

Approaches to Meaning

Current Research in the Semantics/Pragmatics Interface

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Approaches to Meaning

Composition, Values, and Interpretation

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For Ede or Thomas



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Acknowledgements

This volume collects original research papers in natural language semantics, which we and the authors dedicate to Ede Zimmermann on the occasion of his 60th birthday. We think that the quality of the papers, the profile of the authors involved, and the variety of topics the authors have chosen for their papers alone is proof of the influence Ede has had and continues to have on the landscape of formal semantics and the respect he gets from colleagues and friends worldwide.

Working with or, in our case, for Ede is very inspiring and it leads to surprising insights into the semantics and pragmatics of natural languages. It is not just that you can ask him about even the most complicated things while taking a walk to the next supermarket (to buy many cookies or cakes), which he promptly answers in a precise and helpful way. (Sometimes you have to think about his answers for three weeks just to figure out how helpful they are.) It is not just that he is always ready to talk through your (linguistic) problems, even if you are telling him about them for the n -th time. And it is not just that he is one of the most competent, insightful and fastest thinking semanticists possible. On top of all of this, you easily get acquainted with lesser known semantic or pragmatic facts about German. (1) You can start an entirely new conversation with *Ja*, or *Genau* or even *Ja, genau* ('Yes', 'Indeed' or 'Yes, indeed'). (Ede does this all the time; especially on the phone.) (2) You can end a conversation in the very same way. (3) There are contexts, where *working with Ede* means 'watching random conference pictures online together' or 'exchanging jokes and puns for much more time than it is normally allowed by social norms', or the conjunction of these two paraphrases. (4) *Preparing for a talk held in the traditional Thursday colloquium by a specific guest* in some cases means 'trying to find the best recipe for gin tonic possible'. (5) You can plan possible discourses beforehand by instructing your interlocutor to remember certain things in case you ask him something like *Didn't I talk about this and that with you?* And therefore, (6) you learn about even devious ambiguities in allegedly 'harmless' sentences as *Working with or for Ede is very inspiring and it leads to surprising insights into the semantics and pragmatics of natural languages*. Finally, a rarely observed property of Ede is that he serves as truth-maker for both readings of this sentence. Thank you, Ede!

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Composition, Values, and Interpretation

An Introduction to Elements of Semantic Theory

Daniel Gutzmann, Jan Köpping, and Cécile Meier

1 Introduction

A semantic theory always stands in relation to other disciplines of linguistic theorizing. For example, it operates on syntactic inputs and it feeds pragmatic processes. This introductory text looks a bit more closely at these relationships and sketches an account of how one should think about the interrelatedness of semantic theory with other disciplines of linguistics, as well as with related domains of investigation like ontology, epistemology and logic. Thereby, it sets the frame for the contributions collected in this volume, which can be understood as partaking in the general enterprise of getting the balance between all these fields and semantics right.

The paper is organized as follows. Section 2 presents two perspectives on semantic theories. One resembles most textbook characterizations of semantics (see among many others Zimmermann & Sternefeld 2013) and should sound very familiar. The other one emphasizes the rôle of interfaces as a relevant factor in the characterization of semantic theories as such. This second perspective is laid out in more detail in Section 3, where examples of seemingly different semantic theories are provided that turn out to be equally well suited to answer the demands posed by pragmatics. Section 4 looks at a more realistic example, which also sheds some light on the relation between semantics and pragmatics (although from a different point of view). The implications of this concrete example are scrutinized in Section 5, where the key notions developed to describe the interrelatedness are extended to other disciplines like the examples mentioned above. Also, it is briefly shown how the contributions fit into the general enterprise laid out in this introduction and an overview of the contributions is provided.

2 Varieties of Semantic Theories

A quite natural way to characterize semantic theories is to describe them as the kind of theory that is concerned with the (*literal*) meaning of natural language expressions. Although this view cannot be completely mistaken, it may lead to a misconception of what semanticists are actually doing. One may think that

semanticists have a clear idea of what literal meaning really is and that they fully agree on its definition, its ontological and epistemological status, its rôle in actual speech, its cognitive representation, etc. Surprisingly, this is not the case. And, maybe even more surprisingly, there seems to be no evidence that can completely settle these issues.

One common notion of *meanings* identifies them with (contributions to) the *truth conditions* particular natural language expressions, viz. sentences, have. Intuitively, the truth or falsehood of a (declarative) sentence is not absolute, but relative to the *circumstances* that it is taken to describe or that it is evaluated against. Consider the following simple declarative sentence.

- (1) Ede is smiling on September 26th 2014 in Frankfurt.

Whether (1) is true or not, depends on what is the case in the real world, and what Ede is doing there (what properties he has/exemplifies/instantiates/...) while the sentence is uttered. And, given that the sentence negation of (1) in (2) happens to have the opposite, or simply any other, *truth value* under these circumstances, one can conclude that these two sentences differ (among other things) in *meaning*.

- (2) Ede isn't smiling on September 26th 2014 in Frankfurt.

This observation can be expressed in the following conditional, which was first proposed in Cresswell (1982: 69) and has become famous under the label *most certain principle*:

- (3) If two sentences differ in truth value at least under some circumstances, then they do not have the same meaning.

Taking this conditional for granted, one can start to discriminate the (immediate) parts of these sentences, and compare their contributions to the truth conditions of sentences in which they occur in other examples. That is, one starts to identify the meaning of *subsential* expressions as contributions to the meanings of whole sentences, and thereby finds out which contribution to the *meaning* of the whole sentence is to blame for this difference in meaning of the original examples (cf. Zimmermann 2012a). Needless to say, all of this aims at a determination of what the literal meanings of the parts of a sentence are. This is a natural way to carry out a semantic investigation in a *compositional* fashion and it is characteristic for formal semantics. But one has to keep in mind that this method rests on the *identification* of truth conditions with

meanings that is not justified by the conditional in (3), which only states that (contributions to) truth conditions and meanings *covary*, without claiming that they are the same (Zimmermann 2011: 763). Therefore, treating the connection between truth conditions and meanings as a biconditional—as one does, when the identification happens—needs further justification. However, this does not mean that there is no way to justify this additional move. Usually, plausibility considerations are used to accomplish that. What is the important point here is just that this may not be the route every semantic theory has to take. This makes it less surprising that the notion of *meaning* may differ from one semantic theory to the next.

Assigning different meanings to sentences is not the only reason for variation between semantic theories, of course. Another cause may be rooted in the anchoring of semantics in a more general theory of *linguistics*. This perspective is certainly not incompatible with the other view, but it puts more emphasis and constraints on the semantic *interfaces*. For example, semantic theories are constrained by what syntactic theories offer as a structural description of natural language expressions. If there are syntactic arguments in favor of one structure instead of another, then this is the structure that semantic theories have to adjust their rules to. This is what the core business of semantic theories consist in. They assign certain (semantic) objects to lexical expressions and to larger expressions by applying compositional rules to the immediate parts of these larger expressions. Let us call these objects assigned to expressions *semantic values*. Additionally, semantic theories are constrained by the demands posed by the interfaces, for instance, pragmatic theories in the broadest sense of the term. If, for example, pragmatic reasoning needs a certain semantic output to feed its processes like, say, Gricean reasoning, this output should be the result of the semantic calculation along the lines of the syntactic structure of the expressions. Note that not all semantic values have to be relevant at all the interfaces. For instance, if pragmatics solely acted on the semantic values of whole sentences, the values of subsentential expressions would be irrelevant for this interface. Therefore, the former deserve to be qualified as *internal* semantic values, while the latter may be called *external* semantic values (Zimmermann 2006c). Another way to use this distinction is to talk about internal and external *rôles* of semantic values. We use these two notions interchangeably.

That this characterization is on the right track can be seen by looking at an extreme mirror image. A semantic theory without any theory external constraints on its value assignments is vacuous, as triviality proofs for the notion of compositionality show (cf. Zadrozny 1994). Roughly put, if one can freely assign any value to an expression, compositionality issues can be resolved by propos-

ing semantic values that serve no purpose other than solving the problem.¹ Needless to say that this is not a desirable semantic *theory*.

Driven by the interfaces, this view on semantics does not start by asking what meanings are or what meanings intuitively connect to, but considers this to be determined by several other disciplines like pragmatics, logic, ontology, epistemology, discourse theory, and so on. Therefore, what meanings are and how they are used is determined externally, by *interpreting* semantic values. So, we reserve the term *meanings* for the interpretation that the interfaces assign to the (external) semantic values. That is, apart from its core business of capturing the composition of (internal) semantic values, semantic theories have to deliver meanings that fulfill the external rôles as required by the interfaces. In this sense, it takes the notion of *contribution* (which traces back to Frege 1884) seriously. Of course, this is also compatible with semantic theories of the first characterization. The main difference solely lies in the notion of meaning. Under the first characterization, it is just a given, where in the second, it emerges from the various theories that are external but related to semantics. Therefore, it is in order to introduce two notions of semantics here. Semantics *in the narrow sense* is just concerned with the core business of solving compositionality puzzles, whereas semantics *in the broad sense* deals with the interfaces and hence, strictly speaking, engages in a non-semantic enterprise, by doing so. Throughout this article, if used without further qualification, *semantics* refers to the narrow conception.

Understood along the sketched lines, semantic theories can differ in their value assignments without differing in their outputs at the interfaces, that is, in their meanings. To see this more clearly, the next sections look at an example.

3 Equivalence of Semantic Theories

The second characterization of semantic theories sketched in the previous section is taken from Zimmermann 2012b, where it is a crucial part of a definition of *equivalence* between semantic theories. For two semantic theories to be equivalent, they have to agree on what he calls “interpretable semantic values”, viz., external semantic values. Consider the extremely simplified example of a pragmatic theory \mathcal{P}_1 that is only interested in the truth values of whole sentences. Let’s take a look at the value assignments of the three semantic theories

¹ Thanks to Ede Zimmermann (p.c.) for pointing this out.

TABLE 1 *Three different semantic theories*

Theory	\mathcal{T}_1	\mathcal{T}_2	\mathcal{T}_3
Expressions	Values		
<i>Ede</i>	<i>Ede</i>	$\{X: \text{Ede} \in X\}$	<i>Ede</i>
<i>loves</i>	$\{(x, y): (x, y) \in L_w\}$	$\{(x, y): (x, y) \in L_w\}$	$\{\mathfrak{X}: \{x: \{y: (x, y) \in L_w\} \in \mathfrak{X}\}\}$
<i>somebody</i>	$\{X: \text{Per}_w \cap X \neq \emptyset\}$	$\{X: \text{Per}_w \cap X \neq \emptyset\}$	$\{X: \text{Per}_w \cap X \neq \emptyset\}$

\mathcal{T}_1 – \mathcal{T}_3 given in Table 1. Per_w stands for the set of individuals that are *persons* in w , and L_w for the relation between two individuals a, b such that a loves b in w .

According to the value assignments of \mathcal{T}_1 (and some simple combinatorial rules), the calculation of the truth value of a declarative sentence (4) runs as shown in (5). For the sake of the argument, let us ignore tense and aspect.

(4) *Ede loves somebody*

$$\begin{array}{c}
 (5) \quad \llbracket \text{Ede loves somebody} \rrbracket = 1 \text{ iff} \\
 \text{Ede} \in \{x : \{y: \{(x, y): (x, y) \in L_w\} \in \{X: \text{Per}_w \cap X \neq \emptyset\}\} \} \text{ iff} \\
 \text{Per}_w \cap \{y: (\text{Ede}, y) \in L_w\} \neq \emptyset \\
 \begin{array}{ccc}
 \swarrow & & \searrow \\
 \llbracket \text{Ede} \rrbracket = & & \llbracket \text{loves somebody} \rrbracket = \\
 \text{Ede} & & \{x : \{y: \{(x, y) : (x, y) \in L_w\} \in \{X: \text{Per}_w \cap X \neq \emptyset\}\} \} \\
 & & \begin{array}{cc}
 \swarrow & \searrow \\
 \llbracket \text{loves} \rrbracket = & \llbracket \text{somebody} \rrbracket = \\
 \{(x, y) : (x, y) \in L_w\} & \{X: \text{Per}_w \cap X \neq \emptyset\}
 \end{array}
 \end{array}
 \end{array}$$

As is easily seen, the value assignments of \mathcal{T}_2 and $\mathcal{T}_1/\mathcal{T}_3$ (with somewhat different combinatorial rules) boil down to the same result. Since all possibilities agree on the values that are assigned to sentences, these little theories turn out to be equivalent according to the criterion proposed above. Any other semantic value is internal in the sense that it just accounts for the composition, while only the semantic value of the whole sentence has an external rôle.

What this little example shows is that internal values can be chosen on purely internal grounds, for example, to solve compositionality issues as long as the external values are not affected. For a survey of combinatorial puzzles

and strategies of how to solve them, see Zimmermann (2012a). Note that this is the same kind of attitude that semanticists usually adopt in regard to syntax-internal rules. Basically, semantic theories are just interested in the output of syntactic rules, that is, in the (unique) determination of part-whole relations, which in turn serve as (unique) syntactic individuation of natural language expressions. Whether this is achieved via minimalistic rules, transformations, term algebras, or whatever you like, does not matter for semantic purposes. Likewise, as long as pragmatics does not put any demands on the semantic values of, e.g., proper names, they may be rendered as direct referential expressions,² as quantifiers,³ or whatever one needs to account for their combinatorial behavior. This does not change if \mathcal{T}_1 – \mathcal{T}_3 are intensionalized or otherwise modified to yield different semantic values for sentences, in case pragmatics asks for them. As long as pragmatic theories just need to know about the external values of sentences, the equivalence of (adapted versions of) \mathcal{T}_1 – \mathcal{T}_3 holds. See Zimmermann (2012b) for more details.

But let us now consider a pragmatic theory \mathcal{P}_2 that is interested in the values of proper names in addition to truth conditions. That is, \mathcal{P}_2 aims at a theory of reference that treats proper names as rigid designators. The question is whether this enhanced pragmatic theory necessarily leads to the non-equivalence of $\mathcal{T}_1/\mathcal{T}_3$ and \mathcal{T}_2 , since \mathcal{T}_2 assigns a different value to *Ede* than \mathcal{T}_1 and \mathcal{T}_3 . The answer is no. The interpretation of the semantic values does not necessarily reduce to identity mappings, as one might expect from \mathcal{T}_1 and \mathcal{T}_3 . It is possible that this interpretation is more complex in itself. So, for example, \mathcal{P}_2 could take the value that \mathcal{T}_2 assigns to *Ede* and interpret it by taking the sole element of the intersection:

$$(6) \quad \iota x : x \in \bigcap \llbracket Ede \rrbracket = \iota x : x \in \bigcap \{X : Ede \in X\} = \iota x : x \in \{Ede\} = Ede$$

Note that the same argument works for semantic theories that assign quantifiers to definite descriptions in the tradition of Russell (1905) and its type theoretical reconstruction by Montague (1970)⁴ compared to semantic theories that assign the referent directly (cf. Zimmermann 2012c: 630). The moral to be drawn here is that semantic values do not need to match perfectly to ensure equivalence. Matching values are a sufficient, but not a necessary condition for

2 On proper names in general see also Lerner & Zimmermann 1991, Zimmermann 1984, and Zimmermann 2005b.

3 That is, *scopeless quantifiers* in the sense of Zimmermann 1987 and Zimmermann 1993b.

4 See Zimmermann (1991b) and Zimmermann (1996b) for further informations on Montague.

equivalence. For equivalence, meanings have to match. So, there is a bit of leeway between the semantic values on the one hand and meanings on the other.

Applying this view on equivalence of semantic theories, it may well come out that the analysis of indefinite complements of opaque verbs, like e.g. that proposed in Zimmermann (1993a) and Zimmermann (2006b), come out as equivalent. As long as only the values of whole sentences are interpreted by the interfaces. If it turns out that a pragmatic theory is in need not only of the truth-conditional interpretation of the sentence but also of information that is buried more deeply in the sentence, this difference in value assignment may lead to a difference in meanings and therefore to non-equivalence.

Or consider traditional truth-conditional semantics in comparison to dynamic semantic theories. The most common view is that theories of this kind cannot be equivalent, due to the representation of discourse referents in the latter, but not in the former. But, by a slightly different interpretation (see Zimmermann 1999a), it is also possible to render them indistinguishable from a pragmatic point of view. Setting the representation of discourse referents aside, however, it is not a difficult task to read off propositional contents (instead of *updates*, that is, relations between information states) of the semantic values that are assigned to sentences by dynamic treatments.⁵ If this is true, then these theories can, in principle, turn out to be equivalent.

Considerations involving the notion of equivalence carry over to what one may regard as mere technical questions. As it is argued especially in Zimmermann 2011, the choice between a model theoretic approach to semantic interpretation and a possible worlds framework is not a matter of taste (see also Zimmermann 1996a, 1999a). Model theory is “too powerful” for the interpretation of natural language, as it allows variation in all kinds of areas where natural language does not display it, e.g. in the meaning of lexical expressions like *life*.⁶ As one may be accustomed from model theoretic interpretation of predicate logic, non-logical constants vary in meaning relative to the model. This kind of variation is superfluous for the interpretation of natural language. Without going into details too much, intuitively, one has to restrain the power of pure model theoretic interpretation to yield exactly the interpretation possible worlds semantics assigns to natural language expressions. To arrive at a natural interpretation, model theory has to be restricted. Early attempts to restrain model theory in a Montagovian fashion by *meaning postulates* are dis-

5 For more details on the relation between traditional and dynamic frameworks see for example Hamm & Zimmermann (2002).

6 “What is the meaning of *life*?” (Zimmermann 1999a: 539).

cussed by Zimmermann (1983, 1985a, 1993c). He draws the conclusion that this method is highly suspicious, to say the least. Since meaning postulates are no viable alternative, models are firstly restricted to particular *intended models*. That is, only models that contain logical space as it is also used in possible world semantics are taken into consideration. Secondly, *correspondence conditions* are needed, since they allow for a (homomorphic) mapping between real entities and their model theoretic representations. Without these preconditions, model theory allows for an infinitely large family of semantic theories. Some of them may even be equivalent, but in general they are not. And only a few of them can be equivalent to possible world semantics. And even if these conditions are implemented, model theory does not boil down to a possible worlds framework. First, there is still a difference between intended models and logical space. And second, the interpretation of, e.g., noun phrases still varies with models. This is why model theory is not able to capture *sense relations* between expressions, for example, synonymy (Zimmermann 2011: 798). This, of course, has consequences for the semantic values pragmatic theories are interested in. Since model theory fails to account for (7a), it also fails with respect to (7b).

- (7) a. *Woodchuck* and *groundhog* are synonyms.
 b. $\llbracket \text{Ede loves a woodchuck} \rrbracket \leftrightarrow \llbracket \text{Ede loves a groundhog} \rrbracket$

Therefore, the choice between these two general frameworks for interpretation should already be made based on a pragmatic theory. But crucially this must not be confused with other methodological choices. For example, allegedly different formal languages⁷ that were used in Montagovian *indirect* interpretation do not fiddle with the semantic values of expressions at all. In general, the formal language involved as an intermediate step in indirect interpretation (first, translate natural language expressions into a formal language, second, interpret this formal language, that is, map its formulae to the semantic values) is dispensable. So, they are simply not able to do any harm to the semantic values of a theory and therefore cannot be taken into account for the question of equivalence.

Before turning to the more detailed outline of the contributions, let us look a bit closer at an example taken from the linguistic literature. What is shown in the following section is the development of *context theory*. In the course of the development one can see that several different demands are

7 That is, Montague's *intensional logic* and Gallin's *two-sorted type theory*, which were proved to be equivalent in Zimmermann (1989).

fulfilled by a single semantic theory. This is why we take up the example here. Its primary goal consisted in giving a semantic account of indexicals. But as it turned out very soon, the 2-dimensionalism developed to do this allows for the definition of certain other notions like *direct* and *absolute* reference, leading to a more concrete *reference theory*. Another motivation comes from the context theoretic definitions of *a priori truth* and *necessary truth*, which answer a demand on semantic theory raised by Kripke (1972), among others. At first glance, it is not obvious that notions like these are related to the semantic values of indexical expressions such as *I*, but the concrete shape of context theory seems to be suited for answering these additional demands as well.

4 Context Dependency

In many overviews of pragmatics one still finds a canonical chapter on indexicals (and other kinds of context dependency). Since the seminal work carried out by David Kaplan—which began circulating in the 1960s but was printed as the definite version in 1989—the notion of context dependency has become one of the biggest chunks of linguistically relevant aspects that has been brought into formal semantics back from the pragmatic wastebasket.⁸

The basic motivation for this semantic reclaim of context dependency comes from the insight that, even if some linguistic expressions, like indexicals and demonstratives, are inherently context dependent, they nevertheless are governed by conventional linguistic rules, and not by the rational considerations and conversational inferences that can be considered as the hallmark of (Gricean-)pragmatics. That is, while the extension of the first person indexical *I* depends on the utterance context, the way in which one comes from the utterance context to the extension is governed by a conventional linguistic rule: the extension of *I* is always the speaker in that utterance context.⁹ Similar rules can easily be stated for other indexicals.

8 Still the best introduction and overview over this topic is, of course, Zimmermann (1991a), followed by a more recent version Zimmermann (2012b), which is accessible for non-German speakers as well. For a different but related case in which it is not obvious how to categorize the phenomenon see for example Zimmermann (1997).

9 Direct quotation and other forms of mention are obvious exceptions for which this rule does not apply.

- (8) a. $\llbracket I \rrbracket(c) = \text{SPEAKER}(c)$
 b. $\llbracket \textit{you} \rrbracket(c) = \text{ADDRESSEE}(c)$
 c. $\llbracket \textit{here} \rrbracket(c) = \text{PLACE}(c)$
 d. $\llbracket \textit{now} \rrbracket(c) = \text{TIME}(c)$

Prima facie, this context dependency is very similar to the way in which the extension of sortal nouns like, say, *penguin* (the set of penguins), definite descriptions like *the Professor of Semantics at the University of Frankfurt* (the unique individual that is the semantics professor at the University of Frankfurt), or sentences like *Ede is laughing* (a truth value) is dependent on the situation in which that expression is evaluated. When uttered, e.g., on September 26, 2014 in the actual world, these expressions receive the following extensions.

- (9) a. $\llbracket \textit{penguin} \rrbracket(w) = \{x : x \text{ is a penguin in } w\}$
 b. $\llbracket \textit{the Professor of Semantics at the University of Frankfurt} \rrbracket(w) = \textit{Ede Zimmermann}$
 c. $\llbracket \textit{Ede is laughing} \rrbracket(w) = 1$

Despite this parallelism between the situation dependency of the extension of such expressions with the situation dependency of indexicals, the major result of Kaplan's investigation is that they should not be treated on a par. The main observation supporting this observation concerns the behavior of indexicals in intensional contexts. If they were treated on a par with, e.g., definite descriptions, then their world argument should get bound in these contexts. This means that *today* and something like *the day this sentence is uttered* should behave in the same way, contrary to fact:

- (10) a. Ede thinks that today is his birthday.
 b. Ede thinks that the day this sentence is uttered is his birthday.

Therefore, even though the extensions of indexicals and other expressions are dependent, they do not depend on the same things. A semantic theory that is just concerned with the core business could stop with this observation and develop a compositional theory. Kaplan does this, too. He concludes that there are two realms of world variables the extension of an expression can be dependent upon. He develops a third semantic value to account for this observation. That is, beside just the extension and the intension, or the *content* as Kaplan calls it, there is also the *character* of an expression. While the content abstracts away from the situation dependency of the extension, it is the character that abstracts away from the context dependency of the content. One can define the

character of an expression as a function from contexts into intensions, while the intension of an expression in turn is a function from worlds (or situations) into extensions.

$$(11) \text{ CHARACTER} \xRightarrow{c} \text{INTENSION} \xRightarrow{w} \text{EXTENSION}$$

That is, the extension of an expression depends on two arguments and in this sense, Kaplan's context theory can be called 2-dimensional. To get the compositional machine running, one needs to single out the combinations of expressions that call for the invocation of a particular internal value. This leads to the definition of *extensional* and *intensional* constructions (cf. Zimmermann 2012b: 2382, 2393). Since back then there did not seem to be a construction that calls forth the character of an expression, no *characterial* constructions were defined. Instead, the famous *ban on monsters* was proposed. Since then, the general opinion has changed due to impressive counterexamples. For an overview, see Zimmermann (2012a) and the references given therein.

Kaplan (1989) is not just concerned with semantics in the narrow sense of the word. Under the impression of Kripke (1972), among others, he notices two other properties of indexicals. The first observation is that indexicals lead to a different kind of triviality than non-indexicals do. First, consider a standard case of a necessarily true utterance.

(12) Every penguin is a bird.

The lexical meanings of *penguin* and *bird* are such that this sentence is true in every situation in which it is uttered. That is, it is true regardless of the specifics of the situation that determine the extension of *penguin* or *bird*. (12) expresses a necessary and a priori truth. Now, consider Kaplan's classic example.

(13) I am here now.

This sentence, too, seems to be trivially true in a sense: whoever utters (13) is obviously at the place at which the utterance is made at the time that it is made. If (13) is uttered by, say, Ede on September 26, 2014 in Frankfurt—let's call this context c_e for further reference—the utterance trivially comes out as true, because the extensions that the indexicals receive in that context (Ede, Frankfurt, 2014-09-26) make the entire sentence true.

The crucial observation, however, is that this kind of triviality is not the same as the one induced by (12). While an utterance of (13) is also a priori true in

every context in which it is uttered—the meaning of the words alone ensures that—it is not a necessary truth. This can easily be seen by the fact that even in c_e , the following utterance is intuitively also true, because it is not necessary that Ede is in Frankfurt on that given date of utterance.

(14) It is not necessary that I am here now. I could be in Paris.

That is, for every context, (13) is (*a priori*) true in that context, but it is not necessarily true once uttered in that context.¹⁰

The distinction between character and intension/content can explain the two kinds of trivialities. The character of (13) can be paraphrased as follows.

(15) $\llbracket I \text{ am here now} \rrbracket = \lambda c \lambda w. \text{SPEAKER}(c) \text{ is in PLACE}(c) \text{ on TIME}(c) \text{ in } w$

Applied to the context c_e as given above this character yields the following intension.

(16) $\llbracket I \text{ am here now} \rrbracket(c_e) = \lambda w. \text{Ede is in Frankfurt on Sep 26, 2014 in } w$

It is obvious that this content is not necessary true since it may yield different truth values for different world arguments. But in which sense is the character of *I am here now* given in (15) trivial? Recall what was said above: for every context, (13) is true *in that context*; just because for every context, its speaker is at its place at its time. Technically, this means that the character in (15) is such that for every context, it delivers a content that is true if it is applied to the world of that context; that is, if the context does not only act as the argument for the character but also for the content.¹¹ Given the way in which one can visualize the 2-dimensionality of the character/content divide, using the context both for the character and the content is called *diagonalization*.

With the differences between character and intension, context and situation in place, it is possible to give a formal definition of the two kinds of trivialities that (12) and (13) give rise to (cf. Zimmermann 2012b: 2369).

10 This is one half of the disentanglement of *a priori* truth from necessity, the other half being provided by examples like *Water is H₂O*, which is, if one follows Kripke in his philosophical analysis, a necessary, but *a posteriori* truth.

11 The details of the exact formulation of this idea depend on whether one assumes that contexts are special kinds of worlds/situation or whether they are parametrized.

- (17) a. A sentence S is necessarily true in a context c iff S is true of every possible situation: $\forall w. \llbracket S \rrbracket^{c,w} = 1$.
 b. A sentence S is *a priori* true iff for every context, S is true of c in c : $\forall c. \llbracket S \rrbracket^{c,c} = 1$.

In our terminology, this amounts to answering external demands of an interface that, for the lack of a better term, may be called (modal) *logic* or *epistemology*. For compositionality, the definitions in (17) are not needed. This does not mean that characters have to play an external role. The definitions separate different sets of worlds at which sentences are true (logical space and the subset of contexts therein). So, the interface does not need to look at the characters of the expressions involved, but just at the truth conditions. Therefore, the external values remain the same. But they are used in a different way.

Kaplan's second observation quite naturally leads to a theory of reference. Indexicals do not depend on the evaluation situation; their reference is directly fixed by the context. That is, their content is a constant function. For most non-indexical expressions, the opposite is true. The utterance context does not play a rôle so their character can be thought of as being a constant function, while their content is a non-constant function. Expressions of the former kind are called *direct*, while expressions of the latter are *absolute* (Zimmermann 2012b: 2372).

- (18) a. An expression α is direct iff $\llbracket \alpha \rrbracket(c)(w) = \llbracket \alpha \rrbracket(c)(w')$, for any context c and worlds w and w' .
 b. An expression α is absolute iff $\llbracket \alpha \rrbracket(c)(w) = \alpha(c')(w)$, for any contexts c and c' and world w .

There are also expressions that are both direct and absolute, like, arguably, proper names, whose extensions therefore do not depend on context nor evaluation situation. Finally, there are expressions that are neither direct nor absolute, as they are dependent on both the utterance context and the situation. This is true of many complex expressions that involve indexicals like the following example.

- (19) Ede and I saw a penguin today.

However, the majority of lexical expressions only depends on one of the two dimensions. Zimmermann (1991a: 164) even puts forward the appealing hypothesis (L), according to which lexical expressions are either direct or absolute. If

this hypothesis were true, the semantic values of all lexical expressions would depend on one intensional argument only, and the difference between deictic and absolute expressions would boil down to just which of the two parameters the expression accepts as an argument. While raising the possibility of (L), Zimmermann also is sceptical of the empirical truth of that hypothesis. And indeed, in later work, Zimmermann (1995, 2004a,b), he discusses some counterexamples like the first person *possessive* pronoun that arguably depends on both the context and situation.

(20) My penguin is drinking coffee.

The NP *my penguin* in (20) is headed by the possessive first person indexical and hence, its extension depends on the utterance context in order to get the speaker. In addition to that, however, the reference of the NP also depends on the situation. Which penguins stand in the possessive relation to the speaker depends on contingent facts of the evaluation situation. Despite such counterexamples, which are relatively rare and could be explained away by decomposing the first-person feature from the possessive, genitive feature, hypothesis (L) remains an attractive heuristic for the analysis of index/situation dependency.

This, again, answers demands external to semantics in the narrow sense. But unlike the example in Section 3, now characters of certain expressions are involved. To decide whether an expression refers directly, or absolutely, or in both or neither ways, one has to take a look at its character. Therefore, the newly introduced semantic value gets an external interpretation at an interface that may be called *reference theory*. Note again that this is not necessary if one is just interested in compositionality. Of course, since indexicals necessitate a new semantic value by displaying a different kind of dependency, and since this new value has to be spread over to other expressions as well, at least due to technical reasons, every expression gets assigned a character. But this is justified by the overall compositional procedure alone. Adapting the values of other expressions to fit in well with indexicals is not the same as interpreting these values. Kaplan's classical paper therefore turns out to be engaged in semantics in the broad sense of the term.

5 *Realistic Semantic Theories and Their Goals*

Doing semantics in the broad sense of the term amounts to engaging in at least three quite different tasks as the discussion so far suggests:

- (21) a. Getting the composition of semantic values right (the ‘core business’).
 b. Finding out which semantic values have to have an external rôle.
 c. Getting the interpretation of external semantic values right.

That composition (21a) is part of a semantic theory is hardly controversial. In this volume, especially **Manfred Kupffer**, **Mats Rooth** and **Paul Dekker** investigate problems of compositionality. In “Does Context Change?”, Kupffer investigates the phenomenon that different syntactic occurrences of one and the same (pure) indexical in an utterance may refer to different objects even though there is no change of context. He develops the notion of occurrence-dependence which accounts for this behavior. He discusses two frameworks: token-reflexive semantics and occurrence-interpretation and discusses assumptions for their equivalence. Rooth’s “Operators for Definition by Paraphrase” focuses on the equivalence of the semantic value of a sentence and its paraphrase and investigates two methods of deriving the equivalences compositionally: syntactic scoping and type-raising. The method of type-raising predicts the derivation of constructions with intensional operators that take sentential as well as nominal arguments using silent modification by type-shifters. Dekker takes the contextualist findings to heart in “The Live Principle of Compositionality” and develops a new Principle of Compositionality which combines speaker-dependent meanings (live meanings). Live Meanings are assigned to expressions by the interlocutors as they talk. The result of the enterprise is a new prospective on inferencing. Dekker’s contribution shows very well that it is not easy to tear apart the different tasks.

The distinction between internal and external rôles of semantic values, the task set out in (21b), cannot be made considering semantic theories in isolation. This is because this distinction is dependent on concrete conceptions of pragmatic theories or other interfaces. Semantic theories that are sensitive to the demands of other disciplines in the sense that they try to restrict themselves to semantic values that are useful at the interfaces can be called *realistic*. That is, realistic semantic theories allow for the interpretation of certain values by other disciplines. Or, to put it differently, realistic semantic theories are aware of the fact that at least some of their semantic values have to fulfill other, external rôles. The question is which semantic values are needed to account for phenomena other disciplines are trying to explain.

This task also is quite commonly dealt with in semantic theories in the broad sense. For example, if attitude verbs are taken into consideration, semantic theories seldom are satisfied with proposing a relation between individuals and propositions as their semantic value. What is aimed at is a more thorough understanding of attitudes, relations among them and inferences between

them. In other words, what is aimed at is an epistemic (or deontic) logic if not a theory of epistemology.¹² In this volume, the contributions by **Ivano Ciardelli**, **Jeroen Groenendijk**, and **Floris Roelofsen**, by **Graeme Forbes** and by **Kjell-Johan Sæbø** can be grouped under this heading, even though this task only partly characterizes the scope of their papers. Sæbø takes up the partly semantic, partly ontological question *what it takes to be missing*. In his “*Do You Know What it Means to Miss New Orleans? More on Missing*”, he elaborates on Zimmermann’s (2010) proposal to analyze the argument of *missing* as an individual concept and brings up a realm of interesting examples that corroborate this idea.

Ciardelli et al. elaborate on their theory called inquisitive semantics in “Information, Issues, and Attention” and present a case study of the modal epistemic *might* taking up results of Zimmermann. The result is that a proper account of the free choice effect motivates a third kind of information (besides regular truth-conditional content and so-called inquisitive content): attentive content. This kind of content helps selecting between the proposed ways of updating the common ground.

This paper also serves as another example for a semantic theory that may or may not turn out to be equivalent to more classical semantic frameworks. Inquisitive semantics assigns question denotations even to declarative sentences instead of propositions. Whether this ultimately leads to non-equivalence is, of course, dependent on a concrete conception of the interfaces.

Forbes is concerned with the free choice effect as well. He proposes a purely semantic account for the apparent conjunctive interpretation of disjunctive *or* in comparative clauses with *than*. The basic idea of “A Truth-conditional Account of Free-choice Disjunction” is to interpret the comparative clause as a universally quantified identity statement. This method of interpretation is applied to disjunction in modal contexts, as well.

There are other factors that can be involved to constrain the choice between different semantic values, such as the invocation of distinctions like necessary vs. a priori truth, as is shown in more detail above in Section 4. Other constraints may stem from (other) logical, ontological or metaphysical considerations. In “Being Tolerant about Identity?”, **Robert van Rooij** investigates the connections between semantics and ontology. He starts out from the famous problem of identity statements in modal contexts by observing an asymmetry between the treatment of (referring) expressions on the one hand and the

12 For examples of this kind of study consult, among many others, Zimmermann (1999c, 2000, 2005a, and 2006a).

(referred) entities on the other. Usually the former is covered by the principle of substitution which is said not to apply in modal constructions while the latter is covered by Leibniz's law which is upheld even in the view of counterexamples. To resolve this tension, van Rooij argues for Tolerance Logic that deals with vague objects.

Philippe Schlenker's contribution "The Property Paradox in (not so plain) English" looks at property-talk in natural language and concludes that it allows for the formulation of paradoxes. Based on his observation, he claims that paradoxes should be modeled in semantic theories. In showing that there is a general way in which natural language paradoxes involving properties can be obtained, he shows that paradoxes are a phenomenon conceivable not just in formal but also in natural languages. Thereby, he makes a strong case for the choice of a trivalent logic as part of semantic theorizing.

One example that immediately comes to mind when concrete cases of the task set out in (21c) are asked for, is Gricean pragmatics. The hallmark of this enterprise is the interpretation of propositions in context. The starting point of the processes that are called *Gricean reasoning* are propositions, that is, the values of whole sentences handed over by semantic theories. But the investigation can turn in other directions as well.

In "On the Meaning of Fictional Texts", **Matthias Bauer and Sigrid Beck** are concerned with the difference between the subjective understanding of the meaning of a literary text and notions of meaning in truth-conditional semantics. The interesting point here is to predict why readers of a literary text may agree on its meaning. The authors locate the apparent "objectivity" of literary meaning in an assert operation that is derived from the assert operation used in speech act theory.

This contribution executes exactly what is asked for by (21c). The authors consider a special environment of natural language expressions, literary texts, and lay out the mechanisms applied to semantic values in these contexts, that lead to a somewhat non-standard interpretation.

Regine Eckardt investigates vocative expressions that usually serve to identify the addressee of an utterance. Especially interesting is the case of free indirect speech (third person narration with elements of first person speech) used in literary texts. *Dear Ede!* "Semantics and Pragmatics of Vocatives" presents an analysis of vocatives that predicts them not to occur in free indirect speech because these contexts lack the subjective contextual factors that are a necessary meaning component of the vocative.

In "Notes on Disagreement", **Markus Kracht and Udo Klein** investigate disagreement in every-day speech. They locate the disagreement in the variable use of word meanings dependent on the speaker that uses the word. So the

debate is more a debate about meaning of the words than about the state-of-affairs if faultless disagreement arises. They show that this is a major source of complication when talking to each other.

In addition, the linguistic context (or common ground) in which a sentence is used may affect its interpretation. This fact is well known from the investigation of anaphoric pronominal elements other than indexicals and the effects of focus on information packaging. Old information is anaphoric to a discourse question. New information answers such a possibly latent question under discussion.

Malte Zimmermann takes a closer look at embedded foci elaborating on the theory of *question under discussion*¹³ and draws a connection to *wh*-scope-marking constructions. The idea of “*Was glaubt EDE, wer der Mörder ist?* On D-trees, Embedded Foci, and Indirect Scope Marking” is that the *wh*-scope-marking construction grammaticalizes part of a pattern of two questions where one question is a subquestion of the other. Analogously, embedded foci are licensed if there is a question denotation in the discourse that is related to a subquestion asking for the embedded focus. The paper shows that the structure of the discourse has an impact on the nesting of new information.

In the last paper of this volume, “A New Type of Informative Tautology: *Für Unbefugte Betreten Verboten!*”, **Manfred Krifka** issues a compact study of a new kind of tautology the meaning of which has to be found beyond its trivial truth-conditional content and hence also involves the re-interpretation of the semantic values at the interface.

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13 On the semantics of questions and answers see, among others, von Stechow & Zimmermann (1984), Zimmermann (1985b), Bäuerle & Zimmermann (1991), and Plunze & Zimmermann (2006).

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PART 1

Composition



Does Context Change?*

Manfred Kupffer

1 The Problem

1.1 *Kaplanian Semantics and Occurrence Dependence*

Semantics deals both with utterances and expressions. On the one hand, if a theory does not tell us how to interpret utterances of English it is simply no semantics of English. On the other hand, meanings are meanings of expressions, i.e. of words and constructions made out of words. If we want to define the meaning of an expression, we have to take into account that *content sometimes varies with the utterance*. Take, e.g., the indexical “I”. A sentence like

(1) I am Fritz.

has different contents, depending on who utters it. If uttered by Fritz (1) expresses a proposition that could not possibly be false. If uttered by someone else, it expresses a proposition that could not possibly be true.

In order to capture the variability of content, David Kaplan has proposed to explicate meaning by the technical notion of *character*, see Kaplan (1989b). First every utterance uniquely determines a *context*. This notion aims at capturing the circumstances surrounding the utterance, e.g. it determines a distinguished individual, roughly who plays what may be called the speaker-role. Then characters are defined as functions from contexts to contents. E.g., the character of “I” is a function which maps every context on the distinguished individual of the context.

In the following, I will reserve the term “Kaplanian semantics” for a semantics with the following traits.¹

* I am indebted to many people. The seminal paper on occurrence-interpretation was written by Arnim von Stechow, my teacher in semantics. The main idea of the equivalence proof in this paper has been taken from an unpublished manuscript of Ede’s, only the ontological twist to that idea is mine. It never occurred to me that his permission to use that idea in a paper of my own might include an obligation to get the idea published. I am very grateful to the editors of this volume that they helped me to finally fulfill the obligation. The paper has benefitted from discussions with Ede and Ulli Haas-Spohn and comments by Ulf Friedrichsdorf, Michael Hand, Wolfgang Spohn, and Philippe Schlenker.

1 These traits are characteristic of the semantics in Kaplan (1989b). For an excellent survey of Kaplanian semantics, see Zimmermann (1991).

1. Meanings are assigned to expressions.
2. Contexts are determined by utterances.
3. Meanings are characters, functions from contexts into contents.
4. The content of a complex expression in a context c is a function of the contents of its constituent expressions in the same context c .²

Kaplanian semantics is able to deal with cases where the content of different occurrences of an expression varies between different utterances. Simply assume that context has changed! E.g. if “I” refers differently in u from how it refers in u' , then we can safely suppose that the contexts c and c' determined by u and u' , resp., differ in their distinguished individual.

Kaplanian semantics is unable to deal with cases where the content of different occurrences of an expression varies within one and the same utterance. 1. implies that different syntactic occurrences of the same expression have the same meaning. With 3. every such occurrence receives the same character, and hence, within one and the same context, the same content. 4. implies that context never changes during the evaluation of a complex expression. Therefore, multiple occurrences of the same expression in the same utterance always agree in content. And this means that Kaplanian semantics is unable to deal with what I will call *occurrence dependence* (*OD*). An utterance u exhibits *OD*, I will say, if and only if it contains (utterances of) different occurrences of the same expression which differ in content.

There has been a wealth of examples in the literature that purport to show that there is *OD*. While I think that many of the examples are mistaken, in the remainder of this section I will argue that there are, indeed, cases of *OD*. But then, Kaplanian semantics is in need of revision.³ In this paper I will compare two alternatives to classical Kaplanian semantics. The first is tokenreflexive semantics, see García-Carpintero (1998); Kratzer (1978); Perry (1997); Reichenbach (1947), the second is occurrence-interpretation, Kupffer (2001); von Stechow (1979). These two frameworks incorporate the prototypical ways

2 At least for so-called intensional constructions. But all constructions we will be dealing with are intensional. (A complex expression is intensional iff it has the property that its content only depends on the contents of the subexpressions, not on the characters of the subexpressions. If an expression is not intensional it is called a monster. Kaplan thinks that there are no monsters).

3 Both Braun (1996) and García-Carpintero (1998) agree that Kaplan's way to explain away *prima facie* cases of *OD* involving demonstratives leaves something to be desired, and that therefore Kaplanian semantics is in need of revision. Their line of argument is different from the one I discuss here.

to react to the the shortcomings of Kaplanian semantics. Tokenreflexive semantics revises 4. above (by letting context change);⁴ occurrence-interpretation retains 4. and revises 3. (by making content dependent on occurrences).⁵

1.2 *The Data*

1.2.1 Demonstratives

That there is *OD* seems to be easy to establish. Suppose sentence (2) below is used in a situation where there are two different pointings associated with the two occurrences of “that” which point at different spots, suppose e.g. the speaker points at two different photographs of the same planet, Venus.

(2) That is the same planet as that.

It seems that in such an utterance, the first occurrence of “that” refers to a different thing than the second, hence that there is *OD*. This conclusion is based on two assumptions. (i) “that” alone is the bearer of demonstrative reference, and (ii) the two occurrences of “that” in (2) are really occurrences of one and the same expression. These presuppositions might seem inevitable on first sight. At least (i) and (ii) are parts of a straightforward analysis of the case; let this be called the simple analysis of demonstratives. According to the simple analysis demonstratives are neither multiply ambiguous, nor do they contain elements invisible in print.

Now there are two influential theories, both by David Kaplan, which deny either (i) or (ii). This is directly relevant to our question. If, e.g., the two occurrences of “that” are not occurrences of one and the same expression, then (2) does not exhibit *OD*. And if, on the other hand, it is not “that” alone that refers, but rather “that” plus some hidden element, then it depends on the individuation of that hidden element whether what really bears demonstrative reference in this case, occurs twice in sentences like (2) at all. Therefore I will first examine Kaplan’s views on the individuation of the bearers of demonstrative reference, and whether they can be used to argue against the existence of *OD*.

1.2.2 Kaplan on the Individuation of Demonstratives

Let’s first take the Indexical Theory, discussed in Kaplan (1989b). It is also the sole theory advanced in Kaplan (1989a). According to that theory, we should replace (2) for the purpose of interpretation with a suitably indexed version, e.g. with

4 Compare also the Context Shift Theory (Braun 1996).

5 For an overview of various alternative to classical Kaplanian semantics, see Predelli (2012).

- (3) That₁ is the same planet as that₂.

Given this theory, demonstratives need to be indexed in order to be interpretable. Context contains an indexed sequence of demonstrata, and the index at a demonstrative indicates which demonstratum of the context it refers to. It is not claimed that speakers actually produce the like of (3). They utter (2). Then (2) is, for the purposes of interpretation, translated into a disambiguated language (see Montague 1970), i.e. a language, in which distinctions in type are always reflected by distinctions in form: no two words with different meanings ever look the same. So, if we use (3) for the purpose of interpretation, it is implicitly claimed that “that” is ambiguous, and that the two “that”s in (2) are not occurrences of one and the same expression. What is the source of the ambiguity? In Kaplan (1989b) the indices attached to the demonstratives simply reflect the order of occurrence of the demonstratives.⁶ In Kaplan (1989a), on the other hand, the source of the ambiguity is a difference in directing intention. Whether two utterances of a demonstrative form are utterances of one and the same word depends on whether they are used with the same directing intention.⁷

However the Indexical Theory is understood precisely, as an ambiguity theory it seems to be misguided. This has been pointed out by Manuel García-Carpintero.

It should be clear that, in the most natural understanding of “ambiguity”, there is no ambiguity whatsoever (exotic or otherwise) when two different syntactic occurrences of “that” are involved. An expression-type is ambiguous when it is governed by two independent linguistic conventions; to characterize the conventions as independent entails that a competent user could know one without knowing the other, and vice-versa. This is the case regarding the typical examples of ambiguity, like “bank”, “cat”, and proper names for different people. However, a speaker who can understand the first but not the second syntactic occurrence of “that” in our stock examples is not a competent user.

GARCÍA-CARPINTERO 1998: 553

6 “We then attach subscripts to our demonstratives and regard the n-th demonstrative, when set in a context, as rigid designator of the n-th demonstratum of the context.” (Kaplan 1989b: 528).

7 Directing intentions are discussed in more detail in Bach (1992a,b) and Reimer (1991a,b).

Let us now turn to the other Kaplanian theory, “the Corrected Fregean Theory” of Kaplan (1989b). According to this theory, it is not the demonstrative alone that refers, but rather a syntactic compound consisting of demonstrative cum demonstration, where a demonstration is a Fregean manner of presentation: “typically, though not invariably, a (visual) presentation of a local object discriminated by a pointing” (Kaplan 1989b: 490). According to that theory, the attached demonstration is also used to determine the referent for every context of use. Then, (2) is only an incomplete rendering of the real sentence. In order to know which sentence has been uttered, we also need to know which demonstrations accompany the two occurrences of the demonstrative. If the accompanying demonstrations differ, then the bearers of reference will also differ, and there will be no *OD*, even if the *demonstrata* (the things demonstrated) differ. This seems to be the case with (2), which should be rendered in the form of (4) below, accordingly.

- (4) That[δ] is the same planet as that[δ'],
(let δ and δ' be two different demonstrations).

Demonstratives cum demonstrations are called *complete demonstratives* by Kaplan. Now the following question arises: Can a complete demonstrative like “that[δ]” exhibit *OD*? This is indeed the case. First, manners of presentation are multiply realisable, consequently Kaplan himself concedes that “[a] given demonstration might [...] be repeated in the same or a different place” (Kaplan 1989b: 525). Therefore nothing bars the same demonstration from occurring twice within the same *sentence*. But, second, a manner of presentation is not necessarily tied to the object it in fact presents. A manner of presentation may fail to present a particular object, in case of a hallucination. Even if there is a object presented that may vary with world, location of the agent, and with the time of the presentation. Now in a normal utterance of

- (5) That[δ] is the same planet as that[δ],

the two occurrences of “that[δ]” will be uttered at slightly different times. And this is why they may refer differently.⁸ Suppose e.g. that you utter (2) and point twice in exactly the same direction during the two utterances of “that”. The first

8 The following example is inspired by one Lalor (1997) uses to argue that the Corrected Fregean Theory is committed to the existence of *OD*. Braun (1996), who wants to deny the existence of *OD*, considers only the very special case of an utterance where the same demonstration token is associated with the two occurrences of the demonstrative (imagine, e.g., the speaker

pointing points at the planet Venus, but while you blink in mid-sentence, an evil demon exchanges the locations of Venus and Mars. Then the second pointing will point at Mars. Suppose further that Mars at the former place of Venus appears exactly to you, as Venus did. Then, the demonstrations connected with the first and with the second use of “that” will coincide, and the utterance will be, according to the Corrected Fregean Theory, an utterance of (5). Intuitively, the first occurrence of whatever bears the demonstrative reference here refers to Venus, while the second occurrence refers to Mars. Therefore, the utterance in question exhibits *OD* even if demonstrative reference is analysed in terms of Kaplan’s Corrected Fregean Theory.⁹ I have no reason to take issue with this theory, so far. Nevertheless, in my formal treatment of “that”, I will stick to the simple analysis, presented in the introductory remarks to this section. I will do so because it is the simpler theory, and, unlike Kaplan, I am not forced to look for an alternative.

The very same comments would apply, *mutatis mutandis*, to a variant of the Corrected Fregean Theory, according to which the complete demonstrative consists of the demonstrative expression and a pointing gesture.

Summing up, Kaplanian views on the individuation of demonstratives present no challenge to the claim that there is *OD* connected with demonstratives. The Indexical Theory is incorrect, because it posits spurious ambiguities, the Corrected Fregean Theory, on the other hand, does not deny that there is *OD*.

1.2.3 Indexicals and *OD*

Many purported examples of *OD* in the literature involve indexicals. Kaplan himself gives the following example: “If we speak slowly enough (or start just before midnight), a repetition of “today” will refer to a different day” (Kaplan 1989a: 587). The following examples all are at least variations of examples taken from the literature.

(6) The men shoot NOW,¹⁰ NOW, and NOW.¹¹

simply does not lower his arm again after the first utterance of “that”). Presented with such an utterance at least I would feel that for the second “that”, a second demonstration token is missing (or that the second “that” is not used demonstratively). Anyway, the case cannot be used to argue against *OD*, precisely because it is so special.

9 It is another question whether this conclusion is borne out by Kaplan’s own formal treatment of the Corrected Fregean theory in terms of the “dthat”-operator. (It is not.)

10 Here, and in the following, upper-case is used to mark stress.

11 “Don’t shoot NOW, but NOW, NOW and NOW!” (Levinson 1983: 95) (An officer gives his men the order to make at the indicated moments.)

- (7) HERE it is louder than HERE.¹²
- (8) ICH bringe Weihrauch, ICH Myrrhe, und ICH Gold.
(I bring incense, I myrrh, and I gold.)¹³

I do not think that examples like these really show that there is *OD* outside the realm of demonstratives. The reason is that they all may still be considered as cases of *demonstrative use*. They all involve stressed indexicals; stress often has the function to mark a demonstration.¹⁴ The kind of demonstration involved here may be described as pointing to the *origo*, i.e. pointing to the very speaker, place, or time of the respective utterance. Such pointings are easily overlooked, because they go without extending the arm. The only detectable action in addition to the utterance itself is the stress on the utterance.¹⁵ While all three examples are uttered without any detectable action in addition to the stress pattern, we could imagine them to be uttered with precisely the same stress pattern and some action in addition. This could be taken

12 Lutzeier, (1974); in the example, the speaker changes the room during the utterance.

13 It is not easy to come up with convincing examples of occurrence-dependent first-person pronouns. Kratzer (1978) discusses “Ich komme vom Norden her.” “Und ich vom Süden.” “Und ich vom Meer.” (“I come from the north.” “And I from the south.” “And I from the sea.”) This is a piece of Fontane’s poem “Die Brücke am Tay”. Obviously, the three occurrences of “I” refer differently; Kratzer also thinks that it is a case of a single utterance. But given the situation described by the poem (three witches convene), it seems to be much more plausible that we are in the presence of three different utterances. Utterances are (partly) individuated by communicative intentions, and it is not easy to imagine a situation in which the communicative intentions of several speakers agree. At least the example does not seem to be such a case. This problem can be avoided by turning to multi-speaker utterances which have been rehearsed before, e.g. in the case of (8). In such a case, I think, it is less contrainuitive to assume that different consecutive speakers produce a single utterance.

14 Not every stressed occurrence of an indexical marks demonstrative use, though—e.g. it could be a simple focus accent.

15 There has been some disagreement in the literature whether pointings play any part in the determination of the referent of a demonstrative. While Kaplan (1978, 1989b) and Reimer (1991a,b) defend this view it is opposed in Kaplan (1989a) and in Bach (1992a,b). According to the latter view, demonstrative intentions replace pointings. García-Carpintero achieves a synthesis. While he maintains that demonstrations determine referents, he takes “demonstrations to be sets of deictical intentions manifested in features of the context of utterance available as such to any competent user” (García-Carpintero 1998: 537). However, the presence of a pointing is still the best indication that we are in the presence of a demonstrative use.

to corroborate our analysis of the original examples as cases of a very reduced form of demonstration. E.g. a person who utters (6) could accompany her utterance by repeatedly raising her finger at the relevant moments.

Observe that stress is vital, here. E.g., if stripped of stress, (7) appears to be contradictory. Similar things hold for other examples of indexical *OD*, as well. E.g., even if Kaplan's speaker had uttered the second "today" after midnight, and the first one before, his utterance of, say, "Today is before today" would be very peculiar, in contradistinction to an utterance of "TODAY is before TODAY". To my mind, the first utterance would not even express a proposition, while the second would be perfectly acceptable and even true. And while "NOW is before NOW" seems to be true to me, "now is before now" sounds contradictory.

Demonstrative use also leads to differences in logic, witness the following example.

(9) Now Berta is alive, therefore now Berta is alive.

(10) NOW Berta is alive, therefore NOW Berta is alive

Prima facie, (9) is a clear example of a valid argument. The second argument, on the other hand, admits of utterances where the premise is true, but the conclusion is false (only suppose Berta is shot in mid-sentence). Hence, such an utterance would itself provide a clear counterexample to the claim that (10) is logically valid. If the first argument were uttered in the same kind of situation, no such counterexample would be forthcoming. These observations seem to suggest that occurrence dependence only affects indexicals when used demonstratively.¹⁶

In order to account for the differences between demonstrative use and non-demonstrative use of indexicals, I would posit an ambiguity.¹⁷ If I am right, then the above examples of *OD* with indexicals may be still classified as examples involving demonstratives.

16 But: "If the present occurrence of a subject noun phrase is too complicated, then the present occurrence of a subject noun phrase is too complicated too" (Philippe Schlenker, *pc.*).

17 Already Kaplan treats demonstrative and anaphoric uses of "ordinary" pronouns as instances of two different words. While Braun (1996: 170, fn. 9) objects, it seems to be legitimate to posit an ambiguity, because demonstrative uses of pronouns seem to be guided by a different linguistic convention.

2 Two Solutions

2.1 *Tokenreflexive Semantics*

Tokenreflexive semantics relates to Kaplanian semantics in the following way. While characters of expressions are still functions from contexts to content, context is allowed to change during evaluation.¹⁸ How? The main idea is:

*Let the context of α be the relevant utterance of α .*¹⁹

If we want to evaluate a sentence S in a context c , then, for the contexts of S 's constituent expressions, we have to look for their utterances in c .

So context changes during evaluation. The change of context follows the *syntax of utterances*: If you want to evaluate a complex expression you will move from the utterance of the complex expression to those *subutterances* of the first utterance which are the utterances of the constituent expressions.

Consider, e.g., the semantics of function application. As indicated above, we will only treat *intensional* expressions.

- (11) **Semantics of function application** Let u be an utterance of $\alpha\beta$. Then $|\alpha\beta|(u) = |\alpha|(u^\alpha)(|\beta|(u^\beta))$, where $u^x :=$ the immediate subutterance of x in u .

This rule also illustrates the costs of tokenreflexive semantics.

First, characters are no longer *total* functions from the set of contexts into the set of contents. Now they are partial. For this kind of definition to work, we have to assume that for every γ , the character of γ is only defined for contexts which are utterances of γ .²⁰ Second, now, every part of an expression that is uttered has to be uttered itself. So utterances of expressions are required to contain parts that are utterances of their constituent expressions. Hence, tokenreflexive semantics requires expression to be visible.²¹

18 *Caveat*: this is not necessarily the way the proponents of the theory like to think of their theory.

19 Perry distinguishes context and utterance, and says that the content of an indexical is determined by utterance and context. When I say "utterance" I mean utterance *plus* context in Perry's sense. And when I say "context", I mean "what plays, in tokenreflexive semantics, the role context plays in Kaplan's theory".

20 This partiality raises philosophical problems about the resultant notion of meaning, see Zimmermann (1997); see my Kupffer (2001) for an attempted solution.

21 In contradistinction to LF-interpretation à la Chomsky (1981).

With the main idea in mind, we can already show how to tackle *OD*. For the following, let $|\alpha|$ denote the character of α . Let's for instance suppose that *that* has the following semantics.

- (12) **Semantics of *that*** For any utterance u of *that* let $|that|(u)$ be the object indicated by the speaker of u while uttering u .

Now, in an utterance of

- (13) *that* = *that*,

the two *thats* are allowed to refer to two different objects because the context of the first *that* is the utterance of the first *that* and the context of the second *that* is the utterance of the second *that* and these two different utterances may be uttered while indicating different objects.

Tokenreflexive semantics is also able to explain why certain other expressions lack *OD*. The following semantics of non-demonstratively used “I” may be representative for a treatment of pure indexicals. Let u^* be the maximal utterance of which u is a part.

- A For any utterance u of *I* let $|I|(u)$ be the speaker of u^* .
- B For any utterance u of *here* let $|here|(u)$ be the place of u^* .
- C For any utterance u of *now* let $|now|(u)$ be the time of u^* .
- D For any utterance u of *today* let $|today|(u)$ be the day of u^* .²²

All these rules define the reference of an utterance of an indexical in terms of a unique entity related to the utterance. What if there is no such entity? If there is, for instance, no unique day, because the utterance begins slightly before, and ends slightly after midnight? In such a case the reference of the indexical is undefined.²³ This may help to explain, in terms of a presupposition failure, why an utterance of “Today is before today” (without additional stress or any other kind of demonstrative action) with the first “today” uttered before, and the second after midnight, does not even seem to express a proposition. These

22 In Kratzer (1978) it is argued that instead of considering the place and time of the utterance we should rather take what *counts* as the time and place of the utterance; for a similar view wrt. Kaplanian contexts, see Predelli (1998).

23 Technically, this requires a trivalent semantics, a complication I will ignore in the following.

rules are also able to explain why stripped of stress, (7) is contradictory, and “Now is before now” likewise.

2.2 Occurrence-Interpretation

Occurrence-interpretation departs from Kaplanian semantics in the opposite way: While contexts do not change, now the meaning of an expression may distinguish different occurrences of the expression within the same context. I.e., the meaning $\llbracket \alpha \rrbracket$ of an expression α is now a function from occurrence-context pairs to contents.

Thus contexts should be able to distinguish different occurrences of α within the same context, such that $\llbracket \alpha \rrbracket(o, c)$ and $\llbracket \alpha \rrbracket(o', c)$ are allowed to differ if $o \neq o'$. Which notion of context is able to manage this? (This is not a mathematical question. Of course, formally $\llbracket \alpha \rrbracket$ is able to distinguish (o, c) and (o', c) , simply because $o \neq o'$. But there is still the question about how to make sense of the difference.) The answer to that question is, again, to require contexts to contain (in some sense) different utterances of the occurrences in question. Consequently, in von Stechow (1979) it is assumed that, for every α , if o is an occurrence of α in some expression β , then $\llbracket \alpha \rrbracket(o, c)$ is only defined for contexts c in which β is uttered. Such contexts can again be conceived of as utterances of β itself, and as such they are guaranteed to contain an utterance of o . The price of this assumption is, again, that occurrence-interpretation requires expressions to be visible.

The treatment of OD, given the above assumption, may be illustrated by the following semantics of “that”. We will say that o occurs in a context c if c contains an utterance of o .

- (14) **Semantics of *that*** For any occurrence o of *that* and context c in which o occurs, $\llbracket that \rrbracket(o, c) :=$ the object indicated by the speaker of o in c while uttering o in c .

This still allows for OD. E.g. let o be the first and o' be the second occurrence of *that* in (13) *that* = *that*. (13) expresses the proposition that $\llbracket that \rrbracket(o, c) = \llbracket that \rrbracket(o', c)$. This proposition is predicted to be informative, as it should, because $\llbracket that \rrbracket(o, c)$ and $\llbracket that \rrbracket(o', c)$ may differ because the speaker may indicate different objects while uttering o and o' , resp.

So, while context stays constant, occurrences change during evaluation. The change of occurrences follows the *syntax of occurrences*: If you want to evaluate a complex expression you will move from the occurrence of the complex expression to those *suboccurrences* which are occurrences of the constituent expressions. Consider, e.g., the semantics of function application:

- (15) **Semantics of function application** If o is an occurrence of $\alpha\beta$, then $\llbracket \alpha\beta \rrbracket(o, c) = \llbracket \alpha \rrbracket(o^\alpha, c)(\llbracket \beta \rrbracket(o^\beta, c))$, where o^x is the immediate suboccurrence of x in o .

3 Comparison

The two frameworks appear to be strikingly different: in one of them context changes, while in the other it doesn't. Nevertheless I will show they are equivalent. The two frameworks also bear great resemblance, e.g., we require both utterances and occurrences to have some kind of syntactical structure. I will explain these similarities.

In order to compare the two frameworks I will first try to connect their primitives. So far we have had a great number of primitives: expressions, utterances, and occurrences. We already proposed to identify *contexts* with utterances. Now I will try to reduce this number even further. The only ontological primitive remaining will be the notion of an utterance.

Most importantly, expressions and occurrences will be reduced to certain sets of utterances.²⁴

3.1 *Metaphysics*

3.1.1 Utterances of Expressions

Speech is the totality of our linguistic actions. These, like any other kind of actions, have parts. Speech actions and their parts have agents, locations and times, and take place in worlds, the same holds for speech actions. I will also assume that speech actions have unique worlds. (This may seem to be controversial. But if your ontology of events admits of the same event being in many worlds, when I say "speech event", simply translate into "speech event/world pair".)

Some speech actions are utterances of meaningful expressions. We discover expressions by analysing speech, and theories of our linguistic activities may

24 This is inspired by Cresswell (1973). The author also takes the notion of an utterance to be his only primitive and then reduces expressions and contexts to constructions from utterances (he does not treat occurrences, though.) There is a superficial difference in the case of contexts, which he identifies with sets of utterances, rather than with utterances simpliciter. (Where Cresswell's contexts represent circumstances of utterances, partially specified, our contexts can be taken to represent circumstances of utterances, totally specified. It is a customary move in possible worlds semantics to factor out partial specifications into sets of total specified entities.)

well differ in what expressions they know. By analysing speech we discover expressions (or even bring them into being), but at the same time we categorize parts of speech as belonging to these expressions, i.e. as being utterances of expressions.

Let U be the set of utterances of expressions of some particular language, say English. By being parts of speech, utterances have a part-whole structure. \sqsubset is the *proper part* relation on U . We say that v is a *part* of u ($v \sqsubseteq u$) iff $v \sqsubset u$ or $v = u$, and that $v \sqsubset Cu$ (u is an immediate constituent of v) iff $v \sqsubset u$ and there is no w such that $v \sqsubset w \sqsubset u$. $\sqsubseteq u$ is the set of parts of u , $\sqsubset u$ is the set of proper parts of u , and ICu the set of immediate constituents of u . Finally, we say that u and v *overlap* iff there is a w , such that $w \sqsubseteq u$ and $w \sqsubseteq v$. The realm of utterances is not closed under mereological summation. But I think it is at least plausible to assume that every utterance decomposes into finitely many non-overlapping parts.

U 1. *For all $u, v \in U$: either $u = v$, $u \sqsubset v$, or $v \sqsubset u$, or u and v do not overlap*

U 2. *If $u \sqsubset v$, then there is a w , such that $w \sqsubset u$ and w and v do not overlap*²⁵

U 3. *For every $u \in U$: $\sqsubset u$ is finite*

An utterance is *maximal*, iff it is not a proper part of some utterance. We want to exclude the possibility, that there is an infinite sequence of utterances $u' \dots u'' \dots u''' \dots$, such that $u' \sqsubset u'' \sqsubset u''' \dots$.

U 4. *Every utterance is part of some maximal utterance*

Because of U1 this implies

Fact 1. *Every utterance is part of a unique maximal utterance.*

In terms of their times, we could define a notion of temporal precedence $<$ between utterances, in the obvious way. Instead, I will simply state a property of $<$ which I will need in the following.

U 5. *For every u , $< \upharpoonright ICu$ ($<$ restricted to ICu) is a strict linear order*²⁶

²⁵ These axioms imply the usual principles of so-called extensional mereology: \sqsubseteq is a weak order and if $u \not\sqsubseteq v$, then there is a w , such that $w \sqsubseteq u$ and w and v do not overlap

²⁶ I.e., it is transitive, asymmetric, and connected.

3.1.2 Expressions

Expressions are properties of utterances. Why? First, unlike utterances, expressions may be multiply realised, i.e. multiply instantiated. Therefore they are universals (i.e., properties), not particulars. Secondly, their instances are utterances. Therefore expressions are properties of utterances. Following a usual practice in possible-worlds-semantics, I will represent them as sets of utterances. Since utterances are instances of expressions, every utterance is an element of some expression. It is at least plausible, that no utterance is an instance of two different expressions.²⁷ Finally, since our notion of utterance comprises all possible utterances, and not just actual ones, and every expression may possibly be uttered, we assume that every expression is non-empty.²⁸

Summing up, the set of expressions, E is a set of mutually disjoint, non-empty sets of possible utterances, such that $\bigcup E = U$, in other words

E 1. *The set of expressions E is a partition of the set U .*

But what kind of sets are expressions? They are sets of *isomorphic* utterances. If $u, v \in U$, then, an *isomorphism from u onto v* is a 1–1 function f from $\sqsubseteq u$ onto $\sqsubseteq v$, such that $f(u) = v$, for every $\alpha \in E$ and $u' \sqsubset u$: $f(u') \in \alpha$ iff $u' \in \alpha$ and for arbitrary $u', u'' \sqsubseteq u$:

1. $f(u') \sqsubseteq f(u'')$ iff $u' \sqsubseteq u''$,
2. $f(u') < f(u'')$ iff $u' < u''$.

So an utterance isomorphism is a bijective function that preserves parthood, linear precedence and constituent expressions. We say that an utterance u is *complex* iff $\sqsubset u$ is non-empty. We say that u and v are *isomorphic*, iff either they are complex, and there is an utterance isomorphism between them, or they are not complex and belong to the same expression. For every utterance u , let $[u]$ be the set of utterances isomorphic to u . Now we can say more precisely:

E 2. *For every $a \in E$: $a = [u]$ for some $u \in U$.*

3.1.3 Occurrences

Occurrences of expressions are properties of utterances, too. Why? Like expressions, occurrences are multiply realisable. The first occurrence of “Paul” in

²⁷ For some discussion, see section 3.2.

²⁸ This is an instance of the principle of plurality, a general principle about the size of logical space, see Lewis (1986).

“Paul is Paul”, e.g., is realised by the first subutterance of every utterance of the sentence. So, like expressions, occurrences are instantiated by utterances. Accordingly, I will represent occurrences as sets of utterances, too.²⁹ But while an expression is an intrinsic property of utterances, defined only by reference to the structure of utterances, occurrences are relational properties. Let us first define $[u']^u$, the set of v' which appear in the same place (and expression) in which u' appears in u . If $u' \sqsubseteq u$, then

$$[u']^u := \{v' \mid \text{there is a } v \text{ and an isomorphism } f \text{ from } u \text{ onto } v, \text{ s.t. } f(u') = v'\}$$

Finally,

O 1. *o is an occurrence of β in α iff there is a $u \in \alpha$ and a $u' \in \beta$, s.t. $u' \sqsubseteq u$ and $o = [u']^u$.*³⁰

Sometimes I will omit some of the arguments of the predicate “occurrence”. This should be taken as indicating existential quantification over the arguments I have omitted. E.g. “ o is an occurrence of β ” abbreviates “there is an α , such that o is an occurrence of β in α ”. Obviously,

Fact 2. *$u \sqsubseteq v$ is an utterance of α exactly iff $[u]^v$ is an occurrence of α .*

Now, the syntactico-mereological structure of occurrences may be directly defined from that of utterances, by the following definitions. Let o and q be occurrences of expressions in the same expression β and w be an utterance of β .

29 In von Stechow (1979), occurrences are identified with pairs of an expression and a node of a tree. This definition misses the important point that occurrences and expressions are ontologically on a par. Furthermore, trees can be defined in various, but equivalent ways, so the definition is based on an arbitrary choice.

30 If you are presented with the sentence “Hans smiles” and someone asks, “How many occurrences of ‘Hans’ do you perceive?” you will probably want to answer “one”. Now our formal ontology says “two”; first there is the occurrence of “Hans” in “Hans”, then there is the occurrence of “Hans” in “Hans smiles”. (This feature is shared by von Stechow’s alternative ontology.) In such cases, however, the spurious occurrences will all stand in a subset-relation. E.g. if $u \neq v$, but both $u' \sqsubseteq u$ and $u' \sqsubseteq v$, then $[u']^u$ and $[u']^v$ will differ. In this case either $u \sqsubset v$ or $v \sqsubset u$, and it holds that if $v \sqsubset u$, then $[u']^u \subset [u']^v$. We are used not to distinguish subsets when counting, see Link (1983). Note also that the definition gives at least the intuitively correct answer “one” to the question “how many occurrences of ‘Hans’ in ‘Hans smiles’ are there?”

$o < q$ iff there are u, v , such that $o = [u]^w$, $q = [v]^w$ and $u < v$.

$o \sqsubseteq q$ iff there are u, v such that $o = [u]^w$, $q = [v]^w$ and $u \sqsubseteq v$.

It could be shown that the structure of occurrences in β defined by these definitions and the structure of subutterances of w are identical. The following facts establish at least that there is a 1–1 correspondence between subutterances of w and occurrences in β .

Fact 3. *For every pair (u, w) , such that $u \sqsubseteq w$, there is exactly one occurrence o , such that $o = [u]^w$.*

Holds by definition.

Fact 4. *If o is an occurrence in β and w is an utterance of β , then there is some $u \sqsubseteq w$ such that $o = [u]^w$.*

Since expressions are structures, i.e., sets of isomorphic utterances, and occurrences define places in structures, if o is an occurrence in β , then every utterance of β contains an utterance that occupies the place defined by o .

Fact 5. *If $[v]^w = o = [u]^w$, then $u = v$.*

Suppose $[v]^w = o = [u]^w$. Then there is an isomorphism f from w onto itself, such that $f(v) = u$. We will now show by induction over the decomposition of w that f maps every part of w onto itself. (i) f maps w onto itself. (ii) If f maps v onto itself, then it is easily seen that f maps ICv onto ICv . But the only way to map ICv onto ICv and to preserve $<$ is to map every member of ICv onto itself; hence, if f maps v onto itself, then f maps every member of ICv onto itself.

3.2 The Equivalence of the Frameworks

The above metaphysics can now be used to show that the two frameworks are equivalent, i.e. that, given an interpretation function for one, we can always define a matching interpretation for the other.³¹

³¹ I owe the idea for the following sketch of an equivalence proof to Ede Zimmermann (p.c.). It was cast within a different ontology of occurrences (and a reformulation of tokenreflexive semantics), though.

1. First, given an interpretation for tokenreflexive semantics, let's define one for occurrence-interpretation:

Define $\llbracket \alpha \rrbracket(o, u)$ to be $|\alpha|(u)$, where u' is that subutterance of u , s.t. $o = [u']^u$.

2. Then, the other way round:

Define $|\alpha|(u)$ to be $\llbracket \alpha \rrbracket([u]^u, u^*)$, where u^* is the maximal utterance, s.t. $u \sqsubseteq u^*$.

That these definitions work is guaranteed by certain consequences of our definitions. For 1. we need the existence (Fact 4) and uniqueness (Fact 5) of the subutterance of u that instantiates o ; for 2. the existence of a unique maximal utterance (Fact 1), furthermore the existence and uniqueness of an occurrence corresponding to a given subutterance (Fact 3).

3.3 Possible Refinements

Our metaphysics may still be regarded to be a bit too simplistic. I briefly mention three cases in point. A more realistic theory seems to be feasible, but it is not entirely clear to me how such a theory would look.

The picture of the precedence relation contained in U5 is certainly too simple. In reality it is not the case that utterances always follow each other. Sometimes, there are discontinuous constituents, e.g., in cases of particle verbs and the poor victims of infixes, like “absolutely” in “abso-bloody-lutely”. Another alleged case is “if ... , then ...”. A more refined picture seems to be possible; it would involve also parts of utterances which are not themselves utterances of meaningful expressions.

E1 requires that different expressions are disjoint, i.e. that an utterance of a complex expression divides into utterances of its component expressions. Now this does not seem to be true for all expressions. E.g., an utterance of “knew” is at the same time an utterance of the expression PAST and an utterance of “to know (3rd person singular)”. Thus, if you admit abstract expressions like PAST, E1 has to go.³²

Such expressions may also be used to argue that utterances of the same expression may have different forms. E.g., “knew” and “-ed” may both be considered to be forms of the expression PAST, but they are not isomorphic (“knew” is a form of “to know” while “-ed” is not). This indicates that, if you think that

32 A ban on invisible as well as abstract expressions is characteristic of the doctrine of “surface compositionality”. For further references and a defence of surface compositionality, see Kracht (2007).

some expressions are abstract, you should try to replace E2. Instead of requiring that expressions are equivalence classes of isomorphic utterances one could merely require that expressions are closed under isomorphisms. This would force changes in our definition of an occurrence and many details in our proofs as well.

4 Conclusion

In this paper I argued that, at least in the realm of demonstratives, there is *OD*; that Kaplanian semantics is unable to cope with *OD*; and that tokenreflexive semantics and occurrence-interpretation are two prototypical ways out of this predicament. Their primitives (utterance and expressions, on the one hand, and expressions, occurrences, and contexts, on the other) have been subjected to an ontological analysis. Here I provided answers to the questions what contexts, expressions, occurrences and utterances are. These answers finally afforded an equivalence proof by way of translations between the two frameworks.

Let me finally point out two applications of these ideas. First, the above translations might indicate a way for the tokenreflexive semanticist to react to the so-called *logic problem*. Braun (1996), following Kaplan (1989b), complains that tokenreflexive semantics cannot evaluate more than one sentence in the same context, something which is crucial for Kaplan's conception of logic. Now occurrence-interpretation can. But if occurrence-interpretation has a logic that is acceptable to the Kaplanian, then tokenreflexive semantics can borrow it, *via* the above translation.

Let's generalise the notion of an expression, such that arguments count as single expressions. Now we can talk about occurrences in arguments. We can then define an argument *A* to be logically valid iff for all utterances *u* of *A* and every world *w*, if $w \in ||P||(o, u)$ for every premise *P* and occurrence *o* of *P* in *A*, then $w \in ||C||(o, u)$ for the "concluding" occurrence *o* in *A* of the conclusion *C*. The corresponding notion of logical validity for tokenreflexive semantics is that an argument *A* is logically valid iff for all utterances *u* of *A* and every world *w*, if $w \in ||P||(u^P)$ for every utterance u^P of a premise *P* of *A* in *u*, then $w \in ||C||(u^C)$ for the "concluding" utterance u^C of the conclusion *C* of *A* in *u*. Either way, (9) above is predicted to be logically valid, whereas (10) is not. Second, the translation may help to sort out empirical and theoretical matters in the semantics of indexicals. For instance, sometimes *OD* is described in a way that seems to imply that occurrence-interpretation is wrong.

Why do we not need distinct symbols to represent different syntactic occurrences of “today”? If we speak slowly enough (or start just before midnight), a repetition of “today” will refer to a different day. But this is only because the context has changed. [...] It is no part of the meaning of “today” that multiple syntactic occurrences must be associated with different contexts.

KAPLAN 1989a: 587

Kaplan claims that context has changed between the two subutterances of “today”. This is what tokenreflexive semantics says (according to my reconstruction) and what occurrence-interpretation denies. So is occurrence-interpretation wrong? Not at all! What our equivalence proof shows, is that *whether context changes is totally a matter of theory, of no empirical import*.

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The Live Principle of Compositionality*

Paul Dekker

1 Introduction

In this paper I approach contextualist findings in the philosophy of language (not epistemology) from the perspective of the formal semanticist's enterprise. These contextualist findings have already been shown, despite expectations or suggestions to the contrary, to be consistent with a compositional understanding of the syntax-semantics interface (Laserson 2012; Pagin & Pelletier 2007). However, these proposals for the accommodation of contextuality in the form to meaning mapping seem to carry with them the danger of trivialization.

Contextualist findings can be rendered compositionally once we assume that what we are dealing with are so-called 'live meanings'. The principle of compositionality, thus understood, obviously generalizes the well-known statement of the principle itself, and it obviously leaves room for all kinds of contextual modulation. Moreover, it allows for a critical evaluation of several kinds of formal semantic analyses that are proposed in the literature. For one thing, the principle naturally builds on a notion of 'live' as opposed to 'past meanings' (in the spirit of Davidson 1986), which are deemed 'present' rather than 'absent'. The principle is also called upon as a methodological tool, by means of a so-called 'interference principle', that can be applied in the evaluation of proposed semantic analyses of various phenomena at the syntax/semantics interface.

I will proceed as follows. In the first section I will briefly discuss the issues of contextualism and compositionality and propose a conception of the principle of compositionality as one that involves so-called 'live' meanings. Live meanings figure as the natural instances of contextually determined interpretations. In section 2 I discuss a series of cases, in which we can see the live principle of compositionality at work, and which illustrate the importance of a live understanding of expressions in actual discourse. Section 3 provides some further reflection on the formal semantic enterprise, given that the live principle of

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compositionality can be taken to cast doubt on the very idea of a minimalist semantic program. I will argue that the principle can be, and as a matter of fact is, already, very productively employed in linguistic discussions at the syntax / semantics / pragmatics interface. The final section briefly sums up the results.

2 Live Compositionality

2.1 *Compositionality and Contextuality*

The formal study of the syntax and semantics of natural language, as, for instance, cast in the Montagovian paradigm, is seriously devoted to the Fregean principle of compositionality. The principle can be found at work in Frege's writings (e.g., Frege 1892), and although it is not stated as such by Gottlob Frege himself, it can be formulated as follows.

Principle of Compositionality (PoC) *The meaning of a compound expression is a function of the meanings of its parts and their mode of composition.*

A formulation of the principle along these lines naturally shows up in a vast body of 20th century work on logic, language and computation, whether it be philosophical, or not. (For a solid, general overview and background, see Janssen 1997; Partee 2004.) The principle of compositionality allows for a neat explanation of the fact that finite language users may be able to create, use and understand a possibly infinite number of expressions so as to express a possibly infinite number of meanings.

Formally, the principle tends to be spelled out by means of, first, a specification of a syntactic and a semantic algebra, and, second, the definition of an interpretation function as a homomorphism from the one algebra into the other. The principle is often characterized as a methodological, not substantial, one, that does not characterize or constrain natural and formal languages, but one that constrains the formulation of the interpretation of these languages, i.e., as, in principle, a homomorphism. Nevertheless, there are ongoing attempts to falsify or refute the principle, and these at least challenge its proponents to come up with analyses that refute these attempts. It is, then, at best an estimation of the methodological cost of keeping to the principle that may decide for or against maintaining it. While a natural defense of the principle consists in the rhetorical question: "if the meaning of a whole is not determined by the meanings of its parts, 'of what else could it be a function?'"

(Putnam 1954: 118), a natural attack often consists in the reply that it is also determined by other parameters of interpretation, not better labeled than 'contextual'.

Many authors in the philosophy of language have realized, in the spirit of the later Wittgenstein (1953), that the context of the use of language plays a pervasive role in its interpretation, up to the effect that it hardly deserves the effort any longer to characterize meanings of natural language expressions without paying due attention to these contextual aspects. Thus, an old and methodologically convenient picture of a linguistic theory has come under attack. According to this picture, or caricature, the syntax of a language is taken to define what are the well-formed expressions of that language; in its semantics it is next systematically specified what are suitable meanings of those expressions; and in the pragmatic component of such a theory it is ruled what one can do with these expressions with their meanings. The picture is naturally associated with a so-called 'minimalist' view of semantics. Upon this view, expressions or utterances of a natural language are associated with a minimal core meaning, that can be enriched, by pragmatic means, up to a more natural, contextually adjusted meaning. Compositionality of meaning is taken to reside on the supposed autonomous level where syntactically analyzed expressions are associated with their minimal semantics. Contextualists argue, or assume, that the prospects of a formal semantics, thus conceived, are slim, if not outright unattainable.

The contextual impact on meaning and interpretation has been subsumed under various labels. To name a few, there is pragmatic enrichment, argument saturation, domain restriction, predicate loosening, semantic coercion, deferred reference, and what have you. Generalizing somewhat rudely, we may bring them all under the label of 'modulations' of meaning, and then it can be observed that the various types of modulation indeed affect all basic, truth-conditionally relevant, semantic categories. They affect the traditional semantic categories of reference, predication, quantification, and construction. It will not do here to rehearse all the contextualist examples that have been presented, as they are probably fairly well-known, and since they will reappear in the cases to be discussed below. Let me just cite some of the conclusions that have been drawn.

Contextualism holds that what is said depends on the context of utterance. The evidence in favor of contextualism is provided by indefinitely many examples in which the same sentence, which does not seem to be ambiguous, is used in different contexts to say different things.

Contextualism ascribes to modulation a form of necessity which makes it ineliminable. *Without contextual modulation, no proposition could be expressed*—that is the gist of contextualism.

RECANATI 2005: 179–180

These days, the natural descendent of the formal approach, known as minimalism, has been consigned to the margins: not everyone rejects minimalism, but lots of people do. Minimalism is rejected in favour of contextualism: roughly, the idea that pragmatic effects are endemic throughout truth-evaluable semantic content.

BORG 2007: 339

According to Herman Cappelen and Ernie Lepore, one of the hallmarks of ‘radical contextualism’ is the claim that “No English sentence *S* ever semantically expresses a proposition. Any semantic value that Semantic Minimalism assigns to *S* can be no more than a *propositional fragment* (or radical), where the hallmark of a propositional fragment (or radical) is that it does not determine a set of truth conditions, and hence, cannot take a truth value” (Cappelen & Lepore 2005: 6). Even so, in response to the contextualists’ conclusions, Cappelen and Lepore, Emma Borg, Peter Pagin and Jeff Pelletier, and recently Peter Lasnik, have all defended a systematic, compositional, semantic theory, that does not deny the contextualist findings. “Even if the output of linguistic activity (i.e., what was said, meant, asserted, claimed) is, as we have argued, context sensitive to the extreme, it does not follow that there is nothing general, systematic, or non-context sensitive to resolve about how we determine what-was-said (or meant, asserted or claimed)” (Cappelen & Lepore 1997: 293). Emma Borg also submits that “according to the minimalist (as I construe her) there is an entirely formal route to meaning. This means not only that every contextual contribution to semantic content must be grammatically marked but also that those features contributed by the context must themselves be formally tractable” (Borg 2007: 358). As a matter of fact, Pagin & Pelletier (2007) develop a classical compositional architecture of interpretation which provides room for the (outcomes of) pragmatic aspects of interpretation within the composition of meaning. They propose a compositional syntax/semantics architecture which allows, for any analyzed sentence, for modulations on every constituent of its construction-tree and of the corresponding meaning-tree. It is worthwhile to explore their compositional implementation of contextualist insights in some detail.

2.2 *Modulated Compositionality*

Pagin & Pelletier (2007) proposes a system of interpretation that employs expressions of a familiar type-theoretical language for the representation of meanings of analyzed sentences of natural language. The language is assumed to be built up from basic terms t , and construction operations σ combining terms into larger structures. It employs a basic interpretation function μ for the terms, and an interpretation $\rho(\sigma)$ of the construction operations which are assumed to be of the right type for the (interpretation of the) terms that they combine. Generalizing over the types of modulation that have been distinguished, a modulation function \mathcal{M} is used that may apply to basic meanings and more involved constructions alike.

The evaluation of the type-theoretical constructions proceeds in two steps: first, the constructions are associated with structured meanings (constituted by the meanings of the constructions' constituent expressions); second, these meanings are evaluated by a proper combination of the meanings' components, in joint combination with any type of interfering modulations \mathcal{M} . The full definition runs as follows.

Modulated Principle of Compositionality (MPoC)

- *The structured meaning $\mu'(\sigma(t_1, \dots, t_n), c)$ of the construction of the constituents t_1, \dots, t_n by means of operation σ in context c , is:*
 - $\langle \rho(\sigma), \mu'(t_1, c), \dots, \mu'(t_n, c) \rangle$,
the ordered $n + 1$ -tuple consisting of the composition function $\rho(\sigma)$ and the structured meanings in c of the constituents of the construction.
- *The modulated evaluation E_m of such a structure using modulation function \mathcal{M} in context c , $E_m(\langle \rho(\sigma), \mu'(t_1, c), \dots, \mu'(t_n, c) \rangle, c)$, is:*
 - $\mathcal{M}(\rho(\sigma)(E_m(\mu'(t_1, c), c), \dots, E_m(\mu'(t_n, c), c)), c)$,
the modulation of the result of the application of $\rho(\sigma)$ to the modulated evaluation of the structured meanings of the constituents in c .
- *For an atomic term t , the structured meaning $\mu'(t, c)$ of t in c is $\mu(t, c)$, and the modulated evaluation $E_m(\mu'(t, c), c)$ of $\mu'(t, c)$ in c is $\mathcal{M}(\mu(t, c), c)$, the modulation in c of the basic meaning of t in c .*

In order to keep things tractable we may proceed on the assumption that the syntactic operation σ is almost always functional application FA , so that the modulated evaluation yields results written, in relational format, as $R(t_1, \dots, t_n)$ or, in functional format, as $R(t_n) \dots (t_1)$. As one can see, meanings are in the first place the basic meanings of terms, and structures built up from them. The modulated evaluations of these structures are recursively, compositionally,

defined, in terms of the modulated application of the modulated evaluations of the constituents of these structures.

To see how the MPoC works, let us inspect three basic examples, a simple subject-predicate structure to begin with.

(1) Ede smiles.

This sentence can be basically rendered in context c as the structured meaning $\langle \rho(FA), S_c, e_c \rangle$, where $\rho(FA)$ indicates function application, S_c is the basic meaning $\mu(S, c)$ of ‘smile’ in c , and e_c the basic meaning $\mu(e, c)$ of ‘Ede’ in c . The modulated evaluation of this structure under modulation \mathcal{M} in c is $\mathcal{M}(\mathcal{M}(S_c, c)(\mathcal{M}(e_c, c)), c)$. If \mathcal{M} ’s dependence on the contextual parameter c is incorporated in a contextual modulation \mathcal{M}_c , we get $\mathcal{M}_c(\mathcal{M}_c(S)(\mathcal{M}_c(e)))$; and if these three modulations are trivial (the identity function) then the result is $S(e)$, the proposition that Ede smiles. Just what we want (1) to mean in the first place.

The next example has some proper internal structure.

(2) Alfred gave Ede a skateboard.

A structured meaning for example (2) may take the following form:

$$\langle \rho(QIFA), G_c, e_c, \langle \rho(FA), some_c, S_c \rangle, a_c \rangle.$$

For simplicity’s sake I have assumed a rule labeled *QIFA*, which can be taken to involve any form of ‘quantifying in’, plus functional application, according to one’s favourite syntactic/semantic framework. The objects G_c , $some_c$, S_c and a_c are the basic meanings $\mu(X, c)$ of ‘ X ’ in c , where ‘ X ’ is ‘give’, ‘a’, ‘skateboard’ and ‘Alfred’, respectively. Again, absorbing the contextual contributions in a contextual modulation function \mathcal{M}_c , the modulated evaluation of this structure will be the following:

$$\mathcal{M}_c(\mathcal{M}_c(SOME)(\mathcal{M}_c(S), \mathcal{M}_c(\lambda z \mathcal{M}_c(G)(\mathcal{M}_c(a), z, \mathcal{M}_c(e))))).$$

Any constituent contributing to this construction may be modulated, but, again, if no modulation interferes, so if \mathcal{M}_c is trivial, we arrive at the following evaluation:

$$SOME(S)(\lambda z G(a, z, e)).$$

Of course, this is the proposition normally assigned to example (2).

In the last example discussed here we will allow for some non-trivial modulation.

- (3) Few philosophers are linguists.

The syntactic structure of this sentence can be assumed to be very simple, as well as the structured meaning it is associated with:

$$\langle \rho(FA), few_c, P_c, L_c \rangle.$$

The modulated evaluation consists in the modulation of the proposition obtained by applying the modulation of *FEW* to the modulations of *P*, the ‘philosophers’, and *L*, ‘linguists’.

$$\mathcal{M}_c(\mathcal{M}_c(FEW)(\mathcal{M}_c(P), \mathcal{M}_c(L))).$$

Probably the outermost modulation is superfluous, but it may be evoked if someone deems (3) a platitude that the speaker always employs in contexts like the one in which it is uttered. The modulation $\mathcal{M}_c(FEW)$ of *FEW* may be needed because this determiner itself is heavily context dependent of course, and it can be argued that its contextual meaning may even get shifted. Assuming that the modulation has effectively incorporated contextual influences both effects can be accounted for. The modulation $\mathcal{M}_c(P)$ of the philosophers may or should answer questions like:

- (4) Philosophers? What do you mean by ‘philosophers’? Do you mean, so-called, ‘philosophers’? People that act thus? Academically trained philosophers? ‘Real’ philosophers? Philosophers attending the present conference? Philosophers we have been studying lately? Etc.

Once a suitably modulated interpretation of *P* has been established, it can contribute to the proposition expressed by an utterance of (3), which, as said, may itself be in need of further modulation as well. Analogous questions can be asked about what *L* means in an utterance of (3). A modulated interpretation $\mathcal{M}_c(L)$ may result, which then plays its part, in a compositional way, in the interpretation of (3).

One of the main points taken from an example like (3) is, or so it has been argued, that one doesn’t seem to construe or understand a most general and context independent proposition first, like ‘Few academic philosophers in the

entire universe are linguists,' and then derive from this a more specific, and more informative one, to the effect, for instance, that some of the philosophers at this conference are so-called linguists. Rather, it seems, that in a given context one directly interprets the phrase 'some philosophers' as 'some philosophers at this conference,' or as any of the other specifications suggested. But then, contextualists ask, what role would the most general (trivial) proposition have to play here in the first place? The minimal answer appears to be, none, really, except that the associated structured meaning hosts a component which, after possible modulation, contributes to the meaning that is expressed.

There is an obvious appeal to the MPoC and it has an obvious weakness. It fits perfectly in the idea that natural language and its interpretation has a recursive structure, ideally established by a homomorphism between the syntactic and the semantic algebra involved. Moreover it leaves plenty of room for all kinds of modulated interpretation. As a matter of fact, too much room, one might want to say. This is the weakness, but not a weakness of the MPoC itself, but of the underlying contextualist conclusions, that have often been left implicit, and now have gone explicit. For, an unconstrained use of the modulation function \mathcal{M} allows, for any expression or utterance, to have any kind of meaning built up from any kind of meanings of its constituents. Even for a principle that, like compositionality, can be claimed to be purely methodological, this is by itself too lenient to be acceptable.

Of course, one may be tempted to put constraints on, or characterize, the modulations that are allowed in practice, or realistic, in an actual linguistic setting or community. One may think of external constraints on \mathcal{M} , naturalistic ones, cognitive ones, or conventional ones, but this seems to be a real Sisyphean enterprise. Moreover, doing so could seem to be a false start. First, one may wonder whether, or why, a semantic theory should be designed to be ontologically endorsable, cognitively plausible, or socially acceptable. It is not self-evident that a semanticist should live up to current common standards (if any) in epistemology, cognitive psychology, or the social sciences. More crucially, if the common notion of meaning may appear, upon philosophical reflection, to be inscrutable, or even suspect, so much the worse, it seems, for the very notion of modulation of meanings, let alone for that of constraints on such modulations.

Maybe it would be better to take the contextualist findings to heart, and not think of the meanings at issue as something derivative from an independent and idealized architecture, but as the basic building blocks in actual interpretation. In what follows I will argue that such a conception yields a constructive take on the issue. I do want to take to heart the fact that language consti-

tutes a real, actual phenomenon, that it is actually used and plays a role in real life, and that there is a both cognitively and socially embodied practice of meaning—of language use and understanding. These are commonplace and rather inescapable assumptions, or so it seems to me. They, however, bring along a different view on what compositionality really says, or should be taken to say.

2.3 *Live Compositionality*

At a certain level of abstraction and idealization we can, and do, speak of meanings as identifiable and distinguishable entities, that allow to be formalized and quantified. I.e., we do speak, formally as well as naturally, about ‘the meaning of’ a certain expression, and wonder and debate about the question ‘how many meanings’ a certain expression has. Obviously some such talk also underlies the formulation of the principle of compositionality, which assumes the very existence of meanings of compound expressions and of their constituents. This need not, and should not, hamper the conviction that these are, indeed, entities that exist (only?) at some level of abstraction and idealization, and that their well-being vaporizes upon philosophical, intuitive or naturalistic reflection. As a matter of fact, this may hold of all objects and properties we are familiar with, or that are known to us. After all, situations and events are negotiable entities, like, upon further inspection, properties, objects, even numbers. In the context of sceptical epistemological arguments David Lewis has put things as follows.

We know a lot. (...) We have all sorts of everyday knowledge, and we have it in abundance. To doubt that would be absurd.

LEWIS 1996: 549

However,

(...) it will be inevitable that epistemology must destroy knowledge. That is how knowledge is elusive. Examine it, and straightway it vanishes.

LEWIS 1996: 560

Lewis’ argument in the article mentioned seems compelling, and casts doubt on the qualified assessment of knowledge of things. So much the worse one might say for our claimed knowledge of meanings, and a fortiori for our knowledge of modulations of meanings. Or not? After all, Lewis does not disqualify everyday, unqualified, knowledge. We have all sorts of everyday knowledge of meanings, and we have it in abundance. Upon reflection, it then seems

wise to let our theories call on this everyday knowledge, and then, very much in the spirit of the later Wittgenstein, look at the practice of meaning and meaning attribution.

Die Bedeutung eines Wortes ist sein Gebrauch in der Sprache.

(The meaning of a word is its use in the language.)

WITTGENSTEIN 1953: § 43

We can retain the spirit of Wittgenstein's observation by explicitly relating the principle of compositionality to these matters of use.

Live Principle of Compositionality (LPoC) *The live meaning of a compound expression is a function of the live meanings of its parts and their (live) mode of composition.*

With this formulation of the principle of compositionality I have deliberately been unspecific about what 'live' means. (As a first approximation, I can say that a 'live' interpretation is one that the interlocutors, and a suitably informed observer, can agree upon.) I have also abstained, and will abstain in the remainder of this paper, from giving a more specific implementation of the principle in terms of a homomorphism, which would force me to fill out details that require all kinds of philosophical and methodological justifications that are not relevant now. These reservations being made, let us have a look at the constructive aspects of the given understanding of the principle of compositionality. There are two general points about the given formulation that may need to be emphasized first, and a third, more substantial one, that will figure as the main subject of the investigations in the next section.

First, notice that if one so chooses to understand 'live meaning' as 'the meaning' (or 'literal meaning,' or 'linguistic meaning') then the live principle of compositionality simply, literally, *is* the generally accepted principle as we have presented it in the beginning of this section. Thus, from a conservative semantic point of view there can be nothing wrong with the principle. Quite the opposite. Such a conservative understanding may itself be in need of an explanation or justification of what kinds of things these literal or linguistic meanings really are—but, being progressively conservative myself, I will not capitalize on this issue.

Second, more importantly, we can, and should of course, understand the principle as one that is tailored to incorporate the contextualist findings. For,

any time that it invokes the live meaning of an expression that is not its so-called literal meaning, we can take it to *replace* its modulation given by the \mathcal{M} function in Pagin and Pelletier's modulated principle of compositionality. Thus the LPoC can be conceived of as a pure notational variant of the MPoC, with, of course, some purported motivation added in terms of the suggestive notion 'live'. This brings me to the third point.

Third, and now I do want to give some substance to the notion 'live', the 'live meanings' of expressions are supposed to be their actual interpretations upon their actual use and they can, at worst, be incorrect, or, at best, be intended, correct and justifiable. Here I, again, draw from an everyday, colloquial, understanding of the relevant notions and one that does not purport to be more than that. Of course unclarity, confusion, discussion and misunderstanding may always arise about what is 'intended', 'correct' and 'justifiable', but that's what we have to live by. I here take again my cue from the later Wittgenstein:

Die Begründung aber, die Rechtfertigung der Evidenz kommt zu einem Ende;—das Ende aber ist nicht, daß uns gewisse Sätze unmittelbar als wahr einleuchten, also eine Art *Sehen* unsererseits, sondern unser *Handeln*, welches am Grunde des Sprachspiels liegt.

(The grounding, however, the justification of the evidence, has an end;—but the end is not that certain propositions immediately strike us as true, i.e. it is not a kind of *seeing* on our part; it is our *acting*, which underlies the language-game.)

WITTGENSTEIN 1984: § 204

Unser Fehler ist, dort nach einer Erklärung zu suchen, wo wir die Tatsachen als 'Urphänomene' sehen sollten. D. h., wo wir sagen sollten: *dieses Sprachspiel wird gespielt*.

(Our mistake is to look for an explanation, just where we ought to conceive of what happens as a 'proto-phenomenon'. That is, where we ought to say: *this language-game is played*.)

WITTGENSTEIN 1953: § 654

The point is that, pending further investigations, most live interpretations are simply clear, and good as they are. While the principle of compositionality is meant as a methodological principle, and even while the notion 'live' has been left unqualified, it nevertheless naturally suggests two principles that can be

brought to bear on ‘live’ examples, that is, on cases that have been discussed in the literature and that are considered to be ‘natural’. In the first place the principle implies that live meanings of expressions, and, more importantly, of their constituent expressions, are actually *present* on an occasion of use. In the second place, it suggests that past meanings—if one wants: ‘literal’ meanings—are absent, when they are substituted by more suitable live meanings. These are two intuitions or even predictions that are open to empirical investigation, even if, in a paper like this, only virtually, or only in thought experiment. So what I will do in the next section is to test the idea that the natural actual (live) meanings of expressions are indeed present on their occasion of use, and not the meanings that they might, e.g., literally, have, but do not actually have. The next section thus puts the following two ‘predictions’ to the test.

- Live meanings are present.
- Past meanings are absent.

3 Live Meanings

In this section the live principle of compositionality is demonstrated to apply to a number of cases familiar from the literature, and some of my own making. It will not do to attempt a full analysis of the cases here, but I will take them to indicate the presence of live meanings, and the absence of past meanings. Since most of the cases already figure on the semanticist’s agenda, they hopefully need not too much of introduction and examination.

The first case relates to nominal or verbal predications, by means of an utterance of, e.g., ‘The car is red.’ About such predications François Recanati has critically observed:

(...) in most cases the following question will arise: what is it for the thing talked about to count as having that colour? *Unless that question is answered, the utterance ascribing redness to the thing talked about (John’s car, say) will not be truth-evaluable.* (...) To fix the utterance’s truth-conditions, we need to know something more—something which the meanings of the words do not and cannot give us: we need to know *what it is for that thing (or for that sort of thing) to count as being that colour.* What is it for a car, a bird, a house, a pen, or a pair of shoes to count as red?

In many cases of use it is hard, if not impossible, to precisely define what kind of 'red' is meant on a specific occasion, and, actually, it normally is quite irrelevant to do so. (Irrelevant, suspending philosophical or linguistic reflection.) However, Anne Bezuidenhout has brought up a case in which situations serve to decide about possible, relevantly distinct, readings of 'red.'

Case 1. (*Bezuidenhout 2002: 107*)

We're at a county fair picking through a barrel of assorted apples. My son says

- (5) 'Here's a red one,' [Example numbering is mine, PD]

and what he says is true if the apple is indeed red. But what counts as being red in this context? (...) But even when it is an apple that is in question, other understandings of what it is to call it 'red' are possible, given suitable circumstances. For instance, suppose now that we're sorting through a barrel of apples to find those that have been afflicted with a horrible fungal disease. This fungus grows out from the core and stains the flesh of the apple red. My son slices each apple open and puts the good ones in a cooking pot. The bad ones he hands to me. Cutting open an apple he remarks:

- (6) 'Here's a red one.'

What he says is true if the apple has red flesh, even if it also happens to be a Granny Smith apple.

A typical contextualist conclusion from examples such as these is that 'red' (as for apples) and also 'sorting' (as for red apples) typically has an interpretation that heavily depends on context. However, such, entirely correct, conclusions tend to obscure a typical and semantically systematic fact that the live principle of compositionality intends to lay bare. The point is that whatever meaning 'red' or 'sorting' is meant to play in a concrete use of example (5) or (6), it does play a non-negotiable role in the construction of the meaning of the whole utterance, and this contribution can be reinforced by subsequent anaphoric means. So while Anne's son, when going through the barrel, may be right when uttering (6), it would be very odd indeed, if he were to claim (7).

- (7) 'Here is again a red one. Like yesterday, at the county fair.

Intuitively, Anne's son is not holding the same kind of red apple like he did yesterday, so there is something very odd about the son's use of 'again' in (7). Anne herself, because she is seeing her son is indeed holding a Granny Smith, might also have countered (6) with either of the following two replies, which, abstractly speaking, constitute a truth-conditionally felicitous follow up of (6):

(8) ?Yes, it is red; but look: it is green!

(9) ?No, that one is not red, it is green.

In the circumstances described, however, these would be like linguists' jokes, one almost funny, the other rather sick. One may explain this, and rightly blame these reactions, pointing out that they involve violations of Gricean-style maxims of relevance or cooperativity. But in order to do so, one has to draw from the assumption that the live meaning of 'red' in (6) is not the live meaning of 'red' countered by the attribution of 'green' in (8) or (9). To mark the reactions by means of the latter two utterances as deviant one has to assume that they elaborate on a meaning of 'red' absent from the utterance of (6) (while present in the utterance of (5)). (Notice, moreover, that the distinction between the two readings of 'red' in the present discussion of this case is contextually infected as well. It is not difficult to come up with a case in which the distinction relevant here is immaterial.)

Case 2. (*Kripke 1979: 14/15*)

Two people see Smith in the distance and mistake him for Jones. They have a brief colloquy:

- (10) "What is Jones doing?"
 "Raking the leaves."

"Jones," in the common language of both, is a name of Jones; it *never* names Smith. Yet, in some sense, on this occasion, clearly both participants in the dialogue have referred to Smith, and the second participant has said something true about the man he referred to if and only if Smith was raking the leaves (whether or not Jones was)." "In the example above, Jones, the man named by the name, is the semantic referent. Smith is the speaker's referent, the correct answer to the question, "To whom were you referring?"

Notice that Kripke, as a third person figuring in this case, understands the second participant as having said something true about Smith, so he might have interfered in the colloquy and have uttered:

(11) True, but he is not Jones.

With an interjection such as in (11), Kripke would have picked up the live referent of 'Jones', which is Smith, and referred back to him with the pronoun 'he'. He would have re-established the past, and 'official', interpretation of 'Jones' by reusing the name 'Jones'. Also, assuming that the real Jones is as a matter of fact not raking the leaves, Kripke might have interfered with:

(12) False, that is not Jones.

With an interjection like that in (12) Kripke could have used the pronoun 'that' to refer demonstratively to the guy who is raking the leaves, Smith, while 'Jones', as usual, would have referred to Jones.

Now, since the speaker has mentioned Jones himself, Kripke might as well have used a pronoun for him, as in the following reply.

(13) False, that is not him.

In replying thus, 'that' would again have been used as a demonstrative, and the pronoun 'him' could be conceived to be coreferential with the term 'Jones' used by the first speaker, according to Kripke's picture of the common language. The interesting situation arises when Kripke agrees with the speaker about the situation and construes 'Jones' as denoting Smith. The live principle of compositionality then predicts that Jones himself is not available as a live antecedent for the pronoun, thus the following kind of reply on the side of Kripke would appear to be ruled out.

(14) *True, but he is not him.

In this hypothetical reply, 'he' would apparently be intended to denote Donnellan's so-called speaker's referent, and 'him' to denote Kripke's own semantic referent. According to the live principle of compositionality this would not correspond to a sensible reply, and indeed a reply with (14) sounds quite bizarre. In Donnellan's and Kripke's terms, 'Jones' may have a semantic referent and a speaker's referent but when the two are different, the live meaning cannot be both.

Very much the same observations can be made about a case which is very similar to the previous one, the difference being that a definite description is used, not a proper name.

Case 2'. (Kripke 1979: 7)

Someone sees a woman with a man. Taking the man to be her husband, and observing his attitude towards her, he says,

(15) *"Her husband is kind to her,"*

and someone else may nod,

(16) *"Yes, he seems to be."*

Suppose the man in question is not her husband. Suppose he is her lover, to whom she has been driven precisely by her husband's cruelty.

The scenario allows for the following alternatives. (Kripke 1979: 21)

(17) *B: "No, he isn't. The man you're referring to isn't her husband."*

(18) *B: "He is kind to her, but he isn't her husband."*

The reaction from *B* that Kripke imagines in (17) can be explained if we assume that 'he' is intended to refer to the woman's actual husband, while there is obviously a man present who is not her husband, and whom the speaker apparently refers to. The reaction from *B* that Kripke imagines in (18) simply picks up this intended referent as the live meaning of 'her husband.' Notice, however, that it would be pretty awkward again if *B*, in the way we imagined with (14), were to react as follows.

(19) *B: *Yes, but he is not him.*

The confirmation 'Yes' would indicate that *B* agrees with the lover as the live referent of 'her husband', as in his confirmation with (18). But then this means that the woman's real husband does not play a part in *B*'s rendering of (15). Thus, even though *he* (the lover) isn't her husband, so *he* [the lover] is not *him* [the husband], *B*'s appreciation of (15) does not license him to respond as in (19).

Similarly, assume that the lover is actually the husband's neighbour, and that *B* knows this. Then it would be fine for him to respond with (20), but not with (21).

(20) *B*: No, *he* is his neighbour.

(21) *B*: *Yes, but *he* is his neighbour.

Uttering (20) indicates that *B* construes (15) as involving the real husband, picked up with the pronoun 'his', while he may use 'he' to ostensibly refer to the lover seen with the woman. However, uttering (21) would indicate that *B* accepts the lover as the speaker's referent of 'her husband', but then 'his neighbour' can only be understood as her lover's neighbour, and this yields, again, a bizarre result.

The following observation comes along with a whole series of cases, and which can be taken to show to what extent discussions about phenomena like presupposition or discourse reference rely upon a notion of present meanings.

Case 3. *Quantified structures of the form* $DET(A, B)$ *presuppose a domain* *A* *and contribute discourse referents* $(A \cap B)$ *and* $(A \setminus B)$. (Free after Geurts & van der Sandt 1999; Moltmann 2006; Nouwen 2003, among many others.)

It is often assumed that quantified structures of the form $DET(A, B)$, where *DET* is a determiner or generalized quantifier, and *A* and *B* are set denoting expressions ('restrictor', and '(nuclear) scope', respectively), carry an implication or presupposition about the determiner's domain, i.e., the restrictor's denotation. There is the old Aristotelean insight that this term carries existential import, and in logical and linguistic treatments of quantifiers it has been argued that such a use of a term presupposes its domain as something that is given or retrievable in a discourse in which it is used. Moreover, it is also assumed that such structures may provide antecedents for subsequent (plural) pronouns that may denote the *A*'s, the *A*'s that are *B*, or even the *A*'s that are not *B*. No matter how such 'domain presuppositions' are formally analyzed, or how the potential to supply antecedents for subsequent anaphoric reference is implemented, one thing seems to be so obvious that it hardly deserves to be mentioned. The live presupposition of the use of such a term and its live anaphoric potential derive from its live, i.e., present, meaning.

Consider again example (3):

(3) Few philosophers are linguists.

Let us set aside all interesting questions one may have about the meaning of ‘few’ and of ‘linguists’, and let us focus on the philosophers. If (3) is used while taking ‘philosophers’ to apply to those who use lots of involved unwordly speech, then, if there is a domain presupposition, it is that there are those who use lots of involved unwordly speech; if it is used with the term ‘philosophers’ applying to trained and graduated academic philosophers, and if there is such a presupposition, it is that there are trained and graduated academic philosophers around, or mentioned in the discourse; if it is used to apply to philosophers who gave a talk at the present conference, and if there is a domain presupposition, then the presupposition applies to those. It appears to be difficult to argue that this would *not* be the case. How could anyone take an utterance of (3) to express a proposition about a certain type of philosophers, and presuppose something about another type?

Moreover, consider a possible continuation of an utterance of (3) with something like (22):

(22) They are artists / biologists / unaware of Chomsky’s work.

In a continuation of (3) with an utterance of one of (22), the pronoun ‘they’ can be used to refer to the philosophers, the philosophers that are linguists, or even the philosophers that are not—at least, that is a common opinion in the literature. But of course, these can only be meant to be the philosophers (that are linguists, or not linguists) as taken from the utterance of (3), and it involves the philosophers, so-called, being, or not being, linguists, as ‘linguists’ is taken from the utterance of (3). That is to say, the presupposition, if any, of an utterance of (22) draws from the live meaning of ‘philosophers’ and ‘linguists’ established by a previous utterance of (3). I dare claim that also, and in particular, in all discussions in the literature about examples such as these, such an assumption is taken for granted by all participants in the discussion. (Maybe no textbook in formal semantics would be understandable if not under the assumption that it systematically generalizes over occurrences of object language expressions assumed to have the same live meanings—that is, if not indicated otherwise.)

Something ironic happens here which might seem methodologically paradoxical for a formal semanticist. For, if an expression itself is reused in natural language, it *does* allow for the possibility that it is used with a different interpretation. People do after all say things like “You have philosophers and philosophers”, and this is quite understandable, and they can say “The dog bit the dog” without implying that the dog bit itself. Returning to example (3), a different interpretation of ‘philosophers’ thus may arise if one reuses the term, as in a continuation of (3) with an utterance of one of (23):

- (23) Philosophers are artists.
 Linguistic philosophers are biologists.
 Philosophers that are not linguists are unaware of Chomsky's work.

The three continuations correspond to the types of discourse referents that an utterance of (3) may have appealed to. However, with an utterance (23), and not with that of (22), one *might* presuppose or introduce a different concept of a philosopher, a live meaning of 'philosopher' different from the live meaning that its use in (3) had—even though this appears to be difficult. If one is not convinced that an iterated use of a term may come with a different interpretation, while a pronoun may not allow for such a reinterpretation, try to convey that you have philosophers and philosophers by uttering "You have philosophers and them". I think you will not succeed. One can say, however: "You have philosophers and philosophers. They are not them."

The next case describes a portion of relatively recent American history, and summarizes what one can say about it, as it seems is generally agreed upon in the semantics literature.

Case 4. In 1969, January 20th, Richard Nixon succeeded Lyndon B. Johnson as the president of the United States, so that after eight years of Democratic rule (with John F. Kennedy and Johnson), an eight year period of Republican rule started (with Nixon and Gerald Ford). With hindsight, the following sentence could have been truthfully uttered in 1969.

- (24) The last eight years the president was a Democrat. The next eight years he will be a Republican.

Example (24) could have been used, in 1969, to state something true, if the noun phrase 'the president' was rendered, or read, as whoever has been residing in the oval office over a certain stretch of time. On this reading it would merely serve to sum up the outcomes of the presidential elections over some sixteen years. The past eight years a Democrat was president and the next eight years a Republican would be. Alternatively, example (24) could have been rendered as being about the actual president, in 1969, Johnson. On this reading it would state that Johnson had been Democrat the past eight years, and, surprisingly, and falsely I assume, would turn out Republican the coming eight years.

Notice, that, of course, it may both have been true that Johnson was a Democrat the past eight years, and that a Republican would be the president the coming eight years, as was actually the case. However, this does not appear

to be a situation that would render example (24) true. If the pronoun 'he' in the second sentence of example (24) would pick up the president from the first sentence, it would do so under the interpretation that 'the president' had there—i.e., its live meaning. Thus, if 'the president' would have been read as Johnson, then so would 'he', and if 'the president' would have been read as whoever, in any of these sixteen years, had won and would win the elections, then so would 'he' be read. The pronoun would *not* pick up some underspecified specification of the president under which it could be used, at will, referentially on its first occurrence, and attributively on the second. The live interpretation of the pronoun has to conform to the live interpretation of its antecedent.

Case 5. (*Dahl 1973: 83/4*)

Consider the following sentence:

- (25) John realizes that he is a fool, but Bill does not, even though his wife does.

One of the readings of (25) is the following:

- (26) John realizes that he is a fool, but Bill does not realize that he—
Bill—is a fool, even though his wife realizes that he—Bill—is a fool.

Dahl's example provides quite a vivid illustration of the LPoC. First of all, notice that, if the pronoun 'he' in the sentential clause 'John realizes that he is a fool' is simply understood as John, upon what is called a strict reading, then it seems example (25) cannot but claim that John realizes that John is fool, and that Bill does not, but his wife does, realize this, i.e., that John is a fool. A more likely interpretation, the so-called 'sloppy' reading, evolves if 'he' is understood as a subject bound variable, to the effect that an utterance of the first sentence of (25) is taken to state that John is aware of being a fool. Upon this rendering of the pronoun, the most likely interpretation of the continuation in (25) is that Bill does not realize that he, Bill, is a fool, while his wife does, i.e., realize that she is a fool. This interpretation thus fully, and directly, complies with the LPoC.

The reading that Dahl himself mentions in case 5 may be a bit harder to get, and it is even one that some claim the sentence not to have. The reading is naturally obtained, though, if what Bill does not realize, upon the sloppy reading of 'he is a fool' in the interpretation of the first sentence, is itself bound to Bill, so that, also on this sloppy interpretation of the first sentential clause,

the second may deliver a bound interpretation. Upon this understanding, Bill is said to be not aware of being a fool, even though his wife does realize he is. What Bill's wife does is realize, on a bound interpretation, what Bill does, viz., realizing what John does on a sloppy interpretation. Indeed, in the way sketched, this interpretation seems to require more 'work', or processing, but it yields a natural understanding of the whole sequence (25), notwithstanding the misgivings people may have about it.

It is interesting to see that a reverse 'reanalysis' of example (25) does not seem to be forthcoming. Once 'he' is understood as John, and what Bill fails to realize is that he, John, is a fool, the continuation with 'his wife does' does not naturally render any interpretation according to which she realizes Bill, or she herself, is a fool. It seems everyone agrees with this observation, and it naturally falls out of the LPoC analysis of the case at hand. What is present is the live interpretation of the previous discourse in which John being a fool is at issue, and no constituent contributes a new issue that Bill's wife is said to realize.

Case 6. (*Nunberg 1979: 149*)

For example, a restaurant waiter going off duty might remind his replacement:

(27) The ham sandwich is sitting at table 20.

It appears to be clear to most of us that the protagonist in case 6, by uttering (27), refers to a person, not a ham sandwich, so that the live meaning of 'the ham sandwich' is understood to be someone who, e.g., ordered, or has been served, a ham sandwich—not the ham sandwich. Thus, a subsequent observation, later, made by (28) seems to be fine, while claiming (29) sounds odd.

(28) The ham sandwich wants to pay. He is in a hurry.

(29) ?The ham sandwich wants to pay for it.

Notice that if the replacement of the protagonist is new to the location, and not familiar with the colloquial way of referring to customers, an utterance of (28) could be backed up by uttering an instance of (30).

(30) The ham sandwich is the person who ordered (has been served) the/a ham sandwich.

which would hopefully be revealing to the replacement. However, even though the ham sandwich is taken to be the person who ordered the ham sandwich, and even though it trivially holds that the person who ordered the/a ham sandwich is the person who ordered it, one could not quite felicitously state (31) instead of (30).

- (31) ?The ham sandwich is the person who ordered it.
 ?The ham sandwich is the person to whom it has been served.

The reason is that while the live meaning of ‘the ham sandwich’ is the person who ordered (has been served) a ham sandwich, and thus is present, the ham sandwich that is ordered (has been served) is absent in the envisaged utterance of ‘the ham sandwich’ in (30) or (31). (Notice that the examples (29) and (31) are totally fine, of course, if the pronoun ‘it’ is used to refer to a demonstratively present sandwich.)

In my characterization of the examples (28)–(31) I have focused on the live meaning of the full noun phrase ‘the ham sandwich’, but, as Nunberg points out, the transfer should originally be attributed to, as I call it, the live meaning of the predicate ‘ham sandwich’. “(...) there are a number of reasons for concluding that the transfer here takes place on the common noun meaning—that is, that this is a case of meaning transfer, rather than reference transfer. (...) the transfer actually takes place at the level of the common noun, which contributes only a property of persons (...)” (Nunberg 1995: 115–116). Thus, understanding ‘ham sandwich’ as a predicate applying to persons, instead of to food, the construction in (32) appears to be fine.

- (32) The ham sandwich that stumbled in the toilet wants to file a complaint.

A construction like we find in (33), however, is problematic.

- (33) ?The ham sandwich that fell on the floor in the kitchen wants to file a complaint.

Of course it is not unusual that, if a person has been served a ham sandwich that has fallen on the floor in the kitchen, he (i.e., the person) next wants to file a complaint. However, this reading of (33) seems to force us to read ‘ham sandwich’ in both ways: as a piece of food that fell on the floor, and as a person to whom it has been served, at the same time. With only one live meaning of ‘ham sandwich’ at our disposal, we feel inclined to either conclude that the customer fell on the floor in the kitchen, or that pieces of food are about to

complain about that. Neither reading is very plausible. Needless to say that there is nothing wrong with the *sentence* (33), neither are we incapable of assigning it some *interpretation*; however, the two most likely ones are very odd indeed.

Case 7. (*Nunberg 1979: 148*)

(34) The newspaper weighs five pounds.

(35) The newspaper fired John.

Obviously, the pack of paper that weighs five pounds is not an entity that is capable of firing people; or, the organization that fired John is not something that has a weight that one expresses in pounds. Obviously, 'the newspaper' should have as its live meaning the pack of paper in an ordinary use of (34), while it would normally be the publisher in one of (35), and this is what explains (36) and (37) to be odd.

(36) The newspaper weighs five pounds. ?It fired John.

(37) ?The newspaper weighs five pounds and fired John.

Sure enough, as also imagined by Nunberg, one can focus on the newspaper that is lying on the table, and say 'They fired John,' and 'And it weighs five pounds today.' In that case one and the same object may both serve to establish a live referent for 'they', i.e., the publisher of the newspaper, as well as directly figure as a live referent for the pronoun 'it,' the hard copy on the table as an instance of today's edition. But in that case the newspaper as an organization is present both as a live meaning and directly, demonstrably, present in the form of the hard copy.

Observe that, moreover, with some imagination, we *can*, if need be, make sense of the following statement.

(38) ?There are five newspapers lying on the table, and John is fired by two of them.

Surely this really requires some forceful conceptual coercion, and, no doubt, *some* will deem this coercion unacceptable, while *others* will not complain. For notice that making sense of (38) anyway requires (making sense of) live meanings of 'newspaper', 'lying on' and 'firing' that allow the latter two to apply

to the first kind of thing. This, one might say, is where some people give up, and others don't.

Case 8. http://en.wikipedia.org/wiki/The_Brothers_Karamazov (accessed on April 29, 2014)

"Although Dostoyevsky began his first notes for *The Brothers Karamazov* in April 1878, he had written several unfinished works years earlier." "Dostoyevsky spent nearly two years writing *The Brothers Karamazov*, which was published as a serial in *The Russian Messenger* and completed in November 1880."

We may conclude:

(39) Dostojevsky began *The Brothers Karamazov* in 1878. He finished it in 1880.

As a matter of fact, I got a copy of *The Brothers Karamazov* from my grandmother early winter 1977, and I read it over the Christmas break. It is true to say that:

(40) I began the book by the end of 1977, and finished it ten days later.

Books are a philosopher's nightmare. Not only should they be read and written, but they come in editions, versions, hard copies, in thoughts and in bookshops. Not only are their identity conditions hard to settle, conceptually, practically and legally, they also easily turn into events, as the above cases are meant to show. Books can be written, published and completed (and stolen from the library). Thus, as can be seen from the examples (39) and (40), the noun '*The Brothers Karamazov*' can be used to denote the event of writing the book, which Dostojevsky started in 1878, and an event of reading it, which I for instance completed in 1978. However, it cannot be used to denote both events at the same time. It appears to be particularly odd to conclude, from (39) and (40):

(41) ?Dostojevsky began *The Brothers Karamazov* in 1878. I finished it in 1978.

What I read is what Dostojevsky wrote, *The Brothers Karamazov*. So what he began in 1878 is what I finished in 1978. Or not? What he began was writing *The Brothers Karamazov*, and what I finished was reading it, so not the writing of it. So what Dostojevski began in 1878 is not what I finished in 1978, and upon the most common understanding of (39) and (40), it does not allow one to con-

clude to (41). We find that what feeds the compositional interpretation of utterances like (39) and (40) is, as the contextualist would have it, a highly context-dependent interpretation of a constituent expression, but once more we find that it does act as a genuine, live, constituent of the interpretation of the whole.

The following case is imaginary, even in fiction.

Case 9. Clark Kent has revealed, maybe even shown, to Lois, a day before, that he can fly, to her great surprise, of course. One may report:

(42) Yesterday Lois Lane discovered that Clark Kent can fly.

If one is familiar with what is really going on in the (fictional) series of comics or movies, one may be quite unwilling to accept a continuation of (42) with (43).

(43) ?Of course, she already knew that.

The reaction with (43) is marked because one discovers things one did not know before, so Lois could not yet have known what she subsequently discovered. Notice that a continuation with (43) is not totally out, however, because one may use 'know' in the sense of 'in a sense 'know'', and thus one may, with an utterance of (43), claim that, for instance, Lois already had this vague suspicion that Clark Kent was capable of much more fancy things than just writing dull reports for the Daily Planet, and maybe fly. (Like, e.g., Superman!) The utterance then can be used to state that such a hunch of Lois' has suddenly become plain knowledge.

However, if the utterance of (43) relates to Lois' ordinary, plain knowledge, it is really odd, or even outright in contradiction with a preceding utterance of (42). What Lois then is said to have discovered is something which, thus, she is said not to have known before, in contradiction with (43).

Even so, it is not contradictory to observe that Lois indeed already knew that Clark Kent can fly, upon a different interpretation of the clause 'that Clark Kent can fly,' viz., as one involving Clark Kent known as Superman.

(42) Yesterday Lois Lane discovered that Clark Kent can fly.

(44) Of course, she already knew that Clark Kent can fly (...)

With such a 'reinterpretation' of 'Clark Kent' in the sequence (42)–(44), the sequence seems perfectly fine. Sure enough, such an utterance of (44) may require some clarification, as with (45).

- (45) (...) because, she knew that Superman can fly, and Superman is Clark Kent.

The utterance of (44) can be felicitously understood, not by another rendering of the type of knowledge involved, but by a different rendering of Clark Kent, as Superman. Notice that this is possible only because the same (sub-)sentence, “that Clark Kent can fly” is restated, and because it may be interpreted differently on its second occurrence. In contrast, the demonstrative pronoun ‘that’ in (43) does not allow for an analogous reinterpretation of the original (sub-)sentence, because it can only be meant to pick up the live meaning of the (sub-)sentence in (42), and upon this interpretation Lois is claimed not to have (really) known the very same thing before.

I believe the observations about (43)–(44) are intuitively clear in the absence of, or even thanks to, any discussion of these examples in theoretical terms, like that of ‘de dicto’ and ‘de re’, or ‘modes of presentation’. Evidently, if one is, naturally, puzzled by the observations, some at least modestly theoretical analysis may evolve of what it then is that is discovered, and what is known, by Lois, hence there is nothing intrinsically wrong or counterintuitive about the urge to analyze. Even so, the primary conclusion, given what we know about Lois and Clark, is that (43) is odd in the context of (42), while (44) is not. So even without trying to pin down what the contributions of the embedded sentences exactly are, they apparently must be the live meanings on their occasion of use.

It may be both illuminating, as well as a further distraction, to see that one might supplement the utterance of (44) in response to that of (42) with:

- (46) But she did not know that Clark Kent is Superman.

or, even worse, with:

- (47) For she did not realize that Clark Kent is Clark Kent.

An utterance of the latter sentence can be understood under a conception of the referent of the first occurrence of Clark Kent in (47) as that of Clark Kent as he is conceived of in the utterance of (42), and a conception of the referent of the second occurrence with that of Clark Kent as he is conceived of according to the utterance of (44); i.e., as the reporter of the Daily Planet and Superman, respectively. I believe an utterance of (47) is intuitively quite fine, even though people may think it extremely puzzling. (In the presence of an analysis.)

Case 10.



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Case 10 has been photo-shopped by a student of mine so as to display a reading, deemed impossible, of sentence (50) below. First notice that in this cartoon, (48) and (49) are both true on a most obvious reading.

(48) Tom paints a mouse.

(49) Jerry paints a mouse.

For, there is a mouse, Jerry, and Tom is (body-)painting him, and, Jerry is creating a mouse on linnen, out of his imagination. However, people are hesitant to conclude to (50), as pictured in case 10:

(50) Tom and Jerry paint a mouse.

As a matter of fact, I myself have come up with the displayed reading, as an example of one that the sentence does *not* have. However, it has become clear that at least some people have no problem with it, and that most at least get the joke. Now, of course, one may quarrel whether the joke is a joke because there is really something *wrong* with example (50) in view of case 10, or that the joke is that it is just *unexpected*. To me, it seems, it is not the task of a formal semanticist or a philosopher of language to decide on *that* issue. Rather, we may conclude that at best it is up to us, as teachers, say, to *decide* (sic) whether such a mixed reading of ‘paint’ is allowed to be a live one or not. In line with the previous section, we may conclude that the intended reading, rejected or not, is negotiable.

What I hope the discussion of these ten cases makes clear is that, first, there are obvious interpretations of constituent expressions of full sentences which are heavily context dependent, and, second, that these are present, live, while other possible interpretations are not. The cases thus supply support for a live interpretation of the principle of compositionality, as stated in the LPoC. This observation also complies with the fact that what actually *are* the live interpretations of constituent expressions can be a matter of discussion—or that they are negotiable, as we may as well say. This, latter, fact, can be taken for granted not just in literary, legal, or philosophical practice, but just as well in our very daily practices.

4 Live Methodology

4.1 *Abundant Elusive Meanings*

With the live principle of compositionality I have formulated an understanding of the principle of compositionality that formally suits the principle as it is generally accepted, or debated, and that nevertheless allows for an intuitive accommodation of contextualist findings. It does not come for free, though. For, it at least challenges us to rethink the ideal of a minimalist semantics, according to which a sentence (not: utterance) can be assigned propositional or truth-conditional content independent of its context of use, and one which plays a substantial role in the determination of the content conveyed by all or

most utterances of it. The live principle purports to characterize live meanings of utterances, in terms of the live meanings of their constituents, and does by itself *not* abstract away from contexts of use. Rather, it purports to characterize meanings or sentential contents as a property of sentences or expressions *used* in a context, and as the cases above may serve to suggest or show, these are not in the first place characterized by context independent meanings.

It is worthwhile to notice that, besides the acknowledged pervasive role of contexts of utterances, there is no real departure from traditional concepts of meaning and use. Even though it has not been said above, nothing stands in the way of characterizing contents of descriptive sentences or utterances in terms of truth-conditions. And once the (live) truth-conditions of an utterance have been determined, other pragmatic factors may kick in to establish or describe what a person may do, or convey, or achieve, with the utterance with that (live) meaning. This part of the story suits the classical picture quite well. The difference with more traditional conceptions of the semantics/pragmatic interface resides in the fact that although the LPoC does allow for a notion of 'literal' meanings of expressions independent of context, it does not attempt to phrase their live meanings as a function from these 'literal' meanings, but from the live meanings of their constituent expressions. True enough, the live meanings of the basic constituent expressions may functionally derive from the 'literal' meanings that these can be taken to have, so that after all, formally, the live meanings of compound expressions can be ultimately derived from the 'literal' meanings of their basic constituent expressions, but this would rob the LPoC of its true intuitive intent.

The LPoC can be motivated by the insight that, on the one hand, natural language is good as it is, that it normally functions well, and that we have sufficient knowledge of the meanings of expressions used, while, on the other hand, we think this should not lead us to think or postulate that there exists an independent realm of meanings. Willard van Orman Quine famously observed:

Uncritical semantics is the myth of a museum in which the exhibits are meanings and the words are labels. (...) The primary objection persists even if we take the labeled exhibits not as mental ideas but as Platonic ideas or even as the denoted concrete objects." "Seen according to the museum myth, the words and sentences of a language have their determinate meanings. To discover the meanings of the native's words we may have to observe his behavior, but still the meanings of the words are supposed to be determinate in the native's *mind*, his mental museum, even in cases where behavioral criteria are powerless to discover them for us. When on the other hand we recognize with Dewey that "meaning (...) is

primarily a property of behavior,” we recognize there are no meanings, nor likenesses nor distinctions of meaning, beyond what are implicit in people’s dispositions to overt behavior.

QUINE 1968: 186/187

However, this does not amount to saying that we cannot make sense of the notions of ‘meanings’, ‘contents’, (...) that we, after all, talk about without problem, and that also serve as useful methodological tools in formal, empirical and philosophical analyses of natural language. On the contrary. But by the end of the day, the tools or the roles they play, have to be explained—not as insuperable inalienable, and unquestionable entities in our minds, or in a third realm of meanings—but in terms of their actual use, or of the functional role that they play in the life of (verbal) agents in their actual (phenomenological, social and ontological) and linguistic (formal, mental and lexical) appearance.

So, even if I do not, or do not aim to, supply independent identity conditions on meanings, the fact remains that my discussion of all of the above cases draws from some notion of (differences of) meanings that I hope we can make sense of. These meanings are meant to serve as auxiliary tools in the works of both empirical and theoretical semanticists, for we do believe, and indeed see, that there are structural, semantic, properties of utterances that they help to pin down. My descriptions of what might go on in each of the cases discussed above employ notions like coreference, coercion, ellipsis, notions which figure in a web of obviously semantic terms. (A few more can be found a bit later in this section.) Of course, a description of semantic phenomena, no matter how pragmatically infected they are, cannot do without a proper semantic vocabulary.

4.2 *Two Tenets of Formal Semantics*

The main import of the LPoC is obviously given by the term ‘live’, which, like I said above, I have deliberately left rather unspecified. The term figures in the principle as a term of art, in the sense of the later Wittgenstein, that is, in its usual sense, with its own ‘live’ meaning. Like I also said, this may leave one wondering whether this does not imply that the principle may let anyone go with anything. I hope it may be clear I think this is not the case. On the contrary. The ‘live’ interpretation of the LPoC itself saddles those interested in the meaningful use of language with quite a substantial task: that of bringing to light how people manage to interpret utterances that are intended to be meaningful. Surely the LPoC, like the very original formulation of the principle of compositionality, itself already lays bare a general format of meaningful linguistic construction work.

All linguistic structure that has been brought to light by linguists and more in particular semanticists still lies there, most of it at least, as a body of almost undeniable evidence. We need not think of the revealed structures as actual realities, lying there for us to grasp and make mathematical sense of, but as structural patterns in our linguistic behavior, patterns that we adapt to—not necessarily, but contingently and practically and also conventionally. For denying that there exist (linguistic) rules of such and so kind, over and above the tendencies in our behavior, does not imply the unreality or irrelevance of any of the linguistic observations and generalizations made about that behavior or about our inclinations. What I have said at best serves to qualify them. Qualify them in the sense that they (are intended to) describe how we practice language, and how we refer, and predicate, and make generalizations, abstractions and idealizations ourselves. And then indeed, it is very often methodologically convenient to state these observations and generalizations in terms of models, and the more mathematical models figure as the more transparent models, for the working linguist. However, such models constitute the semanticists' reality, not (necessarily) that of the modeled agents.

Besides compositionality there are at least two basic tenets which one may adhere to, as a heuristic guideline, which provide a point of view from which significant regularities in our verbal behavior become visible. They serve to bring to light natural and justified patterns according to which our verbal behavior is apparently structured. The tenets generally take the form of slogans, but should not be taken to be dogmas, but, rather, position statements. (Of course, other perspectives and tenets are equally viable, significant, and productive.)

The first, I believe very productive, tenet is that of truth-conditionality.

Tenet 1 (Truth-Conditional Semantics) *The meaning of a sentence is given by the conditions under which it would be true; the meaning of sub-sentential expressions resides in their contribution to the meanings of the sentences in which they occur.*

Frege introduced truth values as the referents of sentences and propagated meanings as determinants of referents, and he has obviously worked in the spirit of this tenet (Frege 1892). A statement very close to it can be found in the early Wittgenstein: "Einen Satz verstehen, heißt, wissen was der Fall ist, wenn er wahr ist" ("To understand a sentence means knowing what is the case in case it is true", Wittgenstein 1922: 4.024). The tenet has been further motivated, and cashed out, in the second half of the 20th century, in the work of Donald Davidson and Richard Montague and of those who purchased this line of work (Davidson 1967; Montague 1974).

I probably don't need to say much about the viability and productivity of the tenet of truth-conditionality, but it may serve our purposes to emphasize two points. First, the tenet is intuitively plausible in the sense that one can focus on a prime use of language as that of being informative about the world. The main question (and for some: the only) then is, if a sentence is supposed to tell me what the world or situation is like, I need to know what the world or situation should be like if the sentence were true. The linguistic work hinted at above reveals that natural languages have sophisticated means to serve this descriptive function. Second, together with the principle of compositionality, the tenet may serve in an explanation of how language can be learnable. An agent learning a common language may ground his knowledge of it in the correlations he detects between utterances of sentential expressions and the situations he and his interlocutors find themselves in. This is not even half of only a thumbnail of such an explanation, but it does provide a picture.

The tenet of truth-conditionality, as generally stated and employed, and also as it has been stated here, abstracts from the use of sentences. As long as one can live and work with a use-independent notion of sentences this is fine of course, and once the use of sentences does come to play a part, the meanings of sentences can, at will, be construed as abstractions over utterance meanings. The second tenet relates to this observation as well as to a felt limitation imposed by the first tenet. It appears to be a truism that the interpretation of natural language expressions is not only seriously context dependent, but also that their meanings also reside in the changes they may induce in the context of their interpretation. The idea has become popular, and relatively widespread, that the meanings of sentences are 'context change potentials'. (E.g., Groenendijk & Stokhof 1988; Heim 1982; Kamp 1981, and many of their followers.) A first, not ideal, formulation of such a new, dynamic conception of meaning consists in the slogan that "You know the meaning of a sentence if you know the change it brings about in the information state of anyone who accepts the news conveyed by it" (Veltman 1996: 221). Put thus, the idea comes close to Jaakko Hintikka, who already noted that "it seems to me in any case completely hopeless to try to divorce the idea of the meaning of a sentence from the idea of the *information* that the sentence can convey to a hearer or reader, should someone truthfully address it to him" (Hintikka 1969: 22). Hintikka subsequently wondered "Now what is this information?" and argued that it is derived from the sentence's truth conditions. Now, we may notice that if that were also the news that the above slogan is about, the endorsed new and dynamic concept of meaning could be traced back to the old, truth-conditional one. (As is actually done in, e.g., Dekker 2012; Stalnaker 1978, 1998).

Obviously, the changes in information states people tend to talk about are often supposed to be more than information update only, but then the idea of a sentence's meaning as an information state change potential starts to lose its original appeal. How, for instance, would people be able to learn them? By carefully looking at information states, and watch how utterances change them? This answer seems preposterous, as probably is the idea that inspired the question in the first place. Even so, a strong conviction remains that there is something crucial about the idea that meaning is not only essentially indexical (context dependent), but also inherently dynamic (context changing). So let me try and bring the idea back into a more mundane form: "You know the meaning of an utterance if you know the change it brings about in the situation you are in." More formally, and specifically:

Tenet 2 (Dynamic Semantics) *The meaning of an utterance resides in the change it brings about in the situation in which it occurs. The meaning of a sentence resides in its regular contribution to the meanings of utterances of it.*

This tenet can be taken to state, and it is at least intended to resemble, a genuine folk notion of meaning. It is intuitively general, it covers the impact of all kinds of political, methodological, or philosophical statements, and it naturally accommodates other types of uses of expressions, like questions, commands, and permission statements. This certainly lifts quite a bit of the bias initiated by the first tenet. The tenet also points at aspects of meaning which are very well learnable. An agent learning a common language may ground his knowledge of it in the correlations he detects between utterances of expressions and changes in the situation he and his interlocutors find themselves in.

The first half of the above tenet is of course way too general for linguistic or semantic purposes, for it may include any (that is, all) effects of any single utterance, which are too many to be of theoretical interest. The second half therefore zooms out to find the contributions utterances of certain expressions generally make, in order to isolate their systematic linguistic roles. Here we find a proper breeding ground for abstraction and idealization—and critical discussion, of course—as well as a relatively fresh start for new observations. Much relatively recent work on the so-called semantics-pragmatics interface, and at least most of the work that escapes the scope of truth-conditional models, can be conceived of from the perspective of this tenet. Notice, though, that the perspective on language, as given by this tenet, natural and productive, is neutral, linguistically, cognitively, phenomenologically, and sociologically speaking. Notice, too, that it, indirectly, but crucially, appeals to live meanings.

4.3 *Live Composition and Interference*

Returning to the very formulation of the LPoC, one may observe that I have also added, but parenthesized, the qualification 'live' where I referred to the mode of composition. The qualification has been parenthesized because it gives a rather obscure and dubious qualification of the mode of composition which I prefer not to dwell upon too much. It has been added, nevertheless, because it naturally raises some interesting issues about understanding, and that is why it is addressed here after all (superficially though). The notion of a live mode of composition allows us to set aside, for the moment at least, the notion of 'the (syntactic) analysis of an expression', and instead talk about the analysis of an utterance. This shift of attention may not be innocent, and it may also not be without methodological repercussions, but it squares well with our ordinary conception of analyses of expressions as rendering readings of expressions. Once we settle on one such analysis of an expression, and conceive of it as the live mode of composition on an occasion of use, we naturally get at its reading or interpretation on that occasion, or at least at a substantial part of it. Moreover, more importantly, and therefore maybe more dubiously, the qualification also allows for more flexibility in our engagements with envisaged rules of grammar. Surely I would not even want to suggest that there are no such rules. On the contrary, one of the main tasks of the linguist consists in spelling them out, syntactic as well as semantic rules. However, rules, of any kind, can be violated, overruled, or played with, in practical life—for practical reasons, or cognitive, or social ones—without this automatically making the offender opt out of the language game. (As a matter of fact, some such deviations can be argued to be at stake in our last five cases.) Of course, much more can be said, and need be said, about this issue, but I hope these marginal remarks suffice to clarify to some extent why the qualification 'live' has been added to the notion of mode of composition, and also why it has been parenthesized.

It may have worried the reader that an obscure notion of meaning has been replaced by an even more obscure one, and that the latter can be invoked to establish the vacuous result that any expression can have any meaning based on any meaning assigned to its constituent parts. As a matter of fact, this was kind of the worry about the compositionalist rendering of contextualist findings in the modulated principle of compositionality as presented by Pagin and Pelletier. Let me here, first, point out, rather trivially, that this is not by itself a bad result. For any expression *can* have any meaning on the basis of any meaning assigned to its constituent parts. There is nothing about the name, or inscription, or sound, 'Nixon' that makes it refer to Nixon. It is only when expressions or utterances are understood as figuring as types or tokens of a

language, or a language game, that we can make sense of assigning non-trivial meanings to them.

Moreover, despite formal appearances to the contrary, the assignments of meanings to constituent expressions, and to compound wholes, are not at all arbitrary, and the intention of the LPoC is to account for especially this fact by employing the cover term 'live.' The live meaning of a compound is determined, so it can be argued for, by means of the live meanings of its constituents, but such an argument rests on the assumption that one can make sense of such live meanings of such constituents. Naturally, not anything goes here. While it is not impossible to give an interpretation of (3) as (51):

(3) Few philosophers are linguists.

(51) Paris visited John.

it would involve a situation in which there are vast and very specific deviations in the use of the constituents of (3) from ordinary English as it is normally used, and it surely serves no obvious purpose to make up a situation in which such deviations occur. The interesting cases are those we naturally encounter in ordinary texts and conversations, where we do find uncertainty, unspecificity, and ambiguity of, and deviation from, off the shelf interpretations of constituent expressions, but ones that we can make sense of—and 'making sense of' is here understood in, normally, principled ways that are subject to intuitive, philosophical, but also empirical, social, investigation.

The idea that, in the interpretation of natural language anything *might* go, but *doesn't* go in practice, can be put to work in an assessment of proposals for things that don't go, but, for as far as the LPoC suggests, might have worked out well after all. This already happens with an example we have discussed above.

In my discussion of case 8, I gave a '?' to example (41), but the attentive reader may have noticed that, in passing, I denied the claim that what Dostojevsky began in 1878 is what I finished in 1978. By stating the denial the way I did, this didn't render (41) *infelicitous*, as was indicated by my '?', but *false*, upon the live interpretation suggested by the description of the case. This very fact also suggests a way of rendering it coherent, i.e., as possibly true. Actually, this already works on a fairly natural interpretation of (52), if we consider what Dostojevsky started and what I might have finished as the beginning and end of one and the same event.

(52) ¹Dostojevsky began *The Brothers Karamazov* in 1878. I finished it in 2013.

The example can be understood to be acceptable, and true, in a suitably adjusted context. We can adopt an interpretation of '*The Brothers Karamazov*' where it denotes, say, a literary accomplishment realized at a stretch of time beginning with Dostojevsky's writing it, and ending with my reading it. For instance, if a critic thinks he has written the ultimate, killing, review of the book in 2013, after which nobody is supposed to ever want to read it any more, then he may feel justified in stating (52). Upon such a reading '*The Brothers Karamazov*' denotes one big literary event.

Also in case 1, Anne's son might have felicitously replied with (7) upon a different interpretation, by him and possibly others, of what he was doing in both of the situations set up by Bezuidenhout. Perhaps, for him, this was all about detecting redness among sets of apples, and then, while slicing, he found red stuff just like he did the day before, picking through the barrel.

Some such re-reading is common place in the semantics literature. A telling and well-known example relates to the classification of verbal phrases as states, activities, accomplishments or achievements (Vendler 1957). Such classifications are often presented by means of examples of phrases that do, or do not, allow to be put in the progressive, or can, or cannot, be qualified by *for*- and/or *in*-phrases. Thus, we find (un-)grammaticality or (in-)felicity judgments like the following in the literature:

(53) *Romeo recognized Julia for/in an hour.

(54) *Parmenides was an ancient philosopher in an hour.

However, such classifications tend to be overruled by suitable reinterpretations, or re-readings of the predicates involved. Once we stretch the notion of recognition employed in a use of example (53), or that of being a philosopher for example (54), to a suitable category of events or states, the two examples are felicitous after all. Would this then show that a categorization of verbal phrases into certain aspectual classes has therefore been refuted? Not at all, it seems. Rather, the required reinterpretation of the relevant verbs or predicates may bring to light the semantic properties that allow them to be qualified, for instance, by certain adverbial phrases.

Another case is presented by Cohen (2001), quoting an example from Burton-Roberts (1977).

(55) *A king is generous.

The sentence, with the noun phrase ‘a king’ read generically, is claimed to be odd because, according to Cohen, a generic use of such an indefinite singular subject, requires it to be paired with a law-like predicate. Example (55) “is bad because being generous is not part of the definition of **king**”. However, when such properties “*are* used in a definition, the sentences become acceptable” (Cohen 2001: 201). A sentence like (55) “may, in the appropriate context, receive such a reading:

- (56) Sire, please don’t send her to the axe. Remember, a king is generous.”
(Cohen 2001: 197)

Generalizing over such cases and discussions we may observe the following caricature of a characteristic pattern. Certain linguistic proposals start with the presentation of a couple of constructions deemed dubious, which are marked with a *, then continue by opposing them to certain unproblematic examples, and next raise and answer the question what the difference resides in. (Often this marking of grammaticality is qualified by a footnote, or by the mark itself, consisting in, e.g., one or two or even three question marks, and adjoined with the qualification “in an out_of_the_blue context”.) In the semantics literature these answers tend to consist in the identification of a certain semantic property that an element in the construction typically has or lacks. The LPoC can then be invoked by means of an interference principle so as to test the viability of the given explanation. For, a most obvious test of the proposed explanation would consist in setting up a case in which the element that has induced the infelicity mark in the original example, can be read as having, or lacking, the responsible semantic property. It may be useful to formulate and label this point explicitly as another principle.

Interference Principle *If (the lack of) a semantic property π of an expression X is proposed as an explanation of the fact that X does not felicitously figure in configuration $^*\phi(X)$, then in a context in which the live meaning of X fails (has) π , it should, all else being equal, render X felicitous in $^*\phi(X)$ again.*

As I indicated, this principle is already appealed to in live discussions between semanticists and it can be deliberately invoked whenever a certain suitable, well-formulated, proposal is made about the acceptability or felicity of certain linguistic constructions. However, notice that such a principle only makes sense when one allows for a notion of live meanings. For if expressions are

assumed to have one literal or linguistic meaning only, then infelicity would be systematic, and ought to be without exceptions. It may be clear, from the position adopted in this paper, and from the contextualist findings, that such a rigid notion of interpretation better be given up. Notice, moreover, that the interference principle literally presupposes that we can generalize over expressions, contexts, configurations and semantic properties. Thus, the principle only makes proper sense within (i) an enterprise of formal semantics that (ii) eventually takes live meanings to heart.

5 Conclusion

The aim of this paper has been to maintain and substantiate a formal semantic approach to natural language in view of deemed obvious contextualist findings. In particular, I have argued for a notion of compositionality of meaning, with just that amount of intuitive or philosophical substance that allows for the accommodation of these findings while not rendering the principle entirely vacuous or trivial. By means of a survey of a number of cases I hope to have demonstrated that the principle allows for a flexible concept of interpretation. I have also argued that it naturally fits the well-motivated paradigms of formal semantic analysis.

The tenets of truth-conditional and dynamic semantics unfold a perspective on the meaning of natural language expressions that help us reveal significant structures and principles, as is generally assumed. The (live) principle of compositionality can indeed be taken to be one of such principles. The corresponding insight that semantic principles apply to live meanings furthermore allows for a specification of the interference principle, as it is called here, which can be used as a methodological tool, and that actually is invoked and that can be systematically applied in a variety of linguistic discussions.

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Operators for Definition by Paraphrase*

Mats Rooth

1 Introduction

Define a semantic lexical entry for *want* as used in (1b) whose first argument is a property contributed by a VP complement, and which makes (1b) equivalent to (1a), assuming our established semantics for the words and constructions in (1a). Next define a semantic lexical entry for *self* as used in (2b) whose argument is the verb *admiring* and which makes (2b) equivalent to (2a). Then give a semantics for DP-embedding *want* as used in (3b) that makes (3b) equivalent to (3a), assuming our semantics for the words and constructions in that structure.

- (1) a. Justin₁ wants himself₁ to be asleep.
b. Justin [_{VP} wants [_{VP} to be asleep]].
- (2) a. yeti who₁ admires himself₁.
b. [[self- admiring] yeti].
- (3) a. Justin₁ wants to have a duck.
b. Justin [_{VP} wants [_{DP} a duck]].

Finally, define a type-raising operator *RAI* which as used in (4b) combines with the quantified object *everybody* and the transitive verb *admires* to produce a semantics equivalent to the semantics of (4a), where the object is quantified in.

- (4) a. [[everybody] ₁ [Justin admires e₁]]
b. Justin [admires [*RAI* everybody]].

These are problems of *definition by paraphrase*, where one is to find a semantics for a given word that creates an equivalence with a sentence or phrase whose lexical and compositional semantics is already established. Such problems

* Thanks especially to students in my Semantics II classes at Cornell for reactions to versions of the material presented here. Thanks also to Dorit Abusch, Marcus Kracht, and Paul Dekker for comments on the manuscript.

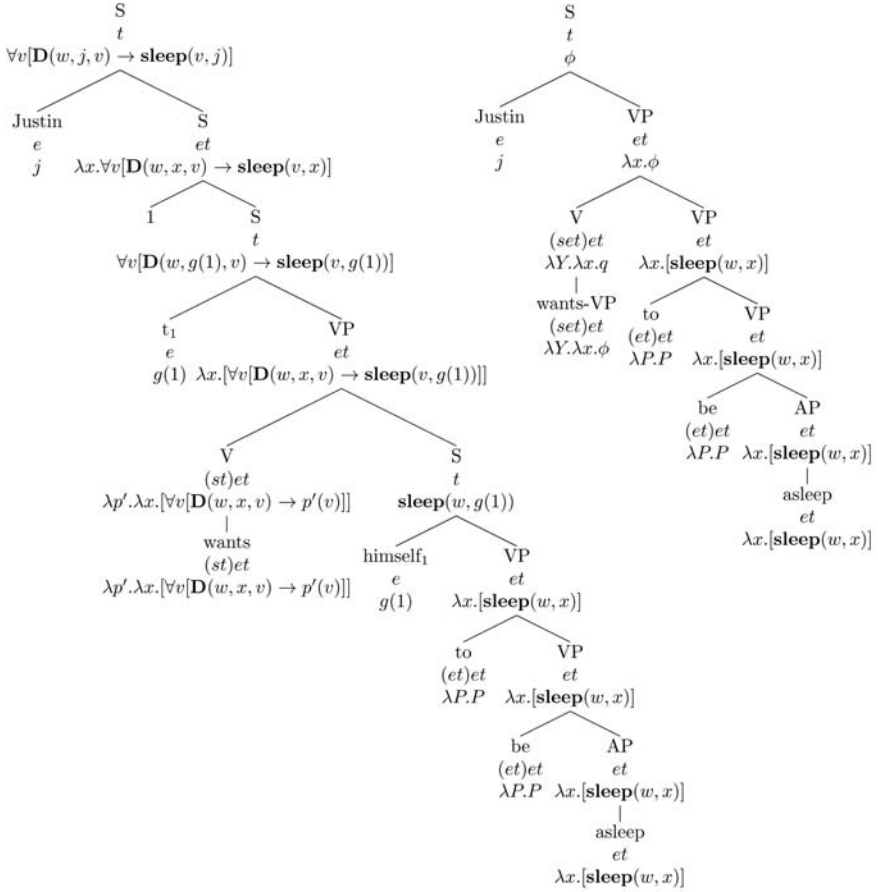


FIGURE 1 On the left, a semantic derivation for (1a). On the right, a skeletal derivation for (1b).

come up in semantics problem sets. In research, definitions by paraphrase are used as a clue to lexical-semantic primitives and compositional patterns (e.g. Zimmermann 2006), even when the paraphrases are felt to approximate. Or as in (4), a technical problem can be posed as a problem of definition by paraphrase.

Here is a marginally useful recipe for solution, illustrated for (1). On the left in Figure 1 is a textbook semantic derivation for (1a). Each node is labeled with a denotation expressed as a lambda term, and a semantic type given using Link type labels (Link 1979). The denotations are relative to a world of evaluation w and assignment function g that gives values for free variables. The expressions are built up from lambda, variables, logical vocabulary, and function primitives such as **sleep**, which is a two-place function that maps a world and an

individual to a truth value. D is a primitive attitude modality, with $D(w, x, v)$ understood as “ x ’s desires in world w are satisfied in world v ”. The semantic rules that are used are function application, variable binding, and function application after binding of the world variable for the argument—so-called intensional function application, which applies at the higher VP node (Heim & Kratzer 1998). The subject *Justin* is quantified in, in order to obtain a closed interpretation. In the formula at the top, w and v are world variables, and the semantics of (1a) with respect to a world of evaluation w is being rendered as “in any world v that satisfies Justin’s desires in w , Justin is asleep.” On the right in Figure 1 is a skeletal derivation for the second sentence, which shows the meaning of $want_{VP}$ as a lambda term with a dummy body ϕ . The lambda variables correspond to the complement VP (the variable Y) and the upstairs subject (the variable x). To solve the problem, we need to substitute the right thing for ϕ . It is clear that some combination of the lambda variables Y and x , the D relation, and logical spices are needed. This is loosely represented in (5a). Trying things out, we may arrive at (5b) as a denotation for $want_{VP}$, and verify as in Figure 2 that it produces the required equivalence.

- (5) a. $\lambda Y \lambda x [\dots x \dots Y \dots D \dots \forall \dots v \dots w \dots \rightarrow \dots]$
 b. $\lambda Y \lambda x [\forall v [D(w, x, v) \rightarrow Y(v)(w)]]$

This is a recipe that lists the ingredients, and then concludes abruptly with an instruction to combine them in the necessary way—something that calls for creativity or experimentation. The solution itself has an interesting positive point though. (5b) as used in Figure 2 produces a result that is not just semantically equivalent to the target, but syntactically identical to it as a lambda term. It turns out that the other problems can also be solved to give a result that is syntactically identical to the target, in the sense of being an alphabetic variant of it. This suggests that it might be possible to solve problems of definition by paraphrase syntactically, by some kind of tree-geometric manipulations and/or type-raising operators at the syntax-semantics interface. Figure 3 illustrates syntactic equivalence as lambda-terms for the *self*- problem.

2 The Scoping Method

In Figure 2, $want_{VP}$ combines with arguments *to be asleep* and *Justin* that are also present as constituents in the compositional structure for the target. Suppose that starting from the target derivation, we scope these constituents out in two steps:

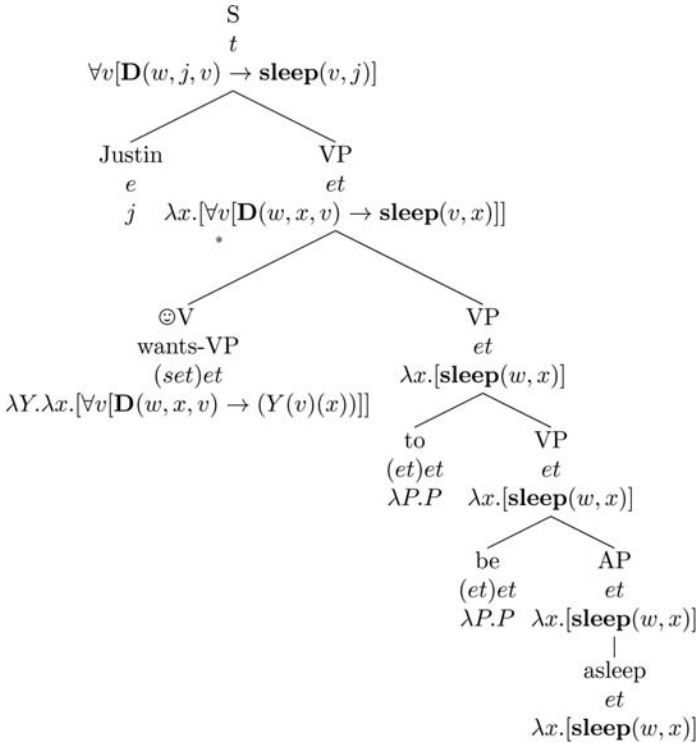


FIGURE 2 The semantic lexical entry (5b) for want produces a lambda term for the semantics of (1b) that is syntactically identical to the one for the target (1a).

- (6) a. $[[[_{\text{NP}} \text{Justin}] [\langle 1, e \rangle [\text{t}_{\langle 1, e \rangle} \text{wants } [_{\text{S}} \text{himself}_1 [_{\text{VP}} \text{to be asleep}]]]]]$
 b. $[[[_{\text{NP}} \text{Justin}] [[[_{\text{VP}} \text{to be asleep}] [\langle 2, \text{set} \rangle [\langle 1, e \rangle [\text{t}_{\langle 1, e \rangle} \text{wants } [_{\text{S}} \text{himself}_1 \text{t}_{\langle 2, \text{set} \rangle}]]]]]]]]$

Using the intensional type *set* for the trace of the VP in the second movement will ensure that scoping out VP does not change interpretation, because the moved constituent is modally closed. Another point about the VP movement is that it is a “zippering” QR, where the landing site for movement is between the moved subject and its binding index. In this process, the derivation at the left in Figure 1 has been unzipped into a right-branching structure, putting two arguments at the top, and the corresponding binders in a second block below them. Zippering LF movement (QR) is nothing new as a tree-geometric operation—it just involves a particular choice for the target of movement. Sauerland (1998) discussed an application of zippering QR to the semantics of cumulative predication, and Barker (2007) used it in an analysis of comparatives, in both cases

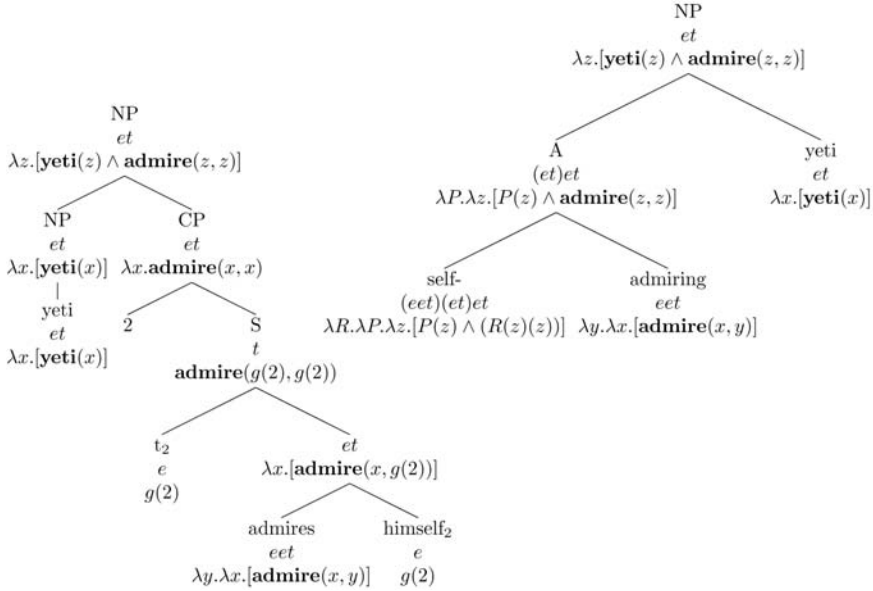


FIGURE 3 Syntactically equivalent results in derivations for yeti who admires himself and self-admiring yeti

in connection with non-standard semantic interpretations for scope. Here the semantic interpretation is the standard one.

Figure 4 is a semantic derivation for the unzipped paraphrase. As expected, we see the same result as in the the original derivation for the paraphrase. The new part is that the higher levels of the tree are isomorphic to the semantic derivation in Figure 2 for VP-embedding *want*. The two-place abstract $[1 [2 [...]]]$ that is marked with smiley in Figure 4 is annotated with the same lambda term as the verb *wants-VP* that is marked with smiley in Figure 2. And they combine with the same arguments in the same order. In consequence the interpretations at the top in the two derivations are syntactically equivalent as lambda terms, and the interpretation of the abstract $[1 [2 [...]]]$ can be used as a systematically derived interpretation for the verb *want-VP*, as shown in (7). One way of thinking about this is that if *want-VP* were syntactically complex and had exactly the syntax of the abstract $[1 [2 [...]]]$, then the derivation for the VP-complement example would be isomorphic all the way down to the derivation for the unzipped paraphrase. See Figure 5.

$$(7) \quad \llbracket want_{VP} \rrbracket =_{\text{def.}} \llbracket [1[2[...]]] \rrbracket$$

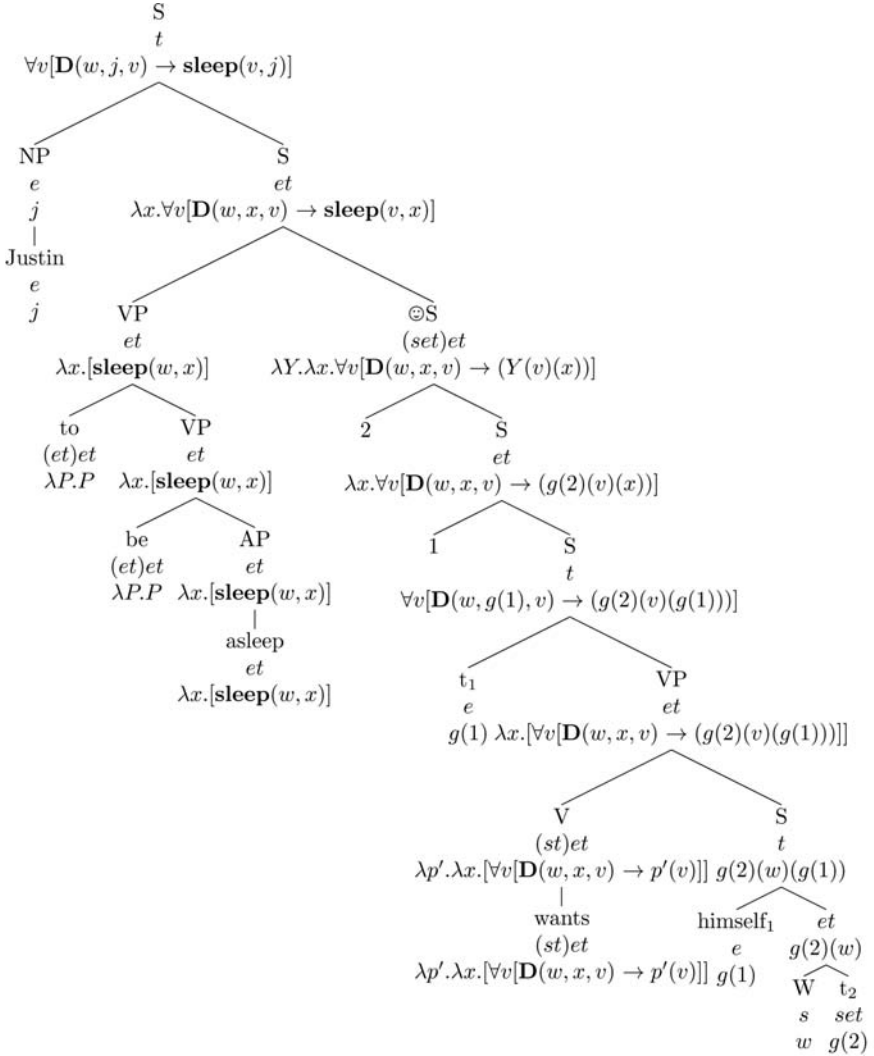


FIGURE 4 *The derivation on the left in Figure 1 unzipped. Working from the position between VP and 2 in the tree, the VP complement and matrix NP subject are above (in that order), and the corresponding binders 2 and 1 below (in that order).*

To obtain the equivalence, it is essential that unzipping the derivation for the paraphrase does not affect the semantics. In this case, this is so because of the intensional variable used for the trace of VP_2 . A related technical point is that at the position of the trace, the trace semantics has to be applied to the local world of evaluation in order to fit it into the local compositional context. This can be achieved with a special “intensional traces and pronouns rule”, or

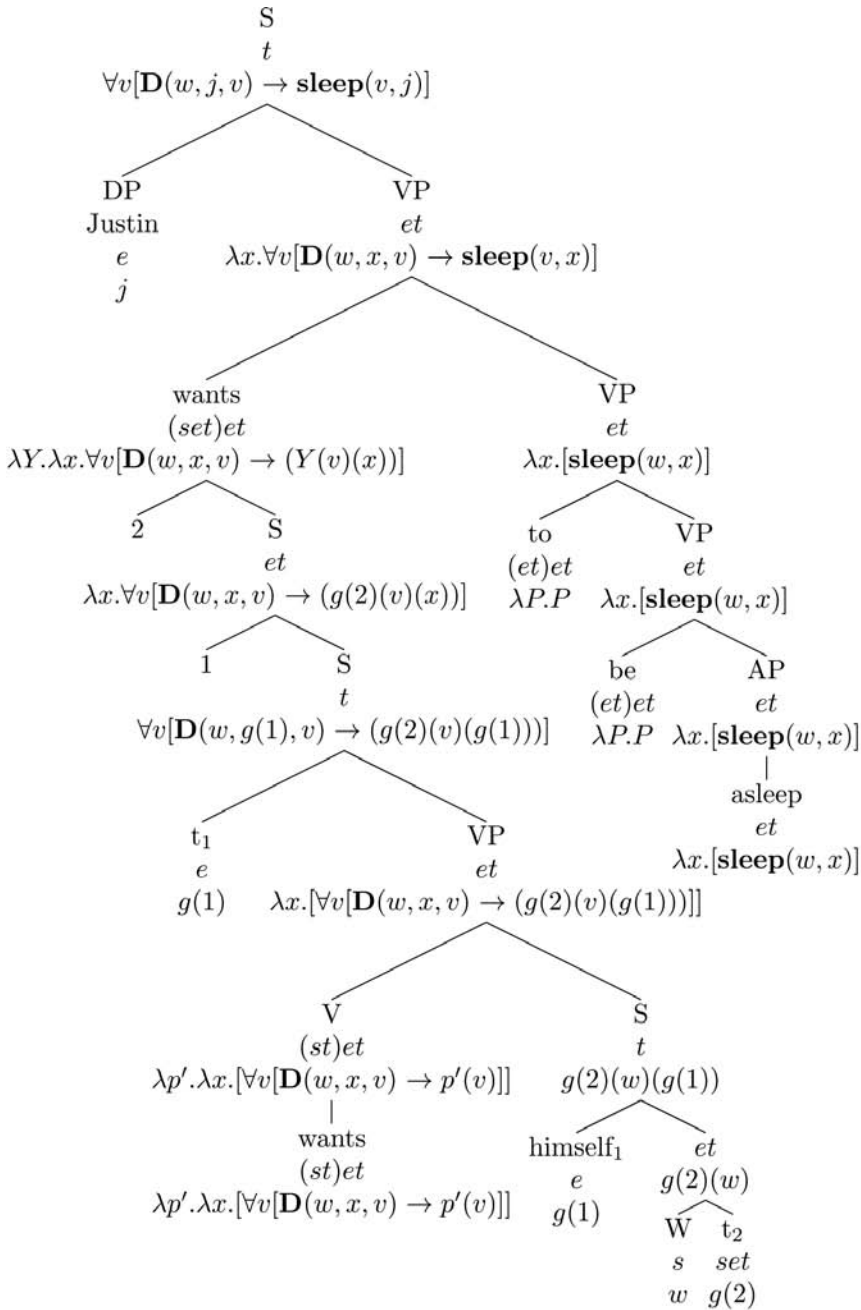


FIGURE 5 *The lambda abstract $[2 [1 \dots]]$ from the unzipped paraphrase used as a syntactic definition of VP-embedding want*

as in Figure 4 by putting the world variable explicitly into the tree; see Abusch (2012) for a statement of the intensional trace rule and an application of it. In generalizing the procedure, intensional variables should be used systematically for higher-type arguments.

Note that we obtain an equivalence between (8a) and (8b) for any NP_1 and VP_2 , not just the particular ones seen in (1).

- (8) a. NP_1 wants him/himself VP_2 .
 b. NP_1 wants VP_2 .

Turning to the self-example, since in (2b) *admiring* and *yeti* are to be the arguments of the morpheme *self*-, the pattern of definition is the same, because there are two arguments. Figure 6 shows the result of definition by paraphrase, with the syntactic abstract coming from an unzipped paraphrase used as a syntactically structured definition for the target word. Vertiginously, the syntax tree below *self*- consists entirely of variables and binding indices. The derivation in Figure 6 uses an extensional system of interpretation.

The derivations in this section were computed using the derivation calculator designed and implemented by Lucas Champollion and his colleagues (Champollion & Tauberer & Romero 2007, Champollion & Tauberer & Romero & Bumford 2013).

3 Operators for Definition by Paraphrase

This section reworks the procedure from Section 2, using type-raising operators in place of syntactic scoping. The goal is to tie the combinatory syntax of the defined word with the derived semantics, and to derive that semantics completely mechanically. This will be done with some cross-categorical operators that are employed uniformly. The procedure is illustrated in (9) for the problem of defining the operator *RAI* that combines with a quantified nominal, a transitive verb, and its subject to quantify in the nominal with minimal scope. As shown in (9a), the first argument in the source derivation is modified with an operator *A3* (for the argument that is third from the last). The second argument (the transitive verb) is modified with *A2* (for argument that is second from the last), and the last argument in the source derivation (the subject) is modified with *A1* (for last argument). The operators *A1*, *A2*, and *A3* are designed so that both the target meaning for *RAI*, which is (9b), and its target syntactic category, which is (9c), can be extracted trivially from the semantics and categorial syntactic category for (9a).

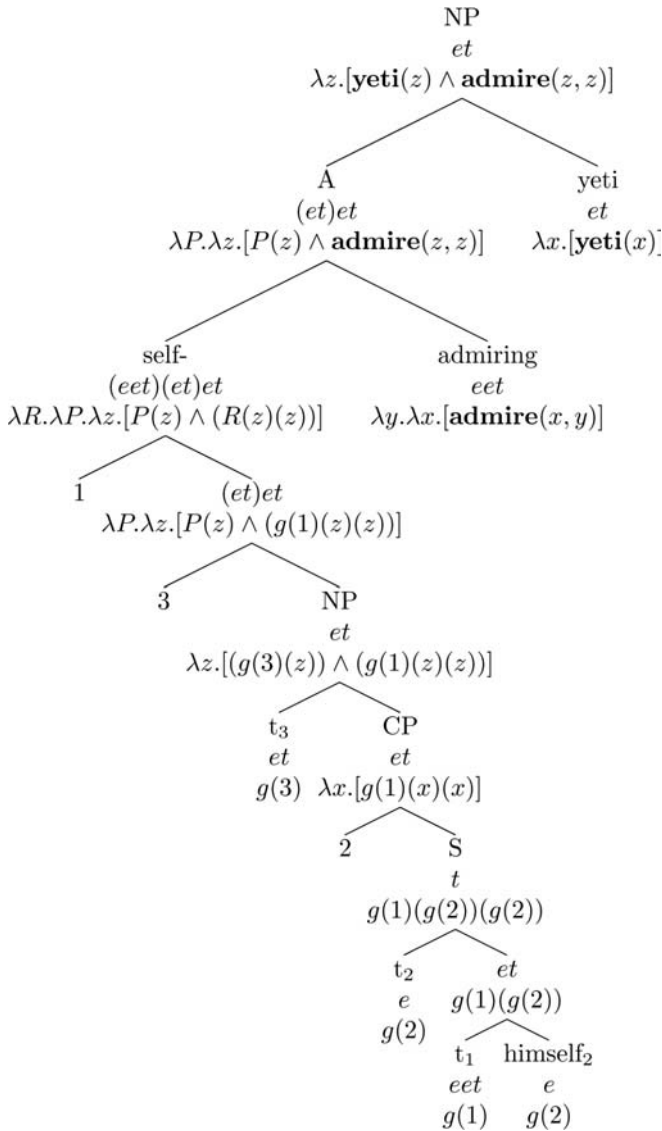


FIGURE 6 Self-*in* self-admiring yeti *defined by paraphrase from yeti*
who admires himself

- (9) a. (A1 Justin) (A2 admired) (A3 somebody)
 b. $\lambda r \lambda r_1 \lambda r_2. r(\lambda r_3. r_1(r_3)(r_2))$
 c. $((((e \setminus t) / e) \setminus (e \setminus t)) / (t / (e \setminus t)))$
 d. [Justin [admired [RAI somebody]]]

We have switched to a categorial syntax, where a transitive verb has category $((e \backslash t) / e)$, a subject generalized quantifier has category $(t / (e \backslash t))$, and a verb phrase has category $(e \backslash t)$. This already determines the category (9c) of RAI: something with this syntactic type combines with a generalized quantifier on the right (the object), then with a transitive verb on the left, then with the individual type e on the left, to produce the sentence type t .

My definitions for the A-operators use the continuation scope calculus of Shan & Barker (2006). For our purposes this calculus can be characterized as using special categorial symbols of the form $c \parallel (a \parallel b)$. Something of category $c \parallel (a \parallel b)$ has the local combinatory properties of category a , and takes scope at category b to produce something of category c . To illustrate, (10a) characterizes the category symbol for a scope-taking DP *everyone*. It has the local category e , because it has the local combinatory properties of (for instance) a proper name. And it takes scope at the sentence category t , resulting in something that again has type t . (10b) shows the category for the quantificational determiner *every*. It first takes an NP argument on the right, resulting in a scope-taking quantifier. NP is represented categorially as $e \backslash_N t$. The idea is that NP is similar to the VP type $e \backslash t$, but can not directly act as a functor in the syntax. The indexed slash category $e \backslash_N t$ can only be used syntactically as an argument of something else, such as *every*.

(10)	category	local	scope	result	argument
everyone	$t \parallel (e \parallel t)$	e	t	t	
every	$(t \parallel (e \parallel t)) / (e \backslash_N t)$	e	t	t	$e \backslash_N t$

(11) gives information parallel to (9) for the derivation of *self*-. In structure (11a), the noun *yeti* is modified with A_1 , because the noun is the last argument of the defined operator. The verb *admired* is modified with A_2 , because it is the penultimate argument of the defined operator *self*-. The symbol t is the trace of *who*, and B is a binding operator that binds the pronoun *himself* to its antecedent, the trace. In Barker and Shan's system, such binding operators are used in place of indexing. The items B , t , and *who* have complex syntactic and semantic definitions in the categorial system, which are not directly relevant here—see Barker and Shan's paper.

- (11) a. $(A_1 \text{ yeti}) \text{ who } B \ t \ (A_2 \text{ admired}) \text{ himself}$
 b. $\lambda r_1 \lambda r_2 \lambda a. r_2(a) \wedge r_1(a)(a)$
 c. $((e \backslash_N t) / (e \backslash_N t)) / ((e \backslash t) / e)$
 d. $[[\text{self- admiring}] \text{ yeti}]$

The project now is to define the A-operators in a way that mimics the scope relations in the unzipped derivations from Section 2. Look at Figure 6, where the surface position of *yeti* in the zippered derivation corresponds to the trace t_3 . This trace locally has category NP (categorial type $e \backslash_N t$). The moved phrase takes scope at NP. So the type for $[A_1 \text{ yeti}]$ is of the form $c // ((e \backslash_N t) \backslash (e \backslash_N t))$, and the type for this use of A_1 is of the form $(c // ((e \backslash_N t) \backslash (e \backslash_N t))) / (e \backslash_N t)$, with the argument of A_1 added to the right. What is the result type c ? Earlier I said that the A-operators would derive also the syntactic category of the defined word. To achieve this, the right choice for c is $(e \backslash_N t) / (e \backslash_N t)$, reflecting the fact that [*self-admiring*] takes an NP argument on the right and also creates an NP. To control the derivation, I will instead use $(e \backslash_N t) /_1 (e \backslash_N t)$, with the subscript marking the last argument of the defined word. The category for this use of A_1 is recorded in the line *self-* in (12). A_1 as used in (9a) has simpler types. The argument category is the subject, and has type e rather than $e \backslash_N t$. The scope is type t rather than $e \backslash_N t$. And since RAI takes its last argument on the left, the result type is $e \backslash_1 t$. See the line RAI in (12).

$$\begin{array}{ll}
 (12) & A_1 \\
 & \text{self- } ((e \backslash_N t) /_1 (e \backslash_N t)) // ((e \backslash_N t) \backslash (e \backslash_N t)) / (e \backslash_N t) \\
 & \text{RAI } ((e \backslash_1 t) // (e \backslash t)) / e
 \end{array}$$

In schematizing the category of A_1 , there are three dimensions. There is an argument type α , which for *self* is $e \backslash_N t$ and for RAI is e . There is a scope type β , which for *self* is $e \backslash_N t$ and for RAI is t . And finally, we allow the defined word to take its last argument on the right (like *self-*) or on the left like RAI. This results in the schematized categories A_{1L} and A_{1R} , as defined in (13). α and β are type variables which can be instantiated with any categorial syntactic type.

$$\begin{array}{ll}
 (13) & A_{1R} ((\beta /_1 \alpha) // (\alpha \backslash \beta)) / \alpha \\
 & A_{1L} ((\alpha \backslash_1 \beta) // (\alpha \backslash \beta)) / \alpha
 \end{array}$$

Following the plan of the derivations in Section 2, A_2 should always scope directly above A_1 —or technically, it should scope above $\beta /_1 \alpha$, corresponding to a defined word that takes its final argument on the right. Or it should scope above $\alpha \backslash_1 \beta$, corresponding to a final argument on the left. Independently, the defined word could take its penultimate argument either on the left or on the right. This results in four schematized definitions for A_2 , as given in (14). To explain the notation, a word defined using A_{2LR} takes its penultimate argument on the right (indicated with R), and takes its final argument on the

left (indicated with L). α_1 is a type variable corresponding to the final argument of the defined word, and α_2 is a type variable corresponding to the penultimate argument. As before β is the result type.

$$\begin{aligned}
 (14) \quad A2_{RR} & ((\beta/_1\alpha_1)/_2\alpha_2) \parallel (\alpha_2 \parallel (\beta/_1\alpha_1)) / \alpha_2 \\
 A2_{LR} & (((\alpha_1 \setminus_1 \beta) /_2 \alpha_2) \parallel (\alpha_2 \parallel (\alpha_1 \setminus_1 \beta))) / \alpha_2 \\
 A2_{RL} & ((\alpha_2 \setminus_2 (\beta/_1\alpha_1)) \parallel (\alpha_2 \parallel (\beta/_1\alpha_1))) / \alpha_2 \\
 A2_{LL} & ((\alpha_2 \setminus_2 (\alpha_1 \setminus_1 \beta)) \parallel (\alpha_2 \parallel (\alpha_1 \setminus_1 \beta))) / \alpha_2
 \end{aligned}$$

The semantics of the A-operators is simple. Let σ be the function that maps syntactic to semantic types. For instance, for the transitive verb type. $\sigma((e \setminus t)/e) = eet$ and for an ordinary subject quantifier, $\sigma((t/(e \setminus t))) = (et)t$. In general, a continuation scope type $c \parallel (a \setminus b)$ has a semantic type $(\sigma(a)\sigma(b))\sigma(c)$. For instance, the lexical continuation quantifier *someone* has syntactic type $t \parallel (e \setminus t)$, and the denotation $\lambda P \exists x. \text{person}(x) \wedge P(x)$ of semantic type $(et)t$. The continuation scope calculus is set up so that the denotation of a phrase of type $c \parallel (a \setminus b)$ gets applied to the abstract of type $\sigma(a)\sigma(b)$ that is obtained by binding with lambda a variable of type $\sigma(a)$ in the local position of the phrase. The binding takes place at a scope level of type b .

Since $A1_R$ has syntactic type $((\beta/_1\alpha) \parallel (\alpha \setminus \beta)) / \alpha$, its denotation should have type $(\sigma(\alpha)((\sigma(\alpha)\sigma(\beta))\sigma(\beta)))$. The initial argument of type $\sigma(\alpha)$ corresponds to the phrase of type α that is modified by $A1_R$, such as *yeti* in the case of the definition of *self*-. We are not really interested in the semantics of *yeti*—we just want the derivation to pick up its syntactic and semantic type. Looking back to Section 2, a variable of the right type in the local position of *yeti* should be bound with lambda. Since the work of binding is already done by the continuation scope calculus, we obtain the simple denotations for the A-operators as projection functions in (15). The other varieties of $A1$ and $A2$ are identical in the semantics.

$$\begin{aligned}
 (15) \quad & \text{syntax} \\
 A1_R & ((\beta/_1\alpha) \parallel (\alpha \setminus \beta)) / \alpha \\
 A2_{RR} & (((\beta/_1\alpha_1)/_2\alpha_2) \parallel (\alpha_2 \parallel (\beta/_1\alpha_1))) / \alpha_2 \\
 & \text{semantics} \\
 A1_R & \lambda x_{\sigma(\alpha_1)} \lambda k_{\sigma(\alpha_1)\sigma(\beta)} \cdot k_{\sigma(\alpha_1)\sigma(\beta)} \\
 A2_{RR} & \lambda x_{\sigma(\alpha_2)} \lambda k_{\sigma(\alpha_2)\sigma(\alpha_1)\sigma(\beta)} \cdot k_{\sigma(\alpha_1)\sigma(\alpha_1)\sigma(\beta)}
 \end{aligned}$$

With these definitions, definitions by paraphrase can be obtained systematically. (16a) is the source for the definition by paraphrase of *self*-. $A1_R$ and $A2_{RR}$

are used because *self-* takes both of its arguments on the right. Running the derivation results in the syntactic type (16b), or (16d) after erasure of slash indices, and the semantics (16c). The derived lexical entry for *self-* is the syntax (16d) paired with the semantics (16c). With *self-* defined in this way, (17a) has the semantics (17b). As required in the problem statement from Section 1, this is also the semantics of (17c). Naturally, we also get equivalence when the alternative phrasings are embedded, as in (18).

- (16) a. $(A1_{RR} \text{ yeti}) \text{ who B t } (A2_{RR} \text{ admired}) \text{ himself}$
 b. $((e \setminus_N t) /_1 (e \setminus_N t)) /_2 ((e \setminus t) / e)$
 c. $\lambda r_1 \lambda r_2 \lambda a. r_2(a) \wedge r_1(a)(a)$
 d. $((e \setminus_N t) / (e \setminus_N t)) / ((e \setminus t) / e)$
- (17) a. *self-admiring yeti*
 b. $\lambda a_e. \text{yeti}(a_e) \wedge \text{admire}(a_e, a_e)$
 c. *yeti who B t admires himself*
- (18) a. Every *self-admiring yeti* admires Justin.
 b. $\forall x_e. \text{yeti}(x_e) \wedge \text{admire}(x_e, x_e) \rightarrow \text{admire}(x_e, j)$
 c. Every *yeti who B t admires himself* admires Justin.

(19)–(20) run through the phrase orders that are derived using the different operators. Four categories are derived in (19), and these result in the four surface orders for *self-admiring yeti* that are seen in (20). The semantics in each case is as in (17). These four lexical entries illustrate that the A-operators derive both a semantics and a parallel categorial syntax for the defined word.

- (19) $\text{self}_{RR} \ A1_R \text{ yeti who B t } A2_{RR} \text{ admired himself } ((e \setminus_N t) / (e \setminus_N t)) / ((e \setminus t) / e)$
 $\text{self}_{LR} \ A1_L \text{ yeti who B t } A2_{LR} \text{ admired himself } ((e \setminus t) / e) \setminus ((e \setminus_N t) \setminus (e \setminus_N t))$
 $\text{self}_{RL} \ A1_R \text{ yeti who B t } A2_{RL} \text{ admired himself } ((e \setminus_N t) / (e \setminus_N t)) / ((e \setminus t) / e)$
 $\text{self}_{LL} \ A1_L \text{ yeti who B t } A2_{LL} \text{ admired himself } ((e \setminus t) / e) \setminus ((e \setminus_N t) \setminus (e \setminus_N t))$
- (20) a. $\text{self}_{RR} \text{ admiring yeti}$
 b. $\text{yeti self}_{LR} \text{ admiring}$
 c. $\text{admiring self}_{RL} \text{ yeti}$
 d. $\text{yeti admiring self}_{LL}$

Additional arguments work the same way. (21) defines the four versions of *A3*, and (22a) is the source structure for defining *RAI*. Running a syntactic and semantic derivation results in the syntactic type (22b), and the semantics (22c).

Erasing indices in (22b) results in (22d), which paired with (22c) is the syntactic and semantic lexical entry for *RAI*.

- (21) $A_{3RR} ((\beta/2\alpha_2)/3\alpha_3) \parallel (\alpha_3 \parallel (\beta/2\alpha_2)) / \alpha_3$
 $A_{3LR} (((\alpha_2 \setminus 2\beta)/3\alpha_3) \parallel (\alpha_3 \parallel (\alpha_2 \setminus 2\beta))) / \alpha_3$
 $A_{3RL} ((\alpha_3 \setminus 3(\beta/2\alpha_2)) \parallel (\alpha_3 \parallel (\beta/2\alpha_2))) / \alpha_3$
 $A_{3LL} ((\alpha_3 \setminus 3(\alpha_2 \setminus 2\beta)) \parallel (\alpha_3 \parallel (\alpha_2 \setminus 2\beta))) / \alpha_3$
- (22) a. $(A_{1L} \text{Justin}) (A_{2LL} \text{admired}) (A_{3LR} \text{somebody})$
 b. $((((e \setminus t)/e) \setminus 2(e \setminus 1t)) / 3(t/(e \setminus t)))$
 c. $\lambda r \lambda r_1 \lambda r_2. r(\lambda r_3. r_1(r_3)(r_2))$
 d. $((((e \setminus t)/e) \setminus (e \setminus t)) / (t/(e \setminus t)))$

4 *Want-VP and Want-DP*

The problems involving *want* require an intensional semantics, since the basic and derived versions of *want* are intensional. (23) illustrates an intensional version of the categorial system, with world variables added to basic relations. As in Section 1, $\text{sleep}(v, j)$ is understood as “j sleeps in world v ”, and $D(w, j, v)$ is understood as “world v is a buletic alternative for individual j in world w ”. As shown in the lexical entries of (23c), the last argument of any lexical entry is a world. To match worlds, for any functor category, this world is supplied as an argument of each argument.

- (23) a. B Justin wanted himself to be asleep
 b. $\lambda w \forall v. D(w, j, v) \rightarrow \text{sleep}(v, j)$
 c.

sleep	$(e \setminus t)$	$\lambda x \lambda w. \text{sleep}(w, x(w))$
want	$(e \setminus t)/t$	$\lambda p \lambda x \lambda w. \forall v D(w, a(w), v) \rightarrow p(v)$
Justin	e	$\lambda w. j$

Adding intensionality does not necessitate any adjustment in the A-operators. (24a) is the source structure for defining the VP-embedding *want*. A derivation for this structure produces the syntactic category (24a), or (24d) after erasure of indexes, and the semantics (24c). The new lexical entry for *want* is (24d) paired with (24c). Using this in (24e) results in the same semantics as in (23).

- (24) a. $(A_1 \text{Justin}) \text{wanted himself} (A_2 \text{to be asleep})$
 b. $((e \setminus 1t)/2(e \setminus t))$
 c. $\lambda r \lambda x \lambda w \forall v. D(w, x(w), v) \rightarrow r(x)(v)$

- d. $((e \backslash t) / (e \backslash t))$
- e. Justin wanted to be asleep.

For DP-embedding *want*, there is an additional complexity. Assuming we are looking for a version of *want* that combines with an ordinary quantifier of category $(t / (e \backslash t))$, it is necessary to fit this into the derivation. This can be done with an intensional version of the RAI operator. (25) shows the derivation for defining DP-embedding *want*.

- (25) a. $(A_2 \text{ Justin}) \text{ wanted to have RAI } (A_1 \text{ a duck})$
 b. $((e \backslash_1 t) /_2 (t / (e \backslash t)))$
 c. $\lambda r \lambda r_1 \lambda w \forall v. D(w, r_1(w), v) \rightarrow r(\lambda r_3 \lambda w. \mathbf{have}(w, r_1(w), r_3(w)))$
 d. $((e \backslash t) / (t / (e \backslash t)))$

In the following way, the A-operators encapsulate a process of definition by paraphrase. Starting from categorial grammar (i.e. a lexicon) that derives the paraphrase, and a target syntax for the word that is to be defined, one or more operators that correspond to the target syntax are inserted in the paraphrase. Solving for a derivation produces a semantics for the defined word in the form of a lambda term, and a syntax in the form of a categorial label. Transforming the latter trivially (by deleting slash indices) produces the syntactic categorial label for the defined word.

This process can actually be executed computationally using Barker and Shan's derivation calculator for continuation categorial grammar (Barker & Shan 2005). Source files for my derivations are included in Rooth (2014). The lexical items, operators, and results differ only notationally from those presented here.

5 Discussion

The operators from Section 3 provide a generic solution to the paraphrase problems posed in Section 1. Starting from a grammar that generates the syntax and semantics of the paraphrase, the syntax and semantics of the target lexical item are derived formally.

The method gives a systematic way of solving a class of problems that are frequently posed in semantics classes—one can hope that their being automatically solvable will not undermine the interest and utility of such problems. Equally, the method can be used to address problems that come up in research, in a way that is guaranteed in virtue of the formal methodology

to get the technical minutiae right. Certainly, definitions with the complexity of the definition of DP-embedding *want* in (25c) are frequently erroneous in some minor technical way, even in publications.

It came out in Section 2 that it is possible to think of the lexical entries that are derived by the scoping method syntactically, as providing a syntactically structured lexical entry for the target word that is in a certain way parallel to the syntax and compositional semantics of the paraphrase. In this there are general connections with theoretical models that employ syntactically structured derivations for surface words, such as generative semantics (McCawley 1976) and distributed morphology (Halle & Marantz 1993; Harley 2012). There is a more specific connection with the proposal in Hale and Keyser (1993; 2002) that some lexical items have a clause-like internal syntax that is generated in the lexicon. To explore connections with these theoretical approaches in morphology, one could try to cast the A-operators as null affixes that are involved in morphological and/or syntactic derivations.

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PART 2

Values



Do You Know What it Means to Miss New Orleans?

More on Missing

Kjell Johan Sæbø

1 Introduction. Zimmermann's Beamwork

The title of this contribution belies its topic: it is not really about the verb *miss* but about (*be*) *missing*, which is not just the progressive form of *miss* but a predicate of its own.¹ To be sure, the meaning of transitive-only *miss* is closely related to that of transitive *be missing*, but it has an additional emotional component, a treatment of which will be missing.² I will even be missing a discussion of transitive *be missing*, meaning that I will centre on the intransitive variant at the centre of attention for Zimmermann (2010).

According to Zimmermann, and it seems very intuitive, what it takes to be missing (from x) is (i) being in x in all the accessible worlds where x is complete (the *intensional* part) and (ii) not being in x in the actual world (the *extensional* part); sloppily, if something is missing from somewhere, it ought to be there but it isn't.

As far as proper names are concerned, this analysis is not problematic.³

(1) Wolfgang is missing, though.

In Zimmermann's formalization, (1) gets the Ty_2 representation (2):

(2) $[\neg I_i(\mathbf{w}, x) \& (\forall j \triangleright_x i) I_j(\mathbf{w}, x)]$

1 This predicate may seem like an adjective, but it corresponds to verbs in languages like French (*manquer*), Danish (*mangle*), German (*fehlen*), Spanish (*faltar*), Swedish (*fattas*). There is also the transitive variant of *be missing*, clearly a verb. As clearly an adjective is the variant (more or less confined to animates) that corresponds to German *vermisst*.

2 Norwegian draws a lexical distinction between the two meanings: *savne* vs. *mangle*. There is also the less closely related meaning variant of *miss* corresponding to German *verfehlen*, not to *vermissen* or to *fehlen* with a dative argument.

3 (1) was uttered at a reunion at Luigi's, in Old Mary's Pub, on 3 September 2002 in connection with the 7th Sinn und Bedeutung conference in Constance.

That is: Wolfgang (**w**) is not actually (*i* denotes the default world) in (**I**) *x* (*x* is a free variable which the predicate comes with) but in all the worlds *j* accessible from *i* completing *x*, he is in *x*.⁴ This captures the sense of (1): for the reunion to be complete, Wolfgang would have to be there too.

To a fair extent, the same holds for definite and indefinite descriptions, indeed, for all quantifiers: as long as they are given a specific interpretation, as suggested by (3a)–(5a), they do not create problems.

- (3) a. In 1785, it was discovered that a diamond necklace was missing.
b. $(\exists y)[D_i(y) \& \neg I_i(y, x) \& (\forall j \triangleright_x i) I_j(y, x)]$
- (4) a. Many people were missing (from the funeral).
b. $(M_1 y : P_i(y))[\neg I_i(y, x) \& (\forall j \triangleright_x i) I_j(y, x)]$
- (5) a. Being originally a 10-keyed oboe, most keys are missing now.
b. $(M_2 y : K_i(y))[\neg I_i(y, x) \& (\forall j \triangleright_x i) I_j(y, x)]$

Well, not grave problems anyway; for one thing, we must assume that Marie Antoinette's diamond necklace and the original oboe keys still exist(ed), or allow for relating **D** and **K** to past times. Secondly, the quantifiers in (4) (to the extent that *many* has a proportional reading) and (5) must be restricted to people that should have come to the funeral and keys that belong(ed) to the oboe; as Zimmermann observes, this can be achieved through a general manoeuvre of contextually restricting quantification to salient referents; in effect, the second conjunct of the scope would be copied to the restrictor.

As far as specific readings are concerned, then, the predicate *be missing* could be adequately analysed simply as expressing a property:

- (6) $be\ missing' = \lambda y[\neg I_i(y, x) \& (\forall j \triangleright_x i) I_j(y, x)]$

This is not what Zimmermann does, however. In order to provide a basis for describing **unspecific** readings of (in)definite descriptions and quantifiers, he analyses *be missing* as a predicate of quantifiers in intension:

- (7) $be\ missing' = \lambda Q(\forall j \triangleright_x i) Q_j(\lambda y[\neg I_i(y, x) \& I_j(y, x)])$

4 In the utterance context sketched in footnote 3, *x* gets the value of Old Mary's Pub. Zimmermann is careful to point out, though, that the exact nature of the locative relation **I** is underspecified, open to contextual influences. Note that the world—world completion relation \triangleright with respect to *x* is defined in terms of a completion property **C**.

The specific readings (3b)–(5b) are obtained by Raising the Quantifier above the predicate. And as for unspecific readings, (7) works well for some DPs: indefinite descriptions and (other) quantifiers with symmetric determiners. (8a) gets to be—adequately—represented as (8b):

- (8) a. One stamp is still missing (from my collection).
 b. $(\forall j \triangleright_x i) (\exists^= y) [S_j(y) \& \neg I_i(y, x) \& I_i(y, x)]$

For other DPs, i.e., quantifiers with asymmetric, proportional determiners, (7) fails to deliver correct readings. Essentially, the second conjunct of the quantifier's scope should be part of its restrictor. This parallels the problem noted for the 'specific construals' (4b) and (5b); but while that problem could be solved, salvaging the specific readings, by appealing to a general mechanism of contextual domain restriction, the same road is, Zimmermann notes, obstructed in the context of the modal operator:

... the quantifiers ... would have to be restricted to the objects in x at j . Hence, ... appropriate quantificational domains are index-dependent, which means that the context would have to specify a property rather than just a set of objects. And it seems that this property would have to be that of being in x . This is quite a burden for pragmatics to carry, especially since it does not seem possible to override the restrictions.

ZIMMERMANN 2010: 289

In the absence of a general pragmatic derivation of the desired domains, one should explore alternative ways of obtaining the intended interpretations, Zimmermann concludes, sketching an alternative way on the last page or so: give the quantifiers wide scope throughout, but capture unspecific readings by letting their domains consist of **individual concepts**—functions from worlds to individuals—instead of (or in addition to) mere individuals. The purpose of the present contribution is to elaborate a bit on this intentionalist approach, “the elaboration of the delicate details” which was “left for future work”.

2 Functions to Things That are or Ought to be There

We speak of *the* dagger Macbeth seems to see. We ascribe properties to *it*. We regard it as a definite individual. Yet how can that be? [...] To solve the case of the missing dagger, we need only look for it in the right place.

LEWIS (1983: 4f.)

There is independent evidence that we sometimes refer to, or quantify over, individual concepts when we would appear to be talking about individuals, and a body of existing work argues for this: Aloni (2005); Condoravdi & Crouch & van den Berg (2001); Löbner (2011); Schwager (2007); Zimmermann (2006)—not to forget Tichý (2004), who used the term *individual office*—to mention some. Below, I add some evidence with a direct bearing on the case at hand.

Next, I will elaborate on the idea that reference to and quantification over individual concepts under Aloni's **conceptual covers** can help model unspecific readings of descriptions and quantifiers combining with *missing*, in particular, by defending a naïve analysis: (9).

$$(9) \text{ } be\ missing' = \lambda y[(\forall j \triangleright_x i)I_j(y, x) \& \neg I_i(y, x)]$$

Here y is a variable ranging over individual concepts. The naïveté of (9) lies mainly in the assumption that this analysis is to account for specific and unspecific uses alike, even though y ranges over individual concepts *only*—it is intended as the *one and only* analysis.

As such, it may meet challenges from various angles. First, it should be a plausible analysis of unspecific readings; there should be natural ways of conceiving the individual concepts and the conceptual covers constraining them that are at play in given cases. I discuss some intuitive cases, but also a less intuitive one, in section 2.2.

Second, it should work for specific readings as well; although these are not separate readings in any structural sense, it should be possible to isolate the factors—to do with the conceptual cover operative in a given context—that license us to infer what we could formalize as a specific interpretation. This issue is the topic of section 2.3.

Third, the observed tendency for the 'intensional part' of *missing* to be, as it were, interpreted into the restrictors of quantifiers should be explained. Here again, the contextually operative covers play a key role, along with the information structural division of the extensional and intensional part into focus and background,—as argued in section 2.4.

In addition to the readings that Zimmermann (seriously) considers, there is the reading of *be missing* sentences with singular indefinite subjects a P where we infer that *no* P is there. In section 3, I concede that this forces us to supplement (9) with a **property** reading parallel to the proper treatment of opacity in certain verbs according to Zimmermann (1993).

Section 4 brings another change to (9): x becomes a syntactic argument. This argument is often missing, and if so, it acts as a free variable, as in (9).

Zimmermann (2010) hints that the fact that the x argument is anaphoric if it is not saturated syntactically is predictable on the basis of Sæbø (1996), and I try to show that this is so.

Section 5 winds up the paper and puts it into perspective.

2.1 *Missing May be Missing*

A consequence of the idea that we sometimes or always refer to or quantify over functions from worlds to individuals in connection with *missing* is that nouns like *screw* and determiners like *one* must be able to shift their type, from denoting sets of individuals to denoting sets of such functions and from denoting type $((et)(et))$ relations to denoting type $((se)t)((se)t)$ relations. It is not unnatural to assume that these shifts are brought on by coercion, ultimately triggered by lexical items like *be missing*.

There is evidence, however, that the reinterpretations that are involved do not require the threat of a type conflict. Consider (10) and (11a):

(10) **One of the covers wasn't in the package** when it arrived.

(11) a. I took it to a local smith and he told me that **the firing pin wasn't there**.

It is easy to imagine that, for instance, the firing pin of the particular gun at issue had never existed, so that the DPs have unspecific readings here.⁵ This is evidently provoked purely by pragmatic pressure, not type coercion. Since there is no modal operator, the unspecificity cannot be attributed to embedding. But if we interpret the DPs as quantifiers over sets of concepts (say, the singleton consisting of the function assigning to any world where it is defined this gun's firing pin), we seem to get the right truth conditions ($F_i^+(x)$ is the singleton set of concepts 'firing pin of x ', x is the gun):

(11) b. $(\lambda y \neg I_i(y_i, x))(\iota y F_i^+(x)(y)) \equiv \neg I_i([\iota y F_i^+(x)(y)]_i, x)$

This is true in the sketched scenario because $\iota y F_i^+(x)(y)$ is undefined for i , the scenario world (so \neg must be interpreted as weak negation). Data like (10) and (11a) thus provide extra motivation for individual concepts as the sort of thing we quantify over when we talk about missing things.

5 True, (11a) might be analyzed in a traditional Russellian way, with negation targeting the existential entailment; (10), however, shows that this is not generally a viable option.

2.2 *Partial Functions to Things in x*

I pursue two goals in this section: (i) add flesh to the bones of the idea that *be missing* denotes a set of individual concepts y (as this idea is primarily motivated by unspecific readings, I will concentrate on unspecific cases), (ii) confront a case in which it is not immediately evident how this notion is to be understood (that will be Zimmermann's paradigmatic IKEA case).

2.2.1 Nice Cases

Consider (12a): every mailed letter is supposed to have a postage stamp on it, but here the sender has forgotten.⁶

(12) a. They may deliver it if they don't notice the stamp is missing.

One function with stamps as values stands out as salient in this situation: the function that assigns to any world where it is defined the stamp on the envelope. This function is of course undefined for worlds where (12a) is true. To be precise, it would seem as if the set of functions effectively denoted by the noun *stamp* is the singleton $\boxed{1}$:

$\boxed{1} \{ \lambda j \text{ the stamp on the envelope in } j, \text{ if one there is; undefined else} \}$

This set is a suitable argument for the definite article qua *iota* operator, so that the effective denotation of *the stamp* can be characterized as $\boxed{3}$:

$\boxed{2} \iota \lambda j \text{ the stamp on the envelope in } j, \text{ if one there is; undefined else} =$

$\boxed{3} \lambda j \text{ the stamp on the envelope in } j, \text{ if one there is; undefined else}$

Now when this individual concept is plugged into the meaning of *be missing* as given by (9), we get an interpretation of the clause *the stamp is missing* according to the following informal paraphrase:

(12) b. $\boxed{3}$ is defined for all i -accessible worlds completing the envelope but actually undefined.

This we may view as a fair rendering of the meaning of the sentence in the context of (12a), but it would arguably be better yet if the 'intensional part'

⁶ Let us ignore the complication that two or more stamps can be necessary, or can fill the same function as one.

(defined for all i -accessible worlds completing the envelope) were not a truth *versus* falsity condition but a truth *or* falsity condition, a presupposition; this can be accomplished if that part is ‘read into’ the definite’s restrictor, reducing the relevant set of functions to stamps to $\boxed{4}$, *at most* a singleton:

- $\boxed{4}$ $\{f \mid f = \lambda j$ the stamp on the envelope in j , if one there is; and, for all worlds k accessible from i completing the envelope, $f(k)$ is on it in $k\}$

If due to the second constraint this set is empty, the existence presupposition of the definite fails. (12c) could illustrate this kind of situation.

- (12) c. —Let’s hope they don’t notice the seal is missing.
—Whaddya mean, the *seal* is missing—this is the 20th century!

The respondent rejects the constraint that the function ‘ λj the seal on the letter in j , if one there is’ is defined for any k where the letter is complete.

Let us next consider a case with an indefinite subject; now x is a page of a stamp album.

- (13) a. A stamp is missing (from this album page).

We can visualize how the album page induces a set of individual concepts: there are, say, twenty slots there, each identifying a different type of stamp, by series, value, and an image. What *stamp* effectively denotes will contain twenty partial functions from worlds to stamp tokens, *inter alia*:

- $\boxed{5}$ λj the 1953 $2\frac{1}{2}$ d Coronation stamp sitting in the third slot from left in the third row in j , if there is one (undefined else)

Thus determined, these will all be defined for all worlds completing the page. But should the slot for the 1953 $2\frac{1}{2}$ d Coronation stamp be empty, we would have a witness for the existential quantifier in (13a), represented as (13b):⁷

- (13) b. $(\exists y)[S_i^+(y) \& (\forall j \triangleright_x i) I_j(y_j, x) \& \neg I_i(y_i, x)]$

7 Possibly, we would also have a witness for the existential if the slot were filled by the wrong type of stamp—a 1954 40+10 Pf Bertha Pappenheim stamp, say, or a 1926 35c Marianne stamp.

[5] is a witness verifying (13a) because it is undefined for the actual world—so (13a) is true by weak negation.

Now if what *stamp* effectively denotes is a set of 20 individual concepts, that amounts to a considerable enrichment of the (lifted) meaning of *stamp*—and it certainly does not show in the representation (13b). Here, there seem to be three conjuncts on equal footing: *y* must be a function to stamps, it must be a function assigning to each accessible world completing *x* a value in *x*, and it must be undefined for *i* or assign to *i* a value not in *x*. However, the negative variant (13c) reveals that this is not quite the way it works.

(13) c. No stamp is missing (from this album page).

Only exceptionally can we assert this on the grounds that there is no function mapping every accessible world completing the page to a stamp on the page—it would have to be a blank page, without any slots;⁸ then we might say, humorously: ‘At least there are no stamps missing from *this* page!’ But on the normal understanding of (13c), the first and second conjuncts of (13b) seem to form a unit which is not ‘at issue’.

In fact, we seem to normally presuppose a nicely delimited set of partial functions from worlds to individuals (members of the noun’s low extension) in *x*, all defined for all accessible worlds which complete *x*. This semblance is reinforced by the ready availability of plural definite genitive phrases as determiners’ arguments (although the interpretation is unspecific):

(13) d. One/none of the stamps is missing (from this album page).

Now if we assume that the nouns effectively denote sets of functions from worlds to individuals all of which target individuals *in x*, and all of which, moreover, assign individuals in *x* to all accessible ‘ideal’ worlds in regard to *x* (worlds where *x* is complete), it might be expected (i) that the *in x* part, though mostly implicit, could be explicit, and (ii) that adjuncts of the form *that should be in x* could figure as well. Both expectations are borne out.

(14) Rod sometimes mentions a comic he read where Doctor Octopus stole the letter H. To illustrate the severity of this, **all the Hs in the comic** were missing.

8 Unless *S*⁺ is implicitly restricted to functions to stamps of some special kind, say, to stamps portraying Queen Elizabeth II.

The H's in the comic had never been there. Let us say that the first balloon in the eighth panel of page 1 of the comic reads as (15).

(15) I ave special powers wic make me Spider-Man! Nobody else as tem!

We get a clear notion of the set of functions denoted by *Hs in the comic*: ' λj the H at the start of the second word in the first balloon in the eighth panel of page 1 of the comic in j , if one there is; undefined else', and so on.

A finite relative clause can be used instead of these *in x* PP adjuncts—provided the finite verb is a counterfactual necessity modal:

- (16) a. # all the H's that were in the comic were missing.
 b. all the H's that should have been in the comic were missing.

In the standard case, though, the noun is not modified by a PP *in x* or a relative clause *which should be in x*, and still, it seems to effectively denote a nicely delimited set of partial functions from worlds to individuals which are in x , in fact, total functions as far as completion worlds are concerned. But then, where is the source of that set of concepts, and how does it come to enrich, or indeed to define, the (lifted) meaning of the noun?

2.2.2 The Source of Slots

It is reasonable to assume that the modal part of the meaning of *be missing* provides a starting point. Unspecific interpretations involve functions which may be defined for possible worlds only, and to quantify over such things, we need to take a cue from the worlds for which we can expect them to be defined. Now the possible worlds we are familiar with in connection with *be missing* are the accessible worlds where x is complete; for something to be missing from x , it must map all of those to a value in x . In connection with a predicate like *prevent* (Condoravdi & Crouch & van den Berg 2001), the possible worlds under consideration are such where certain prospects of future events are realized. Generally, we seem to base our conception of the relevant functions on what the relevant possible worlds are like; this is more or less what David Lewis alluded to (1983: 4) when he wrote that we need only to look for Macbeth's dagger in the right place.

In the album page scenario outlined above, in any world where the page is complete, there are twenty stamps on it. To be sure, that does not mean that for any such world, each stamp is the value of one of the functions, or that each function has one of the stamps as its value. And yet, both of these generalizations are evidently drawn in practical production and interpretation.

In addition, the language user seems to assume that the relevant functions are ‘separated’ (as are functions belonging to conceptual covers, see below): no two functions assign the same value to a given argument. Then we have a one-to-one correspondence between functions and slots: the relevant domain consists of twenty and only twenty functions.

Since Aloni, (2001), it has become customary to describe reference to or quantification over individual concepts relative to conceptual covers, which are contextually determined sets of concepts. Usually, a conceptual cover is modelled as a parameter of interpretation,⁹ but alternatively, it could also be introduced as a free variable into a language like Ty2.

Conceptual covers help us conceptualize individual concepts. Therefore, it makes sense to attribute to them our tendency to think of such things in terms of slots, making them responsible for the radical reduction of the vast number of stamp-valued functions that are possible in principle, to twenty in the case at hand—and correspondingly in most other cases.¹⁰

One reductory effect comes for free if the set of stamp-valued functions ultimately forms a subset of a conceptual cover: covers are by definition sets of separated concepts, whose values never coincide. Other effects will derive from cognitive plausibility. Although we can conceive of weird functions like ‘the lowest-valued indigo stamp on the page’, it is cognitively more plausible to assume functions which correspond to the slots. (In other cases, of course, only position matters, as with missing panes in a matrix of windows—and in some cases, as we will see in 2.2.3, not even that seems to matter essentially.) And although the functions could in principle be undefined for all but the worlds where the page is complete, it is more natural to assume that each is also defined for worlds where, say, its value is the only stamp on the page.

2.2.3 Indiscriminate Screws

To illustrate the notion of individual concepts under conceptual covers, I chose the stamp album scenario over Zimmermann’s IKEA screw set scenario with care, since here, the operative set of concepts is in the public context. Each member of it is nicely delineated, giving us a clear conception of how the functions are functions and all give different values at any given world. There is a unique, stable position (slot) for each stamp in a complete album, each corresponding to a natural individual concept.

9 To be exact, in Aloni’s theory the parameter is a *contextual perspective* which assigns a cover to a variable.

10 This attribution may seem problematic against the background of Aloni’s definition; I follow Dekker (2012: 64) in replacing her *total* covers by covers of subsets of the domain.

In the case of the screws that are missing from the IKEA set, by contrast, there are typically two, four, eight, or twelve screws that are exactly alike. It will not do to construct the functions from holes where the screws go, where they sit in completion worlds, for we cannot assume that in all worlds where the screw set is complete the piece of furniture will also in fact be assembled. And in the bag the screws (as many as there are) are mumble-jumbled, there are no slots, and the positions in space are liable to shift during transport. According to Zimmermann, in the case under screwtinity a conceptual cover consists of methods for identifying screws, e.g. by their position, size, form; but if the language user has no clear idea of any such method, it seems to be an open question how she can confidently quantify over them.

There are ways, of course, to stipulate some methods of discrimination. Assume, for instance, that (in any world) at any given moment of time, the screws in the set (as many as there are in the world) are totally ordered with respect to a certain cardinal direction (to be sure, an oversimplification, but a more complex topological measure could be used); then f_1 for all practical purposes equal screws could be the values of the following functions:

1. $f_1 = \lambda j$ the northernmost 8×40 mm screw in x at time t in j
2. $f_2 = \lambda j$ the 2nd northernmost 8×40 mm screw in x at time t in j
3. $f_3 = \lambda j$ the third northernmost 8×40 mm screw in x at time t in j
4. $f_4 = \lambda j$ the fourth northernmost 8×40 mm screw in x at time t in j

If all four are defined for all worlds accessible from i completing the set but one 8 mm by 40 mm screw is missing in i , then f_4 is undefined for i ; if two 8 by 40 mm screws are missing in i , then f_4 and f_3 are undefined for i ; etc.

Thus by some ranking, there can always be a set of separated concepts, functions that discriminate between individuals that cannot be told apart. However, the ranking must be stipulated, and its choice is quite arbitrary. This, one might contend, raises a problem for the plausibility of the theory.

2.3 *Specific Readings As Special Cases*

Sentences with rigid terms, like (1), do not have unspecific readings.

- (1) Wolfgang is missing, though.

On the analysis of *be missing* given in (9), (1) gets the representation (17):

$$(17) [(\forall j \triangleright_x i) I_j(w_j, x) \& \neg I_i(w_i, x)]$$

Here w is the intension of the name—the constant function that maps any world k to Wolfgang. I will pursue the idea that specific readings generally are characterized by reference to or quantification over constant concepts.

Take a case with a cardinal determiner:

- (18) After Mary returned my stamp album, I found that three stamps were missing.

The feeling we have that the reading is specific stems from the fact that in the scenario suggested by the sentence, any three witnesses for the quantifier are real stamps that were in the album until Mary borrowed it; more exactly, they are functions which constantly yield real stamps that used to be there. We can conceive of a set of concepts containing, *inter alia*,

- f_1 : λj the 1953 2½d Coronation stamp that used to be in the album in i
 f_2 : λj the 1953 1s3d Coronation stamp that used to be in the album in i
 f_3 : λj the 1953 1s6d Coronation stamp that used to be in the album in i

These functions are all constant, more specifically, they are either defined for all worlds or undefined for all worlds, across the board, and whether they are one or the other depends on whether a stamp of the right type used to be in the album in the world of evaluation i (denoted by the Ty2 variable by the same name); then the value is that stamp.¹¹

We have hitherto tacitly assumed that the shifted meaning of a noun *stamp*, S_i^+ , or rather its extension, S_i^+ , contains functions from worlds k to stamps (generally things falling under the noun's unshifted extension) *in* k . This assumption must now be revised. What S_i^+ contains are (partial) functions from worlds k to things that are stamps *in* k or *in* i ; more exactly, functions to things that are stamps in k and functions to things that are stamps in i . In consequence, members like f_1 – f_3 are possible, and, a member is a constant and once and for all defined or undefined function if and only if it maps worlds k , if to anything at all, to things that are stamps in i .

It is not unnatural to regard specific readings as arising from a contextual setting, more particularly, from a certain characterization of the conceptual

11 Possibly, whether the functions are defined or not should also be made dependent on the stamp being in the album in the accessible worlds where the album is complete.

cover. To be explicit, we could let determiners, when shifted to denoting relations between sets of concepts, take a covert cover argument:

$$(19) \text{ three}'' = \lambda P \lambda C \lambda Q (\exists^{=3} x) [P_i(x) \& C(x) \& Q_i(x)]$$

Here C for 'cover' is a free variable of type $(se)t$; let C be its value. C could now, in a loose analogy from conversational backgrounds (Kratzer 1981), be characterized as *realistic* iff it exclusively contains functions f which, like f_1 – f_3 , are constantly defined or constantly undefined and constant if defined. We then have that if C is realistic, the intersection of the denotation of S_i^+ and C consists of functions that map a k , if to anything, to a stamp in i .

And if by 'specific readings' we understand interpretations that involve realistic covers, we predict that as far as such readings are concerned there is no difference between (9) and (20), where j , the completion worlds index, is replaced by i , the actual world index, at the occurrence of y (the variable corresponding to the concept(s) referred to or quantified over) in $I_j(y_{j/i}, x)$. This may be regarded as a welcome result.

$$(20) \text{ be missing}' = \lambda y [(\forall j \triangleright_x i) I_j(y_i, x) \& \neg I_i(y_i, x)]$$

The specific interpretation is in no way a separate *reading*, though; it is just that special case of setting the cover parameter where it is realistic, so that in effect, those functions from worlds k to stamps in k or i are filtered out that do not target stamps in i (and many more). (20) is thus superfluous.

As a test case, consider a 'mixed' scenario, where one relevant function is undefined for i but two are defined. Suppose I say (21), having in mind one stamp that is too rare for me to even contemplate, another which was there till yesterday, and a third which I own but have not put into the album. Would I be uncooperative, misleading you into trying to decide between, on the one hand, something like f_1 – f_3 and, on the other, something like f_4 – f_6 ?

(21) Three stamps are missing (from this page).

- f_4 : λj the 1953 2½d Coronation stamp in the album in j
- f_5 : λj the 1953 1s3d Coronation stamp in the album in j
- f_6 : λj the 1953 1s6d Coronation stamp in the album in j

Perhaps, but even so, it does not show that there is an ambiguity involved; rather, the situation is typical of the way settings of contextual parameters tend to form natural classes; conversational backgrounds (Kratzer 1981) are again

a suggestive analogy. One natural class of conceptual covers relevant for *be missing* is the class where all of the members are constant functions, another is the class where none of them are.

In sum, Zimmermann's prognosis that the difference between the specific and the unspecific readings "comes out as largely a matter of polysemy and coercion" is corroborated.

But wait: we assumed, prematurely perhaps, that the index i in f_1-f_3 is the shiftable world of evaluation, and in consequence, that specificity can be 'non-global' and relative to modal contexts (over and above *missing* itself). Maybe the relevant index is the unshiftable world of utterance instead?

To check that, we must consult an intensional context which constitutes a scope island, with a DP which is not insensitive to such islands: if we can interpret the noun *de re*, we might have reason to select the context world, with a two-dimensional semantics (or a designated context world variable). In fact, we will have reason to trade the term *specificity* for *extensionality*, as there will be a case of the latter without the former—a question under discussion, in a slightly different context, in Zimmermann (2001). Consider:

(22) Tom suspects that every other stamp is now missing.

The facts of the matter may not be quite clear, but it seems possible to read *stamp* as denoting a set of constant functions yielding stamps that actually exist. However, that could just be an effect of transparent evaluation by free index-binding, the method von Fintel & Heim (2011: 102) refer to as the "standard solution" to the problem of extensionality *cum* unspecificity; the evaluation variable of S^+ could be bound non-locally to begin with.¹²

2.4 *The Intensional and the Extensional Part*

The content of *be missing* splits, both in Zimmermann's original formulation and in (9), into two conjoined parts. As noted in section 1, the *intensional* part seems to be systematically 'read into' restrictors of quantifiers, causing (23a) to be understood as if it were to have the analysis (23c) instead of the compositionally derived analysis (23b):

12 It also seems possible to read *stamp* as denoting a set of constant functions returning stamps which exist in Tom's suspicion worlds, and in that case, there is all the more reason to maintain that the relevant world index is the shiftable world of evaluation.

- (23) a. Most stamps are still missing (in my album).
 b. $(M y: S_i^+(y)) [(\forall j \triangleright_x i) I_j(y_j, x) \& \neg I_i(y_i, x)]$
 c. $(M y: S_i^+(y) \& (\forall j \triangleright_x i) I_j(y_j, x)) [\neg I_i(y_i, x)]$

We also saw that, if the quantifier has an unspecific reading, this is difficult to explain on the basis of Zimmermann's canonical analysis (7) (where the quantifier scopes under the modal operator and quantifies over individuals).

We may now first note that once (9) replaces (7), the prediction that the intensional part may (or must) restrict the restrictor is no more problematic than for specific readings according to (7). Since now, the quantifier scopes over the modal operator anyway, we can consider it as a case of contextual domain restriction; the set of y (under a conceptual cover) such that y_j is in x in all worlds $j \triangleright_x i$ can count as salient discourse objects.

In fact, one lesson from section 2.2 is that normally, when producing or interpreting an utterance of $Q P$ is missing (in x), we intend or take P to denote a closed set of functions from worlds to Ps in x , defined for all $j \triangleright_x i$. I suggested that focusing on such sets is the best way to make sense of talk about unspecific missing individuals in intension. Now from that, it follows that we normally treat the domain of quantification as if the intensional part were to restrict it. But the question naturally arises whether this tendency, strong though it may be, is a rule without exceptions.

The phenomenon as such is well known: in connection with quantifiers—whether adverbial or nominal—or superlatives, parts of the intrasentential material can enter the restrictor:

- (24) John always takes Mary to the movies. (Rooth 1999)
 (25) Almost all tickets were sold at checker 4. (Eckardt 1999)
 (26) The highest mountain was climbed by John. (Heim 1999)

But this can be overridden: there are interpretations where, e.g., the climbed things do not enter into the restrictor. By contrast, recall Zimmermann's observation that "it does not seem possible to override the restrictions needed". Generally, properties that belong, by right of position, in nuclear scopes but make their way into restrictors will be backgrounded and not at issue; this, of course, may well shift from context to context. Is there, then, something that regularly relegates the intensional conjunct to such a secondary status, while the extensional part is regularly foregrounded and at issue?

My answer will be no—at least as far as specific readings are concerned. I will argue that in regard to these, the tendency to read the intensional part

into the restrictor is only a tendency which can, in the right circumstances, be overridden. (I return to unspecific readings in due course.)¹³

To see this, consider first some cases without quantifiers, or proportional quantifiers anyway (where the division between restrictor and nuclear scope really matters), where the typical background—foreground, not-at-issue—at-issue partition between intensional part and extensional part is reversed.

- (27) I am sure we all felt that someone was missing today, ...
the passing of Joe, but I am sure he was with us in spirit.
- (28) (10 Favourite Christmas Music Performances) The one song I think is missing from this list: The Kinks' "Father Christmas" from 1978.

Here the intensional part is brought to the fore, somewhat at the cost of the extensional part, largely due to the subjective attitude verbs *feel* and *think*. Something's absence is an objective fact we do not express opinions about, so when we do supply verbs like those, it is the intensional part we focus on. Particularly in (28), the author is *presupposing* knowledge of which songs are in *x* (here: the list) and, by implication, which are not; and throughout, the extensional part is not what is really at issue.¹⁴

Hence, if the subjects were genuinely quantificational, we would expect this part—rather than the intensional part—to form part of the restrictor. As a matter of fact, though, authentic cases in point prove very difficult to find; let the following constructed example serve the purpose of illustration:

- (29) The exhibition does not include any of the artist's work from before 1900: some 20 paintings and scores of graphic works. In my opinion, most paintings are missing, making the exhibition very incomplete.

On the intended interpretation, the domain (the paintings) is understood to be included in (the artist's work from before 1900 and thus in) the entities that are not in *x* (the works not on exhibition).

13 This means that it is not a good idea to hardwire the intensional part as a definedness condition in the definition of *be missing* and say that the presupposition is accommodated into the restrictor.

14 Another class of cases where the 'ought to be there' part is easily foregrounded is the 'property reading' of indefinites (cf. Section 2.5), e.g.: "“There is something missing,” Tony mused out loud. “Shelves maybe.” Ziva did not answer but looked in the corner A piano was missing but after spending her paycheck and overdoing the credit card, it was going to have to wait until the New Year at least.”

When turning to unspecific readings, it is even more difficult to find cases where the intensional part would not effectively serve to restrict the domain. Still, I believe they may exist. It remains true that when quantifying over individual concepts in connection with *missing from x*, we need to focus on a closed set of functions to things in *x*, identified in terms of possible worlds where they are defined. But those possible worlds are not necessarily worlds where *x* is complete; or, it need not be a matter of *all* the worlds where *x* is complete. Consider a scenario where I am appraising your knitwork:

- (30) I notice you skipped a lot of lice stitches in this sweater. *You* probably don't mind, but in my opinion, most of them are missing.

The lice stitches (single stitches in a contrasting colour) which were skipped never came to be, so the interpretation is unspecific. But all of them are in the sweater in *some* possible worlds, for example, some of those where the sweater is complete (according to me), or, all of those where the sweater is knit in accordance with the pattern (and it is complete according to that); those of them that are to my mind *missing* are moreover in the sweater in *all* the worlds where it is, according to me, complete. In other words, the interpretation could be represented as something like (31) (where S_i^+ now represents a set of functions to stitches); more probably, however, the extra restrictor enters into it implicitly, through the conceptual cover, whether this is modelled as a parameter of interpretation or as a free variable.

$$(31) \quad (\mathbf{M} y: S_i^+(y) \& (\exists j \triangleright_x i) I_j(y_j, x) \& \neg I_i(y_i, x)) [(\forall k \triangleright_x i) I_k(y_k, x)]$$

3 The Property Reading

There is one reading of *be missing* sentences with indefinite subjects which Zimmermann does not treat—although he considers a formalization of (31a) (on the unspecific reading of the indefinite), among other formalizations, as (31b), rejecting it as too strong,—but citing Higginbotham (1989: 500) who paraphrases one case like this: “for an *F* to be missing from a thing *y* is for *y* not to have an *F*, when it is supposed to have an *F*”.

- (31) a. A screw is missing.
 b. $(\forall j \triangleright_x i) (\exists y) [S_j(y) \& I_j(y, x)] \& \neg (\exists y) [S_i(y) \& I_i(y, x)]$

This formalization does not match the truth conditions of (31a) under any reading, Zimmermann writes. But that is evidently a matter of contextual perspective—for Higginbotham was right: *be missing* and indefinite subjects are sometimes used in just this sense, as evidenced by (32) and (33):

(32) Freire has won many honours, including the world road title three times, but an Olympic medal is still missing from his collection.

(33) Seriously, I don't have any tools yet. Even a proper drill is missing in my collection.

This reading can be derived on an analysis along traditional lines like (34):

(34) *be missing*' = $\lambda Q[(\forall j \triangleright_x i) Q_j(\lambda y I_j(y, x)) \& \neg Q_i(I_i(y, x))]$

But that would mean abandoning the uniform analysis in terms of concepts. Is there a way to model Higginbotham's 'no *F*' reading within that format, where the existential takes wide scope, in particular over the negation?

Perhaps, if we think of a conceptual cover containing just one concept, coinciding with the intension of a superlative description, 'the first *F* in *x*'. Examples like (35a), of which (35b) is a fair paraphrase, are suggestive:

(35) a. (Ghent has already won three Belgian cups and were serious contenders for the title in previous seasons.)

Yet **the first Belgian title** is still missing.

b. Yet **a Belgian title** is still missing.

This might do to integrate the 'no *F*' reading in the concept-based analysis. However, there are reasons to stop short of this move. One is that it seems *ad hoc* to assume a singleton conceptual cover and a function involving a superlative when the determiner is *a*. In fact, the definite article does occur in what appears to be the same function, but much more rarely:

(36) However, the Olympic medal is still missing from the trophy cabinet at home.

Secondly, we would expect similar readings from other determiners beside *a*—the numeral *one*, for one. But (37) cannot have a reading on which the first medal is missing; what it says is that one *subkind* of medal is missing.

- (37) (But despite all her dominance,) one medal is still missing from her collection (—a 100 metre Olympic gold).

The considered reading is evidently limited to indefinites (+definites). This should make us suspicious: it is reminiscent of the Overgeneration problem with the classical analysis of opaque verbs, which Zimmermann (1993) solves by analysing them as operating on properties, which indefinites can express.

This analysis could work well for the reading of *be missing* at issue here. (32) would be expressing that the property expressed by *an Olympic medal* is “in” his collection in every accessible world completing it but not actually “in” it, where a property P is “in” x in a world k iff there is a P_k in x in k .

The price to be paid for this solution is that *be missing* is ambiguous; we need to supplement (9) by (38) ($I_k^*(P_k, x) \equiv (\exists y)[P_k(y) \& I_k(y, x)]$).

$$(38) \text{ be missing}^* = \lambda P[(\forall j \triangleright_x i) I_j^*(P_j, x) \& \neg I_i^*(P_i, x)]$$

Note that what happens in (37) is probably that we quantify over suitable subproperties, or *hyponyms*. This is easier with medals than with unicorns; but a parallel reading can be obtained with a *hyperonym* of *unicorn* and an opaque verb like *need* or *seek*:

- (39) Scrooge still needs/seeks two animals for his zoo: a unicorn and a spotted elephant with a square trunk.¹⁵

4 The Nonzero or Zero x

So far, PPs like *from my collection*, *in the comic*, *in my album* have mostly been enclosed in parentheses. The reason is that we have not had an analysis of them—the ‘container’ argument x has, following Zimmermann (2010), been treated as a free variable, to be contextually determined, and not as a syntactic argument. It is time to remove the parentheses and to treat (intransitive) *be missing* as a binary predicate.

$$(9^2) \text{ be missing}' = \lambda x \lambda y[(\forall j \triangleright_x i) I_j(y, x) \& \neg I_i(y, x)]$$

¹⁵ This example fuses two scenarios: Donald Duck #252 and Uncle Scrooge #16.

Syntactically this predicate primarily subcategorizes for a *from* phrase, but phrases headed by *in* or, in certain circumstances, yet another preposition will also do.¹⁶ The preposition does not contribute a meaning of its own, as the (underspecified) locative relation I is supplied by the predicate.

So far, so good, but we have also seen several sentences where such a phrase is missing. Syntactically, the parentheses are justified: the ‘container’ phrase is always optional. But when it is indeed missing, the argument is always context dependent, it is never existentially closed off.

Zimmermann (2010) hints that the fact that the *x* argument is anaphoric if it is not saturated syntactically is predictable on the basis of Sæbø (1996). Well, is it?—To briefly recapitulate the central hypothesis of Sæbø (1996): an argument is anaphoric iff it is involved in a presupposition introduced by the predicate. The question is, then, whether *x*, the container argument, is in fact involved in a presupposition introduced by *be missing*.

On the surface of it, the answer to this question is not yes: there is no sign of a presupposition in the Ty2 translation (9²). However, we have seen (notably in section 2.4) that the two conjuncts in the content of *be missing* are normally not on a par with each other with regard to the background—foreground, at-issue—not-at-issue distinction. There is normally a partition where one conjunct is, in a loose, pragmatic sense of the word, presupposed while the other is asserted (or, more neutrally, *at issue*). Although usually, the intensional conjunct is backgrounded while the extensional conjunct is foregrounded, sometimes (as suggested by (1), where it is taken for granted that Wolfgang is not present) it is the other way around. Different matrix verbs can serve to select different partitions in embedded clauses:

- (40) It was my job to round them all up at the end of the day and that was when we **noticed** that Cornelius was missing.
- (41) And even though they all **felt** that Nico was missing, things were at least a little easier this time.

It is difficult to *notice* that a certain person ought to be present—as difficult as it is to *feel* that a certain person is not present. This is brought out if we present one or the other conjunct in a (nonrestrictive) relative clause:

16 This ambivalence could be taken to indicate that the phrases are not arguments but adjuncts; but on the other hand, predicates that subcategorize for two or more different prepositions are not unknown. Anyway, as long as the individual referred to with *Px* is a semantic argument of *missing*, it is difficult to see how else one could analyse the merge.

(42) ??we noticed that Cornelius, who was absent, should have been present

(43) ??they all felt that Nico, who should have been present, was absent

Now for the question whether the anaphoricity of an unsaturated *x* argument is or is not predictable, all that matters is that the one *or* the other conjunct is presupposed; this argument figures in both conjuncts. Thus provided that the non-at-issue status one of them normally has is reflected in anything like a presuppositional Discourse Representation Structure, where all discourse referents present must be introduced and all introduced discourse referents are (following the theory of van der Sandt 1992) anaphoric, then the fact that *x*, being such a referent, must be bound syntactically *or contextually* indeed follows. That premiss may be debatable, but Zimmermann's allusion to this sort of explanation was at any rate not entirely off the mark.

5 Perspectives

This is not the final word, by far. For one thing, there are loose ends, issues that should be addressed but have not been. The transitive verb *be missing*, for instance, raises questions that I have left unanswered, as does the verb *miss*. In other languages, we find verbs with a partial overlap with *miss*, *be missing*, and (*be*) *lack(ing)*; both this third English lexeme and the cross-linguistic facts are worthy of future attention.

Secondly, what answers have been provided are not definitive. The most solid conclusion we can draw is that yes, the idea of using individual concepts in the analysis of things that are missing looks like a viable one. It is tailored to fit unspecific readings (and it often gives more intuitive results than in Zimmermann's paradigmatic screw case); whether the way to model specific readings suggested in section 2.3 is the appropriate way is more open to debate. There is also reason to be cautious concerning the tendency for the 'intensional part' to restrict the domain; the account offered in section 2.4, building on the discussion in section 2.2, was a bit on the speculative side. Finally, the separate 'property reading' analysis argued for in section 3 is a costly affair; some way to subsume all interpretations under one analysis should still be sought.

And thirdly, there are sure to be, to quote Zimmermann (2010), "delicate details" to the intentionalist approach—possibly less delicate details too—which I have missed.

On a general note, the remaining loose threads and open seams bear testimony to a fact of natural language that becomes apparent in all that Ede writes:

the amazing fact that such small and innocent-sounding words can contain such depths and give rise to such a wealth of riddles.

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Information, Issues, and Attention*

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1 Introduction

Traditionally, the meaning of a sentence is identified with its *informative* content. However, even in a conversation whose only purpose is to exchange information, sentences are not only used to *provide* information. They are also used to *request* information. That is, sentences may be both informative and inquisitive.

Inquisitive semantics intends to capture these two dimensions of meaning in a uniform way.¹ It takes a sentence to express a proposal to update the common ground of a conversation. Such a proposal does not necessarily specify just one way of updating the common ground. It may suggest alternative ways of doing so, inviting other participants to establish one or more of the proposed updates. Formally, a proposition consists of one or more *possibilities*. Each

* An important source of inspiration for this paper was Ede's work on *might* and free choice disjunction (Zimmermann 2000). A preliminary, significantly shorter version of the paper first appeared as Ciardelli & Groenendijk & Roelofsen (2009) and the present, extended version of the paper was largely written in 2010. At that time, the framework of inquisitive semantics that the paper builds on still stood in its infancy. In the meantime, the framework has become more mature, and our general perspective on it has changed in certain respects (see, e.g., Ciardelli & Groenendijk & Roelofsen 2012, 2013a,b; Roelofsen 2013). However, these changes in perspective are largely orthogonal to the main proposal that is made in the present paper, which is to generalize the basic notion of meaning that is provided by inquisitive semantics in order to capture *attentive content* as well as informative and inquisitive content. We are very grateful to Maria Aloni, Luis Alonso-Ovalle, Scott Anderbois, Rajesh Bhatt, Maria Bittner, Chris Brumwell, Seth Cable, Noah Constant, Chris Davis, Paul Dekker, Sam van Gool, Tikitou de Jager, Stefan Kaufmann, Jan Köpping, Angelika Kratzer, Sarah Murray, Edgar Onea, Kathryn Pruitt, Aynat Rubinstein, Will Starr, Frank Veltman and Matthijs Westera for useful feedback on the ideas presented here, and to the Netherlands Organisation for Scientific Research (NWO) for financial support.

1 We assume here the formulation of inquisitive semantics as given in Ciardelli, (2009); Groenendijk & Roelofsen (2009). See Groenendijk (2009); Mascarenhas, (2009) for a different formulation, and Ciardelli, (2009); Ciardelli & Groenendijk & Roelofsen (2013b); Ciardelli & Roelofsen (2011); for arguments in favor of the former. Also, see Ciardelli & Groenendijk & Roelofsen (2012, 2013a,b); Roelofsen (2013) for a more recent perspective on the system proposed in Ciardelli, (2009); Groenendijk & Roelofsen (2009).

possibility is a set of possible worlds, embodying a potential update of the common ground. A sentence is *informative* iff there are possible worlds that are eliminated from the common ground by each of the proposed updates, and it is *inquisitive* iff it proposes two or more alternative updates, requesting information from other participants in order to establish at least one of these updates. Thus, construing propositions as sets of possibilities makes it possible to capture both the informative and the inquisitive content of a sentence.

In the present paper we argue that this notion of meaning has an additional advantage. Namely, it is also suitable to capture what we will call the *attentive* content of a sentence: its potential to draw attention to certain possibilities.

One empirical phenomenon that, in our view, calls for an account of attentive content, is the behavior of *might* sentences, like (1):²

- (1) John might be in London.

This sentence clearly differs from the assertion in (2) and the question in (3).

- (2) John is in London.

- (3) Is John in London?

(1) differs from (2) in that it does not provide the information that John is in London, and it differs from (3) in that it does not require an informative response: one may respond to (1) simply by nodding, or saying “ok”.

Intuitively, the semantic contribution of (1) lies in its potential to *draw attention* to the possibility that John is in London. It is this attentive aspect of meaning that we wish to capture, and we will find that the notion of meaning propounded by inquisitive semantics is especially well-suited for this purpose.

The paper is organized as follows. Section 2 starts with a recapitulation of inquisitive semantics, as formulated in Ciardelli, (2009); Groenendijk & Roelofsen (2009), and also presents an alternative, for our purposes more flexible definition of the semantics. Section 3 shows how attentive content can be

² The idea that a semantic analysis of *might* sentences should capture their potential to draw attention to certain possibilities is not new. It has been informally alluded to in various places in the literature, and several formal accounts have been proposed. See for instance Swanson (2006), Brumwell, (2009), de Jager (2009), Franke & de Jager (2011), as well as the closely related work of Yalcin, (2008) and Dekker (2010). All these accounts differ substantially from the one that will be offered here, both technically and in empirical scope. Some discussion will be provided in section 6, but a detailed comparison is left for a future occasion.

captured in a natural extension of this framework. In particular, it offers a straightforward analysis of the attentive content of *might* sentences, and shows that this analysis accounts for certain rather striking empirical facts concerning the interaction between *might* on the one hand, and disjunction, conjunction, negation, and implication on the other. Section 4 turns to pragmatic aspects of the interpretation of sentences that are not merely informative, but also inquisitive and/or attentive. This will lead, among other things, to a pragmatic account of the *epistemic* component of the interpretation of *might*. The proposed account will be compared with the classical analysis of *might* as an epistemic modal operator, and also with the treatment of *might* in Veltman's (1996) update semantics. Section 5 discusses the behaviour of *might* in certain embedded contexts, and argues on the basis of this that the semantic meaning of *might* sentences is, under certain conditions, strengthened in a particular way before being composed with the semantic meaning of the embedding operator. Section 6 closes with some final remarks.

2 Inquisitive Semantics

In inquisitive semantics, sentences are taken to express *proposals* to update the common ground of a conversation in one or more ways. Technically, the proposition expressed by a sentence is taken to be a set of alternative *possibilities*. Each possibility is a set of possible worlds, embodying a way to update the common ground. In this setting, a sentence may be *informative*, in the sense that certain possible worlds may be eliminated from the common ground by any of the proposed updates, and it may also be *inquisitive*, in the sense that it may express a proposition consisting of two or more alternative possibilities, requesting information from other participants in order to establish at least one of these alternatives.

Thus, the proposition that a sentence expresses in inquisitive semantics embodies both the information that it *provides* and the information that it *requests* from other conversational participants. If a sentence ϕ expresses a proposition $[\phi]$, it provides the information that at least one of the possibilities in $[\phi]$ obtains, and, in case $[\phi]$ contains two or more alternative possibilities, it requests information from other participants in order to establish at least one of these possibilities.

2.1 Alternatives

In Ciardelli, (2009); Groenendijk & Roelofsens (2009), propositions are not just construed as arbitrary sets of possibilities, but rather as sets of *alternative*

possibilities, i.e., sets of possibilities such that no possibility is contained in any other possibility. The rationale behind this is as follows.

Suppose that a proposition $[\phi]$ contains two possibilities, α and β (possibly among others), such that $\alpha \subset \beta$. In this case, α does not really help in any way to represent the information that ϕ provides or requests. For, on the one hand, saying that at least one of α and β obtains is just as informative under these circumstances as saying that β obtains. And on the other hand, asking other participants to provide enough information to establish at least one of α or β is just the same as asking them to provide enough information to establish β . Thus, possibilities that are included in other possibilities do not really contribute to representing the informative and inquisitive content of a sentence. Therefore, as long as we are only interested in capturing informative and inquisitive content, non-maximal possibilities may be disregarded, and propositions can be construed as sets of alternative possibilities.³

2.2 Propositions via Support

We will define an inquisitive semantics for a propositional language, which is based on a finite set of atomic sentences, and has \neg , \wedge , \vee , and \rightarrow as its basic logical operators. There are also two additional operators, $?$ and $!$, to which we will refer as *non-inquisitive* and *non-informative closure*, respectively. $?\phi$ is defined as an abbreviation of $\phi \vee \neg\phi$ and $!\phi$ is defined as an abbreviation of $\neg\neg\phi$. The rationale behind these definitions will become clear presently.

We will provide two alternative definitions of the semantics. The first is the original definition from Ciardelli, (2009) and Groenendijk & Roelofsen (2009).

3 There is an important caveat to note here: strictly speaking, non-maximal possibilities may only be disregarded if they are included in a maximal possibility. In the propositional setting that we consider here that is always the case because there are only finitely many distinct possibilities. However, as observed and discussed in detail in Ciardelli (2009, 2010) and Ciardelli & Groenendijk & Roelofsen (2013c), this is not necessarily the case in the first-order setting.

This is one technical point where more recent formulations of inquisitive semantics take a different route: rather than construing propositions as sets of *alternative* possibilities, they take propositions to be sets of possibilities that are *downward closed*, i.e., if a proposition contains a certain possibility α then it also contains every possibility $\beta \subset \alpha$. This gives essentially the same results for the propositional setting, but it extends more straightforwardly to the first-order setting. Moreover, it more naturally allows for an algebraic characterization of the semantics, which provides important insight into the logical workings of the system (Ciardelli & Groenendijk & Roelofsen 2012, 2013a; Roelofsen 2013). However, for our current purposes it is convenient to stick to the view of propositions as sets of alternative possibilities, as in Ciardelli, (2009); Groenendijk & Roelofsen (2009).

This is an ‘indirect’ definition, in the sense that the propositions expressed by the sentences of our language are defined via the intermediary notion of *support*. The second definition that we will provide, also already discussed in Ciardelli, (2009), is more direct—it bypasses the notion of support, and immediately construes the propositions expressed by the sentences of our language in a recursive fashion.

In the support setup, the basic ingredients for the semantics are *possible worlds* and *states*. A possible world is a valuation function that assigns truth values to every atomic sentence in the language. We will use w as a meta-variable ranging over possible worlds, and we will use ω to denote the set of all possible worlds. A state is a set of possible worlds. We will use s, t as meta-variables ranging over states.

The proposition expressed by a sentence is defined in terms of the notion of *support* (just as, in a classical setting, the meaning of a sentence is usually defined in terms of truth). Support is a relation between states and sentences. We write $s \models \phi$ for ‘ s supports ϕ ’.

Definition 1 (Support⁴).

1. $s \models p$ iff $\forall w \in s : w(p) = 1$
2. $s \models \neg\phi$ iff $\forall t \subseteq s : t \not\models \phi$
3. $s \models \phi \wedge \psi$ iff $s \models \phi$ and $s \models \psi$
4. $s \models \phi \vee \psi$ iff $s \models \phi$ or $s \models \psi$
5. $s \models \phi \rightarrow \psi$ iff $\forall t \subseteq s : \text{if } t \models \phi \text{ then } t \models \psi$

It follows from the above definition that for any sentence ϕ , the empty state supports both ϕ and $\neg\phi$. Thus, we can think of \emptyset as the *inconsistent* state.

Definition 2 (Propositions and possibilities).

- The *proposition* expressed by ϕ is the set of maximal states supporting ϕ , that is, the set of states that support ϕ and are not properly included in any other state supporting ϕ .
- Every maximal state supporting ϕ is called a *possibility* for ϕ .

4 Readers familiar with intuitionistic logic will notice that the notion of support is very similar to the notion of satisfaction in Kripkean semantics for intuitionistic logic. For an exploration of this connection, see Ciardelli, (2009) and Ciardelli & Roelofsen (2011).

In a classical setting, the proposition expressed by ϕ is the set of all possible worlds that make ϕ true. Here, the proposition expressed by ϕ is defined in terms of support rather than in terms of truth. It may be expected, then, that the proposition expressed by ϕ would be defined as the set of all states supporting ϕ . Rather, though, it is defined as the set of all *maximal* states supporting ϕ . This is motivated by the considerations in section 2.1: as long as we are only interested in informative and inquisitive content, propositions can be construed as sets of *alternative* possibilities. If one state is included in another, we do not regard these two states as alternatives.

2.3 *Bypassing Support*

We will now provide a more direct definition of the propositions expressed by the sentences of our language. This alternative definition will yield exactly the same result as the original one, but later on, when we are no longer exclusively interested in informative and inquisitive content, but also in attentive content, we will see that the alternative definition can be adapted straightforwardly, while the original definition in terms of support does not provide such flexibility.

In this alternative setup, we provide a direct recursive definition of the possibilities for a sentence. We will use α, β here as meta-variables ranging over possibilities, and \mathcal{P} as a meta-variable ranging over sets of possibilities. Propositions are non-empty sets of alternative possibilities:

Definition 3 (Propositions).

A proposition is a non-empty set of alternative possibilities, that is, a set of possibilities \mathcal{P} such that $\mathcal{P} \neq \emptyset$ and for no $\alpha, \beta \in \mathcal{P}$: $\alpha \subset \beta$.

In order to give a recursive definition of the propositions expressed by the sentences of our language, we define an operator ALT which transforms any non-empty set of possibilities \mathcal{P} into a non-empty set of *alternative* possibilities.

Definition 4 $\text{ALT}\mathcal{P} = \{\alpha \in \mathcal{P} \mid \text{there is no } \beta \in \mathcal{P} \text{ such that } \alpha \subset \beta\}$

The proposition expressed by a sentence ϕ is denoted by $[\phi]$, and is recursively defined as follows.

Definition 5 (Inquisitive semantics bypassing support).

1. $[p] = \{\{w \mid w(p) = 1\}\}$ if p is atomic
2. $[\neg\phi] = \{\overline{\bigcup[\phi]}\}$
3. $[\phi \vee \psi] = \text{ALT}([\phi] \cup [\psi])$
4. $[\phi \wedge \psi] = \text{ALT}\{\alpha \cap \beta \mid \alpha \in [\phi] \text{ and } \beta \in [\psi]\}$
5. $[\phi \rightarrow \psi] = \text{ALT}\{\gamma_f \mid f \in [\psi]^{[\phi]}\}$, where $\gamma_f = \bigcap_{\alpha \in [\phi]} (\alpha \Rightarrow f(\alpha))$

The clause for implication needs some further explanation. First, $[\psi]^{[\phi]}$ denotes the set of functions from $[\phi]$ to $[\psi]$. Thus, every $f \in [\psi]^{[\phi]}$ is a function mapping every possibility α in $[\phi]$ to some possibility $f(\alpha)$ in $[\psi]$. Second, the semantic conditional operator \Rightarrow remains to be specified. For simplicity, we define \Rightarrow as material implication here, but in principle a more sophisticated semantic conditional operator could be ‘plugged in’ here.

Definition 6 (Semantic conditional operator). For any two possibilities α and β :

$$- \alpha \Rightarrow \beta := \overline{\alpha} \cup \beta$$

Definitions 5 and 6 assure that $[\phi]$ is always a set of alternative possibilities, to which we will refer as the possibilities for ϕ . The following correspondence result says that the direct recursive definition of the semantics yields exactly the same results as the original definition via support.

Proposition 7 (Correspondence). For any sentence ϕ and any state α :

$$- \alpha \in [\phi] \text{ iff } \alpha \text{ is a maximal state supporting } \phi$$

2.4 Illustration

Let us briefly go through the clauses of definition 5 one by one. In doing so, it will be useful to have some terminology and notation to refer to the classical meaning of a sentence. For any sentence ϕ , we will denote the set of possible worlds where ϕ is classically true as $|\phi|$, and we will refer to this set of possible worlds as the *truth set* of ϕ . It will also be useful to make a distinction between sentences whose proposition consists of a single possibility, and sentences whose proposition consists of two or more alternative possibilities. We will refer to the former as *classical* sentences, and to the latter as *inquisitive* sentences. Figure 1 provides some examples of inquisitive sentences, which will be discussed in more detail below.

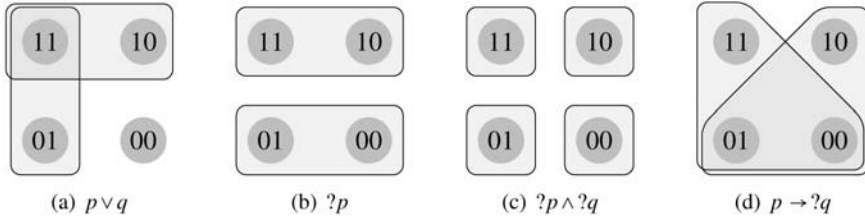


FIGURE 1 Some examples of inquisitive sentences. In each figure, n is a possible world where both p and q are true, 10 is a possible world where p is true and q is false, etcetera.

2.4.1 Atoms

The proposition expressed by an atomic sentence p always consists of just one possibility, $\{w \mid w(p) = 1\}$, which coincides with its truth set, $|p|$. Thus, an atomic sentence is always classical.

2.4.2 Negation

In a classical setting, negation amounts to set complementation. That is, the truth set of $\neg\phi$ is defined as the complement of the truth set of ϕ itself. In the present framework, the proposition expressed by ϕ is not a simple set of possible worlds, but rather a set of possibilities, each of which is in turn a set of possible worlds. In order to determine the proposition expressed by $\neg\phi$, we first take the union of all the possibilities for ϕ , and then take the complement. The resulting possibility, $\overline{\bigcup[\phi]}$, is the unique possibility for $\neg\phi$. This means that negated sentences, just like atomic sentences, are always classical.⁵

2.4.3 Non-inquisitive Closure

The non-inquisitive closure of ϕ , $!\phi$, is defined as an abbreviation of $\neg\neg\phi$. Like any other negated sentence, $\neg\neg\phi$ is never inquisitive. Moreover, $\neg\neg\phi$ always has exactly the same informative content as ϕ itself. As will be discussed in more detail below, the informative content of ϕ is captured by the union of all the possibilities for ϕ . Since $[\neg\neg\phi] = \{\bigcup[\phi]\}$, we always have that $\bigcup[\neg\neg\phi] = \bigcup[\phi]$. That is, besides always being non-inquisitive, $\neg\neg\phi$ always ‘preserves’ the informative content of ϕ . This is exactly what is to be expected of a non-inquisitive closure operator.

⁵ We should note that this is not the only possible way to treat negation in an inquisitive setting. See Groenendijk & Roelofsen (2010, 2014); Lojko, (2012) for an alternative treatment.

2.4.4 Disjunction

Disjunctions are typically inquisitive. To determine the proposition expressed by a disjunction $\phi \vee \psi$ we first collect all possibilities for ϕ and all possibilities for ψ , and then apply ALT to obtain a proposition. For instance, as depicted in figure 1(a), the proposition expressed by $p \vee q$ consists of two possibilities: the possibility that p , and the possibility that q .

2.4.5 Non-informative Closure

The non-informative closure of ϕ , $? \phi$, is defined as an abbreviation of $\phi \vee \neg \phi$. This means that $[? \phi] = \text{ALT}([\phi] \cup [\neg \phi])$. For instance, as depicted in figure 1(b), the proposition expressed by $?p$ consists of two possibilities, the possibility that p , and the possibility that $\neg p$. In general, $\phi \vee \neg \phi$ is never informative, and always preserves the inquisitive content of ϕ , in a sense to be made more precise below. This is exactly what is to be expected of a non-informative closure operator.

2.4.6 Conjunction

To determine the proposition expressed by a conjunction $\phi \wedge \psi$ we take the pairwise intersection of all possibilities for ϕ and all possibilities for ψ , and then apply ALT to obtain a proposition. Notice that if ϕ and ψ are both classical, then conjunction simply amounts to intersection, just as in the classical setting. Figure 1(c) depicts the proposition expressed by $?p \wedge ?q$. In this case both conjuncts are inquisitive, and conjunction amounts to pairwise intersection.

2.4.7 Implication

The clause for implication is the one that is most involved. Let us consider two cases separately. First, suppose that the consequent of the implication, ψ , is non-inquisitive. As a concrete example, take $(p \vee q) \rightarrow r$. In this case, there exists only one function from $[\phi] = \{ |p|, |q| \}$ to $[\psi] = \{ |r| \}$, namely the function that maps both $|p|$ and $|q|$ to $|r|$. Call this function f_* . Then the only possibility for $[\phi \rightarrow \psi]$ is γ_{f_*} , which is defined as follows:

$$\bigcap_{\alpha \in [\phi]} (\alpha \Rightarrow f_*(\alpha))$$

Given the definition of \Rightarrow , this amounts to $|(p \rightarrow r) \wedge (q \rightarrow r)|$, which can be simplified to $|(p \vee q) \rightarrow r|$. Thus, $(p \vee q) \rightarrow r$ behaves classically. And this holds more generally: whenever the consequent ψ of a conditional $\phi \rightarrow \psi$ is non-inquisitive, the unique possibility for that conditional is $|\phi \rightarrow \psi|$.

Now suppose that ψ is inquisitive, but that the antecedent, ϕ , is non-inquisitive. Take as a concrete example the conditional question $p \rightarrow ?q$. In this case,

there is one possibility for the antecedent, $|p|$, and two for the consequent, $|q|$ and $|\neg q|$. So there are two functions from $[\phi]$ to $[\psi]$ in this case, one mapping $|p|$ to $|q|$, and one mapping $|p|$ to $|\neg q|$. Call the first f_q and the second $f_{\neg q}$. The corresponding possibilities are:

$$\begin{aligned}\gamma_{f_q} &= |p| \Rightarrow |q| = |p \rightarrow q| \\ \gamma_{f_{\neg q}} &= |p| \Rightarrow |\neg q| = |p \rightarrow \neg q|\end{aligned}$$

So the proposition expressed by $p \rightarrow ?q$ is $\{|p \rightarrow q|, |p \rightarrow \neg q|\}$, as depicted in figure 1(d). This reflects the empirical observation that the expected answers to a conditional question like (4) are (5a) and (5b):

- (4) If John goes to London, will he fly British Airways?
- (5) a. Yes, if he goes to London, he will fly BA.
b. No, if he goes to London, he won't fly BA.

2.4.8 Implication and Negation

Before moving on, let us briefly remark that negation and implication are closely related in the present system. Namely, $\neg\phi$ is always equivalent with $\phi \rightarrow \perp$, where \perp can be any sentence that expresses the absurd proposition $\{\emptyset\}$. This conception will be useful in section 3.4.

2.5 Informative and Inquisitive Content

In the introduction, we pointed out informally that propositions, construed as sets of alternative possibilities, capture both the informative and the inquisitive content of a sentence. Now we are in a position to say more precisely what this means. The *informative content* of a sentence ϕ , denoted by $\text{info}(\phi)$, is characterized by the *union* of all the possibilities for ϕ . Possible worlds that are not included in $\bigcup[\phi]$ are eliminated from the common ground if any of the updates proposed by ϕ is realized. In this sense, ϕ proposes to eliminate any possible world that is not in $\bigcup[\phi]$.

The *inquisitive content* of a sentence ϕ , denoted by $\text{inq}(\phi)$, should capture what kind of response is needed to settle the proposal expressed by ϕ . One way to settle this proposal is to *accept* it, and to provide enough information to realize one or more of the proposed updates. Another way to settle the proposal is to *reject* it. Thus, the inquisitive content of ϕ must reflect what kind of information is required to realize one of the proposed updates, or to reject the proposal altogether. The information that is required to realize one of the proposed updates is determined by the possibilities for ϕ , while the

information that is required to reject the proposal is determined by the unique possibility for $\neg\phi$. Thus, on a first approximation, $\text{inq}(\phi)$ should be defined as $[\phi] \cup [\neg\phi]$. However, this definition needs to be refined. In line with earlier remarks, only the *maximal* possibilities in $[\phi] \cup [\neg\phi]$ really determine which information is *required* to settle the proposal expressed by ϕ . Thus, $\text{inq}(\phi)$ is defined as $\text{ALT}([\phi] \cup [\neg\phi])$. Incidentally, the only non-maximal possibility in $[\phi] \cup [\neg\phi]$, if any, is the *empty* possibility. So the only effect of ALT here, if any, is to remove the empty possibility. In sum:

Definition 8 (Informative and inquisitive content).

- $\text{info}(\phi) = \bigcup[\phi]$
- $\text{inq}(\phi) = \text{ALT}([\phi] \cup [\neg\phi])$

The inquisitive content of a sentence ϕ always corresponds with the proposition expressed by $?\phi$.

Proposition 9. For any sentence ϕ , $\text{inq}(\phi) = [?\phi]$

The informative content of a sentence always corresponds with its truth set.

Proposition 10. For any sentence ϕ , $\text{info}(\phi) = |\phi|$

This means that the system presented here extends classical propositional logic in a ‘conservative’ way: every sentence is assigned exactly the same informative content as in the classical setting. The difference is that classical propositional logic is exclusively concerned with informative content, while our system captures inquisitive content as well.

Finally, informative and inquisitive content completely exhaust the meaning of a sentence in the present system. Two sentences have the same informative and inquisitive content if and only if they express exactly the same proposition.

Proposition 11. (Informative and inquisitive content exhaust meaning).

For any ϕ and ψ , $[\phi] = [\psi] \iff \text{info}(\phi) = \text{info}(\psi) \text{ and } \text{inq}(\phi) = \text{inq}(\psi)$

2.6 Informative and Inquisitive Sentences

We will say that a sentence ϕ is informative if and only if $\text{info}(\phi)$ does not cover the entire logical space. In this case, there are possible worlds that are not

included in $\bigcup[\phi]$, and ϕ proposes to eliminate these possible worlds from the common ground.

We will say that ϕ is inquisitive if and only if ϕ does not provide enough information to establish any of the updates that it proposes. In this case, an informative response is required in order to establish one or more of the proposed updates.

When does ϕ not provide enough information to establish any of the updates that it proposes? Just in case $\text{info}(\phi)$ is not contained in any of the possibilities for ϕ . But $\text{info}(\phi)$ is defined as $\bigcup[\phi]$. So if $\text{info}(\phi)$ is contained in some possibility for ϕ , then it must actually *coincide* with that possibility, and we must have that $\text{info}(\phi) \in [\phi]$. So ϕ is inquisitive if and only if $\text{info}(\phi) \notin [\phi]$. In sum:

Definition 12 (Informative and inquisitive sentences).

- ϕ is *informative* iff $\text{info}(\phi) \neq \omega$;
- ϕ is *inquisitive* iff $\text{info}(\phi) \notin [\phi]$.

Inquisitive sentences can also be characterized as sentences expressing a proposition that contains at least two alternative possibilities.

Proposition 13 (Alternative characterization of inquisitive sentences).

- ϕ is *inquisitive* iff $[\phi]$ contains at least two alternative possibilities.

In illustrating the clauses of our semantics, we saw that it was useful to also have a term for *classical* sentences, whose proposition consists of exactly one possibility.

Definition 14 (Classical sentences).

- ϕ is *classical* iff $[\phi]$ contains exactly one possibility.

Clearly, given proposition 13, a sentence is classical just in case it is non-inquisitive.

Proposition 15 (Classical and inquisitive sentences).

- ϕ is classical iff it is not inquisitive.

Classical sentences ‘behave classically’ in the sense that their unique possibility always coincides with their truth set. Interestingly, such classical behavior is preserved by all connectives except for disjunction.

Proposition 16 (Connectives preserving classical behavior).

For any proposition letter p and any sentences ϕ and ψ :

1. p and $\neg\phi$ are classical;
2. If both ϕ and ψ are classical, then so is $\phi \wedge \psi$;
3. If ψ is classical, then so is $\phi \rightarrow \psi$.

It follows that any disjunction-free sentence is classical, which means that disjunction is the only source of non-classical behavior in the present system.

Corollary 17. Any disjunction-free sentence is classical.

Tautologies are defined as sentences that express the trivial proposal, and contradictions are defined as sentences that express the absurd proposal.

Definition 18 (Tautologies and contradictions).

- ϕ is a *tautology* iff $[\phi] = \{\omega\}$
- ϕ is a *contradiction* iff $[\phi] = \{\emptyset\}$

It is easy to see that a sentence is a contradiction in the present system iff it is a classical contradiction. However, this does not hold for tautologies. Classically, a sentence is meaningful (non-tautological) iff it is informative. In the present system, a sentence is meaningful if it is informative, but also if it is inquisitive. Thus, a sentence like $?p$, which is a classical tautology, is now meaningful.

Conversely, any sentence which is *not* informative or inquisitive is a tautology. So the only way for a sentence to be meaningful in the present system is to be informative or inquisitive.

Proposition 19. A sentence is non-tautological iff it is informative or inquisitive.

Informative and inquisitive sentences have been defined directly in terms of the propositions that they express. However, they can also be characterized in terms of our syntactic non-inquisitive and non-informative closure operators.

Definition 20 (Equivalence).

Two sentences ϕ and ψ are *equivalent*, $\phi \sim \psi$, if and only if $[\phi] = [\psi]$.

Proposition 21 (Semantic categories and syntactic operators).

1. ϕ is non-informative iff $\phi \sim ?\phi$
2. ϕ is non-inquisitive iff $\phi \sim !\phi$

2.7 Proper Possibilities and the Empty Possibility

Possibilities have been defined as arbitrary sets of possible worlds. This means, in particular, that the *empty* set of possible worlds also counts as a possibility. It is worth commenting briefly on this feature of the system.

First, note that the empty possibility, unlike any other possibility, embodies an update that always leads to an *inconsistent* common ground. Thus, assuming that conversational participants aim to maintain a consistent common ground, the empty possibility embodies an update that cannot seriously be proposed, and certainly will never be established. In this light, we really only think of non-empty possibilities as proper possibilities.

Definition 22 (Proper possibilities).

- A proper possibility is a non-empty set of possible worlds;
- For any sentence ϕ , $\Pi(\phi)$ will denote the set of proper possibilities for ϕ .

There is only one proposition that contains the empty possibility, namely the absurd proposition, $\{\emptyset\}$, which is expressed by contradictions. Propositions expressed by non-contradictory sentences always consist entirely of proper possibilities. This means that the set of proper possibilities for a sentence always completely determines its meaning.

Proposition 23 (Proper possibilities fully determine meaning).

For any two sentences ϕ and ψ :

- $[\phi] = [\psi]$ iff $\Pi(\phi) = \Pi(\psi)$

This concludes the recapitulation of the basic system of inquisitive semantics that covers informative and inquisitive content. We now turn to the main concern of this paper of adding attentive content as a third component of meaning.

3 Attention

We observed in the introduction that, at least in some intuitive sense, the semantic contribution of sentences like (6) lies in their potential to draw attention to certain possibilities, in this case the possibility that John is in London.

(6) John might be in London.

The conception of a proposition as a set of possibilities is ideally suited to capture this intuition. We can simply think of the proper possibilities for a sentence ϕ as the possibilities that ϕ draws attention to; the possibilities that it proposes to take into consideration. At the same time, we can still think of ϕ as providing the information that at least one of the possibilities in $[\phi]$ obtains, and as requesting information in order to establish one or more of these possibilities. Thus, if a proposition is conceived of as a set of possibilities, it may in principle capture the informative, inquisitive, and attentive content of a sentence all at once.

Recall that in section 2 propositions were formally defined as sets of *alternative* possibilities. This was because non-maximal possibilities did not contribute in any way to the representation of informative and inquisitive content, and these were the only aspects of meaning that we were interested in. However, as soon as attentive content becomes of interest, non-maximal possibilities should be taken into account as well. In general, there is no reason why a sentence may not draw attention to two possibilities α and β such that $\alpha \subset \beta$. Thus, there is no general need to filter out non-maximal possibilities anymore.

What we do want to preserve is the characteristic feature of our system that the meaning of a sentence is completely determined by its *proper* possibilities. Thus, we will assure that the proposition expressed by non-contradictory sentences always consists entirely of proper possibilities. As before, the only proposition that contains the empty possibility will be $\{\emptyset\}$, the absurd proposition, expressed by contradictions.

Definition 24 (Propositions).

A proposition is either a non-empty set of proper possibilities, or $\{\emptyset\}$.

In defining the semantics of our formal language, we will of course no longer make use of ALT (which turned any \mathcal{P} into a set of *alternative* possibilities), but

rather of a function PRO , which turns any \mathcal{P} into a proposition in the sense of definition 24. Other than this, the semantics remains untouched.⁶

Definition 25. $\text{PRO}\mathcal{P} = \begin{cases} \mathcal{P} - \{\emptyset\} & \text{if } \mathcal{P} \neq \{\emptyset\} \\ \mathcal{P} & \text{if } \mathcal{P} = \{\emptyset\} \end{cases}$

Definition 26 (Unrestricted inquisitive semantics).

1. $\llbracket p \rrbracket = \{\{w \mid w(p) = 1\}\}$ if p is atomic
2. $\llbracket \neg\phi \rrbracket = \{\bigcup \llbracket \phi \rrbracket\}$
3. $\llbracket \phi \vee \psi \rrbracket = \text{PRO}(\llbracket \phi \rrbracket \cup \llbracket \psi \rrbracket)$
4. $\llbracket \phi \wedge \psi \rrbracket = \text{PRO}\{\alpha \cap \beta \mid \alpha \in \llbracket \phi \rrbracket \text{ and } \beta \in \llbracket \psi \rrbracket\}$
5. $\llbracket \phi \rightarrow \psi \rrbracket = \text{PRO}\{\gamma_f \mid f \in \llbracket \psi \rrbracket^{\llbracket \phi \rrbracket}\}$, where $\gamma_f = \bigcap_{\alpha \in \llbracket \phi \rrbracket} (\alpha \Rightarrow f(\alpha))$

In comparing the system defined in section 2 with the one defined here, we will refer to the former as *restricted* inquisitive semantics, or $\text{Inq}_{\mathcal{C}}$ for short, and to the latter as *unrestricted* inquisitive semantics, or Inq_{\emptyset} for short.

Notice that in definition 26 we use the notation $\llbracket \phi \rrbracket$ in order to avoid confusion with $[\phi]$. Thus, $|\phi|$ is the proposition that is classically expressed by ϕ , $[\phi]$ is the proposition expressed by ϕ in $\text{Inq}_{\mathcal{C}}$, and $\llbracket \phi \rrbracket$ is the proposition expressed by ϕ in Inq_{\emptyset} . If no confusion arises, we will henceforth simply refer to $\llbracket \phi \rrbracket$ as the proposition expressed by ϕ , and to the elements of $\llbracket \phi \rrbracket$ as the possibilities for ϕ .

The basic formal connection between $\text{Inq}_{\mathcal{C}}$ and Inq_{\emptyset} is that $[\phi]$ always consists of the *alternative* possibilities in $\llbracket \phi \rrbracket$.

Proposition 27. For every sentence ϕ , $[\phi] = \text{ALT}\llbracket \phi \rrbracket$

Corollary 28. For every sentence ϕ , $\bigcup \llbracket \phi \rrbracket = \bigcup [\phi] = |\phi|$

We will continue to use $\Pi(\phi)$ to denote the set of proper possibilities for ϕ . As in $\text{Inq}_{\mathcal{C}}$, the meaning of a sentence is determined by its proper possibilities.

Proposition 29 (Proper possibilities fully determine meaning).

⁶ This semantics was first introduced under the name of *possibility semantics* in Ciardelli, (2009), where it served a different purpose, namely, to directly associate possibilities to first-order formulas that lack maximal supporting states. The only difference with the definition given there is that, in the present setting, the empty state is filtered out from any consistent proposition.

For any two sentences ϕ and ψ :

- $\llbracket \phi \rrbracket = \llbracket \psi \rrbracket$ iff $\Pi(\phi) = \Pi(\psi)$

3.1 *Informativeness, Inquisitiveness, and Attentiveness*

As in $\text{Inq}_{\mathcal{L}}$, the informative content of a sentence ϕ in Inq_{\emptyset} is characterized by the union of all the possibilities for ϕ , $\text{info}(\phi) = \bigcup \llbracket \phi \rrbracket$. As stated above, $\bigcup \llbracket \phi \rrbracket = \bigcup [\phi] = |\phi|$ for every ϕ , so the informative content of a sentence is exactly the same in Inq_{\emptyset} and in $\text{Inq}_{\mathcal{L}}$. In particular, Inq_{\emptyset} preserves the classical treatment of informative content, just as $\text{Inq}_{\mathcal{L}}$ did.

The notion of inquisitive content also remains exactly the same. In order to determine the inquisitive content of a sentence ϕ , we first collect all the possibilities for ϕ and all the possibilities for $\neg\phi$, obtaining $\llbracket \phi \rrbracket \cup \llbracket \neg\phi \rrbracket$, and then filter out non-maximal possibilities using ALT . Even though $\llbracket \phi \rrbracket$ now may contain non-maximal possibilities, the end-result of this procedure will be the same as in $\text{Inq}_{\mathcal{L}}$.

Definition 30 (Informative and inquisitive content).

- $\text{info}(\phi) = \bigcup \llbracket \phi \rrbracket$
- $\text{inq}(\phi) = \text{ALT}(\llbracket \phi \rrbracket \cup \llbracket \neg\phi \rrbracket)$

We also still have that $\text{inq}(\phi) = [?\phi]$ for every ϕ . However, it is *not* the case for every ϕ that $\text{inq}(\phi) = \llbracket ?\phi \rrbracket$, again reflecting the fact that inquisitive content is characterized exclusively in terms of *alternative* possibilities.

Proposition 31. For every sentence ϕ , $\text{inq}(\phi) = [?\phi]$

Now let us turn to the characterization of informative and inquisitive sentences. The basic definitions directly carry over from $\text{Inq}_{\mathcal{L}}$ to Inq_{\emptyset} :

Definition 32 (Informative and inquisitive sentences).

- ϕ is informative if and only if $\text{info}(\phi) \neq \omega$;
- ϕ is inquisitive if and only if $\text{info}(\phi) \notin \llbracket \phi \rrbracket$.

The alternative characterization of inquisitive sentences given in proposition 13 also carries over to Inq_{\emptyset} , although here it is important to emphasize, again, that in order for ϕ to be inquisitive, $\llbracket \phi \rrbracket$ must really contain two or more *alternative* possibilities, not just two or more possibilities. For instance, if $\phi =$

$p \vee (p \wedge q)$, then $\llbracket \phi \rrbracket = \{|p|, |p \wedge q|\}$, while $\text{info}(\phi) = |p|$. So $\llbracket \phi \rrbracket$ contains two possibilities, but $\text{info}(\phi) \in \llbracket \phi \rrbracket$ which means that ϕ provides enough information to realize one of the proposed updates, and therefore that ϕ is not inquisitive. More generally, as long as $\llbracket \phi \rrbracket$ contains only one maximal possibility (besides an arbitrary number of non-maximal possibilities) it provides enough information to establish one of the updates that it proposes, and it is therefore not inquisitive. Only if $\llbracket \phi \rrbracket$ contains two or more alternative possibilities, can we be sure that ϕ is inquisitive.

Proposition 33 (Alternative characterization of inquisitive sentences).

- ϕ is inquisitive iff $\llbracket \phi \rrbracket$ contains at least two alternative possibilities.

Besides inquisitiveness and informativeness, attentiveness also plays a role in Inq_\emptyset . The attentive content of a sentence ϕ , $\text{att}(\phi)$, will be defined as the set of proper possibilities for ϕ , $\Pi(\phi)$. These are the possibilities that ϕ draws attention to, that it proposes to take into consideration. It will be useful to introduce a second, more constrained notion of attentive content as well, which is embodied by the *non-maximal* possibilities for ϕ . Maximal possibilities partly determine attentive content, but also informative and inquisitive content. Non-maximal possibilities are insignificant as far as informative and inquisitive content are concerned. Thus, we can think of these non-maximal possibilities as making up the *residual attentive content* of a sentence ϕ , $\text{att}_R(\phi)$. If $\text{att}_R(\phi) \neq \emptyset$, that is, if ϕ draws attention to non-maximal possibilities, then we will say that ϕ has residual attentive content, or for short, that it is *attentive*.

Definition 34 (Attentiveness).

- $\text{att}(\phi) = \Pi(\phi)$
- $\text{att}_R(\phi) = \text{att}(\phi) - [\phi]$
- ϕ is attentive iff $\text{att}_R(\phi) \neq \emptyset$

In $\text{Inq}_\mathcal{A}$, the meaning of a sentence was completely exhausted by its informative and inquisitive content. This is no longer the case in Inq_\emptyset . For instance, p and $p \vee (p \wedge q)$ have exactly the same informative and inquisitive content, but express different propositions in Inq_\emptyset . However, the meaning of a sentence is fully determined by its informative, inquisitive, and residual attentive content.

Proposition 35. For any two sentences ϕ and ψ , the following are equivalent:

1. $\llbracket \phi \rrbracket = \llbracket \psi \rrbracket$
2. $\text{info}(\phi) = \text{info}(\psi)$, $\text{inq}(\phi) = \text{inq}(\psi)$, and $\text{att}_R(\phi) = \text{att}_R(\psi)$

As in Inq_\varnothing , tautologies are defined as sentences that express the trivial proposal, and contradictions are defined as sentences that express the absurd proposal.

Definition 36 (Tautologies and contradictions).

- ϕ is a *tautology* iff $\llbracket \phi \rrbracket = \{\omega\}$;
- ϕ is a *contradiction* iff $\llbracket \phi \rrbracket = \{\emptyset\}$.

The only way for a sentence to be meaningful (non-tautological) in Inq_\emptyset is to be informative, inquisitive, or attentive.

Proposition 37.

A sentence is non-tautological in Inq_\emptyset iff it is informative, inquisitive, or attentive.

As in Inq_\varnothing , we say that a sentence ϕ is *classical* just in case $\llbracket \phi \rrbracket$ contains exactly one possibility.

Definition 38 (Classical sentences).

- ϕ is *classical* iff $\llbracket \phi \rrbracket$ contains exactly one possibility.

Given corollary 28, classical sentences ‘behave classically’ in the sense that their unique possibility always coincides with their truth set. In Inq_\varnothing , a sentence was classical if and only if it was non-inquisitive. This is no longer the case in Inq_\emptyset . Now, a sentence is classical only if it is neither inquisitive nor attentive.

Proposition 39 (Classical behavior, inquisitiveness and attentiveness).

- ϕ is classical iff it is neither inquisitive nor attentive.

As in Inq_\varnothing , classical behavior is preserved by all connectives except disjunction.

Proposition 40 (Connectives preserving classical behavior).

For any proposition letter p and any sentences ϕ and ψ :

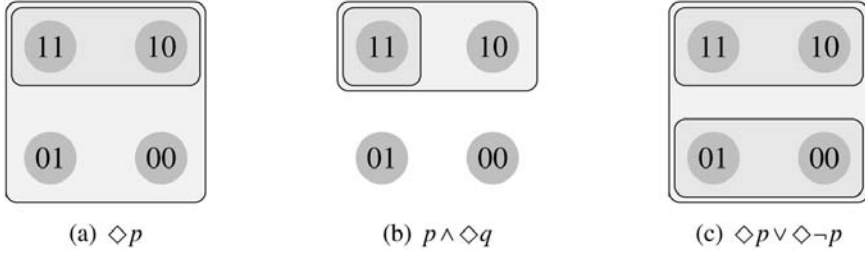


FIGURE 2 Three sentences with residual attentive content

1. p and $\neg\phi$ are classical;
2. If both ϕ and ψ are classical, then so is $\phi \wedge \psi$;
3. If ψ is classical, then so is $\phi \rightarrow \psi$.

This means, in particular, that disjunction is still the only source of non-classical behavior in Inq_\emptyset .

Corollary 41. Any disjunction-free sentence is classical.

3.2 Might

Let us consider some examples of attentive sentences. First consider the proposition depicted in figure 2(a). This proposition consists of two possibilities: the possibility that p , and the ‘trivial possibility’, ω . We take this to be the proposition expressed by ‘*might p*’. It draws attention to the possibility that p , but does not provide or request any information.

We will add an operator \Diamond to our formal language to represent *might*, and define $\Diamond\phi$ as an abbreviation of $\phi \vee \top$, where \top can be any tautological sentence. This means that the proposition expressed by $\Diamond\phi$ always consists of all the proper possibilities for ϕ , plus the trivial possibility ω .

$$- \llbracket \Diamond\phi \rrbracket = \Pi(\phi) \cup \{\omega\}$$

As such, the effect of $\Diamond\phi$ is to draw attention to all the proper possibilities for ϕ without providing or requesting any information.

To get a better first impression of what this attentive treatment of *might* amounts to, let us consider two more concrete examples. First, consider the proposition depicted in figure 2(b). This is the proposition expressed by $p \wedge \Diamond q$. It consists of two possibilities: $|p|$ and $|p \wedge q|$. As such, it provides the information that p holds, and draws attention to the possibility that q may hold as well.

The proposition depicted in figure 2(c) is the proposition expressed by $\Diamond p \vee \Diamond \neg p$. It is especially instructive to consider how this sentence differs from the polar question $?p$. The latter is inquisitive; it requires a choice between two alternative possibilities. $\Diamond p \vee \Diamond \neg p$ on the other hand, does not require an informative response: it draws attention to the possibility that p and to the possibility that $\neg p$, and other participants may indeed confirm one of these possibilities in their response. But they are not required to do so; they may also just say “ok”. This would not be a compliant response to $?p$.

3.3 Closure Operators

In $\text{Inq}_{\mathcal{L}}$, the non-informative closure of a sentence ϕ , $? \phi$, was defined as an abbreviation of $\phi \vee \neg \phi$, and the non-inquisitive closure of ϕ , $! \phi$, was defined as an abbreviation of $\neg \neg \phi$. As long as we are only interested in inquisitive and informative content, these definitions are appropriate: we saw that $? \phi$ is never informative, and that it always preserves the inquisitive content of ϕ , while $! \phi$ is never inquisitive, and always preserves the informative content of ϕ . However, as soon as attentive content is taken into account, these closure operators have to be reconsidered. In particular, apart from preserving inquisitive and informative content, respectively, $? \phi$ and $! \phi$ should now also preserve attentive content.

What does it mean to preserve attentive content? We cannot ask that $? \phi$ and $! \phi$ draw attention to *exactly* the same possibilities as ϕ itself. For then $? \phi$ and $! \phi$ would have to be entirely equivalent to ϕ . What we can ask, however, is that $? \phi$ and $! \phi$ draw attention at least to all the possibilities that ϕ itself draws attention to. That is, $? \phi$ and $! \phi$ may draw attention to additional possibilities as well, but they should not ignore any of the possibilities for ϕ . In more formal terms, we require that $\text{att}(\phi) \subseteq \text{att}(? \phi)$ and that $\text{att}(\phi) \subseteq \text{att}(! \phi)$.

It is easy to see that $? \phi$ is already defined in such a way that $\text{att}(\phi) \subseteq \text{att}(? \phi)$ for all ϕ . However, it is not the case that $\text{att}(\phi) \subseteq \text{att}(! \phi)$ for all ϕ . For instance, $\text{att}(\Diamond p) = \{\omega, |p|\}$, while $\text{att}(! \Diamond p) = \{\omega\}$. So $\text{att}(\Diamond p) \not\subseteq \text{att}(! \Diamond p)$. This means that the definition of $! \phi$ needs to be revised. We want $! \phi$ to be non-inquisitive, which means that $\text{info}(! \phi)$ has to be an element of $\llbracket ! \phi \rrbracket$. At the same time, $! \phi$ should preserve the informative content of ϕ , which means that $\text{info}(! \phi)$ must coincide with $\text{info}(\phi)$, and $! \phi$ should preserve the attentive content of ϕ , which means that $\text{att}(\phi)$ must be contained in $\text{att}(! \phi)$. The simplest way to meet these three requirements is to define $! \phi$ in such a way that $\llbracket ! \phi \rrbracket$ consists of all the possibilities for ϕ , plus the union of all these possibilities. One way to achieve this is to define $! \phi$ as an abbreviation of $\phi \vee \neg \neg \phi$. Recall that the unique possibility for $\neg \neg \phi$ is the union of all the possibilities for ϕ . So the proposition expressed by $\phi \vee \neg \neg \phi$ indeed consists of all the possibilities for ϕ plus the union of all these possibilities.

Definition 42 (Non-informative and non-inquisitive closure in Inq_\emptyset).

- $? \phi := \phi \vee \neg \phi$
- $! \phi := \phi \vee \neg \neg \phi$

Now, the semantic categories of informative and inquisitive sentences can be characterized in terms of the corresponding syntactic closure operators.

Definition 43 (Equivalence).

Two sentences ϕ and ψ are *equivalent* in Inq_\emptyset , $\phi \approx \psi$, if and only if $\llbracket \phi \rrbracket = \llbracket \psi \rrbracket$.

Proposition 44 (Semantic categories and syntactic operators).

- ϕ is non-informative iff $\phi \approx ? \phi$ and ϕ is non-inquisitive iff $\phi \approx ! \phi$

Incidentally, \diamond can be seen as a combined non-informative and non-inquisitive closure operator. That is, $\diamond \phi$ is never informative and never inquisitive, and it always preserves the attentive content of ϕ . Indeed, the class of sentences that are neither informative nor inquisitive can be characterized in terms of \diamond as follows:

Proposition 45. For any sentence ϕ :

- ϕ is neither informative nor inquisitive iff $\phi \approx \diamond \phi$

It should be noted that $\diamond \phi$ is *not* generally equivalent with $?! \phi$ or with $! ? \phi$. That is, the fact that \diamond can be seen as a combined non-informative and non-inquisitive closure operator does not mean that it can be ‘mimicked’ by first applying non-informative closure and then non-inquisitive closure, or the other way around. \diamond makes a sentence ϕ non-informative and non-inquisitive at once by adding the trivial possibility ω , while $?!$ first adds the union of all the possibilities for ϕ and then the unique possibility for $\neg \phi$ (if this possibility is non-empty), and $! ?$ first adds the unique possibility for $\neg \phi$ (if non-empty) and then ω . So each closure operator potentially adds one possibility, and \diamond therefore typically operates ‘more directly’ than $?!$ or $! ?$.

We would like to end this subsection by putting forth the hypothesis that ‘declarativeness’ in natural language typically involves non-inquisitive closure of the kind discussed above (see also Roelofsen 2013). One way to flesh out this idea would be to define the semantic contribution of declarative clause type

markers in natural languages in terms of non-inquisitive closure. A disjunctive declarative like *John is in London or in Paris* would then draw attention to the possibility that John is in London and the possibility that John is in Paris, but it would not be inquisitive, i.e., it would not request an informative response (recall that disjunctions in our formal language *are* typically inquisitive). This would also distinguish non-informative declarative disjunctions (*John is in London or he is not in London*) from polar questions (*Is John in London?*). The latter would be inquisitive, while the former would be ‘merely’ attentive. Further consequences of this hypothesis will have to be explored in future work.

3.4 *Might Meets the Propositional Connectives*

It is well-known that *might* interacts with the propositional connectives in peculiar ways. In particular, it behaves differently in this respect from expressions like ‘it is possible that’ or ‘it is consistent with my beliefs that’, which is problematic for any account that analyzes *might* as an epistemic modal operator. The present analysis sheds new light on this issue.

3.4.1 Disjunction and Conjunction

Zimmermann (2000: pp. 258–259) observed that (7), (8), and (9) are all equivalent.⁷

- | | |
|---|--------------------------------|
| (7) John might be in Paris or in London. | $\Diamond(p \vee q)$ |
| (8) John might be in Paris or he might be in London. | $\Diamond p \vee \Diamond q$ |
| (9) John might be in Paris and he might be in London. | $\Diamond p \wedge \Diamond q$ |

Notice that *might* behaves differently from clear-cut epistemic modalities here: (10) is not equivalent with (11).

- | | |
|---|--|
| (10) It is consistent with my beliefs that John is in London or
it is consistent with my beliefs that he is in Paris. | |
| (11) It is consistent with my beliefs that John is in London and
it is consistent with my beliefs that he is in Paris. | |

⁷ These type of examples have also often been discussed in the recent literature in relation to the phenomenon of *free choice permission*, which involves deontic modals (cf. Aher 2012, 2013; Aloni 2007; Alonso-Ovalle, 2006; Chemla 2009; Forbes 2014; Fox 2007; Geurts 2005; Klinedinst, 2007; Simons 2005).

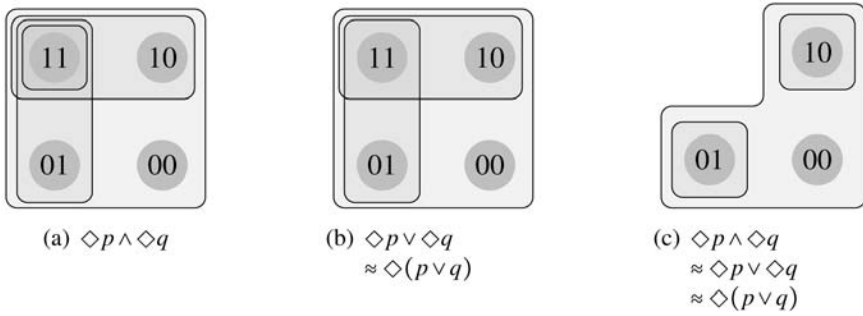


FIGURE 3 Might interacting with conjunction and disjunction

A further subtlety is that Zimmermann's observation seems to crucially rely on the fact that 'being in London' and 'being in Paris' are mutually exclusive. If they had not been chosen in this specific way, the equivalence between (7) and (8) on the one hand, and (9) on the other would not have obtained. To see this, consider the following examples:

(12) John might speak English or French. $\Diamond(p \vee q)$

(13) John might speak English or he might speak French. $\Diamond p \vee \Diamond q$

(14) John might speak English and he might speak French. $\Diamond p \wedge \Diamond q$

'Speaking English' and 'speaking French' are not mutually exclusive, unlike 'being in London' and 'being in Paris'. To see that (12) and (13) are not equivalent with (14) consider a situation, suggested to us by Anna Szabolcsi, in which someone is looking for an English-French translator, i.e., someone who speaks *both* English and French. In that context, (14) would be perceived as a useful recommendation, while (12) and (13) would not.

These patterns are quite straightforwardly accounted for in Inq_\emptyset . The proposition expressed by $\Diamond p \wedge \Diamond q$ is depicted in figure 3(a), and the proposition expressed by $\Diamond(p \vee q)$ and $\Diamond p \vee \Diamond q$ (which are equivalent in Inq_\emptyset) is depicted in figure 3(b). Notice that $\Diamond p \wedge \Diamond q$, unlike $\Diamond(p \vee q)$ and $\Diamond p \vee \Diamond q$, draws attention to the possibility that $p \wedge q$, that is, the possibility that John speaks both English and French. This explains the observation that (14) is perceived as a useful recommendation in the translator-situation, unlike (12) and (13).

In Zimmermann's example, p stands for 'John is in London' and q for 'John is in Paris'. It is impossible for John to be both in London and in Paris. So possible worlds where p and q are both true must be left out of consideration. Once this

is taken into account, $\Diamond(p \wedge q)$, $\Diamond p \vee \Diamond q$, and $\Diamond p \wedge \Diamond q$ all express exactly the same proposition, as depicted in figure 3(c).

3.4.2 Implication and Negation

Now let us consider how *might* interacts with implication and negation. First, consider a sentence where *might* occurs in the consequent of an implication:

(15) If John is in London, he might be staying with Bill.

The corresponding expression in our formal language, $p \rightarrow \Diamond q$, is equivalent with $\Diamond(p \rightarrow q)$. It draws attention to the possibility that ‘if p then q ’, without providing or requesting information. This seems a reasonable account of the semantic effect of (15). Indeed, one natural response to (15) is to confirm that John is staying with Bill if he is in London. But such an informative response is not required. Nodding, or saying “ok” would also be compliant responses.

Now let us consider an example where *might* occurs in the antecedent of an implication:

(16) If John might be in London, he is staying with Bill. $\Diamond p \rightarrow q$

This sentence is perceived as odd. In Inq_\emptyset , this observation may be explained by the following general property of implication:

Proposition 46 (Redundancy of non-informative antecedents).

If ϕ is non-informative and ψ is classical, then: $\phi \rightarrow \psi \approx \psi$.

This proposition says that non-informative antecedents of implications with a classical consequent are completely redundant. This means, in particular, that $\Diamond p \rightarrow q$ is equivalent to q , i.e., that (16) is equivalent to its bare consequent, “John is staying with Bill”. This may be part of the reason why constructions like (16) are generally not used, and are perceived as odd if they do occur.

Our general empirical prediction is that an implication whose antecedent is non-informative and whose consequent is classical is always ‘marked’.⁸ This has particular consequences for negation, which can be seen in our system as a

⁸ In some cases, marked sentences may not be perceived as odd, but rather associated with a marked meaning, i.e., a meaning that differs from the one they are standardly associated with. Such cases will be discussed in detail in section 5.

special instance of implication (see the end of section 2.4). In English, standard sentential negation cannot take wide scope over *might*. For instance, (17) can only be taken to draw attention to the possibility that John is not in London.

(17) John might not be in London.

Notice, again, that *might* behaves differently from clear-cut epistemic modalities here, which can occur in the scope of negation:

(18) It is not consistent with my beliefs that John is in London.

The fact that *might* cannot occur in the scope of negation is explained in Inq₀ by the fact that $\neg\Diamond\phi$ is always a contradiction (recall that $\neg\Diamond\phi$ is equivalent with $\Diamond\phi \rightarrow \perp$, which, by proposition 46, is equivalent with \perp). Thus, $\neg\Diamond\phi$ expresses the absurd proposal. $\Diamond\neg\phi$ on the other hand, seems to have exactly the semantic effect of sentences like (17): it draws attention to the possibility that $\neg\phi$.

Notice that questions cannot be interpreted in the scope of negation either. This basic parallel between *might* sentences and questions is straightforwardly captured: $\neg?\phi$ is always contradictory, just like $\neg\Diamond\phi$. The general prediction is that any non-informative sentence is uninterpretable in the scope of negation.

4 Inquisitive Pragmatics

Gricean pragmatics generally assumes a classical, truth-conditional semantics, where the meaning of a sentence is identified with its informative content. Inquisitive semantics departs from this basic assumption. It does not identify semantic meaning with informative content, but also takes inquisitive and attentive content into account. This shift in semantic meaning changes our perspective on pragmatics. Gricean pragmatics can be seen as a pragmatics of providing information. Inquisitive semantics gives rise to a pragmatics of *exchanging* information.

Such a pragmatics has been articulated in (Groenendijk & Roelofsen 2009). It is concerned with conversations where the participants' main purpose is to exchange information in order to resolve a given issue as effectively as possible.⁹

⁹ In Westera (2012, 2013) a Gricean pragmatics is formulated in relation to a semantics that, unlike that of Groenendijk & Roelofsen (2009), not only models informative and inquisitive, but also attentive content.

In such a cooperative effort, each participant must first of all be *sincere*. That is, if a speaker utters a sentence ϕ , she must believe that at least one of the possibilities for ϕ can be established (*informative sincerity*), and moreover, each possibility for ϕ must be consistent with her information state (*inquisitive sincerity*).

Participants must also be *transparent*. That is, if a hearer cannot execute a proposed update because that would lead to inconsistency of her own information state, she must publicly announce this, so that other participants will also refrain from executing the update. Moreover, if one participant makes a certain proposal and no other participant objects, then each participant must update both her own information state and her representation of the common ground according to the proposal. Notice that the sincerity requirement is *speaker* oriented, while the transparency requirement is *hearer* oriented.

Besides these qualitative sincerity and transparency requirements, inquisitive pragmatics postulates that, among proposals that are sincere and *compliant* with the issue under discussion,¹⁰ there is a general quantitative preference for *more informative* proposals—the more relevant information one provides, the more likely it is that the given issue will be resolved.¹¹ Without going into the more subtle details, let us lay out the basic repercussions that a pragmatic theory along these lines has for the interpretation of *might*.

4.1 *Quality Implicatures*

There are two empirical observations about *might* that we have not discussed at all so far, even though each of them has given rise to one of the two ‘classical’ semantic theories of *might*. Both observations can be illustrated by means of our initial example:

(19) John might be in London.

The first observation, perhaps the most basic one, is that if someone utters (19) we typically conclude that she considers it *possible* that John is in London. This observation has given rise to the analysis of *might* as an epistemic modal operator.

10 Compliance is a formal notion of relatedness. Its precise definition is not relevant for our present purposes. See Groenendijk & Roelofsen (2009) for discussion.

11 Groenendijk & Roelofsen (2009) also postulate a general preference for *less inquisitive* proposals. However, this preference is often overruled by other pragmatic factors, and irrelevant for our present purposes.

The second observation is that if someone hears (19) and already knows that John is not in London, she will typically object, pointing out that (19) is inconsistent with her information state. In this sense, even though *might* sentences do not provide any information about the state of the world, they can be ‘inconsistent’ with a hearer’s information state. One classical account of this observation is that of Veltman (1996). Veltman’s update semantics specifies for any given information state σ and any given sentence ϕ , what the information state $\sigma[\phi]$ is that would result from updating σ with ϕ . The update effect of $\diamond\phi$ is defined as follows:

$$\sigma[\diamond\phi] = \begin{cases} \emptyset & \text{if } \phi \text{ is inconsistent with } \sigma \\ \sigma & \text{otherwise} \end{cases}$$

The idea is that, if ϕ is inconsistent with a hearer’s information state, then updating with $\diamond\phi$ leads to the absurd state. To avoid this, the hearer must make a public announcement signaling the inconsistency of ϕ with her information state. As a result, whoever uttered $\diamond\phi$ in the first place may also come to discard the possibility that ϕ holds.

Our semantics does not directly explain these observations. However, we believe that this is rightly so. In our view, both observations should be explained pragmatically. And they can be. It follows from the inquisitive sincerity requirement that if a cooperative speaker expresses a certain proposal $\llbracket\phi\rrbracket$ and α is a possibility in $\llbracket\phi\rrbracket$, then α must be consistent with the speaker’s information state. In particular, a cooperative speaker who utters (19) must consider it possible that John is in London.

On the other hand, it follows from the transparency requirement that if a hearer is confronted with a sentence ϕ , and one of the possibilities for ϕ is inconsistent with her information state, then she must signal this inconsistency, in order to prevent other participants from considering the possibility in question a ‘live option’.

Thus, both observations are accounted for. And this pragmatic account, unlike the mentioned semantic analyses, extends straightforwardly to more involved cases. Consider for instance:

(20) John might be in London or in Paris.

This sentence is problematic for both semantic accounts just mentioned. The epistemic modality account predicts that the speaker considers it possible that John is in London or in Paris. But note that this is compatible with the speaker knowing perfectly well that John is not in London. What (20) implies is something stronger, namely that the speaker considers it possible that John

is in London *and* that she considers it possible that John is in Paris. This follows straightforwardly on our pragmatic account.

Now consider a hearer who is confronted with (20) and who knows that John is possibly in Paris, but certainly not in London. We expect this hearer to object to (20). But Veltman's update semantics does not predict this: it predicts that an update with (20) has no effect on her information state. Our pragmatic account on the other hand, does urge the hearer to object.

The only task of our semantics is to specify which proposals can be expressed by means of which sentences. The pragmatics, then, specifies what a context—in particular, the common ground and the information state of the speaker—must be like in order for a certain proposal to be made, and how a hearer is supposed to react to a given proposal, depending on the common ground and her own information state. Together, these two components account for the basic features of *might* that classical semantic theories take as their point of departure. Shifting some of the weight to pragmatics evades problems with more involved cases, like (20), in a straightforward way. But, of course, the necessary pragmatic principles can only be stated if the underlying semantics captures more than just informative content.

4.2 *Quantity Implicatures*

If someone says that John might be in London, we typically do not only conclude that she considers it possible that John is in London, but also that she considers it possible that he is *not* in London. In short, we infer that she is *ignorant* as to whether John is in London or not. Notice, however, that this inference is not always warranted. For instance, if a child is figuring out, as a homework exercise, who Napoleon Bonaparte was, a helping mother may say: "He might have been a French emperor". In this case, we do not conclude that the mother must be ignorant about Napoleon's historical role. Probably, she did not want to take the entire homework assignment off her child's hands, but just leave him with the lighter task of verifying her suggestion.

This kind of context dependency is characteristic of Gricean quantity implicatures. In the current setting, the implicature is straightforwardly derived. We have already seen how to establish the inference that the speaker considers it *possible* that John is in London. Moreover, it follows from the quantitative preference for more informative compliant proposals that whenever a cooperative speaker *S* expresses a proposition $\llbracket \phi \rrbracket$ and α is a possibility in $\llbracket \phi \rrbracket$ such that $\text{info}(\phi) \not\subseteq \alpha$ (that is, *S* proposes α as a potential update, but does not provide enough information to actually establish that update), we can conclude that *S* does not have sufficient information to directly propose an update with α . After all, assuming that $\llbracket \phi \rrbracket$ compliantly addresses the relevant question under

discussion, a direct proposal to update with α would also be compliant, and moreover, it would be more informative than $\llbracket \phi \rrbracket$ itself. Thus, the only possible reason why S did not directly propose an update with α is that she does not have sufficient information to do so.

Ignorance implicatures arise in exactly the same way for disjunctions, questions, and other inquisitive/attentive utterances. When working within a traditional semantic framework, where meaning is identified with just truth-conditional informative content, it is far from trivial to derive the right ignorance implicatures for disjunctions, since it is difficult in such a framework to decide in any principled way what the ‘alternatives’ are that a disjunction should be compared with. In the current setting, these alternatives are directly determined by the richer semantics.

5 Epistemic Re-interpretation

In certain embedded environments, $\Diamond p$ really seems to be interpreted as saying that p is consistent with some contextually given body of information (usually, but not necessarily, the information state of the speaker). One may be tempted to conclude that this is simply due to *might* being ambiguous, permitting both an ‘epistemic use’ and an ‘attentive use’, and possibly other usages as well.

However, it may be worth trying to avoid such a conclusion, at least in its strongest form. For, if *might* were simply ambiguous between an attentive use and an epistemic use, then we would lose our explanation for the fact that *might* obligatorily takes wide scope over standard negation, unlike sentential operators like ‘it is consistent with my beliefs that’. Recall the relevant example:

(21) John might not go to London.

We pointed out in section 3.4 that $\neg \Diamond p$ is always a semantic contradiction, and offered this as an explanation for the fact that negation cannot take wide scope in (21). But this explanation only goes through, of course, if the semantic contribution of $\Diamond p$ is to draw attention to the possibility that p . If $\Diamond p$ were ambiguous, and could also be interpreted semantically as saying that p is consistent with some contextually determined body of information, then there would be no reason anymore why negation should obligatorily take narrow scope. After all, we saw that negation is perfectly happy with wide scope in sentences like (22):

(22) It is not consistent with my beliefs that John will go to London.

Thus, rather than assuming plain ambiguity, we would like to offer a more nuanced account of the epistemic interpretation of $\Diamond p$ in the relevant embedded environments. In particular, we will argue that in such environments there is generally a specific *reason* not to interpret $\Diamond p$ as simply drawing attention to the possibility that p . We hypothesize that this triggers *re-interpretation* of $\Diamond p$ in terms of the ignorance implicatures that it typically triggers when not embedded. We will discuss three environments where this phenomenon occurs: in the scope of negation, in the antecedent of a conditional, and in questions.¹²

5.1 Negation

Standard negation cannot take wide scope over *might*. However, there is a complication: wide scope *can* be established by using ‘it is not true that’ instead of standard negation. Consider:

- (23) It is not true that John might go to London.

This sentence conveys that the speaker believes that John will not go to London. If the sentence were analyzed as $\neg\Diamond\phi$, then according to Inq_\emptyset it would be a contradiction, which is evidently not the right analysis. What is going on here, we think, is that the sentence is interpreted as a denial of the *implicature* of the embedded clause. It is in fact a common use of ‘it is not true that’ constructions to deny pragmatic inferences or presuppositions of their complement clause. For example, in (24) the implicature of the embedded clause is denied, and in (25) the presupposition of the embedded clause is denied:

- (24) It is not true that John has four children. He has five.

- (25) It is not true that the king of France is bald. There is no king of France.

Moreover, it seems that (23) is not necessarily interpreted as denying that it is *possible* that John will go to London. It may also be interpreted as denying the stronger implicature that it is *unknown* whether John will go to London or not.

12 The proposal made here is in line with recent observations by Levinson (2000) and Chierchia & Fox & Spector (2012), among others, that the semantic contribution of certain expressions is sometimes strengthened ‘locally’, i.e., before it enters the semantic composition process. Construing this process as ‘re-interpretation’ is especially in line with Geurts’ (2009) take on such phenomena.

For, someone who utters (23) may continue as in (26), but also as in (27) (where SMALLCAPS indicate contrastive stress).¹³

(26) It is not true that John might go to London. He will go to PARIS.

(27) It is not true that John might go to London. He WILL go to London.

These observations support the idea that ‘it is not true that’ constructions can be interpreted as denying pragmatic inferences that the embedded clause gives rise to, and thus lend support to a re-interpretation analysis of examples like (23).

One may ask, of course, why this same re-interpretation strategy could not be applied in (21). We would argue that re-interpretation only occurs if it is triggered. In (21), negation can take narrow scope, and the interpretation of $\diamond\neg p$ is unproblematic. Thus, there is no need for re-interpretation. In (23) however, negation is forced to take wide scope, and $\neg\diamond p$ is, at face value, a contradiction. This is what triggers re-interpretation in this case.

Below we will see that another reason to re-interpret a given construction is that under its standard interpretation, it expresses a meaning that could also have been expressed by a simpler construction. This mechanism, usually referred to as *blocking* or *division of pragmatic labor*, is widely assumed to play a crucial role in the process of interpretation (cf. Horn 1984, 2004).

5.2 Conditionals

We observed in section 3.4 that a conditional with *might* in its antecedent is sometimes difficult to interpret. The example was:

(28) If John might be in London, he is staying with Bill.

There are other examples, however, which *can* be interpreted. For instance:

(29) If John might be in London, I won’t go there.

This sentence is interpreted as stating that if it is *possible* that John is in London, then the speaker will not go there. Thus, *might* seems to be interpreted as an

13 Note that in (27), it is strongly preferred, perhaps even necessary, to not only place contrastive stress on *will*, but also on *might*. This observation does not seem to affect our argument, however. See (Fox & Spector, 2009) for relevant discussion.

epistemic possibility modal here.¹⁴ This is a case, we would say, where blocking plays a role. It follows from proposition 46 that the meaning of (29), taken at face value, could just as well have been expressed by the bare consequent, “I won’t go to London”. This triggers re-interpretation of the *might* construction in the antecedent in terms of the implicatures that it typically generates.

Re-interpretation also applies to (28), but it does not improve its intelligibility. This is explained by the fact that, if the antecedent of (28) is re-interpreted, the sentence as a whole becomes paraphrasable as:

(30) If it is possible that John is in London, he is staying with Bill.

What this is supposed to communicate is, for reasons that need not concern us here, still quite unclear.¹⁵ This is why re-interpretation does not ‘save’ (28).

5.3 Questions

Finally, consider a question containing *might*:

(31) Might John be in London?

Taken at face value, (31) is presumably interpreted as $? \diamond p$. But $? \diamond p$ is equivalent with $\diamond p$. Thus, the meaning that is standardly assigned to (31) could just as well have been expressed by the simpler sentence “John might be in London”. Therefore, this interpretation is blocked for (31), and the sentence is re-interpreted in terms of the implicatures that *might* typically evokes.¹⁶

These observations support the hypothesis that, rather generally, non-attentive readings of *might* are the result of re-interpretation. More work is needed, of course, to solidify this claim. But we think this is a direction worth pursuing.¹⁷

14 Note that the relevant epistemic state does not seem to be the speaker’s own information state here, but rather the information state that would be obtained if all discourse participants would bundle their beliefs. Notice also that the subject of the consequent, “I”, can be replaced by “Sue” for instance. In that case, it is even clearer that the relevant epistemic state must be contextually determined in sometimes intricate ways. There is an ongoing debate about this issue, which is largely orthogonal to what is at stake here. See von Stechow & Gillies (2010) for a recent proposal and further references.

15 See Papafragou (2006) and Portner (2009: pp. 145–167) for relevant discussion.

16 See Roussarie (2009) for a recent alternative account of *might* in questions.

17 A weaker hypothesis that may be worth considering is that the attentive use of *might* is historically primary, and that non-attentive usages are derivative, though (partly) grammaticized (in the general spirit of, e.g., Levinson 2000).

6 Final Remarks

The idea that the core semantic contribution of *might* sentences lies in their potential to draw attention to certain possibilities has been entertained before. For instance, Groenendijk & Stokhof & Veltman (1996) wrote that “in many cases, a sentence of the form *might- ϕ* will have the effect that one becomes aware of the possibility of ϕ ”.¹⁸ However, it was thought that capturing this aspect of the meaning of *might* would require a more complex notion of possible worlds and information states, and a different way to think about growth of information. Thus, immediately following the above quotation, Groenendijk & Stokhof & Veltman (1996) write that their own framework “is one in which possible worlds are total objects, and in which growth of information about the world is explicated in terms of elimination of possible worlds. Becoming aware of a possibility cannot be accounted for in a natural fashion in such an eliminative approach. It would amount to extending partial worlds, rather than eliminating total ones. To account for that aspect of the meaning of *might* a constructive approach seems to be called for”.

The present paper has taken a different route. Possible worlds are still total objects, and growth of information is still explicated in terms of eliminating possible worlds. What has changed is the very *notion of meaning*. Our semantics does not specify what the truth conditions of sentences are, or what their update effect is, but rather what the proposal is that they express. And this shift in perspective immediately facilitates a simple and perspicuous way to capture attentive content.

It is perhaps worth emphasizing that, even though our efforts in this paper have been focused on giving a systematic account of the possibilities that *might* sentences draw attention to, we certainly do not think that this is all there is to the meaning of *might*. Drawing attention to possibilities may have several side-effects. We discussed how ignorance implicatures typically enter the picture through (possibly grammaticized) pragmatic reasoning. Another potential side-effect is that participants may be led to *hypothetically effectuate* the updates that have been brought under attention for the purpose of further discussion.

This ‘hypothetical update’ aspect of the use of *might* is familiar from the literature on modal subordination (Brasoveanu, 2007; Kaufmann 2000; Roberts 1989; among others) and also closely related to a prominent line of work on

18 See also the more recent work of Swanson (2006), Franke & de Jager (2011), Brumwell, (2009), and de Jager (2009).

conditionals, starting with Ramsey (1931) and Stalnaker (1968). The literature on modal subordination is typically concerned with constructions like (32):

(32) A wolf might come in. It would eat you first.

The system proposed here is not dynamic and does not deal with quantification. As such, it has no chance of accounting for constructions like (32). However, transferring its key features to a dynamic, first-order system, may not only lead to a principled account of (32); it is also expected to take care of cases like (33), (34), and (35):

(33) A wolf or a lion might come in. It would eat you first.

(34) A wolf or a lion might come in. Would it eat you first?

(35) If a wolf or a lion comes in, would it eat you first?

Such cases have, to the best of our knowledge, always been thorns in the eyes of theories dealing with modal subordination and/or conditionals.

Finally, we would like to emphasize that the primary purpose of this paper was not so much to propose a novel analysis of *might*, but rather to develop a formal framework that can be used to capture attentive content more generally. The analysis of *might* was intended to illustrate the usefulness of the framework.

Attentive content seems to play a crucial role in many other domains as well. For instance, certain types of *evidentials* are taken to ‘present a certain proposition, without establishing whether that proposition holds or not’ (see, for instance, Faller, 2002; Murray, 2010). In this respect, such evidentials seem to behave very much like our attentive *might*.

Another phenomenon that seems to require an account of attentive content is that of *insubordinate interrogatives*.¹⁹ Truckenbrodt (2006) provides the German example in (36), which contrasts with the non-insubordinate interrogative in (37):

(36) *Ob es ihm gut geht?*
Whether it him well goes
‘I wonder whether he is doing well.’

¹⁹ We are grateful to Seth Cable for bringing this phenomenon to our attention.

- (37) *Geht es ihm gut?*
 Goes it him well
 'Is he doing well?'

Again, sentences like (36) are reported to 'present' a certain issue, without really requesting an informative response from other participants. There is a sharp contrast in this respect between (36) and (37): the latter does request an informative response. These are precisely the type of distinctions that the framework developed in this paper could help to elucidate.

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A Truth-conditional Account of Free-choice Disjunction*

Graeme Forbes

1 Conjunctive Force and Comparative Adjectives

In many languages, some uses of disjunction, often surprisingly, result in sentences that have a reading equivalent to that of certain conjunctions: these sentences have *conjunctive force*. In such a case, the word for *or* is sometimes said to express ‘free choice’ disjunction (this traces to the examples involving permission with respect to which the phenomenon was first studied; (Kamp 1979; von Wright 1968)). I say only that conjunctive force is ‘often’ surprising because in a few cases there is no surprise; these are cases where the equivalence to a conjunction is guaranteed by the semantics of (or classical inference rules for) disjunction, material implication and negation, as for instance in:

- (1) a. $(P \vee Q) \rightarrow R \models (P \rightarrow R) \wedge (Q \rightarrow R)$
b. $\neg(P \vee Q) \models \neg P \wedge \neg Q$

where in (1a), ‘ \rightarrow ’ may be either material or (variably) strict implication.

As a consequence of the equivalences in (1), English sentences taken to have forms that are essentially the left-hand-side formulae in (1) should have conjunctive force, for example,

- (2) a. If Mary got a D or an F she will be dropped from the course
b. Mary didn’t get a D or an F.

The prediction of conjunctive force is correct, since the preferred reading of (2a) is equivalent to ‘if Mary got a D she’ll be dropped, and also if she got

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an F', while for (2b) it is 'Mary didn't get a D and didn't get an F'. Given the equivalences in (1), there is no real mystery here.

The cases of conjunctive force that are more mysterious are those in which it is not at all evident why the force is with them. Comparative adjectives are a well-known example: (3a) below, barring cues to the contrary, means (3b), not (3c); this requires explanation; and there is little agreement on what it should be.

- (3) a. A is taller than B or C
- b. A is taller than B and A is taller than C
- c. A is taller than B or A is taller than C.

In fact, it would be best to say that (3a) is ambiguous between a reading equivalent to (3b) and a reading equivalent to (3c) (the ambiguity is also present in parallel examples with 'less tall than' and 'as tall as', and can be brought out by partitive paraphrases: 'A is taller than either of B or C' versus 'A is taller than at least one of B or C'). The default reading of (3a) is equivalent to (3b), but some examples are understood as equivalent to (3c): they get a 'pure disjunction' reading. But talk of ambiguity does not mean we endorse a lexical ambiguity hypothesis for *or*.¹ Rather, we will develop a structural account of the free-choice/ pure disjunctive distinction, within the framework of type-logical grammar (TLG). The main problem is to explain how (3a) acquires a meaning equivalent to that of (3b); however, we begin with a discussion of the (3c)-reading.

2 Pure Disjunction and Ellipsis

The contexts in which (3a) means (3c) rather than the default (3b) are sometimes ones where some sort of 'epistemic distancing' rider is appended, as in

- (4) A is taller than B or C, but it's hard to tell which.

One can get the same effect non-epistemically, say by continuing (3a) with 'whoever is younger'. It is the *wh*-word that forces the reading (3c), for the pragmatic reason that its use conveys something that assertion of (3b) conflicts

¹ I haven't heard of any language in which there are distinct words for free-choice and pure disjunction.

with: it conveys that the speaker is not committing herself to A being taller than both B and C.

But this pragmatic explanation of why the reading (3c) is selected by wh-riders is only part of the story. If we are not explaining the difference between *or*'s that do and *or*'s that don't generate conjunctive force in terms of lexical ambiguity, then selection is not selection between alternative lexical entries for *or*. So what exactly is the compositionally derived meaning for (3a) that wh-riders select? Plausibly, a reading that involves ellipsis is selected. That is, on the pure disjunctive reading, (3a) is taken to be the result of a process in which certain material common to the two disjuncts of a more verbose version is restored to the second disjunct for the purposes of interpretation, or, as in TLG, (3a) is interpreted *as if* such material is present. The examples in (5) indicate the range of options, and for none of these examples is an interpretation with conjunctive force available:

- (5) a. A is taller than B or [taller than] C
 b. A is taller than B or [is taller than] C
 c. A is taller than B or [A is taller than] C.

All three of these have the same semantics, namely

- (6) (or(**taller(b)(a)**))(taller(c)(a))

and we can arrive at this in a TLG-derivation (see (7) below) that in effect treats (3a) as synonymous with (5c). So the whole story about how (3a) gets a pure disjunctive reading combines semantics and pragmatics: the derivation of the semantics in (6) for (3a) shows that a pure-disjunctive reading is possible, and the imperative to avoid interpreting the speaker to be expressing a proposition that conflicts with what a wh-rider conveys, creates the obligation to process (3a) in the way the derivation in (7) below displays.

In this derivation, we resolve the problem of the apparently non-Boolean coordination 'NP or NP' by lifting the type of NP, normally *individual* (*i* for short), to that of a quantifier, ($i \rightarrow \text{boolean}$) $\rightarrow \text{boolean}$, or (*ib*)*b* for short, since we can explain disjunction of quantifiers ultimately in terms of sentential disjunction. This is not the only option; we could, for instance, treat 'B or C' as the boolean co-ordination 'B [is] or C [is]', but since it makes no difference to the ultimate theory, we will avoid positing more elided linguistic material than necessary. Also in (7), I follow Morrill (1995) in assigning quantifiers the syntactic category $(s \uparrow np) \downarrow s$, which is the category of an expression which inserts into an *s* that has a gap for an np, i.e., $s \uparrow np$, and produces an *s* (I suppress

of the various types of example discussed in this paper, such an approach avoids a *pragmatic* account of why (3a) means (3b) by default. Other things equal, it is unlikely that some cases of free-choice disjunction are explicable semantically—this can hardly be denied for *or* in the antecedents of material and strict conditionals, as (1a) shows, and so leaves little else to say about (2a)²—while for others, even other types of conditional, a pragmatic account of conjunctive force is the best that is available.³

Specifically, following Makinson (1984), let us take (1a) as the paradigm. We will therefore assimilate all other cases where the presence of conjunctive force is surprising to that of a conditional with a disjunctive antecedent.⁴ (I will return later to justifying my preference for (1a) over (1b).) As far as assimilating comparatives to (1a) is concerned, the main observation is that (3a), repeated here as (9a), is synonymous in its free-choice sense with (9b):

- (9) a. A is taller than B or C
 b. A is taller than {each thing/anything} identical to B or identical to C.⁵

In (9b) the choice between *each* and *any* is underdetermined, but *any* itself has a free-choice sense, and it is better not to rely on that in explaining free-choice *or*.⁶ (9b) embeds the structure of the left-hand-side of (1a). So one way of accounting for the behavior of *or* is to explain how we can get from 'B or C' to the disjunctive quantifier in (9b). 'B' and 'C' individually lift to $\lambda P. P(b)$ and $\lambda P. P(c)$, and they are coextensive with ($\text{each}(\lambda x. x = b)$) and ($\text{each}(\lambda x. x = c)$) respectively; we simply have two expressions for the charac-

2 I am assuming that (2a) is a material or strict conditional (whose implicit \Box may be restricted). Franke (2011: 12) develops a pragmatic theory of conjunctive force in the context of a blanket rejection of the material analysis of 'if ... then ...', but my point here only requires that (2a) have *some* reading with conjunctive force which can be understood as material or (variably) strict.

3 See Loewer (1976) for a (the first?) pragmatic account of conjunctive force, for counterfactuals with disjunctive antecedents. For more discussion of pragmatic approaches, see Forbes 2014. For another take on *might* see also Ciardelli & Groenendijk & Roelofsen (2014).

4 I first argued for this approach in an unpublished note written in 2000, unaware that I was simply rediscovering Makinson's idea. In the present paper, I go beyond Makinson by applying the proposal to a wider range of cases (Makinson considers mainly existential modals), and situating it within a compositional semantics.

5 With *each* explicit, we would normally say 'A is taller than each of B or C', so in effect the free-choice reading of (9a) is being explained in terms of the covert presence of *each of*.

6 Clearly, though, it would be good to have a theory that accounts for free-choice *any* and free choice *or* in the same way. See Aloni (2007) for a theory which does this.

teristic function of the set of B's properties, and two for C's. But in (9b) we have an expression whose meaning is the quantifier ($\text{each}(\lambda x. x = \mathbf{b} \text{ or }_b x = \mathbf{c})$), the characteristic function of the intersection of the sets of properties of B and C. This means that free-choice disjunction can be realized truth-conditionally in interpreting the likes of (3a) by allowing the introduction of a *free-choice operator*, roughly 'each identical to ... or ...', that manifests itself in various types.

That a special operator is introduced is supported by the fact that free-choice *or* is often indicated by special stress, which we write as *OR* (*or* pronounced with what Jennings (1994: 128) calls a 'good intonational thump'), and that special stress is frequently associated with specific semantic effects *via* focus. For example, we can say 'everyone *doesn't* smoke' to express 'not everyone smokes', and can express 'everyone is unloved' with one intonational contour of 'no-one loves *everyone*'. Stress can also be used to focus the intended input to a function: contrast 'John only introduced *Sue* to Bill', for which we have, at least as a first approximation, $(\text{only}(\text{sue}))\lambda x. \text{intro}(\text{bill})(x)(\text{john})$, with 'John only introduced Sue to *Bill*', for which we have, ditto, $(\text{only}(\text{bill}))\lambda x. \text{intro}(x)(\text{sue})(\text{john})$.⁷ Closer to home, if we begin with a disjunction that does not have conjunctive force, such as

(10) A taught B or C

and negate it, the result is ambiguous between a de Morgan reading (cf. (2b)) and a disjunctive reading, an ambiguity which can be resolved with *OR* one way and a *wh*-rider the other way:

- (11) a. A didn't teach B *OR* C (= A taught neither)
 b. A didn't teach B or C, whichever dropped out (= A didn't teach B or A didn't teach C).

So we might find in 'B *OR* C' an indication that $\lambda x. x = \mathbf{b} \text{ or }_b x = \mathbf{c}$ is to be a constituent of the meaning and the input to each in the semantics of (9a).⁸

This resurrects a scope hypothesis about the free choice/pure disjunction contrast, for if we are associating ($\text{each}(\lambda x. x = \mathbf{b} \text{ or }_b x = \mathbf{c})$) with the free-choice reading of (3a), it is tempting to suppose that the pure disjunctive read-

⁷ This style of example is due to Jackendoff (1972).

⁸ Of course, intonational thumping cannot compel conjunctive force (see (10)) but it does appear to promote the conjunctive reading whenever it is available.

ing is to be associated with $\text{each}((\lambda x. x = \mathbf{b})) \text{ or}_{(ib)b} (\text{each}(\lambda x. x = \mathbf{c}))$, the characteristic function of the union of the properties of B and C. Then the contrasting readings have the semantics

- (12) a. $(\text{each}(\lambda x. x = \mathbf{b} \text{ or}_b x = \mathbf{c}))(\lambda y. \mathbf{a} \text{ is taller than } y)$
 b. $((\text{each}(\lambda x. x = \mathbf{b})) \text{ or}_{(ib)b} (\text{each}(\lambda x. x = \mathbf{c})))(\lambda y. \mathbf{a} \text{ is taller than } y).$

Since (12b) reduces to the semantics derived in (7), this is not really a different way of capturing the contrast between the two readings, but it's worth noting how difficult it is to compel an English sentence to have the semantics in (12b) directly. In particular, the obvious candidate,

- (13) A is taller than each thing identical to B or each thing identical to C

can easily be made to bear the interpretation (12a) by pronouncing *or* as OR. This will introduce a free-choice operator for quantifiers, represented on the current approach by the rather convoluted

- (14) $\text{each}(\lambda \mathcal{Q}^{(ib)b}. \mathcal{Q} = (\text{each}(\lambda x. x = \mathbf{b})) \text{ or}_b \mathcal{Q} = (\text{each}(\lambda x. x = \mathbf{c})))$
 $(\lambda \mathcal{Q}'. \mathcal{Q}'(\lambda y. \text{taller}(y)(\mathbf{a})))$

In view of this, it doesn't seem that a straightforward scope ambiguity in the English underlies the free-choice/pure disjunction distinction. Rather, conjunctive force is to be explained by the presence of a free-choice operator, frequently manifested by intonation, while pure disjunctive readings involve ellipsis and get their semantics as illustrated in (7).

The effect of the *or* in 'B OR C' is shown in the following derivation of a conjunctive-force semantics for (3a). In this derivation, subscript Δ means 'by steps from a previous example' or 'by obvious steps', and italics are used for unpronounced material:

$$\begin{array}{c}
 (15) \quad \frac{\text{it is identical to } \Rightarrow_{\Delta} \lambda y. x = y; (\text{s}\uparrow\text{np}) \quad \text{B} \sim \text{OR} \sim \text{C} \Rightarrow_{\Delta} \lambda \mathbf{R}^{ib}. ((\lambda \mathbf{P}. \mathbf{P}(\mathbf{b}))(\mathbf{R})) \text{ or}_b (\lambda \mathbf{Q}. \mathbf{Q}(\mathbf{c}))(\mathbf{R})); (\text{s}\uparrow\text{np})\downarrow \text{s}}{\text{it is identical to } \sim \text{B} \sim \text{OR} \sim \text{C} \Rightarrow \lambda \mathbf{R}^{ib}. ((\lambda \mathbf{P}. \mathbf{P}(\mathbf{b}))(\mathbf{R})) \text{ or}_b (\lambda \mathbf{Q}. \mathbf{Q}(\mathbf{c}))(\mathbf{R})); \text{s}} \downarrow \text{E} \\
 \frac{\text{it is identical to } \sim \text{B} \sim \text{OR} \sim \text{C} \Rightarrow_{\Delta} \lambda \mathbf{x}. \mathbf{x} = \mathbf{b} \text{ or}_b \mathbf{x} = \mathbf{c}; \text{s}}{\text{each} \Rightarrow \text{each}; \text{q}/(\text{s}\uparrow\text{np}) \quad \text{identical to } \sim \text{B} \sim \text{OR} \sim \text{C} \Rightarrow \lambda \mathbf{x}. \mathbf{x} = \mathbf{b} \text{ or}_b \mathbf{x} = \mathbf{c}; (\text{s}\uparrow\text{np})\downarrow \text{s}} \uparrow 1 \\
 \frac{\text{A} \sim \text{is taller than } \Rightarrow_{\Delta} \lambda y. \text{taller}(y)(\mathbf{a}); \text{s}\uparrow\text{np} \quad \text{each} \sim \text{identical to } \sim \text{B} \sim \text{OR} \sim \text{C} \Rightarrow \text{each}(\lambda \mathbf{x}. \mathbf{x} = \mathbf{b} \text{ or}_b \mathbf{x} = \mathbf{c}); (\text{s}\uparrow\text{np})\downarrow \text{s}}{\text{A} \sim \text{is taller than } \sim \text{each} \sim \text{identical to } \sim \text{B} \sim \text{OR} \sim \text{C} \Rightarrow (\text{each}(\lambda \mathbf{x}. \mathbf{x} = \mathbf{b} \text{ or}_b \mathbf{x} = \mathbf{c})) \lambda y. \text{taller}(y)(\mathbf{a}); \text{s}} \downarrow \text{E}
 \end{array}$$

The meaning of 'B OR C' here is no different from that of 'B or C' in (7), so there is no lexical ambiguity in *or*. The role of OR (the role of intonational thumping) is to introduce the free-choice operator expressed by *each identical*

to and provide it with its input. The derivation assigns a semantics to (3a) that by (1a) is equivalent to the semantics for (3b).

Our approach leads to correct meaning-attributions to examples of free-choice *or* with negation:

- (16) a. A isn't taller than B or C.
 b. $(\text{each}(\lambda x. x = \mathbf{b} \text{ or}_b x = \mathbf{c}))\lambda y. \text{not}(\text{taller}(y)(\mathbf{a}))$.

The existence of the free-choice operator we have postulated is confirmed by (16a), which may be understood purely disjunctively (see note 9), but also, certainly when *or* is OR, with conjunctive force ('is taller than neither'). The conjunctive force reading, which has the semantics in (16b), is obtained as in (15), only with

A is not taller than $\Rightarrow \lambda y. \text{not}(\text{taller}(y)(\mathbf{a})); s \uparrow \text{np}$

derived on the left at the penultimate line.⁹

We can also easily accommodate conjunctive force in other positions, for instance

- (17) a. A OR B is taller than C
 b. $(\text{each}(\lambda x. x = \mathbf{a} \text{ or}_b x = \mathbf{b}))\lambda y. \text{taller}(\mathbf{c})(y)$
 c. A OR B is taller than C OR D
 d. $(\text{each}(\lambda x. x = \mathbf{a} \text{ or}_b x = \mathbf{b}))\lambda y. (\text{each}(\lambda z. z = \mathbf{c} \text{ or}_b z = \mathbf{d}))\lambda w. \text{taller}(\mathbf{w})(y)$.

9 One argument for a pragmatic account of free-choice disjunction is that if conjunctive force is encoded in truth-conditions, we would expect negations like (16a) to have a rather weak meaning as default (see Fox 2007: 81–83 for discussion and references). In fact, a weak, i.e., pure disjunctive, reading for (16a), 'isn't taller than B or isn't taller than C', can be forced by a *wh*-rider (just as with (11b)), but if the positive form has the semantics **each identical to ... is ...**, it's hardly surprising that the normal negation (16a) is **each identical to ... isn't ...** (to my ear, English with an explicitly wide-scope negation, 'it is not that case that A is taller than B or C', does admit the weak reading, though it's not the default, perhaps because it's less informative). Note that the weak reading shouldn't be given the wide-scope negation of (12a) as its semantics, since if the pure disjunctive reading is *intended* there would be no reason for the free-choice operator to be present in the first place. Rather, the disjunctive reading is obtained as in (7), only with $\lambda y. \text{not}(\text{taller}(y)(\mathbf{a}))$.

The derivation in (15) is easily adapted to provide (17a) with the semantics in (17b), and (17c) the semantics in (17d). These cases also provide a justification for preferring the pattern of the left-hand-side of (1a), $(P \vee Q) \rightarrow R$, to that of (1b), $\neg(P \vee Q)$, as the basis of a general explanation of conjunctive force, namely, that $\neg(P \vee Q)$ would require negation-insertion in both subject and object positions. Actually, some treatments of comparatives, such as that in Carpenter (1997: 263–281), provide a standing negative context for the object term, whether or not the term is disjunctive, but there seems to be no prospect of doing the same for the position of the subject term in the semantics of ‘A is taller than B’.¹⁰ Nor is it plausible that the intonational effect of OR is to insert a negation, since (17c) would require a double insertion, and it’s hard to see how (17c)’s positive content could then be captured without baroque complexity.

The free-choice operator analysis is also adequate for examples with quantified NP’s in place of singular ones:

(18) {Someone/everyone} in the room is taller than B OR C.

In (18) there may be a scope-ambiguity, in one case superficially between ‘someone in the room’ and OR, more fundamentally between the quantifier and the free-choice operator. Then the two readings would be

10 Carpenter’s analysis is based on a primitive **height**, which assigns individuals a numerical height. The predicate tall is a relation between individuals and heights, meaning that x has a height of at least amount m . A bare comparative such as ‘taller’ is taken to be the existentially quantified case of ‘ n units taller’, and the analysis of ‘A is taller than B’ is that for some non-zero amount of height m , A is tall by an amount greater than m and B is not tall even by amount m (Carpenter 1997: 274–275). The second conjunct suggests an explanation of conjunctive force in ‘A is taller than B or C’ based on the de Morgan distribution in (1b), but examples like those in (17) would be left unaccounted for. The accounts in Klein (1980) and Larson (1988) also, so far as I can tell, have problems with the cases in (17). These cases are still problematic if we say that ‘A is taller than B or C’ means that A is tall to some degree greater than any to which B or C is tall, which doesn’t generalize straightforwardly to (17a). Worse, although we can paraphrase the conjunctive reading of ‘A is slightly taller than B or C’ as ‘A is tall to some degree slightly greater than any to which B or C is tall’, using degrees to explain *or* seems to lead only to ‘A’s height is slightly greater than the *maximum* of B’s and C’s’, which allows A to be enormously taller than one of B or C, and is therefore incorrect. We can produce correct ‘degree’-paraphrases in a piecemeal way, but it’s not obvious how to get compositional assignment of truth-conditions that works across the language.

- (19) a. $(\text{some}(\text{in}(\text{the room})))\lambda x. (\text{each}(\lambda y. y = b \text{ or } y = c))\lambda z. \text{taller}(z)(x)$
 b. $(\text{each}(\lambda y. y = b \text{ or } y = c))\lambda z. (\text{some}(\text{in}(\text{the room})))\lambda x. \text{taller}(z)(x)$

though (19a) is much preferred, to my ear.¹¹

In view of the relationship between \exists and \forall , one might expect to have both free choice and pure disjunctive readings for

- (20) A is taller than someone in the room.

But only the disjunctive, ‘at least one’, reading is possible: given that B and C are exactly those in the room, (20) is equivalent to (3c) and has no reading equivalent to (3b). That is, there is no reading “for each x such that there is someone y in the room such that $x = y$, A is taller than x ”.

There are also combinations of quantifiers and negation to be considered. Negative quantifiers provide perhaps the most contentious case, for example,

- (21) No-one in the room is taller than B or C.

One might expect the semantics of (21) to be just the external negation of (19a), assuming that **no ...** is **not(some...)**. This produces a semantics that is apt for the explicitly wide-scope English ‘it is not the case that ...’, with the resulting meaning that each person in the room fails to exceed the height of at least one of B and C. And I think this meaning can also be attached to (21). There also needs to be a semantics for the pure disjunctive reading obtained by a *wh*-rider. If I can’t remember *who* it is that no-one is taller than, I’m saying that no-one is taller than B or no-one is taller than C, which isn’t logically equivalent to ‘each person in the room fails to exceed the height of at least one of B and C’. But given the necessary linear ordering of heights, the two conditions are necessarily equivalent.

There is, in addition, a conjunctive force reading, ‘no-one is taller than B and no-one is taller than C’. If this is obtained using a free-choice operator, **each** will have to have **no** within its scope—the other way round means that no-one in the room is taller than both, which is the external negation of (19a) again. This switching of the quantifier order of (19a) might be a worry, but it’s independently unlikely that the free-choice operator is responsible for the

11 For the pure disjunctive readings of the two cases in (18), add a *wh*-rider and change *or* to *or*.

conjunctive force in what's plausibly the most natural reading of (21). The conjunctive force is simply a de Morgan effect, in the same way as conjunctive force in (2b) is.¹²

Finally, I should emphasize that all I have argued to this point is that all cases of comparative constructions where conjunctive force is present can be reduced to a single, well-understood, paradigm, that of a conditional with a disjunctive antecedent. *Why* exactly these cases manifest conjunctive force, while other somewhat similar sentences do not (see (10)), has not been explained, and I will not be attempting such an explanation here. The explanation might involve special semantic structure in comparatives, with, say, a *more than* operator which is in some way existential, thus linking up with the 'existential modals' to be discussed in Section 5. Alternatively, it may be that free-choice *or* exists to avoid an ambiguity that use of *and* would produce, between individual versus collective readings. There's no such ambiguity in the *and*-variant of (10), but an example like 'A is heavier than B and C' could easily be taken to mean that A's weight exceeds the *combined* weights of B and C. A similar ambiguity is also present with existential modals.

4 Larson's Puzzle

Larson (1988: 13) notes a puzzle about temporal comparatives such as the prepositions or subordinating conjunctions *before* and *after*. Comparing

- (22) a. A arrived before B or C
b. A arrived after B or C

an asymmetry emerges, according to Larson: there is a dominant free-choice reading of (22a), but none at all for (22b).¹³ Why is there such a contrast

12 Geurts (2005: 398) reports an experiment by Johnson-Laird and Savary in which subjects were presented with a disjunction of conditionals of the form $(A \rightarrow B) \vee (\neg A \rightarrow B)$ and asked what follows if *A* is given. Almost all respondents replied that *B* follows, which Johnson-Laird and Savary regarded as a fallacy. Geurts suggests instead that the subjects might simply have been interpreting the disjunction as having conjunctive force, which is very plausible, especially given that the antecedents seem to be trying to cover all the options ('he's asleep in his office if he's on campus or asleep at home if he's not on campus'). The Makinson-style analysis of this case would be 'for each proposition *p* identical to *A* or identical to $\neg A$, if *p* then *B*'.

13 This is one of a number of judgements in this section that I checked with informants. This one was supported 9–0.

involving expressions for converse relations on times or events (*before/after*), and why doesn't focusing *or* in (22b) produce an 'arrived after both' reading? Since one might anticipate a parallel between *before/after* and the comparative adjectives *earlier/later*, because the two pairs of expressions seem to pick out the same pair of converse relations, it's natural to ask if our account of conjunctive force with comparative adjectives helps us resolve the puzzle in (22).

One suggestion is that the existence of a conjunctive force reading of (22a) and the nonexistence of one for (22b) is to be expected just on the basis of the lexical meanings of *before* and *after*. Treating them as sentential operators, the homophonic equivalences

(23) *S before/after S'* is true iff *S* is true before/after *S'* is true

look reasonable. But then (22a) requires that A arrived before the disjunction 'B arrives or C arrives' became true, which requires that A arrived before 'B arrives' became true, and A arrived before 'C arrives' became true. Thus (22a) says A's arrival preceded *both* B's and C's. However, (22b) says, in these terms, that A arrived after the disjunction 'B arrives or C arrives' became true. So A is only required to arrive after at least one disjunct becomes true, and hence could arrive after B but before C, or vice-versa. If this is right, (22a) is like (2a), in that (22a)'s conjunctive force is generated by the interaction of the lexical meaning of 'before' with inclusive disjunction, just as conjunctive force in (2a) is a product of the lexical meanings of the conditional and negation in combination with disjunction. There would then be no reason to suppose that (22a) gets its conjunctive force from the covert presence of a free-choice operator, any more than such a supposition is required for sentences whose logical forms are the left formulae in (1). That the free-choice operator isn't in play with *before* is borne out by the fact that there is no conjunctive force when *or* is in the subject; for example, 'A or B arrived before C' contrasts with (17a).¹⁴

However, this idea, and the principle (23) it is based on, don't seem to be correct. If (23) is endorsed, it is hard to see how we could resist

(24) *S shortly before S'* is true iff *S* is true shortly before *S'* is true.

But this is incorrect, for if A arrived shortly before B OR C arrived, then A arrived shortly before each of them. But once the first of the two arrives, say B, the

14 My informants agreed with this, 9–0.

disjunction becomes true, so (24) would have it that it does not matter how much time elapses before C arrives; thus A may arrive *long* before C arrives, and it would still be that A arrived *shortly* before B OR C arrived.¹⁵

So conjunctive force in (22a) is instead a candidate for explanation in terms of permissible use of the free-choice operator: the reading ‘for each of B or C, A arrived before that person’ is allowed. But this makes the absence of conjunctive force in ‘A OR B arrived before C’ especially perplexing. (22b) raises further questions if no amount of intonational thumping can give it conjunctive force.¹⁶ For then *earlier/later* fails to pattern with *before/after*. In particular, the examples in (25),

- (25) a. A arrived after B OR C
b. A arrived later than B OR C

offer a contrast, for while (25b) certainly has a reading with conjunctive force, (25a) does not, it seems to me.¹⁷ The original thought, that an account of conjunctive force with comparative constructions would straightforwardly extend to *before/after*, was evidently far too optimistic.¹⁸

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- 15 See also the discussion of ‘slightly taller than’ in Fn. 10. I was helped to see this problem with (23) by a counterexample to an ‘at the same time as’ version of it due to Ivano Ciardelli (p.c.): ‘A arrived at the same time as B or C’ is true if B arrived before C and A arrived when C did. But by then, the disjunction may have been true for some time, so it’s incorrect that *p at the same time as q* is true iff *p* is (becomes) true at the same time as *q* becomes true. Perhaps this only shows that ‘A arrived at the same time as B or C’ can be understood as ‘A arrived at the same time as B or at the same time as C’, but then where is the missing reading with narrow-scope *or*?
- 16 My informants split 7–2 on this, one of the two finding a conjunctive reading to be available when *either* is prefixed.
- 17 Here I am in agreement with Geis (1970). However, one of my informants reported that he got an ‘after B and after C’ reading for (25a) by inserting *either*. Evidently, it would be unwise to let important parts of a theory depend on how these cases are settled.
- 18 Larson (1988: 12–13) observes that complement position of *before* is an environment that permits negative polarity items, while the complement position of *after* is not (perhaps ‘*p* before *q*’ means ‘when *p* becomes true, *q* is not yet true’, while ‘*p* after *q*’ means ‘when *p* becomes true, *q* has already been true’). The same could be said of comparatives (‘A is taller than C will ever be’). However, it doesn’t seem that every free-choice disjunction is an NPI, since this wouldn’t account for the examples in (17), or those in (26) other than (26b) (although counterfactuals are not downward-entailing in the antecedent—consider any counterexample to antecedent-strengthening—they do allow such NPIs as *ever* and existential *any* in their antecedents). And it’s rather unattractive to offer a completely non-uniform account of conjunctive force.

5 Zimmermann's Analysis of Modals

Conjunctive force is commonly found in disjunctions within the scope of existential modals, as the following examples show:

- (26) a. Socrates could have been a lawyer OR a banker (metaphysical 'could')
 b. If Socrates had been a lawyer OR a banker, he would have lived longer
 c. Socrates might speak in Doric OR Ionic (epistemic 'might', it's unpredictable)¹⁹
 d. Socrates may speak in Doric, Attic OR Ionic (the permitted conference dialects).²⁰

All these examples are interpreted by default as having conjunctive force; for example, (26a) standardly means that he could have been a lawyer *and* could have been a banker, and (26d) that speaking in Doric is permitted, and speaking in Attic is permitted, and speaking in Ionic is permitted. The conjunctive force in (26b), that being a lawyer would have let him live longer *and* so would being a banker, is not expected in Lewis-Stalnaker semantics: (26b) may be true for the reason that some world where (i) the antecedent *d* is true because Socrates is a lawyer, and (ii) Socrates lives longer, is closer than any world where *d* is true and he doesn't live longer; but if we suppose that it would have been much easier for him to be a lawyer than a banker, and that the Athenians had no particular problem with lawyers but were even more hostile to bankers than to subversive philosophers, then it's false that if Socrates had been a banker he would have lived longer. Nevertheless, the intuition that there is conjunctive force in (26b) is as strong as for (2a).²¹

19 "It's unpredictable (which)" doesn't force a pure disjunction reading, despite having the appearance of a wh-rider. The 'which' refers to the languages or the activities, not the epistemic possibilities; see further (Zimmermann 2000:259). Contrast (26d)—if we append "it's still to be decided which" we mean it's still to be decided which is to be allowed.

20 These examples all have a single protagonist ('topic'), Socrates. But that isn't necessary: 'Socrates could have been a lawyer or Plato a banker' also has conjunctive force.

21 Counterfactuals could be argued to be a special case, their conjunctive force deriving directly from their semantics. This would be so if we give them a *cotenability* semantics (Goodman 1947): $p \Box \rightarrow q$ is true iff q is a consequence of p together with those actual truths which are *cotenable* with p . In the case where p is a disjunction, this requires that q follow from *each* disjunct. For more recent work in this vein, see Kaufmann (2013); Kratzer (1981). One catch is that there are cases where there seems to be no conjunctive force: 'if I were to vote for the Democrat or the Republican, I'd vote for the Republican' (see McKay & van Inwagen 1977: 354–355). But the corresponding indicative conditional is similar.

The conjunctive force of the examples in (26) is easily explained by the hypothesis that in their default interpretations, a free-choice operator is present. For instance, (26a) may be glossed as in (27):

- (27) For each property P that is either the property of being a lawyer or the property of being a banker, $\Diamond P(\text{Socrates})$.

So our approach to free-choice disjunction applies just as straightforwardly to existential modals as to comparatives.

But there are many other accounts of the modal cases. Some are pragmatic, which I discuss in Forbes (2014). Among the semantic theories rival to Makinson's are those of Barker (2010), Fox (2007), Simons (2005), and Zimmermann (2000). The last will be my focus at this point. The core idea of Zimmermann's radical proposal is that natural language expressions such as *or* that are commonly taken to express the logician's inclusive (or even exclusive) disjunction truth-function, in fact do no such thing. Rather, natural-language "disjunctions" have the semantic structure of a *conjunction of epistemic possibilities*. For example, 'Holmes is in London or (Holmes is in) Paris' has the semantics ' $\Diamond L \wedge \Diamond P$ ', where ' \Diamond ' expresses epistemic possibility. So there is no mystery about the source of conjunctive force: conjunction is actually in the semantics.

One concern I have about this is whether the introduction of epistemic possibility is appropriate for non-modal cases. In an example like (9a), 'A is taller than B or C', the conjuncts are not qualified by a weakening possibility operator, epistemic or otherwise. Zimmermann (2000: 284–286) has various ways of collapsing iterated modalities to a single modality, but there does not seem to be any way of eliminating modalities entirely (the same difficulty arises for the development of Zimmermann's account in Geurts (2005)).²² There is also a question about the particular case of metaphysical possibility, as in (26a). The prefix ' \Diamond ' cannot be reduced to ' \Diamond ', because it is epistemically possible that Goldbach's Conjecture is metaphysically possible *and* epistemically possible that it is metaphysically impossible (consider also any proposition of whose metaphysical impossibility we've only recently been persuaded). And even if we liberalize the modality which appears in the conjuncts *via* the semantics of *or*, as Geurts (2005: 391) recommends, and allow ' \Diamond ' for (26a), we would still be faced with the conjunction ' $\Diamond \Diamond L \wedge \Diamond \Diamond B$ '. To get to the desired ' $\Diamond L \wedge \Diamond B$ ' we need a transitivity principle for relative metaphysical possibility. But

²² See Fn. 10 against *sui generis* semantics for comparatives, which would make this objection irrelevant.

transitivity is precisely the structural constraint on relative metaphysical possibility that is most controversial, and it would be a drawback to Zimmermann's semantics if it had to take sides in this dispute.²³

A second difficulty concerns inferences which the proposal seems to misrepresent, or even fail to account for entirely. Consider

- (28) If Holmes is in Berlin or Paris, Watson won't find him. (We have just discovered that) Holmes is in Paris. So Watson won't find him.

It is hard to shake the impression that this inference is valid, and that the reasoning underlying this impression consists in an application of $\vee I$ (perhaps after factive detachment) on the second premise to get the antecedent of the first, followed by $\rightarrow E$ (*modus ponens*). But on Zimmermann's analysis, $\vee I$ is irrelevant, since the conditional premise has the form ' $(\Diamond B \wedge \Diamond P) \rightarrow \neg F$ '.²⁴ And while the second premise, in its ' $\Box P$ ' version, might be held to justify ' $\Diamond P$ ', ' $\Diamond B$ ' appears to be unobtainable (granted ' \Box [no-one is in Paris and Berlin simultaneously]'), ' $\Box P$ ' leads instead to ' $\neg \Diamond B$ ', so "Watson won't find him" can't be inferred). And we cannot get round this by appealing to (1a), since the epistemic conjunction variant of (1a) fails left-to-right.²⁵

23 The locus classicus of the case against transitivity is Salmon (1989). See also Peacocke (1999: 196).

24 Zimmermann (2000: 274, fn. 29) has his doubts about $\vee I$, citing 'if 2 is prime then 2 is odd or prime' as a classical validity that misrepresents the ordinary meaning of *or*. But while it's clear that an isolated use of $\vee I$ that produces a conclusion weakened by disjoining an obviously false disjunct would produce considerable puzzlement in an audience, a use of $\vee I$ embedded in a piece of reasoning where the point is apparent and the outcome is an extension of our knowledge (as in (28)), is perfectly acceptable.

25 In fact, Zimmermann offers a semantics for 'if ... then ...' on which the English 'if p then r and if q then r ' entails 'if p or q then r ', but not vice versa. His counterexample is: 'if Mr. X is in either Regent's Park or Bloomsbury, we may as well give up' (Zimmermann 2000: 275, (41)). The point is that if X might genuinely be in either place, the pursuers, with their limited manpower and time, have only a low chance of catching him (which doesn't mean that if X is in Regent's Park, they have only a low chance of catching him). The example is interesting, but I draw a different moral, which is that "either Regent's Park or Bloomsbury" functions here as a term for the mereological aggregate of the two, so we are saying, in effect, that (even) if X can be anywhere in r , it's likely he'll be found, but if X can be anywhere in $r \sqcup r'$ it's unlikely he'll be found. The particular semantics for 'if ... then ...' Zimmermann endorses to get his result also seems to me to be unattractive: it is that 'if p then q ' is true iff q is true at every world where our actual knowledge expands to include p (Zimmermann 2000). Consequently, 'if p then q ' is true not merely if p is impossible, but if p is possible but can't be known, e.g., 'there are no sentient beings'.

Nor is the problem restricted to negative contexts such as a conditional's antecedent, for an inference like "Holmes is in either Berlin or Paris; he can't be in Berlin; so he's in Paris" appears to be misrepresented in fundamentally the same way. 'Holmes is in either Berlin or Paris' is ' $\Diamond B \wedge \Diamond P$ ', and "he can't be in Berlin" is ' $\neg \Diamond B$ ', so the premises are contradictory and entail anything. This is clearly the wrong verdict on a simple disjunctive syllogism, but it is not easily withdrawn. For example, if we say that the worlds taken to be epistemically possible in the first premise are not the same as those for the second premise, then the argument becomes some kind of fallacy of equivocation, which is implausible.

My conclusion, therefore, is that Zimmermann's semantics is *too* radical. Much of the logic of disjunction (the logic of ' \vee ') fits our intuitions about natural-language reasoning very well, and to have to give it up just to accommodate conjunctive force is a high price to pay.

6 Intensional Transitives

Some transitive psychological verbs pattern with modals:

- (29) a. Socrates will enjoy law OR finance
 b. Socrates used to believe you OR me
 c. Socrates prefers philosophy to law OR finance.

For example, (29a) means 'Socrates will enjoy law and he will enjoy finance'. The same conjunctive meaning seems to attach to 'Socrates will enjoy law or he will enjoy finance'. On the other hand, if we widen the scope of OR in (29c) to 'Socrates prefers philosophy to law or he prefers it to finance', the result only has a pure disjunctive reading.

So the examples in (29), even the intensional transitive example (29c), do not raise any new issues. However, with other intensional transitives, specifically verbs of absence, there is a further complication. There is conjunctive force in all the following examples (Socrates looks out the window and sees the weather deteriorating):

- (30) Socrates {wants/needs/is looking for} an umbrella or a raincoat

where the indefinites are understood in Quine's *notional* sense (Quine 1956: 185). Note that none of 'Socrates {wants/needs/is looking for} an umbrella' implies its disjunctive counterpart in (30): some sort of conjunctive force is

present in the latter. Yet there is no simple distribution that articulates it. For example, we are not saying that Socrates wants an umbrella *and* wants a raincoat: given an umbrella, a raincoat would probably be unnecessary, and vice-versa. Rather, the meaning is, very roughly, that getting an umbrella satisfies his desire, *and* getting a raincoat satisfies it.

But there are some twists. We require some sort of *sufficient* condition for desire-satisfaction to be involved, since a necessary condition by itself only captures what Zimmermann calls exhaustivity (Zimmermann 2000: 261): these are all the ways for the desire to be satisfied. On the other hand, not just *any* umbrella, or *any* raincoat, will satisfy Socrates' desire: an umbrella that can't be opened, or a raincoat full of holes, would not do it. This shows that *counterfactual* sufficiency is not what is meant either, since the actual world may be such that, were he to get an umbrella, it would be one that couldn't be opened. What we appear to be saying in (30) is that *in certain circumstances*, getting an umbrella will bring about satisfaction of Socrates' desire, and getting a raincoat will do so too. We need modal operators restricted to worlds where either he doesn't get an umbrella or raincoat, or he gets a properly functioning one, and his desire is satisfied *as a result*. Similar truth-conditions apply to *need* and *seek*. With *need*, the formulation would be in terms of Socrates' needs and the gettings by which they are *met*, and with *seek*, in terms of his searches and the findings with which they *successfully culminate*.

That is much to extract from the words that occur in (30). However, event semantics provides a model of how the two levels of complexity can be related. Following Parsons (1990) we can distinguish *atomic* semantic representations, a level at which a transitive verb is just a binary relation, and *subatomic* semantic representations, a level at which the verb is broken up into a conjunction of a state or event predicate and binary relations involving states or events. At the atomic level, the *wants* version of (30) is just

(31) **wants**(an umbrella *or_q* a raincoat)(socrates)

where *or_q* is a generalized-quantifier co-ordinator. But at the subatomic level there is a postulate governing **wants** that ties it to a specific subatomic semantics:

(32) $\lambda Q^{(ib)b}. \lambda x. \mathbf{wants}(Q)(x) \stackrel{\text{def}}{=} \lambda Q. \lambda x. \lambda e. \mathbf{want}(e) \text{ and } \mathbf{experiencer}(e)(x)$
 $\text{and } \Box(Q\lambda y. \mathbf{gets}(y)(x) \rightarrow \mathbf{consequently}(\mathbf{satisfied}(e)))$

where the necessity is restricted to a class of worlds *C* determined by context, which in our example would be worlds where Socrates doesn't get bro-

ken umbrellas, torn raincoats, and so on.²⁶ The subatomic version of (31) is then:

- (33) **some**(λe . **want**(e) **and experiencer**(e)(socrates) **and**
 $\Box[(\text{each}(\lambda Q. (Q = \text{an}(\text{umbrella}) \text{ or } Q = \text{a}(\text{raincoat}))))$
 $\lambda Q'. Q'(\lambda y. \text{gets}(y)(\text{socrates})) \rightarrow \text{consequently}(\text{satisfied}(e))]$).

The outcome is that the conjunctive force is explained by the free-choice operator emerging in the meaning-postulate for *want*: a certain property instantiates *each* property of properties. Clearly, there is a great deal more to be said, but in this approach to (33) I believe we have the beginnings of an explanation of the difference between the examples in (29) and (30): all semantics is event semantics, but only verbs of absence have postulates analytically relating states to conditions of their dissolution and events to conditions of their termination.

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26 I am relying on the 'consequently' to deal with certain problem cases. Suppose ϕ expresses some condition that holds in all worlds in C . Then without 'consequently', 'Socrates wants an umbrella' would entail 'Socrates wants an umbrella and ϕ to obtain'. But his actual desire wouldn't be satisfied *as a consequence* of getting an umbrella and the holding of ϕ , for only getting the umbrella would play the right sort of role in the process resulting in desire-satisfaction. This, combined with the restriction on \Box , is intended to avoid some of the difficulties about sufficient conditions I wrestled with not entirely successfully in (Forbes 2006: 94–117).

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Being Tolerant about Identity?*

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1 Introduction

Identity and identification are very important concepts in philosophy and logic. They are crucial for the analysis of quantification and for counting. As already remarked by Frege, one cannot even start counting before one knows how to identify objects. For all its importance, identity still seems like a very straightforward relation. It is the relation that an object has, and only has, towards itself. The relation can be characterized as the *unique* relation that is reflexive and satisfies Leibniz's Law, or *the principle of indiscernibility of identicals*: $\forall x, y, \forall P((Px \wedge x = y) \rightarrow Py)$.¹ Indeed, this so-called *absolutist's* view seems to be the dominant view among philosophers, and is prominently defended, for instance, by Kripke (1971).

Despite its naturalness and simplicity, the absolutist' view has not gone unchallenged. First of all, at first sight Leibniz's Law seems to be obviously false. For can't I imagine this table to have been somewhere else? Also, it may happen that you meet someone at two occasions, and that at the first occasion he is healthy, but that at the second occasion he is not. The latter problem can easily be dissolved, however, by stipulating that properties of objects include an index of time, e.g. healthy at t , sick at t' . In a similar way we can account for the fact that it is *contingent* that the first man was not sick at time t , for we could imagine *the same man* to have been sick at time t as well. Notice that once we acknowledge the latter, we admit individuals to have not just temporal, but also modal properties. We could start saying that although this table occupies this space-time region, it is *not identical* with it, because the table could have occupied a different space-time region. The existence of such so-

* I would like to thank Pablo Cobreros, Paul Egré and Dave Ripley. In our joint work we developed our non-transitive analysis of vagueness and truth. Together we also published a paper on ontic vagueness (Cobreros et al. 2013), of which a slightly different version of the current paper was actually a (too long) early draft. Especially discussions with Pablo Cobreros helped me to (hopefully) better represent some of the ideas in this paper. I would also like to thank Manfred Kupffer for his useful comments on this paper. Finally, I would like to thank Ede Zimmermann for the many discussions we had during the time I was his PhD student on issues related to the ones dealt with in this paper.

1 It can easily be shown that this is equivalent to $\forall x, y(x = y \rightarrow \forall P(Px \leftrightarrow Py))$.

called *de re* modalities was disputed by Quine (according to whom we should identify this table with the space-time region it occupies), but even he had to admit that we attribute *de re* beliefs to individuals. He even constructed a well-known example—involving Ralph's beliefs about Orcutt—that either seems to be incompatible with the Law of Non-Contradiction, or is straightforwardly in conflict with Leibniz's Law. Soon, others argued that similar examples of so-called *contingent identity* can be constructed involving other modalities. What these examples seem to show is that we don't simply talk about individuals *per se*, but only about individuals *under a certain guise*.

According to some philosophers, many examples that are supposed to show that identity is contingent, in fact show that the notion of identity is *relative*. But the idea behind this view is very similar to the earlier one: Identity depends on the method of conceptualisation, and—or so it is argued—different methods might be incompatible with each other. A well-known proponent of the latter view is Geach. He argued, for instance, that although the cat on the mat *with*, and the cat on the mat *without* hair h_i might be different lumps of feline tissue, they are still the same cat. If we would make the assumption—or so it is argued—that if being the same cat made two objects thereby also *absolutely* identical, this same object would have as a result two properties that are evidently incompatible with each other, even without considering temporal or modal properties. Thus, it seems one has to give up on the notion of absolute identity, on pain of being in conflict with Leibniz's Law. But Geach's cat on the mat has also been used as a prominent example to 'prove' the existence of *vague identity*: to answer the same threat, perhaps one can still assume that there is only one notion of identity, but it is just that this one notion is vague.

Of course, proponents of absolute identity want to hear nothing like it. The so-called examples of contingent-, relative-, and vague-identity *have* to be wrong. And they can even *prove* this, making use only of rules and principles (like abstraction and Leibniz's Law) that everybody will (or should) accept (or so they argue). From these proofs one can conclude that identity is a once-and-for-all *absolute* relation, and thus that proponents of contingent, vague, and relative identity must have made a *logical* mistake. So this should have settled the matter, shouldn't it?

Well, it didn't. As the saying goes: one's modus ponens is the other's modus tollens. And indeed, oponents of the absolutist's view can say that the only thing the proofs show—given the additional empirical evidence—is that it doesn't make sense to speak of individuals or objects independent of how they are conceptualized. But on this view the examples mentioned above challenging the absolute identity view, are now examples that challenge Leibniz's Law. But Leibniz's Law should be upheld, or so almost everybody would say.

In order to make sense of objects identified over times and otherworldly possibilities, Lewis and others have argued that *similarity* plays a major role: in order to identify x at one possibility with y at another, it seems natural to demand that they must at least be similar to each other in one or more crucial aspects. But similarity gives rise to its own problem: the Sorites paradox. The Sorites paradox is based—among others—on the acceptance of the *Tolerance Principle*: if x has property P and x is similar (with respect to P) to y , then y should have property P as well. It is well-known, however, that the acceptance of this principle in addition to other seemingly uncontroversial assumptions leads to absurdities: every object has property P and *not* property P . Many theorists about vagueness have concluded that it is the Tolerance Principle that is to blame, and the assumption that should be given up. Notice, however, that the Tolerance Principle $\forall x, y((Px \wedge x \sim_P y) \rightarrow Py)$ is in fact almost identical with Leibniz's Law, $\forall x, y((Px \wedge x = y) \rightarrow Py)$!² Thus, the standard reactions to puzzles of identity and vagueness brings us in the rather peculiar and unsatisfactory situation that although Leibniz's Law is taken to be unsuspicious, the almost identical Tolerance Principle is almost unanimously abandoned.

Isn't it more natural that we should either give up both the Tolerance Principle and Leibniz's Law—even though both seem to express obvious truths—or keep both principles, and blame other assumptions to be responsible for the derived absurdities in reasoning involving identity and similarity? Indeed, it is. And it is the latter line that I will advocate in this paper.³

2 Contingent Identity

Leibniz's Principle is closely related to the *principle of substitution*. According to the Substitution Principle, if two expressions have actually the same denotation, they should be substitutable for each other without change of truth value. In contrast to Leibniz's Principle, it is almost uncontroversial that once we allow for modal and temporal contexts, the Substitution Principle has to be given up. And there are well known examples showing this. Why is the falsity of this principle so uncontroversial? The reason is that the Substitution Principle involves *expressions*, and it is uncontroversial that expressions that have a *descriptive*

2 If $x \sim y$ means ' x appears identical to y ', ' \sim ' can even be turned into '=', if x and y are turned into their appearances.

3 This paper can be thought of as a follow-up to Cobreros et al. (2013), although it was written earlier, and sometimes takes a different position.

meaning like ‘the number of planets’ and ‘the Morning star’ can denote different objects in different possible worlds. Leibniz’s Principle, in contrast, is not about the meaning of expressions, but is only supposed to be about the *objects* themselves. According to the absolutists, once we talk about the objects themselves it only makes sense to assume Leibniz’s Principle. But once this is done, one can prove that identity is a rigid relation. Here is a famous proof due to Kripke (and Barcan Marcus), showing that once ‘ $x = y$ ’ is true, one has to admit that this is necessarily so (where ‘ \Box ’ means ‘necessarily’):

- (1) $x = y \vdash \Box(x = x)$ (Truism)
- (2) $x = y \vdash \hat{z}(\Box(x = z))(x)$ (Abstraction)
- (3) $x = y \vdash \Box(x = y)$ (by (1) and (2), and Leibniz’s Law)
- (4) $\vdash x = y \rightarrow \Box(x = y)$ (conditional proof)

If one assumes that ‘ \Box ’ is interpreted in terms of an accessibility relation that is *symmetric*, and we assume that \Diamond is the dual of \Box such that $\Diamond\phi \equiv \neg\Box\neg\phi$, the following so-called Brouwersche Principle is valid: $\neg\phi \rightarrow \Box(\neg\Box\phi)$. If we assume that ‘ \Box ’ gives rise to the rule of necessitation, i.e., that if ϕ is provable, it follows that $\Box\phi$ holds, we can follow Wiggins (1980) and derive from the necessity of identity also the necessity of non-identity, i.e., that if $x \neq y$, then $\Box(x \neq y)$.⁴

Still, even when we are talking about the objects themselves, Leibniz’s Principle can be challenged on the basis of so-called ‘modal examples’. Lewis (1976) argues, for instance, that a person is identified with his body, although this identity is contingent. Or consider Gibbard’s (1975) famous example of a statue, named ‘Goliath’, and the clay out of which it is composed, named ‘Lumpl’. It is natural to assume that the statement ‘Lumpl = Goliath’ is true. Still, the identity seems to be only contingently true, because the piece of clay might have been rolled into a ball and turned into a new, very different statue, named ‘David’. Thus, afterwards the truth of the original identity statement is replaced by the truth of a new identity statement: ‘Lumpl = David’. Of course, an absolutist will deny that this new and the old identity statements are, or were, true, and they will appeal to Leibniz’s Law: Lumpl cannot be identified with Goliath, because only Lumpl could be transformed into David. Although defensible, this view is not unproblematic either: does it really make sense to claim that objects that at one time occupy the same space and are made of exactly the same material can nevertheless be distinct? It is easy to account for the intuitions that contingent

4 See Williamson (1999) for more discussion.

identity is possible by assuming that the names denote individual concepts, but that the truth of identity statements only involves extensions. If one does not want to do that (by assuming with Kripke that proper names denote rigidly), one could still make use of individual concepts by assuming that quantifiers range over them. The contingent identity of 'Lumpl = Goliath' can then be analyzed as $\exists x, y(x = l \wedge y = g \wedge x = y \wedge \Diamond(x \neq y))$. More generally, contingent identity is then characterized by the truth of $\exists x, y(x = y \wedge \Diamond(x \neq y))$.

Unfortunately, quantifying over individual concepts is well-known to be problematic, both for an empirical and for a conceptual reason. To start with the former, notice that to assume that quantifiers quantify over *all* individual concepts gives rise to the prediction that $\forall x \phi \rightarrow \phi[y^{Py}/x]$ is valid (where y^{Py} denotes the unique individual that satisfies atomic or complex predicate P). The reason for this is that a definite description denotes something equivalent to an individual concept. Unfortunately, this principle seems to be false in many modal contexts. From the truth of 'All numbers larger than 9 are necessarily larger than 7' one cannot conclude to 'The number of planets is necessarily larger than 7', although the principle predicts this to be ok (given that 'the number of planets' denotes a number larger than 7). Perhaps the conceptual worry of quantifying over all individual concepts is even more problematic: the worry is that *de re* modal statements are secretly turning into *de dicto* ones. As a result, $\forall x, y(x = y \rightarrow \Box(x = y))$ is no longer predicted to be valid.

Kripke's proof of the necessity of identity is appealing, but so are the examples involving contingent identity. This gives rise to the question whether it is even possible to have a semantics for quantified modal logic which predicts that ' $\forall x \forall y(x = y \rightarrow \Box(x = y))$ ' is valid, even though ' $\exists x \exists y(x = y \wedge \Diamond(x \neq y))$ ' can still be true. Using classical logic, it is not, because if the first is valid, the second cannot be satisfiable. However, I will argue in favor of a modification of the classical notion of logical consequence which makes this possible.

3 Relative Identity

Geach has argued that identity is always *relative identity*. Geach argues for the following three theses: (i) There does not exist a notion of absolute identity; (ii) complete identity statements are always of the form ' x is the same F as y ', ' $x =_F y$ ', where F stands for a count-noun; and (iii) it is possible that ' $x =_F y$ ' is true and ' $x =_G y$ ' is false, when F and G are distinct count nouns. Counting presupposes the notion of identity, and Geach motivates theses (i) and (ii) by what Frege says about counting: one cannot count apart from counting some kind of thing. Whether there exists an absolute notion of identity is highly

controversial, and so is Geach's motivation against it by appealing to Fregean arguments. We will only be concerned with thesis (iii) (assuming that a notion of relative identity is at least useful): that there can be individuals x and y , and sortals F and G for which it holds that ' $x =_F y$ ' is true, but ' $x =_G y$ ' is false. One proposed example that shows this pattern we have seen already, and involves Gibbard's (1975) piece of clay. Recall that according to this example, the statue Goliath is identified with the piece of clay it is composed of, even though this piece of clay might be turned into another statue, David. According to identity-relativists one should analyze this example in terms of just two objects, David and Goliath, which are identical in terms of constitution (both are made of the same piece of clay), $d =_c g$, but not identical when thinking of the objects as statues, $d \neq_s g$. Many other examples have been proposed in the literature as well. Wiggins (1980), however, has argued that existence of the pattern $\exists x, y (x =_F y \wedge x \neq_G y)$ is impossible if F and G are sortals, because from the assumption that ' $=_G$ ' is reflexive and the truth of ' $x =_F y$ ' one can derive ' $x =_G y$ ' for any G , when one also assumes the following version of Leibniz's Law: $\forall x, y, G ((Gx \wedge \exists F (x =_F y)) \rightarrow Gy)$.

1. $x =_F y \vdash x =_G x$ (Tautism)
2. $x =_F y \vdash \hat{z}(x =_G z)(x)$ (Abstraction)
3. $x =_F y \vdash x =_G y$ ((1), (2), and Leibniz's Law)
4. $\vdash x =_F y \rightarrow x =_G y$ (Conditional proof)

But still, isn't it natural to say that in Gibbard's example David and Goliath are *the same* in one sense (constitution) but *different* in another (statue)? Notice that as far as Gibbard's example is concerned, it doesn't really seem to matter much whether we analyze it in terms of relative identity or in terms of contingent identity. In both ways we account for the intuition Gibbard pointed to. The reason that such cases of claimed 'relative identity' can be analyzed as contingent identity is that David and Goliath are objects that 'live' in different possibilities (times), and that David and the piece of clay it is composed of have different *modal properties*. Unfortunately, other examples of claimed 'relative identity' exist that cannot be (naturally) analyzed in terms of contingent identity. Such examples—e.g., Geach's (1980) example of the 1001 cats—are cases where modalities don't play any essential role.

4 Vague Identity

Geach's example of the 1001 cats is seen by some not as an example of relative identity, but of *vague identity*, instead. There can be little doubt that some identity statements are vague. But what is the source of this vagueness? Standardly, it is assumed that a sentence like 'John is tall' is vague, because the predicate 'tall' is vague. But does it make sense to say that ' $s = t$ ' is vague, because in different languages/models, identity means something different? The natural idea would be that if an identity statement is vague, the vagueness concerns what is denoted by the terms ' s ' and ' t '. But this still leaves open two possibilities: either one of the two *terms* is vague, or the terms are not vague, but what is denoted by (at least one of) the terms is vague. The latter would be a case of *ontic vagueness*. Yet another possibility is that identity statements are vague, because identity itself is vague. Also this would fall under the heading of ontic vagueness. Many philosophers find ontic vagueness absurd. Moreover, vague identity due to ontic vagueness cannot exist, or so it is argued. That is, one can prove that if $x = y$ holds, then it cannot hold vaguely so. To illustrate this, let us say that an identity statement is vaguely true iff ' $\nabla x = y$ ' holds. We assume that ∇ is the dual of Δ such that $\nabla\phi \equiv \neg\Delta\neg\phi$, where ' $\Delta\phi$ ' means that it is determinate whether ϕ . Then one can easily show that $\forall x, y(x = y \rightarrow \Delta(x = y))$ is valid, using Leibniz's Law.

- (1) $x = y \vdash \Delta(x = x)$ (Truism)
- (2) $x = y \vdash \hat{z}(\Delta(x = z))(x)$ (Abstraction)
- (3) $x = y \vdash \Delta(x = y)$ (by (1) and (2), and Leibniz's Law)
- (4) $\vdash x = y \rightarrow \Delta(x = y)$ (conditional proof)

Perhaps the proof shows that to make sense of vague identity, one has to give up on Leibniz's Law (Parsons 2000). Of course, this was not the standard reaction to Evans's (1978) proof, of which the above argument is a close relative. The standard reaction was to conclude that Δ creates a modal context for which abstraction is not valid, because singular terms might have different denotations in different possibilities (Lewis 1988). We take the above reasoning to be sound, and so we accept the assumption in the proof that variables are 'rigid' expressions (or better, perhaps, that Δ does not create a modal context). We also accept Leibniz's Law, thus we accept the validity of $\forall x, y(x = y \rightarrow \Delta(x = y))$. Still, we want vague identity to be possible, such as in the well-known example of Theseus's ship. How to account for that?

5 Vagueness

The case of Theseus's ship (TS) is like that of the sorites paradoxes but this time for identity. Vague predicates seem to be *tolerant* in the sense that a small enough difference in the relevant properties of two objects cannot make a difference in the applicability of the predicate. Suppose we've got a first-order language with similarity relations, \sim_P , for each predicate ' P ' (similarity relations are reflexive, symmetric but possibly non-transitive). Should we take that, as vague predicates, identity is tolerant? For vague predicates one can formulate the idea of tolerance in at least two ways ('Tolerance Principle' and 'tolerant reasoning'):

$$\text{TP } \forall x \forall y ((Px \wedge x \sim_P y) \supset Py) \quad \text{TR } a \sim_P b, Pa \models Pb$$

The following two principles correspond to this for identity (for a richer language with '=')

$$\text{TPI } \forall x \forall y ((TS = x \wedge x \sim y) \supset TS = y) \quad \text{TRI } a \sim b, a = TS \models b = TS$$

For a Gap theorist endorsing a K3 Kleene logic, the Tolerance Principle TP(I) is untrue. For an Epistemicist, endorsing classical semantics and logic, the Tolerance Principle is false. Also supervaluation theory predicts TP(I) to be false. Seemingly, the only roughly tolerant solution is the Dialetheist (Priest 1979), but she endorses TR(I) at the price of sacrificing Modus Ponens and the deduction theorem (for material implication). The case of identity is, however, peculiar and there is a deeper reason for intolerance. The "received view" on Sorites reasoning with identity statements takes it that TPI is untrue, *but only due to semantic indeterminacy*. If there were no issue of reference indeterminacy (suppose that for each t in the sequence, it is semantically determinate whether $t = TS$), TPI would not just be untrue, but *false*. The received view, then, is that vagueness with identity is *intolerant*. Either because identity is not tolerant for the same reason as vague predicates are not tolerant: accepting tolerance requires dubious logical commitments. Or because there cannot be vague objects due to the fact that identity is assumed to be a transitive relation. In this paper I try to dispute this way of seeing things. I show how to extend our account of tolerance to identity, showing this way that identity can be made tolerant avoiding the logical commitments of dialetheism.

Tolerant Logic

In TCS (Cobreros et al. 2012, 2014, t.a.), a Tolerance Logic was formulated to deal with vagueness (and truth). We might formulate the logic making use of three truth-values and Kleene's strong valuation schema:

$$\mathbb{I}(Pa) \in \{1, \frac{1}{2}, 0\} \quad \mathbb{I}(A \wedge B) = \min(\mathbb{I}(A), \mathbb{I}(B)) \quad \mathbb{I}(\neg A) = (1 - \mathbb{I}(A))$$

The universal quantifier generalizes conjunction and the other connectives are defined in a standard way. We say that A is *strictly satisfied* in a model when $\mathbb{I}(A) = 1$ and *tolerantly satisfied* when $\mathbb{I}(A) > 0$. Logical consequence is the absence of a countermodel, but in this semantics there are several ways of defining the notion of a countermodel. If a countermodel for an argument is a model in which all premises take value 1 and no conclusion takes value 1 this leads to the Kleene logic K3. If a countermodel is a model in which every premise takes value more than 0 and no conclusion takes value more than 0, this leads to the logic LP (Priest 1979). We consider, however, a further alternative in which both strict and tolerant satisfaction play a role. A countermodel is a model where all the premises take value 1 and no conclusion takes value more than 0 (that is, a countermodel is a model where all the premises are strictly true and no conclusion is even tolerantly true). This leads to the logic we call ST. A remarkable feature of ST is that it is classical logic for the classical vocabulary (that is, over the classical vocabulary, $\Gamma \models^{st} \Delta$ iff $\Gamma \models^{cl} \Delta$). Our accommodation of tolerance deals with the interplay of vague predicates with similarity relations. So we restrict our attention to models in which \sim is interpreted as a similarity relation (models where $\mathbb{I}(a \sim_p b) = 1$ iff $|\mathbb{I}(Pa) - \mathbb{I}(Pb)| < 1$). Call the restriction of \models^{st} to these models ' \models_{\sim}^{st} '. An immediate consequence of this is that \models_{\sim}^{st} is an extension of \models^{st} (thus, classically valid inferences, such as MP, are preserved). Now TR is valid in \models_{\sim}^{st} and TP is tolerantly true in every model (and so \models_{\sim}^{st} -valid). This shows that, contrary to the common opinion, one need not deviate too much from classical logic in order to accommodate tolerance: \models_{\sim}^{st} is fully classical, except that ... it is *not* a *transitive* relation. (In TCS a complete proof-system is provided for \models_{\sim}^{st} .)

As noted before, the Tolerance Principle ($\forall x, y ((Px \wedge x \sim_p y) \rightarrow Py)$) is in fact almost identical with Leibniz's Law ($\forall x, y ((Px \wedge x = y) \rightarrow Py)$). We have seen in this section that by making use of 3-valued logic and our notion of tolerant entailment, we are on the one hand able to preserve the Tolerance Principle, while on the other hand still account for vagueness: the fact that there exists a sorites sequence of pairwise P -similar objects such that the first element has property P while the last one does not. This gives rise to the question whether we can do something similar with respect to Leibniz's Law: On the one

hand preserve the validity of Leibniz's Law, and as a consequence validate all of (i) $\forall x, y (x = y \rightarrow \Box(x = y))$, (ii) $\forall x, y, \forall P, Q (x =_P y \rightarrow x =_Q y)$, and (iii) $\forall x, y (x = y \rightarrow \Delta(x = y))$. But on the other hand, still account for (i) contingent identity, (ii) relative identity, and (iii) vague identity due to ontic vagueness. The purpose of the rest of the paper is to show that this is indeed possible.

6 Vague Identity Revisited

Consider now $\mathcal{L}^=$ languages. These are \mathcal{L}^\sim -languages extended with the identity symbol '='. In the same way in which we allowed two different readings of predicates, a strict and a tolerant reading, we will now also allow for two different readings of identity. $a = b$ is strictly satisfied in a model for $\mathcal{L}^=$, written $\mathbb{I}(a = b) = 1$, iff $\mathbb{I}(a) = \mathbb{I}(b)$. $a = b$ is tolerantly satisfied in a model for $\mathcal{L}^=$, written $\mathbb{I}(a = b) > 0$, iff $\mathbb{I}(a) \sim \mathbb{I}(b)$ (for now it is assumed that ' \sim ' is a primitive similarity relation that is reflexive, symmetric but need not be transitive). As usual, the definitions of satisfaction and logical consequence carry over from previous models to models for $\mathcal{L}^=$.

We propose the following. First, we say that for complex predicate, $\hat{x}A$ it holds that $\mathbb{I}(\hat{x}A(\underline{d})) = \mathbb{I}(A[\underline{x}/\underline{d}])$.⁵ Second, $\mathbb{I}(\Delta A) = 1$ iff $\mathbb{I}(A) \in \{0, 1\}$, 0 otherwise. ∇A abbreviates $\neg\Delta\neg A$.

Let us now see how our analysis avoids the fatal contradiction in Evans's (1978) proof given in Table 1 (Evans's argument only goes from 1 to 5, assuming them already to be problematic enough).

Notice that according to our analysis, abstraction preserves truth value, and Leibniz's Law is *st*-valid, but it is not *K3*-valid. As a result, we predict that if 1 and

TABLE 1 *Evans's argument*

1	$\nabla(x = y)$	(Assumption)
2	$\hat{z}[\nabla(x = z)](y)$	(From 1, by abstraction)
3	$\neg\nabla(x = x)$	(Assumption, since $a = a$ is a logical truth!)
4	$\neg\hat{z}[\nabla(x = z)](x)$	(From 3, by abstraction)
5	$\neg(x = y)$	(From 2, 4, by Leibniz's Law and Contraposition)
6	$\neg\nabla(x = y)$	(From 5 and meaning of ' ∇ ')

⁵ We use the substitution analysis for convenience, and assume that \underline{d} names d .

3 are strictly true, 5 has to be tolerantly true. Thus, the inference from 1 and 3 to 5 is *st*-valid. Likewise for the inference from 5 to 6. However, these inferences cannot be joined together, as the following counterexample illustrates: $M = \langle D, \mathbb{I}, =, \sim \rangle$ with $D = \{a, b\}$, $a \neq b$, but $a \sim b$.

7 Contingent Identity Again

In this section we will account for contingent identity by making use of *sortal* variables with a constraint on their interpretation. That x is a lump of clay, we will express as x_l , and that y and z are statues, we will express by y_s and z_s . We will assume that during time (or possible worlds) the lump of clay stays the same, but that in these different possibilities, it will be different statues. Thus it can be that $x_l = y_s$ and $x_l \neq z_s$, but that still $\diamond(x_l \neq y_s)$ and $\diamond(x_l = z_s)$. This formalism accounts for *contingent* identity, because of the truth of $x_l = y_s \wedge \diamond(x_l \neq y_s)$.

We will interpret variables by means of states, assignments and *counterpart functions*. Counterpart functions were introduced by Stalnaker (1986) as an improvement of Lewis's (1968) idea of using counterpart *relations* making use of similarity. In my dissertation (van Rooij 1997), written under Ede Zimmermann's supervision, I made use of context-dependent counterpart functions to account for the intuition that the truth of *de re* attitude ascriptions might be context dependent. We will assume that variable x will be interpreted in state s as the counterpart of the individual denoted by $g(x)$ in s . We will now assume each state has its own domain, and that variables are *sorted* (following Gupta (1980) in spirit). Moreover, we will assume that with each sort k , there corresponds a unique counterpart function c^k . A counterpart function c is a function taking an individual d and a state s as arguments, and has the unique c -counterpart of d in s , $c_s(d)$, as value. We will interpret formulas not with a contextually given unique counterpart function, c (as proposed in van Rooij 1997), but rather with a *set*, C , of counterpart functions. We assume that every formula takes a value in $\{1, \frac{1}{2}, 0\}$.

$$\begin{aligned}
 - \mathbb{I}_{s,g,C}(x_k = y_l) &= 1 \quad \text{iff} \quad \llbracket x_k \rrbracket^{s,g,C} = \llbracket y_l \rrbracket^{s,g,C} \text{ and } k = l \\
 &> 0 \quad \text{iff} \quad \llbracket x_k \rrbracket^{s,g,C} = \llbracket y_l \rrbracket^{s,g,C}. \\
 - \mathbb{I}_{s,g,C}(P(x_k)) &= 1 \quad \text{iff} \quad \llbracket x_k \rrbracket^{s,g,C} \in I_s(P) \quad (\text{we ignore vagueness now}) \\
 &= 0 \text{ otherwise,} \quad \text{if } P \text{ is a simple predicate} \\
 - \mathbb{I}_{s,g,C}(\hat{z}\phi(x_k)) &= \mathbb{I}_{s,g,C}(\phi[\hat{z}/\llbracket x_k \rrbracket^{s,g,C}]) \\
 - \mathbb{I}_{s,g,C}(\neg\phi) &= 1 - \mathbb{I}_{s,g,C}(\phi) \\
 - \mathbb{I}_{s,g,C}(\phi \wedge \psi) &= \min\{\mathbb{I}_{s,g,C}(\phi), \mathbb{I}_{s,g,C}(\psi)\}
 \end{aligned}$$

$$\begin{aligned}
- \mathbb{I}_{s,g,C}(\forall x_k \phi) &= \min\{\mathbb{I}_{s,g[\mathbf{x}_k/d],C}(\phi) : d \in \mathbb{I}_s(K)\} \\
- \mathbb{I}_{s,g,C}(\Box \phi) &= 1 \quad \text{iff} \quad \forall t \in R(s) : \mathbb{I}_{t,g,C}(\phi) = 1 \\
&> 0 \quad \text{iff} \quad \forall t \in R(s) : \mathbb{I}_{t,g,C}(\phi) > 0.
\end{aligned}$$

The only question that remains is how to interpret $\llbracket x_k \rrbracket^{s,g,C}$. In the end we will use for each sorted variable x_k only a unique element of C . But which one? Except for the interpretation of identity statements, this is one more reason why we introduced the sortals: the relevant counterpart function will be singled out by sortal matching. Thus, $\llbracket x_k \rrbracket^{s,g,C}$ is interpreted as follows:

$$- \llbracket x_k \rrbracket^{s,g,C} = c_s^k(g(x_k))$$

Notice that on this semantics, Leibniz's Law is *st*-valid. As a result, (i) $\forall x_k, y_l (x_k = y_l \rightarrow \Box(x_k = y_l))$ is also *st*-valid. Still, we predict that (ii) $\exists x_k, y_l (x_k = y_l \wedge \Diamond(x_k \neq y_l))$ can be tolerantly true,⁶ and our analysis accounts for *contingent identity*. But then, what is wrong with the following argument given in Table 2?

Again, 2 and 4 follow from 1 and 3, and from this 5 can be derived. 6, in turn, can be derived from 5. But the two arguments cannot be joined together.

Because '=' is reflexive and satisfies Leibniz's Law, it is also symmetric and transitive, i.e. both $\forall x_k, y_l (x_k = y_l \rightarrow y_l = x_k)$ and $\forall x_k, y_l, z_m ((x_k = y_l \wedge y_l = z_m) \rightarrow x_k = z_m)$ are *st*-valid. In fact, in this case we predict that it is not possible that $x_k = y_l \wedge y_l = z_m \wedge x_k \neq z_m$ can still be tolerantly true. We will see that things are different in the case of relative identity.

TABLE 2 *The impossibility of contingent identity*

1	$\Diamond(x \neq y)$	(Assumption)
2	$\hat{z}[\Diamond(x \neq z)](y)$	(From 1, by abstraction)
3	$\neg\Diamond(x \neq x)$	(Assumption, since $x = x$ is a logical truth!)
4	$\neg\hat{z}[\Diamond(x \neq z)](x)$	(From 3, by abstraction)
5	$\neg(x = y)$	(From 2, 4, by Leibniz's Law and Contraposition)
6	$\neg\Diamond(x = y)$	(From 5 and Wiggins's proof)

6 To be sure, we could have reached very similar predictions by assuming that quantifiers range over sortal individual concepts. We could then make, for instance, the following constraint on the interpretation of sortal variables: for all sortals k and variables x_k, y_k : if $\exists s \in S_M : g(x_k)(s) = g(y_k)(s)$, then $\forall t \in S_M : g(x_k)(t) = g(y_k)(t)$ (cf. Gupta 1980). The interpretation function for formulas would be similar to what is given in the main text. Details are left to the reader.

8 ... And Relative Identity

We propose the following analysis of relative identity:

$$\begin{aligned}
 - \mathbb{I}_{s,g,C}(x_k =_P y_l) &= 1 \text{ iff } \mathbb{I}_{s,g,w}(P(x_k) \wedge P(y_l) \wedge x_k = y_l) = 1 \text{ and } k = p = l \\
 &> 0 \text{ iff } \mathbb{I}_{s,g,w}(\exists z_p (P(z_p) \wedge x_k = z_p \wedge y_l = z_p)) > 0.^7
 \end{aligned}$$

Of course, this analysis is not really in the spirit of Geach's argument that relative identity is the best we can have, because we have interpreted relative identity in terms of its non-relative counterpart. But still, it is easy to see that in terms of this definition we can account for the relative identity concerning Lump_l, David, and Goliath. So what goes wrong in the following argument given in Table 3?

Again, all steps are valid, but we cannot combine them. David and Goliath would be identical pieces of clay, $d_s =_C g_s$, but not identical statues, $d_s \neq_s g_s$. On the other hand, because d_s and g_s are not of the sort C , but are the same piece of clay, both statements $d_s =_C g_s$ and $d_s \neq_s g_s$ will receive value $\frac{1}{2}$. If these were the only three objects in our domain, the formula $\exists x_s, y_s (x_s =_C y_s \wedge x_s \neq_s y_s)$ would indeed be counted as (tolerantly) true.

Notice that although $\exists x_s, y_s (x_s =_C y_s \wedge x_s \neq_s y_s)$ is tolerantly true in our imagined situation, it still holds that $\forall P, Q, \forall x, y (x =_P y \rightarrow \forall Q (x =_Q y))$ will be *st*-valid, and thus also $(x_s =_C y_s) \rightarrow (x_s =_s y_s)$. How can that be? The reason is that in our situation $x_s =_C y_s$ is only tolerantly true, not strictly. As a result, the relative version of Leibniz's Law can be *st*-valid even though $x_s =_s y_s$ is not even tolerantly true.

TABLE 3 *The impossibility of relative identity*

1	$(d_s =_C g_s)$	(Assumption)
2	$(d_s =_s g_s)$	(From 1 and (relative version of) Leibniz's Law)
3	$(d_s \neq_s g_s)$	(Assumption)
4	$(d_s =_C g_s) \wedge (d_s \neq_s g_s)$	(Contradiction from 2 and 3)
5	ϕ	(From 4 and explosion)

7 We assume that $x_k = z_p$ can have value $\frac{1}{2}$ with respect to s, g and C for two reasons. First—and most obviously—because of contingent identity, i.e. $\llbracket x_k \rrbracket^{s,g,C} = \llbracket z_p \rrbracket^{s,g,C}$, but $k \neq p$. Second—and more important later in this section—because the identity between $\llbracket x_k \rrbracket^{s,g,C}$ and $\llbracket z_p \rrbracket^{s,g,C}$ is vague, as discussed in section 6.

Encouraging as the analysis might be, it still seems to give rise to *counting problems*. Although Gibbard's case seems to involve only one piece of clay, it seems we have to admit that there are two such pieces: $\exists x_k, y_l (C(x_k) \wedge C(y_l) \wedge x_k \neq y_l)$ will now be strictly true, because of David and Goliath. But, then, recall that one of the motivations for the existence of relative identity is that counting presupposes prior conceptualization. As a consequence, it seems only natural to claim that the above formula should not be used to express that there are at least two pieces of clay. To express this, it is much more natural to make use of relative identity as follows: $\exists x_k, y_l (C(x_k) \wedge C(y_l) \wedge x_k \neq_c y_l)$. This sentence is now counted as tolerantly true, but not strictly true. Moreover, $\forall x_k, y_l ((C(x_k) \wedge C(y_l)) \rightarrow x_k =_c y_l)$ will not be strictly true, but still tolerantly true. Thus, 'There is exactly one piece of clay' will be (tolerantly) true. Unfortunately, this is also the case for 'There are exactly two pieces of clay' *and even* for 'There are exactly *three* pieces of clay'. In a sense, the present analysis would only worsen Geach's problem of the 1001 cats. Fortunately, there is yet another natural possibility to represent counting sentences: we can represent that there are at least two pieces of clay, or cats, by the following formula: $\exists x_c, y_c (C(x_c) \wedge C(y_c) \wedge x_c \neq_c y_c)$.⁸ But how does this help? Indeed, so far it doesn't: David and Goliath would still make this sentence tolerantly true. The reason is that both are counted as pieces of clay, and we have not yet ruled out the possibility that Goliath might be the interpretation of x_c . But our sortal variables allow us to do exactly that. We can make the following extra assumptions:⁹

- For all sorts k matching predicate K and for all states s : $c_s^k(g(x_k)) \in \mathbb{I}_s(K)$.
This validates $\forall x_k \Box K(x_k)$.¹⁰
- For all sortals k, l s.t. $k \neq l$, there is an $s \in S$: $c_s^k(g(x_k)) \neq c_s^l(g(x_k))$.
This validates $\forall x_k \Diamond \neg L(x_k)$.

Thus, Goliath and David, as being statues, no longer can be the values of the sorted variable x_c ; only our one lump of clay can. Now we correctly predict that 'There is exactly one piece of clay' is strictly true, just as we want it to be.

Now, how does this analysis help us to account for the problem of the 1001 cats on the mat? Think of lumps of feline tissues t_1 and t_9 . They are not the same lumps of feline tissue. But we still want to say that they are the same cat: $t_1 \neq_T t_9$, but $t_1 =_c t_9$. This is immediately accounted for once we think of the

8 Similarly for 'There is at most one piece of clay': $\forall x_c, y_c ((C(x_c) \wedge C(y_c)) \rightarrow x_c =_c y_c)$.

9 It is natural to think of sortals now as something like Aristotelian secondary substances.

10 Of course, it doesn't validate the more general $\forall x_l (K(x_l) \rightarrow \Box K(x_l))$, even if K is a sortal predicate. Indeed, Lump1 is a statue now, though it doesn't have to be one.

lumps of feline tissues and the cat as separate objects, just like we thought of David, Goliath, and Lumpl.¹¹ But now it seems crucial that ' $t_1 =_c t_9$ ' will have a value higher than 0 because the cat c is now vaguely identified with both t_1 and with t_9 .

Notice that because relative identity is reflexive and satisfies Leibniz's Law, it is also symmetric and transitive, i.e. both $\forall x_k, y_l (x_k =_F y_l \rightarrow y_l =_F x_k)$ and $\forall x_k, y_l, z_m ((x_k =_F y_l \wedge y_l =_F z_m) \rightarrow x_k =_F z_m)$ are *st*-valid. Even $\forall x_k, y_l (x_k =_F y_l \rightarrow y_l =_G x_k)$ and $\forall x_k, y_l, z_m ((x_k =_F y_l \wedge y_l =_G z_m) \rightarrow x_k =_Z z_m)$ are predicted to be *st*-valid.¹² In contrast to the case of identity discussed in the previous section it is now possible, however, that $x_k =_F y_l \wedge y_l =_F z_m \wedge x_k \not=_F z_m$ can still be tolerantly true.

9 Conclusion

Are some identity-statements vague for ontic reasons? Are some contingent-identity statements true? Is there a notion of relative identity such that two things are identical relative to one sortal, but not with respect to another? I don't know. What I do know, though, is that all these claims *can* be made true, and are all consistent with Leibniz's Law being a validity. Being tolerant about the notion of consequence allows (though not forces) one to be tolerant about identity as well.

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11 Indeed, this can be immediately accounted for if we think of the 'objects' of state s not simply as elements of $D(s)$, but rather as elements of O , which is the following set of individual concepts: $O = \{\lambda s. c_s^k(d) : d \in D(s) \text{ and } k \text{ a sortal}\}$.

12 Although transitivity for a very simple reason.

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The Property Paradox in (Not So Plain) English*

Philippe Schlenker

1 The Property Paradox in the ‘Naïve Theory of Properties’

Reference to properties is widely used in semantic analyses of natural language (e.g. Chierchia & Turner (1988); Zimmermann (1993), and Moltmann (2004), among others). But as is summarized in Field (2004), the ‘naïve theory of properties’ is prone to a ‘property’ version of Russell’s paradox:

According to the naïve theory of properties, for every predicate $\Theta(x)$ there is a corresponding property $\lambda x\Theta(x)$. Moreover, this property $\lambda x\Theta(x)$ is instantiated by an object o if and only if $\Theta(o)$. More generally, the naïve theory involves the following ‘naïve comprehension schema’:

$$\text{NC. } \forall u_1 \dots u_n \exists y [\text{Property}(y) \& \forall x (x \text{ instantiates } y \leftrightarrow \Theta(x, u_1 \dots u_n))].$$

This naïve theory of properties has many virtues, but it seems to have been shattered by (the property version of) Russell’s paradox. ‘Seems to’ have been shattered? There is no doubt that it was shattered, if we presuppose full classical logic. Let us use the symbol \in to mean ‘instantiates’. The Russell paradox involves the Russell property R corresponding to the

* Earlier versions of this manuscript benefited from critical comments by Barry Schein and Chris Tancredi; this version benefited from further comments by Jan Köpping and Graeme Forbes—many thanks to all. Unfortunately, remaining errors are mine. But fortunately, I can safely assume that Ede Zimmermann will find them all, and probably go on to correct them too, as he regularly has in the past.

When I first met Ede at Sinn und Bedeutung 1998 in Leipzig, he asked me: “Bist du Elsässer?”—and I didn’t quite understand the term (I had learned my German in Berlin, and in Hegel). We have had many deeper conversations in the meantime, on every conceivable topic in semantics, logic and the philosophy of language. They have been a constant intellectual treat and have provided me with long-term food for thought (not to mention the drinking). It is a pleasure to dedicate these musings to him—and to wish him many happy returns.

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predicate ‘does not instantiate itself’. So according to the naïve theory, $\forall x[x \in R \leftrightarrow \neg(x \in x)]$. Therefore in particular, $(*) R \in R \leftrightarrow \neg(R \in R)$.

FIELD 2004: 78

Field’s enterprise is to find a logic that is strong enough to capture part of the naïve theory of properties, yet not so strong that it generates paradoxes. This is certainly a worthy logical task; but if one is interested in the semantics of natural language, one should first ask whether paradoxes can or cannot be constructed from fragments of English that only include ‘property talk’. Obviously, if we gave ourselves the word *property* and made the necessary assumptions to ensure that for every formula, there exists a corresponding property, we could express in plain English the property paradox. All we would need to do is to express with English words the formulas that are mentioned in the paragraph by Field that we quoted at the outset. But this should certainly not be taken to show that the *grammar* of English suffices to generate the property paradox. Rather, one should conclude from a natural language rendering of Field’s reasoning that certain assumptions about properties lead to paradox. Under this view, then, *nothing in the grammar of English would have to be modified if we were to abandon the belief that for each formula there exists a property that corresponds to it*. Thus it might be reasonable to conclude that all is well with the grammar of English, though one might get into trouble if one insists on making misguided assumptions about ontology.

2 The Property Paradox in Natural Language

The situation is more complex, however. We will now see that quantifiers and pronouns, combined with plausible rules of inference (ones that have nothing to do with the word *property* or any other technical terminology), might suffice to generate the property paradox in English. However, some linguistic work is needed to come up with the paradoxical statements, which are very complex, for reasons outlined below. But before we embark on this construction, we need to be clear about the role played by quantifiers and pronouns *independently* of the issue of property talk. Thus we will start with some brief remarks about individual-denoting quantifiers and pronouns before applying our results to property talk.

2.1 Individual-denoting Quantifiers and Pronouns

Quine famously argued that ‘to be is to be the value of a variable bound by an existential quantifier’. His criterion applies most clearly to a theory stated in

First-Order Language with a standard syntax,¹ but we can extend it to natural language—on condition, of course, that we identify plausible analogues of quantifiers and variables.

In the case of reference to individuals, the problem is not hard to solve. *Something* is a plausible counterpart of the existential quantifier. For variables, one may either use the pronoun *it* or the relative pronoun *which*. A particularly pedantic translation of (1a) is afforded by (1b), where every variable is translated by a pronoun.

- (1) a. $\forall x_1 \exists x_2 P(x_1, x_2)$
 b. Everything₁ is such that something₂ is such that it₁ protects it₂.
 c. Everything₁ is such that there is something₂ which₂ it₁ protects.
 d. Everything protects something.

Of course (1d) is by far the most idiomatic translation of (1a), but it has the disadvantage of not making the variables explicit (many contemporary syntacticians believe that even in this case a particular sort of variables, called ‘traces’, are syntactically but not phonologically present. They further believe that there exists a level of syntactic representation in which quantifiers roughly figure in the syntactic positions that they would have in First-Order Logic. If so, (1d) has a representation such as the following: *Everything₁ something₂ t₁ protects t₂*).

Interestingly, there are idiosyncracies of natural language that make the translation of certain First-Order formulas slightly more complicated. Suppose we wanted to translate (2a) using the recipes we used in (1). We would end up with translations that are deviant or do not have the desired meaning:

- (2) a. $\exists x_1 P(x_1, x_1)$
 b. # Something₁ is such that it₁ protects it₁.
 c. # There is something₁ which₁ protects it₁.

The source of the problem lies in a grammatical constraint called ‘Condition B’, which (among others) prohibits an object pronoun from coreferring with the subject of its predicate (e.g. Chomsky 1981). Of course in this case there is an easy fix, which is to use the reflexive pronoun *itself* instead of *it*:

1 As observed in Quine (1995), the usual criterion of ‘ontological commitment’ must be modified if one uses a system such as Quine’s own ‘Predicate Functor Logic’, which is variable-free.

- (3) a. $\exists x_1 P(x_1, x_1)$
 b. Something₁ is such that it₁ protects itself₁.
 c. There is something₁ which₁ protects itself₁.

Still, even if reflexive pronouns were not available we could find a more devious way of expressing (3a) while circumventing Condition B. The idea is to start, not with (3a), but with (4a), which is equivalent to it. We then translate this sentence into English and avoid the Condition B violation:

- (4) a. $\exists x_1 \exists x_2 (x_2 = x_1 \ \& \ P(x_1, x_2))$
 b. Something₁ is such that something₂ is such that it₁ is identical to it₂ and it₁ protects it₂.
 c. There is something₁ which₁ is identical to something₂ which₂ protects it₁.

The idea, then, is to introduce an additional quantifier and a predicate of identity to circumvent the prohibition against coreferential arguments.² This piece of trickery will come in handy in our discussion of property talk, where we won't be able to appeal to reflexive pronouns to circumvent Condition B.

2.2 *Property-denoting Quantifiers and Pronouns*

Let us now turn to properties. First, it seems that we can quantify over them:

- (5) John is clever. Therefore there is something that John is—namely clever.

Furthermore, pronouns sometimes appear to refer back to properties. This is somewhat easier to show in French or in Italian than in English, because these languages allow regular pronouns to play this role (like other pronouns in French and Italian, they appear in the pre-verbal ('clitic') position; unlike individual-denoting pronouns, they always take 'default' gender, i.e. they always appear in the masculine even if the predicates they refer back to exhibit feminine features, as is the case below). In English, the pronoun *it* doesn't work well in this case, but the relative pronoun *which* does (we may marginally use the demonstrative *that* to obtain the desired meaning, but the resulting sentences are still a bit awkward):

2 It can be ascertained independently that (i) pronouns bound by different quantifiers do not in general count as 'coreferential', and that in any event (ii) what counts for purposes of Condition B is presupposed rather than asserted identity.

- (6) a. Anne est travailleuse et sa fille le sera aussi (French)
Anne is hardworking-FEM and her daughter it-MASC will-be too
 'Anne is hardworking and her daughter will be too'
- b. Ann is hardworking, which her daughter is too
- c. ?Ann is hardworking, and her daughter is that too

So far we have only demonstrated that natural language has quantifiers and pronouns that may range over properties. The key to produce a paradox, however, is to show that the underlying system is not fully typed, and that *different occurrences of the same property-denoting variable can appear in predicate and in argument positions*. If this were not the case, we could assume that the system is 'implicitly' typed, in the sense that even though the *morphology* does not display any distinction between property-denoting pronouns that appear in argument and in predicate positions, syntactic or semantic rules still prohibit the same variable from simultaneously appearing in both types of position.

But (7b) suggests that this is probably not the case in English (I write 'probably' because some speakers might find (7b) a bit marginal); and I find (7b') rather acceptable in French. It seems that certain parts of the language might not to be typed.

- (7) a. John is something₁ which₁ is very important [, namely clever].
- b. (?) There is something₁ which₁ John is and which₁ is very important [, namely clever].
- b'. Il y a quelque chose que Jean est, à savoir sage, et qui est fort important dans la vie.
It there have some thing that Jean is, to know wise, and that is very important in life.
 'There is something that Jean is, namely wise, which is very important in life.'
- c. $\exists x_1 (x_1(j) \& \text{important}(x_1))$

The key formal observation, made apparent in (7b)–(7c), is that the same variable (namely *which₁* in (7b) and x_1 in (7c)) occurs both in a predicate position (*which₁ John is* in (7b) and $x_1(j)$ in (7c)) and in an argument position (*which₁ is important* in (7b) and *important(x_1)* in (7c)).

At this point a clarification is in order. Jan Köpping (p.c.) suggests that instantiated counterparts of (7b) fail, as shown in (8a); this might cast doubt on the idea that property talk in English is entirely untyped.

- (8) a. John is clever. *Clever is important.
 b. C(j) and important(j)

But we do not need to claim that the system is entirely untyped. In order to obtain a derivation of the property paradox with the grammatical resources of ordinary English, all we need to do is to find a *subpart* of the language which is 'sufficiently' untyped to give rise to the paradox. As far as we can tell, sentences like (7b)–(7b') are rather acceptable whereas instantiated counterparts like (8a) aren't, but we won't need the latter to derive the paradox.

Although in the preceding cases we started from properties that were denoted by atomic predicates, the same constructions can be extended to properties that are denoted by complex formulas. Thus in the examples in (9) it is possible (though admittedly not required) to understand the predicate-denoting pronoun as referring to the conjunctive property of being intelligent and hard-working (note that in French the singular form of the pronoun must be used; the plural pronoun is simply ungrammatical in this case).

- (9) a. Anne est (à la fois) intelligente et travailleuse, et sa fille le (*les) sera aussi.
*Anne is (both) intelligent and hard-working, and her daughter it (*them) will-be too.*
 'Ann is both intelligent and hard-working, and her daughter will be too'
 b. Ann is (both) intelligent and hard-working, which her daughter is too.

Furthermore, in this case as well different occurrences of the same property-denoting variable may occur in predicate and in argument positions:

- (10) a. Ann is both intelligent and hard-working, which₁ is useful but which₁ unfortunately her daughter isn't.
 b. Ann is something which₁ is useful but which₁ unfortunately her daughter isn't (namely (both) intelligent and hard-working).

In order to represent these sentences insightfully, we use in our discussion a notation in which complex predicates can be formed by an operation of λ -abstraction. In (11a) we represent *Ann* and *her daughter* with *a* and *d* respectively, and we assume that x_1 is a free variable which denotes the same thing as $[\lambda x_2 (\text{intelligent}(x_2) \wedge \text{hard-working}(x_2))]$.

- (11) a. $[\lambda x_2 (\text{intelligent}(x_2) \wedge \text{hard-working}(x_2))](a) \wedge \text{useful}(x_1) \wedge \neg x_1(d)$
 b. $\exists x_1 (x_1(a) \wedge \text{useful}(x_1) \wedge \neg x_1(d))$

If our judgments are correct (and they could of course be challenged), these expressive possibilities will now allow us to generate the property paradox in plain English, without any recourse to technical terms such as *property*.

2.3 *The Property Paradox in English*

Let us start from the inference in (12a) to (12b), which is plausibly valid:

- (12) a. This is green. Therefore:
 b. There is something₁ [, namely green,] which₁ each thing₂ is if and only if it₂ is green.

This inference has the following form (we represent *this* by a free variable or a constant *y*):

- (13) a. $g(y)$
 b. $\exists x_1 \forall x_2 (x_1(x_2) \leftrightarrow g(x_2))$

In this case the formula that triggers the inference involves an atomic predicate. But it would seem that the inference is also intuitively valid when the initial formula involves a complex predicate. Let us start with a simple example, in which the pronoun *which*, represented in (14b) as a free variable, appears to refer to the property denoted by $\lambda x_2 (green(x_2) \wedge tasty(x_2))$; we use *a* to stand for *this apple*, and *a'* to stand for *that apple*.

- (14) a. This apple is green and tasty, which that apple isn't.
 b. $[\lambda x_2 (green(x_2) \wedge tasty(x_2))](a) \wedge \neg x_1(a')$

(On this construal, the denotation of *a'* may validate the second conjunct by not being green or not being tasty or both.)

It seems reasonable to infer (15) from (14), where the part between square brackets may be omitted in (15a) and in (15b):

- (15) a. There is something₁ [, namely green and tasty / being both green and tasty,] which this apple is and which that apple isn't.
 b. $\exists x_1 (x_1(a) \wedge \neg x_1(a')) [\wedge x_1 = \lambda x_2 (green(x_2) \wedge tasty(x_2))]$

It would also seem reasonable to infer (16):

- (16) a. There is something₁ which₁ each thing₂ is if and only if it₂ is (both) green and tasty.
 b. $\exists x_1 \forall x_2 (x_1(x_2) \leftrightarrow (g(x_2) \wedge t(x_2)))$

Let us now derive the paradox itself. We start from true statements such as those in (17):

- (17) a. This apple is concrete, which (itself) is abstract.
 b. This apple is green, which (itself) is colorless.

We may want to infer the sentence in (18), represented as in (19), where the variables x_1 and x_2 denote the same things as *concrete* and *green* respectively:

- (18) a. This apple is concrete, which (itself) is not concrete.
 b. This apple is green, which (itself) is not green.
- (19) a. $\text{concrete}(a) \wedge \neg \text{concrete}(x_1)$
 b. $\text{green}(a) \wedge \neg \text{green}(x_2)$

If indeed x_1 and x_2 denote the same things as *concrete* and *green* respectively, we may be tempted to find a natural language counterpart of the formulas in (20).

- (20) a. $\text{concrete}(a) \wedge \neg x_1(x_1)$, where x_1 denotes the property of being concrete.
 b. $\text{green}(a) \wedge \neg x_2(x_2)$, where x_2 denotes the property of being green.
 c. $\exists x_1(x_1(a) \wedge \neg x_1(x_1))$

But the most natural candidates, given in (21), are ungrammatical or do not have the intended meaning:

- (21) a. # This apple is concrete, which₁ it₁ isn't.
 b. # This apple is green, which₂ it₂ isn't.
 c. # This apple is something₁ which₁ it₁ isn't.

However this should come as no surprise: as was observed in our discussion of (2), Condition B prohibits an object pronoun from referring to the same thing as the closest subject. But this is precisely what the relative pronoun *which* is trying to do in (21)!³ Still, with some trickery, we can express the desired

3 In addition, the sentences in (21) exhibit a configuration in which (i) a *wh*-expression moves to the left of a coindexed pronoun, and (ii) the pronoun in question c-commands the trace of the *wh*-expression. Examples that satisfy (i) but not (ii) are deemed 'Weak Crossover' violations;

meaning. Thus instead of translating directly the sentences in (20), we will use the more complicated sentences in (22), whose natural language counterparts are given in (23):

- (22) a. $concrete(a) \wedge \exists x_2(x_1 = x_2 \wedge \neg x_2(x_1))$, with $x_1 = concrete$
 b. $green(a) \wedge \exists x_2(x_1 = x_2 \wedge \neg x_2(x_1))$, with $x_1 = green$
 c. $\exists x_1(x_1(a) \wedge \exists x_2(x_1 = x_2 \wedge \neg x_2(x_1)))$
- (23) a. This apple is concrete, which₁ is identical to something₂ which₂ it₁ isn't.
 b. This apple is green, which₁ is identical to something₂ which₂ it₁ isn't.
 c. This apple is something₁ which₁ is identical to something₂ which₂ it₁ isn't.

Since there is an ambiguity in English *be*, which could be understood as 'identity be' or 'predicative be', *we adopt the convention of using 'be identical to' in the first case and simple 'be' in the second*. The resulting sentences in (23) are undoubtedly complicated, ambiguous, and hard to understand. Our point is not that these are idiomatic or even comprehensible English, but just that (i) they are formed by means that do not appear to violate the grammar of English, and that (ii) if our earlier observations are correct, they should have a reading that corresponds to the formulas in (22) (that they are difficult to understand could come from the multiple ambiguities they give rise to, from their syntactic complexity, or from the multiple repetitions they involve). In particular, they satisfy Condition B; for instance, in (23c) the two property-denoting pronouns that occur in *which₂ it₁ isn't* are bound by different quantifiers, and therefore do not count as 'coreferential'.

those that satisfy (i) and (ii) are called 'Strong Crossover' violations. But as noted in Lasnik & Stowell (1991) (among others), with appositive relative clauses Weak Crossover effects just fail to arise in this configuration, as shown in (i).

(i) Gerald_p, who_i his_i mother loves t_i, is a nice guy. (Lasnik & Stowell 1991: 698)

(I personally find the following sentence rather odd: *Gerald_p, who_i he_i thinks nobody likes t_i, is a nice guy*. This might seem to go against Lasnik and Stowell's generalization. But there might be an orthogonal problem with this sentence, which involves the semantics of attitude reports: some authors have argued that De Se Logical Forms should be preferred whenever they can be used to report an attitude (e.g. Schlenker 2005). Here the trace of *who_i* must be a De Re, not De Se term, which might explain the deviance of the sentence.)

We may now apply generalization illustrated in (13) and (16) to the underlined complex predicates in (23)—with the result in (24a). The latter is the natural language translation of (24b), which in turn is equivalent to (24c).

- (24) a. There is something₃ which₃ each thing₁ is if and only if it₁ is identical to something₂ which₂ it₁ isn't.
 b. $\exists x_3 (\forall x_1 (x_3(x_1) \leftrightarrow \exists x_2 (x_2 = x_1 \wedge \neg x_2(x_1))))$
 c. $\exists x_3 (\forall x_1 (x_3(x_1) \leftrightarrow \neg x_1(x_1)))$

The property paradox arises when we ask about the witness of the statement of (24a) whether it itself has the relevant property. Due to the ability of natural language pronouns to pick out the witness of a preceding existential statement, as in (25), the paradox will arise when (24a) is followed by a relatively simple question, as in (26b):

- (25) You bought something to eat. Was it good?
 (26) a. There is something₃ which₃ each thing₁ is if and only if it₁ is identical to something₂ which₂ it₁ isn't.
 b. Is it₃ identical to something₂ which₂ it₃ is?

The question has no non-self-contradictory answer. To say it in technical terms: the witness of the existential statement is self-applicable if and only if it is not self-applicable. Without using any technical vocabulary, we can state the paradox in (not quite) ordinary English:

- (27) It₃ is identical to something₂ which₂ it₃ is if and only if it₃ is identical to something₁ which₁ it₃ isn't.

Needless to say, given the complexity of the sentence and the multiple ambiguities it gives rise to, more work would be needed to make sure that the crucial reading is indeed derivable by independently attested grammatical means. We leave this empirical investigation for future research.

3 Towards an Objectual Semantics

Let us now assume for the sake of argument that our analysis is on the right track, and that property-denoting pronouns and quantifiers make it possible to express the property paradox with the grammatical resources of ordinary

English. There are two conceivable solutions to this problem, each of which departs in some way from speakers' immediate intuitions.

- We could deny that the patterns of inference that yield the paradox apply without restriction. In particular, we could deny that from *John is P* one can *always* infer: *There is something that John is, namely P*. If so, we could claim that there is no real object-language paradox here; the appearance of one might stem from the fact that speakers erroneously apply incorrect principles of reasoning that are not sanctioned by the grammar of their language.
- Alternatively, we could bite the bullet and say that property talk does make it possible to construct paradoxical statements in the object language.

Since the first line has been explored at length by others, we will briefly discuss ways to develop the second. It should be pointed out that there is a rich literature on this topic, some of which concerns models of the untyped lambda-calculus, and some of which are more linguistically oriented (see for instance Hindley & Seldin 1986 for the former, and Turner 1983, 1985 for the latter). Here we sketch a simple existence proof that some models with the desired properties can be constructed. Within a highly simplified language, we will take the denotation of property-denoting expressions to be formulas of another language. This will be achieved by way of translation into a language with a satisfaction predicate and with quantifiers that range over formulas of that same language. In this way we will translate $x_2(x_1)$ as $Sat(x_2, x_1)$, where the latter formula means that the object denoted by x_1 satisfies (i.e. makes true) the formula with one free variable denoted by x_2 . The advantage of this reductive procedure is that it is straightforward to construct models for a language that contains its own satisfaction predicate. For us, it has the advantage of simplicity; but it is clear that more sophisticated models should be investigated if the present line is to be developed seriously.

3.1 *Syntax and Translation*

Our base language is formed by the following syntactic rules (constants could be added, or treated *à la Quine* by analyzing *Socrates sleeps as there is something which Socratizes and which sleeps*):

(28) L (= the base language)

$$F := P_i^n(x_{k_1} \dots x_{k_n}) | \neg F | (F \wedge F') | (F \leftrightarrow F') | \exists x_k F$$

In order to model property talk, we extend L to a language L^P which includes formulas of the form $x(x')$, where x and x' are two variables:

(29) L^P (= L extended with property talk)

$$F := x_{k_1}(x_{k_2})|P_i^n(x_{k_1}\dots x_{k_n})|\neg F|(F \wedge F')|(F \leftrightarrow F')|\exists x_k F$$

The semantics of L^P will be obtained by way of a translation into an extension L^+ of L which contains a satisfaction predicate *Sat*:

(30) L^+ (= L extended with a satisfaction predicate)

$$F := \text{Sat}(x_{k_1}, x_{k_2})|P_i^n(x_{k_1}\dots x_{k_n})|\neg F|(F \wedge F')|(F \leftrightarrow F')|\exists x_k F$$

It is intended that the interpretations we consider for L^+ satisfy the following condition (i.e. that they are ‘fixed points’ in the sense of Kripke 1975):

(31) *Sat*(x, y) is:

- a. true just in case x denotes a formula with (exactly) one free variable which is made true by the denotation of y ;
- b. false just in case either (i) x denotes a formula with one free variable which is made false by the denotation of y , or (ii) x denotes something which is not a formula with one free variable;
- c. neither true nor false in all other cases (hence in particular if x denotes a formula with one free variable but is made neither true nor false by the denotation of y).

Standard results guarantee that such interpretations can indeed be constructed (see for instance McGee 1990: 170).

The translation between L^P and L^+ is then straightforward: any formula F of L^P is translated into a formula F^* of L^+ obtaining by replacing every occurrence of the form $x'(x)$ with *Sat*(x', x)—as is stated more pedantically in (32):

- a. $[P_i^n(x_{k_1}\dots x_{k_n})]^* = P_i^n(x_{k_1}\dots x_{k_n})$
- b. $[\neg F]^* = \neg F^*$
- c. $[(F \wedge F')]^* = (F^* \wedge F'^*)$
- d. $[(F \leftrightarrow F')]^* = (F^* \leftrightarrow F'^*)$
- e. $[\exists x_k F]^* = \exists x_k F^*$
- f. $[x_{k_1}(x_{k_2})]^* = \text{Sat}(x_{k_1}, x_{k_2})$

3.2 Semantics

Following one of the options laid out in Kripke (1975), we resort to the Strong Kleene System to give a semantics to L^+ and thus—indirectly—to L^P .

The key clauses are copied below; the existential quantifier is treated as general disjunction (which in turn can be defined from negation and conjunction):

		<hr/>					<hr/>				
P	$\neg P$	Q		1	0	$\#$	Q		1	0	$\#$
		P	$P \wedge Q$				P	$P \leftrightarrow Q$			
1	0		1	1	0	$\#$	1	1	0	$\#$	
0	1		0	0	0	0	0	0	1	$\#$	
$\#$	$\#$		$\#$	$\#$	0	$\#$	$\#$	$\#$	$\#$	$\#$	
<hr/>		<hr/>					<hr/>				

For any interpretation function I and any assignment function s , for each formula G ,

$$\begin{aligned} \llbracket \exists x_i G \rrbracket^s &= 1 \text{ iff for at least one object } d, \llbracket G \rrbracket^{s[x \rightarrow d]} = 1 \\ \llbracket \exists x_i G \rrbracket^s &= 0 \text{ iff for each object } d, \llbracket G \rrbracket^{s[x \rightarrow d]} = 0. \end{aligned}$$

As in Kripke's theory of truth, the domain of objects includes formulas of L^+ , which is of course crucial to obtain paradoxical statements.

3.3 Examples

Let us illustrate the translation procedure with a few examples. In each case (a) is the English sentence to be analyzed, (b) is its translation in our property-friendly system, and (c) is the translation of (b) under $*$.

(i) Simple Examples

(33) a. Something is green.

b. $\exists x_1 \text{green}(x_1)$

c. $\exists x_1 \text{green}(x_1)$

(34) a. There is something₁ which₁ each thing₂ is if and only if it₂ is green.

b. $\exists x_1 \forall x_2 (x_1(x_2) \leftrightarrow \text{green}(x_2))$

c. $\exists x_1 \forall x_2 (\text{Sat}(x_1, x_2) \leftrightarrow \text{green}(x_2))$

(ii) A 'reflexive' example

Let us now consider a sentence with a reflexive flavor:

- (35) a. Something₁ is identical to something₂ which₂ it₁ isn't.
 b. $\exists x_1 \exists x_2 (x_1 = x_2 \wedge \neg x_1(x_1))$
 b'. $\exists x_1 \neg x_1(x_1)$
 c. $\exists x_1 \neg \text{Sat}(x_1, x_1)$

The formula in (35b) is equivalent to that in (35b'), whose semantics is provided by (35c). This sentence is trivially true given our conventions: if x_1 denotes something other than a formula with one free variable, by the condition in (31b), $\text{Sat}(x_1, x_1)$ is true, and so is $x_1(x_1)$.

(iii) A paradoxical statement

Let us now consider a sentence which will turn out to be paradoxical according to the present system:

- (36) a. There is something₃ which₃ each thing₁ is if and only if it₁ is identical to something₂ which₂ it₁ isn't.
 b. $\exists x_3 \forall x_1 (x_3(x_1) \leftrightarrow \exists x_2 (x_2 = x_1 \wedge \neg x_2(x_1)))$
 b'. $\exists x_3 \forall x_1 (x_3(x_1) \leftrightarrow \neg x_1(x_1))$
 c. $\exists x_3 \forall x_1 (\text{Sat}(x_3, x_1) \leftrightarrow \neg \text{Sat}(x_1, x_1))$

We will work directly with the simplified formula in (36b'), whose semantics is provided by (36c). We call G the formula $\forall x_1 (x_3(x_1) \leftrightarrow \neg \text{Sat}(x_1, x_1))$.

- Clearly, no object assigned to x_3 can make G true, since for $x_1 = x_3$ G cannot be true.
- On the other hand, when x_1 denotes the formula $H := \neg \text{Sat}(x_1, x_1)$, the right-hand side of the biconditional can only have the indeterminate truth value. This is because in this case $\text{Sat}(x_1, x_1)$ is true just in case H satisfies $\neg \text{Sat}(x_1, x_1)$, which holds just in case $\neg \text{Sat}(x_1, x_1)$ is true (since x_1 denotes H); and similarly $\text{Sat}(x_1, x_1)$ is false just in case $\neg \text{Sat}(x_1, x_1)$ is false. Only the third case is coherent: $\text{Sat}(x_1, x_1)$ must have the indeterminate truth value.

3.4 An Improvement

The semantics of (36) isn't quite what we had promised, however. We wanted, in essence, to guarantee that from:

(37) $\neg x_2(x_2)$ (for some value of x_2)

one could infer:

(38) $\exists x_3 \forall x_1 (x_3(x_1) \leftrightarrow \neg x_1(x_1))$

But we have failed: (37) is often trivially true, but we have just shown that (38) (i.e. (36b')) has the indeterminate truth value.

What is the source of our predicament? The problem lies in our treatment of the biconditional, whose Strong Kleene semantics is exceedingly weak: as soon as one of its arguments is indeterminate, so is the entire biconditional. What we would like is an alternative biconditional (henceforth written as \leftrightarrow^*), which is true just in case its two arguments have the same truth value, and is false otherwise:

(39) $\llbracket G \leftrightarrow^* H \rrbracket = 1$ iff $\llbracket G \rrbracket = \llbracket H \rrbracket$; $\llbracket G \leftrightarrow^* H \rrbracket = 0$ iff $\llbracket G \rrbracket \neq \llbracket H \rrbracket$

Why couldn't we add \leftrightarrow^* to a Strong Kleene Logic? Because in the general case it would make the system inconsistent. To see why, observe that \leftrightarrow^* combined with Kleene's strong negation \neg suffices to define the (so-called 'weak') negation \neg^* :

- (40) a. $\llbracket \neg G \rrbracket = 1$ iff $\llbracket G \rrbracket = 0$; $\llbracket \neg G \rrbracket = 0$ iff $\llbracket G \rrbracket = 1$
 b. $\llbracket \neg^* G \rrbracket = 1$ iff $\llbracket G \rrbracket = 0$ or $\llbracket G \rrbracket = \#$; $\llbracket \neg^* G \rrbracket = 0$ iff $\llbracket G \rrbracket = 1$
 c. It follows that for any tautology T , $\llbracket \neg^* G \rrbracket = \llbracket \neg(G \leftrightarrow^* T) \rrbracket$

But the problem is that once \neg^* is introduced in the language, paradoxes can be defined which cannot be treated within the Strong Kleene System. In particular, we can define a 'Strengthened Liar' λ which says: $\neg^* Tr(\lambda)$, where Tr is the truth predicate. It is immediate that λ can be neither true nor false, for the familiar reasons; but it also can't be indeterminate, because it would be something other than true and should thus be true given the semantics of \neg^* . The situation is no less dismal with the property. We start by defining the property of not being self-applicable in terms of \neg^* :

(41) $[\lambda x \neg^* x(x)]$

The problem arises when we ask whether this property—call it π —is or isn't self-applicable; it is immediate that $\pi(\pi)$ has a classical truth value, and furthermore that $\pi(\pi)$ if and only if $\neg^* \pi(\pi)$.

But there is no reason to be deterred. Nothing prevents us from using \leftrightarrow^* in an *extension* of our language, as long as it doesn't appear in the formulas the quantifiers range over (in other words, we first construct a Kripkean interpretation for the language L^P or L^+ without \leftrightarrow^* , whose quantifiers range over formulas of L^+ ; only then do we add \leftrightarrow^* to the result to obtain a new language which *does not* contain its own satisfaction predicate, but a satisfaction predicate for L^+). It is then immediate that from the truth of any formula $F[x_1]$ of L^P with one free variable x , we can infer:

$$(42) \exists x_3 \forall x_1 (F[x_1] \leftrightarrow^* x_3(x_1))$$

The reason is simple. Consider the translation $F^*[x_1]$ of $F[x_1]$ obtained (as in (32)) by replacing every occurrence of the form $x'(x)$ with $Sat(x', x)$. By the definition of our semantics for L^P , $F^*[x_1]$ has the same value as $F[x_1]$. Furthermore, $Sat(x_3, x_1)$ has the same value as $F^*[x_1]$ if x_3 denotes $F^*[x_1]$. Finally, by the definition of our semantics for L^P , $x_3(x_1)$ has the same value as $Sat(x_3, x_1)$, which is the value of $F[x_1]$ if x_3 denotes $F^*[x_1]$. This shows that (42) is true.

Since this result applies in full generality, it holds of (36) as well. Starting from a formula $\neg x_2(x_2)$, where x_2 does not denote a formula, we obtain a trivial truth, from which we can infer the desired result, thanks to (42):

$$(43) \begin{array}{l} \text{b'. } \exists x_3 \forall x_1 (x_3(x_1) \leftrightarrow^* \neg x_1(x_1)) \\ \text{c. } \exists x_3 \forall x_1 (Sat(x_3, x_1) \leftrightarrow^* \neg Sat(x_1, x_1)) \end{array}$$

On the other hand it is interesting to observe the behavior of the formula (or rather of one formula) that witnesses the truth of this existential claim. In this case we have:

$$\begin{array}{l} F[x_1] = \neg x_1(x_1) \\ F^*[x_1] = \neg Sat(x_1, x_1) \end{array}$$

If x_3 denotes $F^*[x_1]$, i.e. $\neg Sat(x_1, x_1)$, the desired result is immediate: $Sat(x_3, x_1)$ has the same value as $negSat(x_1, x_1)$. (Furthermore, when x_1 denotes the formula $\neg Sat(x_1, x_1)$, it is clear that the latter must have the indeterminate truth value, since the formula satisfies itself if and only if it doesn't; $F^*[x_1]$ can thus be thought of as a 'trivalent property', which is indeterminate when applied to itself.)

As mentioned, more sophisticated interpretations will no doubt have to be constructed to provide a serious trivalent semantics for property talk. We leave this for future research.

If our conclusions are correct (a big *if* indeed), it remains to ask *why* it is that paradoxes can be generated with property talk in natural language. I would like to answer: *why not?* There is no particular reason to assume that language should have been 'created' so as to eschew the property paradox—or other paradoxes, for that matter. In fact, from a naturalistic standpoint it is rather unsurprising that parts of the grammar should be untyped or badly typed (certainly the existence of object language paradoxes exerted a negligible pressure on the evolution of language, and had no reason to be avoided!). Our conclusions are perhaps surprising if one thinks that God created language, that he was a good logician, and that he cared about paradoxes. The present note casts doubt on this conjunction.

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PART 3

Interpretation



*Dear Ede!**

Semantics and Pragmatics of Vocatives

Regine Eckardt

1 Vocatives: Some Data

Vocatives such as in (1) can be used as a parenthetical element in sentences. At first sight, they serve to ensure the correct addressee. (1) is directed to Ede.

- (1) Ede, the pizza is ready.

To date, there is little research on the vocative in formal semantics and pragmatics. This may be due to the simple syntactic structure and pragmatic function of the construction in direct speech. When we turn to indirect speech, however, data are more interesting. Surprisingly, languages like English and German do not allow vocatives in reported and indirect speech. Hence, sentences like those in (2a) are judged ungrammatical.

- (2) a. *Luigi said that, Ede, pizza was ready.
b. *Luigi sagte, Ede, die Pizza sei fertig.
Luigi said Ede.VOC the pizza be.SUBJ ready

The present paper addresses this observation. In section 1, I review possible forms of vocatives and propose a syntactic structure that offers my basis for interpretation. More examples confirm that vocatives are prohibited in indirect discourse. Section 2 discusses Predelli's (2008) analysis of vocatives and argues that this analysis is not suited to explain the data in (2a). Section 3 introduces some basic notions to interpret indirect and free indirect discourse, based on Eckardt (2012), Schlenker (2004) and Sharvit (2008). Section 4 presents the main claim of the paper. I assume that the vocative not only conveys a

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property of the addressee of the utterance, but also implicates that the literal content of the utterance is intended as a message by the speaker to that specific addressee. This implicature is trivially met in direct speech situations. It is however necessarily false in passages of indirect speech or thought, no matter who the interacting parties happen to be. The final section proposes possible extensions to other constructions that are prohibited in indirect speech.

1.1 *Form and Content of Vocatives*

The most typical form of vocative phrases are proper names. However, vocative phrases occur in greater variety, as the following list of examples shows.

- (3) Dinner is ready, *dear friend/guest/fellow*.
- (4) *My brother*, I have to leave.
- (5) *Du*, das Essen ist fertig.
you the dinner is ready
- (6) It's the economy, (*you*) *stupid*.
- (7) *Lucky winner*, we congratulate you to \$1 m.
- (8) *Citizens, fellows, gentlemen*, this is a scandal.

Vocative phrases can consist in referring expressions like names and second person pronouns, as well as NPs with or without adjectival modifiers, and finally of a combination of both, like in *you idiot* or Germ. *Sie alte Knalltüte* (lit. 'you old bang-bag'). Zwicky (1974) surveys how different patterns in English correlate with different attitudes of the speaker. For instance, the pattern *you*+NP commonly conveys a negative attitude towards the addressee whereas the pattern Adj+Name transports a friendly or neutral attitude. I will not investigate these micro-patterns here.

Simple tests confirm that vocatives do not contribute to the asserted content of the utterance. For instance, the addressee cannot use negations such as *No!*, or *That's false* in order to deny that he is Ede, a dear citizen, a lucky winner or an idiot. Hence, Predelli (2008) treats vocative phrases as presupposition triggers. Alternatively, the content of vocative phrases could be analyzed as commentary content ("conventional implicature" in the sense of Potts 2005, "use-conditional content" in terms of Gutzmann 2012, 2013).

The projection behavior of vocatives supports the latter view. While presuppositions as well as non-at-issue content project from many embedded contexts, only presuppositions can be blocked from projecting. Let us first test the projection in (9)–(11).

- (9) Luigi believed that, Ede, the pizza is/was ready.
- (10) Luigi said that Ede, pizza is/was ready.
- (11) It is not the case that, Ede, the pizza is ready.

These examples can only be used in the sense that the *actual* speaker addresses Ede. They are only acceptable in a context where someone utters them towards Ede. They can not be interpreted as vocatives by Luigi to Ede. With a detailed analysis still missing, the examples show that vocatives “project” and tend to be interpreted at the root level.

Projection is shared by presuppositions and commentary content, but unlike presuppositions, commentaries defy blocking. Potts (2005) illustrates this with examples such as (12) where it is not possible to counterfactually assume a different attitude that would allow a specific way to phrase the assertion “Kresge has arrived”.

- (12) #If I hated Kresge, then that bastard Kresge had arrived.

Similarly, it is not possible to counterfactually assume a property of the addressee and phrase one’s assertion with a matching vocative. The judgment in (13) does not depend on the fact whether dinner is actually ready, or would (mysteriously) only be ready if the addressee were the speaker’s brother.

- (13) #If you were my brother then, my brother, dinner would be/is ready.

Testing such data is complicated by the fact that we can issue conditional speech acts. Hence, the following example is acceptable in a situation where the speaker does not know whether the addressee is the winner or not.¹ It is crucial for the acceptability of (14) that the speaker would not ask the question at all, in case the person turned out not to be the winner.

¹ I thank my reviewer for pointing out the example, and making me think about this additional complication.

- (14) If you have won, then, lucky winner, do you want the money all at once?

In addition to their projection behavior, vocatives pattern with other commentary items in other ways. Potts (2005) proposes that commentary content is typically new information, not presupposed information. This second criterion also classes vocatives as commentary content. Vocatives convey that the person who fits the description given by the vocative is the addressee of the message. For instance, the vocative in (1) conveys that the pizza is ready, and that this message is addressed to Ede. The latter is contributed by the vocative, and it is not information that can reasonably be taken as generally known. Neither is it self-evident that the speaker always and only talks to Ede, nor is it a given that information about pizza is always information where Ede is the addressee. Unsurprisingly, most vocatives use known information about the addressee in order to single him out. This should not be mistaken as evidence that vocative content is presupposed content.

It is hard to justify the newness of vocatives in terms of a formal theory of common ground update. Most theories take the utterance context as a given, and hence speaker and addressee are indeed “known” (e.g., Stalnaker 2002). The use of vocatives requires a theory of common ground that can model context changes and the shift from one speaker/addressee to another. Only then could we account for the newness of vocative content. I will therefore leave it at plausibility considerations and tentatively assume that the content of vocative phrases should be captured as commentary content (Gutzmann 2012; Potts 2005). As far as I see, however, the main ideas of the paper could be rephrased in a presuppositional analysis of vocative phrases.

1.2 *A Proposal for a Syntax-semantics Interface*

The examples in (3) to (9) show that vocative phrases minimally contain a referring expression (i.e. an expression that denotes an object of type e), but can also contain syntactic material that denotes a property (type $\langle e, t \rangle$). Determiners are banned from vocative phrases.

- (15) *Dinner is ready, most friends/ the guest/ some brothers.

Plural determiners like *all* pose an exception, but it has been observed before that DPs of the form *all NP* can be reinterpreted as referring expressions.² The examples support the following internal structure of vocative phrases.

2 German possesses an archaic use of definite DPs in vocatives: *Das Essen ist serviert, die*

$$(16) \quad [{}_{\text{VocP}} [{}_{\text{Voc0}} \{you, Du, Sie, \emptyset\text{-}you\}] \text{ NP}_{\text{voc}}]$$

The content of NP_{voc} is predicated of the referent of you or $\emptyset\text{-}you$, a silent second-person pronoun. NP_{voc} can be a normal NP (of type $\langle e, t \rangle$) or a proper name. Proper names will be interpreted as type-shifted (Partee & Rooth 1983). For concreteness, I assume the operator $\lambda x_e \lambda y_e (x = y)$ that turns the denotation of the name into the property of being identical to its bearer. The vocative phrase *dear Ede!* will hence receive the following analysis.

$$(17) \quad [{}_{\text{VocP}} [{}_{\text{Voc0}} \emptyset\text{-}you] \text{ dear } [\lambda x_e \lambda y_e (x = y) \text{ Ede}]]$$

$$(18) \quad \begin{aligned} \text{a. } \llbracket \text{Ede} \rrbracket &= \mathbf{Ede} \\ \text{b. } \llbracket \lambda x_e \lambda y_e (x = y) \text{ Ede} \rrbracket &= \lambda y_e (y_e = \mathbf{Ede}) \\ \text{c. } \llbracket \text{dear} \rrbracket &= \lambda y_e \lambda w. \text{DEAR}_w(y_e)^3 \\ \text{d. } \llbracket [{}_{\text{VocP}} [{}_{\text{Voc0}} \emptyset\text{-}you] \text{ dear } [\lambda x_e \lambda y_e (x = y) \text{ Ede}]] \rrbracket \\ &= \lambda y_e \lambda w (\text{DEAR}_w(y_e) \wedge y_e = \mathbf{Ede}) (\text{ADDRESSEE}) \\ &= \lambda w (\text{DEAR}_w(\text{ADDRESSEE}) \wedge \text{ADDRESSEE} = \mathbf{Ede}) \end{aligned}$$

The propositional content is identical to the meaning of “you are Ede, and dear (to me)”. This appears appropriate. However, we will see that the pragmatic function of a vocative is more complex and will revise the meaning of vocatives in section 4.

Before moving on, let me briefly comment on one peculiar case in German. German can use *Du* in isolation as a vocative phrase (see (5)). This use does not convey that the speaker states the self-identity of the addressee. Rather, *Du* is used as a deictic device that singles out a specific person (you, the person I point at). I therefore assume that the isolated *Du* in examples such as (5) does not instantiate Voc^0 but is treated analogously to proper names. It supplies a referent that leads to a property by type shift.

In this equation, $\llbracket \emptyset\text{-}you \rrbracket$ is instantiated on the basis of the utterance context: it refers to the current addressee, as illustrated in (18). The referent of $\llbracket Du \rrbracket$ is determined by deixis. Deixis does not entail that the person is actually talked to. We will return to this subtle difference when we discuss the eventual semantics of vocatives in Section 4. The content of (5) should be paraphrased as “the intended addressee is identical to the person that I point at and alert by calling him *Du*”.

Herrschaften. (approximately ‘Dinner is served, the Lordships’). I will not treat such isolated usages.

3 DEAR possibly relates to the speaker, too: “dear to the speaker”.

1.3 *Vocatives in Speech and Thought Reports*

Vocatives can straightforwardly be used in quoted speech reports.

(19) Luigi said: Ede, dinner is ready.

They are prohibited in all indirect modes to report speech or thought (unless we interpret them as the speaker of (20) addressing Ede).

- (20) a. *Luigi said that, Ede, dinner was ready.
 b. *Ede, dinner was ready, said Luigi.
 c. Luigi turned to Ede. *Dinner was ready, Ede. Would he mind to come?

Generally, vocatives can not be used in sentences *S* in indirect speech/thought where the referent of *I* no longer refers to the speaker of that sentence, and where the referent of *you* does not refer to the addressee of *S*. For instance, in the examples in (20) Luigi speaks to Ede, but a use of *I* in this context would refer to the person who utters (20), and a use of *you* in this context would refer to the person that this speaker talks to.

While this should be taken into account in the semantic analysis of vocatives, we have to keep in mind that the words *I/you* are not banned from indirect speech or thought. In a first person narrative, *I* refers to the narrator, and *I/me* can occur in indirect speech. Likewise, narrations can use *you* to refer to a fictitious reader, such as in an epistolary novel. The following (made-up) story illustrates this. Assume a novel of letters, addressed from Caroline to Ede, where she describes her first encounter with Luigi. This could be a passage.

- (21) Let me write you about my first encounter with your Italian friend Luigi. He eyed me with suspicion and I could sense his fear. Obviously, I was the dangerous woman in your life! Fortunately, you had told him about my sole weakness: my crave for pralines. ...

The last passage can be interpreted as Caroline mind-reading Luigi's thoughts on their first encounter. The passage illustrates that *I* and *you* can be used with their usual meaning in (free) indirect discourse, in this case a passage of indirect thought. The same constellations can be created for indirect speech in English and indirect thought and speech in German. Hence, there is no *a priori* reason to exclude a clause like [\emptyset -*you* [*my friend*]_{NP}]_{VocP} from interpretation in indirect discourse. If \emptyset -*you* is just a tacit version of the pronoun *you*, then it can be semantically interpreted in indirect speech and thought reports. The mere use of \emptyset -*you* is not what renders vocatives ungrammatical in indirect speech.

2 Earlier Analyses

Vocatives have not received much interest in the formal semantic literature with the exception of Predelli (2008) who offers a formal interpretation of vocatives. Predelli did not consider the interpretation of indirect speech and therefore did not attempt to model the ban on vocatives in indirect speech. Zimmermann (1997) treats a related phenomenon, the choice of politeness forms of pronouns, and we will later make use of one of his core ideas.

2.1 Predelli (2008)

Predelli restricts attention to proper names, used in vocatives. According to Predelli, VocP takes Kaplanian contexts as its argument. Its main function is to ensure that the host sentence can only be sensibly uttered in a limited class of contexts, namely those where the addressee is of the right kind. For proper names—Predelli's main case—this amounts to “being the right person”. Consider his example in (22).

(22) Amanda, the sky is on fire.

He observes that it can only be legitimately uttered in a context c where the addressee in c is Amanda. A vocative use of *Amanda* hence introduces the presupposition that *the addressee-in-c* = $\llbracket \text{Amanda} \rrbracket^c$.⁴

At the level of asserting, VocP leaves the propositional content of the host sentence unchanged. Predelli therefore assumes that, at the level of assertions, VocP denotes the identity function on propositions. If we adopt the notation $[\langle \text{assertion} \rangle; \langle \text{presupposition} \rangle]$ for the content of linguistic items in general, Predelli's analysis for proper names such as (22) can be summarized as follows.⁵

Predelli Analysis of vocatives

$$\llbracket [\text{VocP} \langle \text{Name} \rangle] \rrbracket^c = \lambda p[p; \text{ADDRESSEE}(c) = \llbracket \text{Name} \rrbracket^c]$$

In combination with a sentence S , the vocative phrase ensures that *VocP S* can only be felicitously uttered/interpreted in contexts with a suitable addressee.

4 Predelli (2008: 102, clause (c)).

5 I am using a more explicated version of syntax-semantics interface than Predelli. His distinction between VocP and syntactic material as part of the VocP is not very clear.

Predelli's analysis can be combined with the more elaborate VocP structure and semantics in Section 1.2. According to my analysis, VocP generally attributes a property to the referent of \emptyset -you or *you*, ranging from a simple "you are Amanda" to "you are the lucky winner". All these can be computed as the meanings of VocP. Hence, the following generalization of Predelli's proposal seems justified.

Generalized Predelli analysis

$$\llbracket \text{VocP } S \rrbracket^s = [\llbracket S \rrbracket^c; \llbracket \text{VocP} \rrbracket^c]$$

I leave it open whether the second component in the two-dimensional meaning is a presupposition (as claimed by Predelli) or commentary content (as preliminary testing in Section 1 suggests). Interpretation happens relative to an utterance context c . This utterance context specifies the addressee as follows: $\llbracket \emptyset\text{-you} \rrbracket^c = \text{ADDRESSEE}(c)$.

Predelli's generalized analysis allows us to treat vocatives such as "Dear friend". It predicts that the vocative $[\text{VocP } \emptyset\text{-you } [\text{dear friend}]]$, used in "S, dear friend" can only be felicitously uttered in a context c where the addressee in c has the property of being a dear friend of the speaker. In such a context, the utterance asserts S .

2.2 A Problem

Predelli's analysis is designed to restrict the possible utterance contexts for vocatives. We'd hence expect that the prohibition of vocatives from indirect speech/thought can be derived on the basis of the fact that the respective utterance contexts never meet the content of vocatives. This, however, is not the actual result of Predelli's analysis.

Let us introduce a few terms to talk about utterance contexts. Every utterance is made in an external (real) utterance context C . This context determines speaker, addressee, time, place and world of the utterance (Kaplan 1989). If a sentence contains reported speech, we face a second, internal context d , the one where some protagonist in the story is talking.

(23) Luigi said to Ede that the pizza was ready to eat.

(23) refers to the internal context d where Luigi is the speaker and Ede is the addressee. If Caroline utters (23) towards Tom, then the external context of the utterance is C where Caroline is the speaker and Tom the addressee. (23) explicitly refers to an event of talking, but there are also indirect modes of conveying speech and thought.

(24) Luigi went to alert the guests. The pizza was ready to eat!

The second sentence in (24) can be interpreted as free indirect speech by Luigi. We'd again say that it refers to an internal context d' with Luigi as the speaker, and the guests as addressees. The external context C is provided by the situation where (24) is uttered. In summary, indirect speech and thought reports always refer to an internal context in addition to the external context C .

My explication of Predelli's analysis rests on the tacit pronoun \emptyset -*you* that is interpreted in the utterance context. We can assume that, like overt pronouns, \emptyset -*you* always refers to the external context C . This seems to make sense, given that vocatives can not be used in a shifted interpretation. Still, the content of a vocative in indirect speech could be true accidentally. Vocatives should therefore be occasionally permissible, assuming that the surrounding story is of the right kind. This is, however, never the case.

Consider the a continuation of the epistolary novel between Caroline and Ede. Let us assume that Caroline and Luigi, Ede and Luigi and Caroline and Ede have all become good friends in the meantime. The following passage—part of a letter from Caroline to Ede—establishes the external context C where Caroline talks to Ede, and the internal context d where Luigi talks to Caroline.

(25) Yesterday, Luigi welcomed me warmly. Today was his lucky day, *dear friend.

The generalized Predelli analysis predicts that the assertion "Today is [Luigi's] lucky day" must be made in a context c where the addressee in c is a friend (of the speaker in c). If we assume that the internal context d is used to instantiate addressee and speaker, then Predelli's presupposition requires that Caroline is a dear friend of Luigi. This is the case. Hence, reference to internal contexts does not predict the data in (25). If we assume that the external context C is what instantiates addressee and speaker of the vocative, then Predelli predicts that we need a context where Ede is a dear friend of Caroline. This is, again, true. Hence, reference to external contexts does not predict the data in (25) either. No matter which context is responsible for the interpretation of \emptyset -*you*, the example should be acceptable.

3 Content and Update in Indirect Speech

I will pursue the hypothesis that vocatives do more than ensuring the correct kind of addressee. They moreover express that the content of the host sentence

S is intended as a message from the actual speaker to the actual addressee (as specified in the vocative phrase). This requires a treatment of indirect and free indirect discourse that specifies more precisely which propositions are expressed by what sentence, and which propositions are conveyed from which speaker to which addressee.

3.1 *Interpreting Free Indirect Discourse*

In the following, I will use a format to interpret free indirect discourse that was first proposed in Eckardt (2012) and has been disseminated in various talks. Semantic interpretation of words and clauses occurs relative to an utterance context C , or relative to two contexts $\langle C, d \rangle$ where C represents the external context (e.g. narrator- reader context) and d represents an utterance situation that is understood to be part of the story told. For instance, the free indirect discourse passages in (21) above would be interpreted relative to the pair of contexts $\langle C, d \rangle$ with

- (26) C : Caroline writes a letter to Ede,
 d : Luigi talks to himself as part of the story

Natural language expressions can depend on a limited number of contextual parameters. For concreteness sake, let us assume that these comprise the following:

- ν_{SP} = the speaker
- ν_{AD} = the addressee
- ν_{NOW} = the time of utterance
- ν_{HERE} = the place of utterance
- ν_W = the world where the utterance is made

We will view contexts as variable assignments that instantiate each of these parameters. However, in order to account for shiftable as well as non-shiftable indexicals, we have to design the system a bit more complexly. We will assume that there are two versions of each contextual parameter.

- ν_{SP}, ν_{sp} = the speaker
- ν_{AD}, ν_{ad} = the addressee
- ν_{NOW}, ν_{now} = the time of utterance
- ν_{HERE}, ν_{here} = the place of utterance
- ν_W, ν_w = the world where the utterance is made

The idea is that all capital letter parameters are used for non-shiftable indexicals whereas the small letter parameters are used for indexical reference that can shift, e.g., in indirect speech or free indirect thought. Among those will be speaker dependent subjective predicates, shiftable temporal and local adverbials, modal particles, and more (see Eckardt 2012; Sharvit 2008).

Contexts likewise come in two varieties. External contexts C are assignments that are defined on all contextual parameters.

$$C : \{\nu_{SP}, \nu_{sp}, \nu_{AD}, \nu_{ad}, \nu_{HERE}, \nu_{here}, \nu_{NOW}, \nu_{now}, \nu_{WORLD}, \nu_{world}\} \rightarrow D_e \cup D_s^6$$

They have to be consistent in the sense that $C(\nu_{SP}) = C(\nu_{sp})$, $C(\nu_{AD}) = C(\nu_{ad})$, etc. Internal contexts d are assignments that are restricted to small-letter parameters:

$$d : \{\nu_{sp}, \nu_{ad}, \nu_{now}, \nu_{here}, \nu_{world}\} \rightarrow D_e \cup D_s$$

The meanings of certain expressions in natural languages depend on context parameters. We will indicate this dependency by using the appropriate parameters ν_{SP} , ν_{ad} , etc. in the lexical meanings of words. Crucially, the mode of speaking / writing determines the kind of context dependency of words. If we interpret sentences relative to a single context C , we read it as part of direct speech. If we interpret it relative to two contexts $\langle C, d \rangle$, we understand it in the “indirect speech” mode.

The simple interpretation of terms follows the usual recursive definition of meaning, with the proviso that all indexical parameters are instantiated by C , the one and only external context.

$$\begin{aligned} \llbracket \nu_{SP} \rrbracket^C &= \llbracket \nu_{sp} \rrbracket^C := C(\nu_{SP}) \\ \llbracket \nu_{AD} \rrbracket^C &= \llbracket \nu_{ad} \rrbracket^C := C(\nu_{AD}) \\ &\dots \end{aligned}$$

In (free) indirect discourse, each word and phrase in the sentence is interpreted relative to a pair of contexts $\langle C, d \rangle$ with an external context C and an internal context d . The non-shiftable parameters ν_{SP} , ν_{AD} , ν_{NOW} , ν_{HERE} , ν_W are still instantiated by the external context C . Shiftable parameters ν_{sp} , ν_{ad} , ν_{now} are now instantiated by assignment d , i.e. the internal context.

6 D_s is required to instantiate w , W .

$$\begin{aligned}
\llbracket v_{SP} \rrbracket^{(C,d)} &:= C(v_{SP}) \\
\llbracket v_{AD} \rrbracket^{(C,d)} &:= C(v_{AD}) \\
\llbracket v_{sp} \rrbracket^{(C,d)} &:= d(v_{sp}) \\
\llbracket v_{ad} \rrbracket^{(C,d)} &:= d(v_{ad}) \\
&\dots
\end{aligned}$$

This system allows for arbitrary words and constructions to render a semantic representation that captures both rigid and shiftable indexical elements. For instance, the word *I* in English is a rigid indexical. Hence, its meaning must be captured by v_{SP} : $\llbracket I \rrbracket := v_{SP}$. This parameter is always assigned a value by external context C . Its reference never shifts. An expression like English *alas!*, in contrast, expresses regret by the currently understood speaker. If *alas!* is used in indirect or free indirect discourse, we understand that the thinking protagonist is expressing her regret, not the narrator. Hence, $\llbracket alas S \rrbracket := \text{REGRET}(v_{sp}, \llbracket S \rrbracket)$ is a suitable semantic interpretation for this word.

Given suitable semantic entries for words and expressions of English, this system can successfully be used to compute the correct and intended propositional content of sentences in both direct and (free) indirect speech (see Eckardt 2012, 2014). Specifically, tenses and pronouns are always interpreted from the narrator's perspective. Hence, their meaning must be captured in terms of non-shiftable indexical parameters v_{SP} , v_{AD} , v_{NOW} , v_{HERE}

The analysis shares basic mechanisms with Schlenker's (2004) distinction of contexts of utterance v and contexts of thought θ . Likewise, there are similarities to Sharvit's (2008) system of two-context interpretation. Unlike these systems, however, the present set-up allows us for each semantic entry to read its indexicality properties off its sleeves. In the next section, I will discuss how information update must proceed in such a multi-dimensional system of semantic interpretation.

3.2 *Updating Free Indirect Discourse*

I use Stalnaker's (1978; 2002) notion of common ground update in order to model the content of stories. Given that we will mainly be concerned with story interpretation where the flow of information is unidirectional from author/narrator to reader, we will base our consideration on the beliefs of the addressee *AD*. The addressee interprets language—be it utterance or story sentences—against a certain background. Informative discourse updates the addressee's beliefs, whereas a story is interpreted against the set of possible worlds that the story could plausibly be about. In all cases, the addressee maintains the relevant set of possible worlds CG_n that represents his current information state or fiction content. After parsing sentence S_n in discourse, the addressee will

have computed a proposition p as the denotation of S_n . Under normal circumstances where the speaker is trustworthy and the content of S_n is plausible, the addressee will update her believes by p . This happens by intersecting CG_n with p .

$$CG(AD)_{n+1} := CG(AD)_n \cap p$$

This classical notion of information update is designed to work in ordinary utterance situations where there is just one speaker (be it the “true” interlocutor or a narrator in a story). In terms of the semantic formalism in the previous section, this update yields correct results whenever a sentence was interpreted in the $\llbracket \cdot \rrbracket^C$ mode, relative to one single context C where $C(SP)$ relates news to $C(AD)$. However, the form of update changes when the addressee interprets a sentence relative to two contexts $\langle C, d \rangle$. Let us look at an example.

(27) Tom sighed. Alas, he was the smallest pupil in class!

The first sentence is part of the frame story, told by an narrator to some reader. It has to be interpreted in the $\llbracket \cdot \rrbracket^C$ mode of interpretation and will yield the proposition

$$p = \{w \mid w \text{ is world where } \text{SIGH}(w, \text{Tom}, \text{NOW}) \text{ is true in } C\}$$

The second sentence must be interpreted in the $\llbracket \cdot \rrbracket^{\langle C, d \rangle}$ mode of interpretation with d = context where Tom talks to himself. The pronoun *he* is interpreted relative to C . The third person feature ensures that the referent of *he* is not identical to $C(v_{sp})$. Given that Tom is not the narrating instance, this requirement is met when *he* refers to Tom. The phrase *be the smallest pupil in class* is not dependent on context and hence unproblematic. Past tense is interpreted relative to $C(v_{NOW})$, which means that Tom’s state of being small held before the time of utterance. Finally *Alas!* reports that *sp* regrets the content of the host clause “*Tom is the smallest in class at some time before now*”. In $\langle C, d \rangle$ mode, the parameter *sp* is instantiated by d . The context d represents the utterance situation that is part of the story. Hence, $d(v_{sp}) = \text{Tom}$. Overall, the second sentence denotes the following information package:

$$\begin{aligned} q &= \text{‘Tom was the smallest in class’} \\ r &= \text{‘Tom regretted } q \text{’} \end{aligned}$$

Yet, the propositional content of the sentence is not all there is in the story at this point. When the reader interprets the second sentence as part of the story in (27), she will understand that q, r are the content of Tom's thoughts. Her careful information update will hence be

$$p \cap \{w \mid \text{in } w, \text{THINK}(w, \text{Tom}, q \wedge r) \text{ holds true}\}$$

Only if she decides that the protagonist Tom is moreover trustworthy will she enrich her information base by assuming, in addition, that the content of Tom's thoughts is true in the story.

$$p \cap \{w \mid \text{in } w, \text{THINK}(w, \text{Tom}, q \wedge r) \text{ holds true}\} \cap (q \wedge r)$$

In summary, if a sentence S is interpreted in the direct mode $\llbracket S \rrbracket^C = q$, this leads the addressee to update her beliefs by q . If a sentence S is interpreted in the indirect mode $\llbracket S \rrbracket^{(C,d)} = r$, this leads the addressee to update her beliefs by the proposition ' $d(v_{sp})$ thinks/ says r '. The resulting theory of information update extends Stalnaker's original account in that the content of update depends on the mode of interpretation.

One might object that the content of sentences should not depend on our mode of interpretation. An alternative analysis could assume that the "thinking" must be represented in some way at LF, for instance by an operator that makes it clear who utters S , and towards whom. The analysis by Sharvit (2008) offers an implementation of this idea. Schematically, we could propose the following LF.

(28) Tom sighed. *OP* (Alas, he was the smallest pupil in class!)

We might assume that *OP* (Alas, he was the smallest pupil in class!) is interpreted relative to C and only *OP* effects a context shift from C to $\langle C, d \rangle$. We could then use *OP* in some way or other to not only code the locus of context shift, but also to contribute the information that it is $d(sp)$ who thinks *Alas, he was the smallest pupil in class*. This strategy makes the speech act as well as the speaker explicit at the syntax-semantics interface.

However, we will see that this option leads to wrong predictions about the use of vocatives and other addressee-oriented parts of sentences in indirect speech. This will be discussed in section 4.2. where I argue that the analysis *without* an extra operator is the only feasible one.

3.3 Modes of Indirect Discourse

The framework in section 3.1. was introduced on basis of examples in free indirect discourse. This mode of writing depends particularly on the use of shifting indexicals in order to give clues about the (intended) speaker of the passage. However, the ban on vocatives is more far-reaching than free indirect discourse. Vocatives are prohibited in all modes of indirect speech in both German and English. If we want to use the framework in section 3.1. to account for this fact, we should briefly check whether it is suited to model indirect speech in general. While the present paper is too limited to offer a full discussion of indirect speech, I will use the present section to sketch what such an analysis can look like. In section 4, we turn to the analysis of vocatives in terms of context dependency and explain the ban. Readers who are willing to take a full analysis of indirect speech for granted can move on to section 4 without losses.

The survey of modes of indirect speech starts from German. German possesses two forms of indirect discourse. So-called “erlebte Rede” is presented in the indicative mood. Indexicals show the typical patterns of indirect speech. All tense and aspect forms refer to the narrator’s “now” = $C(v_{NOW})$, and likewise all pronouns. For instance, *ich* refers to the narrator $C(v_{sp})$ and *Du* to the addressee $C(v_{AD})$ like in direct speech. Shiftable indexicals, however, are interpreted relative to the internal context of thought d , i.e. relative to the thinking protagonist $d(v_{sp})$. Among these are temporal adverbials (*gestern, morgen*), expressives (*glücklicherweise, leider*), modal particles (*ja, wohl*), expressive constructions (exclamatives, optatives), and questions. Hence, the meanings of all these must be analyzed in terms of v_{sp} , v_{ad} , v_{now} etc. to allow the internal context of thought d to instantiate the respective parameter. All shiftable speaker-oriented expressions shift together, and to the same context of thought.

The second major mode of indirect discourse in German is indicated by the use of the subjunctive mood. It can occur in embedded clauses but also in free clauses, as illustrated below.

- (29) *Peter sagte, er sei krank.*
 Peter said, he be.SUBJ ill

- (30) *Peter lehnte ab. Er sei krank. Er habe Fieber.*
 Peter refused. He be.SUBJ ill. He have.SUBJ fever

In the unembedded case, we typically understand that the protagonist is talking loudly to himself or others. Under verbs of propositional attitude, however, subjunctive sentences can report both speech and thought. All indirect discourse in the subjunctive must be interpreted relative to two contexts $\langle C, d \rangle$.

Again, pronouns are interpreted relative to the external context *C*. For instance, *er* in (29) shows third person features. This indicates that the referent of *er* is different from $C(v_{SP})$, the speaker of the external context. It doesn't indicate that *er* is different from the talking protagonist—indeed, *er* in (29) and (30) does refer to Peter.

Tense and aspect in the subjunctive mood follow their own paradigms. They can not be simply equated with the morphologically related indicative forms. Their semantics can best be captured if we understand them as tense/aspect forms that refer to the protagonist's speech time v_{now} instead of the narrator's speech time v_{NOW} . In essence, subjunctive forms code three temporal relations between v_{now} and the event time:

- (31) **Co-temporality:** Event and speech time v_{now} overlap.
Forms: subjunctive I or II of main verb
 a. Peter sagte, er fühle sich schlecht.
 Peter said he feel.SUBJ.I himself sick.
 b. Peter sagte, er würde sich schlecht fühlen.
 Peter said he feel.SUBJ.II himself sick.
Meaning: time of saying, and time of sickness overlap.
- (32) **Anteriority:** Event occurred before speech time v_{now} .
Forms: subjunctive I or II of auxiliary, + past participle
 a. Peter sagte, er habe sich schlecht gefühlt.
 Peter said he have.SUBJ.I himself sick felt
 b. Peter sagte, er hätte sich schlecht gefühlt.
 Peter said he have.SUBJ.II himself sick felt.
Meaning: time of sickness is before time of saying.
- (33) **Futurity:** Event occurs after speech time v_{now} .
Forms: subjunctive I of *werden* + infinitive⁷
 Peter sagte, er werde sich schlecht fühlen.
 Peter said he become.SUBJ.I himself sick feel
Meaning: time of (expected) sickness is after time of saying.

7 In fact, the form *würde* + infinitive also occurs in a future sense. At this point, the co-temporality paradigm and the futurity paradigm overlap. I simplify the system for the present purposes.

The observations carry over to non-embedded indirect speech in the subjunctive. Data strongly suggest that subjunctive mood forms denote temporal relations between event time $\tau(e)$ and the protagonist's speech time v_{now} . I won't develop a full-fledged tense-aspect system here; a first attempt at a working system can be found in Eckardt (2014: chapter 9).

We will assume that all passages of indirect discourse can be interpreted relative to a pair of contexts $\langle C, d \rangle$ that manage non-shiftable and shiftable indexicals. Subjunctive mood in German necessitates this shift, whereas the indicative leaves it optional. Interpretation moves from single-context interpretation $\llbracket \cdot \rrbracket^C$ to double-context interpretation $\llbracket \cdot \rrbracket^{\langle C, d \rangle}$ whenever the content of a sentence S or passage in the text suggests this. Beyond mood, a shift can be indicated by temporal adverbs and speaker-oriented constructions that would create implausible content, if interpreted relative to the narrator's context (see e.g. Banfield 1978; Fludernik 1993 for comprehensive lists of indicators). Shift can also be lexically triggered when sentences are embedded under verbs of saying or thinking, mostly when the embedded sentence moreover is in the subjunctive mood. However, I do not assume a syntactic operator **OP** that effects the shift.

In practice, the distinction between indirect speech and reported propositional attitude content can be vague, but I will restrict attention to clear cases in the course of this paper. My assessment of data is in line with the study by Fabricius Hansen & Sæbø (2004). However, they propose to capture shifting indexicals by an elaborate mechanism of presuppositions and anaphoric references in discourse and do not make systematic use of Kaplanian contexts. While I agree with their assumption that internal contexts d are eventually anaphorically linked to the preceding story, the mechanics of context dependency that are proposed here differ substantially from Fabricius Hansen & Sæbø's more conservative account.

In English, (free) indirect discourse can not make use of the subjunctive to indicate context shift. Following Schlenker (2004), Sharvit (2008) and others, we will assume that English sentences in the indicative can be understood as utterances by a protagonist. In such cases, they will—like German *erlebte Rede*—be interpreted relative to two contexts $\langle C, d \rangle$ and understood as the mental content of protagonist $d(v_{sp})$. This can happen in embedded as well as non-embedded clauses, as illustrated below. I use brackets to informally indicate the span of $\langle C, d \rangle$ interpretation.

- (34) Tom sighed. [Tomorrow was Christmas, alas!] ^{$\langle C, d \rangle$}
 [Luckily, tomorrow was a holiday] ^{$\langle C, d \rangle$} , Tom remarked.

Complements of verbs of saying can in principle be interpreted in the *C* mode or in the $\langle C, d \rangle$ mode. In the following example, the temporal adverb tomorrow consequentially can be interpreted as “Tom’s tomorrow” or “the narrator’s tomorrow”.

- (35) a. Tom said [I was invited tomorrow.] ^{$\langle C, d \rangle$}
 = Tom’s tomorrow
 b. [Tom said I was invited tomorrow]^{*C*}
 = speaker’s tomorrow; time of state of being-invited = speaker’s past
 (state of being invited plausibly extends to speech time v_{NOW})
 b. [Tom said I am invited tomorrow]^{*C*}
 = speaker’s tomorrow; time of being-invited = speaker’s present

A comprehensive treatment of English embedded speech in terms of the present framework must include a detailed comparison with theories of sequence-of-tense phenomena in embedded sentences (see Abusch 1997; Ogihara 1995, 2007; von Stechow 2008; Stowell 2007) which I can not provide here. The following discussion will tentatively include examples like those in (35).

In this section, I presented a general framework to interpret indirect discourse. I proposed how the propositional content of sentences in indirect discourse add to our information state by information update. Finally, I outlined how $\langle C, d \rangle$ interpretation is tied to various grammatical forms of indicating indirect speech in German and English. In the next section we return to the meaning of vocatives and investigate them in the present semantic framework of indirect speech.

4 The Content of Vocative Phrases

The present section revises the generalized Predelli semantics of vocative phrases that was given in Section 2.2. Vocative phrases take their host clause *S* as argument. They relate to the external context *C* and state that the intended addressee is the named person or has the named properties. Moreover, they express that the literal content of *S* is the intended message from the speaker in *C* to the addressee in *C*. This constellation is trivially met in direct modes of speech. In indirect modes of speech, however, the same requirement is necessarily violated. The formal implementation is presented in 4.1. Section 4.2. combines this new semantics with sentence meanings in indirect discourse. The analysis correctly predicts that vocatives are prohibited in indirect discourse.

4.1 The Logical Type of *VocP* and *Voc*⁰

Let us return to some examples where the vocative is used in direct speech.

(36) Ede, the champagne has been served.

(37) Ede, where is the pizza?

(38) Ede, have some more wine!

More than in the case of assertions (36), we see in (37) and (38) that the presence of Ede as the addressee of the utterance has consequences for Ede's behavior—or at least for the behavior that the speaker expects. The vocative in (37) ensures that Ede is the addressee in utterance context C_{37} . As a consequence, the speaker expects Ede to react to his utterance and provide an answer to the question. In (38), the speaker states that Ede is the intended addressee. He expects that Ede reacts to the request and takes some more wine. In the assertion case in (36), the speaker's expectation is least pronounced. Yet, an assertion is made by the speaker with the expectation that Ede will update his belief state by the propositional content of the host clause *that the champagne has been served*.

I will adopt two new relations $\text{MESSAGE}_{a/q}$. MESSAGE_a is designed for the use of vocatives with assertions, and is of type $\langle e, \langle e, \langle \langle s, t \rangle, t \rangle \rangle \rangle$. MESSAGE_q is designed for the use of vocatives with questions, and is of type $\langle e, \langle e, \langle \langle \langle s, t \rangle, t \rangle, t \rangle \rangle \rangle$. $\text{MESSAGE}_{a/q}$ are assumed to obey the following restrictions:

- (i) For humans A, B , and propositions p :
 $\text{MESSAGE}_a(A, B, p)$ is true in context C iff $A = C(v_{sp})$ and $B = C(v_{AD})$ and A intends for B to take message p and act accordingly.
- (ii) For humans A, B , sets of propositions Q and contexts C :
 $\text{MESSAGE}_q(A, B, Q)$ is true in context C iff $A = C(v_{sp})$ and $B = C(v_{AD})$ and A intends for B to acknowledge question Q and act accordingly.

I will subsume imperatives as a special case of assertion, following M. Kaufmann's (2012) assumption that imperatives denote a specific kind of modal proposition. Depending on the reader's favorite ontology of speech acts, more objects that serve as messages could be added. Yet, the present proposal is not intended as a comprehensive model of linguistic messages and the way we can react to them. What I do intend to model, however, is the fact that every speaker, in every utterance, has the intention that the addressee perceives and

deciphers the message and reacts in an appropriate manner. This is what MESSAGE is supposed to state.⁸

Let us return to the semantic content of vocatives. In section 2.2, I presented the generalized Predelli semantics of vocatives which, in the present notation, can be rephrased as follows.

(39) **Predelli semantics, old version**

- a. $\llbracket \text{VocP} \rrbracket = \llbracket \text{NP} \rrbracket (\llbracket \text{you} \rrbracket)$
 $= \Phi(v_{AD})$, where Φ is the term denoted by NP.
- b. $\llbracket [\text{VocP S}]_S \rrbracket = [\text{assert} \llbracket S \rrbracket; \text{presuppose} \llbracket \text{VocP} \rrbracket]$

The content of VocP consisted in a simple proposition. It didn't reflect the fact that the VocP serves to modify a sentential argument.⁹ This is what we need to revise when we want to analyze vocatives as expressions of speaker intentions about the content of S. The following definition captures this idea.¹⁰

(40) **Revised semantics of vocatives**

- $$\text{Voc}^0 = \{\text{you}_{\text{voc}}, \emptyset\text{-you}\}$$
- $$\llbracket \text{you}_{\text{voc}} \rrbracket := \lambda P_{\langle e, t \rangle} \lambda q_{\langle s, t \rangle} [q; P(v_{AD}) \wedge \text{MESSAGE}_a(v_{SP}, v_{AD}, q)]$$
- $$\llbracket \emptyset\text{-you} \rrbracket := \lambda P_{\langle e, t \rangle} \lambda q_{\langle s, t \rangle} [q; P(v_{AD}) \wedge \text{MESSAGE}_a(v_{SP}, v_{AD}, q)]$$

(40) assumes that the head of the vocative phrase Voc^0 expects as its first argument $P_{\langle e, t \rangle}$ the meaning of its noun complement. Moreover, it takes an argument $q_{\langle s, t \rangle}$ that is provided by the host clause. The following example illustrates semantic composition.

8 One refinement might be necessary in the long run. Our MESSAGE relation does not depend on time. A more precise version should include v_{NOW} as a further argument. This ensures that the speaker has an intention at the correct time. I omitted this step in order to improve legibility.

9 I will restrict the discussion to the case of assertions. The respective definitions for the case of questions can easily be added.

10 I maintain the two-dimensional representation of contents as [asserted content; additional content]. As indicated in section 1, the additional content of vocatives, like other indexicals, should best be classed as conventional implicature in the sense of Potts (2005). The notation leaves this aspect underspecified.

- (41) $[\text{vocP} [\text{voc0 } \emptyset\text{-you}] \text{ dear } [\lambda x_e \lambda y_e (x = y) \text{ Ede}]]$, *the champagne has been served*.
- (i) $\llbracket \emptyset\text{-you} \rrbracket^C = \lambda P_{\langle e, t \rangle} \lambda q_{\langle s, t \rangle} [q; P(C(v_{AD})) \wedge \text{MESSAGE}_a(C(v_{SP}), C(v_{AD}), q)]$
- (ii) $\llbracket \text{dear} \rrbracket^C [\lambda x_e \lambda y_e (x = y) \text{ Ede}] = \lambda y_e (\text{Ede} = y_e \wedge \text{DEAR}(\text{Ede}))$
- (i)+(ii): $\lambda q_{\langle s, t \rangle} [q; \text{Ede} = C(v_{AD}) \wedge \text{DEAR}(\text{Ede}) \wedge \text{MESSAGE}_a(C(v_{SP}), C(v_{AD}), q)]$
- (iii) $\llbracket \text{the champagne has been served} \rrbracket^C = \lambda w. [\text{CHAMPAGNE-SERVED in } w]$
- ((i)+(ii)+(iii)) [assertion: $\lambda w. [\text{CHAMPAGNE-SERVED in } w]$; commentary: $\text{Ede} = C(v_{AD}) \wedge \text{DEAR}(\text{Ede}) \wedge \text{MESSAGE}_a(C(v_{SP}), \text{Ede}, \lambda w. [\text{CHAMPAGNE-SERVED in } w])$]

This captures that the speaker in C expects to have the addressee **Ede**, and that he wants **Ede** to believe that they are in a world where the champagne has been served. I left reference to utterance time to be spelled out. The context C will eventually specify *when* the speaker wants to inform **Ede**, that the champagne was served before the utterance time of C , and that the result—champagne in the glass of **Ede**—still holds.

In the next section, we will see how this meaning excludes vocatives from indirect discourse.

4.2 Deriving the Ban

Let us first take a look at an example of embedded speech. We don't have an explicit framework to treat embedded speech, but the particulars of embedded speech are orthogonal to the present analysis.

- (42) *Luigi said that, **Ede**, the pizza was ready.

I assume that **Ede** is syntactically analyzed as part of the embedded clause. The denotation of the embedded clause **Ede**, the pizza was ready is given in (43).

- (43) $[\lambda w. \text{PIZZA-READY}(w);$
 $\text{Ede} = C(v_{AD}) \wedge \text{MESSAGE}_a(C(v_{SP}), \text{Ede}, \lambda w. [\text{PIZZA-READY in } w])]$

Commentary content is propagated from embedded levels to the matrix level (Potts 2005), whereas the asserted content can feed higher operators, such as the matrix verb. Therefore, the denotation of (41) is the following.

- (44) $[\lambda w. \text{SAY}(\text{Luigi}, w', \lambda w. \text{PIZZA-READY}(w));$
 $\text{Ede} = C(v_{AD}) \wedge \text{MESSAGE}_a(C(v_{SP}), \text{Ede}, \lambda w. [\text{PIZZA-READY in } w])]$

The asserted content describes an utterance by Luigi, addressed to Ede. If the vocative was interpreted relative to this context, its content would be appropriate. According to our analysis, however, the external context C specifies the parameters of the vocative. The commentary content in (44) hence states that **Ede** is the addressee in C , and that the speaker in C aims to literally convey to Ede the message that the pizza is ready. This content can fail to be met for various reasons. If (42) is uttered to someone who is not **Ede**, the commentary content is not met. But if (42) happens to be uttered to **Ede**, the commentary likewise fails to hold. The utterance in C literally informs the addressee that Luigi said something to Ede, not that the pizza is ready. Therefore our enriched content of the vocative predicts that (42) is ill-formed in this case as well. Obviously, this prediction hinges on the lexical content of MESSAGE_a . It must narrowly capture the intention behind the assertion. The property should not extend to indirect ways in which a speaker can inform the hearer by making an utterance, such as when Caroline tells Ede “Luigi said that the pizza was ready” with the serious intention to let Ede know that the pizza is ready. In such cases, the information is conveyed indirectly as an entailment of the utterance (plus world knowledge that Luigi is a reliable source of information regarding pizza). Such indirect acts of informing are not covered by MESSAGE_a .

I will leave it at this preliminary paraphrase of the content of MESSAGE_a . A more detailed investigation of the intentions behind the act of asserting is beyond the limits of this paper, and probably a topic that requires input from more disciplines such as psychology and evolutionary anthropology. Let us instead turn to the use of vocatives in free indirect discourse. Consider first the appropriate case of free indirect discourse in (45) with the underlined sentence embedded in a story.

- (45) Luigi waved at his favorite guest. The pizza was ready. Did Ede want to taste it?

The most natural interpretation of the underlined sentence is one in $\langle C, d \rangle$ with internal context d where Luigi talks to Ede. If we include a vocative, the example becomes ungrammatical.

- (46) Luigi waved at his guest. *Ede, the pizza was ready.

In this case, there is no matrix clause that contributes to the denotation of the underlined sentence. We will make use of the assumed update content of free indirect discourse, discussed in Section 3. This is the meaning of (46) according to the present analysis.

- a. $\llbracket [\emptyset\text{-you Ede}]_{\text{VocP}} [\text{the pizza was ready}]_s \rrbracket^{(C,d)}$
 $= \llbracket [\emptyset\text{-you Ede}]_{\text{VocP}}^{(C,d)} \rrbracket \oplus \llbracket [\text{the pizza was ready}]_s \rrbracket^{(C,d)}$
- b. $\llbracket [\text{the pizza was ready}]_s \rrbracket^{(C,d)}$
 $= [\lambda w. \exists e(\text{DONE}(\text{PIZZA}, e, w) \wedge \tau(e) < v_{\text{NOW}}); -] \text{ in } \langle C, d \rangle$
- c. $\llbracket [\emptyset\text{-you Ede}]_{\text{VocP}} \rrbracket^{(C,d)}$
 $= \llbracket \emptyset\text{-you} \rrbracket^{(C,d)} (\llbracket \text{Ede}_{\text{Voc}} \rrbracket^{(C,d)})$
 $= \lambda P_{\langle e, t \rangle} \lambda q_{\langle s, t \rangle} [q; P(v_{AD}) \wedge \text{MESSAGE}(v_{SP}, v_{AD}, q)] (\lambda y. y = \text{Ede})$
 $= \lambda q_{\langle s, t \rangle} [q; (v_{AD} = \text{Ede}) \wedge \text{MESSAGE}(v_{SP}, v_{AD}, q)] \text{ in } \langle C, d \rangle$
- d. $\llbracket \text{VocPS} \rrbracket^{(C,d)}$
 $= \lambda q_{\langle s, t \rangle} [q; (v_{AD} = \text{Ede}) \wedge \text{MESSAGE}(v_{SP}, v_{AD}, q)]$
 combined with
 $[\lambda w. \exists e(\text{DONE}(\text{PIZZA}, e, w) \wedge \tau(e) < v_{\text{NOW}}); -]$

With Potts, we assume that only the asserted part of content contributes to the meaning of higher operators. The commentary contents are projected upward. This is the result.

- (47) $[\lambda w. \exists e(\text{DONE}(\text{PIZZA}, e, w) \wedge \tau(e) < v_{\text{NOW}});$
 $(v_{AD} = \text{Ede}) \wedge \text{MESSAGE}_a(v_{SP}, v_{AD}, \lambda w. \exists e(\text{DONE}(\text{PIZZA}, e, w) \wedge \tau(e) <$
 $v_{\text{NOW}}))] \text{ in } \langle C, d \rangle$

An update of the common ground with (47) takes into account that the passage was in free indirect discourse. Hence, the update is not by *The pizza is ready* but by the following information.¹¹

- (48) $d(v_{sp})$ thought/said that THE-PIZZA-IS-DONE at $d(v_{\text{now}})$
 $d(v_{sp}) = \text{Luigi}, d(v_{\text{now}}) = \text{reference time of the story}$

By uttering or writing (46) in the given context, $C(v_{sp})$ literally conveys to $C(v_{AD})$ the proposition in (48). Like in the earlier example, we can show that the commentary content of (46) is never met. If (46) is uttered in a context C where the reader/addressee is not Ede, then the commentary content in (47)

¹¹ Note that the analysis of FID presented here does not include treatment of tense in FID in English. The proposition in (48) assumes that the morphological past in (46) is resolved as a concealed present (Stowell 2007) or omitted (Ogihara 1995, 2007).

fails to hold true. Likewise, if Ede happens to read the sentence in (46), the author of (46) does not literally inform Ede that the pizza is ready, but makes the assertion in (48). Therefore, as in the earlier example, the content of the vocative can never be true in any utterance context C of (46). This explains why vocatives are not permitted in free indirect discourse.

The present semantics of vocatives, combined with a specific proposal how to interpret indirect discourse, offers the basis to explain the observations that we started from. It was crucial to assume that free indirect discourse is a mode of semantic interpretation that influences the way in which a sentence updates the common ground. In Section 3, a potential alternative account was briefly mentioned under the term “traditionalist view”. The traditionalist view attributes the enriched update to an operator **OP** at LF that changes the message from p to ‘ v_{sp} thinks that p ’. Does this analysis offer a viable alternative for our case?

If we make use of an indirect speech operator **OP** at LF, our example has the following structure at LF.

(49) $[[\emptyset\text{-you Ede}]_{\text{VocP}} [\text{OP} [\text{the pizza is ready}]_S]_{\text{XP}}]$

The constituent labeled XP serves as the argument of the vocative phrase and contributes the proposition for belief update: ‘ v_{sp} says that the pizza is ready’. Given the internal context d in the example, this is instantiated to ‘Luigi says that the pizza is ready’. This yields a fully coherent content for the vocative: The sentence commented on is XP. XP triggers an update with ‘Luigi says that the pizza is ready’. The vocative states that the content of XP is the intended message by the speaker to Ede. Which it is—this is the content of the common ground update triggered by the utterance, according to this analysis. Hence, this type of analysis predicts that vocatives in indirect discourse should be permitted. I do not see any simple way out of this false prediction of an **OP** based analysis.¹²

5 Summary and Outlook

The present paper investigated the semantics of vocatives, including the observation that vocatives can not be used in indirect discourse. I proposed a simple

¹² The alternative structure with wide scope **OP** will yield the obviously impossible reading that a protagonist in the story believes that the speaker is presently talking to Ede.

syntactic backbone for vocative phrases and recast the vocative analysis by Predelli (2008) in terms of this syntax-semantics interface. The resulting analysis wrongly predicted that vocatives in certain kinds of indirect discourse should be possible. This prediction followed generally, without making use of specific assumptions about the meaning of indirect discourse. Section 3 introduced a specific framework for the interpretation of indirect discourse that rests on two contexts $\langle C, d \rangle$. I sketched the treatment of shiftable and rigid indexicals as well as the information update that takes place in this mode of writing and reading. The framework covers the fact that rigid indexicals like *I* and *you* can be used in indirect discourse. The reason for the ban on vocatives hence can not be a general ban on the use of *you*. In Section 4, I proposed that vocatives not only specify the addressee but moreover express that the content of the sentence is intended as a message from the speaker to that addressee. This second part of the meaning of vocatives is more or less redundant in direct speech. In indirect speech, however, the propositional content of the sentence is no longer the message that the author conveys to the addressee. Hence, there is a systematic mismatch between the message sent, and the message commented on in the vocative. Therefore, vocatives can not be used in indirect discourse.

There are a few other constructions that cannot be rendered in this mode (Banfield 1978). Most prominently, free indirect speech and thought can not contain sentences in the imperative mood. This poses a challenge for theories of the imperative that are based on propositions. Many semantic analyses assume that imperatives denote properties that are attributed to the addressee v_{AD} . An imperative like *Come!* yields the proposition $\lambda w.COME(v_{AD}, w)$ that describes what the addressee should make true. According to such theories, the meaning of imperatives is addressee-oriented in a similar way as the vocative. We could propose that the imperative mood, like the vocative, contains a second meaning component that states that the message sent is intended as a message for the person addressed, at the time of sending the message. Searle's analysis of speech acts anticipates this component in terms of the "essential condition" that ensures that the speaker actually wants to perform the act in question by making the utterance. The essential condition of an imperative could be coded as a COMMAND relation between v_{SP} and v_{AD} in analogy to the MESSAGE relation for assertions. Again, this relation ensures that imperatives in embedded speech are prohibited. Indirect speech offers an interesting and promising testing ground for speech act related parts of meaning that elsewhere evade detailed analyses.

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On the Meaning of Fictional Texts*

Matthias Bauer and Sigrid Beck

1 Introduction

Various disciplines have investigated meanings of texts, and accordingly different things can be meant by ‘the meaning of a text’. We focus in this paper on fictional texts, on notions of meaning from linguistics and from literary studies, and on the answers offered under (1).

- (1) What do we mean by ‘the meaning of a text’?
 - (i) the meaning determined by the grammar ‘grammatical meaning’
 - (ii) the meaning that a reader/hearer may derive ‘subjective meaning’

Let us consider an example to illustrate this:

- (2) from: *Aesop's Fables*
(trans. George Fyler Townsend)

The Crow and the Pitcher

A Crow perishing with thirst saw a pitcher, and hoping to find water, flew to it with delight. When he reached it, he discovered to his grief that it contained so little water that he could not possibly get at it. He tried everything he could think of to reach the water, but all his efforts were in vain. At last he collected as many stones as he could carry and dropped them one by one with his beak into the pitcher, until he brought the water within his reach and thus saved his life.—Necessity is the mother of invention.

A formal semanticist charged with the task of interpreting this text would begin a compositional calculation resulting in (very roughly) the proposition in (3) for the first sentence. S/he would proceed in a similar way throughout the text. The grammatical meaning of the text, as a first approximation, is the conjunction of the propositions thus calculated.

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- (3) $\lambda w. \exists x[x \text{ is a crow}_w \ \& \ x \text{ perishes}_w \text{ with thirst} \ \& \ \exists y[y \text{ is a pitcher}_w \ \& \ x \text{ flies}_w \text{ to } y]]$

A literary scholar (or an attentive reader) might offer (4) as the interpretation of the text in (2). The subjective interpretation of the text is something that is not literally claimed, but that can in some sense be derived from the text nonetheless.

- (4) One can accomplish amazing things by being creative and persistent.

Our paper is about how the subjective meaning is related to the grammatical meaning. Specifically, we ask at what point in linguistic theory there is the opportunity or indeed the requirement to step from one to the other. The answer we offer is that the formal pragmatics of fictional texts is the relevant step. In contrast to most everyday utterances, newspaper articles and the like, fictional texts are not asserted in the normal sense. That is, it is not claimed that the real world is among the worlds described by the text. For example, it would be inappropriate to reply to (2) with (5). Someone who responds with (5) mistakes the fable for an ornithological report, which is not intended when a fictional text is uttered.

- (5) This is completely wrong. Crows never carry stones in their beaks.

But if fictional texts are not asserted, how do we make a connection to the real world? It is clear that we do so. (6), for example, is an appropriate response to (2); we have an intuition that fictional texts can, in some sense, express truth. The relevance of a fictional text comes about because there is some kind of relation to reality, after all.

- (6) This is completely wrong. Persistence gets you nowhere at all.

We propose that there is a pragmatic operation which is not familiar assertion, but which does make a connection to the real world. The pragmatic interpretation of our example according to this operation is sketched in (7). Our analysis makes the pragmatic meaning a kind of conditional, in which the worlds described by the text are related to the real world. This is presented in the shape of an operator in (8). The relation to the real world is what makes the text relevant. This relation, R in (8), is not overtly expressed. It has to be derived, i.e. $g(R)$ is to be determined on the basis of the specific text. Values for R reflect subjective interpretation ("the text is about ..."). The result of applying

the pragmatic operator is the subjective meaning of the text—its interpretive impact.

- (7) If everything the text T says is true, then one should be inventive and persistent.
- (8) $\llbracket \text{FictionalAssert}_R \rrbracket^{g,w}(T_{(s,t)}) = 1$ iff $T \subseteq \{w' : g(R)(w)(w')\}$
 Worlds in which everything the text says is the case, are worlds that stand in relation R to the actual world.

From the perspective of literary scholarship, our paper seeks to provide a new answer to an old problem, i.e. explaining the difference between fictional and non-fictional texts. By combining literary studies with intensional semantics and taking recourse to possible world theory we choose a new approach. Our starting point is the paradoxical fact that fictional texts do not claim to make any assertions about reality but are still relevant to real people, i.e. have a meaning for the reader. How is this possible? Frequently an answer is sought by pointing out that fictional texts contain a lot that is not fictional, e.g. references to really existing persons, places, institutions, ideas etc. E.g. Ryan (1991) develops a set of accessibility relations between the actual world and the text world which is based on the claim that the more properties they share the closer they are. This is quite different from our focus on the meaning of fictional texts for readers. To us, it does not seem it does not seem satisfactory that the relevance of fictional texts should entirely depend on what is not fictional about them. This would mean that the most relevant fictional texts are the least fictional ones, which is counter-intuitive. What makes a fictional text relevant to a reader is that it establishes a similarity to the real (actual) world. This similarity may be based on references to really existing items but may be based on a number of other features as well. In any case it implies a difference from the actual world, and the particular meaning of fictional texts is derived from this difference.

There is, of course, a tremendous amount of work on the subjective meaning of fictional texts in literary studies and related disciplines. These disciplines discuss what subjective interpretations people arrive at, and what factors play a role for the result. They do not discuss the formal pragmatic connection between grammatical meaning and subjective meaning—i.e. they do not discuss how the interpretive impact is derived from the truth conditional semantics. Our paper offers one simple step as the answer to this how-question. Similarly, there is a lot of work on conditionals, including counterfactuals and various other particular problems in intensional semantics. All the linguistic work is about the compositional interpretation of natural language sentences.

It is not about the pragmatic interpretation of fictional texts. Note that our proposal does not concern semantic composition within sentences or texts. Our conditional arises in pragmatics. Thus we think that our paper is the first to offer an idea of how formal semantic interpretation and literary interpretation of fictional texts are related in terms of linguistic means. We think that this is useful because it connects formal semantics with other interpretive disciplines. It broadens the horizon of the working semanticist and offers him/her a basis for where subjective interpretation takes its starting point. Our project in this paper is an interdisciplinary one, and we hope it might be of interest to literary theorists and semanticists alike.

Our paper is structured as follows: Section 2 provides some simple general background in possible world semantics. We include this section primarily for non-semanticists who might be interested in our project; the reader well-versed in intensional semantics may skip it. Section 3 provides some general background in literary theory and the discussion of the meaning of fictional texts. This section is intended primarily for linguists and it prepares for our proposal in section 4. There, our own analysis is developed. We postpone a detailed discussion of issues related to our topic until after our proposal has been made. In section 5, we situate our analysis in the wider landscape of research that discusses meaning in fiction. Section 6 concludes the paper.

2 Background in Intensional Semantics

This section lays out, for the non-semanticist, what we mean by the grammatical meaning of a text. In (9) we provide what the semanticist might answer when asked for her/his notion of meaning:

- (9) Meanings are the range of the interpretation function $\llbracket \cdot \rrbracket$.
 $\llbracket \cdot \rrbracket : L \rightarrow \bigcup D_\sigma$ (σ a semantic type)

(where L is the set of all expressions in language L , D_σ is the denotation domain of type σ and $\bigcup D_\sigma$ is the union of all denotation domains—that is the set of objects that are assigned to some linguistic expression in the language as its interpretation.)

$\bigcup D_\sigma$ are the ‘meanings’ that can be expressed in L .

The function $\llbracket \cdot \rrbracket$ has to assign to each expression in the language under investigation its meaning. It represents the interpretive component of the grammar

and derives what we call grammatical meaning. Theories of how this happens are developed e.g. in Chierchia & McConnell-Ginet (2000) and Heim & Kratzer (1998). Let us elaborate a little by giving an example:

(10) My crab apple is blossoming.

(11) a. referential NPs: individuals (type $\langle e \rangle$)

$\llbracket \text{my crab apple} \rrbracket = \text{SB's CA}$

 (supposing that the second author is the speaker)

 b. sentences: propositions (type $\langle s, t \rangle$)

$\llbracket \text{My crab apple is blossoming} \rrbracket = \{w : \text{in } w \text{ SB's crab apple blossoms}\}$

Sentence meanings are propositions and propositions are sets of possible worlds. We follow the standard ontology in semantics (Lewis 1986): There are infinitely many possible worlds and each of them specifies completely a way the world might have been. One of them is the way things are—the actual world @. The other worlds are “possible” in the sense that they represent logical possibility. This does not entail that they are “possible” in the sense of being candidates for the actual world.

As we said, sentences denote sets of possible worlds. If I inform you of (12a), you will kick out as candidates for the actual world all those worlds in which my crab apple tree is not blossoming, (12b).

(12) a. $\llbracket \text{My crab apple is blossoming} \rrbracket = \{w : \text{in } w \text{ SB's crab apple blossoms}\}$

 b. $@ \in \{w : \text{in } w \text{ SB's crab apple blossoms}\}$

You do so because I assert (12a) (or rather, if I assert (12a)). Thus (12b) represents a pragmatic step that is standardly taken when we interpret utterances, read a newspaper or other non-fiction. We represent standard assertion by an operator *Assert* in the style of Krifka (1995). Its semantics can be stated, for our present purposes, as simply as in (13).¹ For Krifka, (13) is one of a set of

1 This *Assert* operator is very crude. For one thing, a proper pragmatic operator should consider that utterances are made in a given context, and that there are requirements on what can be asserted in a context (Krifka 1995; Stalnaker 1972, among others). For another, we have followed Krifka here in representing the operator as if it were a lexical item with a semantics given in the lexicon. It might, instead, be an interpretive strategy not represented anywhere in the structure. This issue in the semantics/pragmatics interface is under lively debate at present (see e.g. Chierchia & Fox & Spector 2012). We think that the operator as stated suffices for present purposes, and that presenting it as if it were an element in the structure is simple and clear. Neither is to be taken as a serious analytical claim.

pragmatic operators including for instance a semantically stronger operator for scalar assertions and one for emphatic assertions. We limit our attention to (13) here. We call the application of such an operator the pragmatic step.

$$(13) \text{ Assert}(p)(w) = 1 \text{ iff } w \in p$$

It is well-known that language can also talk about possible worlds that are not the actual world. Consider (14):

(14) If I had scored that goal, my team would have won.

- (15) a. $\llbracket \text{I had scored that goal} \rrbracket = \{w : \text{SB scored that goal in } w\}$
 b. $\llbracket \text{my team would have won} \rrbracket = \{w : \text{SB's team win in } w\}$

- (16) “If I had scored that goal, my team would have won” is true iff
 $\{w : \text{SB scored that goal in } w\} \subseteq \{w : \text{SB's team win in } w\}$

“worlds in which I scored that goal are worlds in which my team won.”

The example is a counterfactual conditional. The actual world @ is not in the set of worlds in which I scored that goal. The other worlds exist as logical possibilities. The things in those worlds are also ‘real’ in that they exist in other possible worlds. They don’t exist in the actual world. The semantics given for the example in (16) is simplified, and cannot be quite right. Not all worlds in which I score that goal are worlds in which we win. For example, the other team might also have scored more goals and still have won. Or the rules of the game might have been different, and my scoring that goal would have been insufficient for us to win. And so on. What is meant by an assertion of (14) is this: If I had scored that goal, and nothing else relevant had been different from the actual world, then we would have won. What is relevant depends on the context. Semantics thus has to leave some room for contextual information, as in (17) (we follow here the most standard analysis of conditionals as explained e.g. in Kratzer (1991); see section 4 for more discussion):

- (17) $\llbracket \text{If I had scored that goal, my team would have won} \rrbracket^{g,w} =$
 $\{w' : \{w : \text{SB scored that goal in } w \ \& \ wRw'\} \subseteq \{w : \text{SB's team win in } w\}$

“If I had scored that goal, my team would have won” is true in @ iff
 $\{w : \text{SB scored that goal in } w \ \& \ wR@\} \subseteq \{w : \text{SB's team win in } w\}$
 where $wR@$ iff w is maximally similar to @ with respect to the relevant facts

The relation R is a relation between possible worlds, an accessibility relation. $R(@)$ is the set of worlds that are accessible from the actual world in the relevant way. In this example, worlds are accessible that share facts with the actual world about soccer and about our game (a *circumstantial* accessibility relation). The accessibility relation R is what makes a conditional statement relevant (von Fintel & Heim 2011). It is not very interesting that hypothetical worlds in which I score are worlds in which we win. But what I'm saying with (17) is that things would have to have been only a tiny little bit different from what they actually were for us to have won. So I'm telling you something about actual things, too. Below are two other run-of-the-mill examples of accessibility relations. These accessibility relations (introduced by modal verbs in the examples) are fairly standardised; that is, the grammar or linguistic convention narrows down possibilities for R . Covert relations between possible worlds will be relevant for our proposal regarding fictional texts in section 4.

- (18) a. Murderers must go to prison.
 b. Worlds in which what the actual laws provide is the case are worlds in which murderers go to prison.
 c. $wR@$ iff what the laws in @ provide holds in w (deontic)
- (19) a. Sebastian must be guilty.
 b. Worlds in which what I believe to be true is the case are worlds in which Sebastian is guilty.
 c. $wR@$ iff what I believe to be true in @ is the case in w (epistemic)

Finally, a word on the interpretation of texts, as opposed to single sentences. We will simplify greatly in this respect and concretely suppose (20).

- (20) Text: S1. S2. S3. ...
 Text meaning: $\llbracket T \rrbracket = \llbracket S1 \rrbracket \cap \llbracket S2 \rrbracket \cap \llbracket S3 \rrbracket \dots$
 Set of worlds in which S1 is true and S2 is true and S3 is true ...
 = set of worlds in which all sentences in the text are true

This view ignores many aspects of textual interpretation, for example information that is needed for interpretation in addition to information the grammar provides: information we might call pragmatic or contextual. For example, in order to interpret (10) in the way indicated you need to know (from the utterance situation or the preceding text—both subsumed under the context) that the speaker is SB, the second author. We will take it for granted that this can

be modelled in a principled fashion. It is included in what we think of as the linguistically determined meaning of an expression (a word, a sentence, a text). At any rate, we assume that the linguistic mechanisms involved in interpreting sentences and texts in the end provide a set of possible worlds, namely those worlds in which everything the text says is the case.

What was sketched in this section, then, is our notion of (i):

- (i) the meaning determined by the grammar 'grammatical meaning'

3 Background in Literary Studies

In literary studies, there is no agreement on the way in which literary texts may establish their meaning. Many readers of literary texts share a *subjective* understanding of meaning: a literary text means what it means for me. But does it make sense then to try and elicit the meaning of a poem etc.²² Or does such a subjective understanding mean that it means just anything?

We can delimit the problem by reflecting on the ontological status of literary texts in a more narrow sense, i.e. works of fiction (which includes poems and plays). A most radical view is expressed by a well-known tag from Archibald MacLeish's didactic poem "Ars Poetica" (1926): "A poem should not mean / But be" (Ferguson Salter & Stallworthy 2005: 1381). In this view, literature is completely unlike utterances in everyday life. One might even say that this view holds that literature does not talk about things. It is rather meant to *be* a thing to be talked about. We realize at once that this leads to a paradox, for literary texts consist of language and without meaning they would not be what they are. Even so-called nonsense poetry can only be recognized as poetry because quite a few meanings are established, and certain expectations of meaning are thwarted. And if meanings are thus established, the poem must, at least to some extent, adhere to the interpretive rules of grammar, even though it need not do so throughout.

If we thus cannot do without grammatical meaning in literature, however, this does not mean that it refers to the actual world @. When I read the first sentence of Melville's novel *Moby Dick*, "Call me Ishmael," I know that I must imagine a speaker who is (or wishes) to be called Ishmael and that I must not start calling Herman Melville Ishmael. Accordingly, let us formulate a first hypothesis:

²² Poems, for the purposes of this paper, are regarded as fictional texts.

- (H1) Fictional literature both evokes and thwarts the expectation that the things to which linguistic expressions refer belong to the actual world. It thus makes us aware of problems of meaning.

To illustrate, consider Shakespeare's Sonnet 18:

- (21) William Shakespeare, Sonnet 18:

Shall I compare thee to a summer's day?
 Thou art more lovely and more temperate:
 Rough winds do shake the darling buds of May,
 And summer's lease hath all too short a date;
 Sometime too hot the eye of heaven shines,
 And often is his gold complexion dimmed;
 And every fair from fair sometime declines,
 By chance or nature's changing course untrimmed;
 But thy eternal summer shall not fade,
 Nor lose possession of that fair thou ow'st;
 Nor shall Death brag thou wand'rest in his shade,
 When in eternal lines to time thou grow'st:
 So long as men can breathe or eyes can see,
 So long lives this and this gives life to thee.

When we read the question "Shall I compare thee to a summer's day?" we cannot and should not try and identify the addressee as long as we contextually realize that the question is part of a work of fiction.³ The only reference that can be identified in our world is "this" in the last line of the poem: "So long lives this, and this gives life to thee". "This" is the utterance, i.e. the poem itself. Thus we start thinking about the utterance and not just about the individuals mentioned etc. Accordingly, it seems characteristic of literary texts to make us wonder about (their) meaning. We do so for the very reason that they do not refer to identifiable objects in our sphere of life. The assertive step (13) does not take place.

3 Conversely, the fact that many readers and critics have tried to identify the addressee indicates that they do not accept the sonnet as a work of fiction. If it is fictional, the addressee may be coincidentally like an actual person but the poem does not depend on this identification. This is what Davies (2007: 44), following Currie (1990), calls the "'counterfactual independence' requirement" of fiction.—Oscar Wilde famously made fun of the factual dependence of the young man of Shakespeare's sonnets in "The Portrait of Mr. W.H." (Wilde 2003).

As a result, we may ask about the ‘deeper’ or figurative meaning of a text.⁴ This may be local, e.g. the metaphorical meaning of an expression, or it may refer to the text as a whole (e.g. in a riddle). Thus in the Shakespeare sonnet we may start wondering what the “shade” of death is or what it means when the speaker says of his addressee that “in eternal lines to time thou grow’st”. In real life, I could start resolving this uncertainty by finding out more about this shade or by asking the speaker what he means by “to time”. In a literary text, this is impossible (and not just because the author is dead: even the answer given by an author does not delimit the range of readings of a fictional text as long as it does not become part of it). In any case, I, the reader/hearer, am asked to establish the meaning of a literary text. We may thus formulate a second hypothesis:

- (H2) In a literary text the meaning “of” something (a word, a sentence, the text as a whole) is always a meaning “for” someone (the reader) because, as a rule, it does not refer to an identifiable reality.

At this point, we may ask how possible world semantics may help in the analysis of fiction. Several literary scholars (e.g. Doležel 1998) have found the concept of possible worlds useful for describing the nature of fiction since it liberates the theory of fiction from the restraint of mimesis in the sense of texts representing what is already there in the actual world.⁵ Others (e.g. Zipfel 2001) reject the concept because “fictional worlds might be impossible”; e.g. a “fictional character can be born on two contradicting dates” (Ronen 1996: 24–25).⁶ Apart from the fact that fictional examples of this kind are quite rare, however, even in fantasy literature (Ronen does not give any), this does not contradict the principle. As long as the sentence describing such a fact makes sense, I must assume that there may be a world in which I may be born on two different dates. Moreover, even in fiction there must be a sufficient number of

4 Davies (2007: 15) speaks of “the higher-order thematic content of the piece, the ‘point’ of the piece that we expect to uncover in our reading”.

5 In fact, this goes back to the old notion that literary mimesis or ‘imitation’ does not consist in reduplicating the actual world but in creating another one. Cf. Sidney (1595/2002: 85), who speaks of “another nature”.

6 For describing fiction as denoting sets of possible worlds, it is irrelevant whether we “try to explicate truth in a story in terms of possible worlds in which a given set of beliefs is true” or whether “we take, as the basis of our analysis, sets of beliefs themselves” (Davies (2007: 64), referring to Lewis and Currie). It is not belief worlds but the meaning of the text that constitutes the reality of fiction, i.e. provides the relevant set of worlds.

logically acceptable facts in order to make us accept a seemingly illogical one as part of the fictional worlds. Thus we embrace the notion that fictional texts talk about possible worlds. The notion of the poet speaking about (logically) possible worlds was first pointed out by Aristotle in his *Poetics* (section 9, trans. S.H. Butcher):

- (22) It is, moreover, evident from what has been said, that it is not the function of the poet to relate what has happened, but what may happen—what is possible according to the law of probability or necessity. [...] The true difference is that one relates what has happened, the other what may happen. Poetry, therefore, is a more philosophical and a higher thing than history: for poetry tends to express the universal, history the particular.

Aristotle's distinction is quite clear: a historian's work is defined by its reference to the real world, to actual events etc.⁷ A poet's work is defined *ex negativo* by not being restricted to the real world, i.e. by inventing things. Because literature is thus 'free,' it can address more universal issues.

Later theories have refined Aristotle's distinction. Most notable is Sir Philip Sidney's differentiating literature from historiography on the one hand and philosophy on the other. History is bound to reality; philosophy is bound to concepts, ideas and general principles. Literature, being free, combines the two:

- (23) Now doth the peerless poet perform both: for whatsoever the philosopher saith should be done, he giveth a perfect picture of it in some one by whom he presupposeth it was done, so as he coupleth the general notion with the particular example.

SIDNEY 1595/2002: 90

In Sidney, this has a moralistic note (literature is to improve us), but we can abstract from his statement a more general notion of literary meaning, forming a third hypothesis:

- (H3) Literary texts may have a generally applicable meaning because they do not and need not refer to a specific reality. The general meaning, however,

7 Of course historians, as has been pointed out by White (2010) and others, actually cannot completely grasp "what has happened" but frequently make up things, due to their bias etc. But this is an epistemological and a psychological problem which does not invalidate the distinction. "History" in Aristotle stands for the class of texts that claim and must strive to refer to the real world; "Poetry" (i.e. literature that is 'made') does not and need not do so.

is arrived at by statements which look as if they refer to the real world in a specific way. For only thus do they establish a similarity to the real world which makes them relevant to readers.

Thus a connection between the fictional worlds and the real world is to be made. If literary/fictional texts had no connection to the real world, they would have no relevance.

4 Our Proposal

In subsection 4.1. we propose a pragmatic step that is intended to capture the hypotheses from section 3. We explain and discuss this step further in subsection 4.2. Subsection 4.3. provides further illustrating examples.

4.1 *The Pragmatic Step in Fiction*

Let us make (H3) more precise in the sense of possible world semantics. We said that a fictional text describes a set of possible worlds

- (24) Text: $T = S1. S2. S3. \dots$
 grammatical meaning: $\llbracket S1 \rrbracket \cap \llbracket S2 \rrbracket \cap \llbracket S3 \rrbracket \dots = \{w : \text{in } w \llbracket T \rrbracket \text{ is true}\}$

that does not claim to include the actual world:

- (25) It is not claimed that $@ \in \{w : \text{in } w \llbracket T \rrbracket \text{ is true}\}$

It is therefore implicated that the actual world is not one of the worlds described by the text:

- (25') Implicature: $@ \notin \{w : \text{in } w \llbracket T \rrbracket \text{ is true}\}$

This is in contrast to normal utterances and to non-fictional texts (newspapers, financial reports etc.), or examples like my (SB's) claim (26). (I may be lying (and so might a newspaper or a financial report). But I can only try to lie because (26b), derived by applying the Assert operator, is a convention.)

- (26) a. $\llbracket \text{My crab apple is blossoming} \rrbracket = \{w : \text{in } w \text{ SB's crab apple blossoms}\}$
 b. $@ \in \{w : \text{in } w \text{ SB's crab apple blossoms}\}$

What about statements that do not seem to be about the actual world? What is their relation to @? Let us reformulate (H3) in the light of this intensional semantic theory.

(H3') A fictional text will be related to the actual world. Otherwise it would not be relevant. But it is not determined by the grammar or by linguistic convention what the relation to the real world is.

We suggest that the pragmatic step in the interpretation of a fictional text T is not derived by Assert, but as in (27) instead:

- (27) $\{w : \llbracket T \rrbracket \text{ is true in } w\} \subseteq \{w : wR@\}$
 "Worlds in which everything is the case that T says, are all worlds which stand in relation R to @."
 (where R is to be determined)

What exactly R is will tell us how to relate the text to our reality. This is what we called above the meaning for somebody, and what we alluded to in the introduction as (ii):

- (ii) the meaning that a reader/hearer may derive 'subjective meaning'

(H3') says that a hearer may derive a meaning by relating the worlds described in the text to the actual world. Since the relation is not determined by a rule system like the grammar, there is some room for variation.

The meaning in (27) is derived as a result of applying a pragmatic operation *FictionalAssert*. Like the *Assert* operator, we conveniently represent this as if it were an element in the structure. Its semantics is given in (28). This, we suggest, is the pragmatic step when something that we know is fiction is uttered.

- (28) $\llbracket \text{FictionalAssert}_R \rrbracket^{g,w}(T_{(s,t)}) = 1$ iff $T \subseteq \{w' : g(R)(w)(w')\}$
 Worlds in which everything the text says is the case, are worlds that stand in relation R to the actual world.

The next subsection discusses our proposal in more detail.

4.2 Discussion

First, let us reconsider the example from the introduction for the purpose of illustrating our proposal.

- (29) from: *Aesop's Fables*
 (trans. George Fyler Townsend)

The Crow and the Pitcher

A Crow perishing with thirst saw a pitcher, and hoping to find water, flew to it with delight. When he reached it, he discovered to his grief that it contained so little water that he could not possibly get at it. He tried everything he could think of to reach the water, but all his efforts were in vain. At last he collected as many stones as he could carry and dropped them one by one with his beak into the pitcher, until he brought the water within his reach and thus saved his life.—Necessity is the mother of invention.

It is quite obvious that this is not a description of the life of birds, i.e. the fact that $@ \notin \{w : \text{in } w \llbracket T \rrbracket \text{ is true}\}$ should be indisputable. Still this very fact establishes the relevance of the story to the human reader. The bird behaves like the reader should behave. At the same time, it is not irrelevant that the protagonist is a bird. If a being that we perceive as inferior has the resources to help itself in a situation of need, surely even stupid I (the reader of the fable) will have them. Thus “*R*” can be fairly clearly isolated in the reassuring message of the story.

- (30) $wR@$ iff w is exactly like $@$ except the counterpart of the crow c in w is the human reader h in $@$ and what is desirable for h in $@$ in terms of ingenuity and persistence is the case for c in w

We offer the paraphrases below to approximate the conditional semantics that (28) derives as the subjective meaning of the text, according to this accessibility relation.

- (31) The worlds of T are exactly like $@$ except that the crow stands for me and I behave as I should.
- (32) If everything the text says is the case, then people should be creative and persistent.

Even though the relation to the real world has to be established by the reader, who accordingly derives the ‘subjective’ meaning of the story, in some cases (such as this one) the “meaning for somebody” is predictable. The ‘management’ of more or less predictable accessibility relations enables authors to produce an effect.

Our proposal can also explain in what way hearers or readers have intuitions about the truth of fictional texts. As we observed in the introduction, a response like (33) to the fable is clearly inappropriate. Someone who reacts like that fails to grasp that the text is fiction. The response in (34) on the other hand is appropriate. Even though the worlds described by the text by way of its grammatical meaning do not include the real world, there is a transparent subjective meaning according to which the text does make a claim about the actual world. (34) appropriately responds to this, the subjective meaning.

- (33) a. #This is completely wrong. Crows never carry stones in their beaks.
 b. #That's true. Male crows sometimes carry stones.
- (34) a. ok: This is completely wrong. Persistence gets you nowhere at all.
 b. ok: That's true. You can come up with surprisingly creative solutions if you really have to.

Next, let us examine the pragmatic meaning derived in more detail. Our proposal sticks to the standard analysis of conditionals from Kratzer's work as sketched in section 2. In contrast to familiar conditionals like (14) above, our proposal places the covert relation between possible worlds not in the antecedent, but in the consequent of the conditional meaning. Here is our intuition behind this possibly surprising aspect: Our intuition is that a fictional text is relevant by way of an inference from the text: "If what the text says is the case, then ...". In the fable with the crow, the crow in the fable should be related to properties of the reader:

- (35) According to *T*, I should be as persistent as the crow.

The idea that an inference is drawn from the text is modeled with a conditional, and the standard semantics of conditionals then places the text in the antecedent and the accessibility relation, unexpectedly in view of syntactic conditional sentences, in the consequent. A more detailed version of the example is in (36).

- (36) $\forall w[[\llbracket T \rrbracket^w \rightarrow \text{counterpart}(\text{reader } @, \text{crow } w) \ \& \ \forall w'[\text{what is desirable in } @ \text{ is the case in } w' \rightarrow \text{reader } @ \text{ behaves in } w' \text{ like crow } w \text{ behaves in } w]]$

It would not capture our intuition to place the accessibility relation, more familiarly, in the antecedent of the conditional. This is demonstrated in (37).

- (37) a. $\forall w[R(@, w) \rightarrow \llbracket T \rrbracket^w]$
 b. All worlds in which I am replaced by the crow and I behave as desired are worlds in which T is true.

It does not follow, from me being an admirable crow, that I will get into trouble and almost die of thirst. Let us take for granted, then, that the fictional text plays a role parallel to the antecedent clause of a conditional.

Next, let us ask if, in similarity to ordinary conditional statements like (14), a covert restriction concerning similarity of possible worlds should be part of the truth conditions. We keep as fixed the relation R in (30) in the consequent, and we only consider the covert constraint of maximal similarity to the actual world. In (38), (39) is a version of our formal pragmatic meaning that adds this constraint to the antecedent as usual.

- (38) $\forall w[\llbracket T \rrbracket^w \ \& \ w \text{ is maximally similar to } @ \text{ otherwise} \rightarrow R(@, w)]$
- (39) $\forall w[\llbracket T \rrbracket^w \ \& \ w \text{ is maximally similar to } @ \text{ otherwise} \rightarrow \text{counterpart}(\text{reader } @, \text{crow } w) \ \& \ \forall w'[\text{what is desirable in } @ \text{ is the case in } w' \rightarrow \text{reader } @ \text{ behaves in } w' \text{ like crow } w \text{ behaves in } w]]$
- “All worlds in which T is true and which are otherwise maximally similar to the real world are worlds in which counterpart(reader @, crow w) and reader @ behaves as desirable”

Adding the restriction results in a weaker statement, and this seems to be a good thing: not absolutely all worlds in which the fable is true are worlds in which the reader is replaced by the crow and behaves as desired. For example, a world in which everything the fable says is true and dislodging so many stones brings about an avalanche that kills the crow, is not a world in which the reader's counterpart behaves as desirable. A final possibility we consider here is that the standard conditional semantics does not optimally capture what we want to say. Below is a semantics that sticks to the idea that fictional assertion amounts to a pragmatic conditional but uses Stalnaker's (1968) semantics of conditionals instead of Kratzer's. This meaning, the Stalnakerian counterpart to the Kratzerian meaning (39), avoids the universal quantification over worlds but is otherwise parallel.

- (40) $R(\text{the } w : \llbracket T \rrbracket^w = 1 \ \& \ w \text{ is maximally similar to } @, @)$
- “the world in which everything is like in the real world except what the text says, stands in relation R to the real world.”
- “the world in which everything is like in the real world except what the

fable says, is such that the crow stands for the reader and the reader behaves as is desirable.”

This seems a good paraphrase of what we have in mind. Without, of course, being able to ultimately resolve the matter of the right semantics of conditionals, we propose the versions (39) and (40) as alternative formulations of our idea.

4.3 *Further Examples*

Let us look at a couple more examples of fictional texts and their pragmatic meanings. A slightly more complex relation is probably at work in (41):

- (41) E.E. Cummings
from *Is 5* (1926), section “TWO”

“next to of course god America i
love you land of the pilgrims’ and so forth oh
say can you see by the dawn’s early my
country ’tis of centuries come and go
and are no more what of it we should worry
in every language even deafanddumb
thy sons acclaim your glorious name by gorrry
by jingo by gee by gosh by gum
why talk of beauty what could be more beaut-
iful than these heroic happy dead
who rushed like lions to the roaring slaughter
they did not stop to think they died instead
then shall the voice of liberty be mute?”

He spoke. And drank rapidly a glass of water

In this case, it is more difficult to identify the message/effect of the text, even though again the relation to the real world is triggered by a number of identifiable references (“America”). The inverted commas, as well as the last line, indicate that a speaker *S* is presented in the poem who is not identical to the speaker of the poem. There are further indications strongly suggesting that this inner speaker’s attitude is held up to ridicule. But much of the effect of the poem will depend on whether a reader/hearer is able to link certain phrases and clichés used by *S* to his or her own experience (e.g. watching TV). Readers may derive the relation in (42). The resulting pragmatic meaning (42’) amounts to the interpretation that the poem is a parody of nationalist politicians.

- (42) $wR@$ iff w is like $@$ except there is/are politician(s) p in $@$ are the counterpart(s) of the speaker S in w and S is more blatantly contradictory in w than p in $@$ but otherwise behaves in a parallel way
- (42') $\forall w[[T]^w \rightarrow w$ is exactly like $@$ except there is /are politician(s) p such that counterpart(p $@$, speaker w) & speaker w is more blatantly contradictory in w than politician $@$ but otherwise behaves in a parallel way]

"Worlds in which what the text says is the case, are like the actual world except actual politicians are less obvious but as insincere as the speaker in the text."

A generalization about accessibility relations R for fictional texts seems to be that accessible from $@$ are worlds similar to $@$, but with certain clear points of departure.

As a final example we present (43). This poem by Emily Dickinson represents a case in which the relation to the actual world and the pragmatic meaning is not at all obvious.

- (43) Emily Dickinson

J315
 He fumbles at your Soul
 As Players at the Keys
 Before they drop full Music on—
 He stuns you by degrees—
 Prepares your brittle Nature 05
 For the Ethereal Blow
 By fainter Hammers—further heard—
 Then nearer—Then so slow
 Your Breath has time to straighten—
 Your Brain—to bubble Cool— 10
 Deals—One—imperial—Thunderbolt—
 That scalps your naked Soul—
 When Winds take Forests in the Paws—
 The Universe—is still—

The difficulty for the reader/hearer begins with arriving at a clear notion who "he" and "you" are, e.g. whether the latter is a generic 'you'. The reader may

establish different accessibility factors, i.e. connect what is described in the poem to various experiences of his or her own (but not with just *any* kind of experience; see Bauer et al. 2010). Accordingly, even though we may be able to describe certain effects, it is much more difficult to delimit this poem to a specific “message”. We may not be able to identify *R*, but we can say things about it. For example, a hearer of J315 is invited to identify with the speaker of the poem, i.e. (44) is plausible:

(44) $wR@ \rightarrow$ the hearer *H* in @ is a counterpart of the speaker *S* in *w*

This is a poem which obviously makes us wonder about the metaphors used and sets us about considering the nature of the experience described. It thus reflects on the specific relationship of generality and specificity/individuality which we have regarded as a hallmark of literary texts. See Bauer et al. (2010) for a detailed interpretation of the poem. This is not our concern here; rather, the poem illustrates what factors may go into determining *R* when one thinks about the subjective interpretation of a complex fictional text. What is literally said in the text is the basis for inferring how I, the reader, am to relate it to myself and the actual world. Texts vary with respect to how easily and specifically this can be determined.

Let us briefly summarise our proposal. We have investigated the pragmatics of fictional texts. Instead of assertional operators familiar from works on formal pragmatics, we argue that their interpretation involves a pragmatic step we call fictional assertion. This step does not entail that the actual world is among the worlds described by the text. Instead, a relation between the actual world and the worlds described by the text has to be inferred. The space between the underdeterminacy of the relation on the one hand, and its foundation on the literal (grammatical) meaning of the text on the other, provides the room for subjective interpretation.

The interest in the connection between grammatical meaning and subjective meaning for the literary scholar lies in the fact that grammatical meaning provides a basis and constraints for possible subjective meanings. This saves us from an ‘anything goes’ approach to the interpretation of fictional texts. The interest in the same connection for the linguist lies in the fact that we have clear intuitions that fictional texts—in some sense—talk about the real world and can—in some sense—express truth. It is not obvious how such intuitions arise, since by definition fiction is not about the real world and has no claim to truth. Investigating the matter more closely amounts to relating grammatical to subjective meaning.

5 Relating the Proposal to Other Work on Fiction

We are not aware of other work that pursues precisely the plot of our paper, summarized at the end of section 4 above. But there is of course a large body of work on the meaning of fictional texts from literary studies and related sources. And there is some work on fiction from formal semantics/pragmatics. Below, we relate our project to both in turn.

5.1 *Semantic Work on Meaning in Fiction and Related Topics*

Many readers with a semantics background will be familiar with David Lewis's work on truth in fiction (Lewis 1978), and so we will begin with that. David Lewis's famous paper is concerned with the truth conditions of sentences like (45) or more generally, (46).

(45) In the Sherlock Holmes stories, a famous detective lives in 22B Baker St.

(46) According to fiction *F*, *p*.

Roughly: all worlds which are compatible with everything in *F* are such that *p* is true.

On a superficial level, Lewis's paper is about sentences that talk about fiction. An intensional context is created by the matrix predicate "in the ... stories" or the like. A fiction operator (46) is introduced that derives the truth conditions of sentences such as (45). Under this perspective, Lewis's project has little to do with our paper. Our paper is not about talk about fiction. Our fiction operator is not an intensional operator that represents a syntactic embedding context for a linguistically expressed proposition. Rather, it represents a pragmatic step. Kai von Fintel (p.c.) points out to us that a less superficial and more interesting way to look at Lewis's contribution is that it spells out what is true according to a fictional text. Thus it represents a richer and much more sophisticated notion of textual meaning. Recall that we simplified greatly and took $\llbracket T \rrbracket$, the meaning of text *T*, to be simply the intersection of all propositions expressed in *T*. Lewis's work can be seen as being about the propositional content of *T*—perhaps: everything that follows from what is said in *T*. Richer notions of textual meaning are of course quite compatible with our approach. If Lewis provides a better notion of what $\llbracket T \rrbracket$ is, our FictionalAssert operator could still take that as its argument and work in the way outlined above, as long as $\llbracket T \rrbracket$ provides a proposition. Probably we should not strictly speaking call $\llbracket T \rrbracket$ the 'grammatical' meaning anymore, because in addition to mechanisms of the grammar information from inferences etc. enter into it. Even so, the pragmatic

step is built on $\llbracket T \rrbracket$. Thus, the work of David Lewis and others that follow his general strategy (see e.g. the summary and references in Woodward 2011) can be seen as feeding (semantically: what is $\llbracket T \rrbracket$?) into our (pragmatic: what does $\llbracket T \rrbracket$ mean for me?) proposal.

Lewis's work, seen in this light, ties up with other projects concerned with the basic propositional content of creative productions, such as Ross's *Semantics of Media* (1997). This book is also concerned with embedded material. Different from common usage, Ross uses the term "medium" for any object which can be described by prepositions such as *in* and *on*, e.g. a "story, programme, play, film, or dream" (Ross 1997: 4). In particular, he is concerned with what he calls "contensive sentences" such as "Marty built a house on Picadilly in the Monopoly game" (Ross 1997: 4). While we are not concerned with sentences like these, which are about the relationship between what is going on within the "medium" and outside of it, the following statement might show a link to our project: "We can associate with any medium the set of all those worlds which agree with it—those worlds which, for all that the medium represents, might be actual" (Ross 1997: 17). It should be pointed out, however, that Ross's "media" are not identical with fictions (let alone fictional texts), i.e. that the fictional status of "media" is not his concern even though most of them appear to involve fictions.

Also similarly, embedding contexts set the agenda for Fauconnier's mental space theory, which is succinctly summed up by Sanders & Redeker (1996: 293): "Mental space theory is a model designed to account for embeddings and restrictions of validity in language. It is based on the assumption that understanding a text involves the creation of domains or *spaces*, with embedded spaces entailing a restriction of the validity or factuality of the embedded material". Fauconnier (1985: 17) is concerned with sentences such as "Max believes that in Len's picture, the flowers are yellow" or "In that play, Othello is jealous" (18). Fictional texts thus appear as examples of mental spaces in Fauconnier. The "restriction of the validity or factuality" might at first glance be considered akin to our fiction operator, but we do not regard works of fiction as embedded in that sense. Our point is not that fiction is defined by restrictions of this kind, i.e. being limited to a space included by a "parent space". In our view, a work of fiction comprises a set of possible worlds which is not necessarily included by speaker's reality (as it is in the sentence beginning "Max believes ..."). Mental space theory may become useful to literary studies, however, when concerned with utterances by characters *within* a work of fiction. In that case, the work of fiction is the parent space which delimits the range of meanings of those utterances. Sanders and Redeker's study of the representation of speech and thought in fiction is a case in point.

5.2 *Other Work on Meaning in Fiction*

Discussions about the meaning of literary texts tend to locate it in four different places and, as a rule, give priority to one of them: there are (1) text-oriented theories, i.e. the meaning of a work of literature is determined by the meaning of the written or spoken utterance; this primarily refers to its literal/grammatical meaning but may also, for example, include allegorical meaning if there are signals for such a meaning in the text. An example of the validity of this is that frequently authors when confronted with questions about the (possible) meanings of their texts, or parts of their texts, say that they never thought about them but think they are true; (2) author-oriented theories, i.e. the literary work is the expression of an author's intention; accordingly, contradictions, vagueness or ambiguities in the text may be resolved by finding out (from interviews etc.) what the author actually wished to say; (3) context-oriented theories, i.e. the meaning of the work of literature is determined by factors that may not be identified by looking at the text alone; examples are allegorical meanings of a text derived from the historical situation in which it was written (e.g. a satire on a politician) but also intertextual references or medium-/genre-specific features (in some versions, external circumstances entirely determine the meaning of a literary text); (4) reader-oriented theories which claim that a literary text means whatever the reader regards as its meaning; such theories may tend to a higher or lesser degree of subjectivism (a lesser degree means interaction with (1), (2) or (3) or the establishing of "intersubjective" meaning in a community of readers). Of course, various theories combine these locations or regard the meaning of literary texts as the product of their interactions.

Where do we locate our approach in this field?

In the first place, we are concerned with the literary text as falling within the domain of compositional semantics; i.e. we think that the basis of all meanings of such a text is its grammar. In that respect, our theory belongs to (1). Secondly, we are not concerned with literary texts in a wider sense (including essays, non-fictional memoirs etc.) but with fictional texts (including poems, plays etc.). The very fact of their fictionality is our trigger: it allows us to extend the reach of intensional semantics by adding a pragmatic operator, which is a feature of (or applicable to) fictional texts. In other words: fiction as a cultural convention/tradition (or an anthropological constant, whatever) meets a logical option (there are such things as non-assertive utterances). This in turn allows us to describe the meaning of literary (i.e. fictional) texts: the grammatical meaning plus fictionality results in a delimited openness of the meaning, which we have marked by *R*. We have introduced the reader (4) at this point, not because (2) and (3) are irrelevant to this meaning but because

this is where the options opened up by the textual feature “grammar” and the contextual feature “fictionality” are realized. Thus we speak of a “subjective” meaning without claiming that a literary text may mean just about anything.

A precise description of what is going on from a truth-conditional perspective will help literary scholars when analyzing literary texts and their functions/effects. It will, in the first place, make scholars realize where “subjective” meaning sets in and what the features of a text are that allow for its multiple interpretations.

We thus hope to provide a clearer space for “subjective” meaning in literature. In the tradition of aesthetics, subjectivity has most frequently been associated with judgment. Thus it plays a central part in Kant’s *Critique of Judgment*, e.g. when he says that the “receptivity of the subject” (Kant 2000: 24) is the basis of all aesthetic judgment. This notion points to the experiential quality of perceiving a work of art, which has been explored with regard to literature by the phenomenological school and others. A common denominator in their discussions (cf. Bleich 1978; Holland 1968; Ingarden 1973; Iser 1974) is the degree to which the reader contributes to the realization of the literary text.

Ray (1984: 54) has plausibly pointed out that in many cases the “concretization” of a text by the reader (roughly equivalent to what we have called the meaning that the reader/hearer may derive from a fictional text or its ‘subjective’ meaning) consists in its becoming “familiar by virtue of being constituted in previously experienced aspects,” which may be a “version of the general mechanism of understanding outlined by hermeneutics: we understand elements by correlating them with a larger context, which in turn must be reassessed, thereby provoking a reconsideration of its elements, and so forth”. While the various models of literary meaning as “a personal experience unique to each reading subject” (Ray 1984: 62) may foreground either psychological or cognitive aspects of this process, either emotional or rational responses, and may be interested in establishing an ‘intersubjective’ meaning shared by readers, we seek to define subjective meaning by setting it off from the meaning determined by the grammar but correlating it with it. The nature of fiction allows and requires us to integrate subjective meaning into a formal semantic representation and thus widens the theoretical scope of formal semantics and pragmatics. Literary scholarship profits from this procedure by enabling us to distinguish between subjective meaning as any kind of personal response to a literary text on the one hand and as a definable pragmatic feature of the text on the other hand.

6 Conclusions

This paper adds a new pragmatic operator to the set of operators discussed in formal semantics and pragmatics to embody the pragmatic step that accompanies an utterance. Our operator can apply to fiction and is repeated in (47).

- (47) $\llbracket \text{FictionalAssert}_R \rrbracket^{g,w}(T_{(s,t)}) = 1$ iff $T \subseteq \{w' : g(R)(w)(w')\}$
 Worlds in which everything the text says is the case, are worlds that stand in relation R to the actual world.

Its purpose is to account for the non-assertive nature of fiction and to capture what its interpretive impact is instead. It offers an answer to the question of how the subjective meaning of a fictional text may be based on its grammatical meaning.

We hope that this approach may offer the basis for much further interdisciplinary work. Research on what consequences readers/hearers draw from a text, and how they are guided in this, can now be seen as investigating the nature of the accessibility relation R and how it is identified. The pragmatics of fictional texts can be investigated under the guideline that the text is embedded under the fictional assertion operator. We hope that this will prove useful in future research.

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Notes on Disagreement*

Udo Klein and Marcus Kracht

1 Introduction

Language is generally assumed to be homogeneous inside what is called the language community. This is also a common presumption in everyday conversations. When we talk to each other we assume that the words the others use have the same meaning for them as they do for us. And we think that they associate the same ideas with our words as we do. Yet quite often this is not the case. Compare your definition of “poor” with a technical description provided by an agency.¹ There are bound to be differences, and they are not only due to the fact that the agency can actually quantify poverty when you cannot. It may be that their definition yields differences in real terms. When for example they define that to be poor is to earn less than half of the average income it may be that some earn less than half the average income and still you do not think that they are poor, or that some earn more and you think they really are poor. Or compare your understanding of the word “poor” with that of your neighbour. Again, you may find that you two disagree in very subtle ways. While he thinks that not being able to afford a car is a sign of poverty, you may think that this is not so. But do these differences matter? And if they do, how do we still manage to understand each other? And can there at all be cases when someone is wrong about the meaning of a word?

As it turns out, we all have ways to cope with the situation of misunderstanding despite the initial impulse to think that everybody speaks the same language. And that is because we all have experienced situations where our

* It is Monday morning and the phone is ringing. Ede is calling from Frankfurt. For a moment I am in panic that he wants to sell me some obscure paper to be reviewed until yesterday. But no. Ede actually wants to know something about context sensitive grammars. He makes my day. A question about content! Who in this world is still calling people on Monday morning to ask some question about ... linguistics? If only I could get more phone calls like this.

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1 There is absolute poverty, relative poverty, poverty as defined by national committees, the World Bank, the United Nations, and so on.

words had different meanings—if only as a child, when we had to learn our very first language. However, the formal theory does not seem to have progressed far enough to deal with this fact. There are still some who wish to maintain the belief that mutual understanding requires the use of a common language. Some of that is driven by a curious fear—expressed recently among others in Glanzberg (2007) and Cappelen & Lepore (2005)—that we could simply not communicate without a homogeneous language. However, it is one thing to lack an explanation for a phenomenon and quite another to deny its existence. The evidence against a shared language is overwhelming, although the idiolects seem to share a common core (if at least in the form of a set of common words and constructions). Thus language, it appears, is both a private and a public entity. This tension creates an interesting role for communication. We will argue, among other things, that successful communication *in the sense of fully shared meanings* exists only in rare situations. Mostly, we simply (optimistically) assume it to be given. This means that successful communication in this sense rarely ever happens. But since we rarely find out about any discrepancies the failure will mostly not be diagnosed. And this leaves us with the impression that communication works perfectly. When occasionally we realise that we misunderstand each other, we do not break down. Quite to the contrary. We humans can actually fruitfully deal with this situation. Failed communication not only exists but also opens interesting avenues to improve our mutual understanding.

A final point concerns compositionality. A standard argument in favour of compositionality is that we can understand the meaning of a sentence that we have never seen before. It is feared that the individualisation of language makes it impossible to make this argument. We do not think so. For it is not necessary to assume that the result of someone else's meaning composition is the same as yours. Diagnostically, however, if you assume the sentence to mean anything you please and someone else can do the same, then who is to judge that the result of meaning composition has any value? The answer to that question is simple: compositionality simply is a property of an individual language. Communication does not figure in the definition of compositionality. It is not needed. You may even have a different meaning composition algorithm for the same language, let alone for different languages (based on the same syntax).

The paper is structured as follows. In Section 2 we argue that the homogeneity assumption is actually ill-founded. We should in fact expect endless variation. This opens the door for less-than-optimal communication. Section 3 discusses an example on how misunderstandings can be diagnosed and managed in dialogue. The following sections work out some of the theory behind

this story. Section 4 broadens the scope somewhat showing that not only are differences in semantics partly due to the fact that we have to learn them, but also that the variation is deliberately created and exploited. Pragmatics will have to take some of the burden of explaining which of the many meanings enter the discourse. The next section, Section 5 takes this a step further. Given that we can manage to talk with each other knowing that meaning differences exist, we can bridge them only if we have a theory of the language in its totality. That is to say, not only are we informed about our own language, but we also possess a (somewhat incomplete) theory of the language of other people. In analogy to the phrase “theory of mind” we may call it “theory of language”. The Sections 6 and 7 provide a theoretical reconstruction of communication in terms of the calculus of judgements. Crucially, the calculus allows to deal with both judgements and announcements, which are the fundamental categories of communication. Section 8 shows how the distinctions in meaning from one person to another inform pragmatics. For example, if you promise us something, whose understanding of the words is relevant in that context? In Section 9, we look at the issue of evaluatives and see whether it is relevant for the present discussion. The remaining sections deal with some loose ends.

2 Why Languages Cannot be Uniform

In this section we shall attack what we call the “homogeneity assumption”. By that we mean the assumption that all speakers of the same language community share the same language in the sense of a relation between expressions and meanings. This assumption says more exactly that if A and B are members of the same language community, they both attribute the same meanings to the same expressions. We shall not only show that this is factually not correct; rather, we shall show that it is virtually impossible to guarantee that a language can be taught so that in the end children speak exactly the same language. Thus, even if at the beginning the language is homogeneous, this homogeneity disappears in one generation. In particular, it is to be expected that the languages used by two individuals speaking the ‘same language’ will differ (if only slightly) at every level of linguistic analysis. We shall focus here on the semantic level.²

When children learn their first language they have to learn the syntax, morphology, phonology of the language while they are also trying to communicate

2 Variation on the phonetic and phonological level is discussed and modeled among others in Gafos (2006); Gafos & Benus (2006).

with other children as well as with adults. Anyone who has witnessed their frustration in telling us something and being consistently misunderstood can appreciate that communicating their intentions can be very hard for children. They very early on think that everyone else will understand what they are saying. As adults we mostly know however that this simply isn't the case. Endless battles in school about important concepts such as "good music", "democracy" or "free will" have taught us that other people might think quite differently about them. Meanings need to be learned, too. And there is no guarantee that we are fully competent when we are finally grown up. As Putnam (1988) has argued, even adults use many words without being able to say exactly what they mean. If asked, they would say that elms are a type of tree—if they know that English word at all. Yet they probably could not identify elms nor tell us how they are different from, say, oaks. They would assume that elms are not oaks, and oaks are not elms, but that is hardly something they know for sure. They simply apply a heuristic rule that different words mean different things, and that mostly they tend to be exclusive. The deeper question of course is why that is so. The answer we suggested above was that languages need to be learned in a way that excludes direct instruction on meanings themselves.³

Children face the formidable task of not only identifying the structure of the language, but also shaping the meaning of the words. All they are given is some indications towards that goal. They will learn, for example, that a certain colour is called "red", while another is called "green", yet another "blue", and so on. From this input they can directly infer only that some particular colour is red, green or blue; but over time they will produce some hypotheses as to how the spectrum is divided up into colour names. Algorithms that allow them to do so have been proposed among other by Gärdenfors (2004); see also Kelley (1984) on the problem of abstraction. All these algorithms share the following interesting property: *there are (typically infinitely) many series of input data that lead to different results while each being consistent with a fixed language*. That means the following. We start with a language L , which is a set of pairs $\langle e, m \rangle$ consisting of expressions and meaning. Expressions are in this case colour names and meanings intervals of wave lengths.⁴ So, the meaning

3 This is to be contrasted with computer languages. By obtaining an installation software you are then equipped with a total data set that implements the language on your computer with all meanings of expressions given.

4 There is more to colours than wavelengths, see Gärdenfors (2004). However, the nature of the conceptual space is quite irrelevant, as long as it is infinite and reasonably homogeneous. Essentially, it needs to be divided into finitely many parts without there being a priori ways for doing so.

of “red” is given by an interval $[\lambda_r, \mu_r[$ of wave lengths, the meaning of green by some interval $[\lambda_g, \mu_g[$, and so on. This means that the expression red is applied successfully to any wavelength ℓ such that $\lambda_r \leq \ell < \mu_r$. Thus the *data* consists in an arbitrary finite series $\sigma = \langle \langle e_i, \ell_i \rangle : i < n \rangle$, where e_i is a colour name and ℓ_i a wave length from the corresponding interval, i.e. the colour name is successfully applied to the wavelength. To be somewhat more explicit, the data simply consists in a series of utterances. Each utterance u has a context c . From this context we can distill fragments of meaning of the elements (in the given case the situation provides a specific colour, whose wavelength is the sought after data point). So we take as input data for the algorithm pairs $\langle e, d \rangle$, where e is a sentence and d the associated data point. Call a series *consistent* if the sentences are actually made true by their respective data points, that is, if the speaker is always telling the truth. Or, in the case at hand, if we are interested in meanings of constituents, the data point should supply correct denotata. The algorithm is a function $f : \langle L, \langle e, \ell \rangle \rangle \mapsto L'$. It takes as first input a language L (here a set of pairs consisting of colour names and the associated intervals (!) of wave lengths) and a pair $\langle e, d \rangle$ and computes another language, L' .⁵ The algorithm starts with a fixed null state (for example, the empty language). The language eventually learned is defined as follows.

$$(1) \quad f_L(\sigma) := f(\dots, f(f(L_0, \langle e_0, \ell_0 \rangle), \langle e_1, \ell_1 \rangle), \dots), \langle e_{n-1}, \ell_{n-1} \rangle)$$

Then the property can be defined more formally as follows.

There are at least two (typically infinitely many) consistent series $\sigma, \sigma' \in L^+$ such that $f_L(\sigma) \neq f_L(\sigma')$.

Effectively, this is a version of the indeterminacy of a theory by the data. More precisely, as the algorithm is deterministic, the randomness does not lie in the learning procedure but in the actual data encountered. The principle above states a core assumption of cognitive grammar: that the adult grammar is a result of the individual learning history. Since no one can guarantee that we are fed with the same sentences on the same colours, no one can effectively control the training sequence, and so the result is to some degree random.

5 One way of specifying f is as follows: If the data point d is outside the interval m denoted by e in L , then the meaning m' of e in the resulting language L' is the interval resulting from minimally extending m to include d . If the data point d is within the interval denoted by e , then $L' = L$.

This means that the transmission of meanings from one generation to the next cannot be guaranteed to yield unique results, even if we fix the algorithm that constructs these meanings. And that in turn means that we cannot expect *at any given moment* that the concepts people use are identical.^{6,7}

And yet everything seems to work fine. Nobody is worried about the idea that others could misunderstand them. Children do not wait until they master the language before they expect to be understood. To the contrary, their basic assumption is always that they are being understood perfectly. It is quite an optimistic perspective in view of the many ways things could go wrong. But it is probably the best they can do.

When we get older, the situation is essentially the same; there is no guarantee that we are being understood. However, there are some differences. On the one hand we have become more knowledgeable about our language. Moreover, when we have learned the language well enough it is through that very same language that we can transmit the idea that something has gone wrong in communication. This is what we shall investigate here. Rather than looking at action exchanges (which we would need to look at for first language acquisition), we may look at verbal exchanges. What makes this particularly interesting is the apparent circularity. What seems to happen is that we are able to pull ourselves out of the swamp by talking to each other. Somehow we manage to clear that mess of different ways of talking step by step.

3 A Showcase Scenario

Suppose Marcus argues with John about peak oil (the point when the world oil production reaches its overall maximum) and John says

(2) Peak oil happened in 2006.

6 More precisely, the initial point, when language was invented, so to speak, is a potential counterexample. However, it is highly doubtful if such a point ever existed. The more realistic picture seems to be that languages arise through mutual agreement, and thus have never been fixed between speakers in sufficient detail at any point of their history.

7 Contrast this with the idea of learning theory. Most algorithms work with the so-called limit assumption: given enough time we shall settle on the right grammar. But what do we do in the meantime? And, more, importantly, what happens if we only have limited time? Indeed, the story in Niyogi (2006) is that language evolution is the side effect of imperfect learning, which in turn is a necessary side effect of the time constraint. What Niyogi does not consider, though, as he is mainly working in the principles and parameters framework, is the possibility that there is no unique target grammar to work one's way up to.

TABLE 1 *EIA, Crude oil including lease condensates (2010)*

2001	2002	2003	2004	2005	2006	2007	2008	2009
77.686	76.994	79.598	83.105	84.505	84.661	84.543	85.507	85.389

Now suppose Marcus disagrees. Then what is he in fact disagreeing with? Is he really disagreeing with what John said? Could they perhaps both be right (or wrong)? To see the problem, suppose that Marcus openly disagrees with John. He shows him the figures in Table 1 and says: "Look, the world production of oil in 2008 and 2009 is slightly larger than in 2006". And suppose John now says: "Yes, I know these figures, but they count something different. By 'oil' I mean conventional oil, and what your figures show is not the production of conventional oil but also of natural gas liquids and other liquids, also called unconventional oil". And so John is giving Marcus a one minute lecture about the different sorts of oil and what goes into "peak oil". Effectively, the problem has turned into a discussion of what "oil" means. And so Marcus will learn from John a new fact, namely, that there are two types of oil, conventional and unconventional oil. And that conventional oil is used in his definition of peak oil. And so, the difference between John and Marcus was that while by "oil" John meant only conventional oil, Marcus meant that term to indiscriminately include what John called conventional and unconventional oil (without knowing that there was such a difference).⁸

Note that the disagreement between John and Marcus is not related to vagueness: "peak oil" names a particular event, and therefore there is no sense in which "peak oil" could admit borderline cases, unlike eg. "poor", "rich" etc.

The reply that Marcus gets from John makes it clear that (at least as far as John is concerned) they are not in disagreement about the facts but in disagreement about the meaning of the words they are using. Of course, at that moment this is simply *his* assessment of what is going on. As for Marcus, he will yet have to become convinced that the distinction is real and not made up; in other words, he may still subscribe to the idea that they are using the word in the same sense. Or he may decide that they do not and instead try to find out what he thinks the difference is (other than taking John's words for granted).

8 See "Looking in the Rear View Mirror" by Phil Hart (<http://www.theoil Drum.com/node/7909>) and the discussion thereafter to get a feel for the complexity of the issue as discussed here. Moreover, there are supplementary issues on the method of data collection and its (desired or undesired) consequence, discussed in "The EIA—JODI divergence Part 2" (<http://www.theoil Drum.com/node/7965#more>).

Thus he may decide to take “oil” (if uttered by John) to mean conventional oil, whatever that is. Then he obviously has to review his figures and see if John has a point. (Since there is no way to realistically validate the numbers, all Marcus can do at this point is to search for something that explains their origin.) Or he insists to let “oil” uttered by John mean what he took it to mean (and maybe review the figures as well). Recall that the situation is that he had no previous idea that there can be different varieties of oil and that oil statistics do not always count the same varieties. (This is now a question of facts not meanings once we are in agreement about the substance in itself, namely “oil”. The whole point of the discussion is that there indeed *are* different methods to produce oil and that the terminology reflects this. Most people know of only one: pumping it out of the ground—known as conventional oil.) Then in that situation it may seem to Marcus that they are not disagreeing about the facts. It could in principle still be the case that his data contradicts John. But suppose that this is not the case (typically good data sets show you which varieties are being counted).

Let’s follow one particular trajectory, namely that Marcus accepts John’s claims. Then, after the discussion the situation looks as follows. Not only was his objection to John’s statement invalid, he also acknowledges that John’s statement has been right after all, and that he knows more about the subject, and he (Marcus) accepts John’s viewpoint. This may or may not have consequences for Marcus’ use of the word “oil”. We will return to that issue. Also, we claim that most people in this situation accept John as a higher authority, who could decide in this discussion on language use better than we do. The problem with that assessment, though, is that there normally is no central authority on language use, so all these ideas of authority over language need to be negotiated as well. The upshot is that in the discussion we may accept John as an authority and decide to “upgrade” our language use. Saying that someone is right or wrong about certain language use has to be taken with a grain of salt. They are often used with hindsight. Once Marcus adopts John’s way of talking, he may class his earlier usage as erroneous, though before that shift it did not appear to him that way.

Let’s look at another trajectory. Suppose Marcus had instead said in response to (2):

(3) Yes, peak oil certainly did not happen in 2008.

or something of that sort. Then what was he saying, not knowing that there are different varieties of oil? What did he mean by the word “oil”, and also by “peak oil”? If John by chance disagreed with *this* statement, what proposition of Marcus’ did he reject? Did he know? It seems that judging Marcus’ utterance

using the meaning of the words from his own language he was issuing an incorrect statement (see the data in Table 1). And yet John will in this setting agree with Marcus, taking Marcus' words to mean what he (John) uses them for. There would have been no open disagreement even though Marcus had made a mistake. Indeed, Marcus missed a chance to get to know something about John's language. If, however, by accident John knows how Marcus normally uses the words, he might say that Marcus is being inconsistent (because peak all liquids might well have occurred in 2008).⁹

Thus we see that agreement can be deceptive. People agree in the assessment of the same sentence but it may be quite different propositions that they thereby agree to. Disagreement however can be very productive in giving us an opportunity to discover that we essentially mean different things with the same words.

4 Private Language

A language is a set of signs, that is, a set of pairs $\sigma = \langle e, m \rangle$, with e the expression and m the meaning of σ . So, a language is a relation (not necessarily a function!) between expressions and meanings. The predicament is that there is no unique meaning given to the expressions of a language. Everyone seems to have his own. This is essentially what Putnam argued, following Quine (see Quine 1960, Putnam 1988).¹⁰ This position also enters the discussion in syntax

9 Our focus on this particular instance of disagreement is not meant to imply that this type of disagreement is the only or the main type of disagreement. In our case the disagreement was triggered by the interlocutors making different assumptions on which event "peak oil" names. Another type of disagreement is exemplified by cases of mistaken identity, cf. Donnellan (1972); Kripke (1979): if you mistake Smith for Jones and say (pointing at Smith) "Jones is raking the leaves", I can disagree by saying "No, that's not Jones, Jones is in hospital right now". In this case what I disagree with is not your actual statement, but with the presupposition that the person raking the leaves is the person we both refer to by saying "Jones". Note also that if you accept my authority on Jones' whereabouts, there is no need for you to adjust your usage of "Jones", unlike in the peak-oil case. A third type of disagreement is exemplified by cases involving evaluative predicates like "That was fun", where the disagreement is triggered by diverging responses (attitudes, feelings, etc.) towards an object, cf. the distinction made in Stevenson (1944) between disagreement in belief versus disagreement in attitude. Yet another type of disagreement may be caused by vague terms, eg. if we disagree about whether or not George W. Bush is an old man.

10 We take the problem of radical translation to be one that not only haunts linguists in foreign settings but also children when they learn what their parents are trying to tell them.

under the name microvariation. So, John and Marcus are technically speaking talking different languages. Differences exist at all levels. Here, we focus on semantics. To simplify, we even assume that the languages of the individuals are identical at all other levels except for semantics; so their phonology, morphology and syntax are identical. Indeed, speakers of any language may share some morphology and grammar, but may have different ideas about what certain expressions mean. The effects of this distinction are particularly manifest when we turn to speech acts. A speech act involves several people, and thus presupposes that the transmission of meanings is in some ways effective. Vanderveken says that “[a] promise is a commitment that is made to a hearer to do something, with the special preparatory condition that it is for his benefit, and which is made in a way that creates an obligation for the speaker to do what he says” (Vanderveken 1991: 155). Of course, the question at issue here is what commitment is being made with an utterance, and therefore what the speaker is thereby obliged to do. Suppose some politician has promised to bring down the unemployment rate to under 8 percent. Suppose that official statistics show that the unemployment rate is 7.8 percent. It seems, then, that he has been somewhat successful. Yet would we still think so if we learned that it was achieved by introducing tougher laws so as to fill up the jails? For technically an inmate is not unemployed, so rather than creating jobs for people, stacking them in a prison cell achieves the same for the statistics. But maybe we others think that this is fishy. Are we justified in thinking so or does our politician have a line of defence?¹¹

We think it is not straightforward to say whether our politician has been successful or not and whether he should be held accountable for it. Any mismatch in understanding of the term “unemployment” actually creates a different reading of what counts as success. Thus, in promises (as in all other speech acts) we face a problem of accountability: what is the exact proposition for which speaker should be held accountable when issuing a promise? Of course, as the proposition is coded as a sentence, our problem is to find the relevant meaning of the sentence. Thus, speaker roles enter as a parameter of interpretation. We shall now work out some details of this.

11 Actually, the case we are describing is quite real. The US government has in the past adapted its definition of unemployment, inflation and other economic measures to make the situation look better. It is therefore no longer the case that one can simply take official unemployment rates of different countries and compare them since the internal reporting mechanisms are different. For more background look at the website “Shadow Government Statistics”, <http://www.shadowstats.com>, by John Williams.

Following Kracht (2010) we distinguish phatic and noetic acts. A noetic act is the act of acknowledging some mental attitude towards a proposition, such as agreeing with it or rejecting it. The proposition however is always mediated through an expression so that ultimately the attribution is of the expression, with the intention that it be of the proposition so expressed. A phatic act however is public and performed by means of speaking. Phatic acts are public acts. They can but need not express a corresponding noetic act. A speech act requires, among other things, speaking in public. As there are several speech acts, so there are different noetic acts. However, we shall deal here mainly with *announcements* (the speech act of declaring that something is true) and *judgements* (the noetic act of agreeing to a proposition). Each of the two requires a person π . The phatic act of π announcing that φ is written “ $:-_{\pi}\varphi$ ” and the noetic act of π judging φ true “ $\vdash_{\pi}\varphi$ ”.¹² The notation is not explicit on some parameters that might be needed on occasion such as time and addressee (for announcements). They will be added on need. Also, note that Kracht (2010) does not distinguish in the notation between acts and dispositions. We shall return to that question below.

Now suppose that John’s language contains $\langle e, m_1 \rangle$ but not $\langle e, m_2 \rangle$, while Marcus’s language contains $\langle e, m_2 \rangle$ but not $\langle e, m_1 \rangle$, then John means something different by using e than Marcus. Now, write “ \vdash_j ” for the judgement operator of John and “ \vdash_m ” for the judgement operator of Marcus. Then “ $\vdash_j e$ ” has to be taken as John’s consent that m_1 , while “ $\vdash_m e$ ” has to be taken as Marcus’s consent that m_2 . This seems clear. Let us now turn to an announcement. Is the announcement “ $:-e$ ” meant as an announcement of m_1 or of m_2 ? In plain words, if John is to announce “ e ”, would we interpret this using his own words or someone else’s? We venture a guess that the rule is that we take John to mean what his own words mean to him even though he is speaking to someone else. This is so even if we do not know for a fact what exactly the words mean to him. For usually it does not matter much. However, take our politician as an example. In assessing his performance we will eventually ask the following question: was our politician sincere in his promise? In other words, did he himself think that unemployment goes down as the population of prisons increases? Note that if his understanding of the words is too different from ours he will risk his job regardless of how sincere he had been. Success in a job cannot be redefined by skewing the semantics. Maybe this is also part of the nature of contracts: you tacitly assume that both parties understand the relevant terms (or, as it sometimes happens, you have them sign that they do

¹² “ \vdash ” represents Frege’s judgment stroke.

or at least that they think that they do). Yet, it will make *some* difference to us whether or not he was sincere. Even though it is hard for us to know what someone really thinks, this *is* a question we will be asking when we consider whether he has kept his promise.

But sincerity becomes something of an unclear notion in this connection. We can imagine a situation where the politician was sincere. Maybe he really thought this is a way to reduce unemployment, say, because he thought that these people shouldn't be employed anyhow. Still it might be that we still have the feeling of betrayal. And this is the case when we additionally think (or know) that our politician knew well that his promise was bound to be understood in a different way. In that case, knowing that the other side will understand his words in ways beneficial to him (but not to us) is a different way of failing to be sincere. Here, the complaint is about exploiting the knowledge in meaning differences for one's own benefit. This very often happens when companies exploit people's inability to understand legal or technical jargon. (In fact, the idea of changing the definition of unemployment or inflation mentioned above in Footnote 11 is precisely of that kind.) The latter kind of problem will not be discussed here in depth but clearly shows the complexity of the problems surrounding accountability.

The apparent privacy of language is in conflict with its primary function, namely to communicate. What is needed is that there are rules of language use and accountability. For example, there is a rule that says that in a public announcement we are accountable for the proposition that we just uttered.¹³ If we claim that a given sentence is true, we are taken to have claimed the truth of the proposition which that sentence means. This is an instance of the Maxim of Quality (quoted from Grice 1975):

[Maxim of Quality] Try to make your contribution one that is true, specifically:

1. do not say what you believe to be false,
2. do not say that for which you lack adequate evidence.

These maxims are obligations. This is where the accountability enters. The community sanctions disobedience of these maxims.

But now look at the expression "make your contribution one that is true". What is a "contribution" and what is required for it to be true? Obviously,

13 For recent discussion of the role of commitments in assertions cf. Pagin (2004) and MacFarlane (2011).

contribution here means utterance and “true” means that the proposition expressed by it is true. Although we will develop a somewhat refined picture, this is good enough for the purpose at hand. So, it is not utterances but the proposition that they express that can be true or false. So we must ask what that proposition is that the utterance expresses. The first attempt at resolving the issue is to say that the proposition is to be calculated in the speaker’s language.¹⁴ Thus, if π ’s language contains $\langle e, m \rangle$, it is a rule that from “ $\neg_{\pi} e$ ” π is accountable for m . This is because there is a general rule of interpretation dictating that the announcement of e by π is (in normal cases) tantamount to expression of the judgment “ $\vdash_{\pi} m$ ”.¹⁵

Now, suppose John wants to communicate “ m_1 ”. Since the meaning itself cannot be communicated he must choose what we call an *envelope*. So he chooses the sentence “ e ” as an envelope and sends that over to Marcus, who then unpacks it and finds, well, “ m_2 ”. John stands accused of breaking the Maxim of Quality. But the problem is that the maxim does not talk about choosing envelopes. It only talks about contributions, truth and falsity. Some work is needed to straighten this out.

First, let us note another problem. In Balbiani et al. (2008) it is claimed that when a proposition is announced in public then it is mutually known to everyone. It becomes common knowledge. Applying this to the present context derives the apparent contradiction that after “ $\neg_{\pi} e$ ”, that is, after John’s announcement of e , e becomes known to everyone, or, more cautiously, that it is known to everyone to whom John announced “ e ”. In fact, there is *no* contradiction here, because what “ e ” stands for is what John means by using it. So the contradiction arises only if, say, Marcus attempts to deduce that therefore “ m_2 ” is common knowledge. He cannot safely do so since as a matter of fact if John is sincere he would rather judge “ m_1 ” to be correct. Passing from envelope to message is not an innocent step.

Notice that we allow for two different judgements: “ $\vdash_{\pi} e$ ” as well as “ $\vdash_{\pi} m$ ”. Thus, we may give our consent either to some proposition (here “ m ”) or to

14 This may be seen as uncooperative, but maybe an excusable form of uncooperativeness. We shall talk more about that problem below. Generally, speakers are not assumed to know what the words mean for others, or more exactly, we assume that by default everybody talks the same as we do. Only when evidence to the contrary appears do we dissociate the meaning and start to be concerned about which language is to be used. On how to strategically deal with this new situation see below.

15 This assumes that there is no other meaning that e has in our language, a possibility that needs to be taken into account as well.

some expression, “ e ”. By contrast, an announcement can be made only using an expression. Whence “ $:-_{\pi}m$ ” is simply impossible (there is no mindspeak). Assuming—as we do here for simplicity—that the expressions of the language are uniform across speakers, all speakers share the same expressions but may have different views on their meanings. There are ways of objectifying meanings, but that is outside of the concern here.

5 Theory of Language

Now, there are several issues that we must deal with. Strictly speaking, if our understanding of words is no longer shared, there is no guarantee that meanings can be communicated. Say John wants to communicate meaning “ m ” and chooses “ e ” to code it because his language contains $\langle e, m \rangle$. There is no way to guarantee that we take John’s utterance to mean “ m ”. And this may be due to several reasons other than error or lie.

1. Marcus might not even know *that* John meant something different from what he (Marcus) did. In other words, he is assuming that John’s words mean the same as his when in fact they do not.
2. Even though Marcus does know that John means something different, he might not be able to tell what meaning John associates with his words.
3. Marcus knows what meaning John associates with the words, but this time John uses the words in a different meaning without Marcus knowing. For example, he might be trying to adapt to Marcus’ way of talking.

Let us start with the first of these issues. To be able to represent the facts, we distinguish between words of the language and concepts. Thus, $/oil/$ is a word of English, while oil' is a particular concept. In a first stage we take them to be properties of individuals, so that when A and B associate the concept oil' with the word $/oil/$, they are actually using the same language. Notice that there are two more concepts at play, namely $c - oil'$ “conventional oil” and $u - oil'$ “unconventional oil”. Furthermore, the following holds

$$(4) \quad (\forall x)(oil'(x) \leftrightarrow c - oil'(x) \vee u - oil'(x))$$

Thus oil is either conventional or unconventional. Since it cannot be both, we also have

$$(5) \quad (\forall x)\neg(c - oil'(x) \wedge u - oil'(x))$$

In plain words, nothing is both conventional and unconventional oil. Now, the fact that John and Marcus speak different languages is represented as follows:

$$(6) \quad \text{Marcus: } \{\langle /oil/, oil' \rangle, \dots\} \quad \text{John: } \{\langle /oil/, c - oil' \rangle, \dots\}$$

For simplicity, let us assume that the meaning of the other words is the same, so that we both agree, for example, that “peak P” is the event where the world produces the maximum amount of P throughout history. Thus, “peak mercury” is the event of the world producing historically maximal amounts of mercury (which happened around 1975). This is a crucial ingredient of the story. Without some agreement (presumed or factual) on the meanings of words communication is downright impossible. It may at some point emerge that we are wrong about that, too, by which time we have hopefully settled at least the problem of “oil” successfully.

Since the truth of the sentence (2) depends on what meaning $/oil/$ has, we can now easily see how it is that John and Marcus disagree without there being a contradiction. Moreover, in the absence of any knowledge to the contrary, both John and Marcus shall assume that the other uses the words with the same meanings. Our conflict over (2) is actually an opportunity for us to discover that this is not so. Upon closer discussion and agreement over the facts (which often does not arise so easily) we conclude that John uses a different language. Moreover, after Marcus learns from John that his unitary concept of oil is actually a union of different concepts he can add that to his knowledge. Without knowing much about what distinguishes conventional and unconventional oil apart from what Marcus has been told he can still go ahead and appreciate the difference between their respective usages.

Now, our representations change significantly. For now Marcus has knowledge about John’s usage of the words. This needs to be represented. Let $\text{means}'(x, y, z)$ be a ternary predicate between words, people and concepts. Then after our discussion we agree that the following are true:

$$(7) \quad \text{means}'(/oil/, j, c - oil'), \quad \text{means}'(/oil/, m, oil').$$

Both John and Marcus know this now (and even share this as mutual knowledge).¹⁶

¹⁶ Of course, every discovery of this kind is just preliminary. It is not guaranteed that after introducing the new notions into Marcus’ language they have settled the question of their meaning beyond doubt. But let that be put aside here.

6 Calculus of Judgements

Kracht (2010) also introduced a version of a calculus of mental reasoning called *gnosis*. A central element of this calculus is that of a judgement. In uttering a sentence we are communicating a judgement. When we say that John is tall, we are not simply issuing a proposition. We are also making claims about its truth. While the calculus itself studied the mental process of the analysis of sentences, it can also help us in showing how to resolve the present dilemma. Essentially, it claims that a statement is a public announcement that we judge something as true. An utterance “ $\vdash_{\pi} e$ ” is *honest*, if $\langle e, m \rangle$ is in π ’s language and “ $\vdash_{\pi} m$ ”. Instead of saying that $\langle e, m \rangle$ is in π ’s language we can also say that means’ (e, π, m). We assume here that all utterances are honest.

So, if John is honest and utters (2) we can deduce (ignoring time here)

(8) \vdash_j Peak oil happened in 2006.

If Marcus agrees to (2) this implies instead

(9) \vdash_m Peak oil happened in 2006.

Or, if Marcus disagrees with (2), then it is this:

(10) \neg_m Peak oil happened in 2006.

Here “ \neg_m ” is the rejection operator. This can be turned into

(11) $\vdash_m \neg (\text{Peak oil happened in 2006.})$

(Observe that we are heavily mixing natural language with formal language here.)

The crucial element is now this. Suppose we are tracking the meaning of the phrase “peak oil happened in 2006” down to its parts. Then that requires finding the meaning of “oil”. That in turn may require us to say that a particular substance produced at some place at some time is or is not oil (say, the biodiesel of the farmers in the Midwest). Let this substance be s . Then we have

(12) $\vdash_j \neg_{\text{oil}}(s) \quad \vdash_m \text{oil}(s)$

And ultimately our disagreement could be resolved by tracking it down to some physical facts where we hope to have no dispute about their reality. That is, we

hope to find facts we agree on but that can make a difference for our terminology.

This now creates further trouble. How do we get ourselves out of the mess if words are to be interpreted in the language of the speaker? How can we negotiate our differences if there is no way to produce such explicit facts? Fortunately, there are ways around this. One can use qualifiers such as “in your/my/Marcus’s sense”, “what you/I/Peter call/s” and so on to actually shift the interpretation. So, our final agreement can be sealed by Marcus saying to John

(13) Peak oil in your sense did happen in 2006.

and John saying to Marcus

(14) Peak oil in your sense did not happen in 2006.

Let us look somewhat closer at how this is possible. Of course, the translation of (13) is *not* this:

(15) \vdash_m Peak oil happened in 2006.

because the shift in meaning is unaccounted for. Nor is it actually

(16) \vdash_j Peak oil happened in 2006.

and this is because it is Marcus who makes the claim, and it is John’s meanings that Marcus gives to the words (or, to be exact, to the phrase “peak oil”). To show the difference, let us introduce a new word “joil”, which in Marcus’s language means what oil means in John’s language. Then a better approximation is

(17) \vdash_m Peak joil happened in 2006.

Since the intended meaning of “joil” is “oil in John’s sense”, John has a say in whether Marcus uses the words correctly. For if someone shows around a substance that John calls “oil” while Marcus claims it is not “joil”, then Marcus is obviously wrong. Here however Marcus did get the facts wrong, since he did not use the words in their correct sense, for they are expressly talking about John’s own language. As the discussion above revealed, there already is a word that could be used in place of /joil/, namely “conventional oil”. After the discussion between John and Marcus it will hopefully be clear that they agree on the meaning of “conventional oil”. And so (17) could be replaced by (18).

(18) \vdash_m Peak conventional oil happened in 2006.

However, the term “conventional oil” is clearly not the same as “oil in the sense of John”.

To successfully represent this, we have several options. The first option leaves the meaning relation implicit. In this model, a language is stored as a relation between exponents and meanings. Additionally, for every person, we may have a separate entry for their language. Marcus’ own entry looks like this:

(19) self: $\{\langle \text{oil}, \text{oil}; \rangle, \dots\}$, John: $\{\langle \text{oil}, \text{joil}' \rangle, \dots\}$

The other option is to encode the knowledge about other people as factual entries. Then there is only one language, the speaker’s own language, and everything else is meaning postulates. For example, there will be a meaning postulate such as “For John, ‘oil’ means light sweet crude oil”. The latter approach has the additional flexibility that it can even deal with iterations of beliefs. For example, John might think that Peter thinks that “oil” also means “palm oil”. On the other hand, it has the disadvantage of only mediating the meanings and not handing them out directly. John’s concept of oil is mediated here in Marcus’s own terms, while it is in principle possible that Marcus learns a new concept corresponding to John’s meaning of “oil”.

In Kracht (2010) a state is defined to be a triple $\langle T, S, A \rangle$, where T is the knowledge base, S a sequence of temporary assumptions, and A a cell containing maximally a single judgement. The calculus developed in Kracht (2010) concentrated on the manipulations of S and A since it was geared to explain derived judgements. Here we shall instead focus on T . T consists of conditional judgement dispositions of the form

(20) $\varphi_1, \dots, \varphi_n > \chi$

These are *dispositions*, not actual judgements. Such a disposition means the following: if φ_1 through φ_n are true, then upon apprehending χ it is judged to be $>$. An example is

(21) $c - \text{oil}'(x) \vdash \text{oil}'(x)$

which says that whatever is conventional oil is also judged oil. We should perhaps caution the reader that the judgement symbols now do double duty: they represent judgements as well as judgement dispositions. This can be avoided by using a special notation. On the other hand, the judgement acts

never are conditional and cannot be members of T . And this is how they are distinguished here.

These dispositions function as follows. When we have reached the conclusion that “ $c - oil'(a)$ ” is true, we may trigger the rule (21) and establish the judgement “ $\vdash oil'(a)$ ”. An entry in the dictionary like $\langle /oil/, c - oil' \rangle$ can be reduced to a pair of judgement rules, called conversion:

$$(22) \quad oil(x) \vdash c - oil'(x), \quad c - oil'(x) \vdash oil(x)$$

Notice that we are mixing words of the language with concepts. Now back to the discussion between John and Marcus. In formal terms, the initial states of John and Marcus are as follows:

$$(23) \quad \begin{array}{ll} \text{Marcus:} & T = \{oil(x) \vdash_m oil'(x), oil'(x) \vdash_m oil(x)\} \\ \text{John:} & T = \{oil(x) \vdash_j c - oil'(x), c - oil'(x) \vdash_j oil(x)\} \end{array}$$

7 Concepts

The previous discussion was somewhat misleading in that it presupposed a uniform language of concepts. So, it seemed as if John is using a different concept for translating $/oil/$ than Marcus since we used a different name. But what relevance does that have? First of all, the concepts cannot be communicated. The names are just labels of an effective property. That is to say, the concept of oil that Marcus uses is the same concept of oil that John has if (and only if) they agree in all instances that some substance qualifies as oil. The name used internally for that concept is irrelevant, for in talking to each other we could just as well use the words themselves as proxy for the concepts.¹⁷ Thus, the conversion of “ $\vdash oil(a)$ ” to “ $\vdash oil'(a)$ ” is somewhat redundant. However, this only applies to one’s own concepts. Performing such a conversion for an utterance of John’s runs the risk of equivocation: his judgements cannot be reduced in the same way unless we make the assumption that he uses the words for the same concepts (an assumption that we are often willing to make). Thus, suppose Marcus has concluded that “ $\vdash_j oil(x)$ ” (say, from “ $\neg_j oil(x)$ ”). Then he is not entitled

¹⁷ Putnam has pressed the issue of internal representations in Putnam (1988). In his view, the internal representations completely underdetermine what we call here the ‘effective concept’. The idea that the concept has something of a recognisable internal name that reveals anything about their effective properties, is wishful thinking according to Putnam.

to conclude " $\vdash_j \text{oil}'(x)$ " because the judgement operator in his conversion rules is " \vdash_m " and not " \vdash_j ". Similarly for John.

However, naming Marcus's internal concept of "oil" oil' is dangerous in that it suggests that he uses the concept in the correct way. For our current purposes it is a more or less descriptive label, used from an outside perspective to name the proposition. (We could use John's language here.) Uniformity is then guaranteed, since we are using the names consistently across speakers.

Let us go over the steps in the discussion once more. The initial state is (23). We ignore John's state for a while. Now, suppose John says:

(24) Peak oil happened in 2006.

Marcus may enter this into his theory as follows:

(25) Marcus: $T = \{ \vdash_j \text{Peak oil happened in 2006.},$
 $\text{oil}(x) \vdash \text{oil}'(x), \text{oil}'(x) \vdash \text{oil}(x) \}.$

This says that John consents to the statement /Peak oil happened in 2006./. The index " \vdash_j " is needed here. We can remove the judgement sign by entering instead the following, where t is the time of utterance of (2):

(26) $\vdash_m \text{states}'(j, t, \text{Peak oil happened in 2006.})$

The index " m " can now be dropped. The ensuing discussion with John reveals that Marcus's concept of oil is to be divided in conventional and unconventional oil. Suppose Marcus believes that what John says is true. Even if he does not know exactly what conventional or unconventional oil is he can still update his theory as follows:

(27) Marcus: $T = \{ \vdash_j \text{Peak oil happened in 2006.},$
 $\text{oil}(x) \vdash \text{oil}'(x), \text{oil}'(x) \vdash \text{oil}(x),$
 $\text{oil}'(x) \vdash c - \text{oil}'(x) \vee u - \text{oil}'(x),$
 $c - \text{oil}'(x) \vdash \text{oil}'(x), u - \text{oil}'(x) \vdash \text{oil}'(x) \}.$

Finally, when John tells Marcus that for him "oil" means conventional oil, he updates as follows:

(28) Marcus: $T = \{ \vdash_j \text{Peak oil happened in 2006.},$
 $\text{oil}(x) \vdash \text{oil}'(x), \text{oil}'(x) \vdash \text{oil}(x),$
 $\text{oil}'(x) \vdash c - \text{oil}'(x) \vee u - \text{oil}'(x),$

$$\begin{aligned}
& c - \text{oil}'(x) \vdash \text{oil}'(x), u - \text{oil}'(x) \vdash \text{oil}'(x), \\
& \text{oil}(x) \vdash_j c - \text{oil}'(x), c - \text{oil}'(x) \vdash_j \text{oil}(x), \\
& \text{oil}'(x) \vdash_j c - \text{oil}'(x) \vee u - \text{oil}'(x), \\
& c - \text{oil}'(x) \vdash_j \text{oil}'(x), u - \text{oil}'(x) \vdash_j \text{oil}'(x)\}.
\end{aligned}$$

Recall that the different uses of oil' refer to the same effective concept even though they are being used in connection with different people. Notice also that updates can also include revisions, that is, they do not have to lead to increasing knowledge. But that is really an orthogonal issue. John's theory will be a mere mirror image of Marcus' theory. With this theory Marcus not only possesses his own theory of meaning but also a fragment of John's theory of meaning, so he can understand John's words in his own terms, and, conversely, make himself understood to John in a better way.

We have discussed above how that can be done. Marcus could say

(29) Peak oil in your sense did happen in 2006.

This is tantamount to using "oil" in the way John does. Marcus cannot use (2) for the reason that the words are interpreted (by default) in his language. Which language is to be used in interpreting the words in an utterance is subject to rules, which we shall now discuss.

8 The Pragmatics of Authorship

So what do people do in face of the fact that everybody speaks his own language? Above all, we claim, there is an assumption that the variation is not too great.

Assumed Identity.

Unless you have reason to the contrary, assume that a particular person has the same language as you do.

This is not a maxim. It does not say what the game of communication *should* be like, it rather says what people *do*. Among other things they assume that others are the same as they are. Unless there is evidence to the contrary. Variation is not randomly attributed, but only where the evidence suggests it.

Let us therefore turn to the question what happens if differences are being assumed. Again, there is a default case and it is this.

Default Interpreting Language.

Words are interpreted in the language of the utterer by default.

More exactly, it is not the utterer but the *issuer of judgement* or *author*. We are thinking here of cases in which the one making the utterance ("impersonator", see McCawley 1999) is not the one issuing the judgement ("author"). Direct reports are such cases, as are cases in which a prepared speech is read out aloud by someone. In these cases, the subject of the phatic act is different from the subject of the noetic act.

The default can be overridden in various ways. One is the official establishment of a different language. This happens in well defined settings. For example, in a legal or technical dispute certain words have to have special meaning and using them in a private meaning is illicit. This means that there is a technical language which people are trained to use (say, at a university) and which they are expected to talk in certain circumstances known to each other.¹⁸

In the same way, the default principle can be overridden by John and Marcus by adding to it a special proviso that regulates the meaning of words when they talk to each other. This proviso may take various forms. It can say, for example, that the meaning of "oil" is fixed to "conventional oil" when they talk to each other but not when, say, Bill is present (whatever reason that might have). Or it may be that they agree to use a specific technical language of petrochemical engineers. However, mostly casual conversations do not proceed in this way. There is no official procedure by which a common language gets established. There are several reasons for this. One is that the precise nature of such an interpretive principle is hard to pinpoint. We may simply say that there is something of a 'bilateral language', a language that is used in a special communicative setting, say, if Marcus talks with John. But talking about such a language when the meaning of only a handful of words is at stake is perhaps going too far. For it means that in addition to having our own private language we also talk numerous 'bilateral languages'. Moreover, it is difficult to understand this as a process of a language coming into sudden existence. Rather, it is the effect of long or repeated exchanges, of tuning in on each other. There is thus no definite point at which we can say that such a language exists and can be entered into a rule of

18 In this connection it is also interesting to take a look at the Plain Language Movement. The idea is that legal documents are often too complex and unintelligible to a layperson. This is not an innocent affair given the fact that people are constantly required to sign documents whose content they can barely be assumed to understand. Try downloading software and ask yourself what the terms and conditions actually do or do not require you to know or do ...

interpretation. And, finally, establishing a common understanding may simply be a unilateral affair. It might happen that Marcus gives up his private language when talking to John and uses a 'bilateral language', while John continues to use his own private language in talking with Marcus. The net result is that Marcus never signals to John that he normally uses the words differently, and so John will keep thinking that they are in perfect agreement; which in a certain sense is also true.¹⁹

Thus, the interpreting language is shifted under special circumstances. For this shift, special rules need to be put in place. However, there are also explicit ways to change the interpreting language. This is done by what we call *deflectors*.

Deflection.

Deflectors possess the power to shift the interpreting language. Deflectors are among other "in X's sense", "as X calls it", and direct quotation.

Note that these principles stand outside the normal principles of semantic interpretation.

Notice the distinction between direct speech reports and indirect speech reports. A direct speech report does not tolerate the substitution of words, and the words are to be interpreted in the language of the author of the speech, not of the one reporting it. Indirect speech reports are more tolerant.²⁰

9 Evaluative Predicates

Recently, there has been a discussion in semantics concerning words that require judgement such as "good", "wonderful", "awesome" and the like, see Glanzberg (2007), Sæbø (2009) and references therein. It has been argued that they require an extra argument place for the 'judge', because people differ for example in what they call "good". From our perspective, the issue of evaluatives is tangential to what we have to say here, as it will simply further complicate matters. Essentially, what has been argued is that the difference in calling this or that a good car is not due to a difference in meaning of "good" but rather in

19 John in his turn can realise that Marcus's language is different from his and change to his usage. If both happen at the same time they are back to where they started, except with roles exchanged. One can only hope that the situation is suitably asymmetric (John the expert, Marcus the novice) that this will not happen.

20 Cf. among others Maier (2009a,b).

the fact that good is parametrized for the person issuing the judgement. Thus, as we will see, Marcus's concept of "good" may be different from John's, while both allow for variations as to what may be good for someone. The question now arises whether the addition of a judge is at all justified since, as we have seen, the same holds for practically all words. What makes "good" different from "car" is maybe only the expected variation in judgement. We do not expect disagreement to arise about whether this or that vehicle is a car, while we may heavily disagree about whether it is a good car. If that is so, then maybe the addition of an argument place for the judge in "good" is no more justified than an argument place for the judge in "car".

Arguing that some predicates do contain an extra argument seems to be an extreme move, though. For it does seem that whether something is a good car is not open to arbitrary judgement, and so the idea that everybody is one's own best judge on what is good seems to be extreme. If Pete describes some old rusty vehicle that has trouble starting the engine as a good car we are not impressed. We think that even Pete cannot think that way. He must be mistaken in his idea about "good". But if that is so, he is not alone in charge of goodness of cars, it seems.²¹

Still, as people have argued, there is data to be accounted for that show a difference between words with an evaluator and one without. It has been noted, for example, that there is a difference between German "glauben" (believe) and "finden" (find) in that the former reports a purely subjective judgement while the latter is about objective reality. So, when we use "glauben" what we report as our belief is open to scrutiny. It is something that can be experienced. For example, the following sentence reports that someone believes there will be reelections next year, and all it takes is to wait for a year and find out.

(30) Ich glaube, dass es im nächsten Jahr Neuwahlen gibt.

It would be inappropriate to use "finden", though.

(31) #Ich finde, dass es im nächsten Jahr Neuwahlen gibt.

21 Of course, as we repeatedly noted, nobody is in charge of someone else's language. This talk presupposes that there is an objective language which has authority over our use, and that we should at least in principle come to know. In absence of that we are left with only the urge to converge on semantics. The way we can do that is by mutual (or unilateral) acceptance to change our semantics in view of disagreement. Communication therefore also serves to negotiate the position of "semantic expert".

One explanation for this contrast is that “finden” as opposed to “glauben” expects the complement sentence to require a judge as an extra argument. Since the statement that there will be reelections does not call for such an argument, it cannot be used as a complement. For notice that when we do have a judge, “finden” is appropriate:

- (32) Ich finde, dass es im nächsten Jahr Neuwahlen geben sollte.

Note similarly the following contrast:

- (33) a. Ich finde, der Urlaub war super.
b. ?Ich glaube, der Urlaub war super.

Here, the evaluation of the vacations via “super” warrants the use of “finden” while “glauben” is less good here (the conveyed meaning appears to be different).

Matters are subtle. Notice first of all that whether or not something is open to empirical testing is not the issue. Even with certain nonempirical propositions, “finden” cannot be used:

- (34) a. Ich glaube, dass Gott existiert.
b. #Ich finde, dass Gott existiert.

This suggests that what is at stake is that there is an act of subjective judgement that must be central to the complement sentence. The existence of god does not require a judgement to be true even if it is hard to imagine how we can verify its truth.

Kant has made a distinction between “das Schöne” and “das Angenehme”.²² The former, he explains, is not subject to subjective judgement while the latter is. That is, there cannot be a disagreement about what is beautiful while there can be disagreement about what is comfortable. The problem that we have with such explanations is that we do not see how it can actually tell us anything relevant about the meaning of these words. If the meaning of “comfortable” is something like “pleasing the senses”, then all we need is to fix the person whose senses are being talked about. The question is whether this person can in principle be different from the one issuing the judgement. That is to say: is it possible that in saying “this is a comfortable chair” we mean “comfortable

²² We owe this point to Carla Umbach.

for you, judging from my own standards"? And if so, does that warrant adding another argument in the semantics?

Whatever the answer, however, the claim here is not that the syntax/semantics provides an explicit slot for the judge. Rather, it is that the meaning of some constituent is different for different speakers. The additional slot for the judge simply adds another point of variation.

10 Aggregation

One problem in judgement is constituted by aggregation. Also groups may reach a judgement, but whereas for single individuals we are not so sure as to how they get to their opinions, for groups we have more practical experience. For example, speaking for John and Marcus they could announce

(35) Peak oil happened in 2006.

Then this is neither a judgement by Marcus alone nor one of John, but rather a judgement of *both* John and Marcus together. Thus, it is formally different from

(36) John and I think Peak oil happened in 2006.

which is a claim that Marcus makes about what they both are thinking. However, (36) is also used to make explicit what (35) leaves implicit: namely, whose judgement is being reported.

Writing " $j \oplus m$ " for the group of people consisting of John and Marcus, and " $\vdash_{j \oplus m}$ " for the judgement operator of this group, (35) now reads

(37) $\vdash_{j \oplus m}$ Peak oil happened in 2006.

How are we to understand this? One possibility is to say that " $\vdash_{j \oplus m} p$ " is the conjunction of " $\vdash_j p$ " and " $\vdash_m p$ ". Thus, (35) is tantamount to claiming that both John and Marcus agree to /Peak oil happened in 2006./. It does not say that they think that peak oil happened in 2006 because the latter would require them to agree to a common content of the phrase as presented. So, we have an agreement in expression rather than meaning. It assumes that John and Marcus are agreeing to that sentence, it does not say that for them the sentence has the same meaning, to which they both agree. Thus, we find that the situation is much like an oft seen compromise where parties reach an agreement simply because all parties involved can agree to a content as worded even though it

is patently clear that the associated content is not the same to everyone. Quite often however a different meaning is assumed, namely that all members agree to some proposition, whose envelope is appropriately chosen by some part of them.

Another problem is the quorum for aggregation. The default seems to be universal. A group thinks that P iff all members of the group think that P . But the larger the group and the more formal its composition the less transparent the judgement of the group becomes. A phrase such as “the citizens of Seattle think” or “the committee thinks” do not mean the same as “everybody in Seattle thinks” (with “everybody” literally meaning each and every one) or “every member of the committee thinks”. For the rules of coming to a decision can be complicated. In many cases a majority of members is sufficient, in other cases it may be a particular formula by which agreement is reached. Thus, if group judgement is based on a majority vote then “ $\vdash_{j \oplus u \oplus m} p$ ” is equivalent to the disjunction of “ $\vdash_{j \oplus u} p$ ”, “ $\vdash_{j \oplus m} p$ ” and “ $\vdash_{u \oplus m} p$ ”.

11 Communicative Success

There is a further problem of the present account that needs to be looked at. What it comes down to is that there is no way in which speakers can determine whether communication was successful. For unlike an external observer, who has access to all the meanings by the various agents involved, the speakers have no such access and therefore cannot guarantee that the message they want to convey is the one they are taken to convey by others. Nor can the listeners guarantee that any of them ends up with the same message as they do. Then why is communication so successful?

The short answer is: there is nothing to explain, the success is simply an illusion. There is, as far as we can see, no guarantee that communication is successful. Moreover, we deny that the theory that we have developed is in need to show that communication succeeds. The problem is that the success that we so often attest often enough does not withstand scrutiny. What does it mean, for example, that we agree that social reform is necessary in this country? Do we agree to the same concept, the same actions, the same moral values? We guess it is fair to say that we agree to the same words and yet it is likely that we do not agree to the same proposition. In everyone’s view the communication was successful. But what does the success consist in? Maybe, strange as it may sound, it consists in agreeing to the same words, not the same concepts.

Paradoxically, the solution to the problem is therefore not that communication works but that it is presumed to work. We start with the assumption

that everyone speaks the same language as we do. As long we are in agreement we merely see this as confirmation that this is so. When we are in disagreement, however, things get interesting. At this moment we get a chance to learn something new. It can be either new facts about the world or new facts about language and language use. All humans are fallible and have incomplete knowledge. So in communication we either encounter that someone can tell us new facts, or that he or she actually has the right facts where we had them wrong. Or we actually find that the dispute we had wasn't about the facts at all but about the way we describe them.

12 Circularity

Finally, we need to consider an obvious problem. The example that we have shown above suffers from a weakness: it is circular. How can it be that we effectively communicate the breakdown of communication with the very same language whose reliability is at issue? The answer to this is that the circularity is unavoidable and has to be accepted. In other words, there is no guarantee that the procedure we have shown above will improve the situation. All we can say is that in all likelihood things will get better.

So, in discussing matters relating to oil, we of course rely on the ability to communicate using words other than "oil". Basic vocabulary must be treated as commonly known and identical across speakers. Of course, there is no guarantee that this is the case, but it is unlikely that we disagree on basic words. We may therefore restrain our use of nonbasic words until we get a more satisfactory agreement on the terms in question. This is in essence what dictionaries do. They give definitions of words in terms of other words (though the latter too in fact often come from quite specialised fields). This is often easier said than done. How, for example, can we define "oil" such that it is clear to everyone what is and what isn't oil? The short answer is: this is impossible. Strangely, though, in the situation described above it is not necessary to come up with such a definition. It so turns out that one speaker, here John, actually comes up with the idea that there are two types of oil, conventional and unconventional oil. This remark typically does two things: the first is that it establishes John as something of an expert. The heuristic (fallible, of course) says that someone who asserts something like that is probably someone who knows more on the subject. This then has the likely consequence that the others consider his opinions henceforth more trustworthy than their own. And they will probably change their own language behaviour so as to follow John's. The rationale is clear: if John is the expert, he probably knows better than we do.

13 Conclusion

That we all talk different languages is not a new observation, yet it has so far not received the treatment that it deserves. Though in recent years there have been debates over evaluative predicates or contextualism, for example, they do not cover the problem of (semantic) ideolects. For they mostly deal with what expressions mean for a single speaker. Contextualism does not ask why it is that we understand words differently and how we can learn to avoid that, it asks how come a word assumes a different meaning in a different context. The evaluative adjectives on the other hand seem to point in that direction but still matters are different. For the idea is not that we all understand evaluative words differently. It is only that the semantics of these terms may require to ask about subjective values. To know whether “You like tennis” is true we need to know something about your feelings. That does not mean that your meaning of “like” differs from ours, only that you like different things. Similarly for adjectives like “good”, “alleged” and so on, which seem to require an additional argument.

But our present case is completely different. We are looking at the issue of meaning variation across speakers, which may target any word whatsoever. There is no guarantee that you and someone else agree on the meaning of the word “and”, for example. That such variety exists is not only possible, it is to be expected if languages have to be learned. The fact that learning a language has to proceed in a limited time window is one argument, see Niyogi (2006). Another is that languages change, and the change needs to spread since it is not a top down process. No one has authority over language even though some institutions wish they had.

Faced with the potential disagreement even about basic words, we are caught in a vicious circle. We use communication to share ideas and at the same time we need communication to also learn the language. That process is never complete, we are only approximating each other. Hence the eternal gap that spawns between the ideal homogeneous language community linguists like to look at and the real, anarchic language community that exists everywhere where there is language. And yet, this circle has a solution quite like the hermeneutic circle: the more we talk to each other, the easier it gets, and the more we can come to understand each other.

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Was glaubt EDE, wer der Mörder ist?

On D-trees, Embedded Foci, and Indirect Scope Marking*

Malte Zimmermann

1 Pot and Tissue

Recent years have seen much progress in the identification of two central question-based *discourse strategies*, which are marked by prominent accent patterns in intonation languages, such as English and German. The notion of discourse strategy here refers to a specific subpart of a question-based discourse structure the presence and identification of which results in a greater degree of discourse coherence and aids the discourse participants in achieving their common goals of exchanging information and *Common Ground* (CG) update (Stalnaker 1978).

First, focus accenting in matrix clauses is standardly analysed as making formal reference to the *Question under Discussion* (QUD) (Roberts 1996/2012) or *Current Question* (Beaver & Clark 2008), where the QUD is the currently prominent question that the discourse participants seek to reach agreement on at a given point in the discourse. This is illustrated in (1a) and (2a), in which the falling focus accents (\\) on subject and object point to the subject and object question in (1b) and (2b), respectively, as suitable QUDs.

- (1) a. EDE_F is reading a Ruth Rendell novel.
b. QUD: Who is reading a Ruth Rendell novel?
- (2) a. Ede is reading a Ruth REN\\dell novel_F.
b. QUD: What is Ede reading?

* I would like to use this opportunity to thank Ede for his support and lasting influence on my semantic thinking since our first encounter in Frankfurt on the Main in 2000. When I asked Ede back then whether he would be willing to co-supervise my University of Amsterdam PhD thesis his first question was whether he would get to wear one of these fancy Dutch professorial robes in the PhD defense. And he did! Over the years, Ede has been a constant source of inspiration. I benefited immensely from our weekly meetings during my PhD. I don't know of anybody else who can make complicated things seem so simple in teaching. What I didn't know, however, is that Ede does not like Inspector Wexford novels.

While the QUD can be, and often is left implicit in the preceding discourse, this discourse strategy is manifested overtly in the case of question-answer congruence (e.g. Krifka 2001).

Secondly, the presence of a contrastive topic (CT) accent—in addition to a focus accent—is used to mark a more complex discourse strategy that consists of a hierarchically structured larger chunk of question-based discourse moves, where the notion of discourse moves subsumes both questions and assertions. Büring (1997, 2003) shows that CT-marking in declarative clauses points to the existence of a higher question in the D(iscourse)-tree, which splits up into various subquestions. These vary in the position of the CT-marked constituent, and one of them serves as the QUD for the CT-marked assertion in question. For illustration, the CT-accent (/) on the subject in (3a) points to the existence of the superquestion in (3b). This superquestion splits up into the subquestions in (3c), the first of which is the QUD for (3a), as indicated by focus accent on the direct object.

- (3) a. EDE/_{CT} reads Ruth REN\dell_F.
- b. WHO/ reads WHAT\?
- c. What does EDE/ read? What does MAL/te read? What does MAG/da read?

It should be observed that the more complex internal organisation of this discourse strategy is directly reflected by the more complex accent pattern of the declarative clause.

These findings give rise to the question of whether there are other question-based discourse strategies, in addition to focus-induced QUD-answer pairs and CT-induced question-subquestion configurations, and, if so, what their discourse-semantic nature is, and how they are marked grammatically? In particular, are there other ways of making formal reference to discourse strategies consisting of a set of hierarchically layered questions? The present article sets out to answer the first of these questions in the positive by investigating the discourse- semantic nature of embedded focus accenting, as illustrated in (4) for accenting in conditional antecedents, and indirect scope marking in *wh*-questions, as illustrated in (5) for German.

- (4) If Malina PA\tel_F were involved in the murder, Wexford would not be surprised.
- (5) Was glaubt Ede, wer der Mörder ist?
 “What does Ede believe? Who is the murderer?”

Both phenomena have been treated separately in the literature so far, but, as will be argued in this article, both construction types exhibit important parallels in discourse-semantic behaviour and structure. Based on these parallels, it will be argued that embedded focus accenting and indirect scope marking in *wh*-questions both have the discourse-semantic function of formally marking the discourse strategy of *question restriction*. Question restriction by means of embedded focusing/*wh*-scope marking shows both properties of *question-answer* and *question-subquestion* configurations, suggesting that it is situated between these two strategies in terms of discourse-semantic complexity. First, same as with question-answer pairs, question restriction relies solely on focus accenting, indicating that the superquestion and its subquestions are of the same semantic type, unlike with CT-congruence; see section 2. Secondly, same as with question-subquestion configurations, question restriction appears to make reference to two different question layers at the same time, which stand in a *question-subquestion* relation as well. For illustration, consider (4) with an embedded focus accent on the subject of the conditional clause. To be sure, unlike with instances of matrix focus, this sentence does not appear to be an answer to the QUD in (6), in which the focused constituent is replaced by a *wh*-element:

- (6) Who is such that Wexford wouldn't be surprised if s/he were involved in the murder?

Rather, (4) appears to be an answer to the general question (7Q'), which is restricted by the more specific question (7Q) at a lower level in the discourse tree.

- (7) Q': Under which conditions wouldn't Wexford be surprised?
Q: Who is involved in the murder?

The core proposal in a nutshell is, then, this: grammatical configurations involving embedded focus marking and *wh*-scope marking indicate the discourse strategy of question restriction, informally illustrated in (7). The entire sentence provides an answer to a general superquestion, which, because of its unspecific question domain, is appropriately restricted by the content of the embedded clause. The article is structured as follows. Section 2 provides some relevant background information on the theoretical concepts of D-trees and the two discourse strategies of *question-answer* and *question-subquestion*, which are familiar from the literature. The end of the section puts forward the main proposal, according to which there is a third question-based discourse strategy that is grammatically marked in natural language: *question restric-*

tion. Building on recent work on embedded foci by Beaver (2012) and Onéa (2013), section 3 puts forward an analysis of embedded focus accents as formal markers of question restriction. Drawing on the observable empirical parallels between embedded foci and *wh*-scope marking, section 4 then argues that indirect scope marking in *wh*-questions is a grammaticalised instance of question-restriction. Section 5 concludes. For obvious reasons, examples are frequently based on Ruth Rendell novels, including—alas—Inspector Wexford novels. The examples may also contain the occasional trace of Cockney slang.

The discussion is restricted to intonation languages with consistent focus accenting. Recent cross-linguistic work on other types of languages has shown, for instance, that grammatical focus marking on non-subjects is not mandatory in many languages, such that the (implicit) QUD is not consistently marked in such languages and the question of embedded focus marking does not even arise (Cable 2012; Hartmann & Zimmermann 2007, 2012; Zimmermann 2011, a.o.). In other language types, the discourse strategies of question-answer and CT-induced question-subquestion are not marked prosodically, but instead by different grammatical means, such as morphological markers (e.g. Japanese, see Vermeulen 2012) or syntactic marking (e.g. Vietnamese, see Tran 2013). It is left open to what extent the current proposal would extend to such languages.

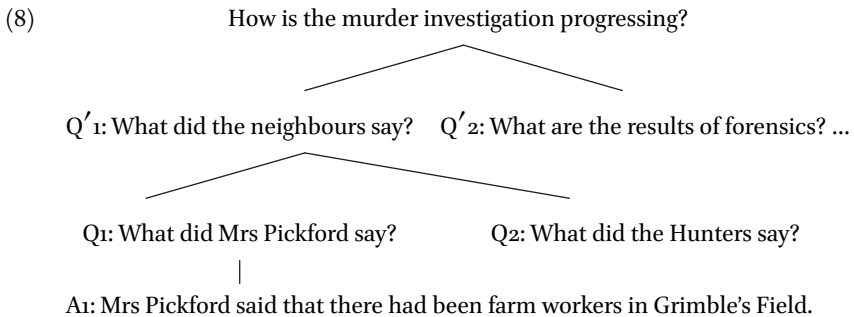
2 D-trees and Strategies

This section introduces some relevant background information on discourse structure and question-based discourse strategies, following which the core proposal is presented. Section 2.1 introduces the notions of discourse moves and D-trees, drawing on Büring (2003) and earlier work by Roberts (1996/2012). Section 2.2 discusses the notion of question-based discourse strategy, which will be of central importance for the discussion of embedded focus accents and *wh*-scope marking in sections 3 and 4. Section 2.3 briefly recapitulates the discourse-semantic analysis of focus accenting and CT-accenting in terms of D-trees and strategies. Finally, section 2.4 puts forward the central proposal, according to which embedded focus accents and *wh*-scope marking are grammatical markers of a third kind of question-based discourse strategy, namely question restriction.

2.1 Moves and D-Trees

Following Stalnaker (1978), natural language discourse is commonly analysed as a joint enterprise of discourse participants with the common goal of increasing the mutually shared knowledge registered in the CG. This principal goal is

to a large extent achieved by means of a sequence of questions, which raise issues of interest, and assertions, which provide answers to these questions and ideally settle the issue.¹ Following Carlson (1983) and Büring (2003), the individual speech acts of question and assertion contributing to CG-updates are often called *moves*, highlighting the conception of discourse as a game played by the discourse participants with the common goal of gaining shared knowledge (Lewis 1979). Furthermore, discourse is hierarchically structured (Asher & Lascarides 2003): Not all discourse moves operate at the same discourse-semantic level. Instead, a discourse consists of more general issues which split up into more manageable sub-issues. Idealising, the general issues are settled by a sequence of general questions and ever more specific sub-questions, occupying higher and lower levels in the discourse structure (Roberts 1996/2012). Following Büring (2003), the hierarchical organisation of discourse in terms of (sub)questions and answers can be modelled in the form of *D(iscourse)-trees*, in which the various moves and sub-moves are organised in a structure tree. This is illustrated in (8):



Again following Büring (2003: 517 f.), the well-formedness of D-trees is subject to two kinds of constraints. First, it is subject to constraints concerning the propositional content of a move, namely *informativity* relative to the CG (Stalnaker 1978) and *relevance* relative to the QUD (Roberts 1996/2012). A move is relevant if (an answer to) it provides at least a partial answer to the QUD; see Büring (2003) and Roberts (1996/2012) for more discussion. The second kind of constraint, which is of relevance here, is subsumed by Büring (2003: 518)

1 See, for instance, Roberts (1996/2012) for a model in which all kinds of communicative goals are achieved by means of a rigorous question-subquestion-answer strategy. See Krifka (2012) for a more comprehensive model of discourse structure based on speech acts, in which information exchange by means of questions and answers constitutes just one particular subcomponent of the discourse, which is taken to consist of speech-act based social commitments of the interlocutors.

under the notion of *congruence*. Congruence constraints concern the relation between the grammatical realisation of a discourse move, its accenting pattern that is, and its position in the D-tree. If the accent pattern of a move does not correspond to its local discourse context, i.e. its D-tree environment, it will be infelicitous.

2.2 *Question-based Discourse Strategies*

The notion of a question-based *discourse strategy* refers to a subpart of a discourse, or a D-tree, the parts of which are structurally related by dominance and (possibly) linear precedence, and which is devoted to the settling of a particular issue of interest (Roberts 1996/2012). For instance, the leftmost branch in the discourse fragment in (8) represents a strategy devoted to gaining relevant information concerning the interrogation of witnesses. Buring (2003: 518) gives a broad definition of discourse strategy in terms of D-trees and discourse moves, which will be adopted here:

- (9) Any subtree of a d-tree which is rooted in an interrogative move is a *strategy*.

According to this definition, any subpart of a D-tree that is dominated by a question move counts as a strategy. It should be noted that Buring (2003: 520) later gives what appears to be a more narrow definition of “indicating a strategy”. According to this later definition, the notion of discourse strategies is restricted to the presence of CT-marking, which appears too narrow for our present purposes. For the time being, we will assume that there are at least two kinds of question-based strategies marked by different accent patterns in intonation languages. These are discussed in more detail in section 2.3. Section 2.4 then introduces a third strategy, which is formally indicated by the presence of embedded focus marking.

2.3 *Marking of Strategies: Question-Answer and Question-Subquestion*

The literature discusses two prominent cases in which a specific accent pattern indicates the existence of a question-based discourse strategy. The more basic strategy is question-answer, as illustrated in (1) and (2). It is indicated by focus accent on the element corresponding to the questioned constituent in the QUD. The D-trees for (1) and (2) are shown in (10a) and (10b):

- (10) a. QUD: Who is reading a RR-novel. b. What is Ede reading?

|
A: EDE is reading a RR-novel.

|
A: Ede is reading a RR-NOVEL.

Both D-trees in (10) comply with the definition for strategies in (9), as both are rooted in a question, the QUD. Consisting of only two elements, question-answer is the minimal instantiation of a discourse strategy, ignoring borderline cases of individual question moves. As stated above, the QUD can be, and often is left implicit. Its resolution is governed by the location of focus accent in the assertion, which imposes a formal constraint on the QUD along the lines of the informal *Focus Principle* in (11) from Beaver & Clark (2008: 37).

(11) *Focus Principle*

Some part of a declarative utterance should evoke a set of alternatives containing all the Rooth-Hamblin alternatives of the [QUD].

We follow Rooth (1992), Roberts (1996/2012) and Beaver & Clark (2008), in assuming that the primary discourse-semantic function of focus accenting consists in establishing a formal congruence between an assertion A and its corresponding QUD. In alternative semantic terms (Rooth 1985, 1992), focus congruence spells out as in (12):²

(12) *Matrix Focus Congruence*

FOC in A indicates a strategy in D iff there is a question under discussion Q such that $Q \subset \llbracket A \rrbracket^F$

The question-answer sequences in (10a) and (10b) are well-formed in accordance with focus congruence, as shown in (10'):

- (10') a. $\text{QUD}_{10a} \subset \llbracket (10aA) \rrbracket^F$;
 with $\llbracket (10aA) \rrbracket^F = \{\lambda w. x \text{ is reading a Ruth Rendell novel in } w \mid x \in \text{PERSON}\}$
 b. $\text{QUD}_{10b} \subset \llbracket (10bA) \rrbracket^F$;
 with $\llbracket (10bA) \rrbracket^F = \{\lambda w. \text{Ede is reading } y \text{ in } w \mid y \in \text{THING}\}$

2 The subset relation between Q and $\llbracket A \rrbracket^F$ in (12) is found in various formalisations in Rooth (1985, 1992), Beaver & Clark (2008), Onéa (2013: 110), a.o. These accounts differ from Roberts's (1996/2012) conception of focus congruence, which assumes the stronger identity relation $Q = \llbracket A \rrbracket^F$. See also Onéa (2013: 112), who argues that both notions of focus congruence may be required for different kinds of QUDs. As nothing hinges on it, we will stick with the more general subset condition for focus congruence for the time being.

Conversely, focus congruence rules out the infelicitous question-answer sequences in (13) as involving incongruent discourse moves, since QUD $\nsubseteq \llbracket A \rrbracket^F$ as illustrated in (13a) and (13b):

- (13) a. #QUD: Who is reading a RR-novel? A: Ede is reading a RuthREN\dell novel_F.
 b. #QUD: What is Ede reading? A: EDE_F is reading a RR-novel.
- (14) a. $\{\lambda w. x \text{ is reading a Ruth Rendell novel in } w | x \in \text{PERSON}\}$
 $\nsubseteq \{\lambda w. \text{Ede is reading } y \text{ in } w | y \in \text{THING}\}$
 b. $\{\lambda w. \text{Ede is reading } y \text{ in } w | y \in \text{THING}\}$
 $\nsubseteq \{\lambda w. x \text{ is reading a Ruth Rendell novel in } w | x \in \text{PERSON}\}$

The second, more complex strategy of *question-subquestion* is marked by the co-occurrence of CT-marking and focus marking within the same clause (Jackendoff 1972). As demonstrated in Büring (2003), the central discourse-semantic function of this accent pattern is not only to point to the existence of a higher question in the context, to which the utterance in question provides a partial answer, see Roberts (1996/2012). In addition, the location of CT- and focus accent provides information regarding the way in which this question splits up into different sub-questions, which are elements of the larger question. CT-marking thus provides additional information on how precisely the discourse is unfolding from the less specific superquestion. To illustrate, consider the multiple question Q' in (15), which can be split up into subquestions Q in two different ways, depending on prosodic realisation.

- (15)
- | | | | |
|-------------------------------|--------------------------|-------------------------------|--------------------------|
| Q': Who reads what? | | | |
| Q1: What does E/de read? | | Q2: Who reads TOL/kien? | |
| | What does MAL/te read? | | Who reads FAUL/kner? |
| | What does CaroLINE/read? | | Who reads Ruth REN/dell? |
| A1: EDE/ reads Ruth REN\dell. | | A2: EDE\ reads Ruth REN/dell. | |

The different ways of splitting up the general question into smaller, more manageable subquestions correspond to two different instantiations of the question-subquestion strategy. The left-branching strategy (Q'–Q1) sorts the general question by subject denotations, as indicated by CT-accent on the subject. The right-branching strategy (Q'–Q2) first sorts Q' by object denotations,

and is marked accordingly by CT-accent on the object. Formally, the congruence of the $Q'-Q-A$ sequences in (15) is captured in the CT-congruence rule in (16), slightly adapted from Büring (2003: 520). The semantic CT-value $\llbracket \cdot \rrbracket^{CT}$ stands for a set of sets of propositions that differ in the position of CT- and focus constituent, and all propositions with identical value for the CT-constituent are collected in individual sets:

(16) *CT-congruence*

CT in A indicates a strategy in D iff there is a non-singleton set Q' of questions such that for each $Q \in Q'$, i.) Q is identical to, or a sister of the question that immediately dominates A, and ii.) $Q \in \llbracket A \rrbracket^{CT}$.

To see CT-congruence at work one should compare the CT-values of (15)-A₁ and A₂ given in (17a) and (17b). The set in (17a) corresponds to the subject-sorting strategy. It consists of sets of propositions in which the value for the subject is fixed and the object value varies. By contrast, the set in (17b) corresponds to the object-sorting strategy. It consists of sets in which the value for the object is fixed and the subject value varies.

- (17) a. $\{\{\lambda w. \text{Ede reads } y \text{ in } w \mid y \in \text{THING}\}, \{\lambda w. \text{Malte reads } y \text{ in } w \mid y \in \text{THING}\}, \{\lambda w. \text{Caroline reads } y \text{ in } w \mid y \in \text{THING}\} \dots\}$
 b. $\{\{\lambda w. x \text{ reads Ruth Rendell in } w \mid x \in \text{PERSON}\}, \{\lambda w. x \text{ reads Tolkien in } w \mid x \in \text{PERSON}\}, \{\lambda w. x \text{ reads Faulkner in } w \mid x \in \text{PERSON}\} \dots\}$

According to CT-congruence in (16), the CT-marked assertion (15)-A₁ requires the existence of a set of questions Q' , realised by the superquestion *WHO/reads WHAT/?*, which consists of the individual subquestions in Q₁, the meanings of which are all contained in (17a)). Conversely, (15)-A₂ requires a different set of questions, realised by the superquestion *WHO\ reads WHAT/?*, consisting of the individual subquestions in Q₂, the meanings of which are all contained in (17b). As for incongruent instances of question- subquestion, it is easy to see that the subject-sorting strategy is incongruent with CT-marking on the object, resulting in the CT-value in (17b), which does not contain the meaning of any of the subquestions in Q₁ (18a). Likewise, the object-sorting strategy is incongruent with CT-marking on the subject, as the CT-value in (17a) does not contain the meaning of any of the subquestions in Q₂ (18b).

- (18) a. $\#Q'$: What do the LIN/guists read? A: EDE\ reads Ruth REN/dell.
 b. $\#Q'$: Who reads the different AU/thors? A: EDE/ reads Ruth REN\dell.

The section concludes with two additional observations. Firstly, as already pointed out in connection with question-answer, either superquestion or subquestions, but not both, are often left implicit in natural discourse since the intended discourse strategy is already marked by means of CT-marking and CT-congruence anyway; see Onéa (2013: 157) for discussion of this point. This is illustrated for implicit subquestions in (19a) from Buring (2003: 526), and for implicit superquestions in (19b).

- (19) a. Q': What did the popstars wear?
 A: The FEMALE/ popstars wore CAF\tans.
 implicit Qs: What did the male/female/transgender popstars wear?
 b. Q: How did you do in the exam?
 A: Well, I/ PAS\sed.
 implicit Q': How did you students do in the exam?

The recoverability of question or subquestion through CT-marking on the corresponding assertion provides a powerful tool for the efficient organisation of natural language discourse.

The second observation concerns the fact that CT-marking is not the only way of indicating that an assertion addresses more than one question simultaneously. For instance, sentences with multiple focus marking, such as (20a), can be taken as answers to a single multiple QUD, as in (20b). Still, they can also be conceived of as marking a single assertion as providing simultaneous answers to two independent QUDs that occupy the same level in a D-tree, as in (20c).

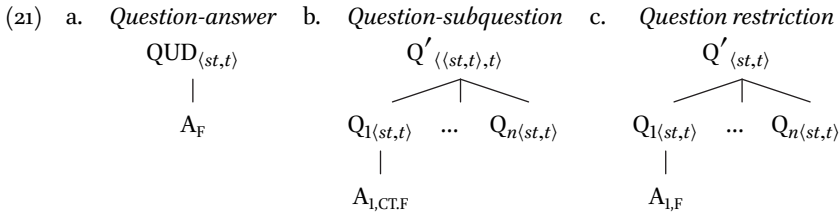
- (20) a. EDE\ reads Ruth REN\ dell.
 b. WHO\ reads WHAT\?
 c. Who reads something? What is read?

In the next section, we propose that intonation languages have yet another way of formally marking declarative assertions as simultaneously addressing more than one question.

2.4 *The Proposal: Question Restriction*

So far, we have seen two discourse strategies that are formally marked in German and English. These are shown schematically in (21). Question-answer in (21a) is marked by focus-accent, whereas question-subquestion in (21b) is marked by a combination of CT- and focus accent. In sections 3 and 4, it will be argued that there is a third discourse strategy of question restriction, cf.

(21c), which is prosodically marked by embedded focus accenting, and which is grammaticalised in the form of wh-scope marking constructions.



The abstract representation in (21c) brings out the parallels between question restriction and the other two strategies in (21ab). Same as question-answer, question restriction solely relies on focus accenting. Same as question-subquestion, question restriction involves two layers of questions and subquestions. The crucial difference between these two complex question strategies lies in the relation between question Q' and subquestions $Q_{1\dots n}$, as indicated by the semantic type subscripts in (21b) and (21c). In question-subquestion, the individual subquestions are *elements of the set of questions* denoted by the larger question Q' , cf. (16). In question restriction, the subquestions are *subsets of the set of propositions* denoted by Q' . In other words, unlike in (21b), question and subquestion do not differ in semantic type, which is $\langle st, t \rangle$ in both cases. Rather, they differ in their restriction, with the subquestions $Q_{1\dots n}$ being more specific instantiations of the less specific superquestion Q' . This is captured as the embedded focus-congruence rule:

(22) *Embedded Focus Congruence*

Embedded focus accent in a syntactically complex clause A indicates a strategy in D iff there is a less specific question object Q' and a more specific subquestion Q , such that (i.) $Q \subset Q'$, (ii.) $Q \subseteq \llbracket A \rrbracket^F$, and (iii.) $\llbracket A \rrbracket^0 \in Q'$.

The next section shows how these assumptions can be applied to the puzzle of embedded foci.

3 Embedded Foci

3.1 *Embedded Foci and Problems for Existing Accounts*

Focus accents are not restricted to matrix clauses, but can also occur in embedded environments. This is illustrated for complement clauses in (23), for restric-

tive relative clauses in (24) and for conditional antecedents in (25), repeated from (4) above.³

- (23) a. Sue doubts that Ed attended the meeting, but we all agree that JILL_F
attended the meeting. (Kratzer 2004: 126, ex. 3b)
b. Ede adam and eves that HEA\ther_F is the murderer.
- (24) Burden discovered the cellar in which the MUR\derer_F buried a dead body.
- (25) If Malina PA\tel_F were involved in the murder Wexford would not be surprised.

Looking at embedded foci in complement clauses first, their existence is unproblematic for the standard Roothian (1992) account, on which the focus alternatives are determined by the scope of a silent focus operator ‘~’; cf. Onéa (2013: 111). When this operator attaches to the embedded CP in (23), the embedded focus accents are licensed by the presence of the questions ‘Who attends the meeting?’ and ‘Who’s the murderer?’, respectively, in the preceding context. Likewise, Beaver & Clark’s (2008) focus principle in (11), according to which only part of a declarative utterance can impose a constraint on the form of the QUD, allows for the existence of embedded focus accents in discourse sequences such as in (26):

- (26) QUD: Who laughed?
A: (I don’t know for sure). I think MA\ry_F laughed.

On this line of reasoning, the occurrence of embedded foci in complement clauses would signal that the complex utterance is not a direct answer to the QUD. This contrasts with the stronger proposal in Roberts (1996/2012), according to which the entire utterance must be congruent to the question under discussion at the time of utterance. The position of embedded focus accents in assertions would constrain the form of possible QUDs in a fully transparent fashion, without the need for finding relevant subparts of the utterance, or silent operators at an abstract level of interpretation. On this line

3 The discussion of embedded foci is restricted to focus accent patterns that cannot be accounted for independently, for instance by focus projection from the most deeply embedded constituent to sentence- embedding constituents and to the matrix level (Selkirk 1984). Focus projection from the embedded subject is blocked in (23) to (25).

of reasoning, focus on embedded *Mary* in (26A) would indicate that it is a direct answer to the QUD in (26'):

(26') QUD: Who do you think laughed?

In contrast to complement clauses, the occurrence of embedded foci in restrictive relative clauses (24) and in conditional antecedents (25) poses a real challenge both for the weak and for the strong version of QUD-answer congruence. As already pointed out in the introduction, the complex sentences in (24) and (25) do not constitute answers to the simple questions in (23') and (24') in any obvious sense, as they should according to Beaver & Clark (2008). Nor can they serve as felicitous answers to the questions in (23'b) and (24'b), as they should according to Roberts (1996/2012).

(23') a. Who buried a dead body?

b. Who is such that Burden discovered the cellar in which this person buried a dead body?

(24') a. Who is involved in the murder?

b. Who is such that if that person were involved in the murder Wexford wouldn't be surprised?

In response to the problem of embedded foci in conditionals, Onéa (2013: 91) tentatively suggests that the constraints on question-focus congruence be weakened. It would no longer be necessary for the focus-containing assertion to answer the QUD in (24'a), as long as this QUD is targeted in some sense. The notion of targeting appears close enough in spirit to the Roothian concept of anaphoric focus licensing by matching chunks of structure in the preceding context. Still, such weakening is of no help in the case of restrictive relative clauses, such as (24), which could never be felicitously uttered in a context containing (23'a). Rather, (24) is a felicitous response to the object question in (27a) and the VP-question in (27b), respectively:

(27) a. Q: What did Burden discover?

b. Q: What did Burden do?

In parallel fashion, (25) is most naturally construed as an answer to the question in (28):

(28) Q: Under which conditions wouldn't Wexford be surprised?

The observable question-answer patterns suggest that embedded foci in restrictive clauses and conditional antecedents are *truly* embedded: They cannot be replaced by a wh-element with matrix scope in the corresponding QUD, pace Roberts (1996/2012) and Beaver & Clark (2008). The argument can be extended to embedded foci in complement clauses. At the same time, though, the position of the embedded foci in (24) and (25) *does* have an information-structuring effect on their discourse environment, which is not captured by the underspecified questions in (27) and (28). For instance, (24) (pre)supposes that there was another person that buried a body. Likewise, (25) (pre)supposes that somebody was involved in the murder. Krifka (2006) proposes to account for the two-level effects of local focus accenting, which determines the local focus alternatives, and the focus-embedding constituent, or *focus phrase*, which determines the QUD, in terms of a hybrid account of focus, which makes use of both structured meanings *and* alternative semantics.

An alternative solution in terms of local question accommodation is briefly hinted at in Beaver & Clark (2008). The approach is discourse-based and relies on the concept of locally accommodated questions (Onéa 2013), or *local questions* for short (Beaver 2012). The idea is that the mismatch between the unspecific wh-question addressed by the complex utterance and the local focus alternatives generated by the embedded focus is resolved by accommodation of a local question that fits the local focus alternatives. In the case of (25), the accommodated question would be ‘Who is involved in the murder?’. Contrasting with Krifka (2006), the additional complexity required for resolving the mismatch between the general question in (28) and the embedded focus in (25) is not located in the abstract syntactic representation, but in the discourse-semantic representation in the form of enriched D-trees. Such enriched D-trees contain an intermediate level of accommodated questions, and it is these restricted questions that function as QUDs for assertions containing embedded foci. The concept of enriched D-trees qua local questions thus allows for maintaining strict congruence between assertions containing embedded foci and their corresponding (implicit) QUDs, but the formal conditions for question accommodation are not worked out in any detail. Building on these suggestions, the next sub-section puts forward a formal account of local questions as part of a more general discourse strategy of *question restriction*.

3.2 Question Restriction: Analysis

The last section has shown that assertions containing embedded foci do not stand in a question-answer relation to wh-questions in which the focused constituent has been replaced by a matrix scope wh-expression, à la Roberts (1996/2012), cf. (23’b) and (24’b). Instead, utterances containing embedded

foci are felicitous answers to less specific wh-questions that do not reflect the impact of embedded focus marking at all, cf. (27) and (28). The question is, then, how to integrate the information-structuring nature of embedded foci in a more general picture of question-answer congruence as signaling discourse-strategies.

The proposed solution is that all complex assertions containing embedded foci address two questions simultaneously. The two questions stand in a question-subquestion relation. The less specific superquestion indicates the general line of inquiry. The more specific subquestion restricts the superquestion by imposing additional constraints on the question domain.⁴ This process of *question restriction* turns less specific, general questions into more specific questions, and the central discourse-semantic function of embedded foci consists in indicating the existence of this discourse strategy. To put it another way, embedded foci indicate that the containing utterance simultaneously addresses two questions at different levels of the D-tree, which stand in a subset-superset relation to each other. The position of the embedded focus indicates the more specific of the two questions. These facts were captured in the rule of embedded focus congruence in (22), repeated here:

(22) *Embedded Focus Congruence*

Embedded focus accent in a syntactically complex clause A indicates a strategy in D iff there is a less specific question object Q' and a more specific subquestion Q, such that (i.) $Q \subset Q'$, (ii.) $Q \subseteq \llbracket A \rrbracket^f$, and (iii.) $\llbracket A \rrbracket^0 \in Q'$.

For illustration, consider again focus embedding in complement clauses (29), relative clauses (30), and conditional antecedents (31), respectively

(29) Wexford believes that $\text{GREN} \backslash \text{ville}_f$ went to France.

(30) Wexford interrogated the person that $\text{GREN} \backslash \text{ville}_f$ liked.

(31) Wexford will be pleased if $\text{GREN} \backslash \text{ville}_f$ went to France.

The assertion in (29) cannot serve as a direct answer to the question in (32a). Rather, it simultaneously addresses the two questions in (32b) and (32d), which

4 We use *question restriction* as an informal label, leaving it open whether the process should be more adequately modeled in terms of *domain narrowing* or *informative extension*; see Onéa (2013: 66 ff.) for insightful discussion.

are located at different levels of the D-tree. (32d) is derived by restricting the less specific question in (32b) with the denotation of the implicit question in (32c):

- (32) a. #QUD: Who went to France.
 b. What does Wexford believe?
 c. Who went to France?
 d. What (who went to France?) does Wexford believe? Wexford believes that $\text{GREN} \backslash \text{ville}_F$ went to France. (= (29))

In other words, (29) is a (weakly) exhaustive answer to questions about Wexford's belief states concerning propositions of the form $\lambda w. x \text{ went to France in } w$, and it is a partial answer to questions about Wexford's beliefs in general (Bäuerle & Zimmermann 1991). The semantic effect of question restriction is sketched in (33), using an informal Hamblin-Karttunen denotation.

- (33) a. $Q' = \llbracket \text{What does Wexford believe?} \rrbracket =$
 {Wexford believes that Sheila made a mistake, Wexford believes that Grenville is a man, Wexford believes that the body in the cellar is the body of Peter Darracott, *Wexford believes that Grenville went to France*, Wexford believes that Sheila went to France, ...}
 b. $Q = \llbracket (32d) \rrbracket = \{\text{Wexford believes that Grenville went to France, Wexford believes that Sheila went to France, ...}\}$

As Q is a subset of Q' , the two question meanings satisfy condition (22i). Furthermore, Q is a subset of the focus value of (29), satisfying (22ii). Finally, the ordinary semantic value of (29) is an element of Q' , which satisfies (22iii).⁵

5 The analysis carries over to more complex cases suggested by Daniel Gutzmann (p.c.), in which the embedded focus occurs in a response to an overt wh-question corresponding to the embedded clause:

- (i) Q: Who went to France?
 A1: I believe that $\text{GREN} \backslash \text{ville}_F$ went to France.
 A2: Wexford believes that $\text{GREN} \backslash \text{ville}_F$ went to France.

The responses in A1 and A2 are only indirect answers to Q , whereas the actual implicit QUDs addressed are 'What do you think/ What does Wexford think who went to France?'. This shift from overt question to a different, implicit question gives rise to the implicature that the speaker does not take full accountability for the truth of the answer in A1, and that Wexford is somehow in the known about who went to France in A2. As pointed out

Embedded foci in relative clauses (30) and conditional clauses (31) can be accounted for in a parallel fashion, as shown in (34) and (35), respectively.

- (34) a. #QUD: Who liked that person?
 b. Q': Which person x did Wexford interrogate?
 c. Who liked that person?
 d. Q: Which person x (who liked x ?) did Wexford interrogate?
 e. A: Wexford interrogated the person that $\text{GREN} \backslash \text{ville}_F$ liked. (= (30))

The complex assertion in (30) answers the general question of which person Wexford interrogated, but the domain of this question is narrowed down to persons with the property of being liked by somebody (34d). The meaning of this question is a subset of the set of focus alternatives of (30), and the ordinary meaning of (30) is a member of Q' in (34b).

- (35) a. #QUD: Who went to France?
 b. Q': Under what conditions will Wexford be pleased?
 c. Who went to France?
 d. Q: Under what conditions (who went to France?) will Wexford be pleased?
 e. A: Wexford will be pleased if $\text{GREN} \backslash \text{ville}_F$ went to France. (= (31))

The complex assertion in (31) answers the complex question 'Under what conditions concerning the question of who went to France will Wexford be pleased?' in (35d), which is derived by restricting the general question in (35b) with the denotation of the implicit question in (35c). Again, the meaning of the restricted Q in (35d) is a subset of the set of focus alternatives of (31), and the ordinary meaning of (31) is contained in the more general question Q' in (35b).

More generally, the three formal conditions on embedded focus congruence in (22) are flexible enough to rule in cases in which Q' is totally unspecific, such as *What happened? or What is the way things are?* (Roberts 1996/2012), granted that such embeddings are ever licit in naturally occurring discourse. Two candidates are given in (36a) and (36b).

- (36) a. It so happened that $\text{POL} \backslash \text{ly}_F$ discovered Rhoda Comfrey's secret.
 b. The way things are the $\text{POL} \backslash \text{ice}_F$ frequently exhibit racist behavior.

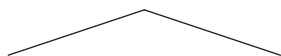
by Daniel Gutzmann (p.c.), these findings may be related in interesting ways to the discussion of embedded implicatures, which are often triggered if the attitude bearer of the matrix clause is considered to be competent regarding a certain question (Chierchia 2004, 2006).

The slightly unnatural status of these examples follows from the difference in informativity between the fully underspecified superquestion Q' and the concrete subquestion Q , which do not form a natural discourse strategy in the absence of additional intermediate questions.

The same type of explanation extends to the marked status of (37), in which the two foci in the coordinated embedded CPs point to the existence of two subquestions to Q' , which are sisters in the same D-tree. The marked status is due to the fact that there is no intuitive link between the two restricting subquestions, and, hence, between the two QUDs in (37c):

- (37) a. ?Ismay thinks [that HEA\ther_F killed Guy], and [that Andrew spent CHRIST \mas_F with his parents].

- b. Q' : What does Ismay think?



Who killed Guy? What did A. spend with his parents?

- c. QUD₁: What does Ismay think concerning the question who killed Guy?

QUD₂: What does Ismay think concerning the question what Andrew spent with his parents?

Still, (37a) is more acceptable than the infelicitous (38a), in which the two embedded foci are located within a coordinated TP-structure. Assuming that it is CPs that are mapped onto question objects at the syntax-semantics interface, this follows as well. The embedded clause as a whole is mapped onto a single question restricting Q' , thus yielding the focus- congruent, but nonetheless pragmatically illformed QUD in (38b-ii).

- (38) a. #Ismay thinks [that HEA\ther_F killed Guy and Andrew spent CHRIST \mas_F with his parents].

- b. (i) Q' : What does Ismay think?



Who killed Guy and what did Andrew spend with his parents?

- c. (ii) QUD: #What does Ismay think concerning the question of who killed Guy and what Andrew spent with his parents?

We conclude this section with two observations lending additional support to the proposed analysis. First, the fact that the restricting questions marked by embedded foci are often implicit and subject to accommodation is already familiar from the discussion of CT-marking, for instance in connection with the

caftan sentence in (19a). Secondly, the ever more specific questions involved in question restriction can always be made explicit in form of a sequence of cascading independent questions. For instance, (29) and (31) are licit answers to the question sequences in (39b) and (39b), respectively, which exhibit *question subordination*:

- (39) a. What does Wexford believe? Who went to France?
 Wexford believes that GREN\ville_F went to France. (= (29))
 b. When will Wexford be pleased? If who went to France? Wexford will
 be pleased if GREN\ville_F went to France. (= (31))

Interestingly, such subordinating questions form the closest English equivalent to wh-scope marking constructions in other languages, such as (40) from German:

- (40) *Was glaubt Wexford wer nach Frankreich gefahren ist?*
 What believes W. who to France gone is
 ‘What does Wexford believe? Who went to France?’

We return to this point in section 4, where it is argued that the empirical parallel between question restriction and wh-scope marking is not coincidental, but follows on principled grounds.

3.3 *Extensions & Non-Extensions*

The proposed analysis of embedded foci as marking the discourse strategy of question restriction easily extends to instances of embedded focus in other languages. These are sometimes treated under the label of focus recursion. A case in point are instances of embedded structural focus in Hungarian, as discussed in Bende-Farkas, (2010), who shows that the sentence in (41) optionally allows for an interpretation on which the embedded focus takes narrow scope inside the embedded clause.

- (41) *JÁNOS_{F1} hiszi, hogy MARI_{F2} ment el*
 JOHN believes, that MARY left PFX
 ‘JOHN believes that MARY left.’

On the assumption that embedded foci in Hungarian are—optionally—used for marking the presence of question restriction in the discourse, the present analysis predicts that (41) is a licit answer to the restricted question in (42).

- (42) Who holds a belief concerning the question of who left?

The only difference to the English complement clauses discussed above is that the restricted superquestion is a subject *wh*-question in the Hungarian case. Even more relevant for the present discussion, Hungarian also has an affirmative scope marking construction which is fully parallel to instances of *wh*-scope marking in that language. The embedded focus in (43) takes narrow scope, as indicated by the cleft in the English paraphrase, and it is most plausibly analysed as indicating the existence of a restricting subquestion to the unspecific superquestion *What did Janos believe?* Given question restriction, (43) provides an answer to the restricted QUD in (44):

- (43) *János AZT_{F1} hiszi, hogy MARI_{F2} olvasta a Hamletet*
 Janos THAT-ACC believes that MARY read the Hamlet-ACC
 “What John believes is that it was MARY who read Hamlet.”

- (44) What does John believe concerning the question of who read Hamlet?

At the same time, the proposed analysis is not intended to account for all apparent instances of embedded focus. In particular, it does not appear to extend to instances of focus marking in appositive non-at issue material (Onéa 2013), cf. (45), or to focus marking of material in the German *Nachfeld*; cf. (46). In particular, the QUDs indicated by focus on appositive or postposed material are typically *not* subquestions of the QUD addressed by the matrix clause. The function of this type of embedded foci is therefore *not* to indicate the discourse strategy of question restriction:

- (45) Buzz Aldrin, the SEC\ond_F man on the moon, lives in CaliFOR\nia_F.
 QUD: Where does A. live?
 QUD_{APP}: Was A the first, second, ... man on the moon?
- (46) (Ich habe ihn [mit nach HAU\se genommen_F], den kleinen HUND_F)_{IP}.
 I have it with to home taken the little dog
 QUD: What did you do with *g(x)*? What happened then?
 QUD_{NACHFELD}: What is the referent of ‘*x*’? Whom did I take home?

In these cases, focus on the embedded or postposed material indicates the existence of locally accommodated QUDs, which are triggered by the content of

the main clause. Onéa (2013) proposes to treat such questions under the label of potential questions. The use of potential questions, as typically addressed by appositions etc., constitutes a core instance of non-strategic discourse, which introduces information on side issues that is irrelevant for achieving the objectives of strategic discourse, which is modeled in the form of D-trees. To be concrete, mention of the name Buzz Aldrin in (45) may bring to mind the Apollo 11 mission and activate the new question of whether Aldrin was first or second on the moon. Likewise, the use of a pronominal form in (46) may leave the identity of the intended referent too vague, thus triggering the new question of what the speaker took home. Potential questions are forward-looking in that they never function as subquestions to a question already established in the discourse.⁶ At the same time, once answered, a potential question cannot be used to serve as a super-question for subsequent QUDs, i.e. potential questions cannot be used to initiate new discourse strategies. Rather, potential questions add an orthogonal dimension of discourse structure to hierarchically ordered strategic D-trees; see Onéa (2013) for discussion.

3.4 Summary

This section proposed an analysis of embedded focus accents as pointing to the existence of a discourse strategy of *question restriction*. Question restriction involves D-tree structures consisting of superquestion Q' and subquestion Q, which is a subset of the superquestion. This sets embedded foci aside from contrastive topic accents, which also mark the existence of a question-subquestion strategy, but where the subquestion is an element of the superquestion. Intuitively, embedded foci can be taken as pointing to the existence of a local question restricting an unspecific higher question Q' (Beaver 2012), but, formally, the higher question Q' is also directly addressed by utterances containing embedded foci. It is restricted by the local question, qua question restriction, thus forming a complex QUD to be answered by the complex assertion. The formal rule of congruence for embedded foci in (22) does not make reference to the specific syntactic domain identified as *focus phrase* in Krifka (2006). This suggests that a successful account of embedded focus phenomena does not necessarily require a hybrid system of structured propositions and the projection of alternatives. Rather, focus-induced projection of alterna-

6 In other words, potential questions do not participate in question subordination as discussed above. The independent semantic status of potential questions is reflected by the independent syntactic status of the denoting appositives and right-dislocated material, which are analysed as elliptical independent sentences in Ott & de Vries (t.a.).

tives may be sufficient for accounting for embedded foci, given a Roberts-style discourse-semantic framework making use of discourse strategies, QUDs, and corresponding. Finally, it was pointed out that the account does not extend to all instances of non-matrix focus, in particular not to focus marking in appositives.

4 Wh-scope Marking Constructions As Grammaticalised D-Trees

The central claim of this section is that the discourse-strategy of question restriction is grammaticalised in some languages in the form of wh-scope marking constructions. Section 4.1 gives a brief overview of wh-scope marking and its semantic analysis, following Dayal (1994, 2000) and Lipták & Zimmermann (2007). Section 4.2 puts forwards the discourse-semantic analysis of wh-scope marking constructions as grammaticalised D-trees representing *question restriction*. Section 4.3 discusses a number of predictions made by the analysis and concludes.

4.1 *Wh-scope Marking*

4.1.1 Empirical Properties

Wh-scope marking constructions are biclausal structures with a wh-element each in the matrix clause and the embedded clause, respectively. Their label owes to the fact that the embedded wh-item *appears* to take matrix scope, as indicated by the informal English paraphrase in (47)-Q and by the licit term answers in (47)-A, respectively:

- (47) Q: *Was₁ denkt Ede, [wen₁ Wexford t₁ verdächtigt hat]?*
 what thinks Ede whom Wexford suspected has
 “Whom does Ede think that Wexford suspected?”
 A: TRE\down_F.

The matrix wh-element, by contrast, *appears* to act as a semantically vacuous placeholder marking the scope of the embedded wh-item—at least at first sight! Wh-scope marking is attested in a range of unrelated languages, including German (van Riemsdijk 1983), Romani (McDaniel 1989), Hindi (Mahajan, 1990), Hungarian (Horvath 1995), Russian, Polish (Stepanov 2000), and Pasamaquoddy (Bruening 2006). It is not attested in English, which has to rely on a subordinating paratactic question sequence for expressing the intended content:

- (48) a. What does Ede think? Whom did Wexford suspect?
 b. *What does Ede think whom Wexford suspected?

Whereas in many languages the scope marking wh-item in the superordinate clause is restricted to the [-animate] default question word corresponding to *what*,⁷ all kinds of wh-items (*who*, *why*, *which concept*, *how many unripe coconuts*) can occur in the embedded wh- position. This shows that there is no semantic restriction on the embedded wh-question. Scope marking can also occur iteratively with multiple embeddings. In such iterative scope markings, the scope markers are usually spelled out in each intermediate clause, as illustrated in (49):

- (49) Was₁ denkt Ede, [was₁ Burden gesagt hat, [wen₁ Wexford t₁ verdächtigt hat]]?
 ≈ “Who does Ede think that Burden said that Wexford suspected?”

Crucially, the embedded clause hosting the content wh-item cannot be a select-ed question: Embedding matrix predicates like *ask* are not allowed, cf. (50). This suggests that the embedded question does not function as an indirect question from a discourse-semantic perspective, but is semantically active all by itself.

- (50) *Was fragt Burden [_(+W) wen Wexford verdächtigt hat]
intended: “Who does Burden ask whom Wexford suspected?”

Two additional properties of wh-scope marking constructions are of particular relevance for the analysis to come. Firstly, scope marking questions can always be paraphrased as a paratactic sequence of subordinating matrix questions, without a change in interpretation. This is shown in (51a) for simple embedding, and in (51b) for double embedding.

- (51) a. *Was denkt Ede? Wen hat Wexford verdächtigt?* (= (47))
 what thinks Ede whom has Wexford suspected
 b. *Was denkt Ede? Was hat Burden gesagt? Wen hat Wexford verdächtigt?* (= (49))
 what thinks Ede what has Burden said whom has Wexford suspected

7 This is not a defining characteristic of wh-scope marking. See the discussion of wh-scope marking in Hungarian in sub-section 4.2.1, where it is shown that Hungarian allows for a variety of wh-items in the matrix clause, including those corresponding to *why*, *who*, and *which*-NPs.

Secondly, scope marking questions typically occur with attitude verbs and verbs of saying that select for a proposition as their semantic complement. Scope marking with event-taking perception verbs, by contrast, is ruled out (52d):

- (52) a. Was glaubt/denkt/weiß Ede, wen Wexford verdächtigt hat?
 b. Was rät/empfielt/möchte/will Baker, was Wexford tun soll?
 c. Was sagt Ede (vorher), wer der Mörder ist?
 d. *Was sieht Ede, wen Malte verfolgt?

4.1.2 Semantic Analysis of Wh-scope Marking

The literature offers both syntactic and semantic accounts of wh-scope marking. Some syntactic analyses (Cheng 2000; McDaniel 1989; van Riemsdijk 1983, a.o.) assume a direct syntactic dependency: The embedded wh-item is directly linked to the matrix wh-item in the syntax (and semantics) via LF-expletive replacement of the same kind as *there*-expletive replacement (Chomsky 1986). This account incorrectly predicts that wh-scope marking and long wh-extraction from complement clauses are semantically equivalent, which is not borne out. Firstly, Pafel (2000) shows that embedded wh-items in wh-scope marking and long-extracted wh-items show different scope interactions with quantifiers in the matrix clause. In particular, the embedded wh-item in wh-scope marking cannot take scope over a matrix universal quantifier, cf. (53a), unlike the case with long extraction (53b):

- (53) a. *Was₁ glaubt jeder, wo₁ die besten Weine wachsen?*
 what believes everybody where the best wines grow
 “What does everybody believe? Where do the best wines grow?”
 $\forall > \text{wh}, * \text{wh} > \forall$
- b. *Wo₁ glaubt jeder, dass die besten Weine t₁ wachsen?*
 where believes everybody that the best wines grow
 “Where is it such that everybody believes that the best wines grow there?”
 $\forall > \text{wh}, \text{wh} > \forall$

This suggests that the embedded wh-item is obligatorily interpreted inside the embedded clause. Secondly, Herburger (1994) shows that wh-scope marking and long extraction differ in their presuppositions. Whereas the wh-scope marking construction in (54a) presupposes that a kissing event by Rosa took place, no such presupposition is observed with long extraction in (54b).

- (54) a. *Was_i glaubt Georg, wen_i Rosa geküsst hat? #Wobei sie*
 what believes Georg whom Rosa kissed has but she
niemanden geküsst hat.
 nobody kissed has
 “What does George believe? Whom did Rosa kiss? #But she didn’t kiss
 anybody.”
 \rightsquigarrow *factivity presupposition: $\exists e[\text{kissing}(\text{Rosa}, e)]$*
- b. *Wen_i glaubt Georg, dass Rosa t_i geküsst hat? Wobei sie*
 what believes Georg whom Rosa kissed has but she
niemanden geküsst hat.
 nobody kissed has
 “Whom does George believe that Rosa kissed? But she didn’t kiss
 anybody.”
 \rightsquigarrow no factivity presupposition

In response to these problems Dayal (1994, 2000) and Lipták & Zimmermann (2007) propose an analysis of *wh*-scope marking in terms of an *indirect semantic dependency* between matrix and embedded question, which is equivalent to question restriction, and which will be adopted here.

According to the indirect semantic dependency account, the matrix *wh*-element has semantic content: It introduces an existentially bound propositional variable *q* to the interpretation of the matrix question, which is a question about propositions, cf. (55a). This variable *q* is restricted by another variable *T*, ranging over sets of propositions, i.e. question denotations (Hamblin 1973; Karttunen 1977). The semantic function of the embedded interrogative clause is to provide a value for *T* in the course of the semantic derivation, cf. (55b). Crucially, replacing *T* in (55a) with the interrogative denotation in (55b) is equivalent to question restriction as discussed above, such that the less specific matrix question is mapped onto a more specific subquestion.

- (55) a. *matrix-question: $\lambda p. \exists q[T(q) \& p = \lambda w. \dots q \dots]$*
 b. *embedded question: $\lambda p. \exists x[\text{PERSON}(x) \& p = \lambda w. \dots x \dots]$*

The complete process is illustrated in (56) for our standard example in (47):

- (56) a. **Was₁ denkt Ede, [wen₁ Wexford t₁ verdächtigt hat]?**
 b. $\llbracket \text{Was denkt Ede?} \rrbracket = \lambda p_{\langle s, t \rangle}. \exists q_{\langle s, t \rangle} [T(q) \& p = \lambda w. \text{Ede thinks that } q \text{ in } w]$

- c. $\llbracket \text{wen}_1 \text{ Wexford } t_1 \text{ verdächtigt hat?} \rrbracket$
 $= \lambda p_{\langle s, t \rangle} \cdot \exists x_e [\text{PERSON}(x) \& p = \lambda w. W. \text{ suspected } x \text{ in } w]$
- d. $\llbracket (56a) \rrbracket$
 $= \lambda p_{\langle s, t \rangle} \cdot \exists q_{\langle s, t \rangle} [\llbracket \lambda p_{\langle s, t \rangle} \cdot \exists x_e [\text{PERSON}(x) \& p = \lambda w. W. \text{ suspected } x \text{ in } w] \rrbracket (q) \& p = \lambda w. \text{Ede thinks that } q \text{ in } w]$
 $= \lambda p_{\langle s, t \rangle} \cdot \exists q_{\langle s, t \rangle} [\exists x_e [\text{PERSON}(x) \& q = \lambda w. W. \text{ suspected } x \text{ in } w] \& p = \lambda w. \text{Ede thinks that } q \text{ in } w]$
 \approx Which proposition p of the form “Wexford suspected somebody/ x ” does Ede think to be true? OR
 What are Ede’s thoughts concerning the question of whom Wexford suspected?

The intuitive motivation for this kind of semantic restriction on questions is, again, that questions of the form ‘What does Mary think?’ are too unspecific, since the domain of thoughts entertained by an individual is typically rather large, and, hence, in need of overt specification qua restriction.

Lipták & Zimmermann (2007) provide conclusive empirical evidence in favour of indirect semantic dependency by showing that in Hungarian wh-scope marking is possible into syntactic islands. Next to standard instances of wh-scope marking into subject and object wh- interrogatives, cf. (57), Hungarian also allows for scope marking into adjunct wh-clauses, cf. (58) with the matrix wh-item *why*, and into relative clauses, cf. (59).⁸

- (57) Q: *Mit szeretnél, [hogy hova utazzunk a nyáron]*?
 what-ACC like-COND-2SG that where travel-SUBJ-3PL the summer-on
 (lit.) “What would you like, where should we go in the summer?”
 A: *Olaszországba.*
 Italy-into
 “To Italy.”

- (58) Q: *Miért vagy dühös [mert kivel találkoztál]*?
 what-FOR be-2SG angry because who-WITH met-2SG
 (lit.) ‘Why are you angry because you met whom?’

8 See Lipták & Zimmermann (2007) for a semantic account of scope marking into relative clauses and other syntactic islands, according to which the meaning of the embedded clause is turned into a question-object of type $\langle st, t \rangle$ by a process of generalised question formation, following earlier ideas in Sternefeld (2001, 2002).

A: *Azért, mert Péterrel.*
 that-FOR because Péter-WITH
 “Because I met Péter.”

- (59) Q: [*Ki*]_i / [*Melyik diák*]_i *megy át a vizsgán* [*aki*
 who which student go-3SG PV the exam-ON REL-who
hány pontot szerez]_i?
 how.many point-ACC score-3SG
 (lit.) ‘Who_i/which student_i who_i scores how many points, passes the
 exam?’
 ↗ “How many points does one have to score in order to pass the exam?”
 A: [*Az*]_i / [*Az a diák*]_i [*aki 20 pontot szerez*]_i?
 that that the student REL-who 20 point-ACC score-3SG
 “Who(ever) scores TWENTY.”

Apart from providing evidence against syntactic approaches to wh-scope marking,⁹ instances of scope marking into relative clauses are telling because they are structurally parallel to instances of embedded focus marking in Hungarian, as discussed in connection with (43) above. Both question and answer in (59) contain a focus-accented placeholder element (*ki/az*) in the matrix, and a focused constituent inside the embedded clause. Notice also that the non-elided version of (59)-A is structurally parallel to the complex assertion with embedded focus in (43). Moreover, the Hungarian data show that wh-scope marking is not restricted to matrix *what*-questions, but that—semantically at least—any kind of unspecific wh-questions (on propositions, individuals, reasons) can be restricted by the denotation of the wh-interrogative.¹⁰ This neatly matches the flexibility found with *question restriction* in section 3 above. In light of the discourse-semantic and structural parallels between wh-scope

9 The possibility of scope marking into syntactic islands also provides an argument against analyses assuming only an indirect syntactic dependency between matrix and embedded wh-item (cf. Fanselow & Mahajan 2000; Horvath 1995, 1997, 1998, 2000; Mahajan, 1990). According to such accounts, the entire embedded CP is taken to pied-pipe and adjoin to (or replace) the expletive wh-item in the matrix clause at LF; see Lipták & Zimmermann (2007) for explicit discussion.

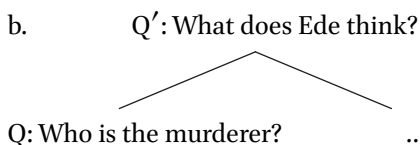
10 As argued in detail in Lipták & Zimmermann (2007), the availability of scope marking into other sentential objects but complement clauses depends on independent syntactic properties of a language in question. In particular, there needs to be a layered CP-domain that can host a Q-operator, which triggers the semantic process of generalised question formation (see fn. 8), in addition to other C-operators, such as, for instance, relative operators.

marking and utterances containing embedded foci, we conclude that wh-scope marking constructions are grammaticalised D-trees. They overtly express the discourse strategy of question restriction in the grammatical structure.

4.2 *Proposal and Discourse-semantic Analysis*

Given the discussion in the previous sub-section, the proposal is now straightforward. The claim is that the wh-scope marking construction in (5), repeated as (60a), overtly realises the D-tree in (60b).

- (60) a. *Was glaubt Ede [wer die Mörderin ist]*
 what believes Ede who the murderer is
 “What does Ede think? Who is the murderer?”



The embedded specific question Q restricts the less specific matrix question Q' in the spirit of Dayal (1994, 2000). The resulting complex question has more content, making it a more meaningful question under discussion in (61a). Congruent answers to this complex QUD exhibit the by now familiar intonation pattern with embedded focus accent, as illustrated in (61b):

- (61) a. QUD: What does Ede think concerning the question of who is the murderer?
 b. A: *Ede glaubt, dass HEA\ther_F die Mörderin ist.*
 Ede Adam and Eves that Heather the murderer-FEM is
 “Ede Adam and Eves that HEA\ther is the murderer.”

The characterising properties of wh-scope marking are accounted for either on a static compositional analysis, making crucial use of a compositional semantic process of question restriction Dayal (1994, 2000); Lipták & Zimmermann (2007), cf. (56), or on a discourse-semantic analysis in terms of a discourse strategy of question restriction, cf. (60b). However, the structural correspondence between wh-scope marking questions and their corresponding answers containing embedded foci constitutes an argument in favour of the discourse-semantic analysis as the underlying motivation for the emergence of wh-scope marking in the grammar of individual languages.

The proposed analysis accounts for the scopal restriction of the embedded wh-items to embedded question clauses, and for the existence of factive pre-

suppositions with *wh*-scope marking, as observed in sub-section 4.1. The scopal facts follow since there is no syntactic relationship between the embedded *wh*-item and the matrix question Q' . As part of the restricting question, the *wh*-item cannot take scope over a universal quantifier in the matrix interrogative; cf. (62a) and (62b).¹¹

- (62) a. *Was_l glaubt jeder, wo_l die besten Weine wachsen?*
 what believes everybody where the best wines grow
 “What does everybody believe? Where do the best wines grow?”
 $\forall > wh, *wh > \forall$
- b.
- Q' : What does **everybody** believe?
- ```

graph TD
 Q_prime["Q': What does everybody believe?"]
 Q1["Q1: What does Ede believe?"]
 Q2["Q2: What does C. believe?"]
 Q["Q: Where do the best wines grow?"]
 A["A: EDE/ believes that the best wines grow in FRANCE\F."]

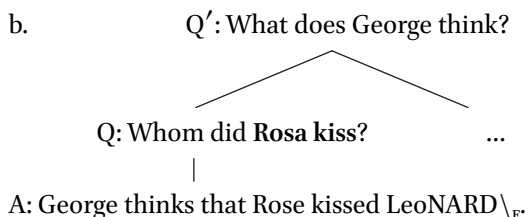
 Q_prime --- Q1
 Q_prime --- Q2
 Q_prime --- Ellipsis1["..."]
 Q1 --- Q
 Q1 --- Ellipsis2["..."]
 Q --- A

```

Likewise, since the embedded interrogative forms part of an independent question object in the D-tree, cf. (63b), it will introduce its own background (pre)suppositions to the Common Ground. In the case of (63a), repeated from (54a), this is the factive presupposition that Rosa kissed somebody. The corresponding long extraction question in (54b), by contrast, merely presupposes that George holds a belief concerning the question of whom Rosa kissed.

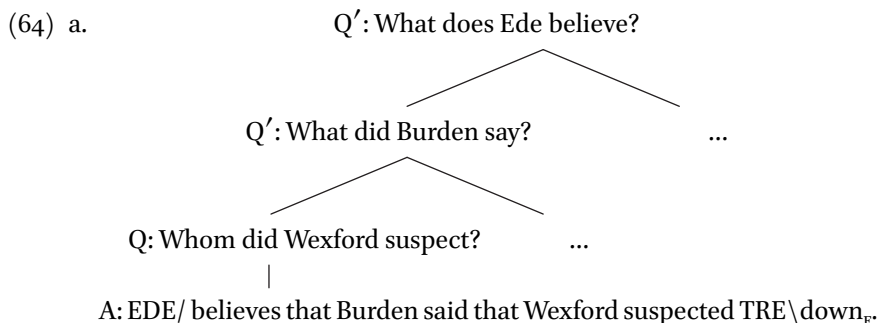
- (63) a. *Was<sub>l</sub> glaubt Georg, wen<sub>l</sub> Rosa geküsst hat? #Wobei sie*  
 what believes Georg whom Rosa kissed has but she  
*niemanden geküsst hat.*  
 nobody kissed has  
 “What does George believe? Whom did Rosa kiss? #But she didn’t kiss anybody.”  
 $\rightsquigarrow$  *factivity presupposition*:  $\exists e[\text{kissing}(\text{Rosa}, e)]$

11 The presence of the universal quantifier in the question typically leads to the accommodation of an intermediate question layer in a question-subquestion strategy. The presence of this strategy in the D-tree is indicated by CT-marking on *Ede* in (62b)-A.



#### 4.3 Further Predictions

We conclude the discussion of wh-scope marking by mentioning some further predictions concerning wh-scope marking, which appear to be borne out. First, the discourse-semantic analysis of wh-scope marking directly accounts for the fact that it can always be paraphrased as a sequence of matrix questions. This was already observed in connection with (47) and (49) in (51). The D-tree for the doubly embedding wh-scope marking construction in (49) is shown in (64):



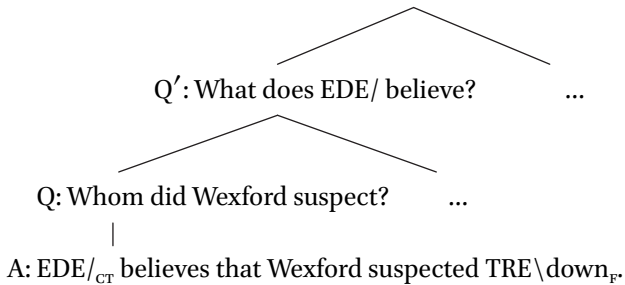
The second prediction concerns the general well-formedness conditions on D-trees mentioned in section 2.1. Firstly, it is obvious that subquestions with the function of narrowing down the question domain of a quite general superquestion are immediately relevant to this superquestion. Secondly, since D-trees must also satisfy the constraint on informativity, it follows that question restriction will only be licit if the less specific superquestion can be restricted in various ways. Conversely, question restriction should be illicit if there is only a single answer to the superquestion to begin with, and hence, no way of increasing the degree of informativity by means of a more specific subquestion. This is illustrated by the contrast between (65a), with no contextual restriction, and (65b), in which the attitude holder of the matrix clause is contextually restricted to hold only a single regret.<sup>12</sup>

<sup>12</sup> Irene Heim (p.c.) observes the following potential counterexample to this prediction:

- (65) a. Was bedauert Ede was er gekauft hat.  
 "What does Ede regret? What did he buy?"  
 b. *Context*: Ede bedauert nur eine einzige Sache.  
 "Ede regrets only one single thing".  
 Was bedauert Ede (# was er gekauft hat)?  
 "What does Ede regret? What did he buy?"

Third, the distribution of *wh*-scope marking is more restricted than that of embedded foci since *wh*-scope marking is restricted by structural syntactic factors, whereas the distribution of focus accenting is not. Fourth and last, since scope marking questions and embedded foci indicate a strategy of their own (question restriction), both processes are expected to freely interact with CT-marking, cf. (62) above and (66a) and (66b).

- (66) a. Q: Was glaubt EDE/<sub>CT</sub>, wen Wexford verDÄCH\tigt hat?  
 A: EDE/<sub>CT</sub> glaubt, dass Wexford TRE\down<sub>F</sub> verdächtigt hat.  
 b. Q': Who believes what?



## 5 Fission and Fusion

The article put forward a uniform discourse-semantic analysis of embedded focus accenting and *wh*-scope marking according to which both phenomena

- 
- (i) *Context*: There is a sign on the door telling us exactly one thing, namely where we need to go. The speaker is too far away to be able to read it and asks:  
 Was steht dort, wo wir hingehen sollen?  
 "What does it say? Where should we go?"

Here, the context makes it clear that there is only one piece of information on the sign, but still *wh*-scope marking appears to be licit. Leaving this issue for another occasion, it can be observed that the question in (i) is naturally answered with 'To Ede's birthday party', a PP-term answer (von Stechow & Zimmermann 1984).



receive a unified account as marking the existence of a particular discourse strategy, *question restriction*. Under question restriction, the question domain of an unspecific superquestion is narrowed down by one or more specific sub-questions. Whereas embedded focus accenting merely points to the existence of question restriction in the discourse context, *wh*-scope marking constructions can be conceived of as grammaticalised D-trees for question restriction. This is transparently reflected in the semantic dependency account of *wh*-scope marking put forward in Dayal (1994, 2000) and Lipták & Zimmermann (2007). Since embedded focus accenting is not subject to syntactic constraints it exhibits a fairly flexible distribution within, and across intonation languages. *Wh*-scope marking, by contrast, shows a more restricted distribution due to structural constraints and due to particular properties of individual languages: The availability and distribution of *wh*-scope marking questions in a language depends on both structural and diachronic factors.

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# A New Type of Informative Tautology: *Für Unbefugte Betreten Verboten!*\*

Manfred Krifka

## Abstract

This paper is concerned with a previously unrecognized<sup>1</sup> type of informative tautology, illustrated by the German subtitle of the paper (and abbreviated by FUBV), with the intended meaning ‘Access to Authorized Persons Only’. In spite of the fact that signs with this wording can be found in many locations in German-speaking areas, and even are constitutive for rules that can be legally enforced, it is argued that FUBV literally expresses a tautology.

After a short discussion of other cases of informative tautologies such as *Boys will be boys* in Section 2, the nature of the FUBV tautology is analyzed in detail in Section 3. It is argued that *unbefugt*, which has both adjectival and adverbial uses, refers to the property of ‘not being authorized to perform  $\alpha$ ’, where  $\alpha$  can be specified by an infinitival complement, whereas the overt specification of the source of authorization itself is blocked due to the morphological negation, *un-*. The nominalization of the adjective/adverb *unbefugt* refers to persons that exhibit this property. In the nominalized form *Unbefugte*, the type of action  $\alpha$  remains syntactically unexpressed, and has to be considered a parameter specified by context. It is argued that in the context of FUBV,  $\alpha$  is contextually specified as ‘entering the area in front of which the sign is placed’, an indexical expression. FUBV itself is a structure in which the propositional phrase *für Unbefugte* specifies the potential addressees, and the main predication lacks a copula and a definite article for the object, a feature characteristic for the style of headlines. (the fully explicit form would be ... *ist das Betreten verboten*). The resulting meaning (fully formalized in deontic modal logic in the paper) is, ‘If  $x$  is a person that is not

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1 Kjell Johan Sæbø reminded me that he pointed out the tautology of sentences like FUBV to me on a walk through the city of Tübingen in 1987. I remember the visit, and he is certainly right.

authorized to access the region in front of which the sign is placed, x is not authorized to access the region in front of which the sign is placed'. A simple proof shows that this is indeed a tautology.

Section 4 argues in detail that FUBV is, nevertheless, felt to be informative by German speakers. Two lines of arguments support this claim: (i), ample corpus evidence, mostly photographs that the author took personally, sometimes under difficult circumstances like in front of military complexes, from 2004–2012, and some photographs from archives dating back to the late 19th century; (ii) experimental evidence, a rating experiment with 48 subjects (mostly undergraduates of Humboldt University).

Section 5, the core of the paper, explains the informativity of FUBV as follows: Natural language quantification, which includes conditional clauses and generic (to be specific, characterizing) clauses, comes with a presupposition that the restrictor of the quantifier is non-empty. In the case at hand, this presupposition states that there are persons that are not authorized to access the region in front of which the sign is placed. As with many presuppositions, this presupposition can be accommodated by the reader. In a next step, a competent reader will self-ascribe the property of not being authorized in case there was no previous instance of an authorization. This requires a reasoning step familiar from autoepistemic logic, also known as the “closed world assumption”: If there would have been an act of authorization, the authorized person would, *ceteris paribus*, know about it; hence the competent reader that cannot remember that she was authorized can conclude that she indeed isn't. The article highlights the fact that it is not the at-issue content of the FUBV expression that creates this information, but rather its non-at-issue content, its presupposition. This could be expressed by *Es gibt Unbefugte*, ‘there are non-authorized persons.’ But interestingly, this clause, which explicitly states the presupposed information, is not attested at all in the corpora, and would, according to introspective evidence, not lead to the same behavioral patterns as the FUBV expression.

Section 6 addresses another aspect of natural-language quantification: Quantifiers with explicit domain restriction implicate that their predication does not hold for the domain of discourse in general. For FUBV, this conversational implicature amounts to ‘there are persons that are authorized to enter the region in front of which the sign is placed’, and ‘for persons that are authorized to enter the region in front of which the sign is placed it does NOT hold that they are not authorized to enter the region in front of which the sign is placed’, i.e. that they are authorized. It is shown that this implicated proposition is a tautology as well, and that its informativity resides in the non-empty domain assumption.

The paper concludes with sketches of explanations for alternative wordings of FUBV, such as *Betreten erlaubt nur für Befugte* ‘Access legal only for authorized personnel’. It also discusses consequences for legal theory and praxis.

**1 Introduction**

Für Unbefugte Betreten Verboten.

**2 Known Cases of Informative Tautologies**

Omitted, as not relevant for the main points to be made here.

**3 The Nature of the Tautology**

Already known by now.

**4 The Informativity of the Tautology**

Omitted for legal reasons, for lack of funding for photographic reproductions, and because approval by the Ethics Commission could not be obtained in time.

**5 A Presuppositional Autoepistemic Account**

For Authorized Readers Only

**6 A Tautological Conversational Implicature**

Top Secret.

**7 Conclusions and Outlook**

Classified.





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