

Ignorance, indifference, and individuation with *wh-ever*

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10.1 Introduction

In a non-modal environment, free relatives with *-ever* (*who-/what-/which-ever*-phrases) give rise to modal implications. One type of modal implication is that of speaker ignorance (Dayal 1997, among others). It is exemplified by the use of *whoever* in (1a). Another type of modal implication is that of agent indiscriminacy or indifference (von Stechow 2000). It is exemplified by the use of *whoever* in (2a).

- (1) a. Whoever entered the house first saw what happened.
Speaker doesn't know who it is that entered the house first
- b. The person who entered the house first saw what happened (but I have no idea who it was).
- (2) a. Ed just voted for whoever was at the bottom of the list.
Ed voted indiscriminately for the person at the bottom of the list.
- b. Ed just voted for the person at the bottom of the list (without regard for who it was).

As can be seen in (1b) and (2b), definite descriptions are compatible with such implications and in the right context they can also convey speaker ignorance or agent indifference. However, as recognized in previous work and discussed in Section 10.2, the ignorance or indifference conveyed by *wh-ever* is more intimately tied to its meaning.

How do these implications arise from the meaning of *wh-ever*? Previous analyses have essentially folded them into the truth-conditional or the presuppositional content of *wh-ever*, without unifying the two types of uses (Dayal 1997; Iatridou and Varlokosta 1998; von Stechow 2000; Tredinnick 2005). At the heart of these analyses is a variation condition that the referent of the description corresponding to the *wh-ever* phrase

should vary across possibilities in a modal domain, such as the speaker's epistemic state (Section 10.3).

In Section 10.4 I show first that an individuation scheme behind the variation condition that is based on non-rigid reference is not strong enough to account for the precise form the ignorance implication takes, and second that there is a systematic difference between singular and plural *wh-ever* phrases: an ignorance or indifference implication is always present with singular, but can disappear with plural, *wh-ever*. I propose an analysis which unifies the different uses and where these two, seemingly quite disparate, problems find a common solution. The analysis also makes sense of an asymmetry in the status of the two types of implications, discussed in Section 10.6, and explains why ignorance projects like a presupposition while indifference does not.

The main idea of my analysis is to get at the notion of *don't know/care who* not via potential referents of the description but via alternative, more specific descriptions. *Wh-ever* phrases convey that any way of specializing their descriptive content along a contextually determined individuation scheme is compatible, epistemically or metaphysically, with the truth of the predication. I develop the analysis in two steps. In Section 10.5, I show that an analysis of *wh-ever* relies on a property-based notion of indeterminacy. Then in Section 10.7, I propose a system of semantic interpretation that exploits the elements provided by the proposed individuation scheme.

10.2 Modal implications of *wh-ever* phrases

10.2.1 *The quantificational force of free relatives*

A central question about free relatives in general is their quantificational force: are they universally quantified noun phrases, definites, indefinites, or ambiguous? Another question is whether plain free relatives and *-ever* free relatives have the same quantificational force. Different positions have been advocated in the literature, motivated by different analytical assumptions about the distribution of definite, indefinite, and universally quantified noun phrases (Bresnan and Grimshaw 1978; Larson 1987; Dayal 1995; Rullman 1995; Iatridou and Varlokosta 1998; Horn 2000, among others). Free relatives differ from universally quantified and indefinite noun phrases in that they can be used in contexts in which it is taken for granted that a unique individual satisfies their descriptive content, as exemplified in (1) and (2).

Jacobson (1995) claimed that free relatives are uniformly definite and that their apparent universal force is the result of plurality. I will adopt her analysis here. Following Link (1983), Jacobson assumed structured individual domains defined in terms of the sum operation and the mereological part-of relation. She furthermore argued that free relatives do not have the internal structure of ordinary NPs: although there is no determiner responsible for their quantificational force, there is a natural

account of their quantificational force. She analysed *wh-* as a predicate modifier selecting the maximal elements from the predicate it is modifying. On her analysis free relatives are thus born predicative. They type-shift via the ι type shifter to a term when they occur in argument positions (that is, most of the time).¹ Her proposed syntactic analysis is as in (3) and the proposed meaning for *wh-* is as in (4).

(3) $[_{NP} [_{WH} \textit{wh-} \dots] [_{srel} \textit{you cook}]]]$

(4) $\lambda P.max.P$

Relative to the mereological proper part-of relation \sqsubset between individuals, *max* is defined as:

(5) $max.P =_{df} \lambda x.P(x) \wedge \neg \exists y [P(y) \wedge x \sqsubset y]$

For a singular predicate P , $max.P = P$. On the assumption that a plural predicate P is cumulative, that is, closed under the sum operation, $max.P$ would yield the singleton consisting of the sum of all individuals in P .

Jacobson focused primarily on plain free relatives but she also defended the definite analysis for *wh-ever*, while noting that ‘*-ever* does not always serve to give the FR the apparent universal reading; a *wh-ever* FR can also be understood as a singular definite where the addition of *-ever* indicates ignorance on the part of the speaker as to the identity of the thing in question’ (1995: 481). She did not account for this observation but it has been the focus of subsequent work (Dayal 1997; Iatridou and Varlokosta 1998; von Stechow 2000; Heller 2005; Tredinnick 2005; among others).

10.2.2 Ignorance implication

Sentence (1a) exemplifies the type of use where a semantically singular *wh-ever* phrase is used with the presumption that there is a unique referent and carries, in addition, an ignorance implication about the identity of the referent. When *wh-ever* gives rise to an ignorance implication, it is incompatible with unique, exhaustive specification, even when it presupposes that a unique entity satisfies its descriptive content.

Elliot (1971) and Dayal (1997) have observed that a *namely* appositive, which specifies uniquely the referent of the description, is infelicitous with *wh-ever* phrases, as seen in (6a), but is felicitous with plain free relatives or with definite descriptions, as seen in (6b), (6c). Dayal (1997) took the infelicity to be a consequence of the ignorance component of the meaning of *wh-ever*.

- (6) a. # Whatever Mary is cooking, namely ratatouille, has tons of onions.
 b. What Mary is cooking, namely ratatouille, has tons of onions.
 c. The thing Mary is cooking, namely ratatouille, has tons of onions.

¹ Jacobson argued that they stay predicative in specificational pseudo-clefts, in which the pre-copular subject is predicative.

Dayal (1997) also argued that the distribution of *wh-ever* in specificational vs. predicational pseudo-clefts is not due to the free relative having universal quantificational force, but rather is tied to the ignorance implication. The limited distribution is manifested in the contrast between (7b) and (7c).²

- (7) a. The book / What Mary bought was Barriers.
b. # Whatever book Mary bought was Barriers.
c. Whatever book Mary bought was expensive.

Horn (2000a), based on examples like (8a) and (8b), observed that ‘plain FRs, like universals, definites, and pseudo-clefts, allow conjoint parentheticals, while *wh-ever* FRs, like indirect questions, allow only disjoint ones’ (2000a: 106).

- (8) a. Everything Mary is cooking, be it ratatouille, latkes, or goulash, has tons of onions.
b. Whatever Mary is cooking, (whether it’s) ratatouille, latkes, or goulash, has tons of onions.
c. Whatever Mary has in that pot, be it ratatouille, latkes, or goulash, has tons of onions.

We can also take (8b) and (8c) to show that a felicitous use of a *wh-ever* phrase requires that the speaker should not be able to pin down *uniquely* what it is that satisfies the associated description, but is compatible with the speaker being able to narrow down the possibilities. Horn’s generalization about *wh-ever*, as we will see, only holds for uses of *wh-ever* associated with an ignorance implication. In that case, we can say that an apposition to a *wh-ever* phrase has to be a non-trivial list, which is interpreted disjunctively, unless the apposition itself contains an expression that conveys uncertainty, such as the modal *probably* in (9), where the apposition is a single phrase.

- (9) Whatever got into the rice bin, a rodent, probably, has ruined the entire stock.

When the speaker pins down uniquely, either in a specificational pseudo-cleft or via a *namely* apposition, what it is that satisfies the associated description, infelicity arises. In a specificational pseudo-cleft the pinning down is part of the truth-conditional content. With a *namely* apposition, the pinning down is part of the overall assertive content of the sentence. The infelicity suggests that the ignorance implication is somehow part of the meaning of *wh-ever*.

Semantically plural *wh-ever* phrases can also give rise to an ignorance implication, as seen in (10). Sentence (10a) can be used to convey that multiple people were on the same plane and that the speaker does not know who these people were. The overtly

² Iatridou and Varlokosta (1998) used the contrast as an argument that *ever* free relatives are universal.

plural *wh-ever* in (10b) conveys that the speaker does not know what all the books were that Mary bought at the relevant time.

- (10) a. We should look for whoever was on the same plane as he was.
 b. Whatever books Mary bought yesterday certainly include Barriers.

As pointed out by Jacobson (1995), some free relatives, such as *whoever*, *what*, and *whatever* without a nominal head, have no formal marking for plurality and can be semantically singular or plural.

10.2.3 *Indifference implication*

On another type of use, a *wh-ever* phrase signals (intentional or unintentional) indiscriminateness, on the part of the agent undertaking it, of the action described by the clausal predicate with respect to the identity of the referent (von Stechow 2000; Tredinnick 2005). This implication is thus more restricted and arises when the *wh-ever* is an argument of an action-denoting predicate implying that the agent in principle has a choice as to who or what. For instance, (11) signals the indiscriminateness of Ed's response and is compatible with the speaker knowing what it was. I will follow von Stechow (2000) in cashing out indifference as a counterfactual implication.

- (11) In response, Ed blurted out whatever came to his mind first.
In response, Ed blurted out the first thing that came to his mind.
Ed could well have blurted out anything else that came to his mind first (instead).

An apposition to a *wh-ever* phrase on the indifference reading can be a single phrase, as seen in (12). In fact, the indifference reading is compatible with the actual referent itself being identified explicitly by the speaker, as seen in (13).

- (12) I grabbed whatever tool was in front of me, a hammer as it happened, and threw it at him.
- (13) a. I grabbed whatever tool was in front of me, this very hammer as it happened, and threw it at him.
 b. I voted for whoever was at the top of the list, Jones as it happened.

As with the ignorance implication, the indifference implication is not confined to semantically singular *wh-ever* phrases, as seen in (14) and (15), though a context that readily gives rise to the indifference implication for a singular *wh-ever* may not do so for a semantically plural *wh-ever* because of another interpretation available only to plural free relatives.

- (14) That night he recorded whoever he ran across that seemed to be interesting.
That night he recorded the people he ran across that seemed to be interesting.
Counterfactual implication: He could well have recorded anybody else he ran across that seemed to be interesting.

- (15) a. ‘They took small objects made of bronze and pottery—figurines, vases and lamps—and the ring,’ the official said. ‘The artifacts were behind reinforced glass panels which fracture like a car windscreen, and the thieves grabbed whatever small objects they could reach through the holes they opened.’
(*New York Times*, 12 February 2012)
- b. The thieves grabbed whatever small objects they could reach through the holes they opened—figurines, vases, and lamps.

Finally, note that a list in apposition to a *wh-ever* phrase associated with an indifference implication is interpreted conjunctively, as seen in the variant (15b) of the naturally occurring (15a).

10.3 Implicit modal meaning

Are free relatives with *ever* implicitly modal, and if so in what part of their meaning? In this section I discuss two previous analyses of the modal aspect of the meaning of *wh-ever* phrases. One is by Dayal (1997), who builds the modal component into the truth-conditional content. The other is by von Stechow (2000), who builds the modal component into the presuppositional content. In Dayal’s analysis the modality is fixed to be epistemic and speaker-oriented, whereas in von Stechow’s analysis the modality is more context-dependent. Both Dayal and von Stechow take free relatives to be uniformly definite.

10.3.1 Modality in the truth-conditional content

Dayal (1997) proposes that the main contribution of *ever* in free relatives is to restrict the description to attributive interpretations. I focus attention here on her account of the ignorance reading, which she calls the ‘identity reading.’³ Dayal does not consider indifference readings, where, as we have seen, the modal implication is of a different kind than that of the ignorance reading.

According to Dayal, *wh-ever* phrases have a modal dimension: they are interpreted with respect to what she terms *i(dentity)-alternatives*.⁴ *i(dentity)-alternatives* are members of equivalence classes, determined by the denotation of the free relative, within the set of worlds compatible with the speaker’s beliefs in the world of evaluation.⁵ I will designate the function that maps a world to the set of worlds that

³ The other reading Dayal considers is what she calls the ‘free choice reading’, where *wh-ever* appears to have universal force. She analyses occurrences of free relatives with that reading as dependent definites in a quantificational structure that results in a non-episodic—generic or habitual—interpretation of the sentence they appear in.

⁴ Giannakidou (2001) makes a related proposal for free choice items.

⁵ Dayal and, following her, Giannakidou (2001) actually define *i(dentity)-alternative* as being a property of individual worlds. The definition itself shows it to be a global property of a set of worlds: for a *wh-ever*

constitute the epistemic alternatives of a speaker Sp in that world as B_{Sp} . If the speaker's beliefs in a world w are realistic, then $w \in B_{Sp}(w)$. Dayal attributes the ignorance implication to a presumption of existence of *i*-alternatives:

The definition of *i*-alternatives . . . requires that there be at least two worlds, distinguishable on the basis of the denotation of the FR. That is, as far as the speaker is concerned, the identity of the object denoted by the FR should still be open. For if the speaker has a belief about the identity of the unique relevant individual, there cannot be two worlds in $[B_{Sp}(w)]$ that will qualify as *i*-alternatives. The *ever* FR will be infelicitous because quantification will be over an empty domain. (Dayal 1997: 109)

This suggests that, on Dayal's conception, the set of *i*-alternatives is empty whenever a speaker Sp utters a *wh-ever* in a world w such that the denotation of the description is the same individual across the worlds of $B_{Sp}(w)$, and identical to $B_{Sp}(w)$, otherwise.

But we can alternatively see the condition for the existence of *i*-alternatives as a requirement that the denotation of the free relative should determine a non-trivial partition of the set of worlds compatible with the speaker's beliefs in the world of evaluation, without the need to invoke *i*-alternatives. A reformulation of Dayal's analysis, due to von Stechow (2000), is given in (16). It makes reference directly to $B_{Sp}(w)$, rather than *i*-alternatives.

- (16) *whatever*(w)(P)(Q)
- a. presupposes: $(\exists w', w'' \in B_{Sp}(w)) \iota x.P(w')(x) \neq \iota x.P(w'')(x)$
 - b. asserts: $(\forall w' \in B_{Sp}(w)) Q(w')(\iota x.P(w')(x))$

According to (16b), a *wh-ever* phrase contributes both a definite description and universal quantification over epistemic alternatives. The presupposition in (16a) amounts to a variation condition on the set that is universally quantified over. Given such a presupposition, use of a *wh-ever* phrase is felicitous only if the corresponding definite description has no constant referent across the set of worlds compatible with the speaker's beliefs in the actual world, and hence it signals that the speaker cannot pin down uniquely the entity that actually satisfies the description.

But is the truth-conditional content really modal? In the presence of other operators, the epistemic aspect of the meaning of *wh-ever* is simply confined to the ignorance implication. For instance, (17) gives rise to the same ignorance implication that its non-negated counterpart does. It does not allow for a reading negating the universal quantification over the speaker's epistemic alternatives, which would amount to the truth-conditional content expressing speaker uncertainty as to whether what Liz is cooking contains onions. Therefore, negation must scope under the universal modal quantifier.

phrase with descriptive content P , a world $w' \in \mathcal{W}$ is an *i*-alternative iff there exists some $w'' \in \mathcal{W}$ such that $\iota x.P(w')(x) \neq \iota x.P(w'')(x)$. The same world can thus be an identity-alternative for a given P relative to one set of worlds, but not relative to another.

- (17) Whatever Liz is cooking doesn't contain onions.

The thing Liz is cooking doesn't contain onions.

I don't know what Liz is cooking.

NOT: *The thing Liz is cooking may well not contain onions.*

Given the status of the variation condition as a presupposition, it ought to project through negation. This accounts for the presence of the ignorance implication. But the scopal restriction of negation remains to be accounted for.

More generally, as von Stechow (2000) observes, in embedded contexts the implication of ignorance as to the identity of the referent of the *wh-ever* description projects like a presupposition, but the epistemic certainty is not part of the truth-conditional content, as would be expected under (16b). Consider (18), where the content of the suspicion is exactly the same for (18a), with *wh-ever*, and for (18b), with a plain free relative. The difference between them lies just in the additional ignorance implication associated with (18a).

- (18) a. I suspect there is a lot of garlic in whatever he is cooking.

I do not know what he is cooking.

I suspect there is a lot of garlic in what he is cooking.

NOT: *I suspect I know there is a lot of garlic in what he is cooking.*

- b. I suspect there is a lot of garlic in what he is cooking.

A way to reconcile the (un)available readings of (18a) with the truth-conditional content attributed to *wh-ever* in (16b) is to interpret the *wh-ever* with obligatory scope above the attitude predicate, which would render (18a) equivalent to (the rather cumbersome) (19).

- (19) For everything which, for all I know, he might be cooking, I suspect there is a lot of garlic in it.

As with the case of negation, this raises the question what accounts for the scopal restriction.

In sum, the proposed layer of quantification over epistemic alternatives in the truth-conditional content of *wh-ever* captures the implication that the predication expressed by the sentence holds regardless of the identity of the referent of the *wh-ever*: the speaker can assert what he does even without knowing what the referent of the description is. But it creates a complication when another operator is present, for special provisions are then needed to ensure that *wh-ever* scopes above it. The epistemic certainty that the wide scope construal of *wh-ever* expresses is compatible with a simple definite description denotation for *wh-ever*, and can be derived as a Gricean side-effect of the assertion. Therefore, the epistemic quantification layer in the truth-conditional content can be dispensed with.

10.3.2 Modality only in the presuppositional content

von Fintel (2000) assigns to *wh-ever* the truth-conditional content of a definite description and makes the source of the ignorance and of the indifference implications be its presuppositional content. He distinguishes two analyses, shown in (20) and (21), differing primarily in the presuppositional content they assign to *wh-ever*: the Ignorance analysis, motivated by the ignorance implication, and the Indifference analysis, motivated by the indifference implication.⁶ The presuppositional content under both analyses makes reference to a contextually determined modal base F , a mapping from worlds to sets of worlds. Sim maps a world w and a proposition p to a set of worlds maximally similar to w in which p is true, as is familiar from the Stalnaker–Lewis semantics of counterfactuals.

(20) IGNORANCE (VARIATION) ANALYSIS:

$whatever(w)(F)(P)$

a. presupposes: $(\exists w', w'' \in F(w)) \iota x.P(w')(x) \neq \iota x.P(w'')(x)$

b. denotes: $\iota x.P(w)(x)$

(21) INDIFFERENCE (UNIFORMITY) ANALYSIS:

$whatever(w)(F)(P)(Q)$

a. presupposes:

$(\forall w' \in Sim(w, F(w) \cap (\lambda w''. \iota x.P(w'')(x) \neq \iota x.P(w)(x)))$

$Q(w')(\iota x.P(w')(x)) = Q(w)(\iota x.P(w)(x))$

b. asserts: $Q(w)(\iota x.P(w)(x))$

Both presuppositional contents impose a variation condition on the identity of the referent of the *wh-ever* description. This is overtly so for the Ignorance analysis, where the variation condition governs the modal base. On the Indifference analysis variation follows, on the reasonable assumption that the proposition that is given as an argument to Sim , namely $F(w) \cap (\lambda w''. \iota x.P(w'')(x) \neq \iota x.P(w)(x))$, has to yield a non-empty set of worlds. In order for that to be the case, the modal base $F(w)$ has to include possibilities w' such that $\iota x.P(w')(x) \neq \iota x.P(w)(x)$.⁷ What kind of variation in the identity of the referent of the *wh-ever* description F and Sim encode, if any, is something von Fintel leaves open.

The presuppositional content on the Ignorance analysis is a generalization of Dayal's analysis under the formulation in (16a): the modal base can be fixed by context to be

⁶ The logical type of *wh-ever* differs depending on whether its presuppositional content makes reference to the predicate Q that the *wh-ever* phrase composes with, or not.

⁷ Whatever F is exactly, it presumably satisfies the existence and uniqueness definedness conditions of $\iota x.P(w')(x)$. We can take F to be a revision (superset) of the context set, so as to allow for the *wh-ever* description to have witnesses different from the one(s) it has in the worlds that are compatible with the information that is common ground among the discourse participants.

B_{sp} , rather than being set by the meaning of *wh-ever* itself.⁸ On the Indifference analysis the presupposition is essentially a uniformity condition on the worlds determined by F and Sim : the truth value of the sentence is uniform across different referents of the description. If the assertive content is true, then the presuppositional content together with the assertive content imply that the sentence is true for all the different referents of the description, in the actual world, as well as in counterfactual alternatives to it. The counterfactual implication of (11), for instance, is a contextual entailment, that is, an entailment of any (consistent) context that results from updating a context that satisfies the condition in (21a) with the truth-conditional content of (11).

To better distinguish between analyses, on the one hand, and implications or readings, on the other, I will henceforth refer to the analysis in (20) as the variation analysis, and the analysis in (21) as the uniformity analysis. Dayal's analysis is also a uniformity kind of analysis, with uniformity encoded in the truth-conditional rather than the presuppositional content.

10.3.3 Unification?

The two analyses in (20) and (21) are each designed for each of the two implications. von Fintel considers whether any of the two could provide a unified treatment for both ignorance and indifference uses, with the apparent ambiguity being reduced to the contextual specification of the modal base: epistemic vs. counterfactual. He shows that the uniformity analysis fares better than the variation analysis. In order for the uniformity analysis to yield a speaker ignorance implication, F has to be set to B_{sp} ; to ensure variation we need two additional assumptions: (a) that $w \in B_{sp}(w)$, and (b) that $Sim(w, B_{sp}(w) \cap p) \subseteq B_{sp}(w)$, for any p . The presupposition amounts to the speaker being ignorant as to the referent of the description but certain that either the referent has the relevant property Q or does not. The assertion then settles that the referent has the relevant property and contextually entails that the speaker is certain about the asserted proposition.

Though harmless when F is set to B_{sp} , using the uniformity analysis to account for the ignorance implication does not easily extend to the whole range of implications about variation of the referent of the description. *Wh-ever* can be used to convey variation of the referent of the description in contexts where the speaker's epistemic state cannot be assumed to obey variation. In hint-type uses, pointed out by von Fintel and exemplified by (22), the modal base made reference to in the variation condition is obviously not the epistemic state of the speaker. Suppose (22a) is uttered in a context in which you are trying to guess (and I know) what I am cooking, and (22b) in a context in which you are trying to guess (and I know) what's behind the door.

⁸ As von Fintel discusses, a *wh-ever* under an attitude predicate can convey speaker ignorance or ignorance of the attitude holder.

- (22) a. I will tell you one thing: there is a lot of garlic in whatever I am cooking.
 b. Whatever is behind that door has two legs.

von Fintel assumes that in hint-type uses *wh-ever* conveys hearer ignorance. But even if the hearer's information state obeys variation, it is not reasonable to assume that it is presupposed to obey uniformity; similarly if we assume that the information state that obeys variation is constituted by what is common ground between speaker and hearer (the context set).⁹ For instance, consider an information state targeted by a use of (22b) which contains three kinds of worlds: worlds in which the thing behind the door is a human, worlds in which the thing behind the door is a bird, and worlds in which the thing behind the door is a cat. That could be the information state of the hearer or that constituted by what is common ground between speaker and hearer, and, intuitively, it seems reasonable for the speaker to assert (22b) in such a case. But such an information state does not obey uniformity and the analysis predicts that *wh-ever* would not be felicitous in such a context.

Finally, an important challenge for the unification of the two types of readings under the uniformity analysis is raised by von Fintel. It has to do with how the projection of the uniformity presupposition varies depending on the type of modal base *wh-ever* is construed with. I discuss the issue in Section 10.6.

10.4 Problems with variation and modality

The analyses discussed in the previous section incorporate the following four assumptions: (I) *wh-ever* is relativized to a modal base which always obeys variation and, on one reading at least, uniformity as well; (II) variation is connected to indeterminacy of the *wh-ever* description; (III) indeterminacy is non-constant reference; (IV) variation and uniformity are presuppositions. In this section I first show that (III) is not right: indeterminacy has to be based on a type of individuation that allows for more coarse-grained individuations than individual-level individuation. I then show that (I), as conceived by previous analyses, is also not right: a semantically plural *wh-ever* need not give rise to modal implications.

10.4.1 Variation and individuation

Variation construed as non-constant reference is simply not strong enough. In fact, such a condition is not sufficient to account for the infelicity of all types of *namely* appositives, or single-member appositives without any qualification, as it predicts an

⁹ This type of use is also problematic for Dayal's analysis, since the modal base made reference to in the truth-conditional content has to be the epistemic state of the speaker, not that of the hearer, even if we assume that in this case the variation condition targets the hearer's epistemic state.

asymmetry between the acceptability of referential appositives, as in (23), vs. that of descriptive appositives, as in (24). The appositives in (23) specify a unique referent for the description, but those in (24) do not, and thus do not necessarily contravene variation.

- (23) a. # Whoever entered the house first, namely John, saw what happened.
 b. # Whatever book Mary bought yesterday, namely ‘Barriers,’ was a steal.
- (24) a. # Whoever entered the house first, (namely) a monk, saw what happened.
 b. # Whatever book Mary bought yesterday, (namely) a book on economics, was a steal.

Consider a situation in which it is presupposed that there are at least two individuals who, for all the speaker knows, might be the person who entered the house first, or the book that Mary bought. Then the variation condition is satisfied and an appositive of the kind in (24) is consistent with the variation condition if the two individuals are assumed to be of the type specified in the appositive. The speaker could use a *wh-ever* along with the appositive to convey that the person who entered the house first is a monk, but he does not know which monk, or that the book Mary bought was a book on economics, but he does not know which book. However, there is no difference in felicity between the examples in (24), where the referent is not fixed uniquely, and those in (23), where the referent is fixed uniquely.

Could the infelicity of (24) be attributed to some particular requirement of *namely*? Onea and Volodina (2011) observe the contrast in (25), which might suggest that *namely* appositives have to be referential (this is not their conclusion).

- (25) a. My best friend, namely John, will be at the party.
 b. # John, namely my best friend, will be at the party.

But this is not the correct generalization. A descriptive *namely* appositive is fine with a plain free relative, as can be seen in (26), which can, moreover, be used in a context where the speaker does not know which song Mary chose for her audition.

- (26) What Mary chose for her audition, (namely) a difficult song, was not sufficient to impress the jury.

The generalization we can draw about *namely* appositives is that they provide an exhaustive specification which further narrows down the potential referents of the phrase they are in apposition to. This holds in (25a), as well as (26), but not in (25b). Therefore, the infelicity of (24) has to be attributed to a clash between the meaning *wh-ever* and the exhaustive specification provided by a *namely* appositive, not just to a peculiarity of *namely* appositives.

Moreover, *wh-ever* shows the same interaction with single-member appositives without *namely*. If the indeterminacy that the variation condition is based on was non-

constant reference, (12) could also have an ignorance reading.¹⁰ Instead, because of the presence of the appositive specifying the kind of tool, the indifference implication arises necessarily.¹¹

Variation then amounts to not being able to pin down uniquely, either descriptively or referentially, who/what it is that satisfies the descriptive content of *wh-ever*. An analysis tying the variation condition to witnesses for the description predicts, incorrectly, a contrast between descriptive and referential single member appositives, specifically, that with a descriptive appositive there ought to be contexts in which the sentence can be uttered felicitously. But a *wh-ever* is uniformly infelicitous with both referential and descriptive single-member appositives, *namely* appositives being a special case. What counts as the same or different for the variation condition, therefore, ought to be something more coarse-grained.

10.4.2 Plural *wh-ever*

Modal implications can disappear with plural *wh-ever*. In contrast to (27), which implies ignorance with respect to the identity of the relevant book, (28a) may be construed with an ignorance implication or not, as seen by the two possible continuations in (28b) and (28c). Sentence (28b) is consistent with, and in fact reinforces, the ignorance implication; (28c) is perfectly felicitous even though it contradicts a potential ignorance implication. Similarly with (29), which also illustrates that a list in apposition to a *wh-ever* phrase associated with a non-modal plural reading is interpreted conjunctively.

- (27) I've already returned whatever book you lent me.
- (28) a. I've already returned whatever books you lent me.
 b. I don't remember what they were but I do remember returning them all.
 c. There was 'Moby-Dick', 'La Modification', 'Europa', and I've returned them all.
- (29) Whatever they have borrowed—books, bikes, (and) furniture—has been returned.

Plural, non-modal readings are independent of, and therefore cannot be reduced to, generalization over occasions. The *wh-ever* in (30a) and in (30b) has a plural, non-modal reading, and the surrounding context—the present perfect with *already* in the main clause in (30a), the past perfect in the relative clause in (30b)—favours the one occasion reading. What *wh-ever* seems to contribute is an emphasis on totality.

¹⁰ Examples (23) and (24) are infelicitous to the extent that they cannot support an indifference reading.

¹¹ This is not to say that the audience cannot draw the additional inference that the speaker might not know precisely which hammer.

- (30) a. I have already corrected whatever typos you brought to my attention this afternoon.
 b. He devoured whatever I had put on his plate—eggs, sausages, fries, salad, EVERYTHING.

Dayal (1997: 110) actually notes that in the case of *wh-ever* with a plural domain and episodic tense, ‘it is hard to unequivocally classify the reading as identity [ignorance] or FC [non-modal universal]’. In a footnote she further notes: ‘a potential problem for the present approach arises with plural domains in discourses like [(31)]. One might argue that since the speaker has beliefs about the identity of the dishes cooked by John, *i*-alternatives could not be invoked. On the other hand, it may be possible to individuate *i*-alternatives on the basis of parts of a plural entity.’ (1997: 115).

- (31) John cooked ratatouille and goulash. They both had onions. Therefore, whatever John cooked had onions.

This is the right idea—that the parts of a plural entity can be involved in some way in satisfying variation—but it cannot be implemented in the set-up we have considered so far. Variation with respect to the parts of a plural entity, for (31), would just amount to ignorance as to whether John cooked only ratatouille, or only goulash, or both ratatouille and goulash.

Both problems discussed in this section point to the need for a notion of indeterminacy based on a type of variation which does not amount just to plurality of potential referents for the *wh-ever* description.

10.5 Individuation via properties

The range and type of appositives and parentheticals to ignorance *wh-ever* provide a window into the notion of indeterminacy at play. They also show that the kind and degree of indeterminacy depend on context. Section 10.4 discussed indeterminacy using evidence from infelicity. This section considers felicitous examples to see how ignorance implications become more specific in the presence of the supplementary information provided by the appositive or parenthetical.

Appositives to *wh-ever* sometimes specify the identity of individuals potentially satisfying the description, as in (32), but they do not always do so. Instead, as seen in (33), they can give further descriptive specification, which is less fine-grained than getting all the way down to individuals.¹²

¹² A parenthetical can also provide additional information, without further specifying who the referent of the description might be, as in example (i). Such parentheticals do not bear on the discussion here.

(i) Whoever ate the cake—and it was a very sloppy eater—must be feeling very guilty right now.

- (32) a. Let us serve whichever dish he brought, this pie or that stew, as the main course.
The dish he brought may be this pie or that stew.
- b. Whoever finished first at the last race—maybe it was Alex, maybe it was Chris—was the winner of the tournament.
The person who finished first may be Alex or Chris.
- c. Whoever writes this blog—and it could really be anyone—gives great advice.
The person who writes this blog could be anyone.
- (33) a. Whatever Mary chose for her audition, a song or a poem, was long.
The piece Mary chose for her audition may have been a song or a poem.
- b. Whoever he confessed to—a relative or a friend, we don't really know—took the secret to the grave.
The person he confessed to may have been a relative or a friend.
- c. Whoever entered the church last, a monk or one of the construction workers, saw what happened.
The person who entered the church last may have been a monk or one of the construction workers.

The descriptive content of the *wh-ever* phrase may also be restricted implicitly, either contextually or by sortal restrictions placed by the predicate in the relative clause. For instance, in (32a) there is a contextually given domain of dishes, in (32b) a contextually given domain of race participants, and in (15) there is the contextually determined restriction that the small objects be ancient artefacts; in (8b) and (31) there is the sortal restriction that the relevant thing be food.

As we saw in connection with the infelicity of the *namely* appositives in (24), unique descriptive specification counts as determinacy, just as referential specification does. We can conclude that the referent of a *wh-ever* phrase associated with an ignorance implication cannot be further identified via a unique property more specific than the descriptive content associated with the *wh-ever* phrase, and that the variation associated with it cannot be more fine-grained than the specification provided by an appositive or parenthetical. I claim that this is because the meaning of *wh-ever* makes reference to a multitude of more specific and mutually incompatible subproperties of its descriptive content, ultimately determining the range of signalled (speaker) ignorance.

10.5.1 *Properties and individuation schemes*

The domain of properties is structured by the relation of specificity \sqsubseteq and the operations of join \sqcup and intersection \sqcap . A sub-property P' of a property P is at least as specific as P , designated as $P' \sqsubseteq P$. A proper sub-property P' of a property P is more

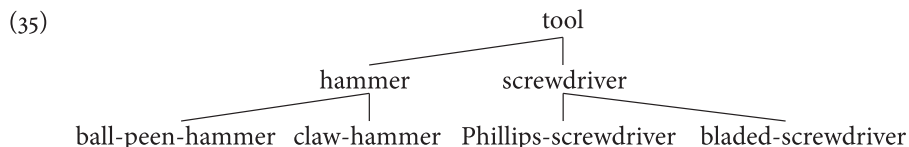
specific than P , designated as $P' \sqsubset P$. The join of two properties, $P_1 \sqcup P_2$, is the most specific property that has P_1 and P_2 as subproperties. \sqcup generalizes \sqcup over a set of properties. The intersection of two properties, $P_1 \sqcap P_2$, is the least specific property that is a subproperty of P_1 and of P_2 . Taking properties to be (or correlate with) mappings from indices to sets of individuals, for any P' and P , if $P' \sqsubseteq P$, then relative to any intended model and index of evaluation w , the value of P' at w is a subset of the value of P at w .¹³ If $P' \sqsubset P$, then there are intended models and indices of evaluation at which the value of P' is a proper subset of the value of P . If two properties P_1 and P_2 are mutually incompatible, then for any intended model and index of evaluation w , the intersection of the values of P_1 and P_2 at w is the empty set. If a property P is instantiated in w , designated as $Inst(P, w)$, the value of P at w is a non-empty set. A property is instantiable if for any intended model there is a w at which it is instantiated.

For a *wh-ever* whose descriptive content is the property P , the relevant properties are more specific properties P' along a contextually given individuation scheme I . An individuation scheme selects a part of the structured domain of properties and provides a property hierarchy rooted in the property supplied by the free relative. If the free relative contains a nominal phrase, the basic root property will be determined by that phrase; otherwise, it will be *person* for *whoever*, and *thing* for plain *whatever*. The full root property will then be the intersection of the basic property with the property contributed by the relative clause, plus any contextual or sortal restrictions. The individuation scheme determines the relevant dimension of individuation and the level of granularity. The dimension encodes a kind of classification on the basis of which the relevant subproperties are selected. For examples, an individuation scheme might classify books by subject matter—books on economics, books on linguistics, books on history—or by method of encoding of the content—printed books, electronic books—or by title, etc. It fixes the granularity of individuation by determining which properties are to be terminal nodes in the hierarchy. The set of terminal nodes are the atoms relative to the relation \sqsubseteq among the properties picked out by the individuation scheme. They are supposed to be the **most specific** relevant subproperties of the root property along the relevant dimension. I will designate the set of atoms relative to an individuation scheme I based on root property P as $Atoms(I, P)$. The atomic properties can be type-level or individual-level. They have to be (a) pairwise at least partially incompatible, (b) instantiable. That is, for any two atomic subproperties, P_1 and P_2 , either they are incompatible, or one, say P_1 , is more specific than the other, say P_2 , which implies that there has to a P_3 incompatible with P_1 such that $P_3 \sqcup P_1 = P_2$.

¹³ This formulation is intended to be agnostic as to whether there is a plurality of intended models. If, like Zimmermann (1999), you believe that there is only one intended model, substitute 'the intended model' in the formulations given here. For our purposes, we can identify indices of evaluation with possible worlds.

For the sake of concreteness, consider the *wh-ever* in (34), which has as its descriptive content the property *tool* intersected with the property of being a thing on the table (at the relevant time). One individuation scheme with the property hierarchy rooted in *tool* is as in (35). The terminal nodes are the atomic elements according to this particular individuation scheme.

- (34) I grabbed whatever tool was on the table, . . .
 a. maybe a screwdriver.
 b. namely, a claw-hammer.
 c. that hammer over there, as it happened.



- (36) $Atoms(I, tool) = \{b.-p.-hammer, c.-hammer, P.-screwdriver, b.-screwdriver\}$

Suppose that the tool on the table was actually a claw-hammer. Then properties like *ball-peen-hammer-on-table* or *screwdriver-on-table* are not instantiated in the actual world. But these properties are made reference to in the meaning of the *wh-ever*, on both the ignorance and the indifference reading, in a way to be made precise in Section 10.7.

Example (35) exemplifies an individuation scheme in which the atomic properties specify subtypes. For any type-level individuation scheme, there is another, with the same dimension but a more fine-grained granularity, which constitutes a further refinement.¹⁴ Given a dimension, the more fine-grained the granularity, the more the atomic alternatives. Another kind of individuation scheme is one where the atomic properties in the hierarchy are the property of being identical to a given individual, either atomic or a sum of atomic individuals, for a range of individuals. In that case, the atomic properties would map to a singleton for any world in which the individual exists. Let's call individuation schemes with this kind of atomic properties individual-level granularity individuation schemes. Individual-level individuation schemes do not have further refinements.

The properties in the individuation scheme may be actively entertained in the context, or not. The exact individuation scheme intended by the speaker may not be recoverable by the hearer, and may not even be determined by the speaker. See Schwarzschild (2002) for discussion on the properties of contextual delimitation and on the distinction between a parameter fixed by context and the extension of that parameter.

¹⁴ There is also one with a more coarse-grained granularity, up to *P* itself.

10.5.2 Property-based variation condition

Take a property P and a set of worlds \mathcal{W} such that for every $w \in \mathcal{W}$, P is instantiated in w (in our notation, $Inst(P, w)$). Then, for every $w \in \mathcal{W}$, it will also be the case that $Inst(max.P, w)$,¹⁵ which implies that $\iota x.max.P(w)(x)$ will be defined (i.e. will denote) in every w . Now take an individuation scheme I such that (i) $Atoms(I, P)$ is not a singleton, that is, I is not a one branch hierarchy, and (ii) for every $P' \in Atoms(I, P)$, there is some $w \in \mathcal{W}$ such that $Inst(P', w)$. \mathcal{W} satisfies the variation condition in (37).

(37) PROPERTY-BASED VARIATION

There are $P', P'' \in Atoms(I, P)$ and $w', w'' \in \mathcal{W}$ such that

$$\iota x.max.P'(w')(x) \neq \iota x.max.P''(w'')(x).$$

Consider first the case where all the elements of $Atoms(I, P)$ are mutually incompatible. Then there can't be a $w \in \mathcal{W}$ such that both $Inst(P', w)$, $Inst(P'', w)$, for any two distinct atomic P', P'' . Next consider the case where there are $P_1, P_2 \in Atoms(I, P)$ such that $P_2 \sqsubset P_1$. Since the atomic properties determined by an individuation scheme are maximally specific, $P_1 = P_2 \sqcup P_3$ for some P_3 incompatible with P_2 . Therefore, even if there is a $w \in \mathcal{W}$ such that $Inst(P_2, w)$ and $Inst(P_1, w)$, $\iota x.max.P_2(w)(x) \neq \iota x.max.P_1(w)(x)$.¹⁶ Partially incompatible properties are relevant for plural *wh-ever*, where some parts of a plural entity can be of one type and other parts of another, for example, a collection of books comprised of books on economics and books on linguistics.

Any set like \mathcal{W} then does not determine the identity of the (maximal) entity with property P , since, in some worlds $w' \in \mathcal{W}$, $\iota x.max.P(w')(x) = \iota x.max.P'(w')(x)$, and in other worlds $w'' \in \mathcal{W}$, $\iota x.max.P(w'')(x) = \iota x.max.P''(w'')(x)$. But not only is the (maximal) entity with property P not the same individual throughout the worlds in \mathcal{W} , it is of different subtypes across the worlds of \mathcal{W} .

We can then say, more generally, that, relative to some individuation scheme I , a set \mathcal{W} does not uniquely determine who/what is the (maximal) entity with property P iff it satisfies the variation condition in (37). If a set of worlds does not uniquely determine who or what is the (maximal) entity with property P relative to individuation scheme I , then it will also not do so relative to any individuation scheme finer than I . The finest such individuation scheme would be in a one-to-one correspondence with the individual referents of the description 'the (maximal) entity with property P ' across the worlds of \mathcal{W} .

We can now attribute the indeterminacy conveyed by *wh-ever* to a requirement that the individuation scheme be branching and to a property-based variation condition as in (37). To derive the implications of *wh-ever* then, we need an appropriately

¹⁵ If P has only one instance in w , then the singleton $max.P(w)$ will contain that instance. If P has multiple instances in w , then the singleton $max.P(w)$ will contain the (mereological) sum of all the instances.

¹⁶ In those worlds, $\iota x.max.P(w)(x) = \iota x.max.P_1(w)(x)$.

determined set of worlds and an individuation scheme. In the analyses we considered in Section 10.3, the set of worlds is the modal base invoked by *wh-ever* and the individuation scheme is invariably individual-based. We have seen that individual-based individuation schemes are a special case and that, in general, the individuation scheme can be coarser.

Suppose we interpret the *wh-ever* phrase in (34) relative to the individuation scheme in (35) and an information state s which does not uniquely determine relative to (35) what was the tool on the table. s is consistent with the information that the tool on the table is a claw-hammer, as well as with the information that it is a bladed screwdriver, etc. If s is set to be the epistemic state of the speaker in the world in which the utterance is made, $B_{sp}(w_o)$, and the use of *wh-ever* makes reference to $B_{sp}(w_o)$, then by using *wh-ever* the speaker is communicating that her epistemic state $B_{sp}(w_o)$ does not determine, relative to the granularity provided by (35), what was the tool on the table, and hence that, for all she knows, the tool on the table was a claw-hammer, or a bladed screwdriver, or a Phillips screwdriver, etc. This is an instance of the ignorance use, which is compatible with the continuation in (34a). If, on the other hand, the speaker can uniquely specify, either descriptively (as in (34b)) or referentially (as in (34c)), what the tool on the table was, s has to be a superset of $B_{sp}(w_o)$, allowing for possibilities in which the tool on the table is a ball-peen hammer, possibilities in which it is a bladed screwdriver, etc. These would be counterfactual possibilities, since the utterance settles the relevant tool to be a claw-hammer, in (34b), or even a particular individual claw-hammer, in (34c).

10.5.3 *Appositives*

Given our earlier observation that the individuation scheme cannot be more fine-grained than the specification provided by an appositive, phrases in apposition to a *wh-ever* provide information about the individuation scheme the speaker has in mind, which in the epistemic case, amounts to information about the range of the speaker's ignorance. Since the speaker is committed to the information in the appositive, then an utterance of (38) makes it clear that $B_{sp}(w_o)$ uniquely determines what it was that Mary chose for her audition: a song across the worlds of $B_{sp}(w_o)$.

(38) # Whatever Mary chose for her audition, namely a song, was very long.

The fact that the speaker does not know the particular song, and hence that different songs may instantiate the property corresponding to the descriptive content of the *wh-ever* phrase across the worlds of $B_{sp}(w_o)$, is invisible to the individuation scheme and hence to the interpretation of the *wh-ever* on this use.

The property-based approach to the indeterminacy signalled by *wh-ever* predicts that variation in individual referents will suffice to satisfy the variation condition only if they are in a one-to-one correspondence with the atomic properties provided by the contextually supplied individuation scheme. In the examples in (32) there is a set

of salient individuals, which both determine the individuation scheme and constitute the potential referents for the descriptions. For instance, (32b) would be interpreted relative to an individuation scheme whose atomic properties are the intersection of the root property, being a person who finished first, with the property of being Alex, and with the property of being Chris. In (32c) the entire domain of individuals determines the individuation scheme and the set of potential referents for the description.

If the specification in the appositive or parenthetical is (semantically) disjunctive, then no conflict arises with the variation condition. Use of the *wh-ever* indicates that the speaker cannot pin down uniquely which of the relevant properties in the individuation scheme the entity denoted by *wh-ever* satisfies; use of the appositive then specifies (some of) the relevant properties. The secondary content provided by appositives and parentheticals is thus integrated with the variation condition to signal the range and degree of ignorance of the speaker. How this is to be worked out technically is an open issue but what matters for our purposes is the observation that the specification of appositives and parentheticals goes in tandem with the individuation scheme relevant for the interpretation of *wh-ever*.¹⁷ The individual-based variation condition is not in a position to capture this interdependence.¹⁸

In this section I have shown that indeterminacy is property-based, hence assumption (III) from Section 10.4 should be revised, and that this revision is consistent with (II). Property-based indeterminacy addresses the problem discussed in Section 10.4.1 and can underpin the variation of the ignorance and counterfactual implications. The question to address next is how the atomic properties figure in the meaning of *wh-ever* and how the relevant set of worlds is determined. An obvious move is to keep (I) and (IV) and just reformulate the variation and uniformity analyses in terms of the revised (III). But if the meaning of *wh-ever* makes reference to a collection of properties, we could ultimately derive *wh-ever*'s apparent hidden modality and also explain why it is obligatory with singular *wh-ever* but optional with plural *wh-ever*. I develop this idea in Section 10.7. In the following section I discuss the status of the variation condition and of the implications of ignorance, indifference, and plain plurality. This provides additional motivation for not keeping (I) and (IV).

¹⁷ My proposal is consonant with Onea and Volodina's (2011) analysis of German *nämlich*, which is like *namely* in one of its uses. They formulate their analysis in terms of questions under discussion and propose that the *namely* specification answers the most current question under discussion, which is implicitly raised by the phrase *namely* is in apposition to.

¹⁸ Recently, Heller and Wolter (2008, 2011) have revisited Dayal's (1997) analysis, and argued, similarly to this chapter, that the indeterminacy required by *wh-ever* should not be construed as non-rigidity. For reasons of space, I cannot do justice to their proposals here and hope to come back to them on a later occasion. Let me note, in any case, that the individuation scheme behind the condition they propose in their 2011 paper, Condition S, is still too fine-grained (therefore weaker than it should be) and does not predict the unacceptability of a descriptive *namely* appositive. The stronger condition that they proposed in the 2009 paper, Condition G, makes the right predictions about the case of descriptive *namely* appositive, but is too strong in other respects and predicts infelicity in contexts of variation when none arises.

10.6 The status of the implications

Variation as a condition on the pre-utterance context is not strong enough, since it is compatible with the utterance providing information that results in a context with no indeterminacy with respect to the *wh-ever*.¹⁹ For instance, why can't it be that a speaker could utter the *wh-ever* in (23a) and (24a) in a context in which it is not (yet) common ground that he can pin down uniquely who it is who entered the house first—which would be a felicitous utterance if variation is a condition on the pre-utterance context—and then go on to specify by use of the appositive that he can uniquely determine who it is who entered the house first?²⁰

Moreover, the indeterminacy conveyed by *wh-ever* is part of the informative content of a *wh-ever* phrase, not taken for granted in advance of the utterance. The ignorance implication, unlike the presuppositional existential implication, cannot be cancelled via denial. Sentence (39) gives a classic example of presupposition denial. The mini-dialogues in (40) and (41) show that denying the existential presupposition of a *wh-ever* phrase is possible, but denying the ignorance implication is not.

(39) The king of France is NOT bald because there IS NO king of France!

(40) A: Whatever you bought was expensive.

a. B: What I bought was NOT expensive because I didn't buy anything!

b. B: # What I bought was NOT expensive because you KNOW what I bought!
(does not deny the ignorance implication of A's utterance)

(41) A: Will you welcome whoever is visiting?

a. B: I will NOT welcome whoever is visiting because NO ONE is visiting!

b. # I will NOT welcome whoever is visiting because you KNOW who is visiting!
(does not deny the ignorance implication of A's utterance)

Of course, one can always challenge an ignorance implication—for instance, A's utterance in (40) can be responded to with (42). It is just not challenged in the familiar way that presuppositions can be denied.

(42) What do you mean 'whatever I bought'? You know exactly what I bought.

Although harder to probe into, we can observe that filtering effects, which would be expected if the ignorance or indifference component were indeed presuppositional, are not necessarily present; instead, if the information satisfying the presumed presupposition, of ignorance or indifference, is supplied in the local context, a different implication arises. For instance, (43), where the first conjunct asserts the requisite

¹⁹ Lauer (2009) raises the same issue based on a different kind of evidence.

²⁰ If presuppositions are construed as speaker commitments, rather than just conditions on the pre-utterance context, the problem of the interaction of ignorance with the specification in the appositive will not arise.

ignorance on the part of the speaker, has no neutral reading. Rather (43) gives rise either to an implication of plurality or to an indiscriminacy implication. The possibility of a neutral reading is exactly what would be expected if the ignorance implication were presuppositional in nature. The question is, why accommodate a presupposition making reference to a different modal base, when the context already satisfies the presuppositional requirement of *wh-ever* with the modal base set to B_{sp} ?

- (43) I didn't know what she had cooked but I ate whatever she put on my plate.
She put more than one thing on my plate.
 OR *I ate indiscriminately.*

Similarly, in (44), where the antecedent supplies the requisite information of indifference, no neutral reading seems to be available but an ignorance implication accompanies the use of the *wh-ever* phrase.

- (44) If he voted indiscriminately, he just voted for whoever was at the bottom of the list.
I don't know who was at the bottom of the list.

Even more problematic is an asymmetry that von Stechow (2000) observed between ignorance and indifference readings: the indifference implication is systematically part of the truth-conditional content in embedded contexts, while the ignorance implication projects out of embedded contexts. Consider the contrast of the effect of the *wh-ever* phrase in an *unless* clause on the ignorance use in (45a) vs. the indifference use in (45b).

- (45) a. Unless whatever John sent us is short, we will have to cut down our part of the proposal.
I do not know what John sent us (and how long it is).
 NOT: *Anything John might have sent us is of comparable length.*
- b. Unless John took whatever car became available first, they didn't make the ferry.
Unless John acted indiscriminately and took the first car to become available, they didn't make the ferry.
 NOT: *John acted indiscriminately in choosing a car and unless he took the first car to become available, they didn't make the ferry.*

von Stechow considered the implications of this asymmetry for the uniformity analysis, which are as follows: the *wh-ever* phrase would have to receive widest scope when the modal base is epistemic;²¹ under embedding, the presuppositional content

²¹ The reason that on the uniformity analysis the *wh-ever* phrase has to receive widest scope on the epistemic construal of the modal base is so as to avoid a uniformity implication projecting as a presupposition, like the indicated missing implication of (45a).

would have to become part of the truth-conditional content when the modal base is counterfactual.

To sum up, modal implications are always present with semantically singular, but can disappear with plural, *wh-ever*. The ignorance implication projects like a presupposition but is, arguably, not a presupposition. The indifference implication is necessarily part of truth-conditional content in embedded contexts. Assuming that variation and uniformity are presuppositional does not capture the fact that the modal implications are part of the informative content of a *wh-ever* phrase, not taken for granted in advance, and does not appropriately distinguish between the components of meaning giving rise to the ignorance and indifference implications. Finally, the question remains whether we can unify the different uses of *wh-ever* and still account for the distinct implications.

10.7 Alternatives and enrichment

In this section I intergrate properties into the meaning of *wh-ever* and propose an analysis which links the modal implications more closely to the atomic properties supplied by an individuation scheme. The analysis derives the special characteristics of the implications, specifically, the presupposition-like behaviour of the ignorance implication, the fact that the indifference implication is a truth-conditional-like entailment, and the possible absence of any modal implications with semantically plural *wh-ever*.

I propose that *-ever* activates alternatives, which, in a given context, are fixed to be the atomic properties provided by a contextually available individuation scheme. If an expression activates alternatives, a general condition is that they be non-trivial. In the case of *wh-ever*, this amounts to the requirement that the property hierarchy supplied by the individuation scheme bottom out to at least two atomic properties. The implications of *wh-ever* are the result of operations on these alternatives.

The appeal to alternatives is in line with much recent work on polarity and free choice items (Krifka 1995; Lahiri 1998; Kratzer and Shimoyama 2002; Menéndez-Benito 2005; Aloni 2007b; Chierchia 2006, among others). Krifka's (1995) analysis of the negative polarity item *any* is a precedent using property-based alternatives.²² Unlike *wh-ever*, polarity items are not sensitive to an individuation scheme and the alternatives have no further restrictions, so the condition imposed on the alternatives is one that has to hold of any subproperty whatsoever, which is a way of accounting for the restricted distribution of polarity items.

Wh-ever phrases then have an ordinary content and an alternative content. To do the composition, I take their semantic value to be a BFA-structure (Background-

²² *Any* phrases are indefinites and have as alternatives indefinites whose descriptive content is a more specific property than the property corresponding to the descriptive content of the *any* phrase.

Focus-Alternative-structure), assuming the compositional framework of Krifka (1995) with certain modifications. The BFA-structure of a *wh-ever* phrase is the invariant part of its meaning relative to a context that supplies an individuation scheme. I assume, following Jacobson (1995), that *wh-* is a predicate modifier as defined earlier in (4), but do not otherwise address here the internal composition of a *wh-ever* phrase.²³ In argument position, a free relative type-shifts to a generalized quantifier. As an example, consider the BFA-structure in (46) corresponding to *whatever tool was on the table* (abstracting away from tense etc.).

$$(46) \quad \langle \lambda R \lambda Q \lambda w. Q(w)(\iota x. \max. R(w)(x)), \text{tool} \sqcap \text{on-table}, \text{Alt}(\text{tool} \sqcap \text{on-table}) \rangle$$

Relative to the individuation scheme in (35):

$$(47) \quad \text{Alt}(\text{tool} \sqcap \text{on-table}) = \{P' \sqcap \text{on-table} \mid P' \in \text{Atoms}(I, \text{tool})\}^{24}$$

I impose one additional requirement on individuation schemes for the interpretation of *wh-ever*: the set of alternative properties should be such that they exhaust the ordinary property, which corresponds to the contextually restricted descriptive content of *wh-ever*. For (46) this means that (48) holds.

$$(48) \quad \text{tool} \sqcap \text{on-table} = \bigsqcup \text{Alt}(\text{tool} \sqcap \text{on-table})$$

In a sentence like (49) the BFA-structure in (46) would apply to the clausal predicate and yield the BFA-structure in (50).²⁵

(49) Whatever tool was on the table was expensive.

$$(50) \quad \langle \lambda R \lambda w. \text{expensive}(w)(\iota x. \max. R(w)(x)), \text{tool} \sqcap \text{on-table}, \text{Alt}(\text{tool} \sqcap \text{on-table}) \rangle$$

Finally, the B(ackground) applies to the F(ocus) and pointwise to the alternatives, yielding a pair whose first member is the ordinary, truth-conditional content, and whose second member is a non-singleton set of alternatives. Ordinary content remains separate from alternatives and the alternatives are carried along in the set of alternatives. This operation, call it *Project*, is defined in (51).

(51) Application of B to F with projection of the alternatives:

For BFA-structure $BFA = \langle B, F, \{F' \mid F' \in \text{Alt}(F)\} \rangle$,

$\text{Project}(BFA) = \langle B(F), \{A \mid (\exists F' \in \text{Alt}(F)) A = B(F')\} \rangle$

For instance, application of *Project* to the *wh-ever*-induced BFA-structure in (50) results in the pair $\langle C^O, C^A \rangle$ whose two members are as in (52).

²³ Discussion and proposals on that issue are to be found, for instance, in Jacobson (1995), Rullman (1995), Caponigro (2003), Giannakidou and Cheng (2006), Rawlins (2008).

²⁴ $\text{Atoms}(I, \text{tool})$ is as in (36).

²⁵ This is an application of the following rule of semantic composition in Krifka (1995): if a semantic rule calls for application of α to β and $\alpha = \langle B, F, A \rangle$, then $\alpha(\beta) = \langle B, F, A \rangle(\beta) = \langle \lambda X[B(X)(\beta)], F, A \rangle$, where X is a variable of the type of F .

$$(52) \quad C^o = \lambda w.expensive(w)(ix.max.tool-on-table(w)(x))$$

$$C^A = \{\lambda w.expensive(w)(ix.max.P'(w)(x)) \mid P' \in Alt(\lambda x \lambda w.tool-on-table(w)(x))\}$$

The first member of the pair is the proposition corresponding to the truth-conditional content of (49). The second member is a set of alternative propositions. Both the proposition C^o and the alternative propositions in C^A come into play in the update of the context with the information carried by (49), as discussed below.

The ordinary truth-conditional content of (49) is the same as that of (53), just as in von Stechow's analysis. Relative to an individuation scheme as in (35), the alternative propositions correspond to the content of the sentences in (54).

- (53) The tool on the table was expensive.
- (54) a. The ball-peen hammer on the table was expensive.
 b. The claw-hammer on the table was expensive.
 c. The Phillips screwdriver on the table was expensive.
 d. The bladed screwdriver on the table was expensive.

Since the definites in (54) specialize the descriptive content of the definite in (53), each one of the sentences in (54) would have a semantic value, and the corresponding proposition a truth value, in a subset of the worlds in which the sentence in (53) has a semantic value, and the corresponding proposition a truth value. This is ultimately how, by asserting (49), a speaker could convey that (53) is true and that each one of the sentences in (54) might be true as well.

10.7.1 Global discharge

When the alternatives are carried along and not discharged in the process of compositional interpretation, they are discharged at the assertion level, via what I call 'global discharge'. But how are pairs with members as in (52), where the set of alternatives consists of more specific, mutually incompatible propositions, supposed to update the context? Krifka (1995) considers the parallel case for scalar assertions—parallel in the sense that the output of semantic composition is a paired denotation, consisting of a proposition and a set of propositions—and proposes the update in (55),²⁶ where c is the context set of the pre-utterance context.

$$(55) \quad ScalAssert(\langle p, Alt(p) \rangle, c) =$$

$$\{w \in c \mid w \in p \wedge \neg(\exists p' \in Alt(p)) w \in p' \wedge c \cap p' \subset c \cap p\}$$

Scalar assertions, in addition to asserting the proposition expressed, negate any informationally stronger alternative propositions.

²⁶ This is a slight adaptation of what Krifka assumes, as he has a BFA-structure be the output of semantic composition.

In the case of pairs with members as in (52), C^O and the elements of C^A do not stand in the same relation of strength as the kinds of propositions on which *ScalAssert* operates, and an update as in (55) would, in general, result in inconsistency. I propose that such pairs are operated on by the anti-exhaustivity operator $AssertO^-$, whose effect is given in (56). For the purposes of this chapter, contextual update via $AssertO^-$ can be taken to be conventional, but my main proposal should not be affected if the same condition on alternatives is effected via a different conventional update rule plus pragmatic reasoning.

(56) $AssertO^-(\langle p, Alt(p) \rangle, c) = c \cap p$, provided (57) holds; else undefined.

(57) If $c \cap p \neq \emptyset$, then $(\forall p^{alt} \in Alt(p)) c \cap p \cap p^{alt} \neq \emptyset$ and defined.

Expression (57) is a uniformity condition requiring that each alternative be consistent with the context resulting from the update with the ordinary content.²⁷ In order for (57) to be satisfied, none of the alternative propositions should be presupposed to be false, that is every $p' \in Alt(p)$ has to be consistent with c provided p is consistent with c . This is the only (pragmatic) presupposition associated with uses of *wh-ever* on the construal where the alternatives are discharged globally.

The name of the operator $AssertO^-$ is not arbitrary. It can be seen as the assertion-level equivalent of Chierchia's (2006) anti-exhaustivity operator. Chierchia (2006), building on Kratzer and Shimoyama (2002), assumes the three enrichment operators in (58) but they are all meant to apply at the level of determining propositional content.

(58) a. $E(\langle p, C \rangle) = p \wedge [(\forall q \in C)p \subseteq q]$, where $C = Alt(p)$

b. $O(\langle p, C \rangle) = p \wedge [(\forall q \in C)q \rightarrow p \subseteq q]$, where $C = Alt(p)$
(Exhaustivity)

c. $O^-(\langle p, C \rangle) = p \wedge [(\forall q, q' \in C)q \rightarrow q']$, where $C = Alt(p)$
(Anti-exhaustivity)

One could see enrichment operators as applying in the process of calculating propositional content, as well as at the assertion level. Exhaustivity at the assertion level, where the alternatives are totally ordered by semantic strength (entailment), gives rise to scalar implications; Chierchia's (58b) corresponds to Krifka's (1995) (55) at the assertion level. Anti-exhaustivity at the assertion level gives rise to uncertainty implications.

For any world $w \in c$, if p is true in w , then at least one of the alternatives is true in w as well. In fact, given that the alternative propositions are mutually incompatible, for any given world $w \in c$ in which p is true, exactly one of the alternative propositions is true in w . Since there are at least two alternatives and they are all compatible with the

²⁷ The information provided by appositives and parentheticals is integrated into the ordinary content. In other words, ordinary content is not just at-issue content.

post-update context, the post-update context obeys variation. Given the congruence between the individuation scheme and the specification in an appositive, discussed in Section 10.5, and the variation required of the post-update context, appositives that provide unique specification, such as *namely* and single member appositives, would be infelicitous, since unique specification is incompatible with variation. For the same reason, a list in apposition to a *wh-ever* on the global discharge construal has to be interpreted disjunctively.

10.7.1.1 Ignorance implication On this analysis, the ignorance implication is a pragmatic inference about the reasons behind the speaker's choice to use an expression resulting in the compatibility requirement in (57). In a context in which it is expected that the speaker is knowledgeable and might be willing to add more information about who/what satisfies the definite description, the listener can assume that the speaker is more informed than her utterance indicated and that she can pin down more specifically than she indicated which is the *P* that *Q'd*. By using an expression requiring that the context updated with the proposition expressed be compatible with each alternative, the speaker is signalling that she will/can not distinguish between them any further. Ignorance—not being able to pin down more specifically which is the *P* that *Q'd*—is one reason; unwillingness to divulge any more information, as in the hint-type uses pointed out by von Stechow and discussed earlier in connection with (22), is another. Disagreement between speaker and hearer that can remain unresolved is yet another, as in the example below.

- (59) A: Susan entered the house last.
 B: No, JOHN entered the house last.
 A: Well, whoever entered the house last saw what happened.

By using a *wh-ever*, A is indicating that both possibilities about who it was that entered the house last should remain in the common ground, thereby both acknowledging the disagreement and setting it aside.

In sum, the ignorance reading is one in a family of readings that motivate the use of an expression which leads to the application of the compatibility requirement in (56): *I don't know which, I won't tell you which, we needn't resolve which*. This is not special to *wh-ever* but is true of other expressions that convey ignorance, such as unembedded or wide scope *or*. See Lauer (2013) for discussion of the variety of implications of *or* and a proposal on how they can be derived as Gricean implicatures of a special kind.

10.7.1.2 Projection of ignorance implication The ignorance implication exhibits the projection properties of presuppositions because of the existential presupposition of the ι operator in the ordinary content and alternatives and the compatibility condition imposed by global discharge. Suppose, for instance, that *p* is the proposition expressed by (60) and *p*₁, *p*₂ two alternative propositions having come about from the alternatives to the description *the thing she is cooking*.

(60) Whatever she is cooking doesn't smell good at all.

I don't know what she is cooking.

(61) p : she is cooking something & the thing she is cooking doesn't smell good

p_1 : she is cooking soup & the soup she is cooking doesn't smell good

p_2 : she is cooking stew & the stew she is cooking doesn't smell good

The requirement imposed by global discharge is that the context set c updated with p be compatible with p_1 and with p_2 . This means that c updated with p entails (62a)–(62d).

(62) a. She may be cooking soup.

b. If she is cooking soup, the soup she is cooking doesn't smell good.

c. She may be cooking stew.

d. If she is cooking stew, the stew she is cooking doesn't smell good.

10.7.2 Local discharge

I propose that in addition to the projection of alternatives, there is another rule of composition which discharges the alternatives locally and results in a single denotational object rather than a pair. I do not define the rule of composition here but simply show its effect on a *wh-ever*-induced BFA-structure in (63).²⁸

(63) APPLICATION WITH LOCAL DISCHARGE OF THE ALTERNATIVES:

$\lambda w.Q(w)(\iota x.P(w)(x)) \wedge (\forall P' \in \text{Alt}(P))(\forall w' \in \mathcal{WS}(w, P'))Q(w')(\iota x.P'(w')(x))$,
where $\mathcal{WS}(w, P) = \text{Sim}(w, \lambda w'.\text{Inst}(w', P))$

Assuming that *Sim* obeys centring, if $\text{Inst}(w, P)$, $\text{Sim}(w, \lambda w'.\text{Inst}(w', P)) = \{w\}$. Since the properties supplied by an individuation scheme are instantiable, \mathcal{WS} would be guaranteed to be non-empty if we assume that *Sim* can always reach into the set of worlds in which a given property is instantiated.

Locally discharged alternatives get folded into truth-conditional content, which is thereby generally strengthened.²⁹ The universal quantification over alternatives can be seen as a type of anti-exhaustivity enriching truth-conditional content. Reference to \mathcal{WS} ensures that the universal condition on alternatives can be satisfied non-trivially. Since for any given world w the unique individual that is P in w can only have one of the mutually incompatible properties that are P 's alternatives, without reference to \mathcal{WS} , the condition on alternatives would only be defined for just one of the alternative properties.

²⁸ A general rule of composition with local discharge of the alternatives would cover the case of dependent *wh-ever*, i.e. *wh-ever* in the scope of a quantificational operator.

²⁹ 'Generally' because, as discussed below, in certain cases the alternative content is entailed by the ordinary content.

Local discharge and incorporation of the alternatives into truth-conditional content are the source of the indifference reading of *wh-ever*. If it is presumed at the time of utterance, or if the utterance itself implies, that who/what satisfies the description is uniquely determined, \mathcal{WS} would be yielding counterfactual alternatives to the world of evaluation for all but one of the alternative properties. For example, take (34) interpreted with respect to the individuation scheme in (35). For any world w in which the tool in front of me was a claw-hammer, $\mathcal{WS}(w, P')$, with $P' = \text{ball-peen-hammer-on-table}$, would deliver worlds maximally similar to w in which the tool in front of me was a ball-peen hammer rather than a claw-hammer, and the condition imposed on alternatives requires that in such worlds I would have grabbed the ball-peen hammer in front of me.

von Fintel's observation that the indifference implication is part of truth-conditional content in embedded environments follows directly in this account. Since the indifference implication arises when the alternatives are locally discharged and local discharge strengthens truth-conditional content, the indifference implication is necessarily part of truth-conditional content in any environment, embedded or unembedded. Embedded environments, as for instance in (45b), are where the effect of local discharge will be visible. Of course, deriving von Fintel's observation relies on the assumption that alternatives do not always project to the assertion level, and that when they don't, they get incorporated into truth-conditional content.³⁰ I leave for future research the question of what triggers local discharge and how this might be tied to the predicate the *wh-ever* is an argument of, as well as the formulation of the rule of composition which results in (63).

10.7.2.1 Plurals If the property corresponding to *wh-ever* is instantiated uniquely, no two atomic subproperties can both be instantiated in the same world. This means that there will always be a modal implication for semantically singular *wh-ever*. With a semantically plural *wh-ever*, there are two broad cases to consider. In one case, the individuation scheme is such that for any relevant world there is an atomic property which is satisfied by all the atomic elements of the plural entity.³¹ Since this case reduces to the case of singular *wh-ever*, plural *wh-ever* relative to such an individuation scheme would have the same range of readings as singular *wh-ever*: the ignorance reading if the alternatives are globally discharged, the indifference reading if the alternatives are locally discharged. In the second case, the individuation scheme is such that there is no atomic property satisfied by all the atomic elements of the plural entity for any relevant world.

³⁰ A similar thing happens with focus-generated alternatives in the presence of a focus-sensitive operator. Also, Chierchia's (2006) appeal to 'implicature-freezing' operators in his account of negative polarity and free choice items is conceptually similar to local discharge.

³¹ If the atomic properties are partially incompatible, then the plural entity could be comprised of elements of the same type in some worlds and of elements of different types in other worlds, e.g., the books bought can all be books on economics, or they can include books on economics and books on linguistics.

On certain individuation schemes among those, however, it is possible for all atomic properties to be instantiated in the world of evaluation. This is the case when every atomic property holds of some members of the plural entity. Consider, for instance, (29), which can get a plain plural reading without a modal implication. The condition on alternatives associated with local discharge predicts that (29) on the relevant individuation scheme would have no modal implications. Since every subproperty is instantiated in the world of evaluation, \mathcal{WS} would simply return the singleton consisting of the world of evaluation. In such a context and with *wh-ever* in a distributive predication, the unenriched truth-conditional content is equivalent to the enriched truth-conditional content. If the things they borrowed have been returned and the things they borrowed include books, then it follows that the books they borrowed have been returned.

Moreover, the condition on alternatives associated with local discharge allows for counterfactual implications even when the individuation scheme relates to the further specification given by an appositive. Consider (15b), whose appositive is a conjunctively interpreted list. Each element of the list is a property specializing the property corresponding to the descriptive content of the *wh-ever*, for example, the property of being a small object reachable by the thieves that is a figurine, the property of being a small object reachable by the thieves that is a vase, the property of being a small object reachable by the thieves that is a lamp. Each one of these subproperties is instantiated in the actual world. Example (15b), therefore, implies that the small objects reachable by the thieves through the holes consisted of figurines, vases, and lamps. So relative to an individuation scheme whose atomic properties consist of exactly the properties associated with the appositive, a simple plural reading would arise, without any counterfactual implication. However, that does not exclude the possibility of other individuation schemes. For instance, there can be individuation schemes with the same level of granularity but a larger number of atomic properties some of which are not instantiated in the actual world, for example, the property of being a small object reachable by the thieves that is a coin. Relative to such individuation schemes, a counterfactual implication would arise from the enriched content, due to the alternatives not instantiated in the actual world, and the *wh-ever* in (15b) would get the indifference reading.

10.7.2.2 Negation and local discharge Unlike the ignorance implication which projects through negation, the indifference implication does not. This can be subsumed under von Steinhilber's observation that the implication is necessarily part of truth-conditional content in embedded context, but the interaction of the implication with negation is independently interesting because negation can negate the indifference implication without negating the ordinary truth-conditional content. For instance, (64a) is consistent with me voting for the person at the bottom of the list, and (64b) with me grabbing the tool in front of me.

- (64) a. I didn't (just) vote for whoever was at the bottom of the list.
 b. I didn't (just) grab whatever tool was in front of me.

This is predicted by the analysis offered here. Schematically, negation of the enriched content amounts to (65), which allows for (65a, 65b) but not (65c).

- (65) $\neg(p^o \wedge \bigwedge p^{alt}) \leftrightarrow \neg p^o \vee \neg \bigwedge p^{alt}$
 a. $p^o \wedge \neg \bigwedge p^{alt}$
 b. $\neg p^o \wedge \neg \bigwedge p^{alt}$
 c. $*\neg p^o \wedge \bigwedge p^{alt}$

If the ordinary content is negated, then universal quantification over alternatives cannot hold, since for one of the alternatives it would have to be the case that it is not true. But, of course, both the ordinary content and universal quantification over alternatives, which amounts to the indifference implication, can be negated. For instance, (64a) can be continued with *I scrutinized the ballot carefully and voted for the person who had the most modest campaign*.

10.8 Conclusion

Wh-ever has a uniform but context-dependent meaning, which ultimately gets enriched by the alternatives it is associated with. Its different readings on particular occasions of use depend on a contextually given individuation scheme and on the choice between global and local discharge for the alternatives. The intensionality of the alternatives is behind the apparent modality of *wh-ever*

Both local and global discharge of the alternatives of *wh-ever* involve an anti-exhaustivity operation on the alternatives with a compatibility requirement that each alternative be possible. The possibility is a world-dependent, metaphysical possibility, when the alternatives restrict propositional content, and dependent on an information state, when they enter contextual update. A deeper analysis would have to explain why that is.

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