of independent facts of w compatible with the proposition P.

Let us go back once more to Tichý's example to see how this works. As we noted, there is a single basis for the actual world: $s = \{<p, 1>, <r, 1>\}$. Let P be the proposition corresponding to the counterfactual hypothesis ¬p (the proposition that the weather is fine). The set corresponding to $w_@{\downarrow}P = \{\{<r, 1>\}\}$ (the unique maximal set of independent facts in $w_@$ compatible with the weather being fine). The revision set ($Rev_{w@/P}$) will be the set of worlds $w \in U_{w@}$ such that $\{<r, 1>\} \subseteq w$. $Rev_{w@/P}$ will include the actual world ($w_@ = \{<p, 1>, <q, 1>, <r, 1>\}$ – a lawful world in which r is true), as well as worlds like $w_4 = \{<p, 0>,$

<q, 1>, <r, 1>}, w_5 = {<p, 0>, <q, 0>, <r, 1>}. $Rev_{w@/P}$ will exclude worlds like w_6 = {<p, 1>, <q, 0>, <r, 1>} (which are not in the modal horizon of $w_@$).

Veltman's objective is to provide an account of counterfactual conditionals. Having identified the revision set for $w_@$ given P, it is now possible to take the second step and make the counterfactual hypothesis that ¬p. This requires updating the revision set with ¬p. In our example, $Rev_{w@/P}$ = {$w_@$, w_4, w_5, ….}. If we update this set with ¬p we will end up with {w_4, w_5, …}. Sentence q ('Jones is wearing his hat') is not true in all the worlds in this set. The prediction (correct!) is that the counterfactual in (2) (repeated below) is false:

(2) If the weather had been fine, Jones would have been wearing his hat.

By defining the revision set in a way that pays attention to the relations between facts, Veltman's proposal is able to handle Tichý's example.

4.2 The interpretation of deontic *should*

Our proposal for deontic *should* will be inspired by Kratzer in differentiating between a modal base and an ordering source. We will maintain Kratzer's views about the ordering source and revise the proposal regarding how to identify the modal base. In evaluating a statement of the form *should* ϕ in a world w, we will use a modal base that is compatible with the proposition corresponding to ϕ. This means that we need to 'remove' the proposition corresponding to $\neg\phi$. We would like to do this in a way that pays attention to the relations between facts (as proposed by Veltman 2005). The modified proposal for *should* is given in (18):

(18) $[[\textit{should}\ \phi]]^g$ is true in w iff
$\forall w' \in Rev_{w/\neg\phi}$: if w' is a g(w)-best world, then $w' \in \phi$.

According to (18), context is responsible for identifying the ordering source for the interpretation of the modal. The modal base, on the other hand, is identified on the basis of the facts in the evaluation world. A schema corresponding to the revision set in (18) is provided in (19):

(19) Where P is a proposition and w is a possible world,
$Rev_{w/P}$ = {$w' \in W$: $w' \in U_w$ and there is some $s \in w{\downarrow}P$ such that $s \subseteq w'$}

With this definitions in hand, we can now turn to the evaluation of the secondary duty associated with the CTD in (3b) in the scenarios provided in (4) and (5). As we will see in the next two sections, the proposal in (18) allows us to correctly distinguish between the two cases: (18) will predict that (4c) is true while (5c) is false. A semantics for *should* that tracks relations between facts can explain the difference between cases in which we are willing to fall back on a secondary duty from cases in which we are not.

4.2.1 When secondary duties come out <u>true</u>

We will begin with example (4):

(4) a. Housing inspector: There should be a fence around the house.
b. House owner: There was no more wood in the store!
c. Housing inspector: Well, there should be a guard dog.

Let us make the following assumptions. Suppose that p = 'the store ran out of wood', q = 'there is a fence', t = 'there is a guard dog', and r = 'Jones lives in Amsterdam' (a random sentence to illustrate how the system works). With these assumptions, the actual world is: $w_@$ = {<p, 1>, <q, 0>, <t, 0>, <r, 1>}. We will assume the generalization *if p is true, q is false* (this is a law in $w_@$). The basis for the actual world is: s= {<p, 1>, <t, 0>, <r, 1>}. The worlds in $U_@$ include $w_@$ = {<p, 1>, <q, 0>, <t, 0>, <r, 1>}, w_1 = {<p, 0>, <q, 0>, <t, 0>, <r, 1>}, w_2 = {<p, 1>, <q, 0>, <t, 1>, <r, 1>}, w_3 = {<p, 0>, <q, 1>, <t, 0>, <r, 1>}, w_4 = {<p, 1>, <q, 0>, <t, 0>, <r, 0>}, etc. $U_@$ will not include worlds like w_5 = {<p, 1>, <q, 1>, <t, 0>, <r, 1>}.

Given the proposal in (18), the statement in (4c) will be true in the following conditions:

(20) a. [[should [there be a guard dog]]].
b. $[[(20a)]]^g$ is true in w iff $\forall w' \in Rev_{w/\text{there isn't a guard dog}}$:
if w' is a g(w)-best world, then there is a guard dog in w'.

According to (20b), the claim in (20a) will be true in $w_@$ iff in the g($w_@$)-best worlds in $Rev_{w@/\text{there isn't a guard dog}}$, there is indeed a guard dog. Which worlds are found in $Rev_{w@/\text{there isn't a guard dog}}$? To answer this question, we first need to identify the set $w_@{\downarrow}$'there isn't a guard dog'. Since there is a single basis for $w_@$ (s= {<p, 1>, <t, 0>, <r, 1>}), this set will consist of a single situation: {s'} = {{<p, 1>, <r, 1>}}. $Rev_{w@/\text{there isn't a guard dog}}$ will consist of the worlds in $U_@$ that extend this situation, e.g. worlds like $w_@$ = {<p, 1>, <q, 0>, <t, 0>, <r, 1>} and w_2 = {<p, 1>, <q, 0>, <t, 1>, <r, 1>}. Worlds like like w_3 = {<p, 0>, <q, 1>, <t, 0>, <r, 1>} and w_4 = {<p, 1>, <q, 0>, <t, 0>, <r, 0>} are not in $Rev_{w@/\text{there is a guard dog}}$ because even though they are lawful, they do not extend s'. Given (20b), (20a) is predicted to be true iff in the g($w_@$)-best worlds in $Rev_{w@/\text{there isn't a guard dog}}$, there is a guard dog. In the toy example we are discussing, this will be the case if w_2 is better than $w_@$ (as is the case).

Given the circumstances described in (4), when we evaluate whether there should be a guard dog, the modal base will consist of worlds that are like the actual world with respect to the fact that there was no wood in the store and that Jones lives in Amsterdam. Since the worlds obey the actual laws, they will also be worlds in which there is no fence (given the law, in these worlds <u>there can't be a fence</u>, accounting for the extra modal force noted earlier). In some of these worlds there is a guard dog, and in some there isn't. The sentence *there should be a guard dog* will be true iff there is a guard dog in the best worlds in that set (given an ordering source g). The proposal in (18) makes correct predictions for the scenario in which we judge the secondary duty true.

4.2.1 When secondary duties come out <u>false</u>

We will turn now to example (5):

(5) a. Housing inspector: There should be a fence around the house.
b. House owner: I didn't feel like following regulations.
c. Housing inspector: #Well, there should be a guard dog.

We will make the following assumptions: p = 'the house owner does not follow regulations', q = 'there is a fence', t = 'there is a guard dog', and r = 'Jones lives in Amsterdam' (a random sentence to illustrate how the system works). With these assumptions, the actual world is: $w_@$ = {<p, 1>, <q, 0>, <t, 0>, <r, 1>}. This time, there are two generalizations at play (they may be different aspects of one generalization): *if p is true, q is false* and *if p is true, t is false* (these are laws in $w_@$). The basis for the actual world now is: s= {<p, 1>, <r, 1>}. The worlds in $U_@$ include $w_@$ = {<p, 1>, <q, 0>, <t, 0>, <r, 1>}, w_1 = {<p, 0>, <q, 0>, <t, 0>, <r, 1>}, w_2 = {<p, 0>, <q, 0>, <t, 1>, <r, 1>}, w_3 = {<p, 0>, <q, 1>, <t, 0>, <r, 1>}, w_4 = {<p, 1>, <q, 0>, <t, 0>, <r, 0>}, etc. $U_@$ will not include worlds like w_5 = {<p, 1>, <q, 0>, <t, 1>, <r, 1>}.

As in the earlier case, given (18), the statement in (5c) will be true in the following conditions:

(21) a. [[should [there be a guard dog]]].
b. $[[(20a)]]^g$ is true in w iff $\forall w' \in Rev_{w/\text{there isn't a guard dog}}$:
if w' is a g(w)-best world, then there is a guard dog in w'.

As before, the truth value of (21a) will depend on which worlds actually end up in $Rev_{w@/\text{there isn't a guard dog}}$ (remember that we are now making different assumptions regarding the facts and laws operational in the actual world). First, we again need to identify the set $w_@\downarrow$'there isn't a guard dog'. Since there is a single basis for $w_@$ (s= {<p, 1>, <r, 1>}.), this set will consist of a single situation: {s'} = {{<r, 1>}}. $Rev_{w/\text{there isn't a guard dog}}$ will now consist of the worlds in $U_@$ that extend this situation. This will include worlds $w_@$ = {<p, 1>, <q, 0>, <t, 0>, <r, 1>}, w_1 = {<p, 0>, <q, 0>, <t, 0>, <r, 1>}, w_3 = {<p, 0>, <q, 1>, <t, 0>, <r, 1>}, w_4 = {<p, 0>, <q, 0>, <t, 1>, <r, 1>}, etc. Notice that in constructing the revision set this time, we have maintained similarity with the actual world only with respect to the fact that Jones lives in Amsterdam. The revision set includes worlds in which the owner ignores safety regulations (and there is no fence and no dog), worlds in which the owner pays attention to safety regulations and there is a fence, and worlds in which the owner pays attention to safety regulations and there is a dog. The sentence in (21a) will be true iff in the $g(w_@)$-best worlds in the revision set, there is guard dog. But this will not be true. In the best worlds in this revision set, there is a fence (and there may or may not be a guard dog). The proposal in (18) predicts that in this scenario, we judge the secondary duty false.

5 Conclusions

In this paper I have made use of intuitions about secondary duties to investigate the interpretation of *should*. Secondary duties are interesting because they arise in response to facts in the world. Our intuitions regarding secondary duties can give us useful insights into how facts and ideals interact in the semantics of deontic modals.

I have used intuitions regarding the interplay between primary and secondary duties to argue for a particular way of understanding how facts enter the picture in the semantics of deontic modals. The main claim has been that in evaluating deontic modals, we pay attention to facts in a manner that is similar to what we do when evaluating counterfactuals. In figuring out what facts matter and what facts can be ignored, we take into account the relations between facts, not just facts in isolation. How facts are related to each other

depends on the laws operational in the world, and the important feature of the semantics of *should* presented in this paper is that it is designed to allow lawful regularities to play a role in identifying the domain of quantification of deontic modals.

The semantics for *should* proposed in this paper builds on the insights of a Kratzer-style semantics, incorporating Veltman's views about revision in the calculation of the modal base. We have maintained Kratzer's dichotomy in terms of evaluating the modal with respect to two interacting parameters: a modal base and an ordering source, where the ordering source establishes a ranking amongst the worlds corresponding to the modal base. We have made use of Veltman's proposal for the semantics of counterfactuals to identify the modal base. Veltman's analysis of counterfactuals identifies the worlds quantified over taking into account the laws of the evaluation world (i.e. the relations between facts in the world, not facts in isolation). Taking into account the relations between facts, Veltman's proposal for counterfactuals is a useful starting point for the semantics of deontic modals (a comparison between a Veltman-style account of relations between facts and other types of accounts lies outside the scope of this paper). The resulting proposal is a semantics for *should* that has at its core a notion of revision/similarity that is analogous to that relevant to counterfactuals.

One of the interesting results obtained with the semantics for *should* proposed in this paper is that it predicts that primary and secondary duties may be compatible. This is a welcome result in light of observations already found in Prakken and Sergot (1996) indicating that we often have the intuition that primary and secondary duties 'hold' simultaneously. Further work remains to be made in this area to better understand the differences between cases in which the conjunction between primary and secondary duties appears acceptable vs. cases in which the conjunction is perceived as infelicitous.

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