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Making Worlds Accessible. Essays in Honor of Angelika Kratzer

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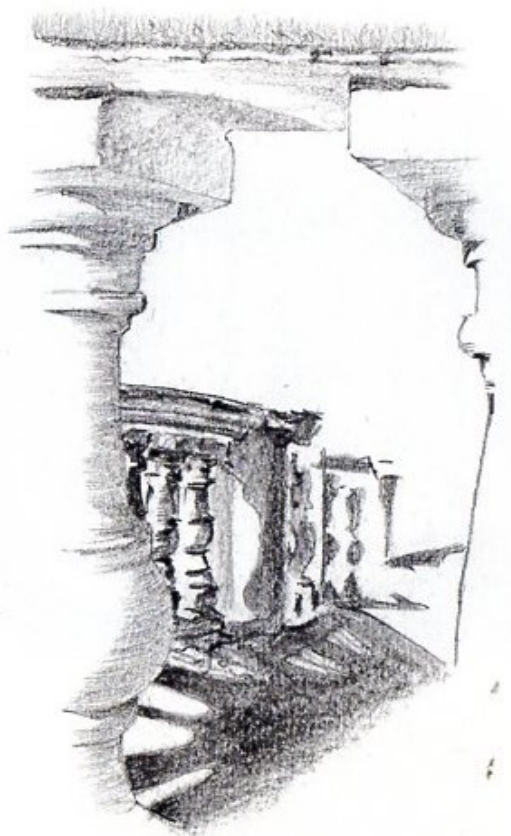
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Making Worlds Accessible



ESSAYS IN HONOR OF
Angelika Kratzer

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Cover image by Orin Percus

Preface

Every linguist knows how colossal Angelika's impact on our field is. Hearing about this would not be informative for anybody who might (virtually) pick up this volume, including Angelika herself. So, instead of writing about, say, Angelika's crucial role in the development of our understanding of modality, we will write about what Angelika means to us, as a teacher, advisor, mentor, colleague, and friend. We know that these words will resonate with many of you (Angelika has meant so much to so many people). We just get to be the lucky ones to tell Angelika publicly.

Ilaria: When I was still a confused undergraduate in Italy applying for graduate programs in the US, I settled on UMass because of Angelika. When the time came during our first year to form a committee for our generals paper, I naturally went to her, who - also very naturally - turned me down. That could have been the end of the story (and the end of me). But it wasn't; I thought she had her reasons. Although I was a pretty good student in her class, she hadn't had the time to assess me outside routine homework assignments, and this is when I learnt something important about Angelika: she takes everyone and everything very seriously. So, I wrote my first generals paper in psycholinguistics instead (my second was in semantics; I did convince her in the end). Through the years, I found out many other things about Angelika's views that I tried to incorporate into my own, and I don't mean just about semantics. I learnt that every student and every student's project matters, that being a honest advisor is as important as being a supportive one, that it is extremely important to recognize others' contribution to the discussion of a topic as you carve your space into it, that as a woman in academia one should not feel obliged to always be pedagogical and that, as a researcher in general, the best one can do is to become acquainted with the condition of 'groping in the dark'. The list could go on, but I will stop here. I hope to have done some justice to the wonderful and affectionate colleague that Angelika has been to everyone of us.

Paula: I would not have become a semanticist if not for Angelika, and I don't think I would have stayed one if not for her. She took me in at a time when I was an outsider in the department (and trying to learn semantics on the side), and has never failed to support me since. Throughout the whole dissertation writing process she took my work as seriously as if it were her own (and held me to the same standards she would herself). She worked alongside me during that long, hot, stress-filled, summer, and even drove to Northampton once to discuss the final touches of the dissertation (so that I would not waste precious hours on the trip to Amherst and back!). And, afterwards, when her advisor work was officially done, she was still there for me at every step of the way. During all this time, I have learned so many things from her. In her graduate classes I learnt what 'research in action' was, and what 'striving for the truth' really meant. Her undergraduate classes showed me that one could fascinate beginners without sacrificing rigour. She encouraged me (all of us) to pursue bold hypotheses but to follow them through carefully and systematically. She showed me how one could support one's students to incredible extremes without fulfilling

dangerous gender stereotypes ('women in academia are expected to be mothers, men are expected to be brilliant', she warned me once). I could not have wished for a more brilliant, generous, amazing advisor, mentor, and friend. Thank you, Angelika.

Rajesh: Angelika has been a dear friend, a valued colleague, and a source of inspiration and support. I am not sure I would have come to UMass if it had not been for her encouragement. I have always loved Angelika's excitement and her mind which has shown me new things which I hadn't thought were possible. Angelika is never afraid of the new, of the unknown. She is not one who relishes the comforts of the familiar. Getting to see her think has been one of the highlights of my career so far. On a more quotidian note, I am grateful to her for not one but two sacher tortes from Vienna and for running a cafe in her office, which I am happy to report is still functional under a new administration.

Death on the Freeway: Imaginative resistance as narrator accommodation*

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Abstract We propose to analyze well-known cases of ‘imaginative resistance’ from the philosophical literature as involving the inference that particular content should be attributed to either: (i) a character rather than the narrator or, (ii) an unreliable, irrational, opinionated, and/or morally deviant ‘first person’ narrator who was originally perceived to be a typical impersonal, omniscient, ‘effaced’ narrator. We model the latter type of attribution in terms of two independently motivated linguistic mechanisms: accommodation of a discourse referent and ‘cautious’ updating as a model of non-cooperative information exchange.

1 Introduction

Consider the following fictional discourse from [Weatherson \(2004\)](#):

- (1) Jack and Jill were arguing again. This was not in itself unusual, but this time they were standing in the fast lane of I-95 having their argument. This was causing traffic to bank up a bit. It wasn’t significantly worse than normally happened around Providence, not that you could have told that from the reactions of passing motorists. They were convinced that Jack and Jill, and not the volume of traffic, were the primary causes of the slowdown. They all forgot how bad traffic normally is along there. When Craig saw that the cause of the bankup had been Jack and Jill, he took his gun out of the glovebox and shot them. People then started driving over their bodies, and while the new speed hump caused some people to slow down a bit, mostly traffic returned to its normal speed. **So Craig did the right thing, because Jack and Jill should have taken their argument somewhere else where they wouldn’t get in anyone’s way.**

* We would like to thank Angelika Kratzer for sponsoring Emar’s visit to UMass, Amherst during the 2017 fall semester – an opportunity that led to this collaborative effort. Thanks also to the SuSurrus participants at UMass, Amherst for insightful feedback about fictional truth. Finally, thanks to Phil Bricker, Patrick Grafton-Cardwell, Chris Meacham, Alejandro Pérez Carballo, Roger Schwarzschild and again Angelika for providing feedback on many of the ideas developed in this squib. Emar Maier’s research is supported by NWO Vidi Grant 276-80-004. The usual disclaimers apply.

The final, bolded sentence of (1) is jarring. So much so that our engagement with the fiction seems to break down. Why should this be, given that much of what we find in fiction is strange, impossible, or immoral, without hindering our engagement? For example, readers of *Lolita* may find Humbert Humbert repulsive, but that doesn't prevent them from engaging with the fiction, i.e. imagining as prescribed by Nabokov's text.

A related observation is that the bolded sentence of (1) seems false in the world of the fiction. That is, it appears that the author of (1) cannot make it fictionally true that Craig did the right thing. Why should this be, given that an author has the authority to turn a human into a bug (as in Kafka's *Metamorphosis*), invent playing cards who are loyal servants to the queen (as in Carroll's *Alice's Adventures in Wonderland*) and describe (truthfully in the fiction) a sociopath who robs, rapes, and assaults innocent people for his own amusement (as in Burgess' *A Clockwork Orange*)?

Such questions are familiar from the rich philosophical literature on *imaginative resistance*: an instance in which “an otherwise competent imaginer finds it difficult to engage in some sort of prompted imaginative activity” (Liao & Gendler 2016).¹ In this squib, we propose that some evaluative propositions, such as in (1), trigger the accommodation of an (unreliable) narrator. It is well known in semantics that, depending on various factors, accommodation can be more or less difficult for the processor. (1) is on the extreme end of the difficulty scale for two reasons. First, right up until the final statement, the story adheres to the standard conventions of a third person omniscient narrative, i.e., without a specific narrating character in the story; narrator accommodation forces us to break out of this frame, and reconceptualize the story as told from a first person perspective. Second, the accommodation is triggered rather indirectly, as opposed to a more explicit introduction of a narrating character through a first person pronoun (cf. ‘Call me Ishmael’).

In what follows we sketch a formal implementation of these ideas. In the next section, we develop a toy analysis of fiction using a version of the dynamic semantic framework of Discourse Representation Theory (DRT, Kamp 1981). Crucial to our analysis will be the idea from Lewis 1978 that in all worlds compatible with a fiction there must be someone telling the story (“as known fact”). Our DRT/Lewis-based framework for representing fiction allows us to distinguish first person or, following Genette's (1980) now standard terminology, *homodiegetic narration*, from third person or *heterodiegetic narration*: only in the homodiegetic case is the narrator represented explicitly by a discourse referent, on a par with the rest of the fictional characters. In this way we try to capture the idea, well known from narratology

¹ The notion of imaginative resistance is usually traced back to David Hume. It was revived, in large part, due to work by Moran (1994) and Walton (1994) and responses to that work by, e.g. Gendler (2000), Yablo (2002), Matravers (2003), Weatherson (2004), Stock (2005), and Todd (2009).

research, that heterodiegetic narration involves an “effaced” narrator that is not part of the story and never referred to (e.g. by indexicals) in the fiction. Subsequently, in section 3, we build on our toy analysis to include different update mechanisms for dealing with both reliable and unreliable information. Combined with the idea of accommodating a narrator discourse referent, this will allow us to analyze (1). In section 4, we consider an objection from Byrne (1993) to the Lewisian modal semantics of fiction underlying our DRS boxes, namely that there are narratorless fictions. We discuss how to revise our Lewisian assumptions in light of the objection and what this may mean for analyzing imaginative resistance discourses as instances of narrator accommodation.

2 Fiction in DRT

2.1 DRT

We take a standard version of Discourse Representation Theory (DRT, Kamp 1981) as our starting point. That is, in interpreting a discourse spoken or written the interpreter updates an information state, represented in the formal language of Discourse Representation Structures (DRS).

We’ll use a standard box notation for DRSs. By way of illustration, the box in (2b) is meant to represent the information conveyed by the single sentence mini-discourse in (2a):

- (2) a. Farmer John owns a donkey.

b.	$\begin{array}{c} x \quad y \\ \hline \text{farmer}(x) \quad \text{donkey}(y) \\ \text{john}(x) \quad \text{own}(x,y) \end{array}$
----	--

The top compartment houses the discourse referents, i.e. variables representing the entities that the discourse is about. The bottom compartment contains descriptive conditions, expressing properties of, and relations between, discourse referents.

The syntax of the DRS language is just a notational variant of that of first-order logic, and the model-theoretic semantics is static as well. The dynamic nature of DRT resides in the way utterances in a discourse are interpreted as successive updates on the discourse context. A single utterance doesn’t express a proposition but a context change potential, i.e. a way to transform an input DRS, representing the information conveyed by the discourse thus far, into an output DRS, representing the information increase due to the current contribution.

To illustrate, say the mini-discourse in (1) continues with (3).

- (3) He’s feeding it a carrot.

The *DRS construction algorithm* has to add the information of the new sentence to the input DRS in (2). One of the key characteristics of the algorithm is its distinct treatments of indefinites and definites: the indefinite *a carrot* introduces a new discourse referent ‘z’ and accompanying condition ‘carrot(z)’ into the input DRS, while the pronouns (*he*) and *it* are treated as *anaphoric*, meaning they introduce free variables (u, v) looking for antecedents. Formally, anaphora are resolved by unifying them with suitable² antecedent discourse referents (u=x, v=y):

$$(4) \quad \begin{array}{|c|} \hline x \ y \ z \\ \hline \text{farmer}(x) \ \text{donkey}(y) \\ \text{john}(x) \ \text{own}(x,y) \\ \text{carrot}(z) \ \text{feed}(u,v,z) \\ u=? \ v=? \\ \hline \end{array} \rightsquigarrow \begin{array}{|c|} \hline x \ y \ z \\ \hline \text{farmer}(x) \ \text{donkey}(y) \\ \text{john}(x) \ \text{own}(x,y) \\ \text{carrot}(z) \ \text{feed}(x,y,z) \\ \hline \end{array}$$

The result is a new, model-theoretically interpretable DRS, representing the information conveyed by the two-sentence discourse. This DRS then can serve as input for the interpretation of a new sentence.

2.2 Fiction and narrators

To model the interpretation of fiction in DRT we’ll first need to distinguish two basic kinds of narration. The first kind that we consider is called *homodiegetic narration*, in which the narrator is herself one of the protagonists in the story, and hence does not have full access to what other characters are thinking or doing behind her back. The second kind of narration that we consider is called *heterodiegetic narration*, in which the narrator is a more or less omniscient, unintrusive abstract entity surveying the events occurring in the story world, including the protagonists’ innermost thoughts and feelings, and presenting them to the reader.³

Applied to DRT, we propose that the distinction between homodiegetic and heterodiegetic narration comes down to the presence or absence of a discourse referent representing the narrator. To see how this works, let us first consider the DRS in (5), which represents a case of homodiegetic narration. Crucially, note the intensional fiction operator, $\text{FIC}_x \phi$, interpreted as “in all worlds compatible with fiction x , ϕ holds” (Lewis 1978).⁴

² Suitable antecedents are salient, accessible, and matching in associated descriptive content and/or semantic features (van der Sandt 1992).

³ For present purposes, we don’t discuss various forms of second person narration and countless other narrative experiments.

⁴ Cf. Semeijn (2017) for an account of how the interpretation of a fictional text leads to an information update under the fiction operator, or Maier (2017) for an alternative account in terms of imagination

Death on the Freeway

(5)

x y	
author(x) book(y)	
melville(x) wrote(x,y)	
moby_dick(y)	
FIC _y	u v w
	speaker(u) ahab(v) whale(w)
	ishmael(u) captain(v)

The DRS in (5) represents the information that there's an author, Melville, who wrote a book, *Moby Dick*. In this book there is a speaker, the homodiegetic narrator (henceforth: narrating speaker). There is also a whale, and so on.

Note that representing the narrating speaker in the way proposed makes it possible to anchor local indexicals (*I, here, now, today*). For example, if the book *Moby Dick* contained the statement *I love the whales here*, then the first pronoun would pick out the narrating speaker, Ishmael, while *here* would pick out Ishmael's location.

A difficulty in making sense of (5) concerns spelling out the nature of the accessibility relation of the fiction operator, i.e. when exactly is a possible world compatible with a fiction told or written in our world? The first attempt that Lewis considers is that a world w' is compatible with a fiction x as told in w iff in w' story x is told as known fact and w' differs less from w than any other world in which story x is told as known fact.

One of the much discussed features of this approach is that we're only considering those fiction worlds that are closest to our own, a feature Lewis borrows from his account of counterfactuals (Lewis 1973). In other words, all truths about the real world automatically carry over to the fictional domain, unless contradicted by the text (what Walton (1990) calls the 'Reality Principle'). Questioning the adequacy of this prediction, Lewis formulates another proposal where it's not the actual world but the overt beliefs of the author and his community that is the source from which implicit fictional truths are imported (Walton's 'Mutual Belief Principle'). Either will do for our current purposes. What concerns us is a different feature of Lewis's approach, viz. the fact in all worlds compatible with a fiction there must be someone telling the story ("as known fact"). In standard narratological terminology, every story-world has a narrator who is moreover distinct from the actual author, as they inhabit different worlds. This view is controversial and we will come back to consider an objection to it in section 4. In the remainder of this subsection, we would like to show how adopting something like Lewis's fiction operator allows us to represent

updates.

both homo- and heterodiegetic fictional narratives in DRT. Subsequently, in section 2.3, we show how Lewis’s fiction operator allows us to relate Weatherson’s Death on the Freeway discussed at the outset to a well known example of accommodation.

Let us, then, consider our proposed analysis of heterodiegetic narration in (6):

(6)

x y	
author(x) book(y)	
tolkien(x) wrote(x,y)	
lord_of_the_rings(y)	
FIC _y	u v
	frodo(u) sam(v)
	friends(u,v)

The DRS above represents the information that there’s an author, Tolkien, who wrote a book, *The Lord of The Rings*, and in this book there are two friends, Frodo and Sam. Crucially, notice that unlike in (5), there is no narrating speaker represented in (6). Nevertheless, on account of our Lewisian modal semantics of FIC, there actually *is* such a narrating speaker in all worlds compatible with the fiction. This non-representational but semantically presupposed narrator captures the narratologists’ effaced narrator of a heterodiegetic narrative. The observation that such a narrator cannot be referred to by an indexical such as *I* follows from the absence of a suitable discourse referent for such a pronoun to be anchored to (assuming the more or less standard anaphoric/presuppositional account of indexicals in DRT, Zeevat 1999; Bittner 2007; Maier 2009; Hunter 2013). Alternatively, the use of *I* in a seemingly heterodiegetic context might also trigger a switch between heterodiegetic and homodiegetic narration, by a process of accommodation, to which we turn next.

2.3 Accommodation

In this subsection, we would like to compare our implementation of the effaced narrator idea to Barbara Partee’s missing marble:

(7) Nine out of the ten marbles are in the bag. #It is under the sofa.⁵

The first sentence in (7) entails the existence of a (contextually) unique marble not in the bag, so why isn’t it possible to refer to this missing marble with a pronoun like *it*? DRT’s answer is that a pronoun requires an antecedent discourse referent, and applying the DRS construction algorithm to (7) does not lead to the introduction

⁵ Cited by Heim (1982).

of a discourse referent for the missing marble.

The analogy to heterodiegetic narration, as we have analyzed it, is this: the omniscient narrator is there in all worlds compatible with the fiction, just like the marble is there as a matter of logical necessity. Yet it can't be referred to by a pronoun, because the DRS lacks a discourse referent representing the intended antecedent.

As noted in debates about Partee's marble, some tweaks (pause, extra information, more descriptive content in the anaphoric expression) will allow us to *accommodate* an antecedent discourse referent, rendering the discourse felicitous (cf. Roberts 1989).

- (8) Nine out of the ten marbles are in the bag.
- a. I've been looking for hours and . . . hey wait, there it is!
 - b. {The missing marble/the red one/the bloody thing} is under the sofa.

By analogy, we would expect to find parallel cases of narrator accommodation. In fact, whenever we pick up a book for the first time and don't know in advance whether the narration is homo- or heterodiegetic, we start without a narrator discourse referent. If the first line we read is, say, 'Call me Ishmael', then we then have to accommodate a discourse referent for the narrating speaker in order to interpret the first person pronoun. Hence, many homodiegetic narratives require an initial narrator accommodation.

More interesting are stories that start out showing tell-tale signs of heterodiegetic narration (third person pronouns referring to protagonists, past tenses, lack of expressives and indexicals, signs of omniscience, free indirect discourse thought reports etc.), but then seem to switch to a homodiegetic style.

A first example comes from *The wild ass' skin* by Honoré de Balzac, in which the first section of the novel is clearly heterodiegetic, told from the point of view of an impersonal and omniscient narrator. The story is about a young man, Raphael de Valentin, who purchases a shagreen that will fulfill any wish of its owner, shrinking slightly upon the fulfillment of each desire. The second section of the novel, however, is clearly homodiegetic, told in the first person, from the point of view of the protagonist Raphael de Valentin himself. This shift can be modeled within our proposed analysis as involving accommodation, but not yet quite accommodation of a narrator discourse referent. What we're accommodating is merely the information that De Valentin is now the narrating speaker, and hence the anchor for first person pronouns and other indexicals. Formally, we add a descriptive condition of the form 'spkr(x)', where x is the already established discourse referent for De Valentin.

A narrative mode switch due to marble-like accommodation of a new discourse referent halfway through the story also occurs, for instance in metanarratives, like

the following:⁶

- (9) Once upon a time there was no time. No time and no space. No heroes, no plot, no drama, no obstacles, no twists, no turns, no hero's journey, no redemption, nothing to learn, nowhere to go, and no one needing to be saved. The sky was blue. The trees were green. People danced for no reason, sang like the birds, and looked up at the sky and down at the ground with the same reverence. This was the time before story, before the need to understand, make meaning, convince, persuade, teach, transmit, entertain, distract, or make a single point. The point? It was already made. And everyone already understood. Hmmm. . . **I** thought about writing THIS story, but then it dawned on **me**, how presumptuous that would be, how full of paradox, contradiction, Facebook Likes, Tweets, lists of things to do, copy edits, **me**, cash projections, reviews, complaint, business, and all the other assorted flora and fauna of life AFTER the story needed to be told. So **I** took out the garbage, washed the dishes, and walked the dog. This is not available on Amazon, nor will it ever be.

In cases like this, the only way to interpret the indexical pronouns (in bold) is by accommodating a narrator discourse referent.⁷ This would mean reinterpreting the whole story as essentially homodiegetic, i.e., told by an apparently not so impersonal or omniscient narrator as we originally assumed on account of the heterodiegetic style characteristics.

In the following section we add one final ingredient to our analysis, an account of unreliable narration, before returning to Death on the Freeway.

3 Unreliable narrators and untrustworthy speakers

Narratologists note that a narrator can (and often does) say something that is false in the fictional world (Booth 1961; Zipfel 2011). Examples include Huckleberry Finn's naive observations about society, or Chief Bromden's hallucinations about growing and shrinking protagonists in *One Flew Over the Cuckoo's Nest*. The question for our toy analysis developed thus far, then, is: How do we separate what's true in fiction from what the narrator tells us? In order to answer this question, let's first consider what happens in regular conversation.

⁶ www.idealchampions.com/heart/archives/2014/06/index.shtml

⁷ In fact, interpreting the hesitation marker *hmmm*. . . already presupposes a person-like, non-omniscient narrator.

3.1 Unreliable conversation partners

In an ideal world where communication serves merely to coordinate our joint truth seeking, any assertion that p should result in the hearer updating their beliefs with p . But this is clearly an oversimplification of the way actual communication works. We don't always believe (or even just accept or commit to) whatever our interlocutors say. Several paths have been explored for dealing with non-cooperative or otherwise unreliable conversation partners,⁸ but for the sake of simplicity, we follow Eckardt's (2014) straightforward semantic proposal. Eckardt distinguishes different types of updates: Trust updates and Cautious updates:

A Trust update is one in which the propositional content of the utterance is added directly (by intersection) to the addressee's beliefs and the common ground. Other assertion situations will only support Cautious updates. Person a asserts s , but addressee b updates her beliefs with $\lambda w.Belief_a(w,p)$, where s denotes the proposition p . Whatever we are told, we'll always have to decide whether we believe it or not. (Eckardt 2014:65-66)

As an example of a Cautious update, suppose a republican tells you (10):

(10) Trump has saved the middle class!

Hopefully, you don't update your beliefs accordingly. Rather, it is suggested that you perform a Cautious update, resulting in the following DRS:

(11)

x y	
spkr(x) trump(y)	
BEL _x <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding: 5px;">save_middle_class(y)</td> </tr> </table>	save_middle_class(y)
save_middle_class(y)	

In sum, in a Trust update we add information directly to the global DRS, as was illustrated in section 2.1. On the other hand, a Cautious update is one where we add information under a doxastic operator, as in (11). We interpret BEL-conditions as modal statements in possible worlds semantics (Hintikka 1969), i.e. $BEL_x\phi$ is true in w iff ϕ is true in all doxastic alternatives of x in w .⁹

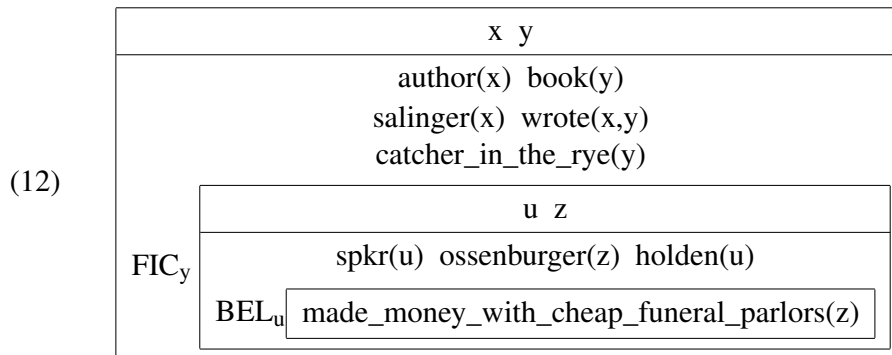
⁸ Most notably with the help of game theory (e.g. Asher & Lascarides 2013).

⁹ The distinction between Trust and Cautious updates is not meant to be exhaustive. In other cases we might want to be even more cautious, as when we suspect that the speaker is deliberately lying to us (or just bullshitting or trolling) that p . In such cases we might do a Supercautious update with p resulting in the addition of the information that the speaker says that p .

3.2 Unreliable narrators

If we distinguish Cautious updates and Trust updates in regular conversation, we could do the same within the context of fiction interpretation. First in homodiegetic narrative, when the narrator says something that is somehow inconsistent with the story developed thus far or if we have other reasons not to trust the narrator, we might not want to perform a ‘fictional Trust update’, i.e. take her words at face value and adding her content as facts about the story world (as represented in the box under the fiction operator). Instead, we might want to perform a ‘fictional Cautious update’, and conclude merely that the narrator apparently fictionally believes this, but it might not be fictionally true.

For example, in Chapter 3 of *The Catcher in Rye*, the first person narrator, Holden, asserts that he is ‘the most terrific liar you ever saw in your life’. Shortly thereafter, he tells the reader that he lives in a dormitory donated by an alumnus named Ossenburger, who made all his money with cheap funeral parlors. Upon hearing this, the reader is likely to perform a Cautious update, which we can represent (roughly) as in (12):



Notice that (12) combines our proposal for analyzing homodiegetic narration in DRT with Eckardt’s proposal about Cautious updates.

The more difficult cases to make sense of are ones that involve Cautious updates in heterodiegetic narration. At first blush, this may seem like an oxymoron. If there is no discourse referent representing the narrating speaker in heterodiegetic narration, as we have proposed, then what would it mean to cautiously update, i.e., which speaker’s beliefs are we supposed to update? The trick is that, as we’ve already seen in section 2.3, a heterodiegetic narration can always switch into a homodiegetic one, by accommodating a discourse referent for the (already implicitly present) narrator. An accommodated narrator referent x can then serve as the anchor for the Cautious update’s BEL_x -condition. Thus, after introducing a first person narrator, we can always choose not to believe what that narrator tells us. This, we claim, is precisely

what happens in Death on the Freeway.

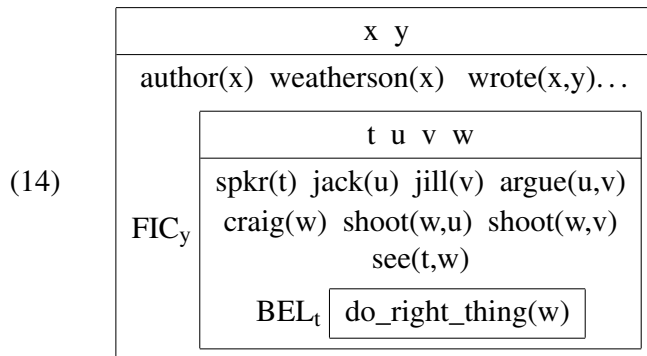
3.3 Death on the Freeway revisited

Let us now put all the pieces together. Before we get to the original Death on the Freeway, first consider the following variant. The key manipulation is the use of the first person pronoun in the final sentence, intended to bring out more clearly the switch to homodiegetic mode.

- (13) [...] When Craig saw that the cause of the bankup had been Jack and Jill, he took his gun out of the glovebox and shot them. People then started driving over their bodies, and while the new speed hump caused some people to slow down a bit, mostly traffic returned to its normal speed. **I was there, I saw it with my own eyes, and, as far as I'm concerned, Craig totally did the right thing. Jack and Jill should have taken their argument somewhere else where they wouldn't get in anyone's way.**

While not as jarring, the final sentence still has shock value. The reader is forced to lift the omniscience from the third person narrator and conclude that she is just a character, and an unreliable one at that, as she seems to have a suspiciously immoral view of the fictional world. On our account, the shock value would be explained by a combination of two interpretive processes: First, the reader is forced to accommodate a discourse referent for a first person narrating speaker in a discourse that started off as a prototypical heterodiegetic narration. Second, the narrator's claim that Craig did the right thing clashes with our reconstruction of the story world thus far (based on the textual evidence and the Lewisian principle(s) of minimal departure from the real world or the author's community's beliefs, cf. section 2.2), so in an effort to maintain a plausible and coherent interpretation of the whole, the reader will likely opt for a Cautious update, adding the information that the newly discovered narrating speaker (incorrectly) believes that Craig did the right thing.¹⁰ Skipping over the details, the end result would look something like this:

¹⁰ An alternative interpretation strategy would be to trust the narrator and infer that the story is about a very distant, immoral world, where killing someone like this really is the right thing to do. Presumably, a story about such a world could be written, but we don't think this is a very plausible interpretation of (13).



With this in mind, we are now ready to revisit [Weatherson's](#) original, repeated below:

- (15) [...] When Craig saw that the cause of the bankup had been Jack and Jill, he took his gun out of the glovebox and shot them. People then started driving over their bodies, and while the new speed hump caused some people to slow down a bit, mostly traffic returned to its normal speed. **So Craig did the right thing, because Jack and Jill should have taken their argument somewhere else where they wouldn't get in anyone's way.**

Without the first person pronoun that overtly signalled the narrative mode switch in (13), it will be much harder for the reader to accommodate a narrator in (15). The discourse preceding the last sentence doesn't help since none of the characters can possibly be the ones responsible for the immoral thought. All we have to go on is a clash between our reconstruction of the story world, presumably somewhat similar to our own in moral and other respects, and the information, from a supposedly omniscient narrator, that Craig did the right thing in killing Jack and Jill. On our analysis, this clash can be overcome, but there's a high processing cost involved. We need to first give up the assumption that we're dealing with an omniscient narrator, i.e. switch to homodiegetic by introducing an as yet unknown narrator referent. We then furthermore have to decide that this narrator is unreliable, merely giving his own, deviant opinion on what's happening, as modeled by a Cautious update.

4 Concluding remarks

This squib proposed that the evaluative proposition in [Weatherson's](#) *Death on the Freeway* triggers the accommodation of an (unreliable) narrator. Given the lack of descriptive content supporting such an accommodation, it is extremely difficult for the processor. We note that we have not said anything about what accommodation

really amounts to in terms of processing. We also note that there are various kinds of accommodation processes. We have focused on the kind of accommodation that arises in Partee's missing marble example. This, we think, is sufficient to make our proposed analogy with the imaginative resistance case under consideration. However, ultimately, one would need to say more about accommodation¹¹ and the plethora of other examples which have been argued to be instances of imaginative resistance.¹²

In drawing the parallel with marble accommodation, our analysis crucially relied on the corollary of Lewis's proposal that in all worlds compatible with a fiction there must be someone telling the story. Byrne (1993) has provided some compelling objections to Lewis's proposal, arguing (among other things) that in many fictions it is not true in the fictional world that there is someone sufficiently knowledgeable to tell the story. And in these fictions, we have a story without a storyteller. For example, there are possible stories about the universe ending or about uninhabited empty spaces, where there couldn't be a narrator.

While we do not have a knock down argument against this objection, several comments are in order. First is the question of whether narratorless stories, if they exist, could ever lead to imaginative resistance effects of the kind considered here. Interestingly, Weatherson claims that *Death on the Freeway* is a narratorless story and would thus provide an affirmative answer to this question. But is *Death on the Freeway* really a narratorless story? Following Genette, narratologists typically maintain that every story, by definition, requires a teller, who is committed to the assertions in the text (cf. Ryan 1981; Margolin 2012). In the case of fiction, the narrator can't be the author, as that would entail that, e.g. Tolkien is committed to the existence of hobbits, but must be somehow residing in the fictional universe, overseeing things happening there. On this narratological assumption, *Death on the Freeway* would certainly have a narrator, implicit at first and, as we have proposed, explicitly represented as a character in the end.¹³

Still, let's suppose that, contrary to Lewisian and contemporary narratological assumptions, *Death on the Freeway* is, in fact, a story without a narrator. To preserve our chief insight, that imaginative resistance can be explained in terms of unreliable narrator accommodation, we only need to weaken the Lewisian semantics by removing the 'told as known fact' restriction, i.e., we define the accessibility

11 For instance, it may be that Weatherson's own analysis (involving Fodorian lower and higher concepts) will shed light on the accommodation effects that we proposed.

12 See Liao & Gendler 2016 for a recent overview and Altshuler & Haug 2017 for a discussion of examples that are directly relevant, involving discourse reanalysis.

13 If we assume that *Death on the Freeway* is a story with a narrator, then it remains an open question whether narratorless stories, if they exist, could ever lead to imaginative resistance effects of the kind considered here.

relation of the fiction operator as: w' is compatible with fictional discourse x in w iff the fictional discourse x is true in w' (and w' is maximally close to w etc.). The rest of our analysis will go through: Death on the Freeway still involves accommodation of an unreliable narrator. What we lose is the analogy with Partee's marble. In a way, the accommodation involved in this version of the theory is even harder, as we have to conjure up a narrator out of thin air, rather than just introduce a discourse referent that was implicitly already available. Unfortunately, a proper understanding of the varieties of accommodation strategies and their limits is still missing. We hope that future progress on these general semantic/pragmatic matters will help us decide whether this route is viable. For now, we hope that our squib at least shows that it can be rewarding to try and apply our familiar semantic tools to topics from neighboring fields, like aesthetics and narratology.

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A comparative note on the Bangla particle *to* and the German particle *doch**

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Abstract The Bangla discourse particle *–to* and the German discourse particle *doch* share a number of syntactic and semantic properties. Their phonetic similarity suggests a remote historical relation. While the latter part will only be mentioned and must remain for the specialists in Indo-European reconstruction, the present short study will highlight points of convergence between the two languages with respect to these particles along a series of concrete tests. The convergence appears to be more than accidental.

1 Introduction

In this note, I would like to draw the attention to a number of parallels that can be found between the Bangla particle *to* and the German particle *doch*. Although appearing in very distant Indo-European languages, the parallels are surprising. Both elements have their roots in Indo-European (IE). Perhaps they have a common ancestor, perhaps not. But even if not, the comparison could still prove to be interesting for reasons of their function in grammar and discourse. After a note on their respective etymologies in 1. I will begin in 2. with a common dichotomy of autonomy and boundedness, move to their semantic core in 3., then in 4. to common properties with regard to information structure, in 5. to their common restrictions in sentence mood, and in 6. to a common core in their distribution in complex clauses. Conclusions appear in 7.

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2 Etymology¹

The immediate history of German *doch* is well documented. The modern conjunctive adverb *doch* relates immediately to Old High German *thoh*, *thō*, Middle High German *doch*, Old Saxon *thōh*, Dutch *toch*, Old English *þēah*, English *though*, Old Norse *þō*, and Gothic *þauh*. Its first part is said to be related to Old Indic *tú*, *tú* which had an adversative meaning and has according to certain researchers developed out of the IE 2nd person singular **tū-*; alternatively, a development out of the pronominal stem **te-*, **to-* is considered, see Kluge (2011: 208) and Lühr (1976: 77-79). The second part relates to the Gothic strengthening particle *-uh*, *-h* ("and"), see also Latin *que*, from Indo-European **kue-*.

It is less clear where exactly *to* in modern Indo-Aryan (e.g. in Bangla and Hindi) comes from. According to Sen (1971), it comes from *tad-u*, which is a 'tadbhava' and originates from the Sanskrit *tad* followed by *u*, *tad* being the third person neuter pronoun while *u* is a widely used particle. Montaut (2016) locates the etymology of Hindi *to* in *an ancient pronominal basis (Sanskrit ta-) referring to third person ("that", "he"), which is still used as such in certain Indo-Aryan languages such as Marathi (to "he")*. According to Dunkel (2014: vol II, 776f.), the oldest function of IE **tó* was prosecutive, sequential, continuative; the adversative form **tú* should be considered to be an ancient Aryan innovation.

3 Free versus clitic usage

Whatever the etymological status of Bangla *to* is, it is interesting to see that both interpretations that Dunkel refers to can be found in the modern language. The non-adversative, sequential interpretation can be found in Bangla examples in which *to* starts the sentence.

- (1) to tumi dilli jabe na bole Thik korecho!
 TO you Delhi go.fut.2 not COMP right make.pst.2
 "Then you have decided that you will not be going Delhi!"

A related usage appears also in final position as in (2) or as a stand-alone in B's response in (3).

- (2) ritar dilipke bhalo lage na, to?
 Rita.gen Dilip.obj like.3 not TO?
 "Rita doesn't like Dilip, so what?"

¹ I will throughout represent the examples in the transcription found in the source texts.

- (3) A: baire khub briSTi hocche
 outside much rain occur.3
 ‘‘It’s heavily raining outside’’
 B: to?
 TO
 ‘‘So what?’’

The same holds for Hindi, as the following examples from Montaut (2016) show:

- (4) a. to kyâ huâ?
 TO what be.aor
 ‘‘And then, what happened?’’
 b. to?
 TO
 ‘‘And then?’’

In these cases, *to* should not be confused with an interrogative element as the translation may suggest. It simply means ‘‘(and) then’’. The interrogative impact follows only in a second step, namely by rising intonation and the challenge of the preceding proposition. ‘‘Rita doesn’t like Dilip, so what?’’ The conversational implicature of this sequencing is question-like (‘‘So what?’’, ‘‘Who cares?’’ etc.) but *to* as such has no interrogative impact. In all these cases, *to* is a free standing temporal adverb. Things change when we consider the usage of *to* as an enclitic element, or what Dasgupta (1984; 1987) calls an ‘‘anchor’’.²

- (5) a. dilip to kal aSbe
 Dilip TO tomorrow come.fut.3
 ‘‘Dilip will come tomorrow, won't he?’’
 b. Dilip kal to aSbe
 c. Dilip kal aSbe to

We see a variety of options. The common denominator is that *to* as a weak clitic-like anchor needs a phonological host to its immediate left which it can lean on. As Dasgupta (1987) argues, *to* in its incarnation as an anchor can never occur in initial position. There is good evidence that the material to the left of *to* must be a major syntactic constituent. In (5a) it is the subject, in (5b) the adverb, and in (5c) the entire clause.

The clause linker *to* and the clitic *to* can obviously not be identified semantically. In its free appearance, *to* is simply a temporal adverb meaning ‘‘then’’. As a

² The difference between a free form of *to* and an enclitic form of *to* has also been described for Hindi in Lakshmi Bai (1977).

clitic, it communicates that the speaker takes the hearer to believe that *p* is true and conveys the additional expectation that the hearer should acknowledge that *p* is true.³ Thus, *-to* triggers a reading according to which the addressee is reminded that *p* holds. Almost certainly, the clitic *to* lacks interrogativity in the same way that the clause linker *to* does. Emphasis of the truth of *p* gives rise to potential adversativity.

Adversativity plays a role in German *doch*. Maybe the clearest case is its use as an answering particle. A negative statement like (6) is not corrected with *nein* ("no") but with *doch*.

- (6) A: Du bist heute nicht in die Uni gegangen.
 you are today not in the university gone
 "You didn't go to university today"
 B: Doch / *Nein
 DOCH NO
 "No, I DID (go to university)"

Doch signals rejection of the previous proposition. It comes across as adversative because it is in fact the focalization of the truth of the proposition that has been denied in a previous speech act.⁴ Something similar is found when *doch* appears as a clause linker.

- (7) Klaus ist intelligent, doch er ist unmotiviert
 Klaus is intelligent DOCH he is unmotivated
 "Klaus is intelligent {but/however} he is unmotivated"

The second clause does not challenge the truth of the former as such but challenges one aspect of it, here the positive properties of Klaus. One can be both intelligent and unmotivated, but the latter property may hamper one's general success. Various authors have suggested that *doch p* corrects a salient *q* that entails $\neg p$; see Abraham (1991), Doherty (1985), Grosz (2010), Karagjosova (2004), Ormelius-Sandblom (1997) and others.

Interestingly, we find in German *doch* also in a role that resembles *-to* in its function as an anchor. It is a central property of German discourse particles that they have a clause-medial fixed position from which they cannot be moved to the

³ Working on *to* in Hindi, Lakshmi Bai (1977) came to a similar conclusion. According to her, the conjunctive *to* in Hindi must be distinguished from what she calls the "emphatic" *to*. The former is a clause linker, while the second is a clitic element that attaches to major sub-constituents of the clause.

⁴ Thus, it would be worthwhile to explore to what extent there is a use of *doch* that relates it to the familiar notion of "verum" focus, i.e. focusing the truth value.

front or to the right of the clause.⁵ *Doch* is such a particle. Imagine the following discourse:

- (8) A: Ich fahre morgen ans Meer.
I go tomorrow to.the sea
"I'll go to the sea tomorrow"
B: Aber du musst doch arbeiten!
but you must DOCH work
"But you must go to work!"

Here B reminds A of something that A is supposed to know, namely that he has to go to work and therefore can most likely not take a day off at the sea. One can see that an adversative clause linker, namely *aber* ("but") introduces B's utterance. Thus, *doch* cannot be identified with *aber*. It must by all means make an additional semantic contribution. It functions as a reminder that p (=B must go to work) is true and should be known to B. This is compatible with adversativity as already expressed by *aber*, but it adds a presupposition about the assumed mental state of the addressee. Interestingly, in this function, *doch* must remain in a fixed pre-VP position, and it must find a focused element in its scope, which in (8) is *arbeiten*. The alternative in (9a) lacks the "reminder"-meaning of the discourse particle, and (9b) is downright ungrammatical.

- (9) a. Doch du musst arbeiten!
b. *Aber du musst arbeiten doch!

In its role as a discourse particle, *doch* is a functional element on a par with negation and other grammatical elements. Although it is not a clitic like Bangla *-to*, it is not a phrasal element either. Various researchers have argued that it is a functional head.⁶

3 Semantics

As already indicated in section 2, *-to* and *doch* are semantically similar. We can distinguish the use as a clause linker and the use as a discourse particle. Obviously both hang together as is especially clear in German *doch*.

⁵ See Thurmair (1989) among various others.

⁶ See Bayer (2018) and works mentioned there.

3.1 Clause linker

As a clause linker, the function of *doch* is like the logical connective \wedge , enriched with the property that the simultaneous truth of the propositions *p* and *q* which are linked with \wedge is unexpected, unusual etc.⁷ This is the source of their adversative semantics. In Bangla, one would use the connective *kintu* but not *to*.

- (10) dilip iSkule jay {kintu/*to} Sipra baRite thake
 Dilip school.loc go.3 but/then Sipra home.loc stay.3
 "Dilip goes to school but Sipra stays at home"

3.2 Discourse particle

In their usage as discourse particles, *doch* and *-to* are quite similar. The clause linker meaning of *doch* reappears in its use as a discourse particle. Karagjosova (2004:183) suggests that in *doch(p)* the speaker's belief is that *p* is explicit but inactive common knowledge. To the extent that *p* is situationally relevant, this amounts to the implicature that the speaker has reason to believe that the hearer has 'forgotten' *p* and needs to be 'reminded' of it.

The Bangla clitic particle *-to* has much in common with this characterization. Again, the speaker assumes that *p* is known to the hearer, and that there is reason to believe that *p* is not in the hearer's focus of attention; *-to* is then actually a signal to the hearer to acknowledge *p* and react in a way that is consistent with subscribing to the truth of *p*. This must be the reason why sentences with *-to* are often interpreted as quasi interrogatives. The addressee is expected to show that he or she acknowledges the truth of *p*. (5c) - *dilip kal aSbe to* – is then interpreted in such a way that the speaker claims that *p* holds (*p* = Dilip will come tomorrow), that he assumes that the hearer already knows that *p* but that it is worthwhile to ask him to acknowledge that the truth of *p* should still be assumed. Of course, this brings the speech act quite close to the interrogative speech act that involves the enclitic interrogative particle *ki*. (11a) shows an explicit polar question; (11b) shows that the particle *ki* may be missing. The latter is possible if the question is a main clause with rising intonation.⁸

⁷ This is the reason why weakly contrastable properties give rise to awkward interpretations as seen in ??*Mary is tall but intelligent, ??2+2=4 but 4-1=3*.

⁸ Some researchers may assume that (11b) is equipped with a zero interrogative particle. I would be hesitant to accept such a conclusion. One could in the same way argue that *dilip kal aSbe* is a *-to* sentence with a zero particle corresponding to *-to*. In my view it is more reasonable to assume that (11b) is syntactically a declarative clause which is pronounced with interrogative intonation as in English *You are married?*

- (11) a. dilip kal aSbe ki?
 dilip tomorrow come.fut.3 Q
 "Will Dilip come tomorrow?"
 b. dilip kal aSbe? [with rising intonation]

4 Information structure

When *-to* is used as a discourse particle, it can be found in different places as has been shown in (5). In (5a), *dilip to kal aSbe*, the speaker wants the hearer to confirm that it is Dilip who will come tomorrow. In (5b), *dilip kal to aSbe*, the speaker wants the hearer to confirm that it is tomorrow that Dilip will come. The most straightforward syntactic solution says that *-to* is a functional head. Functional heads do not float around in the clause. They hold a fixed position in the grid of other such positions in clause structure. Functional heads may give rise to a specifier position. Constituents which match the respective head in feature structure can move to its specifier position; *-to* can attract elements if they qualify a) as constituents in Bangla, and b) are drawn from a set of semantic competitors, say, Dilip in comparison with Hiren or Projit or Mukul, or tomorrow in comparison with next week or next month or next year. (5c) would then be the neutral form in which the entire proposition has been moved to the specifier of *-to*. In this case, the speaker assumes that *p* is common ground between himself and the hearer, and that it is worth reminding the hearer of *p*.⁹ We see that, due to its clitic nature, *-to* is able to express different pragmatically relevant focalizations.

The German particle *doch* seems to be a functional head, but it is clearly not a clitic; following Diesing (1992) and following work, our assumption is that *doch* is merged in a pre-VP position, and that VP-internal constituents may move out of the scope of *doch*.¹⁰

- (12) a. Damals hat doch [dein Bruder] [dem Professor]
 then has DOCH your brother.nom the professor.dat
 [seine Dissertation] gezeigt.
 [his dissertation.acc] shown

⁹ This is - in a much abbreviated form - what Bayer, Dasgupta, Mukhopadhyay & Ghosh (2014) have suggested.

¹⁰ Diesing often uses the combination *ja doch*. Discourse particles can be stacked. But stacking makes no difference. Her main intention is to make the semantic difference between indefinites visible. In the present examples, definite DPs are being used. In this case, a semantic difference is only noticeable in terms of information structure. In general, topical DPs are to the left of the particle, rhematic ones stay in VP.

- "In those days your brother has shown his dissertation to the professor, didn't he?"
- b. Damals hat [dein Bruder] doch __ dem Professor seine Dissertation gezeigt.
- c. Damals hat [dein Bruder] [dem Professor] doch __ __ seine Dissertation gezeigt.
- d. Damals hat [dein Bruder] [dem Professor] [seine Dissertation] doch __ __ __ gezeigt.

Given that VP is the natural place for focal information, and that German allows reordering of arguments ("scrambling"), different options emerge as to which constituent is highlighted by *doch*. In (12a) it is the entire proposition SHOW(x,y,z). Here the speaker asks the hearer for confirmation that this proposition is true. Once the subject has been scrambled out of VP, as in (12b), the proposition remains what it is but confirmation is asked for showing the professor his dissertation; the subject is outside the focus domain. In (12d) we see that *doch* can scope over a VP all of whose arguments have been evacuated; only the verb remains. Here the speaker asks for confirmation about the predicate "show" in comparison with competitors such as "send" or "take-away" etc. We see that despite their syntactic differences, *-to* and *doch* achieve very similar pragmatic effects. While *-to* attracts focal elements to its left, *doch* uses scrambling in order to narrow down the domain in which it associates with a focal constituent.

5 Mood

Given what we have seen so far, it may not be too surprising to see that Bangla *-to* and German *doch* attend to the same core restrictions on sentence mood. Both appear in declarative and imperative clauses, and they are strictly impossible in questions. Consider imperatives.

- (13) a. edike eSo to
 this.direction come.2 TO
 "Please come here!"
- b. Komm doch her!
 come.2 DOCH toward.the.speaker
 "Please come to me!"

In both cases, the use of the particle turns the imperative into a friendly invitation. The semantics is not as straightforward as in declaratives. Nevertheless, it may be possible to argue that the particle's adversative potential adds to the speech act in

such a way that the speaker invites the hearer to make the underlying proposition true, and that he/she should do so in spite of reasons that may suggest otherwise.

Karagjosova (2004:169), who offers a formal speech-act theoretic account of *doch*, speaks of a "contrast between desire and reality". The speaker's positive attitude seems to be the result of an enhanced effort to invite the addressee to act in the sense of making the underlying proposition true.

To the extent that non-finite fragments of speech exist and are interpreted as imperatives, both Bangla and German show that their respective particle cannot be used in such constructions.¹¹ For German see Gärtner (2017)

- (14) a. matha uMcu!
 head up
 "Keep your head up!"
 b. *matha-to uMcu!
 c. *matha uMcu-to!
- (15) a. Kopf hoch!
 head up
 "Keep your head up!"
 b. *Kopf doch hoch!
- (16) a. Alles aussteigen!
 all out.step
 "Get off (the vehicle)!"
 b. *Alles doch aussteigen!

Obviously, fragmentary imperatives of this sort lack functional vocabulary; if in their usage as discourse particle both Bangla *-to* and German *doch* are proper part of the respective language's functional vocabulary, these facts follow straightforwardly.

Interrogative sentences exclude *-to/doch* in both languages.

- (17) Polar question
 a. tui ki aSbi? / tui aSbi ki?
 you Q come.2 / you come.2 Q
 "Will you come?"
 b. *tui ki aSbi to? / *tui aSbi to ki? / *tui aSbi ki to?

¹¹ As Jogamaya Bayer points out to me (p.c.), since Bangla is a zero copula language, (14a,b) can, of course, be a declarative sentences, in which case *-to* has a place.

- (18) Constituent question
 a. tui kObe aSbi?
 you when come.2
 "When will you come?"
 b. *tui-to kObe aSbi? / *tui kObe aSbi-to?
- (19) Polar question
 a. Wirst du kommen?
 will.2 you come
 "Will you come?"
 b. *Wirst du doch kommen?
- (20) Constituent question
 a. Wann kommst du?
 when come.2 you
 "When will you come?"
 b. *Wann kommst du doch?

Given that both particles have roughly the same semantic function, the ban in interrogatives is expected. Since the speaker desires information from the hearer, the true answer cannot be common ground between the interlocutors. As a consequence, the speaker cannot ask the hearer for confirmation of the underlying proposition.¹²

Let me finally return to the question whether the Bangla discourse particle *-to*, which we have seen is incompatible with interrogative mood, may itself be a question particle. As such *-to* would be a competitor of *-ki*. Intuitions appear to be a bit unreliable. As I said before, *-to* sentences are often pronounced with the rising intonation that is typical for questions. Without doubt, *-to* sentences can also be "answered" by acknowledging or denying that *p* holds. Therefore, it is advisable to

¹² Notice that not all *wh*-clauses are alike. There are for example *wh*-exclamatives of the style *What a shame!*, *How beautiful!* or *How good your son can already swim!* Here the proposition *p* = *P(x)*, e.g. *x* can swim, is presupposed, and the new contribution is roughly that the speaker exclaims that property *P* holds to a surprising degree. German exclamatives of that kind permit *doch*.

- (i) Wie gut dein Sohn doch schon schwimmen kann!
 how good your son DOCH already swim can

With *doch* the speaker reminds the hearer of the fact that his son is for his young age a very good swimmer. Interestingly, corresponding *wh*-exclamatives in Bangla like *tomar meye ki Sundor nache!* ("How beautifully your daughter is dancing!") do not permit *-to*, as pointed out to me by Probal Dasgupta and Jogamaya Bayer. I have no explanation for this discrepancy.

employ more formal testing. Such formal testing is provided by the use of negative polarity items (NPIs). We know that some NPIs are not only licensed by negation but also by interrogativity. As seen in (21), one such NPI is Bangla *ekTu-o* (little-even).

- (21) dilip ki **ekTu-o** Sahajjo koreche?
Dilip KI little-even help do.past.3
“Did Dilip help at all?”

The question is whether the use of *-to* provides a relevant licenser as well. If *-to* is equivalent to *-ki*, it should. The result of my little research revealed that examples such as (22) are deviant.¹³

- (22) *dilip to **ekTu-o** Sahajjo koreche?
Dilip TO little-even help do.past.3

In German questions, one can use the NPI *überhaupt* ("at all") among others as seen in (23a); non-inversion (alias failure of movement to C) as in (23b) leaves the NPI in limbo.

- (23) a. Hast du **überhaupt** das Licht ausgeschaltet?
have you at.all the light off.switched
"Have you switched off the light at all?"

b. *Du hast **überhaupt** das Licht ausgeschaltet
you have at.all the light off.switched

¹³ Probal Dasgupta (p.c.) informs me that in Bangla NPIs may also be licensed by bare interrogative intonation. Unlike in various languages in which the NPI must be licensed by an overt lexeme or by a change in word order as is the case in inversion, (i) is an option in Bangla.

- (i) dilip **ekTu-o** Sahajjo koreche?

If so, *-to* may be added to such an interrogative clause in the sense of a tag. (ii), in fact, is possible if intoned with dripping sarcasm and 'not p' is strongly implicated.

- (ii) ora rakar almari theke EkTa-o gOena curi korte parbe to?
they Raka's cupboard from one-even. ornament steal will be.able.FUT3 TO
'I bet they won't be able to steal a single ornament from Raka's cupboard!'

This analysis would not be available if *-to* appears in clause-medial position. Importantly, the designated interrogative marker *-ki* gives a license to the NPI from a clause medial position as well. Thus, the difference between *-ki* and *-to* remains.

When we consider the particle *doch*, one could argue that it turns a declarative sentence into a request which would make it indistinguishably similar to an interrogative. (24) would be a typical check-question for which an affirmative answer is strongly expected.¹⁴

- (24) Du hast doch das Licht ausgeschaltet?
 you have DOCH the light off.switched
 "Have you switched off the light? I hope you have."

In spite of this pragmatic nearness to real questions, such speech acts must not be confused with real questions. They can never license an NPI. (25) is as deviant as a pure declarative such as (23b).

- (25) *Du hast doch **überhaupt** das Licht ausgeschaltet?
 you have DOCH at.all the light off.switched

Thus, to the extent that our comparison between Bangla *-to* and German *doch* looks promising so far, the failure of NPI-licensing by *-to* seems to converge with this result from German.

6 Islandhood

Particles like Bangla *-to* and German *doch* are classical root clause phenomena. The reason must be that they tap into the epistemic system of the speaker and his/her evaluation of the common ground with the addressee. Thus, it is not sufficient for them to be hosted in a proposition; they must be hosted in a speech act which is formally typed according to the mood system of the language. Bangla is a good example for this generalization. According to my joint research with Probal Dasgupta, the discourse particles of Bangla can hardly ever be found in embedded clauses (clausal complements, relative clauses, adjunct clauses). Normally, if a particle like *-to* is in such an "island", it cannot reach the domain of the root clause, which is according to standard assumptions the grammatical layer in which illocutionary force is implemented.

The situation in German is less clear. There are various particles which can arise in *bona fide* islands; *ja* (lit. "yes") is a notorious example.¹⁵ The situation with *doch* is somewhat clearer. It can arise in attributive but not in restrictive relative clauses, see (26a). The former are something like separate ("parenthetical") speech acts; the

¹⁴ See Karagjosova (2004: 175ff)

¹⁵ See Kratzer (1999). Extensive work by Yvonne Viesel has explored the use of *ja*. See Viesel (2017) and ongoing dissertation work.

latter are not. *Doch* cannot arise in clausal complements unless they are in the scope of verbs of speaking and thus count as reported speech; this is seen in (26b).

- (26) a. Klaus/*jeder, [der doch gerade in Indien ist], hat angerufen
Klaus / every who DOCH right.now in India is has called
"Klaus/everyone who is right now in India has called"
- b. Jeder sagt/??glaubt, [dass die Regierung doch versagt hat].
every says/ believes that the government DOCH failed has
"Everyone says/belives that the government has failed"

Islandhood holds for most adjunct sentences. There is, however, an exception: reason clauses. Reason clauses which are initiated with *weil* in German and with *karon* in Bangla are certainly embedded clauses. But both of them can host the respective particles under discussion.

- (27) Max geht jetzt ins Bett,
Max goes now in.the bed
[weil er doch morgen einen anstrengenden Tag hat]
because he DOCH tomorrow a strenuous day has
"Max goes to bed now because he will have a strenuous day tomorrow."
- (28) a. dilip aj khub SOkale uTheche
dilip today very early rise.past.3
[karon o to aj SOhor-e EkTa mEla dekhte jabe]
because he TO today city-loc one.cl fair see go.fut.3
"Dilip got up early today because he will go to see a fair in the city."
b. dilip aj khub SOkale utheche [karon o aj SOhore EkTa mEla dekhte jabe
to]

According to Frey (2012), reason clauses belong to a class of what he calls *Peripheral Adverbial Clauses* (PACs). These clauses show signs of non-integration. Unlike integrated adverbial clauses, PACs have their own illocutionary force. Since they are nevertheless dependent clauses, their force relies on the speaker who utters the root clause. For detailed discussion see Haegeman (2012). It would be worth exploring to what extent Bangla *-to* is licit in other clause types that have been subsumed under the PAC-generalization, and to what extent other tests concerning the theoretical isolation of PACs could be applied to Bangla.

7 Conclusions

The comparative exploration of the particles *-to* and *doch* in Bangla and German respectively reveals a surprising convergence in terms of their syntactic and semantic/pragmatic properties. This convergence may be due to linguistic universality or to large-scale parametric properties. If so, we would expect to find more languages, and in particular also genetically unrelated languages, with similar lexical elements in the service of similar functions and distributions. Given that little attention has so far been paid to "little words" with "fuzzy meaning", such findings could indeed be possible. The other expectation could be that the two elements under discussion emerge from a common Indo-European ancestral language. Their phonetic similarity and the few historical records we have access to suggest that this possibility exists. If so, it would be highly interesting to see that the features that are shared by Bangla *-to* and German *doch* have survived 2000 years or so.

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The child in semantics*

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Abstract This paper discusses the challenges that children face in acquiring natural language meaning, and the kinds of linguistic and nonlinguistic capacities that they may draw from to face these challenges.

1 Introduction

Linguistic theory aims at what makes language possible, and part of this is figuring out what the human child brings to the acquisition of linguistic competence. For the most part, however, the semantic aspect of this capacity has not been the object of work in semantics, which has concentrated on the specification of truth and reference, and viewed with little urgency (less than has work in syntax), the question of how children naturally acquire the languages we use to assert and refer. But semantics has become increasingly integrated into linguistic theory, thanks in large part to Angelika Kratzer, whose work connects semantics to our understanding of both syntax and cognition more broadly. Now the child is playing a more prominent role. In this paper, I would like to discuss what we know about the challenges of acquiring meaning, and about the linguistic and nonlinguistic capacities that equip children to face them, drawing on what I've learned in recent years from working with acquisitionists.

Like all of language, word meanings are acquired from limited input, without much negative evidence or explicit teaching. What a word means is constrained only weakly by the physical environment of its use, which changes little as one word follows another. But neither could it always be decided by perfect insight into what the speaker means to convey, on any one occasion, since this will generally go beyond what is encoded in words. The child will still need to abstract the meaning of a phrase from what a speaker means in using it, and then divide this up among its constituent words. Yet despite these challenges, children

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somehow succeed, by exploiting multiple cues in concert. Included among these are some, perhaps less obvious, that come from the structure of sentences and conversations in which the word is used. What other words are its regular companions? What is its syntactic category? What sorts of arguments does it take? What is the immediate topic of conversation? What has already been discussed? What is the speaker paying attention to? And what is she trying to achieve? These are among the sources of information, less direct than a finger pointing to a ball while the speaker says “ball”, that might help the child—or also sometimes confuse her, when she sees them in a non-adult way.

Whether and when children can make use of these cues depends on the linguistic, conceptual and pragmatic abilities and biases they have at different stages of development. Right at the start, a few conceptual pre-requisites need to be in place for word learning to get off the ground. Children need to be attuned to communicative intentions and goals; they need to parse the world in roughly the same chunks as the speakers around them; and they need to have access to the underlying concepts that the words express. If children can’t see the rabbit for its body parts, and grasp the intention to refer to it as such, they won’t be able to resolve classic problems of indeterminacy that arise even for a simple word like *rabbit*. Likewise without a concept of possibility, and an expectation that people might talk about what is non-actual, children will be hard-pressed to acquire modal words such as *must* or *can*.

The last three decades of research in cognitive development have shown that young children’s conceptual abilities are much more in line with that of their parents than was originally thought. Children tend to parse the world into the same pieces as adults do, and view those pieces under the same concepts (Gleitman 1990, Spelke 1990, Markman 1990, Waxman & Lidz 2006, Carey 2010). Furthermore, they can track the goals and intentions of their interlocutors (Baldwin 1991, Bloom 2001, Clark & Amaral 2010), and see people’s actions in terms of their beliefs, desires, goals and intentions (Gergely *et al.* 1995, Woodward 1998, Onishi & Baillargeon 2005, Southgate *et al.* 2007). This helps resolve one side of the word learning problem: if children parse the world in the right chunks, their task is just to figure out what word corresponds to what concept or chunk of the world. And for some words, like *ball* or *rabbit*, they might succeed solely on the basis of cues from the extra-linguistic context, by paying attention to what objects speakers are directing their attention to, and seeing these objects in the same light.

However, this strategy will be less useful for more abstract words, with no obvious referents in the physical context of speech. In these cases, children may need to depend more on cues from the linguistic context, grammatical and conversational. And just as seeing the world through the same eyes as their parents can narrow the space of candidate meanings for the child, sharing certain

linguistic biases may narrow it further. These biases might include expectations about what concepts are likely and unlikely word meanings, or about how the meaning of a word might correlate with its distribution in syntax, for example.

More than in the past, it is plausible that we might discern what is properly linguistic in the acquisition of semantics, owing to breakthroughs on the conceptual end of the word learning problem. And this makes it an exciting time for semanticists to collaborate with acquisitionists. This paper provides a brief survey of how these issues are currently being addressed. My goal here is not to provide a comprehensive overview, but to simply highlight the kinds of methods that have been developed to probe different aspects of the word learning problem. Section 2 outlines the kinds of cues that children could in principle exploit when word learning, and the kinds of linguistic, conceptual, and pragmatic abilities and biases that would allow them to do so. Section 3 reports on methods that have been developed to probe which of these cues and biases children actually make use of when word learning.

2 Word learning from limited evidence: potential cues & biases

Ordinarily children learn words not from verbal or ostensive definitions, but from hearing them in conversation. This seems incredible at first, since the space of possible meanings for a given word in any given situation is vast. But there are various sources of information that children can in principle make use of. Here I review a few of these, and consider what abilities would allow a child to exploit them.

2.1 Potential cues from the linguistic and extra linguistic context

The *physical context* can provide cues, if learners are able to associate a word with an object that keeps on reoccurring whenever the word is used, especially if speakers draw attention to that object by directing their eye gaze or through pointing gestures. To exploit cues from the physical context, children need to be able to keep track of co-occurrence patterns. They also need to view the world in roughly the same chunks as the speakers around them. They may need further mindreading abilities, to infer speakers' referential intentions, by tracking what part of the world they are attending to. Once children figure out the meanings of a few words this way, these words can then be used to exploit cues from the linguistic context to figure out the meaning of more abstract words (Gleitman *et al.* 2005).

Various aspects of the *linguistic context* can provide valuable cues as to a word's meaning. The *lexical context* (the set of words that occur in the same sentence), for instance, could be quite useful in learning the meaning of verbs like

eat or *drink*, which co-occur with noun phrases from a very narrow semantic range (edibles and drinkables; see discussion in Resnik 1996, White 2015). The *syntactic context* could be useful if the syntactic distribution of a word correlates with aspects of its meaning (Landau & Gleitman 1985; Gleitman 1990 a.o.). Gleitman and colleagues propose that syntactic cues play a critical role in children's acquisition of "hard words", such as attitude verbs like *think* or *want*, which express abstract notions for which the physical context provides few cues. One aspect of the syntactic signal is *syntactic category*: knowing that a word is a noun, for instance, will narrow the range of possible meanings. Another is *syntactic selection*: knowing the kinds of arguments a word takes can further narrow the range of its possible meanings.

For such "syntactic bootstrapping" to work, there need to be robust correlations between the meaning of a word and its syntactic distribution, and children need to recognize them. What the correlations might be appears in the formal literature as the question of how well syntactic selection can be semantically motivated. In the case of attitude predicates, for instance, there is a rich literature about whether various selectional requirements track fundamental semantic distinctions, such as mood selection (Bolinger 1968, Farkas 1985, Giannakidou 1997, Villalta 2008, a.o.), or the ability to take both interrogative and declarative complements (Lahiri 2002, Egge 2007, a.o.). We then have the further question of whether, at a given age, children are able to use these correlations in learning. This requires both the ability to perceive the correlated categories, syntactic and conceptual, and the ability to observe the correlation. These abilities will not emerge instantaneously; even if they draw on some innate expectations, they will develop through infancy and early childhood.

The **conversational context** can also provide very valuable cues. The *topic of conversation* can constrain the lexical field of content words. Other more indirect cues might come from the speakers' *conversational goals*. For instance, figuring out that a verb like *want* is systematically used to make indirect requests might give away the fact that it expresses a kind of preference. Other cues might come from the state of the *common ground*, and what assumptions are shared over the course of a conversation. For instance, tracking what speakers presuppose might help learners figure out whether a given word is a presupposition trigger. To exploit cues from the conversational context, learners will need a combination of pragmatic and linguistic abilities.

2.2 Linguistic, conceptual and pragmatic biases

There are various sources of cues about word meanings that learners can in principle draw from. But whether children can actually exploit these cues will depend on the conceptual, pragmatic and linguistic abilities and biases they have at different stages of development.

2.2.1 Conceptual and pragmatic abilities and biases

To exploit cues from both the physical and the conversational contexts, children need a certain amount of *conceptual* and *pragmatic* competence. First, they need to carve the world in roughly the same chunks as the speakers around them, viewed under roughly the same concepts. And as we saw, the cognitive development literature suggests that they do from infancy. Children also need some mindreading abilities, to see what part of the world speakers are attending to, in order to figure out their referential intentions. And here again, many infant studies have shown that such abilities are in place very early on (Gleitman 1990, Spelke 1990, Markman 1990, Baldwin 1991, Bloom 2001, Waxman & Lidz 2006, Carey 2010, a.o.). Other studies show that young children further pick up on the intended illocutionary force of speakers' direct and indirect speech acts (Shatz 1978, Spekman & Roth 1985, Grosse *et al.* 2010, Grosse & Tomasello 2012, a.o.).

One tricky aspect of word learning is that children are not exposed to literal meanings in isolation: just like objects are embedded in scenes, word meanings are embedded in conversational contexts. What children are exposed to are speaker meanings, and from these they have to distill the contributions made just by the words alone. This may be tricky, if a word is regularly used to express a pragmatically enriched meaning. For instance, if children were to hear *some* only when the speaker means *some and not all*, might they not lexicalize this stronger meaning? This doesn't seem to happen. If anything, children have been reported to be hyper-literal, and unable to compute scalar implicatures with *some* (Noveck 2001). If pragmatic enrichments are routine with scalar terms like *some*, children's hyper-literality is puzzling. It suggests that something either in their experience, or in the expectations they have about word meanings points them to the literal meaning of *some*: perhaps there is enough data in children's experience to show that the meaning of *some* is not *some and not all*; perhaps learners do not expect meanings like *some and not all* to be lexicalized into a single morpheme (see Horn 1972).

The hyper-literality of children with scalar implicatures seems to go against the pragmatic sophistication they display early on, which helps them pick up on speakers' referential and conversational goals. There is now a growing consensus

that children's pragmatic abilities are much more sophisticated than was initially assumed, and that the difficulty they seem to have with scalar implicatures is not with reasoning about speakers' choice of words or computing the implicature itself, but with figuring out what alternatives are relevant in a given context; when the alternatives are made explicit, children have no problem deriving the relevant implicatures (see Pouscoulous 2012, Lewis 2013, Papafragou & Skordos 2016 and references therein).

While it seems clear that children can track and reason about speakers' referential and conversational goals, less is known about their ability to track what speakers presuppose, though there is evidence that young children keep track of the knowledge and shared experience of the people around them (Liebal *et al.* 2009, O'Neill 1996, Moll *et al.* 2008, a.o.). Children seem to have some amount of difficulty with different presupposition triggers like definites (Karmiloff-Smith 1979, Schaeffer & Matthewson 2005, van Hout *et al.* 2010, a.o.) or factives (Schulz 2003; Dudley 2017), but it is not always clear whether the difficulty stems from problems with understanding what is common ground, or instead with noticing that use of a certain word triggers a presupposition.

To sum up, children seem to have rich conceptual and mindreading abilities that could support their exploitation of cues stemming from speakers' referential and conversational goals, when word learning. There are, of course, limits on what children can do, which makes them different from adults. But these limits seem to be more quantitative than qualitative in nature, and based on having less experience of the world and of language, along with processing limitations due to a linguistic parser, which is also developing (see Omaki & Lidz 2015).

2.2.2 Linguistic abilities and biases

When word learning, children will only be exploit linguistic cues once they have the necessary grammatical knowledge and linguistic parsing abilities to identify these cues. As children's vocabulary and grammatical knowledge grows, so does their ability to exploit various syntactic cues (Valian 1990, Fodor 1998, Perkins *et al.* 2017, a.o.) To make fruitful use of syntactic cues, children may need certain linguistic expectations about what are possible meanings and how these meanings relate to syntactic distribution. This is where language acquisition can truly benefit from theory of linguistic meaning.

Expectations about possible and impossible or unlikely word meanings could help children narrow their hypotheses space. Are there concepts that are not expressible in natural language, or perhaps more realistically, not likely to be expressed by a single word? Are there constraints on how notions like time or possibility are expressed in natural language? Do children come with such expectations build in? Here again, questions of acquisition and cross-linguistic

variation overlap. And while there may not be many robust semantic universals as far as content words are concerned, there may be more promising constraints for function words (see Fintel & Matthewson 2007). Most famously, there may be constraints on determiner meanings, for instance, whether they may all obey conservativity (Barwise & Cooper 1981).

Expectations about links between a word's meaning and its syntactic distribution could also help the child, provided that these links are principled, in ways that are accessible to the child. And here again, cross-linguistic variation needs to be taken into consideration. To illustrate, consider how children might acquire attitude meanings. The acquisition literature shows that there is an asymmetry in the apparent mastery of belief verbs like *think* and desire verbs like *want*. Putting aside the cause of the asymmetry, its mere existence suggests that children systematically distinguish the two verbs early, even before they have fully mastered one of them. What might help them distinguish the two verbs early could be syntax. For instance, mood selection in Romance has been argued to correlate with a split in attitude meanings between belief (indicative) and desire verbs (subjunctive). Perhaps mood helps Romance learners differentiate *think* and *want* early. One important caveat for such syntactic bootstrapping is that mood is not a universal way of distinguishing the two verb classes: English doesn't have a productive mood distinction, though it does distinguish the two classes syntactically through other means, for instance, via the finiteness of the complement (finite for belief verbs, nonfinite for desire verbs); German uses mood productively, but not to track the belief vs. desire split, though it does distinguish the two classes via word order (belief—but not desire—verbs, allow V2 word order in their complement). Children do not know what language they are learning, so for syntax to be informative about meaning in a way that supports syntactic bootstrapping, it has to do so in a way that leads to language specific mappings. In Hacquard & Lidz (2018), we propose that the way children might use syntax to distinguish belief vs. desire verbs is by tracking whether a given attitude verb takes complements with syntactic hallmarks of declarative main clauses in their respective language (e.g., indicative mood in Romance, V2 word order in German, finiteness in English).

3 Figuring out how children figure out word meanings

We have seen that there are various cues that children could *in principle* exploit in word learning, coming from both the linguistic and the extra linguistic context. Whether children can make use of these cues depends on whether they have and can deploy various linguistic and cognitive abilities and biases about word meanings and their distribution. In this section, I discuss steps that have been taken to probe which cues and biases learners exploit *in practice*, drawing mostly

from research done by students and colleagues at the University of Maryland as an illustration.

3.1 Figuring out what's in the input and what cues are useful *in principle*

The first step to figure out what cues children make use of is to see what cues are actually present in the input to children. To do so, language acquisitionists have used corpora of naturalistic interactions between children and their parents, to track how parents use various words. Corpus studies investigating questions of meaning are much trickier than those investigating questions of syntax or morphology. For questions of meaning, one must not only look at the kinds of sentences a given word occurs in, but also at how the word is used in context, to figure out what meanings get conveyed in the conversational context, and what speakers presuppose. These kinds of studies are time consuming, but crucial to address questions of how children acquire various word meanings, and sometimes, they reveal new learnability problems. Dudley (2017), for instance, shows that speakers often use the factive verb *know* in contexts where the proposition expressed by its complement is not in the common ground, in ways that doesn't really distinguish it from non factive *think*. This suggests that the way children pick up on the factivity contrast between *think* and *know* is unlikely to come from tracking what speakers are presupposing. Van Dooren *et al.* (2017) show that the way speakers use modal auxiliaries in English makes it challenging to see that they can express different flavors of modality: modals that are in principle polysemous are in practice mostly used monosemously.

Corpus studies can thus reveal the kinds of cues to word meanings that are available in the input: what syntactic environments do the words appear in? What discourse cues correlate with the use of the words? Once the cues have been identified, one can ask which of them are reliably predictive of semantic distinctions. To do so, language acquisitionists have turned to computational modeling, to see whether a virtual learner could learn the right semantic distinctions by tracking various clues. White *et al.* (2018b), for instance, test whether a virtual learner could distinguish belief from desire verbs by tracking whether the complements of the verbs share syntactic features with declarative main clauses, and find that it can, at least for English.

3.2 Figuring out what cues are useful *in practice*

Once we know which cues are available and reliable in the input, and which aren't, we can ask which *children* actually make use of. There could be very obvious cues that children simply ignore, or much more subtle ones that they still

make use of. This can help us get at the underlying conceptual, pragmatic and linguistic competence that enables the child's exploitation of such cues.

There are various ways to address this question. The first is to look at correlations between input and output: does the robustness of cue X for word *w* in the input lead to earlier production of *w*? A limitation of this method is that there could be all kinds of reasons why children fail to produce *w*: they do not like to talk about whatever *w* refers to; they prefer to use some other means of expressing what *w* expresses... Conversely, production of *w* does not necessarily mean full grasp of what *w* means for adult speakers.

Another possibility is to "train" children on the relevant cue, by artificially exposing them to sentences that exhibit the cue, and comparing their performance on *w* post training to the performance of children trained on different sentences. Hale & Tager-Flusberg (2003) for instance developed such a methodology to test whether exposure to (speech) verbs with a sentential complement would help children not just with sentential complements, but with their performance on a standard false belief task: they had groups of children trained on false belief, sentential complements, and relative clauses, and found that the performance of children trained on sentential complements not only improved for sentential complements, but false belief tasks as well, whereas the other types of training only improved performance on the condition that they were trained on.

Another way of getting at the relationship between input and output was pioneered by Rachel Dudley in her recent dissertation investigating children's acquisition of *know* and *think*. Through an initial corpus study, Dudley identified various cues to the factivity contrast in speech to children: cues from the discourse context (what information is discourse old or new), cues from the syntax (what types of complements the verbs take), and cues from the discourse function of utterances of these verbs (what indirect speech acts they are used for). Dudley then set up a behavioral task testing children's grasp of the factivity of *know* and non-factivity of *think*. In this task, children had to figure out where out of two boxes a toy is hidden, using cues like "Chris thinks/knows that it's in the blue box" or "Chris doesn't know/think that it's in the blue box". She found that some three-year-olds treated *know* as factive but that others did not, and that none took *think* to be factive. To see whether this gap in performance was due to differences in their linguistic experience with the verbs, and what aspect of the input lead to earlier mastery of factivity, Dudley designed a final task testing the relation between children's linguistic experience with *think* and *know* and their understanding of factivity. She had the parents of a group of children record various conversations with their children, to get a measure of children's input, and then tested these children on the toy finding task. She then looked for input factors that best predicted children's performance. While her results are not yet conclusive, the methods she introduces provide a good model for how to

investigate the relationship between input and output for words with subtle meaning properties, like presupposition triggers.

3.3 Figuring out what linguistic biases children have

Once we know more about children’s linguistic experience with the various words they learn, and what cues from this input seem to matter for their acquisition, we can ask what linguistic biases help children make use of the cues. To get at this, language acquisitionists have devised various tasks, which typically involve novel or unfamiliar words, to control for children’s experience with the words.

Turning first to expectations about possible and impossible word meanings, Hunter & Lidz (2012) for instance tested whether children expect determiner meanings to be conservative. To do so, they used a variant of the “picky puppet task” (Waxman & Gelman 1986) to teach children novel determiners, by showing them cards with different configurations of boys and girls on the beach or on the grass. The picky puppet liked some of the cards (the ones that supported a certain determiner meaning) “because *gleeb* girls are on the beach”, but didn’t care for others (the ones that did not support that determiner meaning), “because it’s not true that *gleeb* girls are on the beach”. Their results show that while children could easily learn a conservative determiner, they failed to learn a non-conservative one.

As for expectations about word meanings and their syntactic distribution, various studies have shown that children use syntactic information when word learning, both in terms of syntactic category (Waxman & Booth 2001; He & Lidz 2017, a.o.), or argument structure (Landau & Gleitman 1985; Pinker 1989; Naigles 1990, 1996; Naigles & Kako 1993; Lidz *et al.* 2003; Yuan & Fisher 2009, a.o.; for an overview, see Williams 2015). Here I will briefly describe two studies as illustration. Using the picky puppet task again, Wellwood *et al.* (2016) found that children were sensitive to syntactic position when they heard novel superlatives: when the novel word appeared in the syntactic position of a determiner (*gleebest of the cows are in the barn*), children preferred quantity-based interpretations, but when it appeared in the position of an adjective (*the gleebest cows are in the barn*), they preferred quality-based interpretations (tracking the cows’ spottiness vs. their distribution in and out of the barn). Finally, to test children’s sensitivity to syntactic distribution when learning attitude meanings, Harrigan *et al.* (2016) presented children with a low frequency attitude verb (*hope*), in contexts that made salient both the beliefs and desires of a puppet. Children’s interpretations of *hope* sentences depended on whether it appeared with a finite (“*Froggy hopes that it’s a heart*”) or a nonfinite complement (“*Froggy hopes to get a heart*”): with the former, children tended to interpret *hope*

sentences as reporting on Froggy's beliefs; with the latter, they tended to interpret them as reporting on his desires.

4 Looking forward

How do children figure out meaning from very limited evidence? We can now pursue this question in earnest, due to headway made on many fronts. From our analyses of the syntax, semantics, and pragmatics of languages, we now have a better understanding of the target knowledge for various morphemes and constructions. Our expanding knowledge of cross-linguistic diversity for semantic matters gives us a better sense of what is linguistically attested and attestable. From cognitive development, we have more and more evidence that children see the world through similar eyes, and make sense of it with the same conceptual toolkit as the adults around them. From language acquisition, tasks testing children's pragmatic and semantic competence have become more and more savvy, and more often than not, they reveal that when the pragmatics of the task are natural, children tend to know more than we originally thought. Moreover, sophisticated corpus analyses and computational modeling give us a better sense of children's linguistic experience: what evidence children get or fail to get for various word meanings. All of this can help us figure out what it is that children bring to the learning problem, what linguistic biases and expectations they have about natural language meaning and its connection to syntax. The various linguistic, conceptual and methodological breakthroughs have made it possible to start addressing not just when, but how children learn from their limited experience, making it a particularly fruitful time for language acquisitionists and semanticists to collaborate.

The hope from language acquisition is that it can illuminate linguistic theory. In particular, we expect that language acquisition should help arbitrate between competing theories about the target grammar. But this expectation often leads to frustration, as the grain size of the questions that can be addressed in language acquisition cannot always match that of semantic theorization: Until we know everything about children's linguistic experience and about their conceptual, pragmatic, linguistic and processing abilities at various stages of development, we won't be able to tell how well their semantic representations line up with those of the adults around them. But while language acquisition research may not yet be in a position to arbitrate between theory A and theory B for any given semantic phenomenon X, it can address the prior and fascinating question of what linguistic, conceptual, pragmatic abilities and biases would be required for children to acquire X, were it to be analyzed as A vs. B, given the evidence they get from their experience.

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“Relative pronouns” as agreeing complementizers: German *welch-* *

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Abstract Studies on relative clauses have highlighted two opposing views on the nature of relativizing elements. On the one hand, Kayne (2010) has challenged the long held view, dating back to Klima (1964), that relative *that* in English is a complementizer, arguing instead that it is a relative pronoun. In contrast, Pesetsky and Torrego (2006) argue that even (simplex) *wh*-relativizers, like *who* and *which* in English, are agreeing complementizers (see also Thornton and Crain 1994, Thornton 1995, Crain and Thornton 1998). Similarly, Bayer (2014:23) argues for Bavarian that “word-size *wh*-operators have syntactic as well as phonological properties of functional heads rather than genuine phrases”, and that “*wh*-words embrace the role of the complementizer”. Starting from some basic, though not much discussed, asymmetries between two sets of so-called relative pronouns in German, the novel claim I put forward is that the relativizer *welch-*, commonly rendered as *who* or *which* in English, is in fact a (agreeing) complementizer and not a relative pronoun, on a par with other simplex *wh*-elements, most notably *was/wo*, in (varieties of) German (Bayer 1984, 2002a,b, van Riemsdijk 1989, and references therein), and *who* and *which* in English (Pesetsky and Torrego 2006). Consequently, I argue for the fluidity of syntactic categories within a functional domain (specifically, the C-domain). Crucially, the analysis I put forth is only compatible with a non-head-raising analysis of relative clauses, whether in its external head variety, as assumed in Heim and Kratzer (1998) among others, or the matching analysis.

* It is with much gratitude that I dedicate this paper on German *welch*-relatives to Angelika, who I first met at WCCFL XVII in 1998 (can anyone be happier, or prouder of their student self after Kratzer comes over and praises your talk?) and really got to know during a wonderful research stay at UMass in February 2006. Not only did Angelika take time to listen to my ideas on all things linguistic and beyond, she also was the most amazing of hosts, making sure I was never lonely while away from my young son for that first longer spell. Happy birthday, and to many more future encounters, liebe Angelika! For the analysis developed in this paper, I owe special thanks to Gereon Müller and to Sabine Laszakovits.

1 Basic observations

German has two (sets of) so-called relative pronouns differing primarily in terms of the morphology they bear, namely *d*-morphology (*der*, *die*, *das* and their cognates, identical in form with definite determiners and demonstratives) vs. *w*-morphology (*welch-er/-e/-es*). Only the latter are also bona fide *wh*-elements (i.e. question words), just like their (non-partitive) *w*-cognates *wer* (*who*) and *was* (*what*). Unlike *wer/was* though, but like *der/die/das*, *welch-* is barred in free relatives.¹ These facts are illustrated in (1) to (3).

- (1) *Der Soldat*, { ***der*** / ***welcher*** / ****wer*** } *im Irak war, ist wieder zu Hause.*
 the soldier d-REL_{NOM} which_{NOM}who_{NOM} in Iraq was, is again at home
 ‘The soldier who served in Iraq is back home.’
- (2) a. ***Welche*** (*Frage*) *hast du beantwortet?*
 which (question) have you answered
 ‘Which (question) did you answer?’
 b. ***Wen*** / ***was*** *hast du gesehen?*
 who_{ACC} / what have you seen
 ‘Who/what did you see?’
- (3) { ***Wer*** / ****der*** / ****welcher*** (***Student***) } *zu meiner Party kommt, muss etwas mitbringen.*
 who_{NOM} d-REL_{NOM} which_{NOM} (student) to my party comes must something bring
 ‘Whoever/whichever student comes to my party must bring something.’

However, as possessor of a DP, *welch-* does not pattern with *der* (the genitive form of which is *dessen*), but with *wer* (the genitive form of which is *wessen*), as shown in (4).

- (4) *Der Mann*, [{ ***dessen*** / ****wessen*** / ****welches*** } *Hund*] *gestorben ist, war verzweifelt.*
 the man d-REL_{GEN} which_{GEN} who_{GEN} dog died AUX was desperate
 ‘The man whose dog died was desperate.’

¹ The ungrammaticality of *welch-* in free relatives has nothing to do with the fact that it is a complex *wh*-phrase, since as Grosu (2003) notes, these are not disallowed in free relatives. In other words, the impossibility of *welch-* in free relatives cannot be some subjacency-like effect.

There is a variation of expressing the possessor of a DP with dative + possessive pronoun (instead of GEN and no pronoun). In these cases, parallel to (4), *welch-* is out, but *d-* isn't:

- (5) *Der Mann, [{ dem / *welchem } sein Hund] tot ist, war verzweifelt.*
 the man d-RELDAT whichDAT his dog dead AUX, was desperate

Importantly, the ungrammaticality of *welch-* in (4) and (5) is not readily derivable from Keenan and Comrie's (1977) Accessibility Hierarchy (namely: SU > DO > LO > OBL > GEN > OCOMP), since *welch-* may bear both genitive and dative case, as with genitive and dative case assigning verbs; this is shown in (6a) and (6b), respectively.

- (6) a. *Die Soldatin, { derer / deren / welcher } wir uns heute erinnern,*
 the soldier_{FEM} d-REL_{GEN} d-REL_{GEN} which_{GEN} we us today commemorate
*stammte aus Irland.*²
 came from Ireland
 'The soldier we commemorate today came from Ireland.'
 b. *Der Mann, { dem / welchem } wir halfen, ist gegangen.*
 the man d-RELDAT whichDAT we helped is gone
 'The guy we helped is gone.'

Finally, as Heck (2005) observes, under the head-raising analysis (Kayne 1994 et seq.), the occurrence of *welch-* should also be possible when it is associated with a head noun bearing genitive case (see the examples in (7)), but in these cases there is necessarily a switch to *dessen/dem sein*, as was already illustrated in (4) and (5) and as is shown again in (9).³ Note that the fact that (8a) is slightly marked (the

² There is a variation for the genitive of the feminine *d-*form: both *derer* and *deren* are used.

³ There is a complication relating to genitive marking of *welch-* with genitive case assigning verbs, namely that if the head noun is masculine or neuter, *welch-* is not entirely happy bearing genitive case marking, as shown in the examples (i) through (iii), which thus contrast with the grammatical (6a):

- (i) **Der Mann, welches wir hier gedenken, war einsam.*
 the man which_{GEN} we here commemorate was lonesome
 (ii) **Das Kind, welches wir hier gedenken, war glücklich.*
 the child which_{GEN} we here commemorate was happy
 (iii) **ein Buch, welches wir nicht bedürfen*
 a book which_{GEN} we not need
 'a book that we do not need'

post-nominal genitive (8b) is better) does not explain the strong ungrammaticality of (7a), and that the post-nominal variant is excluded in relative clauses, as shown in (7b).

- (7) a. **Die Frau, [welcher Hund] gestorben ist, ist einsam.*
 the woman which_{GEN} dog died is, is lonesome
 [Intended] ‘The woman whose dog died is lonesome.’
- b. **Die Frau, [(der) Hund welcher] gestorben ist, ist einsam*
 the woman (the_{NOM}) dog which_{GEN} died is, is lonesome
 [Intended] ‘The woman the dog of whom died is lonesome.’
- (8) a. ? [*Welcher Frau Hund] ist gestorben?*
 which_{GEN} woman dog is died
 ‘Which woman’s dog died?’
- b. [*Der Hund welcher Frau] ist gestorben?*
 the_{NOM} dog which_{GEN} woman is died
 ‘The dog of which woman died?’
- (9) a. *die Frau, [deren Hund] wir gut kennen, ist einsam.*
 the woman who_{GEN} dog we well know is lonesome
 ‘The woman whose dog we know well is lonesome.’
- b. *die Frau, [der ihren Hund] wir gut kennen, ist einsam.*
 the woman who_{DAT} her_{ACC} dog we well know is lonesome
 ‘The woman whose dog we know well is lonesome.’

2 Proposal

I contend that all the data presented in section 1, and further data to be presented below, can be formally and uniformly derived under the proposal that *welch-* is not a relative pronoun, but an agreeing complementizer in C^0 , specifically agreeing with an empty operator in Spec of CP, as given in (10); note that the non-head-raising structure in (10) evades Heck’s objection detailed in section 1, irrespective of whether one opts for a head-external, or a matching analysis.

Crucially however, as the examples in (7) show, the ungrammaticality of *welch-* in possessor contexts persists even with feminine head nouns (note again the contrast between the grammatical (6a) and the ungrammatical (7a)), a fact that has thus far remained unaccounted for, and which constitutes a central motivation for the present undertaking. And while one may speculate on the reason for the gaps in (i) through (iii), the fact that speakers’ judgments vary in that not all find these examples equally bad is noteworthy.

- (10) [DP [NP [CP [Spec,CP *Op*_{[case, φ]i}] [C⁰ *welch-*_[case, φ]] [TP ... *t*_i ...]]]

Crucial evidence for this analysis involves the following facts. In German restrictive relatives, in addition to the ‘canonical’ verb final (V-final) order, there is a verb second (V2) variation (Gärntner 2000), which is however restricted to indefinite heads, as shown in (11).

- (11) a. *Das Blatt hat eine Seite, die ganz schwarz ist.* [V-final]
the sheet has a side that whole black is
b. *Das Blatt hat eine Seite, die ist ganz schwarz.* [V2]
the sheet has a side that is whole black
‘The sheet has a side that is completely black.’
c. *Ich kenne die Theorie, die du präferierst.* [V-final]
I know the theory that you prefer
‘I know the theory that you prefer’
d. **Ich kenne die Theorie, die präferierst du.* [V2]
I know the theory that prefer you

The V2 pattern illustrated in (11b) is, however, impossible with the relativizer *was*. This follows, as *was* is a complementizer in C⁰, hence the verb cannot raise to this position:

- (12) a. *Das Buch hat ein Blatt, was ganz schwarz ist.* [V-final]
the book has a sheet WAS whole black is
‘The book has a sheet that is all black.’
b. **Das Buch hat ein Blatt, was ist ganz schwarz.* [V2]
the book has a sheet WAS is whole black
‘The book has a sheet that is all black.’

Interestingly, V2 relatives are also impossible with the *welch-* relativizer; see (13). This is predicted under my analysis, since *welch-* and the verb compete for the same position.

- (13) a. *Das Buch hat ein Blatt, welches ganz schwarz ist.* [V-final]
the book has a sheet which whole black is
‘The book has a sheet that is all black.’
b. **Das Buch hat ein Blatt, welches ist ganz schwarz.* [V2]
the book has a sheet which is whole black

Furthermore, the possessor facts illustrated earlier in (7) find a natural explanation under my proposal, since in the case of (7a), a parse where *welch-* is a C-head would require an analysis where an empty operator has been extracted from a left branch, as given in (14), which can however be dismissed since German obeys the Left Branch Condition.

- (14) *Die Frau, OP_i [C *welcher_i*] [t_i Hund] gestorben ist, ist einsam.
 the woman which_{GEN} dog died is is lonesome

Turning to (7b), again assuming the presence of an empty operator, the analysis would look as in (15):

- (15) *Die Frau, [DP OP_i (der) Hund] [C *welcher_i*] gestorben ist, ist einsam.
 the woman the dog which_{GEN} died is, is lonesome

To explain the ungrammaticality of (15) (i.e. (7b)), one could say that the OP must establish agreement with respect to gender, number and case with the C-head, which is however blocked in (15) because the ϕ -features of (*der*) *Hund* serve as a closer goal for the agreement probe on C. Corroboration for this view comes from the fact that in (16), an instance of pied-piping, there are no intervening ϕ -features and the result is well-formed:

- (16) a. *Der Mann, mit welchem wir verhandelt haben, wollte mehr Geld.*
 The man with which_{DAT} we negotiated have, wanted more money
 ‘The man we negotiated with wanted more money.’
 b. Der Mann, [PP mit OP_i] [C *welchem_i*] wir verhandelt haben, . . .

In contrast, the traditional analysis according to which *welch-* is a relative pronoun offers no straightforward explanation for the ungrammaticality of the examples in (7), especially since such an analysis would also have to account for the well-formedness of the variant that replaces *welcher* by *deren*, as was shown in (9a), or that of expressing the possessor of a DP with DAT and a possessive pronoun instead of GEN and no pronoun, i.e. (9b). One could resort to the idea that in (9a) the possessor relative pronoun need not agree with the null C-head simply because this type of relative complementizer does not require agreement with respect to ϕ -features. A reasoning along similar lines would also apply to the variation of expressing the possessor of a DP with dative and possessive pronoun, instead of GEN and no pronoun, i.e. (9b).

A potential problem for the idea that *welch-* is a C-head is the claim that empty operators are unable to induce pied-piping (Browning 1987, Grosu 1994), as supported by the observation that even languages with an invariant element

(arguably a complementizer) in relativization contexts, such as *wo* or *was* in varieties of German, use a different element when pied-piping is involved, which typically inflects for ϕ - features, as shown in (17). Note that (17b) contrasts with (16a).

- (17) a. *Es gibt Leute, wo immer recht haben.*
 it gives people WO always right have
 ‘There are people who are always right.’
 b. **Es gibt Leute, mit wo man nichts zu tun haben will.*
 it gives people with where one nothing to do have want
 ‘There are people one does not want to have anything to do with.’
 c. *Es gibt Leute, mit denen man nichts zu tun haben will.*
 it gives people with those_{DAT} one nothing to do have want
 ‘There are people with whom one does not want to have anything to do.’

One may think that the problem with (17b) is not due to pied-piping by a null operator, but rather to the fact that the null operator bears an oblique (prepositional dative) case. Note also that as shown in (18), the grammatical (17c) becomes bad in the presence of the complementizer *wo*.

- (18) **Es gibt Leute, mit denen wo man nichts zu tun haben will.*
 it gives people with those_{DAT} WO one nothing to do have want
 ‘There are people with whom one does not want to have anything to do.’

This fact is important also because it relates to the question of why it is not possible to have both, an overt relative pronoun and the C-head *welch-*,⁴ unlike for instance in Bavarian dialects, where *der* is followed by the relative complementizer *was* or *wo* (Bayer 2002). However, while the combination *der welcher* is indeed not attested in spontaneous data (which might be due to *welch-* not existing in dialects), speakers show a preference for this combination as compared to *welcher wo*, which they reject; see (19).⁵

⁴ I assume that this lack of co-occurrence relates to some filter violation of sorts, specifically to a stylistic breach, i.e. the fact that *welch-* belongs to a register that is at odds with dialectal forms.

⁵ In contrast, for those speakers of German varieties where the DFC-filter is not active, there is no restriction for non-relative *welch-* co-occurring with a C-element, as shown in (i) below:

- (i) (*Hier sind drei Bücher.*) *Ich weiss nicht welches dass du lesen wirst.*
 Here are three books I know not which that you read will
 ‘(Here are three books.) I don’t know which (one) you want to read.’

- (19) *Der Herr, {??der welcher / *welcher wo} nebenan wohnt, klopft immer an die Wand.*
 the gentleman d-REL_{NOM} which_{NOM} which_{NOM} WO next-door lives, knocks
 always on the wall
 ‘The gentleman who lives next door always knocks against the wall.’

I thus submit that the complementizer *welch-* is an instance of syntactic reanalysis from a relative pronoun, an idea that is corroborated by the fact that in older stages of the language, namely Early New High German and immediately after, but crucially not in present-day German, occurrences of V2 *welch-*relatives are attested (See Catasso and Hinterhölzl 2016).⁶

In the next section, I build an additional argument on the syntactic fluidity of *welch-* on the basis of strong analogies with another element in the C-domain, namely *was*.

3 Fluidity within the C-system

3.1 *Was* as a “radically” underspecified element

As mentioned earlier, in many varieties of German *was* is a complementizer in relative clauses (Bayer 1984, 2002a,b, van Riemsdijk 1989).⁷ But, as Bayer (2002a,b) notes and as the examples in (20) illustrate, *was* is “extremely”, “radically”, or “maximally” underspecified also in its non-complementizer guises.

- (20) a. [+argument, –human] ***Was hast du gegessen?***
 what have you eaten
 ‘What did you eat?’
 b. [+argument, +human] ***Was dort so alles herumhängt!***
 what there so all hangs.around
 ‘The lot that hangs around there!’
 c. [–argument, +amount] ***Was der Vater heute mal wieder schnarcht!***
 what the father today once again snores
 ‘How much father is snoring again today!’
 d. [–argument, +reason] ***Was stehst du hier herum?***
 what stand you here around

⁶ This fact is particularly interesting also because it speaks against a syntactic coordination analysis of V2 relatives à la Gärtner’s (2000), since unlike the *d-*form relativizers, *welch-* cannot possibly be said to be a demonstrative pronoun.

⁷ See also Lowenstamm (1977) for *vos* in Yiddish.

Relative pronouns as agreeing complementizers: German *welch-*

- e. [indefinite pronoun] ‘Why are you standing here?’ ^[I]_[SEP]
Hier stimmt was nicht.
 here attunes WAS not
 ‘Something is not right here.’
- f. [*wh*-scope marker] *Was findest du, wie sie aussieht?*
 what find you how she looks
 ‘How do you think she looks?’

Furthermore, as Bayer (2002b) states for a paradigm like the one in (21), “[t]he assumption that we are dealing with a case of homophony is problematic in view of the cross-linguistic evidence for one and the same element appearing as both argument/operator and head”.

- (21) a. French: que
 b. Italian: che
 c. Russian: что
 d. Polish: co
 e. Greek: oti (*ti* ‘was’)
 f. Albanian: që (*ç* ‘what’)
 g. Persian: ke (*che* ‘what’)
 h. Hindi/Urdu: ki (*kyaa* ‘what’)
 i. English: that (*the book that he bought* vs. *Did you see that?*)

Bayer’s (2002a:11) core claim is that “[i]f German *was* and Bavarian *wos* (both meaning ‘what’) are radically underspecified, they may not only comprise the feature C but count as a morphological instantiation of C”, which, as he points out, also explains why Bavarian *wos* cannot co-occur with *daß* although Bavarian is generally a DFC-dialect:

- (22) a. *I woß, wos-a gern trinkt.*
 I know what-he preferably drinks
 ‘I know what he likes to drink.’
- b. *?*I woß, wos daß-a gern trinkt.*
 I know what that-he preferably drinks
- c. *I woß, wos fiar-a-Bier daß-a gern trinkt.*
 I know what for-a-beer that-he preferably drinks
 ‘I know what kind of beer he likes to drink.’

Finally, as Bayer and Brandner (2008:87) argue, the ban on the doubly filled complementizer in the presence of simplex *wh*-words (also mirrored in those English varieties where the doubly filled complementizer filter is violated, cf.

Zwicky 2002), “can be explained if these *wh*-words occupy the C^0 position themselves, and thus act as complementizers – in addition to their clause typing function which they fulfill due to their status as *wh*-elements.”

3.2 *Welch-* as an underspecified element

Recall that, on top of being a complementizer, *welch-* is a bona fide *wh*-element, (2a). In addition, *welch-* is an exclamative preceding the determiner (on a par with *was für*), as in (23). Note that *welch-* here is uninflected, i.e. it does not (and cannot) agree with the DP.

- (23) *Welch(*-e) eine Überraschung!*
 which(*FEM) a_{FEM} surprise
 ‘What a surprise!’

Furthermore, *welch-* also occurs as a quantificational element, as in (24).

- (24) *Pflanzen hat sie welche.*
 plants has she which
 ‘As for plants, she has some.’

Finally, just like *which* in English, *welch-* can be used in what – for lack of a better term – I will refer to as ‘appositive conditionals’, illustrated in (25).⁸

- (25) *Ich kann vielleicht nicht kommen, in welchem Fall ich anrufen würde.*
 I can probably not come, in which case I call would
 ‘I might not be able to come, in which case I would call (you).’

4 Conclusion

In this paper, I have discussed some striking morphosyntactic properties of the relativizing element *welch-* in German, and I have proposed that it should be analyzed as an agreeing complementizer. The issue is theoretically important on at least three counts. First, it is further evidence that some traditionally called ‘relative pronouns’ are in fact agreeing complementizers (Pesetsky and Torrego

⁸ Note that *welchem* in (25) cannot alternate with anything else, i.e. *dem*, *diesem*, *was* are all out. Similarly, the fact that in English the sequences *if which* or *which if* are ungrammatical in this construction is not obvious to account for under analyses of *which* as a relative pronoun, especially given the existence of the anaphoric expression *if so*. So this might turn out to be additional evidence for the C^0 -status of *which*.

2006 contra Kayne 2010). Secondly, it makes a further case for syntactic fluidity and syntactic reanalysis in the C-domain (see in particular Bayer 2002a,b for German and Walkden 2013 for English). Thirdly, it provides a strong argument against the raising analysis of relative clauses, which Heck (2005) notwithstanding has gone largely unnoticed, thus speaking for a non-raising analysis, such as the external-head analysis also assumed in Heim and Kratzer (1998) among others.

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Attitude embedding predicates and indexicals under role shift in ASL *

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Abstract We discuss some new observations involving attitude predicates in American Sign Language (ASL). We offer more evidence against the uniform treatment of attitudes by revealing new structural and interpretive differences in ASL between two classes of predicates, which we suggest may be due to their status as either proffering or doxastic. Besides providing evidence for this distinction from a new domain, the data also advance the current understanding of the formal syntactic/semantic/pragmatic properties of sign language loci and role-shift (phenomena frequently occurring in sign languages and much discussed in sign linguistics), namely that 1st-person indexicals under doxastics may not shift, and the 3rd-person pronoun under role-shift can be evaluated with respect to the matrix context.

1 Introduction

Traditionally, attitude predicates (e.g. *believe*, *think*, *say*) have as a class been treated as quantifiers over possible worlds (Hintikka 1962), but recent analyses have highlighted possible different subclasses of attitude predicates with respect to both semantics and syntax (Kratzer 2006; Moulton 2009). One of these suggested differences stems from the observation that some attitude predicates are sensitive to the sentience of their subjects (as in (1)) and these same predicates interact with epistemics as in (2) (Anand & Hacquard 2008).

- (1) a. {^{OK}The book/^{OK}Mary} {said/claimed} that he was happy
b. {*The book/^{OK}Mary} {thought/imagined} that he was happy.
- (2) a. Holmes {#believed/assumed} that every guest might be the murderer.
Intended: Holmes believed each had the possibility to be the murderer.
b. John {believes/*assumes} that the Earth might be flat.
(Anand & Hacquard 2008)

* We are very grateful to our colleagues for feedback on this project, especially several Deaf colleagues who provided ASL consultation on the new data that we report here. Jennie Pyers originally shared a database of experimental trials for an ASL project that elicited embedding verbs which inspired some of our examples here.

Anand & Hacquard (2008) argue that the paradigm in (1)-(2) reflects a subjectivity requirement that certain predicates impose on their complements, captured in their semantic analysis by having beliefs be evaluated with respect to an event involving doxastic alternatives held by the subject, while claims are evaluated with respect to alternatives that are active in the common ground after the claim is accepted by all (i.e. not specific to the subject). The former holds for an entire class of verbs that exhibit this type of behavior: *believe, think, wonder, imagine*, i.a. – the doxastic verbs. The latter are a class of proffering verbs: e.g. *claim, assume, mean*. Anand & Hacquard formalize the contrast as in (3), where $f_{epistemic}(e) = \lambda w'.w'$ is compatible with $CON(e)$ (the content of the event).

- (3) a. $\llbracket believe \rrbracket = \lambda e \lambda p \lambda x \lambda w. Holder(x, e) \wedge believe' \forall w' \in \cap CON(e) [p(w') = 1]$, where $\in \cap CON(e) = DOX(\iota x Holder(x, e), w)$
- b. $\llbracket claim(e)(p) \rrbracket = claim'(e) \wedge \forall w$ compatible with Goal (e),
 $[\forall w' \in \cap CON(e_{CG-w'}) [p(w') = 1]]$

(Examples [7], [11],[32] from Anand & Hacquard 2008)

If the suggested doxastic/proffering cut is universal, stemming from the lexical semantics of the verbs themselves, then we may expect to see it distinguished in other languages. We demonstrate, using a new kind of test, that it appears in American Sign Language (ASL), and that manifestation of this difference between predicates (and how their complements are interpreted in discourse) leads to new observations about the nature of two other phenomena in the language – ‘role shift’ and ‘referential loci.’

1.1 Notation and methodology

Following conventions in sign language linguistics, all ASL glosses are in SMALL CAPS. The line above the utterance indicates the spread/duration of the nonmanual marking associated with either role-shifted material (RS) or topicalization (t); the letter/number separated with a dash (e.g. a-) indicates the area of signing space dedicated to a particular referent (Mom) and, thus, the locus of the shift. Subindices i, j, k, \dots on the right indicate coreference.

Observations newly reported in this paper were based on data that were originally a part of a language sample collected in early 2000s from Deaf signers of ASL residing in California (we thank J. Pyers for sharing the data). In several instances that we investigated further, elicited examples were presented to two other Deaf individuals who grew up as native signers of ASL with Deaf signing parents in the Northeast and Midwest of the US, respectively. Each reported judgment was later

verified with at least one additional native (hearing (Coda) or Deaf) or near-native (Deaf) signer of ASL. On average, each judgement was verified across 5 signers.

2 Observations

Most recent formal analyses of the phenomenon we will be concerned with in this paper focus on the shiftability of indexicals in “role shift” (RS henceforth) and so RS has been the primary term for this, a convention which we follow here. However, the same term “role shift” is also used descriptively in the literature to refer to the addition of nonmanual markers such as torso movement (body shift) and/or a shift in eye-gaze that may accompany attitude reports in many sign languages, including ASL. We can see evidence of both in our first example of interest, the paradigm in (4)-(5) (see Lillo-Martin 2012 and Cormier, Smith & Sevcikova-Sehyr 2015 for a detailed discussion of related terminology, including *constructed action*, *constructed dialogue*, etc.).

- (4) a. a-MOM_i SAY $\overline{\text{I-IX}_i \text{ BUSY}}^{\text{RS-a}}$
 b. ?? a-MOM_i $\overline{\text{SAY I-IX}_i \text{ BUSY}}^{\text{RS-a}}$
 ‘Mom says she is busy’ / ‘Mom says: I am busy’
- (5) a. * a-MOM_i THINK $\overline{\text{I-IX}_i \text{ BUSY}}^{\text{RS-a}}$
 b. a-MOM_i $\overline{\text{THINK I-IX}_i \text{ BUSY}}^{\text{RS-a}}$
 ‘Mom thinks she is busy’ / ‘Mom thinks: I am busy’

Two properties of RS are immediately apparent in (4)-(5): (i) role shift movements occur concurrently with manual signs and begin after the embedding predicate for SAY (as in (4)) but on the embedding predicate for THINK (as in (5)); and (ii) in both the element immediately following the embedding predicate (i.e. the embedded subject) is a first person indexical pronoun (I-IX, ‘I’) that refers to someone other than the signer (here: Mom). Typically this type of “indexical shifting” is found in direct discourse (quotation) and not indirect discourse, although a notable exception has been reported to be found in a small number of (unrelated) languages including Amharic (Schlenker 2003), Zazaki (6) (Anand & Nevins 2004), and Ewe (Pearson 2015). A third semantic property will be illustrated in (8) below.

- (6) Heseni_i (mi_k-ra) va ke εZ_{i/k} dezletia [Zazaki]
 Hesen.OBL (I.OBL -to) said that I rich.be-PRES
 ‘Hesen said that {I am, Hesen is} rich.’ (Anand & Nevins 2004)

A few possibilities arise then for the analysis of the difference in the extent of role shift and the interpretation of first person pronoun in examples (4)-(5), which we will see below are representative of two classes of attitude predicates in ASL. First, ASL may indeed have a first person pronoun that shifts, just as seen in some spoken languages (as has been argued by Lillo-Martin (1995) for 1-IX). This, of course, does not explain anything about the extent of role shift, nor does the presence of such a pronoun in ASL offer an account that distinguishes between its interpretation under SAY vs. THINK, or dissociates it from quotation. Additionally, one could argue that syntactically (i.e. regarding integration of the complement), the difference in the extent of RS marking and indexical interpretation originates from lexical properties of the embedding predicates. To determine the right path, we’ll briefly discuss existing formal proposals for the nature of RS.

3 Previous Analyses

3.1 Role-shift

Recent formal analyses of RS-related phenomena (Lillo-Martin 1995, Quer 2005, 2011, Lillo-Martin 2012, Schlenker 2017) generally assume that what is responsible for the shift of certain indexicals in the report clause under RS is the interaction of a higher predicate—namely an attitude verb, null or overt—and some sort of operator below.

- a. Lillo-Martin (1995)
-
- b. Quer (2011) (adpt. Quer 2005)
-
- (7)

Both (7a) and (7b) are syntactic proposals. On the analysis represented by (7a), RS occurs with/is licensed by the Point of View (PoV) predicate – essentially an attitude, which takes as its complement a CP whose Spec is filled with an operator

binding the indexicals in the IP below. In contrast, in (7b), the relevant operator is in the head of the lower CP. This head then is stipulated to compose with the embedding predicate, the precise mechanism for which remains left for future research. (7a) does not demonstrate how this attitude and the Op_i might combine to license the relevant nonmanual markings over the predicate itself; on the alternative view, RS markings indiscriminately apply to all attitude predicates. Thus, the pattern in (4)-(5) showing an asymmetry between two types of attitude predicates is unexplained by Lillo-Martin (1995) in (7a) and unpredicted by Quer (2005) in (7b).

Semantically, for Quer (see also Zucchi 2004), RS is an overt instantiation of the context-shifting operator proposed by Schlenker (2003) and expanded for sign languages in Schlenker (2017). As such, RS changes the context of evaluation for a clause in its scope. This approach predicts that when under RS, indexicals will necessarily shift, irrespective of the type of attitude predicate in the complement of which they are found. Yet, we observe another asymmetry among these classes of predicates: the aforementioned necessary shift only holds for SAY, and not for THINK, verbs, as in (8). The latter seem to allow RS forms even when there is no “shifted” interpretation of the first person pronoun, unexpected under previous accounts.

(8) *Context: You walk into a conversation and see Mary signing to John...*

- a. $Mary_i$: WOMAN_j a-IX_i SAY $\frac{RS-a}{I-IX_{*i/j}}$ PLAY-PIANO
 ‘A woman said that she [\neq Mary, =woman] was playing the piano.’
- b. $Mary_i$: WOMAN_j a-IX_i $\frac{RS-a}{IMAGINE I-IX_{i/j}}$ PLAY-PIANO
 ‘A woman said that she [=Mary, =woman] was playing the piano.’

Extending the use of such operators, Schlenker (2017) proposes that a context shifting operator occurs not just in cases of reported attitudes but also in reported actions ("action role shift"). In some cases of reported actions, RS occurs on the predicate if the predicate is "iconic", while for noniconic predicates RS occurs only in the following complement clause. For Schlenker, this difference is due to the action role shift predicates being embedded under a (covert) matrix predicate that licenses a context shifting operator, while attitude context shifting operators are themselves part of a matrix clause that licenses context shifting operators within their scope (see Davidson 2015 for an analysis of action role shift that places the action predicate itself in the matrix clause). Since this is one of the few cases in the literature where RS has been discussed as occurring on the predicate and not after, we might wonder whether the verbs we discuss here fall into Schlenker’s categories. However, while THINK and IMAGINE might be considered iconic because they are pronounced with locations near the head, it is difficult to see this as a distinction

between the verb categories, since SAY would probably also be considered as iconic (at least in discussing spoken language, appearing near the mouth), and we have more generally found no revealing relationship between iconicity and SAY versus THINK type attitude predicates. So, while it is certainly possible that some cases of more iconic attitude predicates might also involve action role shift (and thus increase pressure for RS to begin on the predicate), it does not seem to explain the cut that we find, nor the behavior of the indexicals under these verbs.

Some analyses (Shan 2010, Maier 2014) have been proposed that cover cases of mixed indexicals (where a single clause includes both shifted and unshifted interpretations, contra, e.g., Anand & Nevins 2004), reported in other sign languages, including Catalan (LSC, Quer 2005) and German Sign Languages (Herrmann & Steinbach 2012). Incidentally, the asymmetry in the extent of role shift on different predicate types under examination here is briefly recorded, albeit not overtly discussed in Quer's work on LSC, comparing LSC's SAY and THINK (9), where RS starts on, not after, the embedding predicate for THINK (there, Quer demonstrates that (9) is a case of indirect discourse).

- (9) a. ANNA_i 3-SAY-2 $\overline{\text{IX-1}_i \text{ FED-UP LOSE+++}}^{\text{RS}_i}$
 'Anna told you that she was fed up with losing so often.'
- b. MANUEL_i $\overline{\text{THINK IX-1}_i \text{ 1-GIVE-2 AT ALL}}^{\text{RS}_i}$
 'Manuel thinks that he won't give me anything at all.'

At this stage, of course, the parallelism between LSC and ASL remains suggestive until this aspect of LSC is examined more systematically.

3.2 Direct or Indirect Discourse (a.k.a. Quote or Clausal Embedding)?

To capture the difference in nonmanual marking and indexical interpretations seen in ASL in (4)-(5) and (8), one might hypothesize a difference in syntactic integration - i.e. one is direct/quotation (nonintegrated) and the other indirect (integrated) discourse. Suppose that in direct discourse, RS begins after the matrix predicate precisely because the complement of this predicate (e.g. SAY) is not integrated - i.e. a "quote" that is not syntactically and semantically embedded under the matrix verb; otherwise, RS is expected to spread over the attitude predicate. This, essentially, is the upshot of the analysis in Quer (2005, 2011), and an appealing one given the semantics of SAY. However, while this path is plausible and at least one of us has argued for an expanded more flexible view of quotation (Davidson 2015), it runs into a problem: some role-shifted complements of SAY bear characteristics of clausal embedding even when the nonmanual difference holds.

Arguments to determine the status of the syntactic embedding (vis-à-vis direct discourse) of role-shifted (parts of) utterances are presented in detail in the recent work by [Schlenker \(2017\)](#). The argumentation is based on the finding that wh-extraction (10), NPIs licensing (11), and VP-ellipsis (12) are possible only in syntactic embedding/indirect discourse cases, in contrast to their ungrammatical status in English quotation.

- (10) a. What did John say he understands?
 b. *What did John say 'I understand'?
- (11) a. John didn't say he understands any chemistry.
 b. *John didn't say 'I understand any chemistry.'
- (12) *Context: The addressee and John have never met each other.*
 a. You love Obama. John told me that he doesn't [love Obama].
 b. (#) You love Obama. John told me: 'I don't [love Obama].'
 ([Schlenker 2017](#))

Diagnostics along the lines of (10)-(12) for ASL remain under investigation, complicated by the fact that (i) our consultants appear to lack clear NPIs and (ii) VP-ellipsis in ASL raises independent questions regarding the possibility of the bound-variable interpretation with (vs. without) previously assigned loci ([Koulidobrova & Lillo-Martin 2016](#), [Koulidobrova 2017](#)). Here, we offer preliminary VP ellipsis data in (13) and wh-extraction data in (14) for some examples with these predicates (we follow the arguments by [Braze \(2004\)](#) and others that YESTERDAY marks clausal boundary in ASL).

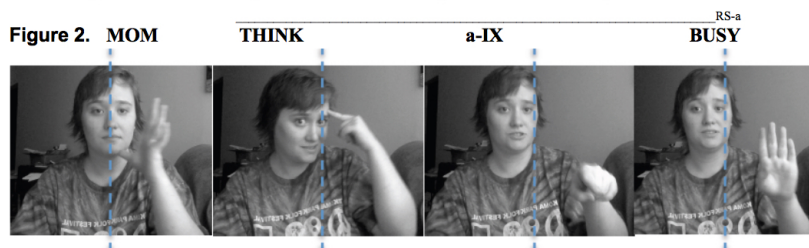
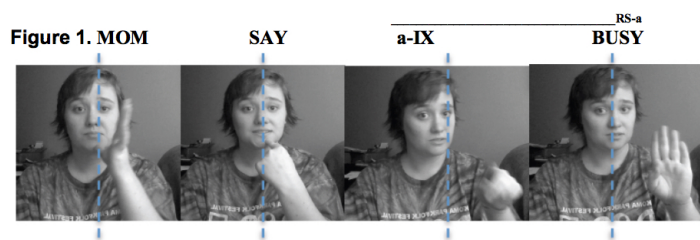
- (13) a. 1-IX LOVE BROCCOLI COOKIES. $\overline{1-POSS\ KID_i\ IX_i\ SAY\ a-IX_i\ NOT\ BUT}$ $\overline{LIE\ EAT-UP}$ $\overline{RS_a}$
 'I love broccoli cookies. My kid says he doesn't [love broccoli cookies], but he is lying, he'll eat them up'
- b. 1-IX LOVE BROCCOLI COOKIES. $\overline{1-POSS\ KID_i\ IX_i\ THINK\ A-IX_i\ NOT}$ $\overline{BUT\ WATCH\ WILL\ EAT-UP}$ $\overline{RS_a}$
 'I love broccoli cookies. My kid thinks he doesn't [love broccoli cookies], but watch, he'll eat them up.'

- (14) a. WHO WOMAN_i SAY YESTERDAY ^{RS-a} BUSY WHO
 ‘Who did the woman say yesterday was busy?’
- b. WHO WOMAN_i ^{RS-a} THINK YESTERDAY BUSY WHO
 ‘Who did the woman say yesterday was busy?’

There is, of course, a possibility that a-IX NOT in (13a), e.g., is a case of ellipsis in direct discourse - i.e. that the child says ‘I don’t.’ However, here, such ellipsis is not expected to be licensed for the same reason ‘I don’t’ is not licensed in (11b). For an extensive discussion of ellipsis in ASL, see Koulidobrova (2017).

In addition to this, however, we suggest another piece of evidence for some integration in these examples coming from the use of pronouns. Existing literature has tended to focus on the 1st person indexical and its shiftability in the context of utterance vs. report; no one would expect the same of the 3rd person pronoun. In fact, fairly uncontroversially, a 3rd person subject in the complement of an attitude predicate, when co-indexed with some NP serving as an argument of that predicate, signals indirect discourse (as in (a.) sentences in (10)-(12)). Thus, if we demonstrate that the phenomenon under discussion holds with a 3rd person embedded subject (a-IX), then it is rather unlikely that we are dealing with direct discourse but, instead, with a case of clausal embedding. Consider (15) (Figures 1-2): although grammatical without any RS markings across the embedded clause, it is also acceptable with them.

- (15) a. A-MOM_i SAY ^{RS-a} A-IX_i BUSY
 ‘Mom_i says she_i is busy.’
- b. A-MOM_i ^{RS-a} THINK A-IX_i BUSY
 ‘Mom_i thinks she_i is busy.’



The contrast in (15) is surprising for existing analyses of role shift. First, it cannot be analyzed as direct discourse, since to quote Mom would be to use a first person pronoun 1-IX . There is also no obvious analysis of this as a full context shifting operator (Zucchi 2004; Schlenker 2017), since nothing throughout the "role shift" actually shifts interpretation, and yet the role shift movements occur, with different extents in the two cases. Finally, it's not clear how to analyze the RS here as a manner adverbial (Davidson 2015), since no extra manner seems to be demonstrated in THINK versus SAY .

We propose that a complete analysis of RS must consider data like those in (15). Although we will not offer one here, we suspect that a solution will depend on increasingly sophisticated dissociations of the locus itself from the point to the locus (IX), as begun in work by Barberà Altimira et al. (2012) and Koulidobrova & Lillo-Martin (2016). For now, we turn to the issue of the proffering/doxastic cue and merely note that behavior like (15) helps us rule out a pure direct discourse analysis of the RS-markings in our SAY vs. IMAGINE examples. Moreover, this same pattern in (15) can be observed with other clearly nonquotational predicates: ASSUME, SHOW, MEAN, INFORM, CLAIM vs. THINK, BELIEVE, IMAGINE, DREAM, WONDER, despite the difference in RS extent.

- (16) a. A-MOM_i { ASSUME, CLAIM, MEAN, INFORM-2 } $\frac{\text{RS-a}}{\text{A-IX}_i \text{ BUSY}}$
'Mom_i { assumed, claimed, meant, informed-you } she_i was busy.'
- b. A-MOM_i $\frac{\text{RS-a}}{\text{A-IX}_i \text{ BUSY}}$ { BELIEVE, DREAM, WONDER-IF }
'Mom_i { believed, dreamed, wondered-if } she_i was busy.'

4 Towards an account

The difference among the predicates in (16) follows precisely the one found in Anand & Hacquard (2008): profferings vs. doxastics. As mentioned at the outset, they argue that this division is based on how the complement clause enters the common ground and the role it plays: for proffering verbs, the worlds in which the proposition expressed by the complement must hold are considered with respect to the existing common ground, while the truth of the proposition expressed by the complement of doxastics is evaluated with respect to the private intensional domain of the subject/belief-holder and his/her conversational goals, not the overall common ground. Formally then, the account along these lines follows (3) (Koulidobrova & Davidson 2015):

- (17) a. $\llbracket \text{MOM IMAGINE A-IX BUSY} \rrbracket$
 $= \text{iffHolder}(mom, e) \wedge \text{imagine}'(e, w) \wedge \forall w' \in \cap \text{CON}(e) [\text{Busy}(mom)(w')]$,
 where $\cap \text{CON}(e) = \text{DOX}(\iota x \text{Holder}(x, e), \text{Word}(e))$
- b. $\llbracket \text{MOM SAY A-IX BUSY} \rrbracket$
 $= \text{iffHolder}(mom, e) \wedge \text{say}(e, w) \wedge \forall w' \in \text{Goal}(e) [\forall w'' \in \cap \text{CON}(e_{CG} - w') [\text{Busy}(mom)(w'')]]$

Pragmatically, what results from the Anand & Hacquard-style account is the suggestion that the two classes of predicates interact with the question under discussion (QUD, Roberts 1996) in different ways: the argument of the proffer (the complement) is what is up for discussion/"proffered" to be entered to the common ground (17a); doxastics offer up for discussion the entire proposition (as given in the main clause), (17b).

- (18) a. MOM A-IX $\{\text{SAY, CLAIM, ARGUE, ASSUME}\} \xrightarrow{\text{RS-a}} \overline{\text{A-IX BUSY}}$.
 \rightarrow Question under discussion: *Is mom busy?*
- b. MOM A-IX $\{\text{THINK, BELIEVE, IMAGINE}\} \xrightarrow{\text{RS-a}} \overline{\text{A-IX BUSY}}$.
 \rightarrow Question under discussion: *Does mom {think, believe, imagine} she is busy?*

Perhaps then the difference in the duration of RS marking associated with different types of predicates in ASL may not be syntactic but rather semantic and pragmatic. One way to refer to a proposition in ASL discourse is to assign it to a locus, which can be done through RS. By extending RS over only the embedded clause in (18a), the signer makes the embedded proposition *Mom is busy* a target for later anaphora. This is in contrast to (18b) where RS extends over the matrix

predicate and thus can make the entire proposition *Mom thinks she is busy* a target for later anaphora by later indexical points (IX) to the locus provided through RS. Consistent with this view is Sandler’s (e.g. 2010) account of nonmanual spreading as determined by a mapping at the interface of the prosodic component and the semantic/pragmatic component, which here may be affected by this potential for a proposition to provide a locus for future anaphora.

Finally, sign languages also allow the attitude embedding predicate to remain phonologically null, as is common in spontaneous discourse. Lillo-Martin (1995) dubs this (null) embedding predicate PoV (see (7a)), typically translated as ‘be like.’ More recently it has been analyzed as a classifier predicate that takes a demonstration as an argument (Davidson 2015). A natural question arises which of the two classes of verbs we have been discussing this predicate belongs to. Of course, since the predicate is phonologically null, the extent of RS-marking over it cannot be determined. Yet, the data offered here provide another avenue for better understanding the nature of this predicate: are the available readings compatible with proffering or doxastic verbs? Preliminary data (three signers but not as part of the full paradigm) suggest the former (compare (19) with (8)).

- (19) Mary_i: MOM_j $\frac{\text{RS-a}}{\text{I-IX}_{*i,j}} \text{BUSY}$
 ‘Mom is like I[≠Mary, =mom] am busy.’

These data offer additional testing ground in sign languages for both PoV and for SAY. In particular, while our consultants overwhelmingly reject SAY under RS, native signer reactions to such sentences contrast with those involving lack of RS-markings on THINK/IMAGINE . A next step will be to contrast SAY with and without RS-marking in order to test the possibility of subjective stance.

5 Conclusion

While the main focus of this paper has been the nature of nonmanual markings that vary in form (both extent and expression) depending on embedding predicates (this has been unsystematically, albeit frequently, noted in the SL literature, Sandler & Lillo-Martin 2006), the data presented here offer a path previously unexplored in the examination of RS and morpho-syntactic realization of indexicals in sign languages. The upshot is this: shift-related phenomena have been considered to be a defining property of a particular type of discourse: direct, indirect, or ‘mixed’ (Zucchi 2004). However, if the analysis presented here is on the right track, the nonmanuals associated with RS may be independent of these categorizations. Instead, they depend in part on semantics of the embedding predicate, which means that the ‘doxastic-proffering cut’ ought to reveal itself, for instance, in interaction with

epistemics as well as with other quantificational elements. The suggestion for the analysis of RS markings put forth here should also revive the debate regarding the views on nonmanual spreading, since in some embedded questions (e.g. with WONDER and KNOW), nonmanual markings begin on the embedding predicate and extends over the embedded clause (Sandler & Lillo-Martin 2006). We suggest that the difference in interpretation and duration between doxastic and proffering verbs, as well as new data concerning the shiftability of a third person pronoun associated with a locus, brings a new perspective to these issues.

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Universal NPs, distributivity and dependent indefinites in Mandarin Chinese*

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Abstract This article discusses the peculiar distribution of the distributivity operator *dou* ‘all’ under the scope of a universal *mei*-NP ‘every-NP’ in Mandarin Chinese. *Dou* occurs with *mei* ‘every’ in most contexts, but the presence of an indefinite may exempt this requirement. This article proposes that *mei* is not inherently quantificational but introduces a partition operator, which partitions the noun extension into a set of partitions based on the number denoted by the numeral, and a choice function variable, which selects one partition from the above set of partitions. Since *mei* is not inherently distributive, an overt distributivity operator is required to express distributivity. This explains most contexts. On the other hand, indefinites can be either plain indefinites, which do not require specific licensing contexts, or dependent indefinites, which require a licenser with a distributive feature. Plain indefinites are not inherently distributive, whereas dependent indefinites are themselves inherently distributive. When an indefinite within the scope of a *mei*-NP is a plain indefinite, *dou* is required. In contrast, when an indefinite within the scope of a *mei*-NP is a dependent indefinite, *dou* is not required because the dependent indefinite already expresses distributivity. *Dou* ‘all’ or *ge* ‘each’ in a sentence such as *Mei-ge chshi (dou/ge) zuo yi-dao cai* ‘Every chef makes a dish (each)’ is optional, because the indefinite is ambiguous between the plain indefinite interpretation and the dependent indefinite interpretation.

1 Introduction

One of the most intriguing studies in Chinese linguistics is the function and semantics of *mei* ‘every’ and *dou* ‘all’ in universal statements such as (1a) and (1b).

* The first chapter of my dissertation (Lin 1996) supervised by Angelika Kratzer is on distributivity in Mandarin Chinese. That chapter was later revised and published in *Natural Language Semantics* in 1998 and that was my first published semantics paper. I cannot thank Angelika Kratzer more for agreeing to supervise my dissertation when I really did not know much about formal semantics and helping me become a semanticist. The topic of the current paper is strongly connected to that chapter and is the best topic that I can think of to show my highest respect to my teacher and to celebrate her retirement and her 70th birthday. I would like to thank Niina Zhang for commenting on this paper and providing many challenging examples. As usual, all the errors are the author’s.

- (1) a. *Mei-ge ren *(dou) lika-le*
 every-Cl person all leave-Asp
 ‘Everyone left.’
 b. *Mei-ge haizi *(dou) hen congming*
 every-Cl child all very smart
 ‘Every child is smart.’

In these sentences *dou* obligatorily occurs with a universal subject NP headed by *mei*. Such sentences have led some linguists to believe that the use of *mei* ‘every’ must be accompanied by *dou* ‘all’ (Lin 1996, 1998, for example). However, Huang (1995, 1996, 2005) pointed out some contexts where *dou* can be absent when *mei* is present. The first context is one where an indefinite noun phrase appears within the scope of a *mei*-NP such as (2) taken from Huang’s works.

- (2) *Mei-ge chushi zuo yi-dao cai*
 every-Cl chef make one-Cl dish
 ‘Every chef makes a dish.’

Interestingly, as Huang (2005: 21) pointed out, when the object NP of the verb is a definite NP instead of an indefinite NP, *dou* becomes obligatory.

- (3) a. **Mei yi ge xuesheng xihuan zhe-ben shu*
 every one Cl student like this-Cl book
 ‘Every student likes this book.’
 b. *Mei yi ge xuesheng dou xihuan zhe-ben shu*
 every one Cl student all like this-Cl book
 ‘Every student likes this book.’

In addition to indefinite NPs, Huang (1996) also claimed that the presence of a reflexive within the scope of a *mei*-NP is capable of rendering *dou* unnecessary. Her example is given in (4).

- (4) *Meiyige houxuanren tan-le-tan ziji*
 every-MW candidate talk-LE-talk self.
 ‘Every candidate talked about himself/herself. (Huang 1996: 34)

Despite Huang’s claim, it is not clear that in (4) it is the reflexive that renders *dou* unnecessary. On the one hand, (5a) does not sound acceptable/complete to the

author and many native speakers that I consulted, unless *dou* is added as in (5b).¹

- (5) a. **Mei yi-ge houxuanren tan-le ziji*²
 every one-Cl candidate talk-Asp self
 ‘Every candidate talked about himself.’
 b. *Mei yi-ge houxuanren dou tan-le ziji*
 every one-Cl candidate all talk-Asp self
 ‘Every candidate talked about himself.’

On the other hand, (4) involves a reduplicated verb, where the second occurrence can be viewed as an indefinite cognate with the numeral *yi* ‘one’ being omitted. So *tan-le-tan* is the elided form of *tan-le-yi-tan* ‘talked a talk’. In fact, if the reduplicated form is not used, the sentence is much worse as (5a) shows. Thus, it is very likely that what licenses the omission of *dou* in (4) is the shortened indefinite expression (*yi*)-*tan* ‘a talk’ rather than the reflexive. The contrast between (4) and (6a) is similar to the contrast between (6a) and (6b) below. While (6a) sounds unnatural and incomplete, the addition of an indefinite as in (6b) makes the sentence much more acceptable.

- (6) a. **Mei-ge-ren da-le ziji*
 everyone hit-Asp self
 ‘Everyone hit himself.’
 b. *Mei-ge-ren da-le ziji yi-ba zhang*
 everyone hit-Asp self one-Cl slap
 ‘Everyone slapped himself on his own face.’

¹ Likewise, (ia) is unnatural unless *dou* is inserted as in (ib). The contrast is very sharp.

- (i) a. **Mei-ge-ren zai qipian ziji*
 everyone Prog cheat self
 ‘Everyone is cheating himself.’
 b. *Mei-ge-ren dou zai qipian ziji*
 everyone all Prog cheat self
 ‘Everyone is cheating himself.’

² Niina Zhang (p.c.) pointed out that (5a) is much improved if *zhi* ‘only’ is added to the sentence, as shown below.

- (i) *Mei-ge houxuanren zhi tan-le ziji*
 every-Cl candidate only talk.about-Asp self
 ‘Every candidate only talked about himself.’

I wonder if (i) above is improved because *zhi* ‘only’ involves universal quantification, which is somehow related to the proposal to be made in section 4.

That reduplication alone may license the absence of *dou* is proved by (7) below.

- (7) *Mei-ge-ren xiang-le (yi)-xiang, zuihou haishi jue ding liu xialai*
 everyone think-Asp one-think finally still decide stay
 ‘Everyone thought about it for a little while and decided to stay.’

In fact, according to Zhang’s (2009) corpus study, *dou* is rarely omitted when a reflexive is under the scope of a *mei*-NP. She pointed out that among 53 examples with a reflexive in a post-verbal position that she found in her corpus, *dou* does not appear in only 3 of them. Moreover, the reflexive appears as a possessive modifier rather than the object. Indeed, when I tried to google-search the string “*mei-ge-ren & ziji*”, mostly the reflexive *ziji* appears as a possessive modifier rather than the object of a verb as illustrated by (8a) and (8b).³

- (8) a. *Mei-ge ren (dou) you ziji de lu*
 every-Cl person all have self DE route
 ‘Everyone has a route of his own.’
 b. *Mei-ge ren (dou) you ziji de fangjian*
 every-Cl person all have self DE room
 ‘Everyone has a room of his own.’

However, for such examples, a numeral-classifier can be inserted before the reflexive without altering the meaning of the sentence. So (8a) and (8b) are equivalent to (9a) and (9b).

- (9) a. *Mei-ge ren (dou) you yi-tiao ziji de lu*
 every-Cl person all have one-Cl self DE route
 b. *Mei-ge ren (dou) you yi-jian ziji de fangjian*
 every-Cl person all have one-Cl self DE room

This indicates that the object NPs in (8a) and (8b) are indefinites which happen to contain a reflexive possessor. Since the referent of the reflexive co-varies with the universal NP, the indefinite as a whole co-varies with it. Therefore, such examples might be better treated on a par with examples such as (2), if possible.

The difficulty in finding a true reflexive object indicates that reflexives might

³ In my idiolect, this type of sentence is still not 100% acceptable without the presence of *dou*.

not be a normal strategy to avoid the use of *dou*.⁴ In this paper, I will leave the issue of reflexives aside, focusing only on the question of why *dou* is optional when there is an indefinite within the scope of *mei-(yi)-ge-N* ‘every-one-classifier-N’.

This article is organized as follows. In section 2, I briefly summarize previous works on *mei* and *dou*, focusing in particular on Lin (1998). In section 3, I introduce Szabolcsi’s (2010) analysis of non-quantificational *every* in English as background information and extends it to Mandarin *mei* with modifications. It is argued that apart from not being inherently quantificational, the semantics of *mei* has two components, one is a partition operator and the other is a choice function variable. This type of semantics is supported by constructions in which *mei* is followed by a numeral whose number is greater than one. In section 4, it is shown that an indefinite within the scope of a *mei*-NP whose numeral denotes a number greater than one should be analyzed as a dependent indefinite. Following Kuhn (2017), dependent indefinites are treated as being inherently distributive. Section 5 answers the question of why *dou* is optional in some contexts with an indefinite. I argue that the optionality of *dou* is a result of the indefinite being ambiguous between a plain indefinite and a dependent indefinite. Section 6 concludes this article.

2 Previous analyses of *Mei* and *Dou*

Based on the contrast between (10a) and (10b), Lin (1996, 1998) proposed that *dou* is a distributivity marker, more precisely, a generalized distributivity operator.

- (10) a. *Tamen mai-le yi-jiang fangzi*
 they buy-Asp one-Cl house
 ‘They bought a house together.’
 b. *Tamen dou mai-le yi-jian fangzi*
 they all buy-Asp one-Cl house
 ‘They each bought a house.’

Lin (1998) pointed out that if *dou* is a distributivity marker and *mei* is also inherently distributive like *every* in English, then *mei* and *dou* should not occur with each other parallel to their English counterparts **Every student all left*. However,

⁴ We do find reflexives in object position in some examples, as illustrated below.

- (i) *Mei-ge-ren fangqi ziji zong you xuduo liyou*
 everyone give.up self always have many reasons
 ‘(When) everyone gives himself up, (he) always has many reasons.’

It seems that this type of sentence involves generic quantification and the *mei*-NP is in a subordinate clause. I will deal with this type of sentence in another occasion.

as discussed in section 1, *dou* is able to occur with a *mei*-NP and in many contexts, the presence of *dou* is even obligatory. In order to account for this fact, Lin (1996, 1998) proposed that *mei* in Mandarin Chinese is not inherently quantificational but its semantics is instead more like the definite article *the*, denoting a maximal plural entity when combined with an NP. His definition of *mei* is given below.

$$(11) \quad \llbracket mei \rrbracket = \text{that function } f \text{ such that for all } P \in D_{\langle e, t \rangle}, f(P) = \cup \{ |P| \}$$

According to this analysis, what *dou* does is to distribute the property denoted by the predicate over the set of individuals that is collected by *mei*. This analysis of *mei*, though sounding daring, gains support from the distribution of *ge* ‘each’, which is usually assumed to be a distributivity operator by Chinese linguists (See T.-H. Jonah Lin (1998) for example). Like *dou*, the sorting key of *ge* must be a plural NP, as the contrast between (12a) and (12b) illustrates. However, in contrast with *dou*, *ge* normally requires that an indefinite appear within its scope. Compare (13a) with (13b).

- (12) a. *Tamen ge mai-le yi-ben shu*
 they each buy-Asp one-Cl book
 ‘They each bought a book.’
 b. **Ta ge mai-le yi-ben shu*
 he each buy-Asp one-Cl book

- (13) a. *Naxie xiaohai dou likai le*
 those kid all leave Asp
 ‘Those kids all left.’
 b. **Naxie xiaohai ge likai le*
 those kid each leave Asp

Significantly, *mei* occurs not only with *dou* but also with *ge* ‘each’, a phenomenon that is less discussed by Chinese linguists but relevant data can be easily found from the internet (Also see Lee, Zhang and Pan 2009; Niu and Pan (2015) for a similar observation). Here are two illustrative examples.

- (14) a. *Mei-ge-ren ge chi-le yi-ge*
 every-Cl-person each eat-Asp one-Cl
 ‘Everyone ate one each.’
 b. *Mei-ge ren ge dian-le yi-fen zhucan*
 every-Cl person each order-Asp one-Cl main.meal
 ‘Everyone ordered a main meal separately.’

Again, if *mei* is inherently distributive, (14a) and (14b) will be difficult to explain without abandoning the assumption that *ge* is also a distributivity operator.

Very interestingly, the above idea of *mei* in Mandarin Chinese has cross-linguistic support. For example, Zimmermann (1992: 177) argued that *every* may express some kind of summation. Landman (2003: 234) claimed that *every*-NPs have both collective definite interpretations and generalized quantifier interpretations. Similarly, Beghelli and Stowell (1997) observed that *every* can be forced into a kind of ‘collective reading’⁵ and proposed that *every*-NPs introduce set variables that can be unselectively bound by a generic operator. Likewise, Szabolcsi (2010) proposed that the domain restriction of quantifiers is introduced by a choice function variable. It is the set of individuals in the restricted quantifier domain that is quantified over by the possibly covert sentence-level distributivity operator. Cable (2012: 3) said that “*every* is “halfway between all and each”, and shares with *all* the function of ‘summing up’ a large set of objects”.⁶ Cross-linguistically, Matthewson (2001) for St’át’imcets claimed that the creation of a generalized quantifier always proceeds by a quantifier taking sisters of argumental type, citing Lin’s (1998) work on *dou* as her supporting evidence. Margariti (2014) for Greek argued that *every*-NPs introduce both context set and individual variables and the distributive reading is due to the presence of a covert distributivity operator that binds the variables in the *every*-NP as well as in the VP. The above cross-linguistic evidence suggests that Lin’s (1996, 1998) treatment of *mei* not as an inherent quantifier and *dou* as the true source of distributivity is not without its grounds but has empirical support from cross-linguistic evidence.

In this paper, I will further pursue the ideas put forth by the above authors and use them to explain the distribution of *mei* and *dou*. More precisely, following Lin (1996, 1998), Beghelli (1997), Beghelli and Stowell (1997) and Szabolcsi (1997, 2010), I assume that *mei* does not contribute universal quantification itself but is syntactically specified for a [+Dist] feature, which requires that a distributive element is within its c-command domain.

Though this article focuses only on my own analysis of *mei* and *dou*, it must be noted that other analyses are available. For example, Huang (2005) argued that

⁵ For example, (i) is true in a scenario where the boys are lifting the piano together as a team.

(i) It took every boy to lift the piano.

⁶ That *every* can be collective is clear in the following contrast discussed by Cable (2012: 4):

(i) a. Take every one of these apples.
(OK if you take the whole bushes at once or take each apple one by one)
b. Take each of these apples.
(Only OK if you take each apple one by one)

universal quantification, in Chinese and English as well, must involve a skolem function, which maps the variable introduced by the common noun to another variable whose choice of value depends on the value of the former variable. In her analysis, *mei* is the source of universal quantification, whereas *dou* sums up the events denoted by the VP. Luo's (2011) approach is somewhat similar to Huang's. He treated both *mei* and *dou* as universal quantifiers with a matching function, the difference being that the range of the matching function introduced by *dou* must be an event. In addition to the above authors, there are many other authors who focus on universal expressions in Chinese or on *dou* such as Pan (2000), Tomioka & Tsai (2005), Yuan (2005), Cheng & Giannakidou (2006), Xiang (2008), Chen (2008), among many others. In this article, I will not try to do a comprehensive survey of *mei* and *dou* nor how the previous literature deals with their distributions. Instead, I will focus more on my own alternative proposal.

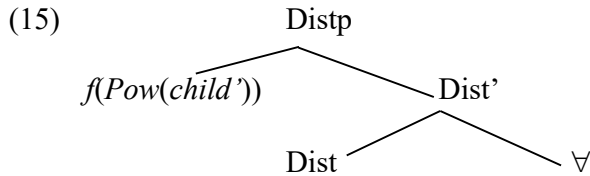
3 Treating *mei* 'every' as partition and variable-introducing element

Although indefinites and universals of the *every*-NP type are traditionally regarded as very different types of noun phrases, Szabolcsi (2010:102-103) argued that they are actually very similar. In particular, she showed that like indefinites, universals of the *every*-NP type display potentially unbounded existential scope, can be referentially dependent upon a higher operator and have clause-bounded distributive scope. These parallel behaviors lead her to propose a uniform analysis of indefinites and *every*-NPs; namely, they both introduce variables that are bound by another operator.

The idea that indefinites introduce variables was first introduced by Kamp (1981) and Heim (1982). Under their analyses, indefinites are free individual variables that are bound by an operator in the structure such as an existential closure operator. This approach explains the island-free nature of the indefinite's scope. The other proposal, made by Reinhart (1997), is that existential closure applies to a choice function variable f . A choice function is a function which picks an element from any set that it applies to. For example, when applying to a set of capitals, a choice function f_1 may pick Taipei as its value from the set of capitals, i.e., $f_1(\text{capitals}) = \text{Taipei}$, and another choice function f_2 may pick another capital. Different choice functions will pick a different element from the same set. This approach to indefinites was adopted by Szabolcsi (2010) and extended to *every*-NP.

It is well-known that quantifier domains do not range over all individuals in the whole world but must be contextually restricted (von Stechow 1994). Stanley and Szabó (2000) argued that domain restriction may contain a variable linked to another quantifier and that this restriction is specifically located in the NP. Following the above thought, Szabolcsi (2010: 105) argued that *every*-NP's

similarity with indefinites can be captured if the former is analyzed as a (possibly skolemized) choice function applied to the denotation of NP, which is the power set of the noun set. For example, *every child* is interpreted as $f(\text{Pow}(\text{child}'))$, picking out a contextually salient subset of children. Under this analysis, *every* is not quantificational nor is it inherently distributive.⁷ Distributivity comes from something else in the structure such as a functional [+Dist] head as in Szabolcsi (1997), Beghelli (1997), Beghelli and Stowell (1997). The role of *every NP* is to supply the sorting key for Dist as shown below.



Lin's (1996, 1998) analysis of Chinese *mei*-NPs and *dou* is along the same line of the above proposal, though he did not assume that *mei* introduces a variable.

With the above as background, I now return to Chinese *mei*-NPs and extend Szabolcsi's (2010) approach to them with some modifications. To begin with, I note a difference between English *every*-NPs and Chinese *mei*-NPs. In English, *every* directly modifies the noun that it combines with. In contrast, in Chinese, there is a numeral-classifier between *mei* and the noun that it modifies. The numeral *yi* 'one' is optional, as is shown by (16).

- (16) *mei (yi) ge haizi*
 every one Cl child
 'every child'

Given this difference, if *mei* introduces a choice function variable, that choice function variable should not be able to take a power noun set as its argument as Szabolcsi proposes for English *every*. I propose that *mei* in Mandarin Chinese actually has two functions. One is to form a set of partitions whose members are sets of n-many individuals with $n =$ the number denoted by the numeral. The definition of partition of a set is given as follows:

- (17) A partition of a set X is a set of nonempty subsets of X such that every element x in X is in exactly one of these subsets (i.e., X is a disjoint union of the subsets).

⁷ The reader may wonder what then is the difference between indefinites and universals of *every*-NP type. The reader is referred to Szabolcsi (ibid: 105) for discussion.

Suppose that the extension of *haizi* ‘child’ in (16) is a set of six atomic children, {A,B,C,D,E,F}. Then, what *mei* does in (16) is to form a set of partitions all subsets of which contain exactly one atomic child. When the numeral is *yi* ‘one’, there is only one single partition, in the case under discussion, it is the underlined part in (18), which is a set of single-member subsets:

$$(18) \quad \{\{\underline{\{A\}}, \{B\}, \{C\}, \{D\}, \{E\}, \{F\}\}\}$$

In addition to forming a set of partitions conforming to the specified number denoted by the numeral, *mei* introduces a choice function variable. This choice function variable will apply to the set of partitions formed, as follows:

$$(19) \quad f(\{\{\underline{\{A\}}, \{B\}, \{C\}, \{D\}, \{E\}, \{F\}\}\}) = \{\{A\}, \{B\}, \{C\}, \{D\}, \{E\}, \{F\}\}$$

In (18), the set contains only one single partition, so when the choice function applies to it, the result will be the same partition. This partition will then be distributed over by the distributivity operator, yielding a result similar to (15).

The partition formation function of *mei* might not be obvious when the numeral is *yi* ‘one’, as this is a special case, but it will become transparent when the number is more than one. In what follows, I discuss this kind of construction which lends strong support to the above proposal.

Consider the construction in (20). In this construction, *mei* is followed by a numeral whose number is larger than one (represented as *mei+Num>1* and has some special properties. The first property of this construction is that an indefinite must appear within the scope of such universal NPs. Compare (20) with (21).

(20) *Mei liang-ge ren chi yi-ge mantou*
 every two-Cl person eat one-Cl steamed.bun
 ‘Every two people eat one steamed bun.’

(21) **Mei liang ge ren likai le*
 every two Cl person leave Asp
 ‘Every two people left.’

Another property of *mei+Num>1*-NP is that *dou* ‘all’ or *ge* ‘each’ may not occur with it in contrast to *mei+Num=1*, as illustrated by (22).

(22) **Mei san-ge ren dou/ge chi yi-ge mantou*
 every three-Cl person all/each eat one-Cl steamed.bun
 ‘Every three people eat one steamed bun.’

Finally, the *mei+Num>1*-NP construction requires the value of the indefinite NP to co-vary with the value of the universal NP.⁸

Now consider a scenario where there are six people, A, B, C, D, E and F in the context and think about when (20) can be true. In order for this sentence to be true, there must be a partition of the six people into two-person groups and the total number of the steamed buns must be equal to the number of two-person groups formed from the six people. Thus, for (20) to be true, there must be three two-person groups and three different steamed buns. In other words, each of the three buns varies with the two-people group that it is associated with. Interestingly, as pointed out by Wu (2013: 10-11), to form a two-person partition out of six people, there are actually 15 partitions as given below.

- (23) $\{\{A,B\}, \{C,D\}, \{E, F\}\}, \{\{A,B\}, \{C,E\}, \{D, F\}\}, \{\{A,B\}, \{C,F\}, \{D,E\}\},$
 $\{\{A,B\}, \{C,D\}, \{E, F\}\}, \{\{A,C\}, \{B,D\}, \{E, F\}\}, \{\{A,C\}, \{B,E\}, \{D, F\}\},$
 $\{\{A,C\}, \{B,F\}, \{D, E\}\}, \{\{A,D\}, \{B,C\}, \{E, F\}\}, \{\{A,D\}, \{B,E\}, \{C, F\}\},$
 $\{\{A,D\}, \{B,F\}, \{C, E\}\}, \{\{A,E\}, \{B,C\}, \{D, F\}\}, \{\{A,E\}, \{B,D\}, \{C, F\}\},$
 $\{\{A,E\}, \{B,F\}, \{C, D\}\}, \{\{A,F\}, \{B,E\}, \{C, D\}\}, \{\{A,F\}, \{B,D\}, \{C, E\}\}$

(20) is true as long as any of the 15 partitions is chosen in a given context and every member of this contextually determined partition has the property of eating a different steamed bun. The sentence by no means means that all the 15 partitions in (23) are universally quantified. So the question is how a partition from the 15 partitions is chosen. The answer is by choice function. Recall that *mei* has two functions. One function is to form a set of partitions whose subsets all contain exactly *n*-many atomic individuals with *n* equal to the number denoted by the numeral, in the case of (20), the number two. Another function of *mei* is that it introduces a choice function variable. This choice function variable, which is existentially closed, will apply to the set containing all the partitions in (23) and return one of the 15 partitions as the value. Suppose that the value is the first partition, ‘ $\{\{A,B\}, \{C,D\}, \{E, F\}\}$ ’, then (20) asserts that $\{A,B\}, \{C,D\}$ and $\{E,F\}$ eats a steamed bun, respectively. The truth conditions predicted seem to be correct.

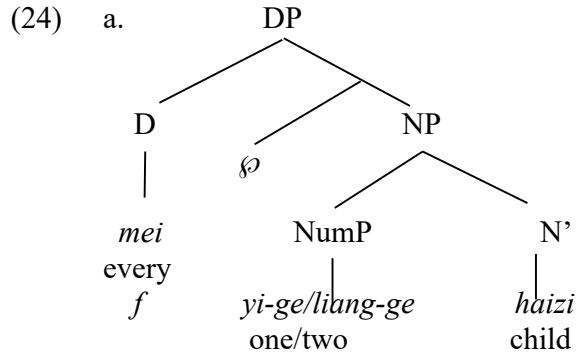
⁸ Niina Zhang (personal communication) pointed out that the following sentence seems to allow partial sharing (many-to-one) reading.

- (i) *Mei liang-ge xuesheng zhao yi-wei zhidao laoshi*
 every two-Cl student find one-Cl supervising teacher
 ‘Every two students find one supervisor.’

The partial sharing reading arises when the total number of two-student groups is larger than the total number of the teachers available. If this observation is correct, what is required by *mei+Num>1*-NP should be a weaker condition, excluding only cases where the indefinite always denotes the same individual.

I conclude that examples such as (20) support the assumption that the meaning of *mei* has two components, one being partition formation and the other being choice function variable.

To sum up, the meaning of a *mei*-NP can be represented as follows, with f standing for a choice function variable and \wp a partition operator:



- b. $\wp(\text{NP})$ = a set of partitions whose subsets contain exactly n-many atomic individuals.
 c. $f(\wp(\text{NP}))$ = one of the partitions chosen from (24b)

4 Partition *mei* and dependent indefinites

The construction in (20) not only supports the treatment of *mei* as introducing a partition operator and a choice function variable but also is the key to answer why the presence of an indefinite may render *dou* unnecessary. Recall that the *mei*+*Num*_{>1}-NP construction has two important properties. One property is that *dou* is not required and another property is that the value of the variable introduced by the indefinite covaries with the value of the variable introduced by the universal NP. The latter property reminds us of the discussion of dependent indefinites in the literature. It has been observed that in many unrelated languages an indefinite determiner or numeral is inflected, mostly involving reduplication, to indicate the covariation between the indefinite and its licenser, usually a quantifier or distributivity operator (Moravcsik 1978; Gil 1995; Farkas, 1997, 2001; 2015; Pereltsvaig 2008; Brasoveanu and Farkas 2011; Henderson 2014; Kuhn 2017). Illustrated below are two Hungarian examples taken from Farkas (2015).

- (25) a. *Minden gyerek hozott egy-egy kőnyvet.* (Hungarian)
 every child brought a-a book.
 ‘Every child brought a book.’

- b. *Minden gyerek hozott k'et-k'et k'onyvet.* (Hungarian)
every child brought two-two book
'Every child brought two books.'

In addition to inflectional morphology, Champollion (2015) argues that *each* may make an indefinite a dependent one as illustrated below:

- (26) Every boy had one apple each.

The previous analyses of dependent indefinites have provided different ways to guarantee the covariation between a dependent indefinite and its licensors such as postsuppositions in Henderson's (2014) framework. In this paper, I will not try to review those analyses but instead would like to assume with Kuhn (2017) that at least dependent indefinites in some languages such as American Sign Language studied by him are themselves inherently distributive. On such an analysis, the at-issue meaning of a dependent indefinite is a universally quantificational lexical entry as illustrated below.

- (27) $\llbracket two - two books \rrbracket =$ Given a licensor X , presupposing that X is nonatomic, for all atomic parts x of X , there are two books associated with x

(Kuhn 2017: 415)

Returning to the Chinese *mei+Num_{>1}*-NP construction in (20), I propose that the indefinite in this construction is a dependent indefinite licensed by the *mei*-NP. Recall that according to our analysis, *mei*-NPs in Mandarin Chinese are not inherently quantificational but introduce a choice function variable applying to the set of partitions derived from partitioning the combination of numeral+noun. This analysis, however, leaves the source of the distributive force in this construction unexplained. In principle, there are two possibilities to solve this issue. One possibility is to say that such constructions involve a covert distributivity operator. As argued by Lin (1998), however, distributivity associated with universal NPs in Mandarin Chinese seems to require an overt marker such as *dou* or *ge*. Given this, this possibility is less plausible. The other possibility is that the distributive force comes from the indefinite itself. Indeed, given what was proposed by Kuhn (2017), I would like to suggest that the indefinite in (20) is a dependent indefinite. Moreover, it is inherently distributive as Kuhn (2017) has proposed for dependent indefinites in American Sign Language. More precisely, I propose that dependent indefinites

in Mandarin Chinese have a denotation like (28).⁹

$$(28) \llbracket yi - ge \textit{ mantou} \rrbracket = \lambda P_{\langle e, \langle e, t \rangle \rangle} \lambda X \forall x [x \in X \rightarrow \exists y [\textit{steamed_bun}'(y) \wedge P(y)(x) \wedge Cov(y, x)]]$$

In other words, a dependent indefinite takes the transitive verb as its argument, returning an intransitive predicate that takes the partition set X chosen by the choice function variable.¹⁰ The members of the set X are universally quantified and scope over the existential quantifier introduced by the indefinite. In addition, the dependent indefinite also introduces a covariation function Cov that guarantees that the value of the variable y co-varies with the value of the variable x .¹¹ This analysis not only explains the meaning of the construction in (20) but answers the question why *dou* ‘all’ or *ge* ‘each’ may not be used in this construction. An overt distributivity operator is not needed, because dependent indefinites are inherently distributive.

5 Explaining the optionality of the distributivity operator in Mandarin Chinese

In section one, we saw that when an indefinite is within the scope of *mei-yi-cl-N* ‘every-one-Cl-N’, an overt distributivity operator such as *dou* or *ge* can be optional, illustrated again by (29).

$$(29) \textit{Mei-(yi)-ge chushi (dou/ge) zuo yi-dao cai}$$

every-one-Cl chef all/each make one-Cl dish
‘Every chef makes a dish.’

Now if the assumption is correct that *mei* is not inherently quantificational or distributive as proposed in this paper, a puzzling question to answer is why the presence of the indefinite makes the distributivity operator optional. My answer to this question is very different from the previous analyses such as Huang (2005) or Luo (2011) briefly summarized below.

Huang (2005) suggested that the universal determiner *mei* requires a variable y in the scope of the universal NP in order to express a “pairing” relation. This pairing relation is guaranteed by a skolem function. Moreover, the dependent

⁹ If Niina Zhang’s observation in note 8 is correct, the Cov function in (28) should be replaced by a weaker condition which excludes only identical referents for the variable y .

¹⁰ The semantics in (28) should be further generalized to include ditransitive verbs. To simplify the matter here, I will leave this task open.

¹¹ The covariation condition might need to be revised given the observation in note 8.

variable must be either lexically licensed as in the case of indefinites or morphologically licensed (by *dou*) as in the case of event arguments. On the other hand, Luo (2011) proposed that *mei* is inherently distributive, as opposed to Lin's (1998) non-distributive analysis and that the semantic representation of distributive quantification is "standard universal quantification plus a matching function". He proposed that like *mei*, *dou* is a distributive quantifier, but it quantifies over events rather than individuals. *Mei* matches an individual with another individual but *dou* matches an individual with an event. Therefore, a universal statement with an intransitive predicate such as **Mei-yi-ge ren likai le* 'everyone left' is uninterpretable because *mei* must match an individual to an individual. Instead, *dou* must be used and *mei* must be type-shifted to $\langle et, e \rangle$ to match the semantics of *dou*.

As we saw above, both Huang's and Luo's accounts for the presence or absence of *dou* rely on the semantic function of either *mei* or *dou*. Here I would like to make a different proposal. My answer is that the presence or absence of a distributivity operator results from the ambiguity of indefinites. An indefinite can be either the familiar plain indefinite or a dependent indefinite when the sentence contains a licenser with a quantificational or distributivity feature. When the indefinite is a plain indefinite, *dou* is required because distributivity needs overt marking in Mandarin Chinese. By contrast, when the indefinite is a dependent indefinite, it is inherently distributive as given in (28). In this case, *dou* is not required.

Let me note an important observation made by Wu (2013: 17-18). He observed that there is a meaning difference with or without *dou* for a sentence like (30).

- (30) *Mei-ge haizi xihuan yi-ge mingxing*
 Every-Cl child like one-Cl star
 'Every child likes a star.'

According to him, without *dou*, (30) can only express a one-to-one correspondence between a child and a star as indicated below.

- (31) Child₁ like star₁
 Child₂ like star₂
 Child₃ like star₃

 Child_n like star_n

That is, in (31), the star must covary with the child. However, if *dou* is inserted into (30), in addition to the covariation reading, the sentence can also mean that every child likes the same star without covariation, as shown below.

- (32) Child₁ like star₁
 Child₂ like star₁
 Child₃ like star₁

 Child_n like star₁

The meaning difference with or without *dou* can be explained as follows. (30) only has a covariation reading because the indefinite *yi-ge mingxing* ‘a star’ is licensed as a dependent indefinite. As proposed in (28), a dependent indefinite is inherently distributive and has a covariation function in its meaning to guarantee a one-to-one correspondence. Since distributivity is already expressed by the dependent indefinite, an overt distributivity marker such as *dou* or *ge* is not required. In fact, it is even not allowed to appear.

But an indefinite can also be a plain indefinite. In this case, it does not have inherent distributive force but can introduce a choice function variable. When the choice function variable is closed by existential closure at the sentence-level, we get the interpretation in (32). When the choice function variable is closed at the VP-level, the interpretation in (31) is yielded. In either interpretation, the distributivity operator *dou* or *ge* is required because distributivity in Mandarin Chinese needs overt marking. Put another way, we can assume with Lin (1998) that though *mei*-NPs are not inherently quantificational, it carries a syntactic [+Dist] feature. This feature requires that the structure has an overt expression to express distributivity. Either an overt distributivity operator or a dependent indefinite may serve this purpose. I conclude that the presence or absence of *dou* or *ge* in a context with an indefinite is the result of the status of the indefinite being a dependent indefinite or a plain indefinite. A plain indefinite requires the presence of a distributivity marker to express distributivity, but a dependent indefinite itself is distributive, hence making *dou* or *ge* unnecessary. Under the proposed analysis, *mei* has a uniform semantics of partitioning the domain of individuals according to the cardinality denoted by the numeral and *dou* is uniformly a distributivity operator across contexts.

Before ending this section, let me make a further remark on different types of *mei*-NPs. We have to divide *mei*-NPs into two types depending upon what numeral appears after *mei*. When the numeral is a number greater than one, i.e., ‘*mei* + Num_{>1} + noun’, the indefinite within its scope must be licensed as a dependent indefinite. That is why *dou* is not allowed in *mei*+Num_{>1}-NP construction. In contrast, when the numeral is the number *yi* ‘one’, the indefinite within the scope of *mei*+Num₌₁+NP can be ambiguous between a plain indefinite and a dependent indefinite. Therefore, *dou/ge* is optional when occurring with *mei*+Num₌₁+NP.

6 Conclusion

This article provides a new account for the interaction between *mei*-NPs, *dou/ge* and indefinites. *Mei*-NPs can be divided into *mei*+*Num*_{>I}+*NP* and *mei*+*Num*_{=I}+*NP* and indefinites can be either non-distributive plain indefinites, or distributive dependent indefinites. Although *mei* is lexically specified for a syntactic [+Dist] feature and requires the presence of a distributive element in its c-command domain, it itself is not inherently quantificational. Instead, it introduces one partition formation operator and one choice function variable. An indefinite within the scope of *mei*+*Num*_{>I}+*NP* is always licensed as a dependent indefinite. Since dependent indefinites are inherently distributive, *dou/ge* may not occur with *mei*+*Num*_{>I}+*NP*. By contrast, an indefinite within the scope of *mei*+*Num*_{=I}+*NP* can be ambiguous between a plain indefinite and a dependent indefinite. In the former case, *dou/ge* is required. In the latter case, *dou/ge* may not appear.

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Quotes as complements: A Kratzerian approach*

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Abstract I explore the consequences of extending Kratzer’s (2006; 2016) treatment of *that*-complements as essentially nominal modifiers, to the domain of quotation.

1 Introduction

In a Festschrift contribution of her own, Kratzer (2006) rejects the traditional Hintikka-style analysis of attitude verbs as intensional operators:

- (1) a. $[[\text{believe}]_w = \lambda p \lambda x \forall w' \in \text{Dox}(x, w)[p(w')]$
b. $[[\text{Ann believes that Orcutt is a spy}]_w = \forall w' \in \text{Dox}(\text{ann}, w)[\text{spy}(\text{ortcutt}, w')]$

She replaces the traditional account with a Neo-Davidsonian one, where attitude verbs are simply transitive verbs that take ‘contentful’ direct objects (as in (2a), where ‘*believe*(*e*, *x*, *w*)’ abbreviates that *e* is the eventuality of believing *x* in *w*), and it’s these belief objects that are in turn modified by *that*-clauses (as in (2b)-(2d), where ‘*content*(*x*)’ denotes the set of worlds compatible with *x*):

- (2) a. $[[\text{believe}]_w = \lambda x \lambda e. \text{believe}(e, x, w)$
b. $[[\text{that}]_w = \lambda p \lambda x \forall w' \in \text{content}(x)[p(w')]$
c. $[[\text{that Orcutt is a spy}]_w = \lambda x \forall w' \in \text{content}(x)[\text{spy}(\text{ortcutt}, w')]$
d. $[[\text{believes that Orcutt is a spy}]_w = \lambda e \exists x [\text{believe}(e, x, w) \wedge \forall w' \in \text{content}(x)[\text{spy}(\text{ortcutt}, w')]]$
e. $[[\text{Ann believes that Orcutt is a spy}]_w = \exists e \exists x [\text{agent}(e, \text{ann}) \wedge \text{believe}(e, x, w) \wedge \forall w' \in \text{content}(x)[\text{spy}(\text{ortcutt}, w')]]$

In the final steps of this derivation, the CP in (2c) combines with the verb (2a) via Restrict (Chung & Ladusaw 2004), followed by Existential Closure over the direct object argument, to get (2d). The eventual truth conditions in (2e) are derived by adding the subject as the agent of the eventuality (or, as Kratzer 2006 puts it,

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as the possessor of the state), and, finally, applying Existential Closure over the event argument. In short, on Kratzer’s account, believing that Ortcutt is a spy means believing something (a belief, a proposition, a thought) with the content that Ortcutt is a spy.

Kratzer’s move essentially relieves the attitude verb of its modalizing duties and foists them on the complementizer. In a more recent version of the theory (Kratzer 2016), the modalizing function is pushed down even further, into an embedded Mood feature, in order to deal with harmonic modals/moods and intransitive ‘manner of speech verbs’. We’ll ignore this complication for now, but we return to it below in section 4 and beyond.

The selling points of Kratzer’s approach include a unification of the syntax and semantics of *that*-complements modifying verbs (3a) and nouns (3b), and an immediate explanation of the otherwise puzzling inference from (3a) to the clearly transitive existential generalization (3c).

- (3) a. Ann believes/desires/fears that Ortcutt is a spy
 b. the belief/desire/fear that Ortcutt is a spy
 c. Ann believes/desires/fears something

In this paper I want to extend Kratzer’s analysis, from *that*-complements to direct quotation complements, because those show the exact same patterns, i.e. quotations can modify both verbs (4a) and nouns (4b), and they license existential inferences (e.g., from (4a) to (4c)):

- (4) a. John said, “Ortcutt is a spy”.
 b. the sentence/phrase/utterance “Ortcutt is a spy”.
 c. John said something.

In earlier work I’ve sketched a simple event semantics for speech reports, where communicative events themselves have both a content and a form, and *that*-clauses and quotations alike express properties of events (Maier 2017).¹ The contribution of the current paper is to explore what happens if we start from Kratzer’s superior event-based analysis of *that*-clauses (where, as we just saw, the connection between the verbal eventuality and the complement is mediated by a direct object), and extend that to the quotation domain. In sections 2–3, I first show that this extension indeed allows us to deal with the basic patterns in (4) above. In sections 4–6 I then more tentatively explore some further consequences of the resulting nominal modification

¹ Analyzing indirect speech and attitude reports in terms of ‘contentful events’ is by no means new, cf. Brasoveanu & Farkas (2007) and Hacquard (2010), in addition of course to Kratzer’s own variety, under discussion here, where the attitude or speech event has a contentful direct object (cf. also Moulton 2009).

account of quotation for the analysis of free indirect discourse, and *be like* quotatives.

2 Quotation in canonical direct speech

The goal is to extend Kratzer’s analysis of indirect discourse in (2) to a theory of quotation. As announced, I’m sticking with the 2006 version of Kratzer’s theory for now, i.e., all the intensionalizing action is in the complementizer. The idea then is that quotation marks function much like such a complementizer,² viz. as taking a clause and turning it into a property of objects, only this time this property characterizes the linguistic surface form rather than the content of the object. Thus (4a) (*Ann said “Orcutt is a spy”*) comes out meaning that Ann said something of the form *Orcutt is a spy*. In the remainder of this section I’ll make this precise.

On Kratzer’s approach, the complementizer takes an intensional type (*st*) argument, which we can assume is supplied by applying Intensional Function Application (IFA, Heim & Kratzer 1998). For direct discourse then, the corresponding operator, i.e. the quotation operator QUOT, will have to take a ‘linguistic form’ type argument, supplied by applying Quotational Function Application (QFA, Sudo 2013). To see how this works, let’s first settle on some notation. Let u be the type of linguistic forms or expressions, i.e., D_u is the set of finite strings of letters in some (phonetic) alphabet, e.g. $\text{abs1f} \in D_u$ and $\text{I am an idiot} \in D_u$. Moreover, every expression in the object language corresponds to one such string object. We’ll use a common notation where ‘ \ulcorner I am an idiot \urcorner ’ in the metalanguage denotes the phonetic string object *I am an idiot* corresponding to the object language expression *I am an idiot*.

Back to the IFA and QFA composition rules. While *that* denotes a function of type (*st*)*et*, QUOT denotes the following function of type $u(et)$ (where ‘*form*(x,f)’ means that the linguistic form of x is f):

$$(5) \quad \llbracket \text{QUOT} \rrbracket = \lambda f_u \lambda x_e [form(x,f)]$$

I leave possible worlds and other intensional parameters out of my notations from here on, since quotation itself is strictly speaking extensional in the current formalization. In order to combine QUOT with its complement we use our dedicated new composition rule QFA, which says that QUOT, as a function with a type u argument, can combine with an argument α of any type to form a complex $[\text{QUOT } \alpha]$, and that this complex is interpreted by feeding into QUOT not the denotation of α but the linguistic form corresponding to α .

$$(6) \quad \llbracket \text{QUOT } \alpha \rrbracket = \llbracket \text{QUOT} \rrbracket (\ulcorner \alpha \urcorner)$$

² This may help explain why some languages use the same marker to introduce both direct and indirect discourse (e.g. Japanese *to*, and (arguably) Ancient Greek *hoti*).

Note that QFA makes the derivation arguably non-compositional as the meaning of the complex is not determined by the meanings of its parts, but also by the linguistic form of the argument. One way to save compositionality perhaps would be to say that determining the surface form of an LF expression is also a kind of interpretation, viz. a phonological interpretation, and that quotation shows that this interpretation must be considered semantic as well. Instead of dwelling on this terminological distraction let's apply what we have to our example:

- (7) a. $\llbracket \text{QUOT [Ortcutt is a spy]} \rrbracket = \lambda x[\text{form}(x, \ulcorner \text{Ortcutt is a spy} \urcorner)]$
 b. $\llbracket \text{say} \rrbracket = \lambda x \lambda e[\text{say}(e, x)]$
 c. $\llbracket \text{say [QUOT [Ortcutt is a spy]]} \rrbracket =$
 $\lambda e \exists x[\text{say}(e, x) \wedge \text{form}(x, \ulcorner \text{Ortcutt is a spy} \urcorner)]$

As in Kratzer's original proposal, reviewed in (2), (7c) is derived by Restrict and Existential Closure. The resulting interpretation of the entire report, (4a), would be that there is a speech event with John as agent, which is an event of saying something of the form *Ortcutt is a spy*.

3 Quotation as a noun modifier

The essence of Kratzer's account is that *that*-complements are always noun modifiers, and now so are quotations. Just to be sure, consider an example of a quotation overtly modifying a nominal, which was beyond the scope of more traditional approaches (including my own earlier attempts):

- (8) a. $\llbracket \text{sentence} \rrbracket = \lambda x[\text{sentence}(x)]$
 b. $\llbracket \text{sentence [QUOT [Ortcutt is a spy]]} \rrbracket =$
 $\lambda x[\text{sentence}(x) \wedge \text{form}(x, \ulcorner \text{Ortcutt is a spy} \urcorner)]$

Treating *the* as a Fregean (*et*)*t* operator we can capture constructions like (9) with just function application:

- (9) $\llbracket \text{write [the [sentence [QUOT [Ortcutt is a spy]]]]} \rrbracket$

For all our derivations above to be interpretable, the thing modified by the quotation must be something that can plausibly be said to have a linguistic form, i.e., something like an utterance or a sentence. Although dreams, desires, fears, intentions and beliefs clearly have contents (and hence allow *that*-complementation), they don't plausibly have a genuinely linguistic structure, and hence such nouns and the corresponding verbs can't take quotation complements.

- (10) a. *the belief/fear/desire "Ortcutt is a spy"

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- b. *Ann believes/fears/desires “Orcutt is a spy”

Interestingly, thoughts are often conceptualized as ‘inner speech acts’ and hence can have both form and content, which explains why *think*, unlike *believe*, can take both direct and indirect discourse complements (Maier 2017).

4 Intransitive communication verbs

So far I’ve been following Kratzer’s analysis of *believe* and *say* as transitive verbs with internal object arguments built in. In her later work Kratzer (2016) modifies the analysis to cover complements of intransitive communication verbs (*sigh*, *groan*, etc.) by assuming a silent report feature [say] high in the left periphery of the embedded clause, above Mood (which in turn functions roughly like the 2006 *that*, or our QUOT). Hence:

- (11) John sighed, “What now?”
- a. LF: John [sighed [[say] [QUOT [What now?]]]]
 - b. $[[\text{sigh}]] = \lambda e[\text{sigh}(e)]$
 - c. $[[[\text{say}] [\text{QUOT} [\text{What now?}]]]] = \lambda e\exists x[\text{say}(e, x) \wedge \text{form}(e, \ulcorner \text{What now?} \urcorner)]$
 - d. $[[\text{(11a)}]] = \exists e\exists x[\text{agent}(e, \text{john}) \wedge \text{sigh}(e) \wedge \text{say}(e, x) \wedge \text{form}(x, \ulcorner \text{What now?} \urcorner)]$

The intransitive in (11b) and the [say]-phrase in (11c) combine via Predicate Modification, which, after bringing in the external argument and event closure, derives the final output in (11d). In words: there was an event of John sighing and (thereby) saying something of the form *What now?*.

As a bonus, the flexibility of Neo-Davidsonian event semantics let’s us derive the common ‘fronted quotation’ order, without postulating overt movement (because, before existential closure over events, both *John sighed* and the [say]-phrase both express properties of events):

- (12) a. “What now?” John sighed.
 b. $[[[\text{say}] [\text{QUOT} [\text{What now?}]]]] [\text{John sighed}]$

5 A note on free (in)direct discourse

Looking at uses of quotation in actual narratives, we find many cases of unframed or free-standing quotations:

- (13) She sighed and looked down at her hands with dull concentration. “I know it’s going to be less than two weeks.”
 “I wish you’d promise me something.”

She looked at him with no anger or suspicion, only faint curiosity. “What?”
 “Not to read any more until I’m done... or until I have to... you
 know...”
 “Stop?”
 “Yes. Or until I have to stop”³

Following the Kratzerian reasoning above, at LF all quotations in this passage will be headed by (at least) a [say]-feature and a QUOT-operator, in order to derive the intended interpretation as speech reports.⁴

But then the same goes for free indirect discourse, where speech and thought attributions are even less clearly marked on the surface.

(14) Mary panicked. The deadline was tomorrow! What on earth was she going to do?

One of the puzzles of free indirect discourse is that it doesn’t just cause indexical shift (*tomorrow* refers to the day after Mary’s supposed panicking, not the day after the utterance of (14)), but that it really forces a reportative reading: the author/narrator is not exclaiming, nor desperately asking the reader what Mary should do; the narrator is merely reporting what the protagonist Mary is exclaiming and asking (*sub voce*, presumably). If we weaken the interpretation of the [say] feature to include also internal/mental speech acts we can assume that its (covert) presence is responsible for deriving the reportative interpretation in (14), just as with (13).

The resulting analysis would in principle be compatible with both my quotation-plus-unquotation account of free indirect discourse (Maier 2017), and the competing indirect-discourse-plus-context-shift accounts of Sharvit (2008) or Eckardt (2014), because the [say] feature could embed either a QUOT,⁵ or Kratzer’s modalizing *that*/Mood.⁶ Either way, introducing the [say] feature here addresses Stokke’s (2013) objection to Schlenker’s (2004) analysis of free indirect discourse – that the latter focuses exclusively on context shift and fails to account for the ‘commitment shift’ characteristic of report constructions – and it does so by replacing the *ad hoc*

3 Stephen King, *Misery*, 1988. New York: Penguin.

4 Whether to further stipulate a covert subject or leave that to pragmatics is a question for future research.

5 This QUOT should then in turn embed an UNQUOTation operator to deal with unshifted person and tense features (Maier 2017).

6 Interestingly, as Fabricius-Hansen & Sæbø (2004) and Eckardt (2014) discuss, free indirect discourse in German can take the Reportative Subjunctive mood, in which case the interpretation is as a speech report rather than as a thought report. It is not clear to me whether all cases discussed by these authors are really free indirect discourse (as opposed to ‘unembedded indirect discourse’, cf. Bary & Maier 2014), and if so how best to deal with it, but one possibility to explore would be that there are distinct [say] and [think] features, selecting for subjunctive or indicative mood.

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‘FID-operator’ of Sharvit (2008) with an independently motivated feature of report constructions generally.

6 A note on quotative *be like*

Quotative *be like* patterns with intransitive speech report constructions like (11) (*John sighed “What now?”*):

- (15) John was like, “What now?”
 ≠ John was like something.

Moreover, like the intransitive *sigh*, *be like* is not inherently restricted to speech reporting (Davidson 2015):

- (16) John was like <looks annoyed and sighs>

Thus, it seems natural to assume that the speech report interpretation of (15) arises due to a transitive [say] feature that in turn licenses QUOT. To ensure a uniform treatment of the quotative constructions in (15) and (16), let’s first take a closer look at the latter.

Following Davidson, *like* denotes the demonstration relation, i.e., it relates a demonstration event (in this case, the reporter’s annoyed look and sigh), to the supposedly similar eventuality thereby depicted (in this case, John’s acting similarly annoyed).

- (17) a. $[[\textit{like}]] = \lambda d \lambda e [demonstration(d, e)]$
 b. $[[\textit{be like} \langle \textit{looks annoyed and sighs} \rangle]] = \lambda e [demonstration(d_0, e)]$ (where d_0 denotes the event of the reporting speaker’s annoyed look and sigh)
 c. $[[\textit{(16)}]] = \exists e [agent(e, john) \wedge demonstration(d_0, e)]$

In words, (16) conveys that there was an eventuality with John as agent which was, in the contextually relevant ways, similar to the reporting speaker’s annoyed look and sigh.

Since they take a demonstration argument, *be like* quotatives most naturally occur in ‘live modalities’ (like face-to-face spoken conversation or signing) allowing vivid gestures, sounds, and other iconic actions. However, following Clark & Gerrig (1990), Davidson goes a step further and suggests that quotation generally be considered a special case of demonstration. This would mean that the (printed) phrase, in quotation marks, in (15) can somehow saturate the demonstration argument. Moreover, canonical *say* reports as discussed above should then be analyzed as involving demonstration as well, perhaps through a silent *like* operator. I’ve argued elsewhere (Maier forthcoming) against such a radical version of the demonstration account, and

in favor of a hybrid account, where the use of explicit, linguistic quotation (under *be like* or *say*) involves genuine reference to form (giving rise to a linguistic faithfulness constraint), in addition to an optional demonstration component (giving rise to an iconic faithfulness constraint).

On the current Kratzerian approach such a hybrid analysis could take the following form:

- (18) John was like <sighs>What now?<looks annoyed>
- a. LF: John [be like d_I] [[say] [QUOT [What now?]]] (where d_I denotes the whole event of the reporter looking annoyed while sighing and muttering *what now?*)
 - b. $\llbracket \text{be like } d_I \rrbracket = \lambda e[demonstration(d_I, e)]$
 - c. $\llbracket [\text{say}] [\text{QUOT} [\text{What now?}]] \rrbracket = \lambda e \exists x[say(e, x) \wedge form(x, \ulcorner \text{What now?} \urcorner)]$
 - d. $\llbracket (18a) \rrbracket = \exists e \exists x[agent(e, john) \wedge demonstration(d_I, e) \wedge say(e, x) \wedge form(x, \ulcorner \text{What now?} \urcorner)]$

In a way, the reporter's vivid report, represented as a complex event involving sighing, speaking, and looking annoyed, thus fulfills two functions simultaneously: it's a live demonstration of a partly linguistic, partly non-linguistic event, but the part that can be construed as a linguistic utterance also serve as argument to QUOT.

7 Conclusion

Like Kratzer, and many others, I believe it's time to ditch the traditional Hintikka-style account of attitude and speech reports in favor of a Neo-Davidsonian alternative. But such a move can take different forms, each with their own merits and motivations. For me, the primary motivation has been to better understand the various forms of quotation and their relations to indirect speech and attitude reports. Kratzer's original motivation seems to have been a better understanding of complementation. In this squib I try to bring Kratzer's significant insights into complementation to the quotational domain. What I hope to have shown is that Kratzer's approach has significant benefits there as well, as it sheds new light on such recalcitrant phenomena as free indirect discourse and *be like* quotatives.

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Clauses as semantic predicates: difficulties for possible-worlds semantics

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Abstract The standard view of clauses embedded under attitude verbs or modal predicates is that they act as terms standing for propositions, a view that faces a range of philosophical and linguistic difficulties. Recently an alternative has been explored according to which embedded clauses act semantically as predicates of content-bearing objects. This paper argues that this approach faces serious difficulties when it is based on possible worlds-semantics. It outlines a development of the approach in terms of truthmaker theory instead.

The standard view of clauses when they are embedded under attitude verbs or modal predicates is that they act as singular terms standing for propositions. There are a range of difficulties for that view, though, which have motivated an alternative approach to the meaning and semantic contribution of embedded sentences. According to that approach, clauses act as predicates of content-bearing objects, such as mental states, cognitive or illocutionary acts or products of such acts, and modal objects (entities like obligations and permissions), objects that may be given by the content of the embedding predicate or the discourse context. In this paper, I want to point out some serious difficulties for possible-worlds semantics that arise when clauses embedded under attitude verbs or modal predicate are considered predicates of content-bearing objects. I will propose instead a situation-semantic account, based on the notion of an exact truthmaker or satisfier in the sense of Fine (2014, 2017). This account allows embedded sentences to apply to content-bearing objects of various sorts in virtue of a single meaning, and it can provide a more adequate semantics of what Kratzer (2016) calls ‘harmonic modals’.

1 The standard view of clausal complements of attitude verbs and of modal sentences

Let me start with the standard view of clausal complements of attitude verbs of the sort of *assume* and *hope*, before turning the attention to sentences embedded under modal predicates (and other sorts of sentence-embedding predicates).

The standard view of clausal complements of attitude verbs as in (1a) is that they act as singular terms standing for propositions, which in turn act as arguments of the embedding attitude verb. Formally, this is what I call the *Relational Analysis* (Moltmann 2003, 2013a), given for (1a) in (1b):¹

- (1) a. John assumes that Mary is happy.
 b. assume(John, [*that Mary is happy*])

Propositions are generally taken to play three roles: to be (the primary bearers) of truth values, the meanings of sentences (or referents of embedded clauses), and the contents or ‘objects’ of propositional attitudes. There are both linguistic and philosophical difficulties for the Relational Analysis.² First the Relational Analysis is considered problematic in that it fails to make a distinction between the content and the object of an attitude (treating propositions as things agents have attitudes to, rather than as the contents of attitudes). Second, there are problems for the notion of an abstract proposition as such, which are a major topic of discussion in contemporary philosophy of language (they concern in particular the graspability and truth-directedness of propositions). But also the linguistic plausibility of the Relational Analysis has been put into question. The difficulties it raises include accounting for the Substitution Problem, the problem of the unacceptability of (2b) as an inference from (2a), and the Objectivization Effect, the difference in the understanding between (3a) and (3b):

- (2) a. John assumed that S
 b. ??? John assumed the proposition that S.
- (3) a. John fears that S
 b. John fears the proposition that S.

Another issue concerns the analysis of nominal constructions. It has long been observed that clausal complements of nouns as in (4) do not behave like arguments, since they are not obligatory even if the verb requires a complement:

- (4) John’s assumption that S

¹ I chose the verb *assume*, rather than *think* or *believe*. I consider *think* a verb of (internal) saying, involving a different semantics than verbs like *assume*, *conclude*, or *claim* (Moltmann 2017b). Moreover, *believe* arguably involves a different semantics as well (Fn 8).

² See Moltmann (2003, 2013 chap 4, 2014) and reference therein.

Moreover, semantically, the clausal complement seems to stand for something closely related to what the nominal construction stands for, a proposition-like object, rather than providing an object entering a thematic relation to the event described by the verb. Clauses can also be complements of underived nouns, where they could not possibly fill in an argument position, as in *the idea that S* and *the thesis that S* (Moulton 2009). Yet, the semantic relation of the denotation of the clausal complement to the denotation of the entire NP is not plausibly that of identity: an assumption, idea, or thesis is not just a proposition, but rather, more plausibly, the (non-physical) *product* of a cognitive act in the sense of Twardowski (1911) (Moltmann 2014, 2017a)

The syntactic status of clausal complements of nouns, though, is far from obvious and there is a significant syntactic controversy surrounding it. Some researchers assimilate them to relative clauses (Arsenevič 2009, Moulton 2009, Kayne 2010).³ Others have argued against such an assimilation (de Cuba 2017). The proposal that I will discuss later, that clauses semantically act as predicates, would go along well with the view that clausal complements of nouns, and even verbs, are relative clauses. But the proposal is not strictly tied to that syntactic view. It is compatible with a different syntactic analysis of complement clauses, as long as the analysis permits them to be in some way interpreted as properties.⁴

There are also various phenomena where the choice of a category or expression in the clause (mood or modals) appears to depend on the semantics of the embedding verb and which thus indicate that the clause does not act as a referentially independent singular term. Such phenomena were Kratzer's main motivations for pursuing the approach of clauses as semantic predicates. In particular, as Kratzer (2016) points out, deontic modals with relevant sorts of speech act verbs as below display two readings, one of which does not contribute to the content of the reported speech but simply reflects the inherent modality associated with the embedding predicate:

- (5) He motioned / proposed / insisted / suggested / recommended / advised / demanded / petitioned / urged / begged / requested / required / wanted / pleaded that we *should* set up an emergency fund. (Kratzer 2016)

Such modals are what Kratzer calls *harmonic modals*. Harmonic modals are not available with verbs of saying of the sort *say, mention, claim*, etc.

There are, as expected, also harmonic uses of modals of possibility, with suitable embedding verbs:

³ Kayne (2010) in fact takes the view that all complement clauses are relative clauses.

⁴ In fact, even some relative clauses, unrestrictive relative clauses, have been analysed not as semantic predicates, but as (E-type) pronouns. See Cinque (2008) for discussion and further references.

- (6) a. John made Mary the offer that she *could* use the house.
 b. The document indicates that Bill *might* be guilty.
 c. John suggested that Bill *might* be at home.

For Kratzer, harmonic modals indicate that complement clauses are not referentially independent. They spell out the inherent modality of the content-bearing object of which the clause is to be predicated (a motion, proposal, suggestion, recommendation, or offer, for example).

Let me briefly turn to the standard view of modals. The standard view of modals consists in the *quantificational analysis* according to which a modal of necessity as in (7a) stands for a universal quantifier ranging over possible worlds, as in (7b), and a modal of possibility as in (8a) for an existential quantifier, as in (8b):

- (7) a. John needs to leave.
 b. $\forall w'(w' \in f(w) \rightarrow [John\ leave]^{w'} = \text{true})$
- (8) a. John is allowed to leave.
 b. $\exists w'(w' \in f(w) \& [John\ leave]^{w'} = \text{true})$

Here, the contextually given function f maps the world w in which the entire sentence is evaluated to the relevant set of worlds, the modal base. The quantificational account of modals was extended to verbs expressing belief and knowledge by Hintikka (1962), and the Hintikka-style analysis has since become a common approach to the semantics of attitude verbs in natural language semantics. The assimilation of attitude verbs to modals has been used, for example, to account for the presupposition projection behavior of the complement of attitude verbs (Heim 1992) and for the understanding of epistemic modals in the complements of attitude verbs (Anand /Hacquard 2013). Thus (9a) on that view has the truth conditions in (9b), where $bel_{w,j}$ is the set of worlds compatible with what John believes in w :

- (9) a. John believes that S
 b. $\forall w'(w' \in bel_{w,j} \rightarrow [S]^{w'} = \text{true})$

(9b) can be reformulated straightforwardly making use of a proposition p (the set of worlds in which the complement clause S is true) as an argument of the attitude verb:

- (9) c. $believe(j, p)$ iff $\forall w'(w' \in bel_{w,j} \rightarrow w' \in p)$.

The modal analysis of attitude verbs has generally been applied only to attitude verbs that are taken to involve universal quantification over worlds, such as belief and knowledge.⁵ It is not obvious that there are verbs expressing mental attitudes that are correlates of modals of possibility and thus would involve not universal, but existential quantification over worlds. Yet, at the same time, it is not obvious that there aren't. For example, there seem to be uses of *think* that function that way; thinking in the sense of taking a possibility into consideration (and so of course for *hypothesize*). Clearly, there are speech act verbs that correspond to modals of possibility. While an act of promising or demanding may result in an obligation, an act of allowing results in a permission and acts of inviting and offering in invitations and offers, modal objects associated with possibility, not necessity.

There is a notorious problem for possible-worlds semantics to account for explicit or heavy permissions, as opposed to implicit or light permissions.⁶ The distinction between the two sorts of permissions is well-reflected in English, in the contrast between simple predicates (*be* + impersonal adjectival passive) as in (10a), which display the light reading (as well as a heavy one), and complex predicates (light verb + nominal), as in (10b, c), which display the heavy reading:

- (10) a. *Mary is permitted to take a walk.*
b. *Mary has the permission to take a walk.*
c. *John gave the permission for Mary to take a walk.*

The possible-worlds-based account would give the same semantics to the two sorts of permission sentences: for a permission sentence such as (10a) or (10c) to be true, the clausal complement would have to be true in *some* world compatible with the agent's obligations. But having a permission means more than that: it means that there was an act whose content is, at least in part, given by the complement clause and whose product, the permission, can be taken up by performing the act described by the complement clause. Moreover, giving or receiving a permission does involve a change, but not in the set of worlds compatible what the agent is obliged to do. Rather it involves a change in a set of options to act that are at the agent's disposal.

A similar issue arises for epistemic modals (and epistemic or doxastic attitude verbs), which arguably display the same sort of distinction between weak and strong readings (Przyjemski 2017).

⁵ Some attitude verbs have been taken to impose an ordering of preference along worlds such as *want, wish, be happy* (Heim 1992).

⁶ See von Wright (1963) for the distinction between heavy and light (or 'explicit' and 'implicit') permissions.

The difference in the predicates in (10a) and in (10b, c) is revealing as to what is going on with light and heavy permission readings. The complex predicates in (10a, b) involve explicit reference to a permission, the product of an act of permission, and the complement clause serves to give the content of that product, as I will argue in the next section. By contrast, (10a) contains a stative predicate *is permitted to* describing a deontic state, rather than the product of an act, and it is that state that the complement relates to. The heavy reading thus will go along with the compositional semantics of complex predicates as in (10a, b), and the light or heavy reading with that of a simple stative predicate. Note that action verbs like *offer* and *invite*, can only serve to describe explicit forms of permission.

2 Clauses as semantic predicates

In order to account for the various problems that arise for the view that clauses act as singular terms standing for propositions, an alternative view has been pursued, namely according to which clauses act semantically as predicates of a content-bearing object that is given by the semantic or pragmatic context (Kratzer 2006, 2016, Moulton 2009, Moltmann 2014, 2017a, b, c).

Let me briefly elaborate a version of the view according to which clauses act as semantic predicates predicated of a content-bearing object, such as a claim, an assumption, a permission, or an obligation (Moltmann 2014, 2017a, b, c). For the present purpose it suffices to assume that a clause acts as a predicate of a content-bearing object by specifying its truth or satisfaction conditions.⁷

A first question to address is: where does the content-bearing object come from of which the clause is predicated? For different kinds of embedded clauses, the content-bearing object may have different sources. For complements of so-called volunteered-stance verbs such as *assume* and *fear*, the object should be closely related to the Davidsonian event argument.⁸ In the case of the verb *fear*, this would be the state of fear that is the event argument of *fear*. Thus, (11a) will have the logical form in (11b):

- (11) a. John fears that S.
 b. $\exists e(\text{fear}(e, j) \ \& \ [S](e))$

⁷ Another way for clausal complements to act as predicates of content-bearing objects is by specifying their structured content or even form, namely when a clausal complement is an indirect and direct quote (Moltmann 2017b).

⁸ See Cattell (1978) for the notion of a volunteered-stance verb as well as that of a response-stance verb. The two sorts of verbs, Cattell argues, behave differently syntactically.

In the case of *assume*, the content-bearing object is more plausibly the product *product(e)* of the act *e* of assuming, the assumption. The assumption is the bearer of representational properties and truth conditions, unlike the act of assuming, which intuitively lacks such properties (Twardowski 1911, Moltmann 2003, 2013, 2014, 2017a). Thus, (12a) will have the logical form in (12b):

- (12) a. John assumes that S.
b. $\exists e(\text{assume}(e, j) \ \& \ [S](\text{product}(e)))$

This analysis straightforwardly accounts for nominal constructions as in (13a), which would be analysed as in (13b), with the *that*-clause acting as a predicate of the referent of the NP:

- (13) a. John's assumption that S
b. $\iota d[\text{assumption}(d, j) \ \& \ [S](d)]$

The nominalization in (13a) is semantically related to the verb in that (13b) is synonymous with $\iota d[\exists e(\text{assume}(e, j) \ \& \ d = \text{product}(e) \ \& \ [S](d))]$.⁹

Not all embedded clauses should lead to a logical form as in (11b) or (12b). Such an analysis is hardly applicable to factive verbs, where the complement more plausibly characterizes a fact (however that may be conceived), in addition to perhaps characterizing the content of a mental state or act. It is also implausible for response-stance verbs such as *agree*, *deny*, *repeat* or *confirm*, where the complement arguably characterizes a contextually given content bearer (a claim, rumor, or suggestion, for example), in addition to characterizing (the product of) the act described by the verb. Thus, (14a) would have the logical form in (14b), where *d* is a suitable contextually given content bearer (Moltmann 2017c).¹⁰

- (14) a. John agreed that S.
b. $\exists e(\text{agree}(e, j) \ \& \ [\textit{that } S](\text{product}(e)) \ \& \ [\textit{that } S](d))$

Also a clause in subject position with a predicate like *is true* arguably gives the content of a contextually given content-bearer (e.g. a claim, rumor, or suggestion) (Moltmann 2015a):

- (15) That S is true.

⁹ There is an issue whether the verb of the nominalization is semantically prior, see Moltmann (2017a).

¹⁰ Kratzer (2016) also proposes such an account for *believe*, which, she argues, behaves syntactically different from verbs like *think* and *assume* regarding its clausal complement.

The general view that clauses act semantically as predicates of content-bearing objects naturally carries over to modals as well. This is most intuitive for deontic modals as in *it is obligatory to do V* and *it is permitted to do V* (Moltmann 2015b, 2017a). (Deontic) modals arguably take as implicit (Davidsonian) arguments entities that I call *modal objects*, entities of the sort of needs, obligations, and permissions. Modal objects may be produced by an illocutionary act (of demanding, promising, or permitting). As such, they have the status of (abstract) artifacts (in the sense of Thomasson 1999), for example as laws or rules. But they need not be the product of an illocutionary act. What is important about modal objects rather are their characteristic properties, most importantly that they come with satisfaction conditions: a need may be satisfied; a promise fulfilled, a permission or offer taken up. The clausal complement of a modal predicate (or the subject clause or prejacent) then serves to give the satisfaction conditions of the modal object that is the implicit argument of the embedding verb. (17a) and (18a) will thus have the logical forms in (17b) and (18b) respectively:

- (16) a. John needs to leave.
 b. $\exists d(\text{need}(d) \ \& \ [\textit{John to leave}](d))$
- (17) a. John is permitted to leave.
 b. $\exists d(\text{permission}(d) \ \& \ [\textit{John to leave}](d))$

How does a clause characterize the content of a content-bearing object, that is, what property of content-bearers does it express? Given possible-worlds semantics, the property below would be the most obvious candidate, a view endorsed by Kratzer (2006, 2016) and Moulton (2009):

- (18) $[S] = \lambda d[\forall w(w \in f(d) \rightarrow S \text{ is true in } w)]$

Here $f(d)$ is the set of worlds compatible with the content of d (or in which the conditions represented by d are fulfilled). f thus represents the modality associated with the content-bearing object d , and various features or elements of the clause S , according to Kratzer, may relate to it.

There is a problem, however, with the possible-worlds-based property in (16), and that is that it could apply only to modal objects of necessity, not of possibility. In application to modal objects of possibility, it would have to stand for the property below, given the standard view of modals of possibility:

- (19) $[S] = \lambda d[\exists w(w \in f(d) \ \& \ S \text{ is true in } w)]$

But then clauses as complements of modal predicates as in (17a) and (18a) would not have a single meaning, but would be ambiguous, depending on the lexical meaning of the embedding predicates. This of course violates compositionality. The very same compositionality problem arises for complements of speech act verbs associated with necessity and with possibility (*demand, request* vs *give the permission, invite, offer*).

In addition to the problem for compositionality, of course, the possible-worlds account is just not applicable to explicit permissions and obligations (and explicit doxastic and epistemic attitudes).¹¹

3 A different approach: clauses expressing truthmaker-based properties

Possible-worlds semantics thus faces serious difficulties with complements of verbs describing explicit attitudes and speech acts, content-bearing objects described by underived nouns, with explicit obligations and permissions. Furthermore, it is unable to provide a single meaning of clauses applicable to embedding predicates (or nouns) associated with different modal forces.

In what follows, I will sketch an alternative to the possible-worlds-based account. It uses situations or actions instead of possible worlds and makes use of the exact truthmaking relation of Fine's recent truthmaker semantics. The advantages of that account will be first that it applies to explicit permissions as well as explicit attitudes and second that it allows for a single meaning of clauses applicable to content-bearing objects associated with different modal forces.

Here is a very brief outline of Fine's (2014, 2017, to appear a, b) truthmaker semantics, which should suffice for the present purposes. Truthmaker semantics involves a domain of situations or actions containing actual, possible, as well as impossible situations and actions. This domain is ordered by a part relation and is closed under fusion. A situation or action s stands in the relation \Vdash of exact truthmaking (or exact satisfaction) to a sentence S just in case s is a truthmaker of S and s is wholly relevant for the truth of S . \Vdash applies to both declarative and imperative sentences: declarative sentences are made true by situations that are their exact truthmakers; imperatives are complied with by actions that are their exact satisfiers.

The following standard conditions on the truthmaking of sentences with conjunctions, disjunctions, and existential quantification then hold:¹²

¹¹ Fine (to appear a, b) gives distinct accounts of deontic modals of possibility and of necessity within truthmaker semantics. This will raise the very same problem for compositionality if clauses are treated as semantic predicates.

¹² The truthmaking condition for sentences with universal quantification and conditionals are less obvious and would require a lot more discussion.

- (20) a. $s \Vdash S \text{ and } S'$ iff for some s' and s'' , $s = \text{sum}(s', s'')$ and $s' \Vdash S$ and $s'' \Vdash S'$.
 b. $s \Vdash S \text{ or } S'$ iff $s \Vdash S$ or $s \Vdash S'$.
 c. For a one-place property P , $s \Vdash \exists x S$ iff $s \Vdash S[x/d]$ for some individual d

Truthmaker semantics assigns sentences not only truthmakers or verifiers, but also falsifiers, situations or actions that are falsemakers of a sentence and wholly relevant for the sentence being false. This allows a straightforward formulation of the truthmaking conditions of negated sentences: a truthmaker for $\neg S$ is a falsifier for S . With $\dashv\vdash$ as the relation of (exact) falsification (or contravention), the condition on the truthmaking of a negated sentence is given below:

- (21) $s \dashv\vdash \text{not } S$ iff $s \dashv\vdash S$

Also complex sentences are assigned both truthmaking and falsemaking conditions. For conjunctions and disjunctions the false-making conditions are those below:

- (22) a. $s \dashv\vdash S \text{ and } S'$ iff $s \dashv\vdash S$ or $s \dashv\vdash S'$
 b. $s \dashv\vdash S \text{ or } S'$ iff for some s' and s'' , $s = \text{sum}(s', s'')$ and $s' \dashv\vdash S$ and $s'' \dashv\vdash S'$

A sentence S has as its meaning a pair $\langle \text{pos}(s), \text{neg}(S) \rangle$ consisting of a *positive denotation*, the set $\text{pos}(S)$ of verifiers of S , and a *negative denotation*, the set $\text{neg}(S)$ of falsifiers of S . In what follows, I will not make use of the positive and negative denotation of a sentence, but just of the meaning of a sentence S as a property of content-bearing objects, namely $[S]$.

We can now turn to formulating the meaning of a sentence as a property of content-bearing objects. First of all, let us note that sentences may underspecify the truth conditions of a modal or attitudinal object. Complement clauses may underspecify an attitudinal or modal object with respect to its satisfaction conditions (as well as, of course, in other respects). One case of such underspecification has recently been discussed by Graff Fara (2013), namely desire reports in which the clausal complement underspecifies the satisfaction conditions of the reported desire, as in Graff Fara's example below:

- (23) Fiona wants to PRO catch a fish.

The desire described by (23) is not simply satisfied in case Fiona catches some fish or other. It is satisfied only when she catches a fish suitable for eating, for example. In a desire report, the clausal complement of the desire verb may give only necessary, not sufficient conditions on the satisfaction of the reported desire.

This is captured by assigning to a sentence S as its meaning the property of modal or attitudinal objects in (24):

$$(24) [S] = \lambda d[\forall s(s \Vdash d \rightarrow \exists s'(s' \Vdash S \ \& \ s < s') \ \& \ \forall s'(s' \Vdash S \rightarrow \exists s(s \Vdash d \ \& \ s < s')))]$$

That is, a sentence S expresses the property that holds of a modal or attitudinal object d just in case every satisfier of d is part of a satisfiers of S and every satisfier of S contains a satisfier of d as part – or in other words, the content of S is a partial content of the content of d (Fine 2017). In (24), \Vdash is the relation of exact truthmaking or satisfaction now holding between situations or actions s and modal or attitudinal objects d as well as sentences.

The relation \Vdash as a relation between situations or actions and modal or attitudinal objects comprises different satisfaction relations reflected in the use of different satisfaction predicates in natural language applicable to modal and attitudinal objects. They include the truthmaking, satisfaction, fulfillment, acceptance, and compliance relation.

(24) cannot yet be adequate, though, since it would not allow distinguishing necessity and possibility semantically. Given (24), a permission (for Mary to enter the house) could be a modal object with the very same satisfaction conditions as an obligation (for Mary to enter the house). But the permission for Mary to enter the house is not an obligation for Mary to enter the house.

What distinguishes a permission from an obligation? Permissions allow for certain actions, those they permit. Obligations allow for certain actions, those that comply with them, but they also exclude certain actions, those that violate them. The permission for Mary to enter the house allows for actions of Mary entering the house, but does not exclude any other actions. By contrast, the obligation for Mary to enter the house allows for actions of Mary entering the house and excludes actions of Mary's not doing so. This means that permissions have only satisfiers, whereas obligations have both satisfiers and violators. Also illocutionary products can be distinguished in terms of having violators or not. An offer or an invitation has only satisfiers, but no violators. By contrast, a request or an order has both satisfiers and violators.

To account for that difference requires modifying (24) by adding a condition on the falsification or violation or the modal or attitudinal object, namely that every falsifier of the sentence also be a falsifier or violator of the modal or attitudinal object (Moltmann 2018). The notion of violation or falsemaking \dashVdash will now be a relation between actions or situations and modal or attitudinal objects or else sentences. The modified meaning of a sentence S then is as follows:

- (25) $[S] = \lambda d[\forall s(s \Vdash d \rightarrow \exists s'(s' \Vdash S \ \& \ s < s') \ \& \ \forall s'(s' \Vdash S \rightarrow \exists s(s \Vdash d \ \& \ s < s')) \ \& \ \forall s(s \Vdash S \rightarrow s \Vdash d, \text{ in case } \text{neg}(d) \neq \emptyset]$

That is, a sentence S expresses the property that holds of a modal or attitudinal object d just in case the content of S is a partial content of d and if every exact falsifier of S is exact falsifier of d , should there be falsifier or violator of d .

On this account, modals of necessity and modals of possibility lead to exactly the same logical form; but they involve different sorts of modal objects with different satisfaction and violation conditions. Thus, (26a) and (26b) will have the logical forms in (27a) and (27b) respectively, involving the very same meaning of the complement clause in (28):

- (26) a. John asked Mary to come to his house.
 b. John allowed Mary to come to his house.
- (27) a. $\exists e(\text{ask}(e, j, m) \ \& \ [\text{Mary come to his house}](\text{product}(e)))$
 b. $\exists e(\text{allow}(e, j, m) \ \& \ [\text{Mary come to his house}](\text{product}(e)))$
- (28) $[\text{Mary to come to his house}] = \lambda d[\forall s(s \Vdash d \rightarrow \exists s'(s' \Vdash \text{Mary to come to his house} \ \& \ s < s') \ \& \ \forall s'(s' \Vdash \text{Mary to come to his house} \rightarrow \exists s(s \Vdash d \ \& \ s < s')) \ \& \ \forall s(s \Vdash \text{Mary to come to his house} \rightarrow s \Vdash d, \text{ in case } \text{neg}(d) \neq \emptyset]$

Unlike the possible-worlds-based account of attitude verbs and modals, this account applies to explicit permissions and obligations. If the object d to which a clause S applies is a permission, then S will specify which sorts of actions will be exact satisfiers of d ; S will not just say what is true in some world in which d is satisfied. If d is an obligation, then a clause S applying to it will specify what sorts of actions fulfill d and what sorts of actions violate it; S will not just say what is true in all worlds in which d is fulfilled (which may not content-wise relate to the fulfillment of d).

The account is thus tailored to explicit (strong or heavy) permissions and obligations. Would it also account for implicit (weak or light) permissions and obligations? The answer is yes, since these would simply be different modal objects, modal objects that are not products of illocutionary acts, but states (however they may have been set up) that come with a greater range of satisfiers and violators.

4 Another application: harmonic modals

Kratzer (2016) proposes an account of harmonic modals based on a possible-worlds-based property meaning of clauses. She focuses on modals of necessity as in (29a) and proposes that the harmonic modal in the embedded clause spells out

universal quantification over possible worlds that make up the content $f(d)$ of the content-bearing object d , as in (29b):

- (29) a. John requested that Mary should leave.
b. $\lambda d[\forall w(w \in f(d) \rightarrow [Mary\ leave]^w = true)]$

One major problem for this account is that it is inapplicable to modals of possibility, as in (6a-c), repeated below:

- (30) a. John made Mary the offer that she *could* use the house.
b. The document indicates that Bill *might* be guilty.
c. John suggested that Bill *might* be at home.

(31) does not make sense as the meaning of the clauses in (30a-c), with the existential quantifier spelling out the contribution of *could* or *might*:

- (31) $\lambda d[\exists w(w \in f(d) \ \& \ [S]^w = true)]$

In (30a), the *that*-clause does not just specify what is the case in some world compatible with the content of the offer, that is, in which John's offer is taken up. Rather it states (at least) what is the case in all the worlds in which the offer is taken up. Similarly in (30b), the *that*-clause does not just say what is the case in some world compatible with what the document indicates, but what is the case in all such worlds, and so for (30c).

In fact, the content of the offer, indication, or suggestion in (30a-c) should not be considered the modal base determining the possible worlds in which the complement clause is to be evaluated. In the case of a light permission the modal base consists in the agent's obligations and not in what he or she is permitted to do. There is no correlate of that, however, for offers, indications, or suggestions. This, again, means that the possible-worlds-based analysis of modals of possibility is just unsuited for 'heavy' content-bearing objects. These include not just explicit permissions, but also offers, suggestions, and indications.

The truthmaker-based semantics of clauses as semantic predicates allows for a straightforward account of harmonic modals, by considering harmonic modals as performative uses of modals in embedded contexts.¹³

The semantics of performative modals will be parallel to that of sentences with a performative use of an illocutionary verb. Sentences with a performative use of an illocutionary verb such as (32a) and (32a) can be assigned as their

¹³ With the performative use of a modal a speaker puts forward a modal state of a affairs described by the sentence. For the notion of a performative use of a modal see Portner (2007).

meaning the properties of illocutionary products in (33a) and (33b), where *s* is the speaker of the utterance:

- (32) a. I ask you to leave.
b. I allow you to leave.

- (33) a. $\lambda d[\exists e(\text{ask}(e, s) \ \& \ d = \text{product}(e) \ \& \ [(\text{addressee}) \textit{leave}](d))]$
b. $\lambda d[\exists e(\text{allow}(e, s) \ \& \ d = \text{product}(e) \ \& \ [(\text{addressee}) \textit{leave}](d))]$

That is, a performative use of an illocutionary verb leads to the sentence expressing a property meant to hold of the illocutionary product produced by uttering the sentence. Similarly, sentences with a performative use of a modal such as (34b) and (34b) will express properties of modal products meant to be produced by uttering the sentence, as in (35a) and (35b):

- (34) a. You must leave!
b. You may leave!

- (35) a. $\lambda d[\text{must}(d) \ \& \ [(\text{addressee}) \textit{leave}](d)]$
b. $\lambda d[\text{may}(d) \ \& \ [(\text{addressee}) \textit{leave}](d)]$

A modal product can be produced by the very same illocutionary act as an illocutionary product, and it will have the very same satisfaction conditions as the illocutionary product (Moltmann 2017a). Thus, an act of demanding produces a demand as well as possibly an obligation, and an act of permitting produces both a permission in the sense of an illocutionary product and a permission in the sense of a modal product.

With a harmonic modal having the status of a performative use of a modal in an embedded context, (36a) will simply have the logical form in (36c) based on the meaning of the embedded clause in (36b):

- (36) a. John requested that Mary should leave.
b. $[\textit{that Mary should leave}] = \lambda d[\text{should}(d) \ \& \ [\textit{Mary leave}](d)]$
c. $\exists e(\text{request}(e, \text{John}) \ \& \ [\textit{that Mary should leave}](\text{modal-product}(e)))$

Similarly (37a) will have the logical form in (37c), based on (37b):

- (37) a. The document indicates that Bill might be guilty.
b. $[\textit{that Bill might be guilty}] = \lambda d[\text{might}(d) \ \& \ [\textit{Bill be guilty}](d)]$
c. $\exists e(\text{indicate}(e, [\textit{the document}]) \ \& \ [\textit{that Bill might be guilty}](\text{modal-product}(e)))$

Thus, truthmaker semantics combined with an ontology of modal objects permits an account of harmonic modals based on a single truthmaker-based meaning of embedded (and independent) sentences.

5 Summary

There are a range of semantic and syntactic reasons to consider clauses semantic predicates of content-bearing objects. However, possible-worlds semantics turns out to be unsuited for developing that view. In this paper, I have outlined a particular version of truthmaker semantics which allows assigning sentences a single meaning as a property of content-bearing objects of different sorts, including implicit (light) and explicit (heavy) permissions. In addition, this account provides a straightforward analysis of harmonic modals.

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Silent anchors: the case for unpronounced indexicality*

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Abstract Diagnostics for indexicality reveal that some constituents exhibit an indexical behavior that goes beyond that of any inherently indexical words they contain. I suggest that this is because unpronounced indexicals can occupy world argument positions associated with predicates.

1 A familiar picture ...

In this paper, I will be looking at the consequences of a familiar picture of sentence interpretation issuing from Kaplan 1977. The picture is designed to account for a phenomenon that we find in sentences like those in (1). When these sentences are used to make a claim, the truth of that claim depends on very specific details of the situation in which the sentence is uttered: on who uttered it, to whom, when. And this obviously has to do with the existence of particular words in the sentence: *I, you, today*.

- (1) a. I am Danish.
b. You are Belgian.
c. Today is Wednesday.

The familiar picture I will be exploring starts from the view that, in the case of sentences like these, *what claim is made* by an utterance of the sentence depends on details of the situation in which the sentence is uttered. That is, *I* utter (1a) to

* For many of my own silent anchors I have Angelika to thank. Her path-breaking remarks, her support at crucial moments, her friendship have all been hugely consequential for me. Following my year at UMass, I think that in one way or another I got to see Angelika every year or so – including at the Gare de l’Est – until 2014 when I presented this material in Tübingen. After that, there was a discontinuity. A number of things got put on hold. Now that I have finally written up the talk (much as I gave it, without any significant changes), I hope that the rest of the pattern will fall back into place too.

So this paper is an attempt to catch up. (I fear some will say on reading it: a few decades late.) I am grateful to have had the opportunity to present this work to audiences at NYU and in Kyoto, Tokyo and Tübingen back in 2014. I remember thought-provoking observations from Dylan Bumford, Stefan Kaufmann, Makoto Kanazawa, Maribel Romero and Philippe Schlenker. The material elaborates on a piece of my ESSLLI 2011 class notes (Percus 2011).

make the claim that Orin is Danish, my neighbor utters (1a) to make the claim that he is Danish, and so on. And it takes the semantic values of the sentences – the objects we compositionally derive on the basis of their syntactic structures – to reflect that. According to the picture, the semantic value that we derive from a sentence’s structure is a function that gives us a proposition when we supply information about the utterance situation – more technically, when we supply an object called a “context” whose features are determined by the utterance situation. The idea is that, when a speaker utters a sentence like *I am Danish*, he is saying that the sentence’s semantic value, applied to the context that corresponds to the utterance situation, gives a true proposition. In the case of *I am Danish*, for example, the semantic value would be a function that accepts a context c and yields the proposition that a certain feature of the context c^I that corresponds to the utterer is Danish. These aspects of the picture are summarized below in (2).

(2) An idea about semantic values

- a. The semantic value of a sentence is a function that accepts “contexts” (objects of the kind that make up the relevant features of an utterance situation) and that returns propositions.
- b. A speaker may use the semantic value of a sentence to claim that the proposition that results from applying the “context of utterance” is a true one.

(2’) Example¹

[[$\Sigma_{I \text{ am Danish}}$]], given context 1, yields the proposition that Orin is Danish

[[$\Sigma_{I \text{ am Danish}}$]], given context 2, yields the proposition that Ilea is Danish

...

[[$\Sigma_{I \text{ am Danish}}$]], given context c , yields the proposition that c^I (the utterer) is Danish

The picture also says something about how these semantic values are built up compositionally – and thus about how *I*, for example, comes to be responsible for the fact that the proposition we derive from *I am Danish* depends specifically on the c^I feature of the input context. The main idea here is that *every* constituent has a semantic value that is a function from contexts, from the words up. Some words are just constant functions, but words like *I* are not: the semantic value of *I* takes a context and yields the feature corresponding to the utterer. Then semantic composition generally works in such a way that, if you are a constituent and contain something whose semantic value is a non-constant function from contexts, then your semantic value will encode the same kind of dependency on

¹ I use “ Σ_X ” for “the syntactic structure of X.” I use “[[Y]]” for “the semantic value of Y.” Sometimes to talk about semantic values I will write “[[A]]” but mean [[Σ_A]].

context. So, for example, given that the semantic value of *me* encodes a dependency on the “I” feature of the context, the semantic value of *related to me* and of *Somebody is related to me* will too:

- (3) An idea about composition
 - a. The semantic value of any constituent is a function from contexts.
 - b. The rules of semantic composition guarantee that, if the value of one constituent given a context depends on a particular feature of the context, then the value of constituents containing it will behave that way too.
 - c. Generally speaking, when a complex constituent has a semantic value that encodes a dependency on context, this will have been inherited from its pieces via the rules of semantic composition.

(3') Examples

[[*me*]], given *c*, yields \underline{c}^I

[[*related to me*]], given *c*, yields the property of being related to \underline{c}^I

I am not going to question this picture. On the contrary: various arguments from language can be given in support of it, and I will review them (in section 3). These arguments specifically have to do with the usefulness of saying that constituents have semantic values that encode a dependency on particular features of the context. My main point will then be the following (in section 4): if we accept these arguments, then we are *also* led to the position that there are constituents that encode a dependency on particular features of the context even though these constituents don't contain a pronounced item like *I* to which we could attribute this dependency. What does this mean? The picture as I presented it suggests that, when a constituent behaves like that, this behavior is nonetheless inherited from its pieces in some way. One might conclude, then, that there is an unpronounced piece somewhere that is creating the dependency. This will in fact be my conclusion, and (in section 5) I will speculate about what the unpronounced pieces are and where we find them. (Throughout, I will speak of “unpronounced indexicality” because I have in mind a technical definition of “indexical” on which it means “have a semantic value that is a non-constant function from contexts.”)

It is proper to mention that a lot of what I will be doing has already been brought up in another setting – in connection with the old debate about the so-called “referential” uses of descriptions. I won't get to that until the final page, I'm afraid.

2 ... fleshed out a bit

In telling the story I just promised to tell, I will be assuming some details that will significantly influence the discussion. Here they are, quickly.

Very importantly for the way I will frame the discussion, I will be assuming an ontology involving possible worlds. I will also be assuming that the same individual – like me or my neighbor – may inhabit different worlds, and I will be assuming that there is a single time line along which events that take place in the various worlds are ordered. These assumptions allow me to articulate a bit further the familiar picture that I just presented – as follows.

To begin with, as far as the semantic values of sentences are concerned, I said “proposition” but will more precisely take this to mean “function from possible worlds to truth values.”² And I said “context,” but more specifically what I will take a context to be is a triple of an individual, a moment on the time line, and a possible world.³ So I can rephrase. I said: a speaker who utters a sentence claims that the sentence’s semantic value, applied to the context that corresponds to the utterance situation, yields a true proposition. I now say⁴: he claims that the sentence’s semantic value, applied to the triple made up of *him*, the moment of utterance and the actual world, yields a function that returns 1 for the actual world. (Accordingly, in talking about a speaker X who utters a sentence at time T in world W, I will use the term “context of utterance” for the triple $\langle X, T, W \rangle$.) To put it another way, a speaker may utter a sentence to claim that in doing so he is saying something true, and on this approach “say something true” is to be explicated as in (4c) below.

² There are some salient alternatives to consider. The objects that we obtain from sentences once we supply a context might need more than just a possible world to make a truth value. They might instead be properties of times – needing a moment on the time line as well – or “centered propositions” – needing an individual too (and thus, overall, all the elements of a context as construed just below). I think it could be useful to review the arguments in section 3 bearing these alternatives in mind.

³ Cf. Haas-Spohn 1995.

⁴ For the record, I don’t mean to dismiss altogether the possibility of a speaker using a sentence to claim that its semantic value yields a true proposition when applied to some other context. But, when it comes to the examples I consider in this paper, I will take the position that the claims made concern the utterance context (in the sense here). I think it reasonable to regard this as the typical case.

(4) Semantic values

- a. The semantic value of a sentence, given a context, yields a function from worlds to truth values. (Ex. $[[\Sigma_{I \text{ am Danish }}]] = \lambda c_k. \lambda w_s. c^I \text{ is Danish in } w.$)
- b. Contexts are individual-time-world triples. (Notation: c has members c^I , c^T and c^W .)
- c. A speaker X who uses a declarative sentence S at time T in world W says something true (... false) when $[[\Sigma_S]](<X,T,W>)(W) = 1$ (...0).

Then to fill out the picture, as far as semantic composition is concerned, I will assume standardly that the composition rules generally pass up the context argument. (5) shows what I mean. The standard notation for this (in the box) uses a superscript to talk about application of a semantic value to a context, and it is customary in this case to talk about “evaluation at a context.” I will sometimes use that notation (for readability’s sake), but not always.

(5) Composition

$$\begin{aligned}
 [[I]] &= \lambda c_k. c^I \\
 [[\text{you}]] &= \lambda c_k: c^I \text{ is addressing someone at } c^T \\
 &\quad \text{in } c^W. c^I \text{'s addressee at } c^T \text{ in } c^W \\
 [[\text{Danish}]] &= \lambda c_k. \lambda x_e. \lambda w_s. x \text{ is Danish in } w. \\
 \\
 [[I \text{ Danish}]] &= \lambda c_k. [[\text{Danish}]](c) ([[I]](c)) \\
 &= \lambda c_k. \lambda w_s. c^I \text{ is Danish in } w. \\
 [[\text{you Danish}]] &= \lambda c_k. [[\text{Danish}]](c) ([[you]](c)) \\
 &= \dots
 \end{aligned}$$

Usual notation

$$\begin{aligned}
 [[I]]^c &= c^I \\
 [[\text{you}]]^c &= c^I \text{'s addressee at } c^T \text{ in } c^W \\
 &\quad \text{(defined only if there is one)} \\
 [[\text{Danish}]]^c &= \lambda x_e. \lambda w_s. x \text{ is Danish in } w. \\
 \\
 [[I \text{ Danish}]]^c &= [[\text{Danish}]]^c ([[I]]^c) \\
 &= \lambda w_s. c^I \text{ is Danish in } w. \\
 [[\text{you Danish}]]^c &= [[\text{Danish}]]^c ([[you]]^c) \\
 &= \dots
 \end{aligned}$$

(In these cases, composition is via functional application “passing up the context argument.”)

I can now be a little more precise about the plot as well. I said that the discussion would take me to the position that there are constituents that encode a dependency on particular features of the context even though they don’t contain familiar items like *I* or *you* or *now*. Specifically, we will see that the constituents encode a dependency on the *world* feature of the context. You can see looking at (5) that the way in which we arrive at functions from worlds to truth values has to do with the fact that predicates select for a world argument.⁵ What I will suggest

⁵ Although I didn’t include this for *Danish* in (5), I assume that predicates can take time arguments too. In accordance with my assumption that the semantic values of sentences take us from contexts to functions characterizing sets of possible worlds (rather than, say, to properties of times as alluded to in fn. 2), I will imagine that matrix present tense generally indicates the presence of an indexical time argument. I won’t be very careful with temporal aspects of interpretation in this paper – maybe a more careful consideration would lead to a slightly different view about the

is that the special indexicality of our constituents arises from a silent indexical filling the world argument slot of a predicate.

3 Arguments for a picture of this kind

In this section I will review arguments for the picture I just described – a picture on which sentences have semantic values that are functions from contexts to propositions, and on which they are built out of ingredients whose semantic values are also functions from contexts, in the way I indicated. (My discussion here owes a lot to Heim 2004.⁶)

In light of the details I provided in section 2, you can see that there is in fact a clear alternative. Look again at (4c) and you will see that, at least when it comes to explicating what it means for an uttered sentence to be true, we are not making use of *all* aspects of a sentence’s semantic value. We could have said just the same thing by writing the condition as in (4c’) below, so really we are only making use of the piece of the semantic value that I underlined there (Stalnaker’s “diagonal,” essentially). In the case of *I am Danish*, this piece comes out to the function $\lambda c_k. c^I$ is Danish in c^W , a function that characterizes contexts whose individual coordinate is Danish in their world coordinate. This makes one wonder if we could instead adopt a picture on which the semantic value of a sentence is this simpler function.

(4) c' . Equivalent to (4c):

A speaker X who uses a declarative sentence S at time T in world W says something true when $\lambda c. [\underline{[\Sigma_S]}](c)(c^W)(\langle X, T, W \rangle) = 1$.

The arguments, then, are arguments that we need the additional structure for something. In particular, their point will be that there is a notion that our more complicated picture makes available that is relevant for natural language. Specifically, our picture allows us to talk about *the semantic value of an expression evaluated in its utterance context*, and this is the notion that turns out to be useful. Kaplan calls this an expression’s “content” given its utterance context. I will call it the expression’s “utterance value”:

semantic values of sentences. I will continue to approximate (probably) and to imagine that *Danish* doesn’t take a time argument.

⁶ These lecture notes on indexicality by Irene Heim contain an exceptionally comprehensive and rigorous discussion of arguments for the position I am defending here. Heim specifically brings up the argument from propositional anaphora in subsection 3.2 (only to return to it more skeptically in Heim 2011), and the other arguments I present are largely inspired by her discussion. The arguments discussed by Heim build to some degree on remarks in Stalnaker 1970.

- (6) When a sentence with constituent A is uttered by X at T in W, the utterance value of A is [[A]]($\langle X, T, W \rangle$).

For example, the utterance value of *I* when uttered by me is me, Orin. Similarly, the utterance value of *I am Danish* when uttered by Barack Obama is the proposition that Barack Obama is Danish, that is, λw_s . Obama is Danish in *w*.

Here are some phenomena that the notion of utterance value makes it possible, or natural, to describe.

3.1 Ellipsis

One phenomenon that utterance values seem necessary to describe is ellipsis. My examples here will involve VP ellipsis, and I will take the position that they literally contain unpronounced VPs (marked “ \emptyset ”). To indicate possible interpretations for the unpronounced VP, I will write in brackets expressions that have those interpretations – and that thus constitute candidates for the VP that goes unpronounced:

- (7) A: John thinks that Mary hates Fred.
B: Does he really? I know he thinks that Jane does \emptyset [hate Fred].

The kind of example that is of interest to us here is (8). In the context of A’s utterance in (8), B’s response can be interpreted in the way the potential response in (9a) with *hates you* would be. It *cannot* be interpreted in the way the potential response in (9b) with *hates me* would be. So to characterize the way in which we are allowed to interpret elided constituents, we need a notion that allows us to pinpoint what connection there is between A’s utterance and the potential response in (9a) that we do *not* find between A’s utterance and the potential response in (9b) (which nonetheless contains the same literal VP that A’s sentence does).

- (8) A: John thinks that Mary hates me.
B: Does he really? I know he thinks that Jane does \emptyset [\surd hate you, # hate me].
- (9) a. ... B: Does he really? I know he thinks that Jane hates you.
b. ... B: Does he really? I know he thinks that Jane hates me.

The notion of utterance value does this. As illustrated in (10), if B had uttered the response with *hates you*, the utterance value of B’s *hates you* would have been the same as the utterance value of A’s *hates me*, while, if B had uttered the response with *hates me*, the utterance value of B’s *hates me* would *not* have been the same as the utterance value of A’s *hates me*. (In (10), for ease of presentation,

I include some details that – unless I specify otherwise – I will generally assume in this paper when I consider utterances that take place in the same world: the utterances take place in a world I call Ω ; the utterances occur on November 8, 2014.)

- (10) a. $[[\text{hates me}]]^c = \lambda_{x_e}. \lambda_{t_i}. \lambda_{w_s}. \text{In } w, \text{ at } t, x \text{ hates } c^I.$
 b. $[[\text{hates you}]]^c = \lambda_{x_e}. \lambda_{t_i}. \lambda_{w_s}. \text{In } w, \text{ at } t, x \text{ hates } c^I\text{'s addressee at } c^T \text{ in } c^W.$
- (9a) : $[[\text{hates me}]]^{<A, 08.11.2014, \dots, \Omega>} = \lambda_{x_e}. \lambda_{t_i}. \lambda_{w_s}. \text{In } w, \text{ at } t, x \text{ hates } A.$
 $[[\text{hates you}]]^{<B, 08.11.2014, \dots, \Omega>} = \lambda_{x_e}. \lambda_{t_i}. \lambda_{w_s}. \text{In } w, \text{ at } t, x \text{ hates } A.$
- (9b) : $[[\text{hates me}]]^{<A, 08.11.2014, \dots, \Omega>} = \lambda_{x_e}. \lambda_{t_i}. \lambda_{w_s}. \text{In } w, \text{ at } t, x \text{ hates } A.$
 $[[\text{hates me}]]^{<B, 08.11.2014, \dots, \Omega>} = \lambda_{x_e}. \lambda_{t_i}. \lambda_{w_s}. \text{In } w, \text{ at } t, x \text{ hates } B.$

So the notion of utterance value is useful in describing how we interpret elided VPs (or, if you prefer, in describing what VPs can be elided). Apparently, we are forced to take the elided VP in (8) as having the same utterance value as a constituent of A's utterance. In (11) I wrote the generalization that comes to mind instantly given the kind of data we have just seen. According to this naïve generalization, a VP can only go unpronounced when it has the same utterance value as a constituent in its environment.

- (11) Generalization (naïve version): The utterance value of an elided VP must be the same as the utterance value of a constituent of a salient sentence.

I did say that the generalization in (11) is naïve. There is a lot of controversy about how to formulate the identity condition relevant for ellipsis, and nobody these days would think that this is all there is to say about the conditions under which constituents can be elided. But at the same time I think it is clear that, whatever the right condition is, it will have to make reference to utterance values. For example, take the view that much discussion in the past two decades has started from: a VP can be elided when you can find a constituent including it that contrasts with another syntactic constituent in the vicinity. On this view, what lies behind the successful interpretation of the ellipsis in (8) would be the fact that B's utterance contains a constituent like $[Jane_F \text{ hate } you]$ that contrasts with the constituent $[Mary \text{ hate } me]$ of A's utterance⁷. But, in what sense does the constituent $[Jane_F \text{ hate } you]$ of B's utterance contrast with the constituent $[Mary \text{ hate } me]$ of A's utterance? In the sense that, when we consider the alternatives evoked by $[Jane_F \text{ hate } you]$ and look at their values at B's context of utterance

⁷ For simplicity, I imagine here that the contrast is between untensed constituents – constituents that we have before the level at which the verb's time argument makes its appearance. My reason for writing *hate* rather than *hates* is just to make this salient. I don't wish to take a position on where the verbal inflection is (if anywhere) in the structure that is interpreted.

(that is, the utterance values they would have had if B had uttered them instead, so to speak), we find among them the value of [Mary hate me] at A's context of utterance. Specifically, among the alternatives evoked by [*Jane_F hate you*] is [*Mary hate you*], and [[Mary hate you]]^{<B, 08.11.2014..., Ω>} = [[Mary hate me]]^{<A, 08.11.2014..., Ω>}.

Given what I just said, you can probably see that one can give a similar argument on the basis of deaccenting phenomena, where parallel contrasts obtain:

(12) A: John hates Mary.

B: That's not surprising given that BILL has a poor opinion of Mary.

(13) A: John hates me.

B: That's not surprising given that BILL has a poor opinion of you / # me.

I won't go into this, but what matters for deaccenting seems to be precisely that, when we look at the focus alternatives and consider the utterance values they would have had, we find among them one that is entailed by the utterance value of the antecedent.

3.2 Anaphora

Our picture allowed us to describe the ellipsis cases we just saw by saying that the utterance value of the elided constituent was the same as the utterance value of a constituent in the environment. In fact, the utterance values of nearby constituents seem to be relevant to anaphora more generally – a point made explicitly by Heim 2004, who uses the term “content anaphora.”

In (14) I give an example along the lines of Heim's where *that* is used as a “propositional anaphor.” The contrasts in (14) are reminiscent of our ellipsis contrasts. We can describe what is happening there by saying that *that* can be resolved in such a way that its utterance value is identical to that of a suitably local clause – and that it is not sufficient merely for its *semantic value* to be the same. So there is a second argument for the utility of the notion of utterance value.⁸

⁸ Very possibly, the same kinds of considerations that motivate a more sophisticated view of ellipsis interpretation can be used to motivate an analogously more sophisticated view of *that*-interpretation. But, as was the case with ellipsis, utterance values would remain important.

- (14) A: John and I are cousins.
 B: That [# John and I are cousins, $\sqrt{\text{John and you are cousins}}$] is unlikely.
 B': That [# John and I are cousins, $\sqrt{\text{John and you are cousins}}$]'s not true.
 B'': I learned that [# John and I are cousins, $\sqrt{\text{John and you are cousins}}$]
 yesterday.
- (15) *That* can be resolved in such a way that its utterance value is identical to that of a clause in the environment (and merely having the same semantic value is not sufficient).

3.3 “Saying the same thing”

Perhaps relatedly, the notion of utterance value also seems to be useful when it comes to explicating what we mean when we say that people “are saying the same thing.”⁹ Consider (16). There is a sense in which A, B and C all “say the same thing” here. What is this sense? Arguably, it is that their sentences all have the same utterance value: as sketched in (17), each sentence evaluated at its own context of utterance yields the same proposition, namely the proposition that New York is A’s birthplace.

- (16) A (*in NY*): I was born here.
 B (*to A*): You were born in NY.
 C: A was born in NY.
- (17) a. [[I was born here]]
 $= \lambda c_k: \dots \lambda w_s. \text{In } w, c^I \text{ is born in the location of } c^I \text{ at } c^T \text{ in } c^W.$
- b. [[You were born in New York]]
 $= \lambda c_k: \dots \lambda w_s. \text{In } w, c^I \text{'s addressee at } c^T \text{ in } c^W \text{ is born in NY.}$
- c. [[A was born in New York]] = $\lambda c_k. \lambda w_s. \text{In } w, A \text{ is born in NY.}$
- [[I was born here]]^{<A, 08.11.2014, Ω>} = $\lambda w_s. \text{In } w, A \text{ is born in NY.}$
 [[You were born in New York]]^{<B, 08.11.2014..., Ω>}
 $= \lambda w_s. \text{In } w, A \text{ is born in NY.}$

⁹ This argument can be seen as reflecting Stalnaker’s (1970) view that utterance values serve as the “common content” associated with utterances of different linguistic expressions, together with Kaplan’s view that the utterance value of a sentence constitutes “what is said.” It exemplifies a form of argument discussed by Heim 2004, according to which utterance values are useful for explicating intuitively natural relations between utterances. Frege described the basic intuition here in a quote that Kaplan (1977/1989: 501) cites: “If someone wants to say the same today as he expressed yesterday using the word ‘today’, he must replace the word with ‘yesterday’. Although the thought is the same its verbal expression must be different”

[[A was born in New York]]^{<C, 08.11.2014..., Ω>} = λw_s. In w, A is born in NY.

- (18) One sense of “say the same thing” is “utter a sentence with the same utterance value.”

At this point, it is only fair to mention a skeptical response to this kind of argument for the utility of utterance values. As Lewis 1980 emphasizes, there are many different ways to understand “say the same thing” and sameness of utterance value would correspond to only one of them. To take a simple example, there is also a use of “say the same thing” which corresponds to “utter the same words”: it thus makes sense to say that, if B had said “I was born here,” then A and B would have said the same thing. But then how useful really *is* the notion of utterance value if it only serves to account for one use of many? Wouldn’t we prefer an explication of “say the same thing” that accounts for all its uses and that doesn’t need as background a picture that allows us to talk about utterance values? The same kind of objection can be levelled against the previous argument. Anaphora to utterance values would only correspond to one use of *that*. Reference to utterance values doesn’t seem to be relevant when it comes to the deictic use of *that*, for example (“*That* was certainly a surprise!”). Wouldn’t we prefer a theory of *that* that accounts for all of its uses and that doesn’t need as background a picture that allows us to talk about utterance values? It is possible (though perhaps not correct) to read Lewis, and also Heim 2011, as making objections of this kind.

Honestly, I don’t really know what to say against this objection. I do agree that it would be nice to have a comprehensive analysis of “say the same thing” and of *that*. But I also think that, if talking about utterance values allows us to describe what is happening in the kinds of examples that I just brought up, then it *is* useful to be able to talk about utterance values. Maybe this says something about my standards.

3.4 “A priori but contingent” truth

Finally, as many people have emphasized in one way or another – notably Kaplan – a position on which propositions are the utterance values of sentences gives us a natural way to describe the special character of sentences like (19a). (19a) is in a certain sense true *a priori* – when uttered, we know that it is true simply by virtue of knowing the language. But at the same time it is contingently true – that is, true by virtue of the way the world is. This contingent aspect is revealed by the coherence of the continuation in (19b).

- (19) a. I am uttering a sentence now.
b. But things could have been otherwise!

Our picture allows us a simple way to explicate this dual character. (19a) is true a priori in the sense that, on any occasion of utterance of (19a), its utterance value will always be true. But it is contingently true in the sense that the utterance value, even if it is true in the world of utterance, will be false in other worlds. For example, if I had uttered this sentence on November 8, 2014, the resulting proposition, the proposition that Orin is uttering a sentence at the time in question on November 8, 2014, would have been true, but this proposition would have characterized some worlds and not others:

(20) $[[\Sigma_{(19a)}]]^c = \lambda w_s. \text{ In } w, \text{ at } \mathbf{c}^T, \mathbf{c}^I \text{ is uttering a sentence.}$

For any event of (19a)'s utterance by X at T in W, $[[\Sigma_{(19a)}]]^{<X,T,W>} (W) = 1$.

But at the same time, for a given event of (19a)'s utterance, its utterance value $[[\Sigma_{(19a)}]]^{<X,T,W>}$ will be a function that yields different values for different worlds.

(Incidentally, when it comes to the continuation *But things could have been otherwise*, arguably we have another instance of the kind of anaphora we considered when we considered *that*: in this example, the expression *otherwise* behaves like *different from that*, where *that* is resolved to the utterance value of the first sentence.)

4 More indexicality than we might have expected

We have now seen some arguments for our overall picture. The claim at the heart of these arguments is that certain phenomena should be described by making reference to utterance values – ellipsis, certain kinds of anaphora resolution, and so on.

If we accept this claim, then that means that we can use those kinds of phenomena to diagnose utterance values – to draw conclusions about utterance values in particular cases. That will be my point of departure now. I will suggest that, when we proceed in this way, we discover that some constituents have an analysis beyond those we might have expected prior to this discussion, an analysis with some extra indexicality. Notably, the indexicality that these constituents exhibit implicates the world feature of the context.

(21) gives an example of what I mean. In (21) I wrote side by side the kind of semantic value that we would standardly expect for *My mother is Danish* ((21b)) and the kind of semantic value that I am claiming that the sentence has on a *second* analysis ((21c)). The kind of semantic value that we would standardly expect is the kind of value we would get, say, if we gave all predicates a variable

as their world argument and if we bound all those variables with a binder at the top. By contrast, in the second analysis, the world feature of the context plays a role. Looking at these two semantic values side by side, you can see that finding evidence for the second analysis isn't easy. Both semantic values are associated with the same truth conditions: both imply that, in uttering the sentence, X utters something true at T in W if, in W, the mother in W of X is Danish. Their *utterance values*, however, will *not* generally be the same. This is why our diagnostics for utterance values will be important.

(21) a. My mother is Danish.

b. $\lambda c_k. \lambda w_s: \dots$ In w, c^I 's mother in w is Danish.

c. $\lambda c_k: \dots \lambda w_s.$ In w, c^I 's mother **in c^W** is Danish.

In what follows, I will concentrate on sentences with definite descriptions. As I will make clear later, however, this choice is not crucial. It's just easier this way to construct the kinds of arguments I want to construct. By proceeding in this manner, I am staying close to the literature where these issues have come up. Others too have taken the position that sentences with definite descriptions may be analysed in a way that involves some extra indexicality. I will signal below some of the precedents for the arguments I invoke.

4.1 Ellipsis

We have seen that we can use ellipsis as a diagnostic for utterance values. I will start with that. In this discussion I will be focusing my attention on the sentence *I saw the woman on my right* – or, to be honest, the fragment “the woman on my right” in a context where it very plausibly realizes the sentence *I saw the woman on my right*. The context is this one:

(22) A (*at time T, whispering to B and nodding in Mary's direction*): ... And you know who I saw at that party twenty years ago? The woman on my right!

...

If we just think about the truth conditions here, there seems to be a kind of temporal indexicality that is relevant to the description. After all, A is saying, in effect, “I saw the individual who is a woman *now* [let's say she was a girl then] and who is on my right *now*.” What he is saying is true iff, in his world Ω , at a certain party twenty years prior to T, A saw the individual who is a woman at T in Ω and who is on the right of A at T in Ω . But it seems to me that with ellipsis we can construct an argument that the sentence has an analysis with even more

indexicality than that. We need some elaborate stage directions for this, though, so here is the full scene:

(22') A (*at time T, whispering to B and nodding in Mary's direction*): ... And you know who I saw at that party twenty years ago? [I saw] The woman on my right!

(*Mary gets up and starts walking toward the dance floor. Sally approaches and B exchanges a few words with her – she knows that Sally was at that long-ago party and wants to verify A's claim. Sally shakes her head.*)

B (*at time T + 15 seconds, to A*): Sally thinks you didn't.

Intuitively, what B expresses here is that Sally thinks that A *didn't see Mary*. And this is the result we would get if the VP *see the woman on my right* had a semantic value as in (23a), one that encodes a dependency not only on the individual and time coordinates of the context but also on the world coordinate. If *see the woman on my right* has the semantic value in (23a), then the corresponding utterance value of *see the woman on my right* when A utters his sentence is the property of seeing Mary ((23b)), and the constraints on ellipsis will insure that this is also the utterance value of the elided VP:

(23) Right for this case:

- a. [[see the woman on my right]]^c
 = $\lambda x_e. \lambda t_i. \lambda w_s. \text{In } w, \text{ at } t, x \text{ sees the individual who is a woman at } c^T \text{ in } c^W \text{ and who is on the right of } c^I \text{ at } c^T \text{ in } c^W.$
- b. [[see the woman on my right]]^{<A,T,Ω>}
 = $\lambda x_e. \lambda t_i. \lambda w_s. \text{In } w, \text{ at } t, x \text{ sees } \mathbf{Mary}.$

Given that the elided VP has the same utterance value, this correctly predicts that B's sentence attributes to Sally the belief that A didn't see Mary.

By contrast, we would *not* get the right result from a semantic value for the VP as in (24a), where the world argument of the context does not play a role. In that case, the corresponding utterance value would be different ((24b)), and the use of an elided VP with the same utterance value would wind up expressing a different claim. The details are complicated, but B's sentence would then express a proposition whose truth depends on Sally situating herself in a world where there

is an individual to the right of A.¹⁰ This is not the right result: in our scenario, B clearly does not mean to imply that Sally has an opinion about anyone being on the right of A at any point.

(24) Not right for this case:

- a. [[see the woman on my right]]^c
= $\lambda x_e. \lambda t_i. \lambda w_s$: There is a unique individual who is a woman at c^T in w and who is on the right of c^I at c^T in w . In w , at t , x sees the individual who is a woman at c^T in w and who is on the right of c^I at c^T in w .
- b. [[see the woman on my right]]^{<A,T, Ω >}
= $\lambda x_e. \lambda t_i. \lambda w_s$: There is a unique individual who is a woman at T in w and who is on the right of A at T in w . In w , at t , x sees **the individual who is a woman at T in w and who is on the right of A at T in w .**

Given that the elided VP would have the same utterance value, B's sentence would end up attributing to Sally a belief according to which there is a woman to the right of A.

So the conclusion from the ellipsis example seems to be that the VP *see the woman on my right* can have the semantic value in (23a). That will give us the utterance value that the elided VP seems to have accessed. This is not necessarily to deny that the VP admits an analysis on which it has the semantic value in (24a). It is rather to *add* that it admits an analysis on which it has this other semantic value with some extra indexicality.¹¹ One might reasonably speculate that the indexicality is present at the level of the definite description:

¹⁰ In a nutshell, this is because the compositional semantics works in such a way that the utterance value of the whole complement of *think* “inherits” the partiality in the utterance value of the elided VP. The utterance value of the complement of *think* thus comes out to be a function whose domain is limited to worlds in which there is a single woman at T who is on the right of A at T .

¹¹ This suggests a possible conjecture: in cases where a sentence admits two different analyses that give rise to the same truth conditions, both analyses may be used to provide antecedents for ellipsis. The traditional explanations of strict-sloppy ambiguities in ellipsis assumed something like this. (And by the way, now that we have found cases of ellipsis whose antecedents seem to contain indexical descriptions, I think it worth noting that studies of strict-sloppy identity in ellipsis have not taken this into account. It might be useful to revisit them with this in mind.)

(25) A possible speculation

[[the woman on my right]]^c
 = the individual who is a woman at c^T in c^W and who is on the right of
 c^I at c^T in c^W

4.2 Propositional anaphora

The idea here will be similar: *that*-anaphora diagnoses an utterance value that could only have come from a constituent with some extra indexicality. The argument from anaphora is actually the main kind of linguistic argument that has appeared in the literature for the indexicality of descriptions – see Dahl 1973, and the discussion of Stalnaker in Heim 2011. Here is the example to consider¹², with stage directions again:

(26) (*B enters the office A shares with Mary.*)

A (*at time T, smiling*): My office mate got the University X job!

B: (*to Mary*) Congratulations, Mary! I actually learned that yesterday.

(*to A*) You know, I only realized now that you shared your office. You're lucky to have Mary as an office mate.

When you learn a proposition, you acquire the belief that the proposition is true ((27)). What is the proposition that B is saying that he learned? It is the proposition that Mary got the University X job. So we can explain what is happening here if *that* is resolved in the same way that we imagined earlier, as the utterance value of A's sentence, and if the utterance value of A's sentence is the proposition that Mary got the University X job. This is the result that we get if A's sentence has a semantic value as in (28a), one that gives a role to the world coordinate of the context argument:

(27) [[learn]]^c
 = $\lambda p_{\langle s, t \rangle}. \lambda x_e. \lambda t_i. \lambda w_s.$ As of t and not earlier, all of x 's candidates in
 w for the actual world are p -worlds (...and...)

¹² My use of the verb *learn* in this example echoes an argument from Heim 2004.

(28) Right for this case:

- a. $[[\text{My office mate got the University X job}]]$ ^c
 $= \lambda w_s. \text{In } w, \text{ prior to } c^T, c^I\text{'s office mate at } c^T \text{ in } c^W \text{ gets the}$
 University X job.
- b. $[[\text{My office mate got the University X job}]]$ ^{<A,T,Ω>}
 $= \lambda w_s. \text{In } w, \text{ prior to } T, \textbf{Mary} \text{ gets the University X job.}$

If *that* receives the same utterance value, this correctly predicts that B's sentence expresses that the proposition he learned the previous day is that Mary got the University X job.

Again, we would *not* get the right result from a semantic value as in (29a) without this little bit of extra indexicality. Using the utterance value that this generates would amount to B conveying that, as of the previous day, he situated himself in a world where A had, or was going to have, an office mate, and B specifically states that this is not the case.

(29) Not right for this case:

- a. $[[\text{My office mate got the University X job}]]$ ^c
 $= \lambda w_s: \dots \text{In } w, \text{ prior to } c^T, c^I\text{'s office mate at } c^T \text{ in } w \text{ gets the}$
 University X job.
- b. $[[\text{My office mate got the University X job}]]$ ^{<A,T,Ω>}
 $= \lambda w_s: \dots \text{In } w, \text{ prior to } T, \textbf{A's office mate at T in } w \text{ gets the}$
 University X job.

If *that* received the same utterance value, B's sentence would imply that he already situated himself the previous day in a world containing an office mate of A.

As before, it is natural to suppose that this little bit of extra indexicality is already present at the level of the description:

(30) A possible speculation

- $[[\text{my office mate}]]$
 $= \lambda c_k: c^I \text{ has a unique office mate at } c^T \text{ in } c^W. c^I\text{'s office mate at } c^T \text{ in } c^W$

4.3 “Saying the same thing”

I claim that the notion of “saying the same thing” that unites A, B and C’s utterances in our old example (16) also includes the case just below in (31). I think that this is really the intuition.

- (31) A’s husband: My wife was born in NY.
 (A, B, C and A’s husband all say the same thing.)

But then, maintaining the position that the relevant notion of “saying the same thing” is having the same utterance value, this suggests that *My wife was born in NY* can have the semantic value in (31’), with a dependency on the world feature of the context. This semantic value will give us the same utterance value that we had in the other cases – the proposition that New York is A’s birthplace.

- (31’) [[My wife was born in NY]]
 = $\lambda c_k: \dots \lambda w_s. \text{In } w, \text{ the wife at } c^T \text{ in } c^W \text{ of } c^I \text{ is born in NY.}$

4.4 Contingency

Finally, our discussion of sentences like *I am uttering a sentence now*, and specifically of the intuition that they are contingent, suggested that intuitions of contingency could also serve as a diagnostic of utterance value. I think that these kinds of intuitions too support the view that sentences can have some additional world-related indexicality. (See Zimmermann 2012 for a similar argument.¹³)

Look at the sentences in (32a) and (32b). Intuitively, these sentences have contingent readings. They have readings that make it quite sensible to say that things could have been otherwise. What would I be expressing in saying that things could have turned out otherwise? In the case of (32a), it seems to be that things could have turned out in such a way that I was not born in New York, the city where I was born in actual fact – things could have been such that I was born elsewhere. In the case of (32b), it seems to be that things could have turned out in such a way that Ora, the individual who happens in actual fact to my mother, did not give birth to me – things could have been such that she gave birth to someone else instead, for example.¹⁴ These intuitions about *what* I am saying might not have come to pass suggest that the utterance value of (32a) is the proposition that I – Orin – was born in New York and that the utterance value of (32b) is the proposition that Ora gave birth to me.

¹³ Zimmermann discusses the sentence *The German chancellor is a politician*.

¹⁴ Or, if you don’t think that my having Ora as a mother is an essential property of mine, things could have been such that someone else gave birth to me instead. I find this reading quite natural when *my mother* is accented.

- (32) a. I was born in my birthplace. (But things could have been otherwise.)
 b. My mother gave birth to me. (But things could have been otherwise.)

Again, this is the result that we would get from an analysis of these sentences with some world-related indexicality at the level of the description but not from an analysis without one. The analysis with the additional world-related indexicality is in (33). It is also informative to look at what I am supposing would be the result of an analysis without one; this is in (34). Basically, the utterance values of the sentences would come out to be “restricted tautologies,” true in every world of their domain. That is not the way these sentences sound, I believe.¹⁵

(33) Right:

- a. $[[\Sigma_{(32a)}]]^c = \lambda w_s. \text{ In } w, c^I \text{ is born in the birthplace of } c^I \text{ in } c^W.$
 a'. $[[\Sigma_{(32a)}]]^{<\text{Orin}, \dots, \text{the actual world}>} = \lambda w_s. \text{ In } w, \text{ Orin is born in NY.}$
 b. $[[\Sigma_{(32b)}]]^c = \lambda w_s. \text{ In } w, \text{ the mother of } c^I \text{ in } c^W \text{ gives birth to } c^I.$
 b'. $[[\Sigma_{(32b)}]]^{<\text{Orin}, \dots, \text{the actual world}>} = \lambda w_s. \text{ In } w, \text{ Ora gives birth to Orin.}$

(34) Not right:

- a. $[[\Sigma_{(32a)}]]^c = \lambda w: c^I \text{ has a birthplace in } w. \text{ In } w, c^I \text{ is born in the birthplace of } c^I \text{ in } w.$
 a'. $[[\Sigma_{(32a)}]]^{<\text{Orin}, \dots, \text{the actual world}>} = \lambda w_s: \text{ Orin has a birthplace in } w. \text{ In } w, \text{ Orin is born in the birthplace of Orin in } w.$
 b. $[[\Sigma_{(32b)}]]^c = \lambda w_s: c^I \text{ has a mother in } w. \text{ In } w, \text{ the mother of } c^I \text{ in } w \text{ gives birth to } c^I.$
 b'. $[[\Sigma_{(32b)}]]^{<\text{Orin}, \dots, \text{the actual world}>} = \lambda w_s: \text{ Orin has a mother in } w. \text{ In } w, \text{ the mother of Orin in } w \text{ gives birth to Orin.}$

¹⁵ Compare them for example to the “restricted tautologies” below:

- (i) ?? Either Mary has quit smoking or she still smokes. (But things could have been otherwise.)
 (ii) ?? Either Mary knew at the time that John was born in New York or she was unaware of that. (But things ...)

Now, the semantic values in (34) do abstract away from the contribution of tense. Maybe the real semantic values are not literally “restricted tautologies.” I acknowledge this, but I don’t think that this detail seriously affects the point.

5 Where does the indexicality come from?

As promised, by taking the arguments for our overall picture seriously, we found evidence that a variety of constituents have an analysis with more indexicality than we might otherwise have expected. Specifically, we found that they can have semantic values that encode dependencies on the world feature of the context.

But what does this mean? Those constituents must have a syntactic structure for which the rules of semantic composition yield a semantic value with this kind of dependency, but what structure? Given our overall picture, it is natural to think that, in our sentences with descriptions like *the woman on my right* or *my wife* or *my mother*, the dependency at the level of the sentence's semantic value is inherited from a dependency in the description's semantic value. In that case, the descriptions would have semantic values as in (35). But what ingredient of the description – if any – is responsible for the description's indexicality?

- (35) a. $[[\Sigma_{\text{my wife}}]]$
 = $\lambda c_k: c^I$ has a unique wife at c^T in c^W . the wife of c^I at c^T in c^W
 b. $[[\Sigma_{\text{my mother}}]]$ = $\lambda c_k: c^I$ has a mother in c^W . the mother of c^I in c^W
 c. $[[\Sigma_{\text{the woman on my right}}]]$
 = λc_k : Exactly one individual is a woman at c^T in c^W and on the right of c^I at c^T in c^W . the individual who is a woman at c^T in c^W and on the right of c^I at c^T in c^W

Here is one speculation. In the same way that we have an element whose semantics makes its utterance value the individual coordinate of the context of utterance – *I* – we also have, for example, an element whose semantics makes its utterance value the world coordinate of the context of utterance – call it W^* . The thing about W^* is that it's unpronounced. Those indexical descriptions get to be indexical because their structures include indexical elements like that.

The kind of picture that this proposal assumes as background is a picture on which predicates project (or at least may project) all their arguments, even their time and world arguments. That is, there are syntactic positions available for the time and world arguments of predicates. We might not pronounce the items that occupy these positions, but they are there. This idea itself is pretty familiar: it is a common view that silent variables can occupy positions like that. What I am suggesting now is that the elements occupying these positions need not be silent variables: they could instead be silent indexicals. If the variables that occupy those positions are unpronounced, then it is in a certain sense unsurprising that the indexicals are too. Maybe those positions are simply never phonetically realized.

This proposal comes naturally to mind if one starts from the view that the utterance values of sentences are propositions, i.e., functions from possible worlds

to truth values.¹⁶ In that case, it is natural to think that there is a silent time indexical – call it T^* – that can occupy a position reserved for time arguments.¹⁷ There is some evident indexicality involving the time feature of the context, and it can be accounted for in just this way. On the one hand, it is easy to find predicates that behave as though they are modified by a silent “now” – think of *On that day I met my wife* or my initial remarks about *I saw the woman on my right* – and that is essentially what T^* is, a silent “now.” On the other hand, we have to account for the connection between matrix present tense and reference to the time of utterance, and one way to do so is to say that present tense on a matrix predicate reflects the presence of T^* in the predicate’s time argument position. What comes out of these considerations is an analysis of simple present tense sentences of the kind I sketch in (36)-(37), where, in accordance with the view that silent variables may occupy the world argument position, you see silent world variables and binders for them.¹⁸ (In these examples, for ease of exposition, I assume that the interpreted structures involve reconstruction into VP.) In this picture, there is an obvious place for an analogous element W^* ((38)). W^* will allow us to generate structures for our definite descriptions ((39)) that have the kinds of semantic values we wanted.

¹⁶ But should we? I have done so here, but, as I mentioned in an earlier footnote, there are alternatives to consider. Also, even if we do imagine that the utterance values of sentences are propositions, it is not obvious that matrix present tense deserves exactly the analysis I sketch below. It is worth thinking about what treatment would allow us to maintain the generalizations I argued for in my discussion of utterance values – as noted earlier, in that discussion I abstracted away from the semantic contribution of tense, to a great extent.

¹⁷ See Kusumoto 2005 for an earlier, somewhat related use of T^* .

¹⁸ To say that there are variables and binders for them is to move to a picture slightly different from the one I started out with. It means adopting a view on which semantic values take an additional assignment argument. Following standard assumptions, just like the context argument, the assignment argument is generally passed up by the semantic composition rules (hence the additional g superscript in (36) and subsequent examples); there is however a special rule for calculating the semantic value of a constituent beginning with a binder. Adding this further assignment argument has consequences: everything I have said here from page 1 on has to be reformulated in order to take the assignment argument into account. However, it seems to me that the modifications to make are minor. As far as our basic assumptions about how semantic values are used, in what follows I will suppose that truth and falsity are now to be explained in terms of evaluation with respect to the null assignment. (4c) should thus be revised to: A speaker X who uses a declarative sentence S at time T in W says something true when $[[\Sigma_S]]^{<X,T,W>,\emptyset}(W) = 1$. This minimal modification implies that there are no free variables, and I think that this is a perfectly reasonable assumption (the remarks about pronouns in section 6 will indicate why). Below I will return briefly to the discussion of utterance values, bearing the assignment argument in mind.

Background picture.

<p>(36) a. I love you</p> <p>b. 1 [_{VP} w₁ [T* pres] I love you]]</p> <p>[[love]]^{c:g} = λ_{x_e}. λ_{y_e}. λ_{t_i}. λ_{w_s}. In w, at t, y loves x.</p> <p>[[I]]^{c:g} = c^I</p> <p>[[you]]^{c:g} = c^I's addressee at c^T in c^W (defined as long as c^I has one)</p> <p>[[T*]]^{c:g} = c^T</p> <p>[[pres]]^{c:g} = λ_{t_i}: t = c^T. t</p> <p>c. [[(36b)]]^{c:g} = λ_{w_s}. In w, at c^T, c^I loves c^I's addressee at c^T in c^W. (defined as long as c^I has one)</p>	<p>(37) a. My mother loves me</p> <p>b. 1 [_{VP} w₁ [T* pres] [the [2 w₁ x₂ my mother] loves me]]</p> <p>[[mother]]^{c:g} = λ_{x_e}. λ_{y_e}. λ_{w_s}. In w, y is mother to x.</p> <p>[[the]]^{c:g} = λ_{f<e,t>}: f = 1. the unique element of f</p> <p>c. [[(37b)]]^{c:g} = λ_{w_s}: c^I has a mother in w. In w, at c^T, the mother of c^I in w loves c^I.</p>
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(38) [[W*]]^{c:g} = **c^W** (just as [[T*]]^{c:g} = **c^T**)

- (39) a. [the [2 W* T* x₂ my wife]]
 b. [the [2 W* x₂ my mother]]
 c. [the [2 W* T* x₂ woman][2 W* T* x₂ on my right]]

A variant of this proposal would say that, rather than silent indexicals, we have silent indexicalizing operators like those in (40). The counterpart of T* ((40a)) would combine with a predicate at the point when it wants its time argument; the counterpart of W* ((40b)) would combine with a predicate at the point when it wants its world argument.

- (40) a. [[I_T]]^{c:g} = λ_{P<i,st>}: P(**c^T**) is defined. P(**c^T**)
 b. [[I_W]]^{c:g} = λ_{P<s,t>}: P(**c^W**) is defined. P(**c^W**)

This would break the parallel with *I*, but, at the moment at least, I don't see a real difference overall – after all, as I have presented these operators, they would combine at exactly the points where the silent indexicals combine. I mention this variant in part because it resembles an actual well-known proposal whose effect is *not* exactly the same. Kaplan famously formulated an indexicalizing operator *dthat* which he specifically imagined to apply to functions that yield individuals. An operator like Kaplan's would account for indexical individual-denoting definite descriptions, and indeed the cases of unpronounced indexicality that have been entertained in the literature generally involve expressions seen in that way. The picture that I have been suggesting here is different in that the indexicality does not start with the definite description: the predicate itself, the complement of

the, is indexical. I like my picture better because I think that predicates can behave as though they have indexical world arguments even in cases that do not involve descriptions of an individual. For instance, (41) and (42) contain examples involving quantifiers which seem to behave like the examples with definites that we have seen. In (41), B is expressing that Sally thinks that A didn't say hello to all (or any) *of those people*; in (42), B is expressing that he learned yesterday that *those people* got rejected from Conference X.¹⁹

(41) A: I think I have the right to go over to the bar now. I've been sociable. I said hello to everyone / someone on my right.

...

B: Sally thinks you didn't.

(42) A (*who just arrived at the hotel*): Everyone else on my floor got his paper rejected from Conference X.

B: I know. Actually, I learned that yesterday.

There are two further remarks that I would like to make here about the proposal I have just put on the table. They concern its relation to problems discussed in the recent literature.

One remark has to do with the skeptical voices that I alluded to earlier when I discussed the arguments for the relevance of utterance values. In Heim 2011, there is a comment that one can see as a challenge to those who wish to use *that*-anaphora to make the argument I made there. Though going into the fine details would be complicated, I think that the view that I put forward can potentially meet this challenge, so I would like to say a few words about this. Heim specifically reacts to the claim that the instance of *that* in the second sentence of (43) is anaphoric to the utterance value of the first sentence, and that the description in the first sentence should therefore be analyzed as in (44a). (She attributes this claim, or something like it, to Stalnaker.) The challenge is how we could account in the same way for the contribution of the apparently parallel use of *that* in (45).

¹⁹ I do feel that it is easier to come up with examples of indexical predicates when one looks at definite descriptions than it is when one looks at indefinites and examples with other determiners. I suspect that pragmatic factors are at work here. One factor, I conjecture, is that we refrain from using silent indexicals to create predicates whose utterance value might be empty. When we use an indexical predicate, we thus presuppose the existence of individuals satisfying it – and, plausibly, due to additional factors (see Section 6), we presuppose of a certain set of individuals that they are the ones satisfying it. The pattern then becomes understandable to the extent that, in cases where we presuppose this kind of thing in connection with a predicate, there is pressure to apply a definite determiner. But this is just a conjecture. It doesn't follow from anything I have said.

- (43) The man in the purple shirt won. I had expected that [i.e. that that person would win]. (Heim 2011: 1016, ex. 49)
- (44) a. [[the man in the purple shirt]]^c
 = the (...) man in c^W who wears a purple shirt at c^T in c^W
 b. [[The man in the purple shirt won]]^c
 = λw_s . In w , prior to c^T , the (...) man in c^W who wears a purple shirt at c^T in c^W wins.
- (45) Every time the most controversial candidate got hired, people later claimed that they had expected that all along [i.e. that the person in question would get hired]. (Heim 2011: 1017, ex. 50)

In order to address this comment, we need to think about constituents with bound variables. I entirely ignored the existence of variables in my initial discussion. Bringing them in means saying that constituents are evaluated not only “with respect to a context” but also “with respect to an assignment” – once we supply a context, we have a function from assignments.²⁰ Accordingly, sticking to the way I have used the term “utterance value” until now, utterance values would really be functions from assignments. With this in mind, look at the case of *that*-anaphora in (46) below, for example. We can potentially account for the anaphora there in exactly the way we accounted for other instances of *that*-anaphora. The idea would be²¹ that we analyze these sentences as having structures like those I sketched in (46’), involving the same binder, and *that* gets resolved in such a way that its utterance value comes out as the utterance value of *he hates me*. (I boldfaced in (46’) the constituents whose utterance values are identified.) Similar remarks apply to (47). In this case, the idea would be that the binder in the relative clause (where I take the relative pronoun itself to be uninterpreted) is the same as the binder at the top of the subject’s sister. Note that this treatment of (47) implies that the relative clause gives us a property, a function from individuals to propositions, once we supply the context and assignment arguments.

- (46) A: Everybody said that he hates me.
 B. Come on, nobody said that [he hates you].
- (46’) a. everybody 1 t_1 said that **he₁ hates me**
 b. nobody 1 t_1 said **that**

²⁰ See footnote 18 for details.

²¹ Permit me here some assumptions that are dated in the same way that my ellipsis assumptions were.

(47) Every person who knows you regrets that [he knows you].

(47') [every person [(who) 1 **t₁ knows you**]] 1 t₁ regrets **that**

Now we can see how Heim's example in (45) could perhaps be analyzed. To begin with, here are the truth conditions we intuitively associate with (45): this sentence is true when uttered by X at T in W if, for every moment t prior to T such that the most controversial of the candidates at t in W gets hired at t in W, there is a moment t' following t such that someone in W claims at t' in W to have expected all along the proposition $\lambda w'$. The most controversial of the candidates at t in W gets hired at t in w'. Before we brought assignments into the picture, we would have said that this suggests an analysis according to which, when we provide a context c, we get the proposition below. Now that we have assignments, we would say²² that, when we provide a context c, we get a (constant) function that takes an assignment and yields this proposition:

(45') λw . For every moment t prior to c^T such that the most controversial of the candidates at t in c^W gets hired at t in w, there is a moment t' following t such that someone in w claims at t' in w to have expected all along the proposition $\lambda w'$. The most controversial of the candidates at t in c^W gets hired at t in w'.

Heim's example is a lot like the example we just saw with a relative clause: instead of *every person* we have *every time*. Suppose we say, then, that along with *every time* we have two properties of moments, and that these two properties come from constituents headed by the binder 2. Looking at (45'), it should be clear that we will be able to arrive at the desired meaning if the material that combines with the binder in the first constituent has the semantic value in (48), and if *that* picks up the corresponding utterance value. Well, it is clear how our approach allows us to form a structure for *the most controversial candidate get hired* with the semantic value in (48). We would use a silent world indexical, together with silent time and world variables.

(48) $\lambda c. \lambda g. \lambda w$. The most controversial of the candidates at moment g(2) in c^W gets hired at g(2) in w.

The second remark that I wish to make concerns the way in which my proposal adds to an existing discussion that concerns structures where world argument positions are projected. It is well known by now that assuming structures with world variables comes at a cost: not all variable binding configurations seem to be possible, and an explanation has to be given for why. The kind of example that is relevant here is the one in (49)-(50) (see Keshet 2011

²² See footnote 18 if it is not clear why.

for a catalogue of such cases). It seems that the world argument position underlined in (50a) – the position reserved for the world argument of the embedded predicate *Canadian* – cannot be occupied by a variable bound at the top. In other words, the structure in (50b) seems to be excluded. The reason for saying this is that the sentence *Mary thinks that my brother is Canadian* does not seem to have the interpretation that would derive from a structure like that. But now let us bring in world indexicals. A structure with a world indexical in a given position will give us the same truth conditions that we would get from a parallel structure where that position is occupied by a world variable bound at the top – indeed, it was in a certain sense this fact that forced us to chase after arguments for world-related indexicality. But this means that, in addition to ruling out a structure like (50b), we also need to rule out a structure like (50c) with a world indexical. (50c) would give rise to the same unavailable interpretation that (50b) does. Is there a lesson to be drawn from this? I don't think that these considerations should make us immediately suspicious of the world indexical idea. Rather, they tell us that the reason that we find for excluding the use of structures like (50b) with world variables bound at the top should extend to the use of parallel structures with a world indexical. To summarize: the facts show us that, even if some predicates can behave as though their world arguments are variables bound at the top, not all predicates behave this way; the facts also show us that, even if some predicates can behave as though they have an indexical world argument, not all predicates behave this way; our position on one of these problems should inform our position on the other.

(49) *Mary thinks that my brother is Canadian.*

- (50) a. $1 w_1 T^*$ *Mary thinks* [$2 _$ [the ... w_2 ... my brother] *Canadian*]
 b. $* 1 w_1 T^*$ *Mary thinks* [$2 \underline{w_1}$ [the ... w_2 ... my brother] *Canadian*]
 c. $* 1 w_1 T^*$ *Mary thinks* [$2 \underline{W^*}$ [the ... w_2 ... my brother] *Canadian*]

Let me close this section by addressing a possible doubt. I have endorsed a picture in which we have both indexicals and variables – a picture where semantic evaluation is both with respect to a context and with respect to an assignment. The remarks that I just made attended to the consequences of a picture like that: the first was about what it allows us to capture; the second was about the costs that come with adopting it. Now that variables have entered the scene, however, one might begin to have second thoughts about the arguments that I gave earlier. I argued (in good company) that a picture where there is selection for a context argument allows us to capture generalizations that we could not express otherwise, and I argued that a picture with silent indexicals allows us to maintain these generalizations in face of data that might at first sight look problematic. However, when I argued this I did not entertain the possibility that constituents

were evaluated with respect to an assignment, and maybe that makes a difference. Maybe, once we entertain this possibility, we have other ways available of expressing or maintaining these generalizations.

I think this is worth thinking about, but my hunch is that other ways that suggest themselves will essentially amount to notational variants of the picture we developed. To see what I mean, take the following aspects of the picture I have been pushing: every constituent up to the sentence level is a function from both contexts and assignments, and the context argument is always passed up by the composition rules. In a certain sense, these aspects were not necessary. We could imitate our picture perfectly with a different picture where only the lexical items that we identified as indexicals select for a context argument, where composition rules only pass up the assignment argument, and where those lexical items combine in the syntax with a designated silent context variable. This imitation picture – look at (51) and (52) – would yield different semantic values for sentences. They would be functions just from assignments to propositions, rather than functions from contexts and assignments to propositions. At the same time, there is a way of translating into the new picture’s terms everything we said on the old picture. In particular, wherever before we needed to invoke the value of a constituent with respect to a context c and an assignment g , we would now invoke the value of the corresponding constituent with respect to the assignment $g \cup [0 \rightarrow c]$. So for example there is a way of recovering our old utterance values: to arrive at our old utterance values for a constituent A uttered by X at T in W , we now take $\lambda g. [[A]](g \cup [0 \rightarrow \langle X, T, W \rangle])$. My point is that, to the extent that these two pictures are completely intertranslatable – and they seem to be – they do not constitute alternative hypotheses in any substantive way. I suspect that we will find the same thing when we try to imagine alternatives that make more sophisticated use of the assignment argument.²³

²³ If you are fond of free variables – if you think of pronouns that way, for example – then more alternatives will suggest themselves. Someone who thinks that free variables can happily inhabit sentences, and who adopts a view where semantic evaluation is with respect to a context as well as an assignment, would say something along these lines about when we say that a sentence is true: a speaker X who uses a declarative sentence S at time T in W with an assignment g “in mind” says something true when $[[\Sigma_S]]^{\langle X, T, W \rangle, g}(W) = 1$. (The idea would be that a speaker X has an assignment g “in mind” when the codomain of g is made up of items X intends as values for the free variables in Σ_S .) And, in order to describe what is going on in our basic cases of ellipsis and so forth, an adherent of this position would probably invoke a slightly different notion of utterance value: when a sentence with constituent A is uttered by X at T in W with assignment g “in mind,” the utterance value of A is $[[A]](\langle X, T, W \rangle)(g)$. This point of view opens up another possibility for sentences that we have analyzed as having a structure like (52a) with a silent world indexical. Perhaps the cases that we have analyzed in this way should instead be analyzed as having a structure with a silent *free world variable* whose intended value is the world of evaluation. Here too, I believe that there is ultimately no substantive difference – what we can do one way with a free variable, we can imitate perfectly the other way with an indexical expression. It does seem to

- (51) John likes me.
 a. $1 w_1 [T^* \text{pres}] \text{John likes me.}$ old
 b. $1 w_1 [T^* c_0][\text{pres } c_0] \text{John likes [me } c_0]$ new
 $[[(51b)]] = \lambda g. \lambda w. \text{In } w, \text{ at } \mathbf{g(0)^T}, \text{ John likes } \mathbf{g(0)^I}$
- (52) John likes my mother.
 a. $1 w_1 [T^* \text{pres}] \text{Mary likes the [2 } W^* x_2 \text{ my mother]}$ old
 b. $1 w_1 [T^* c_0][\text{pres } c_0] \text{Mary likes the [2 [W}^* c_0] x_2 [\text{my } c_0] \text{ mother]}$ new
 $[[(52b)]] = \lambda g. \lambda w. \text{In } w, \text{ at } \mathbf{g(0)^T}, \text{ John likes the mother of } \mathbf{g(0)^I} \text{ in } \mathbf{g(0)^W}$

6 Some notes for the future and the past

This was a starting point. Here are some directions to think about for the future.

If what I have said is on the right track, then many sentences are ambiguous between different structures that are ultimately associated with the same truth conditions – but via different semantic values. *My mother is Danish* would be like that, for instance. The question then arises whether, in such cases, we prefer using one structure over another, and, if so, why. I think that future work could usefully address these issues of pragmatics. Stalnaker has argued for one principle that could end up making a difference: the claim is that we try to use sentences in such a way that it is unambiguous what the utterance value is.²⁴ This implies that, in a situation where it is not established which individual is my mother, I would avoid using the structure for *My mother is Danish* that makes *my mother* indexical. There are also other principles that one can imagine: for example, all else being equal, we might choose to avoid structures with partial utterance values. This would imply that, in a situation where it *is* established which individual is my mother, I would *prefer* using the structure for *My mother is Danish* that makes *my*

me that the treatment of constituents with bound variables would lead to intricacies that I have done without here.

²⁴ If we want to entertain this idea seriously, then it would seem something has to change in the assumptions that I have made up to here. I have imagined that there are time indexicals all over, and in particular that matrix present tense typically contributes a time indexical – though in sentences with predicates like *Danish* I have been able to abstract away from this. In that case, to the extent that we never know at what point on the time line we are located, we will rarely if ever be able to satisfy this condition perfectly. Because our different candidates for the utterance context contain different time coordinates, they will generally lead to different candidate propositions for utterance values. One way of avoiding this difficulty might be to move to a system in which sentences evaluated at contexts yield temporal properties rather than propositions, and accordingly to treat present tense differently. (One could perhaps imagine the level at which we supply a time in order to obtain a proposition as a separate, temporal tier of indexicality.)

mother indexical. Our diagnostics for utterance values might give us a way of investigating empirically whether these kinds of claims are correct.

I have suggested that silent indexicals can appear in positions where silent variables can appear. I think that it could be interesting to search for useful applications of this idea. Pronouns might be worth a look.²⁵ Modern views of pronouns see them as syntactically complex items in which features combine together with other expressions. This syntactic complexity contains room for silent variables, and thus potentially for silent indexicals. Take a case like (53a). Since the features are what determines a pronoun's pronunciation, it is perfectly conceivable that the bulk of the pronoun in (53a) is something that is itself syntactically complex, even a full description that would be pronounced on its own like *my uncle*. As for the gender feature sitting next to this expression (the only feature I will consider here), we can plausibly see it as selecting for a world argument and insuring that the expression's referent is male in the world that it takes as an argument. The structure of the embedded clause would then be as in (53b), where two co-bound world variables occur within the pronoun – one that belongs to the description and one that is selected by the feature. In principle, though, the same pronunciation *he* could equally well realize an indexical description together with a feature taking an indexical world argument. With this in mind, it is worth recalling an older view of pronouns. The old Cooper treatment of a pronoun like *he* or *she* views the pronoun's gender as essentially indexical – as reflecting the gender of the pronoun's referent in the actual world. (53a) shows that this view is too simple. It just doesn't seem right to say that the pronoun in (53a) has a referent who inhabits the actual world. But, if there are silent indexicals that can serve as an argument to the gender feature, then that older view was onto something.

- (53) a. Mary thinks I have an uncle. She thinks he [= my uncle] is Danish.
b. ... 1 w₁ [[the ... w₁... my uncle][*masc* w₁]] Danish

Finally, I think that more thought should be given to the relation between the semantic values of constituents and the objects that we have derived as their utterance values. I claimed that, in order to characterize a variety of linguistic phenomena, we need to make reference to objects that are one step away from semantic values. Everything we saw, however, was equally consistent with the idea that these objects we need to make reference to are in fact *two or more* steps

²⁵ I have specifically argued that, when it comes to understanding the use of pronouns in F(ree) I(ndirect) D(iscourse), it is helpful to see pronouns as potentially realizing indexical descriptions (Percus 2013). Readers familiar with Schlenker's 2004 analysis of FID might not find this surprising. For Schlenker, the treatment of FID pronouns as variables is important, and the remarks to come suggest that those pronouns that have been analyzed as free individual variables could alternatively be analyzed as indexical descriptions.

away from semantic values. We pursued an idea according to which the semantic value of a sentence like *I am related to you* needs a context c and yields the proposition that c^I is related to c^I 's addressee at c^T ; on this idea, the object we need is what we get by applying this semantic value to the sentence's context of utterance. However, an equally viable idea given what we have seen would have been that the sentence needs a context c and a context d and yields the proposition that c^I is related to d^I 's addressee at d^T ; in that case, we would say that the object that we need is what we get by applying the sentence's semantic value to the context of utterance, *twice*. How many context arguments should we imagine, then? In reality, at least two, I would think – one that is relevant for expressions like *I* and *you*, and one that is relevant for certain perspective terms (and maybe for “shifting indexicals” which I have steered clear of here). And then, to the extent that there are silent expressions of one variety, it is likely that there are also silent expressions of the others.

It is healthy to think about the future but we mustn't forget the past that made us what we are. There is one prominent place in the literature where indexical descriptions have played a role, and that is in the context of Donnellan's distinction between “referential” and “attributive” uses of descriptions (Donnellan 1966). It would be wrong to conclude without saying a few words related to this, and here they are, as a brief appendix to this paper.

Donnellan illustrated his distinction with the sentence *Smith's murderer is insane* – to keep things as close as possible to our discussion up to this point, we can replace this by *Smith's daughter is Danish*.²⁶ We can utter this sentence to convey that a certain individual is Danish, presupposing that that individual is Smith's daughter; in that case, according to Donnellan, we are using *Smith's daughter* “referentially.”²⁷ We can also utter this sentence without meaning to take a position in doing so on who Smith's daughter is; in that case, we are using *Smith's daughter* “attributively.” The historical connection with our topic is that a number of authors (and notably Kaplan 1978) have suggested that Donnellan's pragmatic distinction results from a semantic distinction, and in particular that the “referential” use is the use of an indexical description. I would endorse this line of

²⁶ I have my reasons. I would like to continue to abstract away from the contribution of tense – this has to do with the difficulties alluded to two footnotes back.

²⁷ I use “presuppose” here to mean “take it as established for the purpose of the conversation.” I am actually departing slightly here from what Donnellan said. Donnellan talked about cases where the speaker believes that *his own background assumptions* will be recognized – where “we expect and intend our audience to realize whom we have in mind when we speak of Smith's [daughter] and, most importantly, to know that it is this person about whom we are going to say something.” (Donnellan 1966: 285) My way of putting things thus diverges from Donnellan's in the case of deliberate misdescriptions.

thought. Once we take the view that descriptions can be indexical, we are in a position to naturally explicate a number of the intuitions discussed by Donnellan.

To begin with, if the speculations about pragmatics at the start of this section are correct, then someone who utters *Smith's daughter is Danish* is to use the indexical variant of *Smith's daughter* exactly when it is established of a certain individual that she is Smith's daughter. This would mean that the indexical description is indeed specifically tied to a "referential" use, supporting the way in which Donnellan has been interpreted, and also suggesting that his distinction is a significant one. (And, just as far as the term "referential" is concerned, it is clear that an indexical description of this kind can legitimately be said to be referential. The description's utterance value is a particular individual, and the utterance value of the sentence as a whole will be the same proposition that we would arrive at if we were to replace the description by another expression denoting that individual.)

Our view also lends itself to explaining a further intuition that Donnellan famously called attention to. Suppose Smith has no daughter. Suppose that someone who clearly takes Johanna to be Smith's daughter says, while looking at her as she eats open sandwiches and peruses a book by Kierkegaard: "Smith's daughter is Danish!" If Johanna is indeed Danish, then there is an intuition that in some sense the person who uttered the sentence said something true – even if he misdescribed Johanna. Arguably, the way in which we are liberal with a truth judgment here isn't general. (If alternatively Johanna *is* Smith's daughter and is *not* Danish, there is no sense in which a speaker wrongly convinced of Johanna's Danishness says something true when he says "Smith's daughter is Danish.") Donnellan's position was that these cases of truth despite misdescription involve "referential" uses of the description. On our view, they come out as cases where the speaker has used an indexical description believing its utterance value to be different from what it is. As a result, the speaker is also mistaken about the utterance value of the sentence, and we say "true in some sense" to say that the *intended* utterance value holds of the actual world. Specifically, in the case at hand, the speaker made a mistake as to what he took to be established for the purposes of the conversation – he took it to be established (or easily accommodated) that Johanna was Smith's daughter – and this fact led him to use the indexical variant of *Smith's daughter*. He was wrong but, if he had been right, the structure he used for the sentence would have had as its utterance value the proposition that Johanna is Danish.

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Do Italian factives entail their presupposition? Yes, but...*

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Abstract Factive predicates are at the nexus of two challenging topics that are central for a theory of how natural language is understood in context. They syntactically embed clausal complements and semantically express attitudes towards propositional content. Importantly, the content of their complement clause is generally assumed to be presupposed. From the very beginning, it has been clear that there is an additional complication in terms of apparent variation between factive predicates. The present paper reports experimental data relating two recent approaches to variation among factives to one another. These two approaches apply a roughly parallel theoretical approach to separate empirical domains. The core theoretical notion is that the presupposition of factives may or may not simultaneously be part of the entailed content for a given factive verb. Chierchia (2016) puts this notion to use to explain variation in NPI-licensing of factives in English and Italian. Djärv, Zehr & Schwarz (2017) present experimental evidence for differences between cognitive and emotive factives in English, which they also explain based on this notion. The natural next move in an attempt to integrate these works is to extend the experimental paradigm from the latter to Italian, which is what we do in this paper. Overall, the results for Italian do not exhibit the differences from English that we would expect given the two proposals. They thus pose a challenge for maintaining a uniform theoretical approach to the two sets of empirical observations. We consider some potential avenues for understanding the full set of data theoretically, but have to leave a resolution of the theoretical conundrum for future work.

1 Introduction

Factive predicates are at the nexus of two challenging topics that are central for a theory of how natural language is understood in context. They syntactically

* We are grateful to numerous colleagues and audiences at various occasions, as well as attendees of lab meetings at the University of Pennsylvania, for feedback and discussion on this project. Special thanks to Gennaro Chierchia for ongoing discussions of the work we refer to here. Andrea Ceolin provided crucial help with Italian translations, and Jacopo Romoli provided additional feedback — we're grateful for their input. The work reported here received financial support from NSF grant BCS-1349009 to Florian Schwarz.

embed clausal complements and semantically express attitudes towards propositional content. Importantly, the content of their complement clause is generally assumed to be presupposed. From the very beginning, it has been clear that there is an additional complication in terms of apparent variation between factive predicates. The present paper reports experimental data that relates two recent approaches to variation among factives to one another. These approaches apply a roughly parallel theoretical approach to separate empirical domains. The core theoretical notion is that the presupposition of factives may or may not simultaneously be part of the entailed content for a given factive verb. Chierchia (2016) puts this notion to use to explain variation in NPI-licensing of factives in English and Italian. Djärv et al. (2017) present experimental evidence for differences between cognitive and emotive factives in English, which they also explain based on this notion. The natural next move in an attempt to integrate these works is to extend the experimental paradigm from the latter to Italian, which is what we do in this paper. Overall, the results for Italian do not exhibit the differences from English that we would expect given the two proposals. They thus pose a challenge for maintaining a uniform theoretical approach to the two sets of empirical observations. We consider some potential avenues for understanding the full set of data theoretically, but have to leave a resolution of the theoretical conundrum for future work.

The paper is structured as follows: Section 2 reviews the core theoretical notion shared by both approaches, as well as its application to the respective sets of data. Section 3 presents the new experimental results on Italian. Section 4 assesses the tension between the theoretical perspective and the overall empirical situation, and presents some tentative explorations of possible new avenues for reconciling the results. Section 5 concludes.

2 Background

2.1 Entailed vs. non-entailed presuppositions

A central, and — as it turns out — extremely intricate, question in presupposition theory is whether there are lines to be drawn between different types of presupposition triggers, and if so, how to analyze these differences. This was already noted in seminal work by Karttunen (1971), but the issue didn't play an overly prominent role in the theoretical literature until more recently, with a variety of proposals, perhaps most prominently the *soft* vs. *hard* distinction, motivated by differences in the availability of suspension in *if*-clauses (Abusch 2002; also see Abusch 2010), as well as a variety of others (see, e.g., Zeevat 1992; Simons 2001; Romoli 2012). For present purposes, we focus on another theoretical take, variations of which have been presented by various authors in slightly different contexts, most

explicitly by Sudo (2012) and Klinedinst (2010), with more or less direct precursors in Glanzberg (2005), Yablo (2006), and Gajewski (2011). The core notion is that some triggers simultaneously contribute their presupposed content at the levels of entailment and presupposition, whereas others are purely presuppositional. This is illustrated schematically in (1) and (2), following the notational convention from Heim & Kratzer (1998) in representing presupposed content between the colon and the period to indicate that the proposition is only defined for worlds in which the presupposition holds true.¹

- (1) a. Angelika sneezed again.
 b. Angelika continued sneezing.
- (2) a. $\lambda w : t' < t_p \ \& \ \text{sneeze}_w(a)(t')$. $\text{sneeze}_w(a)(t_p)$
 b. $\lambda w : t' < t_p \ \& \ \text{sneeze}_w(a)(t')$. $t' < t_p \ \& \ \text{sneeze}_w(a)(t')$ $\& \ \text{sneeze}_w(a)(t_p)$

Taking the presupposition triggers *again* and *continue*, which give rise to similar presuppositions with regards to there having been prior events of the same sort as described in the current sentence, the central idea is that triggers like *again* only introduce the notion of, say, there having been a relevant prior sneezing event as part of the presupposed content (between the colon and the period), whereas triggers like *continue* introduce it both there and as part of the entailed content (underlined, following the period).

At first sight, it may not be obvious what is gained by such a distinction, as the ‘doubling’ of the presupposed content as entailed content doesn’t really add anything, and in particular won’t make a difference for which worlds are mapped to true by these partial functions. However, as first noted by Sudo (2012), one context in which predictions of these two renderings come apart is that of non-monotonic quantificational environments, e.g., the scope of quantifiers like *exactly one*: in particular, assuming that the quantificational claim introduced by the quantifier only pertains to the entailed content, it matters whether or not what is presupposed is also entailed. For example, based on an analysis along the lines of (2a), (3) is predicted to be false in a situation where two students sneezed, even if only one of them sneezed before:

- (3) Exactly one student sneezed again.

¹ We are glossing over many important details, in particular with regards to tense and aspect, for the sake of illustrating the general idea. t_p and t' represent the time indicated by the past tense and a contextually salient preceding time respectively. A quantificational analysis of tense (as well as the preceding time introduced by the presupposition triggers) gives rise to the Binding Problem, i.e., variables in the presuppositional and entailment parts would need to be bound by the same existential quantifier. See Sudo 2012 for a proposal to address this issue.

This is because if the presupposition plays no role in the entailed content and the quantificational claim is only evaluated relative to the entailed content, then all that is counted is how many students sneezed at the time introduced by the past tense, regardless of their prior sneezing history. In contrast, extending the analysis in (2b) to (4), the students' prior sneezing history does matter for evaluating the quantificational claim introduced by *exactly one*, and correspondingly, the sentence is predicted to be true in a context where multiple students are sneezing at the time introduced by the past tense, but only one student sneezed previously.

(4) Exactly one student continued sneezing.

Assessing the empirical adequacy of these predictions is by no means trivial, especially given the potential additional impact of local accommodation (Heim 1983), but initial experimental results reported by Zehr & Schwarz (2016) and Zehr & Schwarz (to appear) support the general notion of a contrast along these lines between triggers (though perhaps most clearly for the comparison between *also* and *stop*). For present purposes, all we aim to convey is the general notion of the distinction between what we will refer to as 'entailing' and 'non-entailing' presupposition triggers and a sense of how the relevant triggers should behave differently in certain environments.

2.2 Factives, entailment, and NPI-licensing

An entirely separate line of work has alluded to a parallel notion to account for NPI-licensing phenomena. In particular, Gajewski (2011) (also see Gajewski & Hsieh 2014; Gajewski 2016) models differences between singular and plural definites with respect to the availability of NPIs in their noun phrase in terms of a contrast in their entailment, namely whether or not the existential presupposition is also part of the entailed content. Chierchia (2016) extends this approach to account for differences in NPI-licensing between English and Italian factives. This section sketches the core line of reasoning of the latter with respect to both phenomena.

While plural definites readily allow NPIs in their scope, singular definites don't (second example modeled after those in Chierchia 2016, but altered in response to native speaker feedback to yield clearer intuitions):

- (5) a. The clients that had any complaints were rare.
 b. *The client that had any complaint was refunded. (Chierchia 2016)
- (6) a. The students in this class who have {ever} taken {any} statistics will quickly notice that the data is unreliable.
 b. *The student in this class who has {ever} taken {any} statistics will quickly notice that the data is unreliable.

This is puzzling at first sight, especially if one wants to maintain an overall uniform analysis of the definite article for both cases. However, following Gajewski, Chierchia argues that the following denotations for the singular and plural definite article can explain this difference, crucially because they differ in whether or not the existence condition is part of the entailed content or not (while being uniformly presupposed):

$$(7) \quad [[THE_{PL}]] = \lambda P \lambda Q \lambda w : \exists x P_w(x) \ \& \ \forall y P_w(y) \rightarrow y \leq x. \forall x [P_w(x) \rightarrow Q_w(x)]$$

$$(8) \quad [[THE_{SG}]] = \lambda P \lambda Q \lambda w : \exists x P_w(x) \ \& \ \forall y P_w(y) \rightarrow y \leq x. \exists x [P_w(x) \ \& \ Q_w(x)]$$

More specifically, these two meanings differ in whether or not the nominal restrictor of the respective definites constitutes a downward entailing environment or not. This is the case for the plural, but not the singular. Given an account of NPI-licensing in terms of downward entailingness (and assuming that this property is only relevant at the level of entailed content), this explains the pattern above (Chierchia spells out a specific proposal along these lines based on contradictions resulting from obligatory exhaustification; see his manuscript for details).

Turning to the phenomenon we are concerned with in this paper, Chierchia (2016) extends Gajewski's account of the contrast between singular and plural definites (which Chierchia shows to also hold in Italian) to a cross-linguistic contrast in NPI-licensing by factives, illustrated in (9) and (10):

- (9) a. She was surprised that there was any food left.
 b. I am sorry that I ever met him.
- (10) a. *Lei si sorprese che ci fosse alcun cibo
 She REFL was surprised that there was-SUBJ any food
 'She was surprised that there was any food'
 b. *Mi dispiace di averlo mai incontrato
 (I) REFL am sorry to have-him ever met
 'I am sorry I ever met him'

This intriguing cross-linguistic difference raises important questions about the nature of NPI-licensing and possible sources of cross-linguistic variation. Chierchia proposes to locate variation in a functional element, namely the complementizer *that* (and its correlates), rather than positing variation in how NPIs are licensed in different languages. The contrast between the 'weak' and 'strong' variants of a factive C-head that he posits mirrors closely that between the singular and plural definite articles, in that they vary in whether the presupposed content is also entailed. This is illustrated for the sentence in (11) below (note that rendering of the presuppositional dimension, which is constant across the two possible analyses, is ignored here, as in Chierchia):

- (11) John regrets that he {ever} met Mary.
- a. English: ‘weak’ factive C (presupposition not entailed)
 $\forall w' [[S_w(w') \& \neg \exists t \in D[\text{met}_{w'}(\text{mary})(\text{john})(t)]] \rightarrow \neg \text{regretful}_{w'}(\text{john})]$
- b. Italian: ‘strong’ factive C (presupposition entailed)
 $\exists t \in D[\text{met}_w(\text{mary})(\text{john})(t)] \&$
 $\forall w' [[S_w(w') \& \neg \exists t \in D[\text{met}_{w'}(\text{mary})(\text{john})(t)]] \rightarrow \neg \text{regretful}_{w'}(\text{john})]$
- (adapted from Chierchia 2016)

Parallel to the case of singular vs. plural definites, the two versions differ with regards to whether an existential statement, corresponding to what is presupposed by the respective expressions, is included as part of the entailed content. In the case of factives, this corresponds to the complement clause, represented here by an existential statement about there being a time t at which John met Mary. In Italian, this presupposition is posited to be entailed, and correspondingly, NPIs in the complement clause are not expected to be licensed, given that this part of the representation of the entailed content does not constitute a downward entailing environment. In contrast, in English, this statement is not part of the entailed content, but rather merely included as a presupposition (not shown here). The restrictor of the universal quantification over worlds in the other clause of the entailed content, where the embedded clause is also factored in, is of course a downward entailing context. This then accounts for the fact that in English, NPIs are possible in this environment.

For reasons of space, we have to gloss over various other details of Chierchia’s account here (among other things, he also discusses the inability of cognitive factives to license NPIs when no negation is involved, as well as intervention effects), and refer the reader to the original work. What is crucial for present purposes however, is that there is a puzzle about cross-linguistic variation in NPI-licensing by emotive factives, for which there is an account based on the notion that some presupposition triggers simultaneously introduce their presupposed content as entailed content, while others do not. The locus of variation is in the type of complementizer available in different languages, mirroring the variation in definites discussed in prior work, thereby making it possible to maintain a uniform approach to NPI-licensing across languages based on downward entailingness.

2.3 Results from the *Yes, but...* paradigm

As noted in the introduction, the question of whether there are classes of presupposition triggers that need to be distinguished has played a central role in the theoretical literature, and there is a growing body of experimental work on this question as well (for an overview, see Schwarz 2016). Most relatedly to the experiments reported

below, Cummins, Amaral & Katsos (2013) and Amaral & Cummins (2015) investigate various triggers in questions and test the acceptability of *Yes*, *although* and *No*, *because* answers that deny the presupposed content:²

(12) Q: Did Brian lose his wallet again?

A: Yes, although he never lost it before.

A': No, because he never lost it before.

(13) Q: Did John stop smoking?

A: Yes, although he never smoked before.

A': No, because he never smoked before.

While such answers contradicting a presupposition in a question were overall degraded compared to controls, the triggers in their results seem to be grouped into two classes with regards to the extent to which *Yes*- and *No*-responses differ from one another: for expressions such as *stop* and *still*, the *Yes*-versions were significantly worse than *No*-versions, but for triggers like *again* and *too*, both answer versions yielded comparable acceptability ratings. Cummins et al. (2013) interpret their results in terms of a distinction between 'lexical' and 'resolution' triggers (Zeevat 1992), and allude to differences in the availability of local accommodation, corresponding to variation in the acceptability of *No*-responses. A further dimension to the variation that comes into play (also related to Zeevat's notion of lexical triggers), is that, as Amaral & Cummins (2015: 169) put it, in the case of certain triggers 'the responses in condition [A; *Yes*-continuation] appear self-contradictory, if we assume that the presupposition is a logical prerequisite for the at-issue content of the trigger.' In other words, the content introduced in the question cannot be affirmed independently of the presupposition. This roughly corresponds to the notion we have built on in experimental approaches to factives, though we couch it in terms of the entailment contrast introduced above.³

The central idea is that *Yes*-responses relate differently to entailed and presupposed content. While the default is likely that in general, a *Yes*-response is understood to endorse both types of content (e.g., that a plain *Yes* answer to (12) effectively indicates both that Brian lost his wallet AND that he did so before), it is in principle possible to exclusively target the entailed content, making a *Yes*-response followed by a denial of the presupposition possible. Assuming that it holds for some triggers, such as *stop*, that their presupposition is also part of the entailed content, while for

² Similar tasks involving the selection of the best answer from a set of options had previously been used to investigate clefts and focus (Onea & Beaver 2011; Velleman, Beaver, Destruel, Bumford, Onea & Coppock 2012; Destruel, Velleman, Onea, Bumford, Xue & Beaver 2015).

³ Another closely related notion in the literature is that of 'Obligatory Local Effects' of the presuppositions of certain triggers (Tonhauser, Beaver, Roberts & Simons 2013).

others, such as *again*, it is not, we then expect a difference in acceptability of *yes*, *although/but*. . . continuations of the sort above, in line with the reported findings.

In Djärv et al. (2017), we adopted this paradigm to experimentally compare cognitive and emotive factives, starting from the hypothesis that the former entail their presupposition (that the embedded clause is true), whereas the latter do not. We used an acceptability rating task to assess the acceptability of *Yes* and *No* continuations. The latter provide an important point of reference with regards to the relative availability of local accommodation (which can also be related to the entailment contrast; for discussion, see Klinedinst 2010). Sample items are provided in (14).

- (14) Q. {Is Maria **aware /happy**} that [_P Mike is moving back to Chicago]?
 A1. Yes, although he isn't.
 A2. No, because he isn't.

Participants had to rate how natural the answer sounds in light of the question, on a scale from 1 ('completely unnatural') to 7 ('completely natural'). In line with our hypothesis, the results from 62 participants — summarized in Figure 1 — showed this type of *Yes*-continuation to be more acceptable for emotive factives than for cognitive factives, with the latter showing no difference from unacceptable control items. In contrast, there was no difference in the acceptability of *No*-responses for cognitive and emotive factives, which in turn were close to ceiling based on a comparison to acceptable controls.

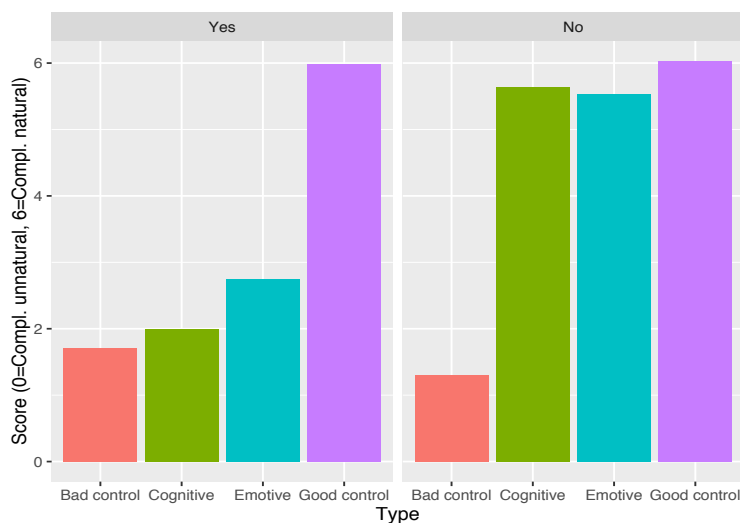


Figure 1 Mean ratings by answer type and predicate type.

3 Experiment: *Yes, but...* with Italian factives

3.1 Predictions for Italian

A logical next step in investigating the properties of factives, specifically with regards to the posited entailment contrast, is to put the predictions of the two empirical applications of this contrast together and test them. This is precisely the endeavor we report on here. Recall that Chierchia’s explanation of the contrast between Italian and English emotive factives in NPI-licensing rested on the assumption that the former entail their presupposition whereas the latter do not. This is of course perfectly in line with our previous finding for English emotive factives, which also suggest that English emotive factives do not entail their presupposition, and therefore allow *Yes*-responses to target their entailed content only. Assuming that in both cases, what is operative is indeed the entailment contrast, we expect Italian emotive factives to differ from the English ones, if the former do entail their presupposition. The current study addresses this issue by extending our *yes, but...* paradigm to Italian factives.

3.2 Design & materials

The design of the experiment was completely parallel to the English one reported in Djärv et al. (2017). The sentences were translated to Italian with some minor adjustments, yielding versions of each item with a cognitive and an emotive factive in a yes/no question, paired with either a *Yes*- or a *No*-answer containing a direct denial of the factive presupposition in the question. The emotive factive predicates used were *felice* (‘happy’) and *apprezato* (‘appreciated’), and the cognitive ones *consapevole* (‘aware’) and *realizzato* (‘realized’). An illustration is provided in (15)-(16).

- (15) a. Anna è felice che Ryan stia venendo al matrimonio?
 Anna is happy that Ryan is.SUBJ coming to.the wedding
 ‘Is Anna happy that Ryan is coming to the wedding?’
 b. Anna è consapevole che Ryan sta venendo al matrimonio?
 Anna is aware that Ryan is coming to.the wedding
 ‘Is Anna aware that Ryan is coming to the wedding?’
- (16) a. Sì, anche se lui non sta venendo.
 Yes, although REFL he not is coming
 ‘Yes, although he isn’t coming.’
 b. No, perché lui non sta venendo.
 No, because he not is coming
 ‘No, because he isn’t coming.’

One choice point concerned the use of mood for the emotive factives. While cognitives only allow for the indicative, both subjunctive and indicative are in principle available for emotives. We decided on the subjunctive, as it is generally noted to facilitate NPI-licensing in Italian, although, according to Chierchia (2016), this does not prevent emotive factives with NPIs from being unacceptable. Since our hypothesis is that there is a link between NPI-licensing and entailment of presuppositions, using the subjunctive for emotive factives then amounts to the most conservative choice, by virtue of providing otherwise favorable conditions for NPI-licensing.

The experiment included 24 critical items in four conditions. In addition, there were 48 filler items, 24 using *pensa* ('thinks') and 24 using conjunctions. Half of these were respectively presented with good *Yes*- and *No*-continuations, which did not directly contradict an endorsement or denial of the proposition put forth in the question, and the other half had continuations that were contradictory based on the respective answer given.

3.3 Participants & procedure

We recruited 59 speakers of Italian through prolific.ac, who completed the study online via IBEX. Critical items were counterbalanced across participant groups such that every participant only saw each item in one condition. *Yes*- and *No* continuations were separated into two blocks to simplify the task, and the order of blocks was counterbalanced across participants. Fillers were divided evenly across blocks, with *Yes*- or *No*-continuations matching the critical items in their block.

3.4 Results

Given that the central prediction of our hypothesis is that *Yes*-answers for Italian emotive factives should differ in acceptability from those for English emotive factives, specifically in comparison to cognitive factives and *No*-answers, we pooled the data from the two experiments for statistical analysis, adding a third factor of Language to the previously considered factors of Emotive type and *Yes*- vs. *No*-continuation, yielding a 3-way interaction design. Recall that the proposal for accounting for the inability of Italian emotive factives to license NPIs under consideration is that in contrast to their English counterparts, they entail their presupposition. Thus, assuming with Djärv et al. (2017) that *Yes*-answers invariably commit you to the entailed content put forward by the question, Italian emotive factives should be just as incompatible with continuations denying the presupposition as cognitive factives. Correspondingly, the nature of the expected 3-way interaction would be that the 2-way interaction found for English, with *Yes*-answers for emotives being

rated relatively better than for cognitives, in comparison to comparable ratings for *No*-answers, is not present in Italian, as *Yes*-answers for emotives should be on par with those for cognitives. The overall results are summarized in Figure 2, and exhibit a parallel pattern for English and Italian in the *Yes*-answers, and lower acceptability ratings for *No*-answers in Italian.

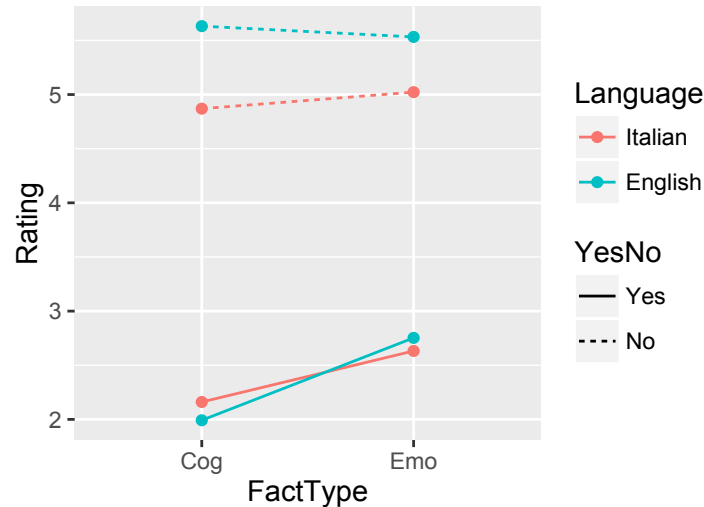


Figure 2 Mean ratings by answer type and predicate type.

To assess the outcome patterns statistically, we ran mixed effect models in R, using the *lmer* function of the *lme4*-package. Results from maximally complex converging models are reported here (Barr, Levy, Scheepers & Tily 2013). For the initial 3-way interaction analysis, all three predictors were centered. Overall, we find a significant 3-way interaction ($\beta = 0.54$, $SE = 0.19$, $t = 2.87$), as well as 2-way interactions between Factive type and *Yes/No*-answers ($\beta = 0.60$, $SE = 0.09$, $t = 6.45$) and Language and *Yes/No*-answers ($\beta = 0.65$, $SE = 0.31$, $t = 2.13$). Furthermore, there were main effects of Answer type, with *No*-answers rated much higher overall ($\beta = 2.89$, $SE = 0.15$, $t = 18.89$), as well as Factive type, with slightly higher overall ratings for emotives ($\beta = 0.32$, $SE = 0.07$, $t = 4.71$), but no main effect of language.

Follow-up analyses using treatment coding with different baselines were conducted to shed further light on the nature of the observed interactions. Setting Italian emotives (with *Yes*-continuations) as the baseline revealed a contrast between factive types parallel to English, with a simple effect showing emotive *Yes*-continuations to receive higher ratings than those for cognitives ($\beta = 0.48$, $SE = 0.12$, $t = 4.02$), as well as different patterns for *Yes* and *No*-continuations, reflected in an interaction

between Answer type and Factive type ($\beta = 0.33$, $SE = 0.13$, $t = 2.44$). The pattern for emotives across Answer types was not significantly different across languages, as reflected by the interaction term for Language and Answer type. However, a parallel analysis with Cognitives and *No*-answers as baseline did reveal an interaction of Language and Answer type for Cognitives ($\beta = 0.92$, $SE = 0.32$, $t = 2.88$), as well as a simple effect of Language ($\beta = 0.76$, $SE = 0.28$, $t = 2.76$), with higher ratings for English *No*-continuations than for their Italian counterparts (no such effect was found for *Yes*-answers).

Taken together, these results reveal Italian emotives to parallel English emotives in yielding greater acceptability than the respective cognitives. The main difference found between languages that is driving the 3-way interaction is in *No*-continuations for cognitives, which are significantly less acceptable in Italian than in English. Thus, while some potentially interesting differences between languages emerge, the pattern predicted by an account of differences between factives based on the entailment contrast, in line with both of the two prior approaches reviewed above, is not found in the present results.

Two additional aspects of the data should be noted here to highlight some nuances of interest. First, there are suggestive indications in the data that the differences in patterns between English and Italian are largely driven by the adjectival items, as can be seen in Figure 3. While there seem to be differences in the acceptability of *No*-answers for both adjectives and verbs, the relative pattern for the within language 2-way interactions is entirely parallel for verbs, but different for adjectives, with the key difference in the relative goodness of emotive and cognitive *No*-continuations in Italian. Including the adjective vs. verb distinction as an additional factor in an analysis using centered predictors yielded a 4-way interaction that seems to be approaching significance ($\beta = 0.71$, $SE = 0.37$, $t = 1.92$). Since we are only looking at one lexical item in each of these categories, it remains an open question not only to what extent this effect can be substantiated and broken down statistically, but also whether it generalizes to the relevant classes of lexical items (an interesting related experimental result comes from Bacovcin & Djärv 2017 who find a difference in the ‘projection’ behavior of verbal and adjectival *non-factives*). However, we have to leave more detailed exploration of these issues for future investigation.

The second point to note here, again without great elaboration of detail, is that some differences emerged between the Italian and English materials with regards to the fillers as well, specifically for the case of the *think*-fillers: in particular, the ‘good’ fillers, designed to be fully acceptable, are significantly lower in both the *Yes* and *No* versions, while the other fillers, using conjunctions, seem comparable, as can be seen in Figure 4. It’s unclear what this effect should be due to. One relevant point to note is that these fillers, like the cognitive factives but unlike the emotive factives, used the indicative in the embedded clause. That alone, however, does

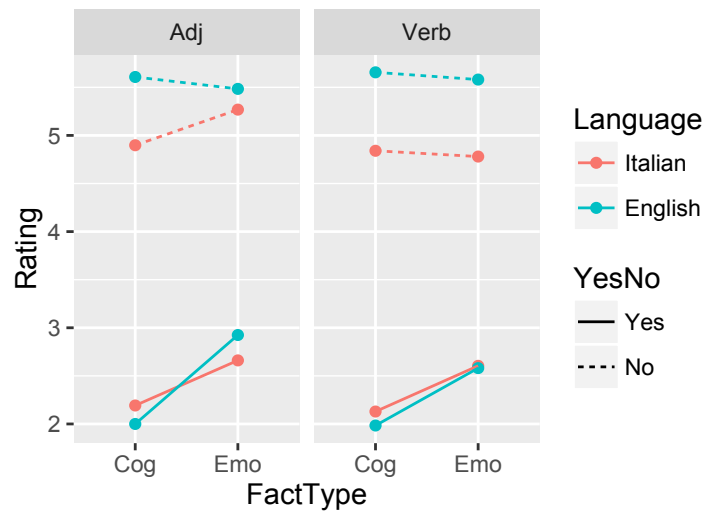


Figure 3 Mean ratings by answer type and predicate type split by Adjectives and Verbs.

not provide a straightforward explanation of the apparent pattern in the data, as the *No*-continuations for the two types of verbal factives seem to be equally acceptable, despite the use of subjunctive with emotives and indicative with cognitives. Further analyses and broader considerations are needed here as well, but have to be left to future work.

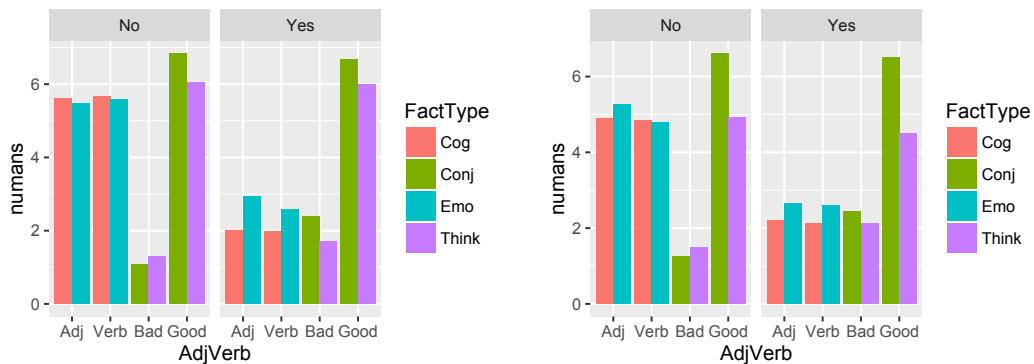


Figure 4 Mean ratings for fillers vs controls in English (left) vs. Italian (right).

4 Discussion: factives, entailment and (lack of?) variation

In a nutshell, the results for the Italian variant of the *yes, but...* study, in comparison to earlier results for English, do not conform to the neat prediction that we get from combining the accounts in Chierchia 2016 and Djärv et al. 2017. If both the cross-linguistic variation in NPI-licensing and the interpretation of the increase acceptability of *Yes*-continuations with denials of the presupposition introduced in a preceding *yes/no*-question were to be attributable to variation with regards to whether the relevant factives do or do not entail their presupposition, then the Italian *Yes, but...*-data should look quite different from the English data, precisely with respect to Italian emotives. While we do find some differences, they are in no way straightforwardly relatable to the theoretically predicted contrast. To the contrary, Italian emotives look remarkably similar to English emotives in this paradigm.

So something will have to give. Maintaining the strong assumption that the cross-linguistic entailment contrast is present at a general level, due to its source in the inventory of functional elements, specifically complementizers, leaves us with little wiggle room. Either the entailment contrast is not to blame for the NPI-licensing variation between English and Italian factives, or the relative increase in acceptability of *Yes*-answers with presupposition denials is not indicative of presupposition entailment. If one weakens the cross-linguistic assumption the space of options becomes broader, but also less elegant and simple in theoretical terms. For example, one could allow different factives within each language to choose which type of complementizer they go with, and correspondingly whether or not they entail their presupposition. In this regard, it's worth noting that the particular emotive factives we looked at, *be happy* and *appreciate*, don't license NPIs in English to begin with. That shouldn't matter if the complementizer choices are general across either entire languages or classes of factives (in particular cognitive vs. emotive, as would need to be posited for English). But if there is more language-internal variation in presupposition entailment, then our results may simply indicate that the specific emotive factives we are looking at do not entail their presupposition, consistent with the *Yes, but...* result, and fail to license NPIs for other reasons. But without further motivation of what factive predicates are of what type, such a perspective of course is unsatisfying with regards to its explanatory potential.

Another possibility to consider is that the *Yes, but...* test does not provide a diagnostic after all for whether or not a presupposition is entailed. A possible starting point for such a rethinking of this paradigm might be the observation that emotive factives are generally richer in content, specifically in terms of expressing an emotive relation between the attitude holder and the embedded proposition that is at least largely, and perhaps entirely, independent of whether or not the embedded proposition is true (see for instance Djärv 2017 for an account of factivity and the

associated yes/no contrast, which does not rely on the notion of *entailment*, for either type of trigger). Thus, a presupposition denying *Yes, but...* response can be seen as endorsing one fairly independent part of the information presented in the question while denying another. In the case of cognitive factives this would seem harder, as the relevant doxastic attitude ascription is more directly linked to the speaker endorsing the truth of the complement clause. The conjunction fillers were intended as a control for this possibility, as a *Yes, but...* reply that goes on to deny one of the conjuncts also has the property of a partial endorsement of separately introduced information in the question. However, the status of the relevant pieces of information may well be different in the cases of emotive factives and conjunction, so that the different results we observe for them need not entirely debunk this possibility.

5 Conclusion and Outlook

We set out to test the predictions of combining two accounts of intricate empirical data from a unified theoretical perspective, based on the idea of the entailment contrast between presupposition triggers. In some ways, it might have been too good to be true to find a new empirical result for Italian that neatly confirms this perspective. What we are left with then, is a situation all too familiar in theoretically ambitious and empirically well-grounded research on natural language meaning: intricate theoretical proposals accounting for different types of empirical data, which lead to new puzzles once we attempt to unify the various accounts. Unsurprisingly, we are not in a position to resolve the new puzzle presented by the endeavor we report on here. But in line with what the first author was taught by his advisor in graduate school, learning that intriguing and interesting theoretical proposals are (at least in part) wrong is every bit as important as finding further confirming evidence for what seems to be a successful analysis, as is finding new problems and puzzles. For the time being, we therefore are happy to leave a possible resolution of the puzzle arising from the considerations above to the reader, and to the future.

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The Representation of Focus, Givenness and Exhaustivity

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Abstract This paper ends with rules of interpretation for a grammar in which an expression can have an *N*-marking ('novel'), an *F*-marking ('focus'), both or neither. Silent exhaustivity operators associate with focus and are susceptible to intervention by overt associators. *F*-marking can trigger *N*-marking on an expression even though it represents old information. A second occurrence focus is a focus that is not *N*-marked.

1 Introduction

Focus boosts intonational prominence, givenness weakens it. What happens when an expression is both given and focused? We'll look at a suite of examples pointing to three conflicting answers to this question. In one case, the result is reduced prominence, in one case increased prominence, and in one case the result is infelicitous. I will negotiate a path out of the conflict by embracing the following hypotheses:

- ◇ Givenness and focus co-exist in the grammar. Each is represented with its own syntactic marker associated with its own phonological consequence.¹
- ◇ Givenness status is determined relative to the discourse context and the immediate syntactic context in which an expression is found in a way that minimizes the amount of material deemed novel (Schwarzschild 1999).
- ◇ Every focus associates with a focus-sensitive operator²
- ◇ There are silent exhaustivity operators that associate with focus (Chierchia 2013, Fox 2007, Katzir 2013 a.o.)
- ◇ Structures containing nested focus-sensitive operators in which all the associated foci are in the scope of the inner operator are problematic. (Beck & Vasishth 2009)

My analysis of the conflicting examples is offered as further support for these hypotheses. The discussion will also produce a new corollary to the theory of givenness. In

1 This view is endorsed in some form in Beaver & Velleman (2011), Féry & Ishihara (2009), Féry & Samek-Lodovici (2006), Katz & Selkirk (2011), Kiss (1998), Kratzer & Selkirk (2009, 2017), Rochemont (2016) and Selkirk (2008).

2 "The focus theory that forms the foundation of this discussion must be explicitly distinguished from the semantic association-with-focus theories, such as the structured meaning theory of focus (see Jacobs (1983, 1991b), and von Stechow (1991)) or the theory of alternative semantics (Rooth (1985)). Within these theories it is assumed that **every focus-sensitive particle is associated with a focus and, conversely, that every focus is associated with a focus-sensitive operator.**" Winkler (1997)

Schwarzschild (1999), I did not discuss association with focus, but once foci are added to the mix, it turns out that an expression which otherwise would be deemed Given, acquires novel status because of the presence of focus. Such expressions will appear to confuse the phonology of givenness and the phonology of focus.

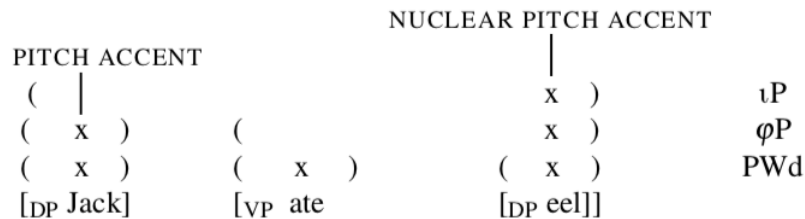
The data to be discussed will include the *crêpes* example, which has been a matter of some controversy in the literature on second occurrence focus. I will propose that the difficulty with this example has to do with nested focus-sensitive operators. So I side with Büring (2015, 2016) in viewing these examples as problematic, but with Rooth (2010) and with Beaver & Velleman (2011) in thinking the problem is not the business of focus phonology.

Finally I will break ranks with the abovementioned authors for whom second occurrence focus is the result of a competition among foci, as well as those who take it to be anaphora-to-focus (Selkirk 2008, Krifka 2004). Rather, I endorse the idea that second occurrence focus results from the confluence of independently derived focus and givenness marking simultaneously implemented in the phonology as in Féry & Ishihara (2009).

2 Ingredients for intonation

In this section, we'll briefly review factors that determine how an expression is intoned. *Intonation and Meaning* (Büring 2016) is a remarkably comprehensive and clear treatment of this question. The diagram in (1) below, based on Chapter 6 of that book, reflects the role played by syntax:

(1)



In (1), prosodic structure and pitch accents are associated with the sentence *Jack ate eel*. The construction is guided by constraints that refer to syntax, such as the following:

- (2) • The right edge of an XP aligns with the right edge of a φP
- The head of ιP is aligned with the head of its rightmost daughter

As a consequence of these constraints, if an adjunct is added to the sentence, the nuclear accent, felt to be the highpoint of prominence in the utterance, shifts to the adjunct. This is indicated with SMALL CAPS in (3).

(3) Jack ate eel in VENICE.

Sometimes, a word or phrase will fail to receive the prominence expected based on its syntax because it expresses content previously introduced in the discourse. In this case, we say that the expression is Given. Such is the fate of *the dog* in (4)B, which unlike *eel* in (1) does not receive a nuclear accent. Likewise, (5)B differs from (3) because in (5)B, *Venice* is Given so its prominence is weakened and the accent remains on the object.

- (4) A: Jack is getting better. He now has an apartment and a dog.
B: Has he NAMED the dog?
- (5) A: What did Jack eat in Venice?
B: He ate EEL in Venice.

Sometimes the location of main prominence is correlated with a difference in content. (6) is one such case.

- (6) a. Jack only ate EEL in Venice.
b. Jack only ate eel in VENICE.

(6)a is felt to convey that in Venice, Jack ate eel and nothing else, while (6)b is felt to convey that Jack ate eel in Venice and nowhere else. EEL is focused in (6)a and *only* is a focus sensitive operator that associates with it. In (6)b, *only* associates with the focused occurrence of VENICE.

3 Focus meets Givenness: The Puzzles

Consider the following interchange:

- (7) Q: What food would Renee only eat in PARIS?
A: She'll only eat CRÊPES in Paris.

At first, the response in (7)A sounds fine. But upon reflection one has the intuition that the wrong question has been answered, that (7)A says that Renee eats nothing but crêpes in Paris making it inappropriate as an answer to (7)Q. Here's an intuitive analysis: to get a felicitous interpretation *only* has to associate with focused *Paris* but the accent on *crêpes* gets in the way and the lack of accent on *Paris*, due to its Givenness status, doesn't help matters. The problem is solved by fronting *crêpes*, taking it out of the scope of *only*:

- (8) a. Crêpes, she'd only eat in Paris.
b. It's crêpes she'd only eat in Paris.

We draw two tentative conclusions from (7):

- (9) (a) If an expression is focused but also Given, it doesn't get an accent, or at least not a nuclear accent. (*Paris*)
(b) A focus-sensitive operator cannot associate with a reduced focused phrase

across an intervening accented expression. (*only*)

The conclusion in (9)(b) is contradicted by this next example, and others like it in Büring (2016: §7.3.3):

- (10) Q: Radiology? Why did you take radiology?
A: because they only OFFERED radiology.

In (10)A, *only* associates with *radiology*. We readily understand that radiology was all that was offered. Despite its focus status, *radiology* is not accented because it's Given, in keeping with (9)(a). The surprising fact is that the prominence on *offered* does not interfere with the focus-association. In fact, the more emphatically one pronounces *offer*, the better it gets, while in (7), the more emphatically you pronounce *crêpes*, the worse it gets.

The next example, in (11) below, was offered by Tony Kroch (pc) as a challenge to the Givenness account invoked earlier regarding (4)B, NAMED *the dog*. In that case, the object DP *the dog* is Given, so prominence falls on the transitive verb. That's not what happens in (11)A₂:

- (11) A₁: Jack had a car and a yacht.
B: What did he do when he lost his money?
A₂: He sold the YACHT.

In Kroch's example, *yacht* intuitively contrasts with *car*. So one might say, and I will, that *yacht* is focused. And then one might go on to say that the prominence falls on *yacht* because of focus. But that can't be right, for recall in the last two examples we saw that an expression that is focused and Given does not get an accent, (9)(b).

Summarizing now, our first example seems to show that an intervening prominence interferes with association with focus. Our second example shows it doesn't. Our first two examples show that Givenness leads to deaccenting even if there is focusing. Our last example showed that it doesn't. In the next three sections, I'll say more about how focus and givenness works. Following that, we'll return to our examples with a fresh perspective.

4 Givenness: N marking

Below is brief summary of the theory of Givenness³ as presented in Beaver & Velleman (2011) using the syntactic marker *N*, reserving *F* for focus. *N* is mnemonic for *not-given* or it can be taken to stand for *new* so long as *new* can be understood in a relative sense. When I replace the knob on the front door, the door is old but the knob is new. The knob is new because it was just made or it's new, in the relative sense, because it just became part of the door.

The theory runs on an implication relation that relates expressions, propositional and non-propositional alike. It subsumes coreference and entailment relations and it generalizes

³ See Büring (2016: chapters 3-5) and Rochemont (2016) for balanced discussion of this theory. The theory is presented in this section somewhat informally. There is a precise statement in the final section of the paper.

to functional types by raising or lowering the type of any predicative expression to propositional type by existentially quantifying arguments. Constituent questions are understood to be predicates of propositions. The relation is illustrated in (12) and the rules for deploying *N* markers are in (13). Following that are examples to illustrate how it works.

(12) IMPLY relation

- Generalized entailment
Jack ate eel in Venice IMPLIES *Jack ate eel.*
ate eel in Venice IMPLIES *ate eel*
- Coreference
if [*the senator*]_{*i*} and *she*_{*i*} corefer, then [*the senator*]_{*i*} IMPLIES *she*_{*i*}
- Constituent questions behave like existential statements
What did Jack eat? IMPLIES *Jack ate something*
What did Jack eat? IMPLIES *ate something*
- Yes/No questions behave like declaratives
Has he named the dog? IMPLIES *named the dog*

(13) Givenness Rules

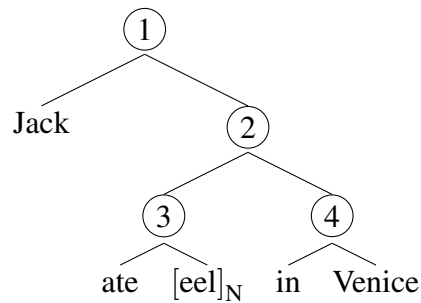
- (I) If an expression α is not *N*-marked, then it must be that:
- a. α is implied by a piece of prior discourse.
 - or
 - b. the result of existentially quantifying any *N*-marked parts of α is IMPLIED by a piece of prior discourse
- (II) *N*-mark as little as possible

The main prominence falls on *eel* in an utterance of *Jack ate eel in Venice* when uttered in response to the question *What did Jack eat in Venice?*

- (14) {What did Jack eat in Venice?}
Jack ate EEL in Venice.

Let's see why that is so. With the exception of *eel*, all the words in the sentence can satisfy (I) without *N* marking because they're IMPLIED by words in the question. Since they can be without *N*-marking, by (II) they should remain un-*N*-marked. *eel* cannot satisfy (I) so it must be *N*-marked. Next, we consider constituents within the sentence:

(15)



④ satisfies (I), it's implied by the same expression in the question. ② also satisfies (I). Since *eel* is *N*-marked, ② requires an antecedent that IMPLIES:

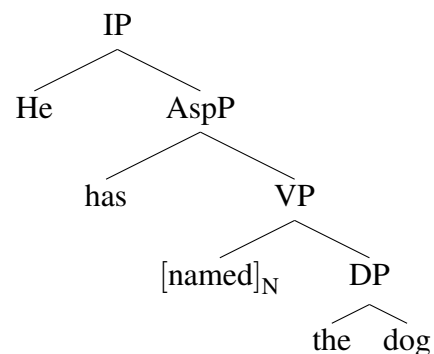
(16) $\exists x \exists y x$ ate y in Venice.

The question IMPLIES (16). Note that the first existential, ‘ $\exists x$ ’ is from generalized entailment and the second existential is due to the *N*-marking. By similar reasoning, ③ and ① satisfy (I) and so by (II) none of these constituents should be *N*-marked. Next we adopt the rule in (17) correlating *N*-marking with prominence:

(17) *N*-marking Phonology
 If α and β are sisters, and α is *N*-marked or contains an *N*-marked expression and β is not *N*-marked and does not contain *N*-marking, then α is more prominent than β .

This rule entails that *eel* will be more prominent than any other expression in (15). It will bear the nuclear accent. (17) is not in Schwarzschild (1999) or in Beaver & Velleman (2011). It can be thought of as a constraint ranked high relative to syntactic constraints like those in (2). Recall that those constraints by themselves require nuclear accent on *Venice*. Givenness, expressed here as lack of *N*-marking, reduces prominence on *Venice*. The object *the dog* suffers a similar fate in (18):

(18) {Jack owned an apartment and a dog}
 Has he NAMED the dog?



the dog is Given due to prior utterance of a dog⁴ while *named* is not Given, hence it must be *N*-marked.

⁴ This reasoning requires it to be the case that *a dog* in (18) IMPLIES *the dog*. That constrains our choice of

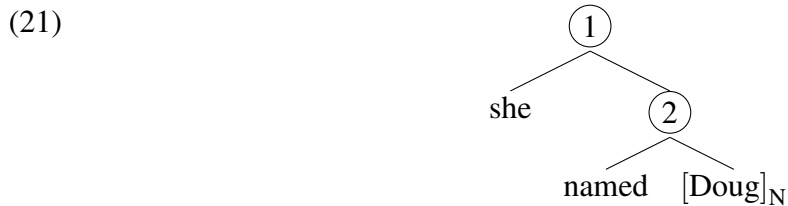
To best illustrate the way in which *N* represents *new* in the relative sense, we turn to an example in which, to use Beaver and Velleman’s phrase, there is *N*-marking “for the sake of a larger expression”.

- (19) {Who did Mary name when Doug was in the courtroom?}
 She named [DOUG]_N

All the words in (19) satisfy Givenness rule (I) so by rule (II), none of them should be *N*-marked. But the story doesn’t end here. Turning to the constituents of *She named Doug*,



we find that ① does not satisfy (I); nothing in prior discourse IMPLIES that Mary named Doug. In fact, nothing IMPLIES that anyone named Doug, so ② also fails to satisfy (I). Consider now what happens when *Doug* is *N*-marked:



The preceding discourse IMPLIES that she named someone. This means that in (21), both ① and ② satisfy (I) and, in fact, *N* marking *Doug* achieves this result with the least amount of *N*-marking.⁵ Summarizing, the structure in its entirety demands *N*-marking of *Doug* even though the word itself is not newly mentioned.

semantics for definites and indefinites. One option is to treat them as non-quantificational and coreferential in (18) at the level at which the Givenness rules apply.

⁵ In (21), *N*-marking on *Doug* is determined at the node immediately above it. Compare that to (i) below from Sauerland (2005):

- (i) {Which of praising and applauding did Mary do to John?}
 She PRAISED John.

Sauerland observes that “the verb and the object are given, but the verb phrase is not.” This means that there must be an *N*-marker on *praised* or on *John*, but as Sauerland’s discussion implies, an *N*-marker on either word will suffice. It’s only at the next level that the choice is made. The question *which did Mary do to John?* IMPLIES that Mary did something to John, making *she [praised]_N John* ok, but nothing IMPLIES that Mary praised anyone, so *she praised [John]_N* is not ok.

5 Association with focus: F-marking

(6) above displays a correlation between locus of intonational prominence and truth conditional content. That connection between sound and meaning is mediated by a logical form that includes *F*-marking. The examples with the *F*-marking are repeated in (22). Below each example is a gloss instantiating the general statement in (23) of the interpretation of *F*-marking.

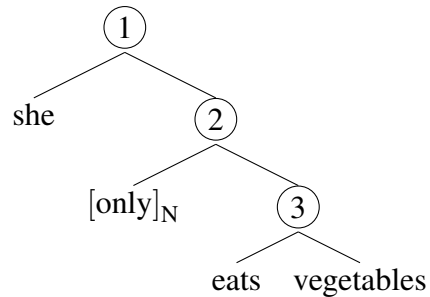
- (22) a. He only₁ ate [eel]_{F1} in Venice.
 ‘he ate eel and nothing else in Venice’
- b. He only₁ ate eel in [Venice]_{F1}.
 ‘he ate eel in Venice and nowhere else’

(23) *F*-marking contributes to truth conditions by determining what alternatives are excluded by *only*⁶

In (22), I’ve coindexed *only* with the *F*-marker. I anticipate examples featuring more than one operator and the indexing will help us keep track of the intended associations. The coindexation confers a level of expressiveness that has been questioned; more on this below.

The locus of intonational prominence in these examples would be determined through *N*-marking with a contribution from *F*-marking. The *N*-marking in (22) would work as in previous examples. Paired with a context, we’d determine where to sparingly place *N*-marks to guarantee compliance with Givenness rule (I). *F*-marking enters in to that calculation insofar as it affects the truth conditional content. This applies to all the parts of (22) including *only* itself which I assume can be *N*-marked, as in the following example from Beaver & Velleman (2011: 1677):

- (24) a. Mary eats vegetables?
- b. That’s not all.
 She [only]_N eats vegetables.



③ in the structure on the right in (24) is IMPLIED by the question in (24)a., so it needs no *N*-marking. However, if there were no *N*-marking at all in the sentence, ① would violate Givenness, for nothing entails that Mary only eats vegetables. *N*-marking *only*, allows ① to obey Givenness, since the question in (24)a. IMPLIES (25) below, assuming that the identity function is a possible value for *X*.

(25) $\exists X$ She *X* eats vegetables.

⁶ There is a precise formalization in the final section of the paper.

Katz & Selkirk (2011) detected a “super-high H tone” on *only* in all-new utterances. Lee (2012) reports the same for the Korean adverb *ozik* ‘only’. These observations lend some plausibility to the idea that *only* participates in intonationally relevant *N*-marking. I will assume that whenever *only* is newly uttered it is *N*-marked.

I defer discussion of the phonetics of *F*-marking to a later section.

6 Exhaustivity: silent EXH

There is a robust intuition that (26)A can be used as an exhaustive answer to the question in (26)Q.

- (26) Q: What did Jack eat?
A: Jack ate [eel]_N.

By this we mean that (26)A can be used to convey that Jack ate eel and nothing else. According to a growing consensus, an exhaustive interpretation is a sign of a silent operator that may associate with focus (see eg Chierchia 2013: §2.3.2, Katzir 2013: 341, Spathas 2010: §2.5). If we spell out that operator in (26)A using the notation in Fox (2007) we get:

- (27) Q: What did Jack eat?
A: EXH₁ Jack ate [eel]_{F1}

The action of EXH is described in (28) below, which makes reference to *F_i*-alternatives. An *F_i*-alternative for a sentence α is a proposition that would be expressed by α if its *F_i*-marked parts had meanings other than the ones they actually do (Rooth 1985). The proposition that Jack ate oatmeal is a reasonable *F₁* alternative to *Jack ate [eel]_{F1}*. Unreasonable alternatives to *Jack ate [eel]_{F1}* would be that Jack ate food or that Jack ate baby eel (see Bar-Lev & Fox 2017 and references therein for a theory of what counts as a reasonable alternative)

- (28) For any sentence α , “EXH_{*i*} α ” is true just in case α is true and any reasonable *F_i*-alternative to α is false.

The reply in (26)A includes *N*-marking and the one in (27)A includes *F*-marking. Putting those together we get:

- (29) Q: What did Jack eat?
A: EXH₁ Jack ate [[eel]_{F1}]_N

According to the Givenness rules, (29)A is felicitous, because:

- (30) *What did Jack eat?* IMPLIES $\exists X(\text{EXH}_1 \text{ Jack ate } X)$

Since there are no *F*-marks left in ‘(EXH₁ Jack ate *X*)’, there are no *F*-alternatives and so EXH is innocuous. In the final section of the paper, we’ll spell out the interpretation of *F*- and *N*-markings in such a way that when the Givenness rules are applied, an expression that is *N* marked is treated in one and the same way whether or not it is also *F*-marked. But

that shouldn't be taken to mean there is no interaction between *F*-marking and *N*-marking, focus and givenness. Consider the following example:

- (31) Q: Did Karen buy a horse or did Marc buy a horse?
 A: EXH₁ [[KAREN]_{F1}]_N bought a horse.

The presence of EXH and its associated *F*-marker accords with the exhaustivity inference one feels here: Marc did not buy a horse. But what about the *N*-marking? There is a piece of preceding discourse, the first disjunct, that IMPLIES *Karen buy a horse* and all subconstituents thereof, so why should there be any *N*-marking? Here's where the focus is relevant. No part of the preceding discourse IMPLIES the exhaustified proposition, that Karen, but not Marc, bought a horse. So having no *N*-marking in (31)A would be unacceptable. On the other hand, if *Karen* is *N*-marked, then the exhaustification plays no role in Givenness, just as in (29)-(30) above. This is a special case of *N*-marking (*Karen*) for the sake of a larger expression, the whole sentence.

The presence of *N*-marking on *Karen* will have the effect of attracting the nuclear accent, due to the phonological rule in (17). The *N*-marking in turn was caused by the *F*-marking. So an unsuspecting observer might misattribute the intonational prominence to the *F*-marking, taking the accent placement to be a marker of exhaustivity.

In the two examples of exhaustivity discussed so far, I've posited an EXH operator based on an intuition that the utterance gives rise to an exhaustive inference. I haven't given a theory of when EXH is present. In both (29) and (31) and in examples to be discussed, one can easily see that a speaker without guile would desire to produce an utterance with an exhaustive interpretation. Nevertheless, as the papers cited earlier make clear, there's more to the distribution of EXH than forthright conversation.

Armed now with a matured understanding of focus, givenness and exhaustivity, we return to the puzzles with which we began.

7 Annotating the puzzles

We return now to the puzzles that triggered our investigation. Using the tools developed above, we'll show that across the three examples, expressions that are focused and given (+*F*, -*N*) are never prominent relative to their surroundings. This resolves one of the contradictions with which we began. Following that, we'll turn our attention to the infelicity of the *crêpes* example.

Our *crêpes* example is repeated in (32), newly annotated.

- (32) Q: What food would Renee only₂ eat *t* [in PARIS]_{F2}? *Crêpes*
 A: EXH₁ She'd only₂ eat [[CRÊPES]_{F1}]_N [in Paris]_{F2}.

Concentrating first on the *F*-marking, EXH₁ ... F₁ is what makes (32)A an exhaustive answer. The presence of exhaustivity is what allowed us earlier to paraphrase (32)A with a cleft:

(33) It's crêpes that she only eats in Paris.

*only*₂ ... F₂ appears in the answer because it appears in the question. Together the two foci and their associated operators should produce the proposition that: crêpes is such that Renee eats them in Paris and nowhere else, and it's the only such thing. Moving now to *N*-marking, observe that *crêpes* must be *N*-marked because it has not been IMPLIED. No further *N*-marking is necessary. To see this consider that the entire sentence satisfies Givenness rule (I) because:

(34) (32)Q IMPLIES $\exists X(\text{EXH}_1 \text{ She'd only}_2 \text{ eat } X \text{ [in Paris]}_{\text{F}_2})$

The *F*-marking on *in Paris* does not trigger *N*-marking, unlike in (31) above. That's because in this case there is an antecedent, (32)Q, that IMPLIES the exhaustive/*only* meaning. Since there is no *N*-marking on *Paris* and there is *N*-marking on *crêpes*, the nuclear accent falls on *crêpes* making it more prominent than *Paris* as required by the our phonological rule in (17).

Next, we turn to our radiology example:

(35) Q: Radiology? Why did you take radiology? *Radiology*
 A: [They]_N [only]₂_N [OFFERED]_N [radiology]_{F2}

In this case, there is no evidence of an EXH operator, at least not one that associates with an expression within the answer. If there is any exhaustive inference, it's that (35)A is the only reason that radiology was taken. Evidence of the *F*-marking on *radiology* comes from the intuition that A is saying that nothing but radiology was offered. Turning now to *N*-marking, except for *radiology*, every word, including *only* requires an *N*-mark. No *N*-marking is needed on higher constituents because:

(36) *you take radiology* IMPLIES $\exists XYV(X YVed \text{ radiology})$

The *F*-marking on *radiology* does not trigger *N*-marking, again, unlike in (31) above. This time the reason is that *only* itself is *N*-marked, an option I assume is unavailable to silent EXH. Since there is no *N*-marking on *radiology* and there is *N*-marking on *offered*, the nuclear accent falls on *offered* making it more prominent than *radiology* as required by the rule in (17).

We turn now to our final example:

(37) A₁: Jack owned a car and a yacht. *Yacht*
 B: What did he do when he lost his money?
 A₂: EXH₁ He sold_N [[the-YACHT]_{F1}]_N

Given the context of A₂'s remark, the question of selling the car must be salient. As this was not confirmed, an eavesdropper would assume that the car was not sold. Indeed, (37)A₂ is understood to convey that, hence the presence of EXH... F₁. In this case, the *F*-marking does trigger *N*-marking, as in (31). *sold* also requires *N*-marking since it is not Given.

This means that the phonological rule in (17) is silent on their relative prominence and the syntactic constraints with which we began lead the nuclear accent to the object. *yacht*, it turns out, is not a focus and given phrase, despite the fact that *yacht* has been mentioned. It's another example of *N*-marking for the sake of a larger expression. This example should be contrasted with (4) repeated below:

- (38) A: Jack is getting better. He now has an apartment and a dog.
 B: Has he NAMED the dog?

In this case, since apartments are not normally named, the question of naming the apartment is not salient, so no EXH is called for and so there is no *F*-marking on *dog* to trigger *N*-marking.

At this point, we've addressed the status of focused-given expressions. They uniformly display reduced prominence. In the next section, we'll briefly discuss the phonology of *F*-marking and its role in focus-given phrases. For now we return to the murky status of the *crêpes* example and we begin by noticing a telltale arrangement of foci and the operators that associate with them.

- (39) Q: What food would Renee only₂ eat *t* [in Paris]_{F2}? *Crêpes*
 A: EXH₁ She'd only₂ eat [[CRÊPES]_{F1}]_N [in Paris]_{F2}.

In (39)A, focus sensitive *only* intervenes between EXH and its associate, *crêpes*. Examples of this kind with pairs of overt operators have been discussed (Krifka 1991, 2004, Rooth 1996a, Wold 1996) with some debate about their acceptability. Beck & Vasishth (2009) conducted an experimental study showing “that such configurations are very problematic”. Beck (2016) traces the problem to the inner operator which cannot help but associate with all the foci in its scope. Concretely, that means that the indices on EXH and *only* represent intended but unrealizable interpretations.⁷ On that analysis, (39)A excludes Renee's eating anything but crêpes in Paris and that entailment spells trouble in the discourse in (39).

In the literature cited above, various combinations of overt focus sensitive operators are considered, however the one that is most relevant to our concerns, *only...only* is, as far as I know, not mentioned. Here's an example of that type:

- (40) Alan, Bob and Carl are in a restaurant enjoying a bottle of red wine together. Alan remarks “Bob only drinks wine in RESTAURANTS” Bob corrects him with “I only said I only drink WHITE wine in restaurants”.
- (41) #I only₁ said I only₂ drink [[WHITE]_{F1}]_N wine in [restaurants]_{F2}.

Bob's remark sounds odd because *only*₂ appears to associate with *white* giving rise to an interpretation according to which Bob drinks white wine in restaurants but not red wine. That conflicts with the fact that Bob is in a restaurant drinking red wine. The intended

⁷ Beck and Vasishth viewed their experiment results as evidence against Kratzer's (1991)'s analysis of foci in terms of distinguished variables, represented here as indices on the *F*-markers and adopted in the formalization in the last section of this paper. This conclusion is unwarranted and was dropped in Beck (2016).

interpretation glossed in (42) would have been felicitous in this discourse:

(42) It's only about white wine that I said I only drink it in restaurants.

The trouble in (39) has to do with the arrangement of foci and the operators that associate with them within the answer. Answerhood per se is not a factor. Here's an example in which the troublesome constellation is created in a correction context:

(43) {Darlene only gave peanuts to the ELEPHANTS}
#No, she only gave WATER to the elephants.
EXH₁ She only₂ gave [[WATER]_{F1}]_N [to the elephants]_{F2}.

Assuming the difficulty in the *crêpes* example is indeed to do with nested operators allows us to make sense of the following observation:

(44) “Rooth (2010) points out that (31b) [RS *Crêpes*] becomes felicitous if uttered with ‘a rising intonation indicating a partial answer on the first focus *crêpes*.’ We agree with these judgments, and have verified them with several consultants.” Beaver & Velleman (2011)

If rising intonation indicates a partial answer, it must mean there is no EXH operator, no focus on *crêpes* and no intervention. *crêpes* is *N*-marked but not *F*-marked.

(45) A: She'd only₂ eat [CRÊPES]_N [in Paris]_{F2}.

As reported earlier, the *crêpes* example is often initially perceived as felicitous and on second thought sounds inappropriate. Suppose that speakers understand *only* as associating just with *crêpes*:

(46) A: She'd only₁ eat [[CRÊPES]_{F1}]_N in Paris.

The *N*-marking would still satisfy Givenness, so the intonation would not give a reason to think there is problem and if *crêpes* is the only thing she eats in Paris, as (46) says, then it must be the only thing she eats in Paris and nowhere else, assuming there is such a thing. So (46) would satisfy the questioner and would do so exhaustively. Moreover, we might be inclined to imagine the question is restricted to exotic foods. In that case, it's less disturbing to say that Renee eats only *crêpes*. The following example tries to control for that effect:

(47) Guest₁: We've just finished an extensive study of who gets called on in our college classes, with a break down by gender and ethnicity.
Host: I read the report. Can you tell our audience which group only gets called on in PHILOSOPHY courses?
Guest₂: Ah yes. Interesting. We only call on AMERICAN MEN in philosophy courses. But then everyone is called on in those classes.

In this case, the alternatives to American men are fixed in the discourse, so if one were to

choose (48) in place of (49), the result would be infelicitous. I do get a clearer negative judgment in this case.

(48) Guest₂: We only₂ call on [[AMERICAN MEN]_{F2}]_N in philosophy classes.

(49) Guest₂: EXH₁ We only₂ call on [[AMERICAN MEN]_{F1}]_N in [philosophy classes]_{F2}.

There is another confound here pointed out to me by Simon Charlow. If *crêpes* were to move prior to interpretation outside the scope of *only* it would eliminate nesting. In his discussion of overt nested operators, Rooth (1996a) considered this possibility which is why you'll find examples there where both foci are locked inside an island. I don't know why QR doesn't just save the *crêpes* example. Maybe it does for some speakers.

In stating our puzzles, we began with the two claims in (50). For each claim, we had validating and contradicting examples. In both cases, exhaustivity turned out to be the missing ingredient.

(50) (a) If an expression is focused but also Given, it doesn't get an accent, or at least not a nuclear accent.

(b) A focus-sensitive operator cannot associate with a reduced focused phrase across an intervening accented expression.

The first conclusion appeared to be challenged by the *yacht* example. In the end, we determined that *yacht* was not in fact Given. Although it was recently mentioned, it was focused and associated with EXH. That association changed the meaning in such a way, that *N*-marking was needed on *yacht*, for the sake of the exhausted utterance. The second conclusion turned out to be wrong in general. It's not an intervening accented expression that causes a problem, it's an intervening focus, in this case, a focus whose presence has to do with exhaustification.

I've restricted attention to a small number of key examples which might lead to spurious generalizations, one of which I'd like to dispel. The intervening accented expression in the *crêpes* example is a DP while in the radiology example it's a verb. What follows are two examples where matters are reversed.

(51) A: I steam any kind of vegetable – even eggplant or potatoes. Then there are special cooking techniques that I reserve for particular vegetables.

B: Really? What method do you only use on celery?

A: #I only BRAISE celery.

EXH₁ I only₂ [[BRAISE]_{F1}]_N [celery]_{F2}

This example is odd like the *crêpes* example due to the presence of nested foci. In this case, the offending focus is on a verb, *braise*.

(52) A₁: I gave Stella a book.

B: Just a book? Why?

A₂: because I only_{1,N} gave [MANNY]_N [a book]_{F1}.

(52)A₂ is ok, just like the radiology example, but this time the unoffending intervening accented expression is a DP. There's no call for an EXH associating with *Manny*; he isn't the only one who got a book.⁸

8 Focus phonology

F-marking is often hard to hear. The following are the results of laboratory studies:

- (53) Phonetics of associated foci⁹
- (a) If an expression is *N*-marked, adding an *F*-mark associated with *only* **increases duration and pitch prominence.**
 - (b) If an expression is pre-nuclear and not *N*-marked, adding an *F*-mark associated with *only* **increases duration and pitch prominence.**
 - (c) If an expression is post-nuclear and not *N*-marked, adding an *F*-mark associated with *only* **increases duration and intensity.**

The statement in (53)c. applies to the words *radiology* and *Paris* in our examples (7) and (10). While the presence of *F*-marking is hard to detect on lexical items in the absence of phonetic measurements, Hoeksema & Zwarts (1991) observed that weak Dutch pronouns could be used as detectors because they resist increased duration and intensity. Susanne Tunstall independently made the same observation for English and von Stechow (1994) employed pronouns as a tool for detecting foci, a tool which has since been used extensively. Applying it here, we replace *radiology* with *it* in (7) to dramatic effect:

- (54) Q: Why did you take radiology?
A: #because they only OFFERED it.

it cannot be *F*-marked and Given.¹⁰ Once *F*-marking *it* is ruled out in (54), for some reason,

⁸ This *N*-marking is also plausible - given *B*'s remark:

A₁ EXH₁ I gave Stella [a book]_{F1}.
A₂: because I only₁ gave [MANNY]_N [a book]_{F1}.

⁹ Rooth (1996b), Beaver, Clark, Flemming, Jaeger & Wolters (2007), Féry & Ishihara (2009), Wagner, Breen, Flemming, Shattuck-Hufnagel & Gibson (2010), Katz & Selkirk (2011). The language of *N*-marking and *F*-marking is mine, not that of the authors whose results I'm summarizing.

¹⁰ I find (i) below more or less ok:

- (i) The robot only pointed at Jane and Jane only pointed at IT.

So it's the increased duration and intensity without accent that seems to be a problem for *it*. Verena Hehl observed that pronominalization with *that* instead of *it* does not cause the kind of disruption seen in (54). Krifka (2004) notes this contrast as well. Rooth (1996b) and Beaver & Clark (2008) say that phonological reduction of a pronoun (any pronoun) is what causes the effect seen in (54).

one interprets *only* as associating with *offer* and in this case that sounds nonsensical. A comparison of (54) with (55) confirms that the problem lies in the *F*-marking not merely in the lack of *N*-marking that steers the nuclear accent to the verb:

- (55) Q: Why did you take radiology?
A: because they OFFERED it.

I've portrayed the pronunciation of *radiology/Paris* as jointly determined by the phonology of *N*-marking and *F*-marking. As Féry & Ishihara (2009: 303) write, "focus boosts prominence (higher pitch/longer duration), givenness weakens prominence (lower pitch/shorter duration)" and an expression that is "both focused and given, is subject to both effects." In the remainder of this section, I briefly recount other approaches to muted foci like those on *radiology* and *Paris*.

Rooth (1996, 2010), Büring (2015,16) and Beaver & Velleman (2011) offer accounts in which foci compete, with the loser muted. They would begin with the assumption that *offer* is focused as in (56) below and then they would show that it trumps *radiology* forcing it to be less prominent.¹¹

- (56) Q: Radiology? Why did you take radiology?
A: [They]_N [only₂]_N OFFERED_{N,F} [radiology]_{F2}.

The additional *F*-marking that these accounts rely on is not implausible, for there is an intuitive contrast between *offer* and *take*. But the contrast intuition is weaker or nonexistent in the second lines of the examples in (57) presented in Selkirk (2008) as a challenge to focus-competition analyses (Selkirk uses acute accents to mark pitch accents. *G* stands for 'given' and corresponds where marked to lack of *N*-marking).

- (57) Only [Eleanor]_F was introduced to Franklin by his mother.
And his whole life, he loved only [Eleanor]_{F,G}

The New York Times gives only [newspaper subscriptions]_F to the city's poor.
I don't think they can live on only [newspaper subscriptions]_{F,G}.

The effect brought about with the pronoun *it* may arise less dramatically with short lexical items. I perceive it in Rooth's (1992) celebrated rice example: *people who GROW rice, generally only EAT rice*. I often hear that as excluding alternatives to eating, which is not the intended reading. This feeling goes away when the noun phrase *rice* is expanded: *people who GROW genetically modified rice, generally only EAT genetically modified rice*. Rooth (2010) suggests that the same is happening in our *crêpes* example - *in Paris* is too short to be a muted focus. But here I don't find that expansion helps:

- (ii) What food would Rosa only eat at the beach in Belgium?
She'd only eat MUSSELS at the beach in Belgium.

¹¹ In this particular case, as Büring discovered, the competition rules according to Rooth (1996b) or Büring (2016) would either yield no winner or the wrong one depending on the scope of the focus on *offer* ('scope of focus' is a term of art crucial to the rules of competition). Rooth (2010) is a response to that predicament.

We were ordered to only think [good thoughts]_F.
 But we were bored by only thinking [good thoughts]_{F,G}.

In one of Beaver and Velleman’s own examples, repeated in (58) below, it is hard to see what notion of contrast is being invoked. Earlier we discussed the *N*-marking of *only* in this small discourse (see (24)). But *N*-marking is not sufficient in Beaver and Velleman’s system to draw the primary accent away from *vegetables*. To accomplish that goal, “*only* must be *F*-marked in addition to being *N*-marked, because it is being contrasted with what has come before”.

- (58) a. Mary eats vegetables? Beaver and Velleman (21-22)
 b. That’s not all.
 She ONLY_{F,N} eats vegetables_F

In Selkirk’s view there is no competition among foci, rather, for an expression to be focused and *G*-marked, previous discourse must imply not only the expression’s content but also the contribution of the focus marking. For the *radiology* example, that would imply a focus in the antecedent¹²

- (59) Q: [Radiology]_F? Why did you take [radiology]_F?
 A: [They] [only₂] OFFERED [radiology]_{F2,G}.

In (59)Q, a focused antecedent for (59)A seems plausible, but that isn’t always the case. Beaver and Velleman discuss Rooth’s (1992) example, *people who grow rice, generally only eat rice*. They point out that the second occurrence of *rice* bears only secondary accent even though the first occurrence is not focused. Assuming the second occurrence of *rice* is focused and associated with *only*, the secondary accent would require *F, G* marking but with no antecedent focus, as Selkirk’s theory would require. A similar point can be made with the following dialogue:

- (60) Q: How was your trip?
 A₁: Hmm. . . we ate crickets in Mexico.
 A₂: Unfortunately, we ONLY ate crickets in Mexico.

(60)A₂ has several readings, one of which is that crickets were all we ate. That reading

¹² I should add that an actual prior *F*-marking is not required. Selkirk’s *G*-Marking Condition is semantic. It makes references to ‘focus semantic values’. Consider Vallduví’s (1990) example (287):

- (i) {A last-minute guest arrives at the host’s house. The host has known the guest’s family for years}
 Host: I’m glad you could come for dinner. Had I known before, I wouldn’t have made pig’s feet.
 Guest: I love pig’s feet. It’s my SISTER who *only* eats *prime cuts*.

Clearly the guest understands the host to have implied that the guest likes only prime cuts. That’s sufficient to treat *prime cuts* as focused and given. While Krifka’s (2004) term “second occurrence focus” is generally applied to muted foci like on *prime cuts* none of the theories surveyed here follow Krifka in requiring an antecedent focused utterance (Rooth 1996b example (25) addresses this point).

corresponds to an LF in which *only* associates with a focus on *crickets*, which is then focused and Given. If *crickets* is pronominalized, making the focus + Given phonology difficult, another reading surfaces:

(61) Unfortunately, we [ONLY₁]_N ate them in [Mexico]_{F1}.

Depending on the reading, *crickets* or *Mexico* would have to be *F,G*-marked in A₂ on Selkirk's account, requiring the corresponding expression to be focused in A₁.

9 Contrastive focus

In our discussion above of Beaver and Velleman's analysis, an *F*-mark was added to *offered*:

(62) Q: Radiology? Why did you take radiology?
A: [They]_N [only₂]_N OFFERED_{N,F} [radiology]_{F2}.

The marking was supposed to represent a felt contrast with *take*. That intuition remains, regardless of who is right about muted foci. In the proposed representation in (62)A, no operator associates with that contrast *F*-mark. Earlier, we explained the difference in acceptability between this example and the *crêpes* example in terms of an operator, EXH, that associates with a focus in the scope of *only*. So if there is an operator associating with a possible contrast focus, it must not interact with *only* the way EXH did. This could be because it is attached directly to the contrasting expression or because it doesn't interact with *only*. (The latter option does not make sense on the Beck theory of nested foci adopted here).

Kiss (1998) argued for a distinction between identificational focus and information focus. Kiss's "informational focus" corresponds more or less to *N*-marking. Among the identificational foci, Kiss distinguished those that are [+exhaustive] and those that are [+contrastive]. [+exhaustive] corresponds more or less to association with *only* or EXH. Büring (2016: 203) proposes as much for Hungarian based on Horvath (2010). This leaves [+contrastive] defined as operating "on a closed set of entities whose members are known to the participants of the discourse" That fairly describes the added focus in (62). Repp (2016) recommends the term explicit alternatives. The theory presented here needs to be further developed to create a home for this category and whatever coherence relations might go with it (Kehler 2005).

Zimmermann (2006) presents a different idea about linguistic devices categorized as 'contrastive focus'. According to him, the key pragmatic feature is low expectation on the part of the hearer. That type of contrast could involve an associated operator, if Chierchia (2013: §2.3.2) is right that there are covert counterparts of *even* alongside covert counterparts of *only*. And if there are covert *evens*, there could be trouble when they have an *only* in their scope. Consider the following example:

(63) A: I've only₂ eaten rabbit in [Paris]_{F2}.

B: That's nothing. I've only eaten MEAT in Paris.

(63) B doesn't work as intended, assuming the speaker means to say that Paris is the only place she's eaten meat and not that meat is the only thing she's eaten in Paris. B's intended message can be paraphrased as:

(64) I've eaten meat in Paris and nowhere else.
Eating meat in Paris and nowhere else is more surprising than eating rabbit in Paris and nowhere else.

The surprise part of (64) looks like the kind of thing you find with scalar *even*, leading to (65):

(65) EVEN₁ I've only₂ eaten [[MEAT]_{F1}]_N in [Paris]_{F2}.

And now we have the familiar nested configuration, in which *only* grabs the focus on *meat* meant for the higher operator.

'Contrastive focus' is a cover term for distinct types of focus (Repp 2010). Some of them are *F*-marking associated with a covert counterpart of *only* or *even* and some require a different kind of analysis. And yet other prominences that are described as contrastive focus might simply arise from uneven *N*-marking (see (58) in the previous section).

10 New

Kratzer & Selkirk (2017) insist that "grammar is blind to Newness: There are no phonological, syntactic, or semantic operations that are sensitive to the mere newness of a constituent." The proposal made here adheres to that negative generalization, if by *new* we mean simply 'not previously mentioned'. But if the intention is the relative notion of *new*, the one captured in the rules for *N*-marking, then I understand the point to be that we must do away with *N*-marking and instead use *G*-marking (Féry & Samek-Lodovici 2006, Selkirk 2008, Kratzer & Selkirk 2017, Büring 2016: 74-76 and elsewhere). This would mean adding a *G*-marker to any un-*N*-marked constituent discussed so far and removing all *N*-markers. And it would mean rewriting our rules changing 'N-marked' to 'not *G*-marked' and 'not *N*-marked' to '*G*-marked'. This may seem like a trivial move, but it would complicate the precise statement of the semantics of givenness (see the next section). Here are some considerations:

- For Kratzer & Selkirk (2017), information structure markers are syntactically potent and not merely a device to aid in the statement of the pragmatics-phonology interface. As such, *G*-markers may play a role in the production of marked word orders in which given material precedes new material (Neeleman & Van De Koot 2016). A left periphery operator, for example, might be attracting *G*-marked constituents (pace Kučerová 2012 for whom givenness stays in the semantics). By contrast, Rochemont (2013) argues that the novelty of a constituent is never motivation for its

displacement (*pace* Petrova & Speyer 2011).

- The N -marking Phonology rule in (17) suffices for this paper. But a more serious account of the interface may require relating prominence to givenness, as in the works cited above. If we assume that information structure markers are privative features then we would need to choose G marking.
- According to the Givenness rules, a given expression is a type of anaphor. And that anaphora can be selective (Schwarzschild 1999: §5). Spelling this anaphora relation out in detail could involve having a G -marker to hang an index on.

11 Formalization

In this section, you will find a precise formulation of the rules of Givenness and an interpretation for EXH. Following Kratzer (1991), I treat F -markers as variables and I extend that treatment to N -markers. I adopt Wold's (1996) method for working this out with a single assignment function parameter. Expressions are interpreted relative to a world and an assignment function. Declarative sentences are assigned truth-values.

Following Beck's (2016) discussion of nested operators, I interpret *only*/EXH unselectively, so that an occurrence of one of these operators associates with all foci in its scope. This follows Kratzer's treatment, although the ingredients are there to make *only* selective as Wold had it.

11.1 Three kinds of indices

(66) Plain indices, N -markers and F -markers.

$\mathbb{N} = \{0, 1, 2, 3, \dots\}$, TYPE is the set of type labels.

plain indices: $\mathcal{P} = \mathbb{N} \times \text{TYPE}$ (eg $\langle 5, et \rangle \in \mathcal{P}$)
 N -markers: $\mathcal{N} = \{Ni : i \in \mathbb{N} \times \text{TYPE}\}$ (eg $N\langle 5, et \rangle \in \mathcal{N}$)
 F -markers: $\mathcal{F} = \{Fi : i \in \mathbb{N} \times \text{TYPE}\}$ (eg $F\langle 5, et \rangle \in \mathcal{F}$)

The type of an index or marker constrains the kind of value it is assigned.

EXAMPLE $g(N\langle 5, et \rangle) \in D_{et}$.

If the type label is e , it may be left off.

(67) Rules for interpreting F - and N -marked expressions

- if $Fi \notin \text{dom}(g)$, $\llbracket \alpha_{Fi} \rrbracket^{w,g} = \llbracket \alpha \rrbracket^{w,g}$
- if $Fi \in \text{dom}(g)$, $\llbracket \alpha_{Fi} \rrbracket^{w,g} = g(Fi)$
- if $Ni \notin \text{dom}(g)$, $\llbracket \alpha_{Ni} \rrbracket^{w,g} = \llbracket \alpha \rrbracket^{w,g}$
- if $Ni \in \text{dom}(g)$, $\llbracket \alpha_{Ni} \rrbracket^{w,g} = g(Ni)$

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$$\begin{aligned}
F1 \notin \text{dom}(g), N3 \notin \text{dom}(g) &\Rightarrow \llbracket [Jack]_{F1}]_{N3} \rrbracket^{w,g} = \text{Jack} \\
F1 \notin \text{dom}(g), N3 \in \text{dom}(g) &\Rightarrow \llbracket [Jack]_{F1}]_{N3} \rrbracket^{w,g} = g(N3) \\
F1 \in \text{dom}(g), N3 \notin \text{dom}(g) &\Rightarrow \llbracket [Jack]_{F1}]_{N3} \rrbracket^{w,g} = g(F1) \\
F1 \in \text{dom}(g), N3 \in \text{dom}(g) &\Rightarrow \llbracket [Jack]_{F1}]_{N3} \rrbracket^{w,g} = g(N3)
\end{aligned}$$

11.2 Meaning for *only*/EXH

The meaning of EXH is given below. I assume EXH attaches to *t*-type expressions. My definition is uninformed by recent advances in alternatives-research (Bar-Lev & Fox 2017). I want to imbue EXH with the power to ignore any prior assignments to *F*-markers and to start fresh. To that end, I introduce an operator ‘+’ on assignment functions defined as follows:

(68) + operation on assignment functions

For any assignment functions *g*, *h*:

$$(i) \text{ dom}([g + h]) = (\text{dom}(g) \cup \text{dom}(h))$$

(ii) for any $u \in \text{dom}([g + h])$:

$$\text{if } u \in \text{dom}(h), \text{ then } [g + h](u) = h(u)$$

$$\text{if } u \notin \text{dom}(h), \text{ then } [g + h](u) = g(u)$$

$$\begin{aligned}
(69) \quad \llbracket \text{EXH } \varphi \rrbracket^{w,g} = 1 \text{ iff } \llbracket \varphi \rrbracket^{w,g} = 1 \wedge \forall p_{st} ((p(w) = 1 \wedge p \in \text{ALT}_g - \varphi) \Rightarrow p \models \lambda w. \llbracket \varphi \rrbracket^{w,g}) \\
\text{ALT}_g - \varphi \stackrel{\text{def}}{=} \{ \lambda w. \llbracket \varphi \rrbracket^{w,g+h} : \text{dom}(h) = \mathcal{F} \}
\end{aligned}$$

Observe that if φ contains no *F*-marking, then $\llbracket \text{EXH } \varphi \rrbracket^{w,g} = \llbracket \varphi \rrbracket^{w,g}$.

This meaning for EXH will also serve to a first approximation as the meaning of *only*. What’s missing is the presupposition and possible arguments for *only* not of type *t*.

11.3 Givenness rules

The Givenness rules rely on entailment generalized to all types. This generalization is carried out by an operator ExClo which has the effect of existentially quantifying arguments:

$$\begin{aligned}
(70) \quad \text{ExClo (existential closure – raising to type } t) \\
\text{If } \varphi \text{ is a meaning of type } t: \text{ExClo}(\varphi) = \varphi
\end{aligned}$$

If α is a meaning of type ab : $\text{ExClo}(\alpha) = 1$ iff $\exists u_a \text{ExClo}(\alpha(u)) = 1$

EXAMPLE $\text{ExClo}(\llbracket \text{attack} \rrbracket^{w,g}) = 1$ iff
 $\exists x_e \text{ExClo}(\llbracket \text{attack} \rrbracket^{w,g}(x)) = 1$ iff
 $\exists x_e \exists y_e \text{ExClo}(\llbracket \text{attack} \rrbracket^{w,g}(x)(y)) = 1$ iff
 $\exists x_e \exists y_e \llbracket \text{attack} \rrbracket^{w,g}(x)(y) = 1$

\therefore For any w , $\text{ExClo}(\llbracket \text{attack} \rrbracket^{w,g}) = 1$ iff someone was attacked in w

The next EXAMPLE presupposes with Karttunen (1977) that a Wh-interrogative denotes a function that characterizes the set of its true propositional answers. For example,
 $\llbracket \text{who smiled?} \rrbracket^{w,g} = \lambda p \exists x x \text{ is human in } w \wedge p = \lambda w' [x \text{ smiled in } w'] \wedge p(w) = 1$

EXAMPLE $\text{ExClo}(\llbracket \text{who smiled?} \rrbracket^{w,g}) = 1$ iff
 $\exists p \text{ExClo}(\llbracket \text{who smiled} \rrbracket^{w,g}(p)) = 1$ iff
 $\exists p (\llbracket \text{who smiled?} \rrbracket^{w,g}(p)) = 1$ iff
 $\exists p \exists x x \text{ is human in } w \wedge p = \lambda w' [x \text{ smiled in } w'] \wedge p(w) = 1$ iff
 $\exists x x \text{ is human in } w \wedge x \text{ smiled in } w$

\therefore For any w , $\text{ExClo}(\llbracket \text{who smiled?} \rrbracket^{w,g}) = 1$ iff someone smiled in w

For *Yes/No* questions, the propositional kernel, before any question operator is added, may serve as a GIVENNESS antecedent.

An utterance in a context c is interpreted relative to a contextually supplied assignment function, g_c , that assigns values only to plain indices and only to those that are free in the utterance. Since the **GIVENNESS CONSTRAINT** will apply to any expression within an utterance, it will apply to expressions containing locally free pronouns and traces that are bound higher up. To take care of this, we'll make use of assignment functions g' that assign values to all plain indices. Given (68) above and our assumptions about g_c , if g' assigns values to all plain indices, then $[g' + g_c]$ is just like g_c for the indices that are free in the utterance and all other indices get the values assigned by g' .

(71) **GIVENNESS CONSTRAINT**

For every g' such that $\text{dom}(g') = \mathcal{P}$, when β is uttered in context c , there must be an antecedent α that is salient in c and (i) or (ii) below holds:

- (i) $\exists h (\text{dom}(h) \subseteq \mathcal{N} \wedge \llbracket \alpha \rrbracket^{w,g'+g_c} = \llbracket \beta \rrbracket^{w,g'+g_c+h})$ and β is type e .
- (ii) $\forall w [\text{ExClo}(\llbracket \alpha \rrbracket^{w,g'+g_c}) = 1 \Rightarrow \exists h (\text{dom}(h) \subseteq \mathcal{N} \wedge \text{ExClo}(\llbracket \beta \rrbracket^{w,g'+g_c+h})) = 1]$

EXCEPTIONS This constraint does not apply if:

- β is not assigned a meaning (β is syncategorematic – eg EXH)
- β is of the form $[\alpha]_{\text{Ni}}$ (eg **[Jill]**_{Ni}, **[vpsee Fred]**_{Ni})

β has Ni as its sister: (eg [**Jill**]_{Ni})

The world quantifier in (ii) could be restricted to worlds compatible with salient common ground propositions. That would allow it to cover cases where an antecedent is as much as expressed (see footnote 12).

[EXAMPLE]

- (72) {Q Who smiled ?}
 A: [Jack]_{N⟨1,e⟩} smiled.
 A': EXH [[Jack]_{F⟨2,e⟩}]_{N⟨1,e⟩} smiled.

For any g' , $\text{dom}(g') = \mathcal{P}$,

- i. $\exists h (\text{dom}(h) \subseteq \mathcal{N} \wedge \text{ExClo}(\llbracket \text{Jack}_{N⟨1,e⟩} \text{ smiled} \rrbracket^{w,g'+g_c+h})) = 1$ iff
 ii. $\exists h (\text{dom}(h) \subseteq \mathcal{N} \wedge \llbracket \text{Jack}_{N⟨1,e⟩} \text{ smiled} \rrbracket^{w,g'+g_c+h}) = 1$ iff *someone smiled in w*

In line (ii), g' and g_c play no role. h assigns some entity to the index $N⟨1,e⟩$.

- iii. $\exists h (\text{dom}(h) \subseteq \mathcal{N} \wedge \text{ExClo}(\llbracket \text{EXH} \llbracket \text{Jack} \rrbracket_{F⟨2,e⟩} \rrbracket_{N⟨1,e⟩} \text{ smiled} \rrbracket^{w,g'+g_c+h})) = 1$ iff
 iv. $\exists h (\text{dom}(h) \subseteq \mathcal{N} \wedge \llbracket \text{EXH} \llbracket \text{Jack} \rrbracket_{F⟨2,e⟩} \rrbracket_{N⟨1,e⟩} \text{ smiled} \rrbracket^{w,g'+g_c+h}) = 1$ iff *someone smiled in w*.

In line (iv), g' and g_c play no role. h assigns some entity to the index $N⟨1,e⟩$ and that takes care of ' $\llbracket \text{Jack} \rrbracket_{F⟨2,e⟩} \rrbracket_{N⟨1,e⟩}$ '. EXH is idle.

Jack is the locus of prominence in either answer in (72). To an extent there is redundancy in the grammar. In simple cases, question-answer congruence follows from givenness as well as from the pragmatics of exhaustivity. That's partly why "there does not seem to be a one-to-one mapping between particular formal features (focus marking devices) and focus, neither from a cross-linguistic perspective, nor within individual languages." [Zimmermann & Onea \(2011\)](#).

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