

## Disarming Context Dependence



# Disarming Context Dependence

A Formal Inquiry into Indexicalism and

Truth-Conditional Pragmatics

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Philosophy  
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# Abstract

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In the debate about semantic context dependence, various truth-conditional frameworks have been proposed. Indexicalism, associated with e.g. Jason Stanley, accounts for contextual effects on truth conditions in terms of a rich covert syntax. Truth-conditional pragmatics, associated with e.g. François Recanati, does not locate the mechanisms for context dependence in the syntactic structure but provides a more complex semantics. In this dissertation, the hypothesis that indexicalism and truth-conditional pragmatics are empirically equivalent is explored. The conclusion that the hypothesis is correct emerges, when claims and accounts in the debate are made formally precise, within the framework of model-theoretic semantics.

The dissertation shows that the frameworks of indexicalism and truth-conditional pragmatics allow for the formulation of two similar, but yet sharply distinct, formal semantic accounts of a set of linguistic examples central to the debate. The semantic accounts are model-theoretic, in the tradition of event semantics. The indexicalist and the truth-conditional pragmaticist semantics are applied to the following linguistic phenomena: quantifier domain restriction, transfer, binding, colour adjectives, meaning negotiation and enrichments of thematic roles. For each linguistic phe-

nomenon, one indexicalist account is put forward, and one truth-conditional pragmaticist account. It is concluded, on these grounds, that indexicalism and truth-conditional pragmatics are empirically equivalent.

The formal accounts are also developed to accommodate a broader range of linguistic phenomena. In particular, context-dependent dimensions of the English present perfect are examined. An indexicalist account of this puzzling linguistic phenomenon is provided, as well as a truth-conditional pragmaticist variant. The dissertation also develops a previously underdeveloped combination of Reichenbach's and Jespersen's early accounts of the present perfect. The proposal provides further evidence that indexicalism and truth-conditional pragmatics are empirically equivalent, but it also enhances our understanding of the present perfect and tests the viability of the model-theoretic, event semantic accounts.

The dissertation ends with a discussion of the results. It is argued that central aspects of alternative accounts of context dependence – relevance theory, radical contextualism and semantic minimalism – are in fact compatible with indexicalism and truth-conditional pragmatics. In addition, questions about simplicity, and how far the hypothesis about equivalence can be generalized, are addressed.

*Whenever you are confronted with an opponent, conquer him  
with love.*

Mahatma Gandhi





## Preface

The topic of this book is context dependence and formal semantics. My understanding of the theoretical problems associated with this area, and with the philosophical frameworks developed to deal with it, had begun to take shape in 2012, when I participated in the summer school *Theories of Communication* (organized by Sandra Lapointe and Jurgis Skilters), in Pumpuri, Latvia. I had great discussions with Deirdre Wilson, who also provided constructive feedback on my course paper about relevance theory and metaphor. The same summer, I participated in *The 2nd East-Asian School on Logic, Language and Computation*, in Chongqing, China. Dag Westerståhl's and Pauline Jacobson's courses on compositionality were impressively clear, and helped me forming a more formal perspective on semantics. Here I also got the possibility to present some preliminary thoughts about the semantics of the present perfect.

The year after, in 2013, I attended Robin Cooper's comprehensive and well-structured graduate course on Montague grammar in Gothenburg. This clearly sharpened my reasoning and writing about linguistic phenomena, and I felt that tools of model-theoretic semantics had not been sufficiently paid attention to in the debate about context dependence. This hunch turned into a deeper conviction in 2014, when I attended *The 26th European Summer School in Logic, Language and Information* (organized by Gerhard Jäger), which took place in Tübingen, Germany. Among a plethora of short courses on logic and language, Lucas Champollion's inspirational course on compositional event semantics is the one I remember most vividly.

From 2015 and onwards, I regularly had meetings with my supervisors Dag Westerståhl and Robin Cooper. First we discussed the main theses, arguments and methods, and then more detailed portions of text. The main points of the thesis, for instance that reasonable indexicalist and truth-conditional pragmaticist fragments, for the main examples in the debate,

are empirically equivalent, seemed clear to me quite early on. The formal semantic accounts took more time to develop, and the forming of an appropriate style, apt for formal semantics and philosophy of language, took more than a few single moments. The supervision meetings with Dag and Robin were pivotal moments. They influenced my work more than any of the other events mentioned above. I knew beforehand that my supervisors had a deep and comprehensive knowledge of the fields of relevance for my dissertation. I discovered that they were also skilled from a pedagogical perspective. I always had the feeling that things will work out, after our encounters. Furthermore, I felt that I could trust them. Despite the delays in the writing process, due to, for instance, parental leaves and financial matters, Dag and Robin always encouraged me and put me back in the saddle.

In addition to the supervision meetings, my interactions with philosophers in Gothenburg were mostly concentrated to the Higher Seminar in Theoretical Philosophy, led by Anna-Sofia Maurin. The seminar broadened my knowledge of philosophy, and discussions with Martin Kaså, Felix Larsson, Anna-Sofia Maurin and Anders Tolland, among others, inspired and helped me to acquire a broad knowledge of logic, speech act theory, metaphysics, and other areas of philosophy. The final seminar, where Sara Packalén was opponent, provided excellent feedback and suggestions of developments, and, as importantly, it was great fun.

Everyone mentioned above has played a significant role in my development as a philosopher during my doctoral studies. I express my gratitude to you for this. I would also like to thank Elisabet Engdahl, who served as secondary supervisor during my first years as a graduate student. Our discussions about grammatical theories and linguistic methodology played an important role in the evolution of my current philosophical standpoints. My PhD-student friends and colleagues deserve praise for supportive and constructive comments and discussions. Rasmus Blanck, Ellen Breitholtz, Alla Choifer, Paul Gorbow, Martin Filin Karlsson, Peter Johnsen, Pia Nordgren, Susanna Salmijärvi, Ylwa Sjölin Wirling and Alva Stråge: thanks for good informal chats about philosophy and life generally. A warm thank you goes to the researchers and lecturers Arvid Båve, Elizabeth Coppock,

Palle Leth, Benjamin Lyngfelt, Zachiri McKenzie, Filip Radovic and Susanna Radovic, with whom I have had inspiring and thought-provoking conversations over the years.

A special thanks goes to Rasmus Blanck, for helping out with typesetting, and Monica Havström, who designed a wonderful cover for the book. For good measure, I would like to thank Jesper Ahlström and the IT-support at the faculty for fixing my crashed computer, and Agnetha Eng, Martin Tuneberg and the staff at Campusservice Lorensberg for assisting me by mounting whiteboards and numerous other tasks. The administrative staff at the department of Philosophy, Linguistics and Theory of Science has always been eager to help; a special thanks goes to Helena Bjärnlind, Matilde Eriksson and Linda Aronsson for helping out with forms, room bookings, and a lot of other pieces of work. I owe a collective thanks to everyone at the Department of Swedish, where I have worked during the last two years. The positive work environment made it possible to write up the final parts of the dissertation in my spare time. Finally, a thanks goes to *Kungliga och Hvitfeldtska stiftelsen* and *Stiftelsen Erik och Gurlu Hultengrens fond för filosofi vid Lunds Universitet* for financial support.

Preliminary material from the dissertation was presented at the conference *Knowledge, language and ideology*, University of Valladolid (organized by Cristina Corredor), in 2015, and *The Swedish Congress of Philosophy*, Linköping University (organized by Fredrik Stjernberg), in 2015 as well, and at Umeå University (organized by Per Sundström, Daniela Cutas and Torfinn Huvenes), in 2019. I would like to thank the audiences at these conferences for constructive discussion and feedback.

On a personal note, I would like to thank my wife, my love, and my everything Rebecka Petersson. From an intellectual perspective, it's clear to me that I would have had completely different trains of thought, if I hadn't had the luck to meet you and to live with you and our amazing three children. Your knowledge of religion, feminist theory and literature has always impressed and influenced me, and the encounters with people I hadn't met otherwise, made possible through your important ministry work, have provided new dimensions and important insights. On the same note, I am grateful to my parents, Christina Rosén and Lars-Olof Petersson, for

always supporting me. I somehow developed the confidence to pursue a PhD in theoretical philosophy: I owe this confidence to my parents. And thank you for helping us with the upbringing and care of the children. I would also like to say thank you to my parents-in-law, Margit and Bengt Olausson, for helping out with the kids, and for providing a relaxing and joyful atmosphere at Hamburgö, where we have spent many summer days.

Majorna, Göteborg, August 2019  
Stellan Petersson

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# I Empirical Phenomena and Theoretical Background

## I.1 Introduction

Consider the following sentences:

- (1) Let's go to Ireland. We'll stop in **every bar** and have a drink.<sup>1</sup>  
(*Basquiat*, 1996)
- (2) The leaf is **green**.<sup>2</sup>
- (3) She took out the key and **opened the door**.<sup>3</sup>

A natural reading of 'every bar' in (1) is that the phrase concerns every *encountered* bar in Ireland (or on the way to Ireland) and not every bar located in Ireland (or every bar on earth). A leaf could be 'green' in several ways: it could, for instance, be *naturally green* or *painted green*. And the intuitive thought, or piece of information, acquired when hearing or reading an utterance or inscription of (3) is that the referent of 'she' took out a unique contextually salient key and opened a unique contextually salient door *with the key*, although it is certainly possible to acquire some other proposition, where, for instance, the door is opened in some other way, if more contextual information is provided.

In the examples above, we can observe that the intuitive thought (or proposition) conveyed can be made explicit by, as it were, filling in some linguistic material. Binding constructions, where natural readings seem to

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<sup>1</sup>See Peters & Westerståhl (2006, p. 46), Recanati (2004, p. 124-127), Stanley & Szabó (2000), Stanley & Williamson (1995), and Westerståhl (1985) for similar examples.

<sup>2</sup>See Bezuidenhout (2002), Hansen (2011), Hansen & Chemla (2013), Kennedy & McNally (2010), Recanati (2010a), Szabó (2001), and Travis (2008/1985b) for similar examples.

<sup>3</sup>Recanati (2004, p. 23).

be dependent on something like a quantifier binding an implicit variable, illustrate a kind a context dependence of a different kind:

- (4) This is how the world will be/ **Everywhere I go it rains on me/**  
Forty monkeys drowning in a boiling sea/ Everywhere I go it rains  
on me.  
(*Tom Waits, Chuck E Weiss 2006, 'Rains on me'.*)<sup>4</sup>
- (5) Every time John lights a cigarette, it rains.<sup>5</sup>

The most natural reading of (4) can be paraphrased as follows: for every location  $l$  and every time  $t$ , such that I go to  $l$  at  $t$ , it rains at  $l$  at  $t$ . And (5) can be paraphrased by the following expressions: for every time  $t$  and location  $l$ , if John lights a cigarette at  $t$ , at  $l$ , it rains at  $t$ , at  $l$ . In these cases, the intuitive readings of 'it rains' are not easily construed as adding extra information about the context.

In the examples considered so far, we hardly need any information about any particular context of use in order to capture what a speaker, using the sentences in some situation, likely would intend to convey. In contrast, there are cases where the natural readings seem to be more dependent on further contextual information about conversational topic, speech participants, location etc. Consider the following cases of metonymy:

- (6) (Pia has called the IT-support because of problems with the new computer system called 'Dafgu'. An IT-technician opens the door to her office.)  
Pia: Hi, are you Dafgu?  
IT-technician: **I am Dafgu.**  
(Observed language use, Gothenburg, 2013).
- (7) (Elevator repairman on phone:) I don't know what to do with that order. **I'll send André street over to you.**  
(Observed language use, Gothenburg, 2016).<sup>6</sup>

<sup>4</sup>See Bourmayan & Recanati (2013), Recanati (2002), and Recanati (2004, p. 98-111) for similar examples.

<sup>5</sup>Pagin (2005), Stanley (2000), Stanley (2005), Zeman (2011b).

<sup>6</sup>Example (6) and (7) are translated from Swedish. The observed dialogues were formulated as follows:



- (8) (A waiter:) The ham sandwich left without paying.<sup>7</sup>

In these examples, the contributions to the intuitive truth conditions made by ‘Dafgu’, ‘André street’ and ‘ham sandwich’ are, arguably, not what these expressions conventionally mean. Intuitively, ‘Dafgu’ does not, in this case, denote a new computer system but rather the property of being a technician working with that system. The contribution of ‘André street’ to the proposition intuitively expressed is not a street but an order concerning an elevator in a house located on André street. And in (8), ‘ham sandwich’ intuitively denotes the property of being an orderer of a ham sandwich.

Context dependence can also bear on temporal dimensions of readings:

- (9) IFK Norrköping has won Allsvenskan.<sup>8</sup>

In 2017, an utterance of (9) could be true: the football team IFK Norrköping won the Swedish premier league, Allsvenskan, in 2015. However, a speaker who uses the sentence in (9) could also mean that IFK Norrköping is the winner of the 2017 competition (if, say, the sentence is uttered after the last match). In the latter case, an utterance of the sentence would be false.

Relatedly, consider an utterance of (10), a sentence in the present perfect like (9) above, in a context where it occurs as an answer to *Would you like to have dinner?*, or a similar question.

- (10) I have eaten.<sup>9</sup>

In interpreting an utterance like that, there are at least two dimensions of context dependence (over and above the obvious context dependence of the indexical ‘I’). First, the speaker has a restricted time period in mind,

(6b) Pia: Hej, är det du som är Dafgu?  
IT-technician: Det är jag som är Dafgu.

(7b) Hur vi ska göra med DEN ordern vet jag inte. Jag skickar över Andréegatan till dig nu.

<sup>7</sup>Pagin & Pelletier (2007), Recanati (2004, p. 26). See Nunberg (1995) for similar examples.

<sup>8</sup>See Higginbotham (2009), Mittwoch (2008) and Portner (2003) for similar examples.

<sup>9</sup>Recanati (2010b, p. 123-125).

for instance the evening when the conversation takes place. Secondly, an utterance of (10) intuitively conveys that the speaker has eaten *dinner*, or at least a meal sufficiently like dinner, and not, say, some nuts, a fruit or a candy bar.

Yet another kind of context dependence is related to meaning litigation. We sometimes disagree with our interlocutors about how to use language, and what the words we use mean. In such cases, our discussions are interrupted by litigations, or negotiations, about meanings. Consider a conversation where two astronomers disagree about the planetary status of Pluto.

- (11) Astronomer 1: Pluto is a planet.  
 Astronomer 2: Pluto is not a planet.<sup>10</sup>

Arguably, disagreements of this kind differ from disagreements over non-linguistic facts (for example, if Kim claims that some given restaurant closes at 5 pm and Robin denies that). One could argue that the astronomers in the example above use ‘planet’ to refer to different properties, and that ‘planet’, in sentence (11) thereby exemplifies yet another variant of context dependence.

Even if the kinds of context dependence presented here may seem to differ, they can be explained by similar mechanisms, or so I argue in this dissertation. Moreover, it is argued that the accounts labelled ‘indexicalism’ (e.g. Martí 2006; Stanley 2000, 2007; Stanley & Szabó 2000 and Szabó 2001) and ‘contextualism’ (e.g. Carston & Hall 2012; Recanati 2004; Sperber & Wilson 1995, 2012) offer two alternative, and equally viable, ways of accounting for the various forms of context dependence shown above. In particular, this holds of truth-conditional pragmatics, the variant of contextualism that we will be primarily concerned with, in this dissertation. This becomes evident when indexicalism and truth-conditional pragmatics are made formally precise, but is obscured when the two accounts are described in informal terms, which is the standard in the literature. In contrast to previous literature, this dissertation offers a fully explicit formal semantics implementing and developing the insights of indexicalism and truth-conditional pragmatics.

<sup>10</sup>See Ludlow (2014, p. 42-45) for examples of naturally occurring uses of language concerning the planetary status of Pluto.

Below, the framework of indexicalism is introduced first. After that, truth-conditional pragmatics is presented, and an overview of some theoretical alternatives to indexicalism and truth-conditional pragmatics is provided. We continue with an introduction to the work on the present perfect construction shown in the thesis. A section on methodological choices is found near the end of this chapter, which closes with an overview of the following chapters and a short elaboration of the main contribution of the dissertation.

## 1.2 Indexicalism

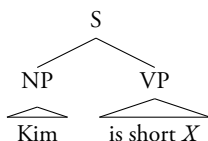
Indexicalism is an approach to contextual effects on truth conditions pursued by e.g. Martí (2006); Stanley & Szabó (2000); Stanley (2000, 2007) and Szabó (2001). According to this view, contextual effects on truth conditions are due to the logical form.

To illustrate the idea, consider the following sentence:

(12) Kim is short.

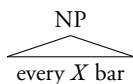
Suppose that Kim's height is 1 meter and 60 cm. Intuitively, Kim is short compared to some people, e.g. a group of basket ball players where the mean height is 1 meter and 90 centimeters, but not short compared to others, say, Hilary and Robin who are both 1 meter and 63 centimeters. Moreover, we don't want our analyses of natural language to be inconsistent, at least not obviously inconsistent. For these reasons, it seems problematic to assume that (12) is associated with constant truth conditions; the problem is avoided if we assume that the truth conditions of (12) vary contextually.

Indexicalists postulate a level of syntactic representation of sentences, where such a representation may, but does not have to, contain expressions that do not correspond to anything audible in utterances of the sentence. This is the 'logical form' of the sentence, i.e. the input to semantic interpretation. In the case of (12), an indexicalist solution is to provide a variable for a comparison class in the logical form of (12):

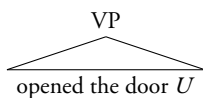


The idea is that the semantics assigns truth conditions to this form, where the variable  $X$ , which denotes a contextually salient comparison class, is present. The truth conditions of the logical form above will, accordingly, depend on the value of  $X$ . But the denotation of  $X$  does not bear on the audible aspect of an utterance of (12), because  $X$  does not correspond to anything audible. The variable is present in the logical form, the syntactic structure interpreted by the semantics, but invisible, as it were, to the phonetic component of the language in question.

Applying the idea to (1) above, the indexicalist hypothesizes that the objects quantified over are somehow restricted, by means of a silent variable.



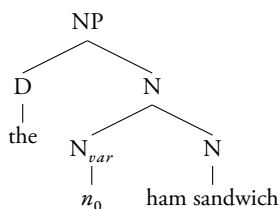
If  $X$  is assigned a contextually salient set of bars (e.g. the bars the speaker expects to encounter on the way to Ireland), and the expression ‘bar’ is assigned the set of bars in the domain, one indexicalist solution is to let the two sets intersect, and then let the quantifier denoted by ‘every’ range over the set thereby formed (cf. Stanley & Szabó 2000, Westerståhl 1985 and Chapter 2.2). The indexicalist strategy for (3) is similar:



If  $U$  is a variable over instruments, whose precise contextual value is assigned by the semantics, and  $U$  does not, furthermore, correspond to anything in the phonetic component of the language, we have the contours of an indexicalist account of the sentence in question (cf. Chapter 2.7).

The semantic transfer (or metonymy) involved in (6), (7) and (8) has been taken to be irrelevant to formal semantics by proponents of indexicalism (notably Stanley 2005, p. 226-230). However, if indexicalism is made formally precise, it is evident that it is possible for the indexicalist to

account for these cases semantically, if she wants to do so. To illustrate, consider the following tree displaying the logical form of the noun phrase of (8) (cf. Chapter 2.3):



If it is assumed that the phonologically covert variable  $n_0$  denotes a contextually salient function of a type that together with the denotation of ‘ham sandwich’ forms a function of type  $\langle e, t \rangle$ <sup>11</sup>, which is a standard type for nouns, we have the beginnings of an indexicalist account, according to which the denotation of ‘ham sandwich’ is a contextually salient orderer of a ham sandwich.

Furthermore, indexicalism has been argued for on the basis of binding data. As mentioned in the introduction, the most natural reading of (4) involves quantification over locations and times, and one indexicalist option is to provide logical forms for (4) and (5), where variables over locations and times are present, at appropriate nodes, in the phrase structure trees displaying the logical forms (cf. Stanley, 2000).

It is also possible to account for cases like (4) and (5) without postulating covert variables in logical form. However, alternative mechanisms for context dependence, employed by contextualists, and introduced below in Section 1.3, turn out to be unnecessary as well, for this kind of data. In contrast to earlier accounts, the proposal in Chapter 2.4 suggests that binding data can be accounted for by using the mechanism of saturation, which is available for both frameworks (the notion of saturation is introduced in Section 1.3.1 below).

<sup>11</sup>In Montague grammar, functions of type  $\langle e, t \rangle$  take objects of type ‘entity’ ( $e$ ) and yield objects of type ‘truth value’ ( $t$ ). The function denoted by ‘ham sandwich’ thus takes each entity to True if, and only if, the entity is a ham sandwich.

### 1.2.1 Formal implementation and pragmatic processes

Indexicalism, especially Stanley's proposal, is often contrasted to 'contextualism' or 'truth-conditional pragmatics' (Recanati 2010b, p. 9-12 and p. 38-40, and Borg 2012, p. 19-23; see also Stanley 2007, p. 21-27 and p. 231-246). The first key characteristic attributed to 'indexicalism' is then that contextual effects on truth conditions are theoretically implemented in terms of phonologically covert variables in logical form. However, there are also a second and a third claim associated with 'indexicalism'. The second claim goes as follows. In an utterance situation, when the hearer interprets an assertion of a context-dependent sentence, e.g. (1) or (2) above, the interpretative processes are of a fundamentally different kind from the processes involved in a situation where someone attempts to interpret non-linguistic acts, such as taps on the shoulder or kicks under the table. In the former case, the hearer assigns values to variables, apparent in highly structured logical forms. In the latter case, neither variables nor highly structured representations (like logical forms) are involved.<sup>12</sup>

Suppose my principal claim is true, that all effects of extra-linguistic context on the truth conditions of an assertion are traceable to logical form. Then, the effects of context on the truth-conditional interpretation of an assertion are restricted to assigning the values to elements in the expression uttered. Each such element brings with it rules governing what context can and cannot assign to it, of varying degrees of laxity. The effects of extra-linguistic context on truth-conditional interpretation are therefore highly constrained. If this picture of truth-conditional interpretation is correct, then it is fundamentally different from other kinds of interpretation, like the kind involved in interpreting kicks under the table and taps on the shoulder. We do not interpret these latter sorts of acts

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<sup>12</sup>This view is related to, although clearly distinct from, the claim that it is not in the scope of indexicalism (or truth-conditional semantics generally) to account for sentences like (8), where transfer (or metonymy) is involved and expressions are used non-literally. This was still Jason Stanley's position in 2015, when he argued that indexicalism assumes that truth-conditional interpretation is highly constrained by conventions (Stanley, p.c.).

by applying highly specific rules to structured representations.  
(Stanley, 2000, p. 396)

To make Stanley's point more concrete, consider the following case of non-linguistic communication (see Sperber & Wilson 2012, p. 98-101, for similar examples).

- (13) *Suppose that Kim is angry with Hilary. When Hilary tries to engage Kim in conversation, Kim opens a newspaper and starts reading it.*

Intuitively, Hilary will understand Kim to mean that Kim does not want to speak to Hilary. But the process of interpretation involved here is fundamentally different from the process involved in grasping the context-dependent truth conditions of an assertion of e.g. (1), where the contextual domain restriction is dependent on a phonologically covert variable in logical form. The main reason for this fundamental difference is that we do not, according to the quote by Stanley above, apply "highly specific rules to structured representations" in the former case, whereas it is clear that we do so in the latter.

Stanley's picture of communication is closely related to Grice's well-known account (Grice, 1975). Grice postulates a dichotomy between conventional, linguistic meaning, on the one hand, and pragmatic meaning in the form of conversational implicatures, on the other hand. For Grice, the notion 'what is said', applied to an utterance, refers to the conventional meaning of the uttered sentence, taken in context. On Grice's account, context dependence is sometimes involved in the conventional meaning of a sentence: pronouns like 'he' and 'she', tenses and ambiguous expressions have their meaning fixed contextually (Grice, 1975, p. 44). But pragmatic competences of cooperation and joint action enter the picture in the case of conversational implicatures and not in cases of context-dependent conventional meanings (Grice, 1975, p. 47-49). Stanley's and Grice's accounts are related in that they both make a sharp distinction between linguistic and conventional meaning, on the one hand, and other pragmatic kinds of meaning, on the other.

However, Stanley's second claim, that the process of interpreting a context-dependent assertion is fundamentally different from interpreting non-linguistic acts, does not follow from the first claim, that truth-

conditional context dependence is formally implemented in terms of variables in logical form. When indexicalism is made formally precise, it becomes clear that it is perfectly coherent to account for truth-conditional context dependence in terms of variables in logical form, while, at the same time, assuming that the assignment of values to variables in logical form is dependent on processes similar to, intertwined with, or even identical to the interpretative processes involved in interpretation of non-linguistic acts (such as kicks under the table or taps on the shoulder).

A third claim, closely related to the second one, concerns the distinction between two kinds of pragmatic processes. Recanati (2010b, p. 1-26), a notable critic of Stanley's approach, describes indexicalism, and similar frameworks, in terms of linguistic constraints on context dependence:

On the currently dominant picture, pragmatics comes into play in the determination of truth-conditional content but does so *only when* the semantic rules of the language prescribes it. [...] Semantics marks the places where pragmatics is to intervene, it sets up 'slots' that pragmatics is to fill. [...] So pragmatics comes into play, but it does so under the guidance of the linguistic material. (Recanati, 2010b, p. 4)

Recanati contrasts this outlook with 'truth-conditional pragmatics', to be introduced below. A pivotal difference between the frameworks is, according to Recanati, that the latter allows for 'free pragmatic effects' or 'modulation', i.e. optional pragmatic processes not initiated by the linguistic material but fully dependent on pragmatic factors, in addition to processes dependent on linguistic expressions and their meaning.

But in what follows it will emerge that there is a possible version of indexicalism, which denies that there is a fundamental difference between the processes involved in uptakes of speech acts and the ones involved in interpretations of non-linguistic acts, and which, furthermore, accommodates the notion of modulation. A philosophical consequence of this dissertation is, as the reader will see, that it is perfectly legitimate, coherent and reasonable to adopt the framework of indexicalism, in the sense that syntactic and semantic formalizations of context dependence postulate covert variables in logical form, while, at the same time, accept that some pragmatic processes are optional. In fact, this will become clear when earlier



indexicalist formalizations are considered, or revised in order to be more empirically adequate (see Section 1.3 below, and Chapter 4.1).

### 1.3 Truth-conditional pragmatics

Contextualists revise Grice's dichotomy between conventional, linguistic meaning, on the one hand, and pragmatic meaning in the form of conversational implicatures, on the other. Carston & Hall (2012), Recanati (2004), and Sperber & Wilson (1995, 2012) argue that the precise distinctions in Grice's well-known proposal cannot be upheld, but let the general contours of it remain unchallenged.

In contrast to the dichotomy of Grice (and Stanley), contextualism claims that pragmatic competences related to cooperation, joint action or general reasoning about events play a crucial role in settling 'what is said' (or 'what is intuitively said'). Therefore, contextualists hold that the interpretative processes involved in assigning context-dependent truth conditions to assertions are closely related to or intertwined with the processes involved in interpreting non-linguistic acts, or cases like (8) where transfer is involved (see Section 1.2.1 and example (13) above).

There are several different versions of contextualism in the literature. In this thesis, I focus on *truth-conditional pragmatics*, which implements context dependence by introducing novel semantic notions pertaining to the interpretation of expressions.

A main theoretical difference between indexicalism and truth-conditional pragmatics, as we will develop the frameworks here, is that whereas the former postulates variables in logical form, and thus assumes a more complex syntax, the latter postulates a more complex interpretation process, and, to some extent, a more complex semantics. According to the explications of 'truth-conditional pragmatics' and 'indexicalism' put forward in this dissertation, expressions in the relevant fragments of English have logical forms, which are translated into a type-theoretic language (the simply typed lambda calculus), which, in turn, has a precise model-theoretic semantics. The intuitive theoretical difference can thereby be made more explicit: indexicalism postulates phonologically covert variables in the fragment of English, whereas truth-conditional pragmatics accounts for context dependence by variables or other terms in the type-theoretic language. The

three levels of relevance for our discussion are, consequently, the following ones:

- Logical form
- Type-theoretic translation
- Truth conditions of type-theoretic translation

The logical form displays the syntax relevant for semantic interpretation. The role of the type-theoretic translation is to make the truth conditions of the logical form perspicuous. The type-theoretic translation is, accordingly, not a further level of logical or conceptual form; it does not belong to the language under discussion (English). Turning back to the main focus of our inquiry, on our construal, the framework of indexicalism develops accounts with more complex logical forms, whereas truth-conditional pragmatics is more concerned with the type-theoretic translations, which means, essentially, that they postulate a more complex interpretation process and a simpler syntactic structure. As Montague (1974a,b) emphasized, the intermediate language could, in principle, be dispensed with, and interpretations could be provided directly to logical forms.<sup>13</sup>

Now consider the noun phrase [<sub>NP</sub> every bar], as it appears in (the syntax of) (1), according to truth-conditional pragmatics. In contrast to the indexicalist account, there is no context variable in the noun phrase of (1) (cf. page 6). But in translating this phrase into the simply typed lambda calculus, and thereby spelling out explicitly precisely what it means, the truth-conditional pragmatist ends up with a translation containing the following clause:

$$(14) \quad O_N(\mathbf{bar})(x)$$

Truth-conditional pragmatics, on my construal of the position, assumes that the *modulation variable*  $O_N$  takes **bar** as argument, thus forming an expression  $O_N(\mathbf{bar})$ , which has a modulated meaning in some contexts. Among other possible modulated meanings, there are contexts in which  $O_N(\mathbf{bar})$  denotes the property of being a bar in Ireland, and contexts where

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<sup>13</sup>But note that whether you translate into an intermediate language or provide interpretations directly to the fragment is inessential to my purposes.

it denotes the property of being a bar that the speaker will encounter on his way to Ireland (see Chapter 2).<sup>14</sup>

Earlier accounts of truth-conditional pragmatics have been formulated differently.<sup>15</sup> Recanati (2004, 2010b) introduces, elaborates and argues for truth-conditional pragmatics using an informal and intuitive vocabulary, whereas Pagin & Pelletier (2007) provide a more formal characterisation of the theoretical position. A difference between my proposal and theirs is that expressions of the fragment are not translated into a formal language before interpretation. Another difference concerns the level of specificity. The aim of Pagin & Pelletier (2007) is to illustrate the possibility and general architecture of a formal semantics implementing truth-conditional pragmatics, focusing on one linguistic example. In contrast, my ambition is to set up a fully explicit formal semantics, where truth-conditional pragmatics is one variant, and to account for a larger amount of examples than has been done before.

In the case of (3), truth-conditional pragmatics does not assume that there is a variable over instruments in logical form (cf. page 6). The syntax is assumed to be simpler and not, as it were, ‘forcing’ us to a context-dependent interpretation. In contrast, the phrase [<sub>v</sub> open] is translated into the following expression:

$$(15) \text{ Instr}(x)(\mathbf{open})$$

The term *Instr*, denoting a function of a suitable type, takes the variable *x*, which denotes an individual, as argument. The result is a function, which applied to the denotation of the term **open** yields the intuitive meaning ‘open with *x*’ (see Chapter 2.7). *Instr* denotes a so-called ‘variadic function’, i.e. a function whose role is to decrease or increase the number of thematic roles associated with verbs and their meaning.

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<sup>14</sup>The subscript *N* indicates that this specific modulation variable is associated with nouns and their denotations.

<sup>15</sup>Pagin & Pelletier (2007) do not use the term ‘truth-conditional pragmatics’ of their framework but ‘moderate contextualism’. Recanati (2010b) uses it, however. Essentially, Pagin & Pelletier (2007) and Recanati (2010b) argue for the same semantic machinery; the difference is terminological rather than substantive.

### 1.3.1 Saturation and modulation

In the illustration of truth-conditional pragmatics above, I focused on a kind of context dependence labelled ‘modulation’. But there is an important distinction in the truth-conditional pragmatic literature between two kinds of context dependence: modulation and saturation.

The main difference between these notions is that saturation is *mandatory* whereas modulation is *optional* (Recanati 2004, p. 23-27, Recanati 2010b, p. 4, and p. 42-43). These characteristics should be understood in the following sense: saturation is needed in order for a sentence containing some context-dependent expression to express a proposition (to have truth conditions) in a context of utterance, whereas modulation could, but does not have to, play a role in determining the intuitive truth conditions of a sentence that contains expressions that can be modulated.

Consider the difference between (16) and the sentence in (3), repeated as (17) below:

(16) She is smaller than John’s sister.

(17) Mary took out the key and opened the door.

If the pronoun ‘she’ and the relevant relation between John and the sister are not assigned contextual meanings, the sentence in (16) does not have truth conditions. In contrast, the intuitive meaning of (17), that Mary took out the key and opened the door *with the key*, is not mandatory: it is possible to assign more literal truth conditions to the sentence, with no reference to the key (Recanati, 2004, p. 23-27).

Another way of illustrating this difference is to say that saturation is linguistically driven, in the sense that it is initiated by (audible and phonologically overt) expressions and their meaning, whereas modulation is a free and pragmatic process, which is not initiated, driven or constrained by linguistic items in that way (therefore, the expression ‘free pragmatic effects on truth conditions’ is sometimes used instead of ‘modulation’, in the literature).

I have often described saturation as a ‘bottom-up’ process in the sense that it is signal-driven, not context-driven. A ‘top-down’ or context-driven process is a pragmatic process which is not triggered by an expression in the sentence but takes place

for purely pragmatic reasons – in order to make sense of what the speaker is saying. Such processes I also refer to as ‘free’ pragmatic processes – free because they are not mandated by the linguistic material but respond to wholly pragmatic considerations [...] [W]e interpret an expression non-literally in order to make sense of the speech act, not because this is dictated by the linguistic materials in virtue of the rules of the language. (Recanati, 2010b, p. 4)

From a more formal point of view, the distinction between saturation and modulation can be described as follows, by the truth-conditional pragmatist. In the case of modulation, modulation variables or variadic functions appear in the translation (cf. page 11 and Chapter 2). These allow for, but do not necessitate contextual adjustments or contextual influences on meaning.

In the case of saturation, we have indexical expressions, whose denotations vary with, or are partly determined by, context. As an example of the latter, suppose that the English expression ‘I’ is translated to  $C_{sp}$ , a shorthand for ‘the speaker of the context’. Suppose furthermore that the interpretation function  $F_0$  (for the formal, type-theoretic language) takes as arguments expressions of the formal language, thus yielding functions from contexts to denotations. We can then let the denotation  $F_0(C_{sp})(c)$  differ depending on  $c$ : it is always the speaker in context  $c$ .

Construed as above, modulation is optional whereas saturation is not. This is the case, since the modulation variables can be assigned a denotation with no impact on the denotation of the expression as a whole. A modulation variable, for instance  $O_N$ , can be assigned an identity function which returns the denotation of its argument. If that is the case,  $O_N(\mathbf{bar})$  will have the same denotation as  $\mathbf{bar}$ . The same manoeuvre is not allowed in the case of saturation. ‘I’ always picks out the speaker of the context (cf. Recanati 2010b, p. 43-46).

#### 1.4 The present perfect

In contrast to cases of context dependence that are instances of modulation, the present perfect construction, ‘has won’, in (9) is not optionally

context-dependent but has a mandatory temporal anchoring in contexts, or so it is argued in Chapter 3. Combining and modifying the core ideas about tense in the classics (Reichenbach, 1947) and (Jespersen, 1924) into a novel approach to the present perfect, and adapting them to the framework developed in Chapter 2, Chapter 3 offers the following translation of (9):

$$(18) \quad \exists e[\text{agent}(\mathbf{i}, e) \wedge \mathbf{win}(e) \wedge \text{theme}(\mathbf{a}, e) \wedge C_{se} \approx e_0 \wedge \mathcal{R}(e_0) \wedge e < e_0 \wedge \text{result}(e, C_{cse}) \wedge C_{cse} \approx C_{se}]$$

In the translation,  $\mathbf{i}$  denotes IFK Norrköping and  $\mathbf{a}$  denotes Allsvenskan (the Swedish premier league). Furthermore, a contextually salient result event, denoted by the indexical  $C_{cse}$ , overlaps with the speech event, denoted by the indexical  $C_{se}$ , which is located posterior to the event the sentence concerns (in the case of 9, the event of winning the Swedish premier league:  $\mathbf{win}(e)$ ). This proposal for present perfect constructions is available for both indexicalists and contextualists (cf. Chapter 3).

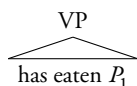
The indexical  $C_{cse}$ , denoting a contextually salient event, plays a central role in accounting for the context dependence of (9). It is easy to imagine that the event or state<sup>16</sup> of being a winner is contextually salient, when (9) is uttered. This accounts for the reading that IFK Norrköping is the winner of the 2017 competition. However, one could also be in the state of previously having been a participant in an event or state. On one possible reading of (9), the contextually salient event/state is that IFK Norrköping plays the role of agent in a winning event, located before the speech event, where the Swedish premier league is the theme. This accounts for the reading made true by the fact that they won in 2015.

Regarding the sentence in (10), and its stipulated context (see page 3), the time restriction is provided by the same semantic machinery as in (18). In the translation above, the conjunct  $\text{result}(e, C_{cse})$  occurs. Its contribution can be paraphrased as follows: the relation of result holds between the event  $e$  and a contextually salient event. Now in the case at hand, the contextually salient event is that the speaker is full or satisfied. This can only be a result of events closely related in time (cf. Chapter 3.6.3), which explains the intuitive restriction.

The other dimension of context dependence of (10), that the speaker has

<sup>16</sup>There is no distinction between events and states in the formal accounts (cf. 3.4.2).

eaten *dinner*, can be accounted for by indexicalism and contextualism in two separate ways. The indexicalist account provided in Chapter 3.6.1 lets a phonologically covert variable  $P_1$  appear in the logical form of (10). For ease of exposition, only the verb phrase is illustrated here:



In the translation, the phonologically covert variable provides a free variable  $x$  over contextually salient entities. The variable acts as argument in the conjunct  $theme(e, x)$ , which is available in the translation of (10) and accounts for the intuitive truth-condition that the speaker has some specific meal in mind when uttering (10).

The contextualist account of this dimension of the context dependence of (10) lets the logical form be without covert variables. Instead, a so-called ‘variadic function’ that adds the thematic role of theme, and, as it were, fills it with a free variable, is appealed to.<sup>17</sup>

$$(19) \quad Thm(x)(\text{has eaten}_{tr.})$$

The term denoting a variadic function,  $Thm$ , takes a free variable  $x$  ranging over entities as argument, and the expression thereby formed takes the translation of ‘has eaten’, resulting in a translation where the conjunct  $theme(e, x)$  is present (cf. 3.6.2).

## 1.5 Alternatives

One of the central claims of the dissertation is that both indexicalism and truth-conditional pragmatics can account for the semantically relevant intuitions associated with utterances of (1)-(11) above. It is a further question whether other accounts also provide explanations. My main claim is, accordingly, not dependent on the viability and fruitfulness of the alternatives below. However, the basic techniques and results presented and discussed in Chapters 2 and 3 seem to be applicable to central aspects

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<sup>17</sup>Variadic functions can be seen as a species of, or a special case of, modulation. The main difference from modulation variables is that variadic functions make a more specific semantic contribution (cf. Chapters 2.7.3 and 3.6.2).

of the alternatives as well, or so I will suggest in the closing discussion in Chapter 4. Moreover, in order to understand indexicalism and truth-conditional pragmatics, it is instructive to compare the positions to other accounts. Three accounts of context dependence differing from indexicalism and truth-conditional pragmatics – relevance theory, radical contextualism and semantic minimalism – are therefore briefly reviewed below.

### 1.5.1 Relevance theory

Truth-conditional pragmatics is one variant of contextualism, relevance theory (Carston & Hall, 2012; Sperber & Wilson, 1995, 2012) is another. The aspect of relevance theory that we focus on here is the account of intuitive truth conditions of utterances.

On the relevance-theoretic approach there is, in addition to a logical form and a surface structure (or a similar distinction) a further kind of representation: a ‘propositional form’ or ‘conceptual representation’, which varies contextually (Sperber & Wilson, 2012, p. 10). Recanati (2010b, p. 127–141), who argues for a truth-conditional pragmatic variant of contextualism and not for relevance theory, but nevertheless discusses and elaborates the relevance-theoretic proposal, calls the relevance-theoretic conceptual representation *lf\**. I will follow that terminology here.

To illustrate the idea, consider (1) above. On the relevance-theoretic account of Sperber & Wilson (2012, p. 8–10), the logical form of this sentence does not contain any variables taking contextual values that restrict the set of bars referred to. But in the *lf\**s of the same sentence, in a context, there could be a restriction. On one way of understanding the proposal, the *lf\** of (1) could contain the expression ‘in Ireland’. On this way of fleshing out the proposal, *lf\**s vary contextually: in one context the phrase ‘every bar’ is associated with the *lf\** ‘every bar in Ireland’, or perhaps ‘every bar on our way to Ireland’, in other contexts the same phrase could be associated with the *lf\** ‘every bar in Sweden’, ‘every bar on this street’, etc. Importantly, a truth-conditional semantics then assigns denotations to *lf\**s, and not to logical forms (Sperber & Wilson, 2012, p. 10).

According to relevance theory, logical forms are developed into *lf\**s, in contexts, by operations that follow pragmatic principles of relevance. Their ‘Cognitive Principle of Relevance’ (p. 103) is formulated as follows:



- Human cognition tends to be geared to the maximization of relevance.

The notion of ‘relevance’ is further elaborated in terms of two factors (p. 102):

- The greater the *cognitive effects* achieved by processing an input, the greater its relevance.
- The smaller the *processing effort* required to achieve these effects, the greater the relevance.

The notion of cognitive effect is, in turn, spelled out as follows: an answer to a question, the raising of a doubt, a confirmation or refutation of a hypothesis, or a suggestion of a course of action are all (examples of) cognitive effects. Processing effort concerns the workings of memory, inference and perception. Given two pragmatic operations that satisfy the condition on cognitive effects equally well, the hearer chooses the one that requires least strains on the psychological operations of memory, inference and perception.

To illustrate, take example (1) again. Suppose that the context is one where the speaker addresses a potential fellow traveller. An operation that follows the cognitive principle of relevance takes the phrase ‘every bar’ in logical form and develops it into the *lf\**-expression ‘every bar on our way to Ireland’. The operation yields this result, since it suggests a course of action to the hearer. The alternative development ‘every bar in Ireland’, or ‘every bar in Sweden’, would not suggest a course of action, at least not without drawing heavily on inference and memory, and is therefore never considered by the hearer, in that context.

### 1.5.2 Radical contextualism

According to Recanati (2010b, p. 17), radical contextualism is the view that the communicated statement of an assertive speech act is the result of a weak sentence meaning plus pragmatic factors. Radical contextualism holds, furthermore, that most expressions have multiple related but distinct meanings that rapidly change and get modified. On Recanati’s explication of the term, a ‘radical contextualist’ holds that lexical expressions in natural

language are not associated with senses (Fregean *Sinn*) and hence do not have lexical denotations (or *Bedeutung*). In the context of a conversation or a text, expressions acquire determinate senses and denotations, or at least senses and denotations that are determinate enough for the purposes of the discourse.

Ludlow (2014) develops and defends a variant of radical contextualism. This variant explores the idea that lexicons are dynamic.<sup>18</sup> The notion of a dynamic lexicon is spelled out by Ludlow in terms of the notions of semantic underdetermination and micro-languages. A meaning *m* is ‘underdetermined’ with respect to an object *o*, if there is nothing in our broad understanding of the meaning of *m* that settles whether *o* falls under *m* or not (i.e. if *o* is a part of *m*’s extension). However, in communication, meanings are sharpened and the underdetermination is thereby decreased. By sharpening meanings, and by modulating (i.e. changing meanings), speakers interactively construct micro-languages where expressions have (more or less) determined meanings. Standard semantic theories that adhere to the principle of bivalence and are formulated in terms of truth conditions could thereby be developed, Ludlow claims, but, importantly, the bearers of truth, falsity and truth conditions will be utterances in local micro-languages, dynamically built on the fly, and not e.g. sentences taken in context (Ludlow, 2014, p. 1-7, 72-89, 112-113).<sup>19</sup>

In Chapter 2.6, I will show that meaning litigations, where interlocutors discuss what the meaning of some term should be, exemplified in (11) above, can be straightforwardly explained by indexicalism and truth-conditional pragmatics. In Chapter 2.5 I will show that indexicalism and truth-conditional pragmatics can account for the semantic context dependence of colour adjectives, exemplified by (2) above. These linguistic phenomena are often discussed by proponents of radical contextualism. I will conclude that one does not have to adopt radical contextualism in order to explain these phenomena: indexicalism or truth-conditional pragmatics are theoretical options as well.

<sup>18</sup>Ludlow labels his account ‘the dynamic lexicon’. The semantics he puts forward is, however, not ‘dynamic’ in the sense of ‘dynamic semantics’ associated with e.g. Kamp et al. (2011).

<sup>19</sup>Other variants of radical contextualism are found in Davidson (1986/2005) and Travis (2008).

### 1.5.3 Semantic minimalism

Semantic minimalism, an approach pursued by Borg (2004, 2012, 2017), Cappelen & Lepore (2005) and Lepore & Sennet (2010), is, in a sense, a view opposite to radical contextualism. The central tenet is that, apart from a short list of expressions whose semantic contents (or contribution to truth conditions) vary with context, like ‘I’, ‘you’, ‘here’, ‘tomorrow’, ‘yesterday’, ‘he’, ‘she’, semantic contents of expressions do not vary contextually. Intuitive truth conditions that differ from the compositionally yielded truth conditions of sentences, given a conception of syntactic structure where the logical form (the input to semantics) is as simple as possible, are not relevant to semantics, on this view. Only *minimal propositions* (or truth conditions), i.e. the truth conditions of sentences, given the simplest possible view of logical form, matter for semantics.

Applying the account to the examples of our interest, the sentence in (2) on page 1 above is true *if and only if the leaf is green*, where ‘green’ is assumed to pick out a determinate property. The contribution of the noun phrase in (1), ‘every bar’, is *not* adjusted by domain restriction, but ranges over every bar in the universe of discourse (e.g. the bars in Ireland). The implicit instrument in (3) is not truth-conditionally relevant. Furthermore, the metonymy in (6) does not bear on the truth conditions of the sentence: it is trivially false.

Some minimalists, notably Borg (2017), distinguish between literal and non-literal speech acts, in order to account for the intuitions associated with e.g. (3), (6) and (8). According to this idea, intuitive truth conditions (or propositions), which differ from minimal ones, can be associated with non-literal speech acts. When a non-literal speech act is performed, the intuitive truth conditions are expressed, in addition to the minimal truth conditions. The minimal truth conditions of a sentence (in context) are always expressed. To illustrate, suppose that a speaker utters (8) in a context *c*. The minimal truth conditions (the minimal proposition) that a contextually salient ham sandwich left without paying are then expressed. But in virtue of the speech act being non-literal, a related proposition is also expressed, namely the proposition that the orderer of the ham sandwich left without paying. This proposal could be contrasted to truth-conditional pragmatics, where a sentence in context conveys a single content/has a specific set of

(possibly modulated) truth conditions.<sup>20</sup>

## 1.6 Intuitive truth conditions and implicatures

Our inquiry primarily concerns examples (1)-(11) and their associated intuitive truth conditions. The attribute ‘intuitive’ and cognates are discussed below, in Section 1.7.1. But first, our approach will be very briefly compared to that of Grice (1975), where ‘what is said’ is distinguished from various forms of implicatures.

A starting point, and an assumption shared by indexicalists and contextualists, which I have no reason to question, is that something like Grice’s distinction between the notion of what is said and implicatures of various sorts, as well as his famous cooperative principle, are central, although not exhaustive, concepts in frameworks of communication. The picture of Grice is, however, incomplete, in many respects. One problem, pointed out in the literature by e.g. Recanati (2004, p. 1-37), is that, if we followed Grice dogmatically, our examples and similar ones would be given cognitively or psychologically implausible treatments.<sup>21</sup> For instance, consider (6). It seems implausible that the IT-technician first assumes that Pia’s question concerns whether he is a computer system, and, equally implausible, that Pia, in trying to grasp the IT-technician’s answer, first considers the absurd information that the IT-technician predicates this property of himself, before the intuitive, natural, immediate meaning, that the question and the answer concern the property of being an IT-technician working with Dafgu, is entertained by the interlocutors. Given this problem with applying Grice’s framework dogmatically, one may wish to revise and develop some aspects of the proposal, which is, furthermore, presented in a very informal style, and in a somewhat different theoretical context, prior to the development of the field of formal semantics, as we know the enterprise today.

The notion of ‘intuitive truth condition’ is meant to avoid this problem of assigning too literal or minimal truth conditions. Recanati (2004, p. 14) puts forward the principle that if a speaker understands a (declarative) utter-

<sup>20</sup>Other minimalists, e.g. Cappelen & Lepore (2005) are skeptical towards systematic accounts of modulation and take a more pessimistic stance towards theories about non-literal truth conditions.

<sup>21</sup>Cf. (Bach, 1994, p. 143-144).

ance, she intuitively knows “which state of affairs would possibly constitute a truth-maker for that utterance, i.e. knows in what sort of circumstance it would be true”. If we start from this assumption, the contrast between ‘what is said’, understood as the intuitive truth condition of an utterance in a context, can still be contrasted with e.g. conversational or conventional implicatures, along the lines suggested by Grice. Moreover, the cooperative principle (or some development of it) can still play a role in accounts of processes of grasping propositions intended to be conveyed by utterances and processes of working out associated implicatures.

## 1.7 Purpose and method

In this dissertation, the hypothesis that indexicalism and truth-conditional pragmatics are empirically equivalent is explored. I will argue for the correctness of this hypothesis by showing that, for the main kinds of sentences discussed in the literature, and intuitions about their contextual truth conditions, there are formally precise versions of indexicalism *and* truth-conditional pragmatics, which account, in a satisfactory way, for the truth-conditional intuitions associated with the sentences. A related claim is that indexicalism, as it is developed in the subsequent chapters, and truth-conditional pragmatics are viable and fruitful research programmes, which explain a vast range of context-dependent phenomena by the postulation of a few simple semantic mechanisms.

### 1.7.1 Intuitions

What kind of phenomena or data should we account for? In the debate on context dependence relevant to us, it is commonly assumed that intuitions are evidentially important. Stanley (2005, p. 6) compares native speakers’ intuitions about grammaticality in their first language to intuitions about the truth and falsity of sentences in their mother tongue, relative to situations. Just as the syntactician develops theoretical accounts of syntax and grammar using the intuitions of speakers as evidential basis, philosophers of language and semanticists can use semantically relevant intuitions in their accounts. Recanati (2004, p. 14) also discusses the relevance of intuitions for accounts of context dependence. As was mentioned above in Section

1.6, he assumes that a speaker who understands an utterance, intuitively knows when it would be true. In this dissertation, I accept these methodological choices. A central aim is to account for the truth-conditionally relevant intuitions associated with (1)-(11), i.e. to provide a formal semantics consistent with native speakers' intuitions about the situations in which utterances of the sentences (1)-(11) would be true.

But what are 'intuitions'? For Chomsky, they are judgments made after reflection. Just as Socrates's discussion partner Meno is guided and questioned by the philosopher in his claims about the common denominator of all virtues, the language theorist may have to add contextual information in order to guide the informant's judgments (Chomsky, 1965, p. 21).

[I]t may be necessary to guide and draw out the speaker's intuition in perhaps fairly subtle ways before we can determine what is the actual character of his knowledge of his language or of anything else. (Chomsky, 1965, p. 24)

For Maynes & Gross (2013), linguistic 'intuition' is a kind of judgment that differs from other judgments in the following way: one simply finds oneself with the judgment, after "attending to the matter" (Maynes & Gross, 2013, p. 716):

It can take some time and reflection for someone to get into or imaginatively construct conditions that enable a particular intuitive judgment – for example, to notice an ambiguity, to hit upon a scenario in which one would use a certain sentence, or to concoct a counter-example to a would-be entailment claim...[S]uch judgments are not based on conscious reasoning, past or present, ones own or another's – in particular, not based on conscious reasoning from hypotheses one would like to support! (Maynes & Gross, 2013, p. 716)

'Linguistic intuitions' are, according to the authors above, and to the view taken in this dissertation, judgments about language, which do not follow from conscious reasons, but which may involve some cognitive effort in terms of imagination and similar mechanisms. The linguistic judgments of interest to us are semantic intuitions: we focus on intuitive judgments

about what the world is like, when a given utterance, taken in context, is true.<sup>22</sup>

Note that the question of what intuitions native speakers have is an empirical one. An empirical investigation of intuitions could use questionnaires with descriptions of situations and questions about the truth of utterances in those situations (or about them). E.g. Hansen & Chemla (2013) adopt precisely that methodology. However, my aim, in this dissertation, is not to question or confirm claims about what intuitions native speakers have. I will assume that there are certain semantically relevant intuitions to be explained, reported in the literature, and rather focus on the theoretical side of explanation than the empirical side of data gathering, data analysis and similar tasks.

### 1.7.2 Frameworks, formal semantic accounts and empirical equivalence

A *framework*, as I will use the notion here, contains all concepts necessary for formulating and investigating a given set of scientific research questions or problems.<sup>23</sup> We are interested in semantic intuitions pertaining to contextual effects on truth conditions, and will start from the concepts developed within the philosophical frameworks indexicalism and truth-conditional pragmatics.

The philosophical frameworks of our interest contain methodological concepts and principles, research questions, informal contrasts between central terms (e.g. ‘saturation’ and ‘modulation’), etc. The frameworks also allow the formulation of *formal semantic accounts*. A formal semantic account, according to our use of the notion, contains definitions of syntactic and compositional rules, translations to a formal, type-theoretic language, and truth conditions formulated in terms of model-theoretic semantics. In Chapter 2, it is shown that the frameworks of indexicalism and truth-conditional pragmatics allow the formulation of two different formal

<sup>22</sup>See (Cappelen, 2012) for a critical discussion of the notion of intuition and its role in philosophy, and (Boghossian, 2014) for a response to the criticism. It is not my ambition to defend intuition-based methodology here. It suffices for my purposes that it is possible to conceptualize the methodology in the debate of our interest as I have done here, and that this is in accordance with a common view in the relevant literature.

<sup>23</sup>Cf. (Carnap, 1950).

semantic accounts, which both yield intuitive truth conditions for the same sentences of English.

Two frameworks will be said to be *empirically equivalent*, if they both account for the same empirical data. The data for our philosophical frameworks are semantic intuitions, as was mentioned and discussed above (Section 1.7.1). But what does it mean that a framework accounts for a given set of semantic intuitions? This should be read as follows: if native speakers associate a given sentence with a given set of truth conditions, in some context, the formal semantic account of the framework assigns that set of truth conditions, or a more formal variant of that set of truth conditions, to that sentence, in some context. This principle will be elaborated in more detail in Chapter 2.2.

*Empirical equivalence: comparison to earlier proposals*

The claim about equivalence can be juxtaposed with earlier prominent claims about the relation between indexicalism and truth-conditional pragmatics. Stanley (2007, p. 225-230), a central proponent of indexicalism, has argued extensively against the empirical adequacy of truth-conditional pragmatics. According to Stanley, truth-conditional pragmatics predicts that there are certain readings of sentences, which are in fact unavailable to native speakers. Consider the following example:

- (20) Every Frenchman is seated.

According to the argument, this sentence cannot have the reading that every Frenchman or Dutchman is seated. But given that modulation can operate on every constituent, it seems that the truth-conditional pragmaticist is committed to the flawed prediction that it can have that reading, Stanley argues. Indexicalism, in contrast, does not have this empirical consequence, or so Stanley claims. This example, and the discussion about it, will be addressed again in Chapter 2.3. My point here is not to discuss the example, but to juxtapose my claim with Stanley's. There is a clear contrast here: whereas I say that indexicalism and truth-conditional pragmatics are empirically equivalent, Stanley holds that truth-conditional pragmatics is less empirically adequate than indexicalism, since truth-conditional pragmatics over-generate readings.



Stanley's assertion above is explicit about the empirical difference between the frameworks. Other authors have given more indirect reasons for assuming that truth-conditional pragmatics is better supported empirically. Kennedy & McNally (2010) is sceptical towards the predictions of the indexicalist account of colour adjectives put forward by Szabó (2001). Kennedy and McNally's proposed account is neither indexicalist nor truth-conditional pragmaticist, but one could argue that, if the reasoning in Kennedy & McNally (2010) is correct, indexicalism about colour adjectives is not a theoretical option, whereas truth-conditional pragmatic accounts of the same phenomenon are still alternatives (Kennedy and McNally do not discuss truth-conditional pragmatics).

A similar indirect reason for assuming that there is no equivalence of the sort I suggest, could be related to the phenomenon of meaning litigation. There is previously no indexicalist or truth-conditional pragmaticist account of this phenomenon, as far as I am aware. The only well known account, in the philosophical debate about context dependence, is (Ludlow, 2014), where the framework of radical contextualism is applied to several examples of meaning litigation. But radical contextualism and truth-conditional pragmatics are often thought of as closely related (Recanati 2010b, p. 17, describes both frameworks as variants of "contextualism"). The close relation between the two could lead one to believe that truth-conditional pragmatics is better suited than indexicalism for cases of meaning litigation. In Chapter 2.6, I will argue that this is not the case: both indexicalism and truth-conditional pragmatics are suitable for meaning litigation data.

Finally, a prominent statement about the empirical status of the frameworks is Recanati's remark that the conflict between Stanley's indexicalism and truth-conditional pragmatics is a case of "genuine empirical disagreement" (Recanati, 2010b, p. 14). An important premise for this conclusion is that indexicalism allows for saturation but not for modulation, whereas truth-conditional pragmatics allows for both pragmatic processes. Therefore, indexicalism cannot account for cases of optional context dependence, Recanati argues. Again, we see that the claim I put forward is strikingly different from the outlook in works central to the debate.

There are, however, earlier remarks in the literature that point in the direc-

tion I take here. According to Martí (2006), some variables in logical form are optional, whereas other are mandatory. Saturation depends on mandatory variables, whereas modulation depends on optional ones. In (Martí, 2006), the conclusion that (some variant) of indexicalism and Recanati's truth-conditional pragmatics are empirically equivalent is not drawn.<sup>24</sup> But in a discussion of the proposal of optional covert variables, Recanati (2010b, p. 138-141) tentatively suggests that an indexicalist framework allowing for a distinction between optional covert variables and mandatory covert variables might have the resources for formulating the difference between saturation and modulation: "the resulting view sounds diametrically opposed to TCP, but appearances may be deceptive" (p. 141). However, there are differences between this comment and my aim. In the formal semantic account put forward on the indexicalists' behalf in this dissertation, the notion of optional variables is not the central suggestion: the indexicalist semantic accounts I propose do not develop that idea.<sup>25</sup> Furthermore, the formalizations in the following chapters attempt to show rigorously that there is, indeed, an empirical equivalence, at least concerning the main examples discussed in the debate. A systematic comparison of the frameworks, on the basis of detailed syntactic and semantic accounts, has not been presented previously, as far as I am aware, even if the possibility has been mentioned or noted.

A key premise in my argument that the two frameworks are empirically equivalent is that indexicalists and truth-conditional pragmaticists can accommodate the distinction between saturation and modulation, in structurally similar and parallel ways (cf. Section 1.2.1 and Chapter 2). This is a philosophical consequence of the syntactic and semantic formalizations that are provided in the following chapter.<sup>26</sup>

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<sup>24</sup>In fact, it is argued that Recanati's framework makes empirically inadequate predictions. See Chapter 2.4.3.

<sup>25</sup>The worry raised by Carston & Hall (2017), that optional covert variables lead to an unnecessarily complex syntax, because of a proliferation of structural ambiguity, is thereby avoided.

<sup>26</sup>In a related discussion about predicates of personal taste, Stojanovic (2007) argues that contextualism and relativism are notational variants from a semantic perspective.

### 1.7.3 Formalization: purpose and method

The claim about equivalence is one of the main points of this dissertation. But the purpose is also to present a formal (compositional) semantics, with detailed syntactic and semantic accounts of various phenomena discussed in the debate about context dependence. In the literature, one is often left with a translation of a natural language expression without specifications of what syntactic categories are assumed or, perhaps more importantly, how the composition of the meaning of the parts yields the meaning of the whole expression. I will sharpen the discussion about contextual effects on truth conditions by setting up formal semantic accounts of the relevant English sentences. This aim is as important as the equivalence claim.

The method of formalization puts constraints on philosophical frameworks and, for that reason, the list of possible, and tenable, answers is reduced. Hopefully, this results in philosophical progress.

### 1.7.4 Plan

The plan for the elaboration of these claims is as follows. In Chapter 2, indexicalist and truth-conditional pragmaticist formal semantic accounts of the main kinds of examples discussed in the debate are presented. In Chapter 3, context-dependent dimensions of the present perfect are examined. In contrast to the linguistic phenomena considered in Chapter 2, the discussion in 3 concerns examples and problems not previously discussed in relation to indexicalism and truth-conditional pragmatics. Chapter 4 contains a discussion of the philosophical consequences of the results, and an outlook on future research.



## 2 Indexicalism and Truth-Conditional Pragmatics

In this chapter, I will make plausible the claim that truth-conditional pragmatics and indexicalism are empirically equivalent. More specifically, I will show that both frameworks allow for the formulation of formal semantic accounts that model the relevant linguistic phenomena. The discussion below will be centered around quantifier domain restrictions, semantic transfer, binding, colour adjectives, meaning litigation and enrichments of thematic roles. I have chosen to focus on these phenomena, since they have been used (or could be used) to argue against truth-conditional pragmatics and for indexicalism or the other way around.

The notions of indexicalism and truth-conditional pragmatics could be made precise in different ways. In the literature, event semantic notions are often used to formulate the differences. This route is taken in Borg (2012); Recanati (2010b); Stanley (2007) and Zeman (2011a). I will continue in that direction here. The indexicalist and the truth-conditional pragmaticist formal semantic accounts will both be of the event semantic kind.

The disposition of this chapter is as follows. First, I set up basic and shared aspects of the indexicalist and the truth-conditional pragmaticist formal accounts (2.1). Second, I develop indexicalist and truth-conditional pragmaticist analyses of quantifier domain restrictions (2.2), semantic transfer (2.3), binding (Section 2.4), colour adjectives (Section 2.5), meaning litigation (2.6), and enrichments of thematic roles (2.7) within extensions of the basic formal account.

### 2.1 Syntax and semantics

#### 2.1.1 Basic formal account

The basic formal account contains a lexicon, a syntax that specifies the well-formed expressions of a fragment of the language  $L$ , and translations from

the well-formed expressions of  $L$  into expressions in a simply typed formal language, which in turn are given model-theoretic interpretations. This format is well-known. It is found in e.g. Montague (1974a), Lewis (1970) and Partee (1975).<sup>1</sup>

Lexicon and syntax are defined as follows. The set  $Cat$  contains sets of phrases and sets of basic (lexical) expressions. Accordingly,  $Cat$  has as elements a set of determiners ( $B_D$ ), a set of nouns ( $B_N$ ) etc. There is also a set of noun phrases ( $P_{NP}$ ), a set of intransitive verb phrases ( $P_{IV}$ ) etc. The following expressions are elements in sets of basic expressions:

### Lexicon

1. every, the  $\in B_D$
2. dog, leaf, ham sandwich, planet, door  $\in B_N$
3. runs, laughs, cries  $\in B_{IV}$

The syntactic structures proposed in this chapter are intended to be logical forms, i.e. syntactic representations interpreted by the semantics. A further elaboration of the syntax could develop the ideas in the direction of Chomsky (2000), where ‘LF’ (for ‘Logical Form’) is contrasted to ‘PF’ (for ‘Phonetic Form’) (cf. Graf 2013).<sup>2</sup> Other syntactic formats could be used as well. The account of Montague (1974a), where derivation history rather than phrase structure is displayed<sup>3</sup>, could, in principle, be used in a formal implementation of indexicalism and truth-conditional pragmatics. The difference between indexicalism and truth-conditional pragmatics would, however, not be clearer with a more complex syntax. Therefore, a simple phrase structure syntax, along the lines sketched below, is sufficient for our purposes.<sup>4</sup>

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<sup>1</sup>Comprehensive introductions to model-theoretic formal semantics are found in the textbooks of Dowty et al. (1981), Gamut (1991) and Chierchia & McConnell-Ginet (2000). More recent, and somewhat shorter, introductions are found in Sternefeld & Zimmerman (2013) and Winter (2016).

<sup>2</sup>It would also be possible to develop it in accordance with Chomsky (1976), where there is a distinction between the logical form of a sentence, LF, and its surface structure, SS (cf. May 1985 and Neale 1994).

<sup>3</sup>Cf. (Jacobson, 2012).

<sup>4</sup>I will only postulate syntactic structure that is semantically motivated. The strategy could

The syntactic and lexical labels I use are closely related to the terminology of *The Cambridge Grammar of the English Language* (Huddleston & Pullum, 2002), even though I will have to deviate from their terminology occasionally. But Huddleston & Pullum's format is not a generative grammar: I use their terminology but not their theory.

The syntax below specifies the members of various sets of phrases. The labels are, hopefully, transparent to the reader. But note that 'M.Clause' is an abbreviation for 'Main Clause' (I will use 'S.Clause' for subordinated clauses later on).

### Syntax

Let  $\alpha$  be a (meta-language) variable over basic/lexical expressions and  $\beta$  and  $\gamma$  be (meta-language) variables over phrasal expressions.

1. If  $\alpha \in B_D$ ,  $[_D \alpha] \in P_D$ .
2. If  $\alpha \in B_N$ ,  $[_N \alpha] \in P_N$ .
3. If  $\alpha \in B_{IV}$ ,  $[_{IV} \alpha] \in P_{IV}$ .
4. If  $\beta \in P_D$  and  $\gamma \in P_N$ , then  $[_{NP} \beta\gamma] \in P_{NP}$ .
5. If  $\beta \in P_{IV}$ , then  $[_{VP} \beta] \in P_{VP}$ .
6. If  $\beta \in P_{NP}$  and  $\gamma \in P_{VP}$ , then  $[_{M.Clause} \beta \gamma] \in P_{M.Clause}$ .

Let me now introduce  $L_{type}$ , the language used later on for translations. Every expression in  $L_{type}$  has a type. All types are in a set  $Y$ . The types in  $Y$  are either  $e$  (entity) or  $t$  (truth-value), or, for any types  $a$  and  $b$ ,  $\langle a, b \rangle$  (the type of functions from a type  $a$  to a type  $b$ ). For every type, there are infinitely many variables and infinitely many constants at our disposal.

$L_{type}$  has denotations with respect to a model  $\mathcal{M}$ .  $\mathcal{M}$  is a tuple  $\langle M, F \rangle$ , where  $M$  is a set of entities and  $F$  is an interpretation function (from ex-

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be perceived as at odds with the syntactic X-bar theory proposed by Chomsky (1970) and Jackendoff (1977), since I will not use their (allegedly universal) schema for syntactic structure. Such an effort would give us a more complicated syntactic representation, where several syntactic operations would be semantically vacuous. That would, again, be unnecessarily complicated for the claims I argue for in the dissertation.

pressions to denotations in  $\mathcal{M}$ ). The set  $M_a$  of possible denotations for an expression  $a$  in a domain  $\mathcal{M}$  is determined by the type of  $a$ :

**Possible denotations:**

1.  $M_e = \mathcal{M}$
2.  $M_t = \{0, 1\}$
3.  $M_{(a,b)} = M_b^{M_a}$

We can now specify the set of meaningful expressions of our  $L_{type}$ . Every expression has a given type, which determines its possible denotations. In the definitions below,  $a$  and  $b$  are arbitrary types, and  $\chi, \chi_0, \dots$  are arbitrary  $L_{type}$ -expressions:

**Meaningful expressions of  $L_{type}$**

1. Every constant of type  $a$  is in  $ME_a$ .
2. Every variable of type  $a$  is in  $ME_a$ .
3. If  $\chi \in ME_b$  and  $x$  is a variable of type  $a$ ,  $\lambda x.\chi \in ME_{(a,b)}$ .
4. If  $\chi \in ME_{(a,b)}$  and  $\chi_0 \in ME_a$ , then  $\chi(\chi_0) \in ME_b$ .
5. If  $\chi \in ME_t$  and  $x$  is a variable of any type, then  $\forall x\chi$  and  $\exists x\chi \in ME_t$ .
6. If  $\chi, \chi_0 \in ME_t$ , then  $[\chi \rightarrow \chi_0], \neg\chi, [\chi \wedge \chi_0], [\chi \vee \chi_0]$  and  $[\chi \leftrightarrow \chi_0] \in ME_t$ .

Given a model  $\mathcal{M}$ , a variable assignment assigns to each variable  $x_a$  (of type  $a$ ) an element of  $M_a$  ( $g, g_0, g_1$  are used for variable assignments).

The definition of truth and denotation below assigns inductively, for every model  $\mathcal{M}$  and every assignment  $g$  in  $\mathcal{M}$ , a denotation  $\llbracket \chi \rrbracket^{c\mathcal{M},g}$  in  $M_a$  to each expression  $\chi$  of type  $a$ . In particular, *formulas*, i.e. expressions of type  $t$ , are assigned 1 or 0 (True or False):

**Truth and denotation in  $L_{type}$**

1. If  $\chi$  is a constant, then  $\llbracket \chi \rrbracket^{c\mathcal{M},g}$  is  $F(\chi)$ .
2. If  $\chi$  is a variable, then  $\llbracket \chi \rrbracket^{c\mathcal{M},g}$  is  $g(\chi)$ .



3. If  $\chi \in ME_b$  and  $x$  is a variable of type  $a$ , then  $\llbracket \lambda x.\chi \rrbracket^{cM,g}$  is that function  $b$  with domain  $D_a$  such that whenever  $d$  is in that domain,  $b(d)$  is  $\llbracket \chi \rrbracket^{cM,g'}$ , where  $g'$  is like the assignment  $g$  except that  $g'(x) = d$ .
4. If  $\chi \in ME_{(a,b)}$  and  $\chi_0 \in ME_a$ , then  $\llbracket \chi(\chi_0) \rrbracket^{cM,g}$  is  $\llbracket \chi \rrbracket^{cM,g}(\llbracket \chi_0 \rrbracket^{cM,g})$ .
5. If  $\chi \in ME_t$  and  $x$  is a variable of any type, then  $\llbracket \forall x\chi \rrbracket^{cM,g}$  is 1 if and only if for every  $g'$  like  $g$  except possibly for the value assigned to  $x$  by  $g'$ ,  $\llbracket \chi \rrbracket^{cM,g'}$  is 1, and  $\llbracket \exists x\chi \rrbracket^{cM,g}$  is 1 iff for some  $g'$  like  $g$  except possibly for the value assigned to  $x$  by  $g'$ ,  $\llbracket \chi \rrbracket^{cM,g'}$  is 1.
6. If  $\chi$  and  $\chi_0 \in ME_t$ , then  $\llbracket \chi \rightarrow \chi_0 \rrbracket^{cM,g}$  is 1 if and only if  $\llbracket \chi \rrbracket^{cM,g}$  is 0 or  $\llbracket \chi_0 \rrbracket^{cM,g}$  is 1,  $\llbracket \neg\chi \rrbracket^{cM,g}$  is 1 iff  $\llbracket \chi \rrbracket^{cM,g}$  is 0, and similarly for the other connectives.

Let us now turn to the translations and map expressions of the fragment to  $L_{type}$  in a systematic fashion. We start with the basic (lexical) expressions and continue with the phrasal ones. From now on, the symbols  $x, x_0, x_1$  etc. will be used as variables over entities, and  $X, X_0, X_1$  etc. as variables over sets of entities.

### Translations of basic expressions

1.  $\text{every}_{tr} = \lambda X.\lambda X_0.\forall x[X(x) \rightarrow X_0(x)]$   
(type  $\langle et, \langle et, t \rangle \rangle$ )<sup>5</sup>
2.  $\text{dog}_{tr} = \mathbf{dog}$  (type  $et$ ), ham sandwich =  
**ham sandwich** ( $et$ ), etc.
3.  $\text{runs}_{tr} = \mathbf{run}$  (type  $et$ ), laughs<sub>tr</sub> = **laugh** ( $et$ ), etc.

### Translations of phrasal expressions

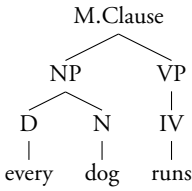
1.  $[_D \alpha]_{tr} = \alpha_{tr}$  (type  $\langle et, \langle et, t \rangle \rangle$ )<sup>6</sup>
2.  $[_N \alpha]_{tr} = \alpha_{tr}$  (type  $et$ )

<sup>5</sup>If a function is of type  $\langle e, t \rangle$ , the notation is simplified to  $et$ .

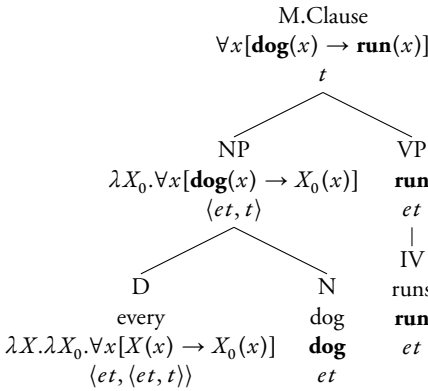
<sup>6</sup>In what follows, types are only presented in connection to phrasal expressions.

3.  $[\text{IV } \alpha]_{tr} = \alpha_{tr}$  (type  $et$ )
4.  $[\text{NP } \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $\langle et, t \rangle$ )
5.  $[\text{VP } \beta]_{tr} = \beta_{tr}$  (type  $et$ )
6.  $[\text{M. Clause } \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $t$ )

For example, the following expression is an element of  $P_{M.Clause}$  and thus an expression of  $L$ , if we identify trees with corresponding strings of labelled brackets:



In the next tree, translations and type information are added. It illustrates how the translation of  $[\text{D every}]$  is applied to the translation of  $[\text{N dog}]$ , which yields the translation of  $[\text{NP } [\text{D every}][\text{N dog}]]$  etc. As the translation proceeds up the tree, the formulas are simplified by beta-reduction.<sup>7</sup>



<sup>7</sup>Beta-reduction, which is essentially a principle of equivalence, simplifies function-argument expressions by eliminating lambda operators and replacing variables bound by lambdas with arguments. See the original formulation of Church (1941), or the textbooks of Dowty et al. (1981) or Gamut (1991).

The final translation of our example is, accordingly,  $\forall x[\mathbf{dog}(x) \rightarrow \mathbf{run}(x)]$ . The truth conditions for universally quantified sentences are found above in *Truth and denotation in  $L_{type}$* .

I have now set up a general format for the two formal semantic accounts. In the next section, events will be introduced, which allows for a revision of verbal meanings.

### 2.1.2 Compositional event semantics

The tradition of event semantics began with Davidson's analysis of action sentences (Davidson, 1967). Davidson's key assumption was that logical forms of action sentences contain event variables bound by existential quantifiers. Various developments of Davidson's analyses have been proposed. Neo-Davidsonian frameworks, which relate events to thematic roles like agent and theme, have been successfully applied to a broad range of linguistic problems, e.g. the semantics of verbal modification (Parsons, 1990; Landman, 2000). Champollion (2015) combines ideas from the event semantics tradition with ideas in the tradition of compositional semantics and suggests some innovative ideas about the translation of verbs, the type system and the phrase structure rules.

The set of types are revised as follows (cf. page 33): we have a set of types  $Y$  such that  $e$  (entity),  $v$  (event) and  $t$  (truth-value)  $\in Y$ . And, as before, for every type  $a$  and  $b \in Y$ , there is a function  $\langle a, b \rangle \in Y$ .<sup>8</sup> The possible denotations are also changed, in line with the change of type expressions. A model  $\mathcal{M}$  is now a tuple  $\langle M, E, F \rangle$  such that  $F$  is an interpretation function and  $M$  is a set of entities (as before), and  $E$  is a set of events (disjoint from  $M$ ) (cf. Champollion 2015, p. 35-44).

The following clause is added to the definition of meaningful expressions of  $L_{type}$ , in order to allow for translations containing the predicates *agent* and *theme*:

#### Meaningful expressions in $L_{type}$

- The expressions *theme* and *agent* are of type  $\langle v, et \rangle$ .

The symbols  $e, e_0, e_1$  etc. will be used as variables over individual events and  $f, f_0, f_1, f_2$  will be event predicate variables.

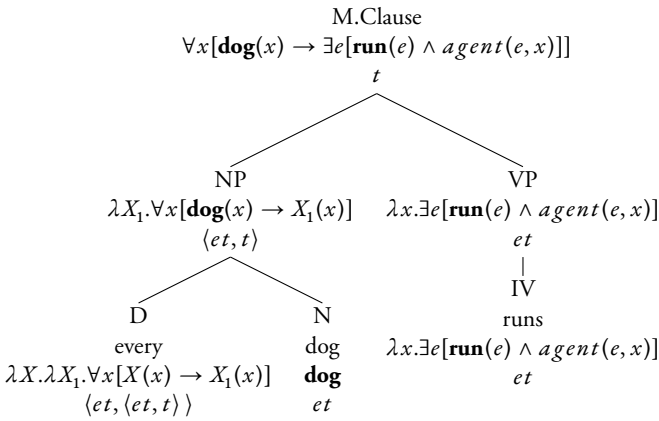
<sup>8</sup>As before, if  $a$  and  $b$  are atomic, I will write  $ab$  and not  $\langle ab \rangle$ .

The translation of intransitive verbs is modified as follows..

**Translations of basic expressions**

1.  $\text{runs}_{tr} = \lambda x.\exists e[\mathbf{run}(e) \wedge \text{agent}(e, x)]$ , and similarly for other intransitive verbs<sup>9</sup>

The following tree describes, accordingly, an expression of  $L$ , where an  $L_{type}$ -translation of the whole tree is stated at the top and translations of each subtree are stated at each node:



*Comparison with Champollion*

My compositional event semantics is inspired by the framework in Champollion (2015). The complexity of his framework is to a large extent motivated by his analysis of verbs, but I have chosen to translate verbs differently. A central tenet of Champollion (2015) is that verbs are always translated into formulas containing existential quantifiers over events. Moreover, the translations of verbs are of type  $\langle vt, t \rangle$ . In other words, verbal meanings are properties of sets of events (or event quantifiers). One of Champollion’s reasons for this view is that he is committed to a principle called *the Scope Do-*

<sup>9</sup>Function terms in the simply typed lambda calculus take one argument. Therefore, the correct notation of thematic roles is  $\text{agent}(e)(x)$ ,  $\text{theme}(e)(x)$ , etc., and not  $\text{agent}(e, x)$ ,  $\text{theme}(e, x)$ , etc. However, informally or for ease of exposition, I occasionally write  $\text{agent}(e, x)$ ,  $\text{theme}(e, x)$ , etc.

*main Principle*, according to which universal quantifiers always have scope over event quantifiers (Champollion, 2015, p. 35-45). By letting verbs be translated to expressions of type  $\langle vt, t \rangle$ , containing an existential quantifier over events, and by postulating that the translations of noun phrases (DPs in Champollion's syntactic framework) are of type  $\langle \langle vt, t \rangle, \langle vt, t \rangle \rangle$ , a compositional translation/interpretation is achieved where (possible) quantifiers in the noun phrase translation always take scope over the event quantifier in the verbal translation.

If one accepted Champollion's reasoning here, my proposed translation above could be problematic. The problem is really pressing for transitive verbs, but a natural extension of my account to transitive verbs would be to treat the translation of transitive verbs as type  $\langle \langle et, t \rangle, et \rangle$ . The idea would be that, if  $Q$  is a variable of type  $\langle et, t \rangle$ , then  $\text{greet}_{tr} = \lambda Q. \lambda x. \exists e [\mathbf{greet}(e) \wedge [\mathbf{agent}(e, x) \wedge Q(\lambda x_0. \mathbf{theme}(e, x_0))]]]$ .

But is it never plausible to let the existential quantifier over events have scope over universal quantification? Consider the following sentence:

(21) Kim greeted every party member.

Imagine a situation where Kim is about to deliver a speech on the first of May in front of a large audience of party members. (21) could truly be used of that situation, with the intuitive meaning that Kim has the thematic role of agent and every party member has collectively the role of theme in one event of greeting. A translation of (a syntactically parsed version of) (21) expressing this meaning could be as follows:

(22)  $\exists e [\mathbf{greet}(e) \wedge [\mathbf{agent}(e, \mathbf{k}) \wedge \forall x [\mathbf{party-member}(x) \rightarrow \mathbf{theme}(e, x)]]]]]$

If this analysis were accepted, we could distinguish between a situation where Kim greets every party member with one greeting from the stage (as above) and an alternative situation where Kim greets every party member individually in a chain of greeting events.

There may be other ways that a proponent of the Scope Domain Principle, or Champollion's specific implementation of the principle, would like to account for the difference between these situations. My point here is not to show that Champollion's proposal is untenable. It may well be rewarding to explore the theoretical and empirical consequences of the Scope Domain

principle. But one does not *have to* accept the Scope Domain Principle or Champollion's specific proposal. It is not obviously correct for all readings, and it leads to a complexity of the framework that is unnecessary for our purposes.

The basic aspects of the indexicalist and the truth-conditional pragmatic formal accounts have now been illustrated. In what follows, I will extend the approaches to cover quantifier domain restrictions, transfer, binding, colour adjectives, meaning litigation, and enrichments of thematic roles. The aim is to extend the basic account just introduced to the mentioned linguistic phenomena and to provide one indexicalist and one truth-conditional pragmatic extension for each phenomenon, thereby illustrating important ways in which indexicalism and truth-conditional pragmatics are empirically equivalent.

### 2.1.3 Digression: Static or dynamic semantics?

The intuitive meanings of sentences in contexts can be theoretically modelled statically. This is the approach in the thesis: each sentence is assigned truth conditions with respect to model and variable assignment (and context; cf. page 135). It is also possible to adopt a dynamic perspective on sentence meaning, and let the notion of sentence meaning be explicated in terms of conventional, typical *change* of information available in discourse.

There are two reasons for the choice of a static semantics. The first reason is that dynamic semantic notions are rarely used in the literature on indexicalism and truth-conditional pragmatics. In the contributions of e.g. Borg, Martí, Pagin, Recanati, Stanley and Szabó, the proposals are not formulated dynamically. A choice of Discourse Representation Theory, or some other dynamic framework, would make the connection to the discussion in the literature less straightforward.<sup>10</sup> The second reason is that frameworks of the dynamic variety have been developed in order to account for linguistic

<sup>10</sup>Kamp & Reyle (1993) and Kamp et al. (2011) develop and elaborate the dynamic account 'Discourse Representation Theory' (DRT). In that framework, logical forms of sentences are translated into *Discourse Representation Structures* (DRSs), which are, in turn, given model-theoretic interpretations. DRSs are used to illustrate how the meaning of a sentence may depend on the information provided earlier in discourse. Moreover, DRSs can be changed dynamically as further information is added in discourse, and thereby illustrate how sentences add to and change the available information.

phenomena that are difficult to account for statically (e.g. interrogatives, anaphora and presupposition), or so it has been argued. But since I will not discuss these linguistic phenomena, but others that are not, as far as I know, better accounted for dynamically than statically, it would be unnecessarily complicated to use a dynamic formalism. This does not entail that one could not, for programmatic reasons, generality and parsimony, try to account for the phenomena discussed in the thesis dynamically. However, that would be motivated by an interest in extending the empirical coverage of dynamic frameworks, e.g. Discourse Representation Theory, which is not the ambition here.

## 2.2 Quantifier domain restrictions

Consider the following example, mentioned as example (1) above but repeated below as (23):

- (23) Let's go to Ireland. We'll stop in **every bar** and have a drink.

We have not (yet) specified the mechanisms in our semantics that allows 'every bar' to range over different domains in different discourses. Moreover, there are no mechanisms that account for the fact that the interpretation of 'every bar' may change within the boundaries of a discourse: the most natural reading of (23) is not that the suggestion is to stop at every bar in Ireland but rather to stop at every *encountered* bar in Ireland (or on the way to Ireland).

Other linguistic examples illustrate the same phenomena. Westerståhl (1985, p. 49) discusses the following one:

- (24) The English love to write letters. Most children have several pen pals in many countries.

The most natural reading of the second sentence above is that 'most children' ranges over English children, but the domain contains other children as well. And in Stanley & Williamson (1995, p. 294), the phenomena is illustrated by the example below:

- (25) As the ship pulled away from the dock, every man waved to every woman, every woman waved to every man, and every child waved to every child.

One reading of (the last clause of) (25) could be paraphrased as *every child on the dock waved to every child on the ship*.<sup>11</sup> These examples warrant a theoretical distinction between the entities, events (etc.) in the domain, on the one hand, and the restricted part of the domain that ‘every bar’, ‘most children’, etc. range over, on the other.

Westerståhl (1985) introduces the notion of context sets, and extends the fragment, the translations and the semantics of Barwise & Cooper (1981) accordingly, in order to make the right predictions about quantifier domain restrictions. The translational language  $L(GQ)$  of Barwise & Cooper (1981), which we will not be concerned with in any detail here, is extended by the following operation that forms new determiners:

$$(RES) D_M^X A B \leftrightarrow D_M X \cap A B$$

On the right hand side, we see the determiner symbol  $D_M$ , which denotes a relation between subsets on the domain  $M$ , and  $A$  and  $B$ , which denote two sets related by (the denotation of) the determiner.  $X$  is a set variable (in context denoting a ‘context set’), whose extension is determined by the variable assignment. By intersecting  $X$  and  $A$ , the first argument of the determiner, a contextually determined set is yielded. On the left hand side, we see that whenever the mentioned facts hold, we could indicate the presence of a context set by an index on the determiner.

In the literature on indexicalism, Stanley & Szabó have defended the thesis that each common noun “co-habits a node with a contextual variable” (Stanley & Szabó, 2000, p. 251), and this is the view we will develop and discuss below. In their proposal, a sentence such as *every dog runs*, is represented as below:

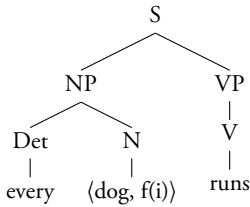
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<sup>11</sup>In Stanley & Szabó (2000), a variant of this example is discussed:

(25b) Every sailor waved to every sailor.

It is possible to interpret this sentence as *every sailor on the ship waved to every sailor on the shore*.





The idea is that “*f*” is a variable over functions from entities to sets of entities; the value is specified by context. The variable “*i*” ranges over entities, so, in a context, “*f(i)*” will denote a set of entities. The reason why Stanley and Szabó choose this formulation of quantifier domain restriction is that there are examples where the interpretation of one quantifier expression is dependent on the interpretation of another. Consider (26) below (Stanley & Szabó, 2000, p. 250-251):

- (26) In most of John’s classes, he fails exactly three Frenchmen.

The most natural reading of (26) is, informally put, that in most *x* such that *x* is a class of John’s, John fails exactly three Frenchmen in *x*. For Stanley and Szabó, this means that *x* ranges over classes (in the educational sense!). But since classes in this sense are not appropriate as domains of quantification, according to Stanley and Szabó, they postulate functions from such classes to sets, which are appropriate for that purpose.

It is, however, unclear what it means to “co-habit” a node, and the crucial role of intersection, stressed in the account of Westerståhl (1985), is not mentioned at all in Stanley & Szabó (2000). These problems can, however, be overcome by the indexicalist, and I will demonstrate how below (Section 2.2.1). I will also provide some remarks on (26) later on, in Section 2.2.4.<sup>12</sup>

<sup>12</sup>In Peters & Westerståhl (2006, p. 46), the view that determiners in noun phrases are indexed with context set parameters is attributed to Westerståhl (1985). Peters & Westerståhl contrast this view with the view of Stanley & Szabó (2000), where the noun of every noun phrase has a parameter of that sort, as will be discussed below. But this is misleading, since Westerståhl (1985) defines determiners with context-set parameters in the translational language  $L(GQ)$ . In the phrase structure tree of (24), and similar examples, there is no set variable, according to the account. Westerståhl (1985) is explicit about this:

[We] must also account for the introduction of set variables which do not appear in the phrase structure trees[...]. Only the translation of NPs is affected. Here we may stipulate that, optionally, an NP

The truth-conditional pragmaticist literature on quantifier domain restrictions is rather sparse. Recanati (2004, p. 124-127) discusses the issue in relation to situation-semantic frameworks. He claims that a truth-conditional pragmaticist approach to quantifier domain restrictions is possible, even though he does not attempt to show that the indexicalist variant of quantifier domain restriction is mistaken. Recanati's 2004 discussion is, however, quite far from a formal semantic implementation. Furthermore, the orientation towards situation semantics in that discussion is at odds with the event semantic accounts I develop here. This does not mean that situations are uninteresting for the present purposes, on the contrary, but I have chosen to leave them out of the picture for simplicity. In Section 2.2.2, I will extend our event semantic framework in a truth-conditional pragmaticist direction, by developing and applying some ideas about compositional semantics and truth-conditional pragmatics outlined in Pagin & Pelletier (2007) and Recanati (2010b) to the phenomenon of quantifier domain restriction.

### 2.2.1 Extension of the formal semantic account (indexicalist variant)

For concreteness, consider the example 'every dog runs', which was given a detailed syntactic and semantic analysis in the basic formal account above (page 38). In order to provide an analysis of that example, which takes quantifier domain restriction into account, we will add some lexical items and syntactic rules:

#### Lexicon

1.  $R, R_0, R_1, \dots \in B_{N_{var}}$
2.  $n, n_0, n_1, \dots \in B_{N_{var}}$

---


$$[[\alpha]_{\text{DET}}[\beta]_{\text{N}}]_{\text{NP}},$$

where  $\beta$  is *not* a set variable, is translated as

$$\alpha^X(\beta'),$$

where X is a new set variable." (Westerståhl, 1985, p. 52).

The variables in the lexical category  $N_{var}$  will be used for modifying the meaning of nouns.<sup>13</sup> The indexicalist analysis adds two syntactic rules to the standard version:

### Syntax

1. If  $\alpha \in B_{N_{var}}$ ,  $[_{N_{var}} \alpha] \in P_{N_{var}}$ .
2. If  $\beta \in P_{N_{var}}$  and  $\gamma \in P_N$ , then  $[_N \beta \gamma] \in P_N$ .

Any noun could, accordingly, be combined with a variable in  $N_{var}$ . Furthermore, additional translations are added:

### Translations of basic expressions

1.  $R_{0tr} = \lambda X.\lambda x.[X_0(x) \wedge X(x)]$ , and similarly for all  $R_i$
2.  $n_{0tr} = \lambda X.N_0(X)$ , and similarly for all  $N_i$

The letters  $N, N_0, N_1, \dots$  will be used later on for variables in  $L_{type}$  of type  $\langle et, et \rangle$ . But in this section, the new syntactic variables  $R, R_0, R_1, \dots$ , and their translation, are relevant ( $n, n_0, n_1, \dots$ , and their translations, which involve  $N, N_0, N_1, \dots$ , are used in Section 2.3 and 2.6).

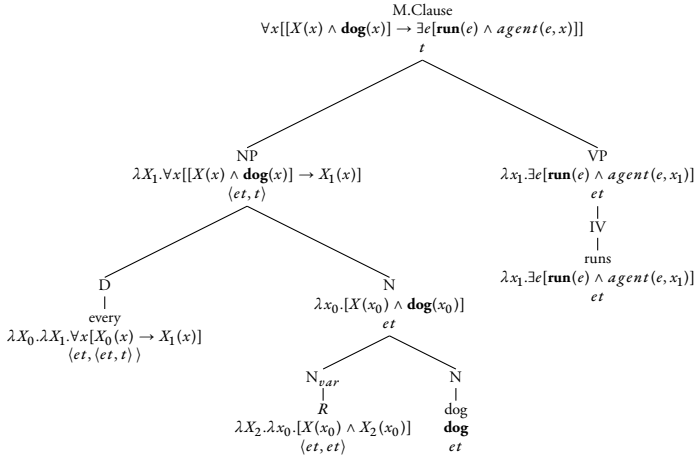
### Translations of phrasal expressions

1.  $[_{N_{var}} \alpha]_{tr} = \alpha_{tr}$  (type  $\langle et, et \rangle$ )
2.  $[_N \beta \gamma]_{tr} = \beta(\gamma)$  (type  $et$ )

The treatment of domain restriction below will let the fact that the denotations of  $X, X_0, X_1$  etc. vary as a result of the chosen variable assignment play a key role (cf. Westerståhl, 1985, p. 51).

The following tree structure with translations and type information is available to the indexicalist:

<sup>13</sup>The lexical and phrasal categories labelled  $C_{var}$  are used for variables modifying the meaning of expressions of category  $C$ , which, hopefully, explains the choice of label name.



Intuitively,  $X$  denotes a contextually salient set; when it is intersected with the literal denotation of the constant, a possibly restricted denotation is given.

In cases where one sentence contains two syntactically identical noun phrases that differ in meaning because of a difference in contextual restriction of the noun phrase meaning, as in (25) and (25b) above, the indexicalist strategy is to place different variables, say  $R_1$  and  $R_2$ , as sisters to the lowest N-node.

This strategy may raise the question of why certain readings are more likely than others, or what makes it the case that some readings are unavailable. But the question of how to account for the fact that some readings are more likely than others is beyond the scope of the formal semantics presented here. Such questions could be addressed in a separate pragmatic theory about pragmatic constraints (cf. Section 4.4).

### 2.2.2 Extension of the formal semantic account (truth-conditional pragmaticist variant)

In the previous section, the standard framework was extended, in an indexicalist manner, in order to handle quantifier domain restriction. In this section, I put forward a similar extension, on the truth-conditional pragmaticist's part.

Instead of postulating a more complex syntax, and variables in the frag-

ment's syntax, the truth-conditional pragmaticist suggests a more complex semantics in order to account for quantifier domain restriction. The strategy I will pursue here is to adapt the formats in Pagin & Pelletier (2007, p. 47-50) and Recanati (2010b, p. 44-46) to the present framework. I will show how the truth-conditional pragmaticist could account for quantifier domain restriction, by providing an explication of the truth-conditional pragmaticist notion of modulation.<sup>14</sup>

Truth-conditional pragmatics, as I construe the position here, makes use of other translation functions than the indexicalist. For instance,  $tr_c$  will be used. On the lexical level, this function works just like the ordinary translation  $tr$ . But on the phrasal level, this function takes phrases and yields the same translation as  $tr$  plus a modulation variable that fronts the translation.

### Meaningful expressions in $L_{type}$

- For every phrasal category  $C$ , if the type of translations of expressions of category  $C$  is  $a$ , then  $O_C, O'_C, O''_C$  are modulation variables of type  $\langle a, a \rangle$ .<sup>15</sup>

### Translations of basic expressions

1. For every basic expression  $\alpha$ ,  $\alpha_{tr} = \alpha_{tr_c}$ <sup>16</sup>

---

<sup>14</sup>My account differs from the one in (Pagin & Pelletier, 2007, p. 47-50) in several respects, as was mentioned on page 13. One difference, which I mentioned but did not elaborate, is that they do not translate logical forms into a formal, intermediate language. But expressions are not directly interpreted in models either. Instead, expressions are first mapped onto *structured meanings*, construed as finite sequences of compositional operations and meanings, and then evaluated semantically. The evaluation can be either modulated or literal. In the former case, but not in the latter, modulation functions are inserted into the structural meaning. On my account, variables for modulation functions are always inserted in the translation, but can be assigned the identity function by the context (furthermore, it is not clear to me if they intend the symbols for modulation functions to be variables or constants).

<sup>15</sup>The type-theoretic language has variables of every type. For ease of reading, special letters are often used for variables of certain types. In particular, for every category  $C$  with type  $a$ , I use the symbols  $O_C, O'_C, \dots$  for variables of type  $\langle a, a \rangle$ , in the truth-conditional pragmaticist setting.

<sup>16</sup>Modulation of a lexical item  $\beta$  will occur at the immediate parent node of  $\beta$ .

In each of the translation rules on page 36 and 38, replace the right hand side ( $rb$ ) by  $O_C(rb)$ , where  $C$  is the appropriate category, and replace  $tr$  with  $tr_c$ . I illustrate these translations by a few examples below:

### Translations of phrasal expressions

1.  $[_D \alpha]_{tr_c} = O_D(\alpha_{tr_c})$   
(type  $\langle et, \langle et, t \rangle \rangle$ )
2.  $[_N \alpha]_{tr_c} = O_N(\alpha_{tr_c})$   
(type  $et$ )

Now consider once again the example ‘every dog runs’. In the truth-conditional pragmaticist variant, the translation function  $tr_c$  yields the following translation:

$$\begin{aligned}
 & tr_c([_{M.Clause} [_{NP} [_D \text{every}]][_{N} \text{dog}]][_{VP} [_{IV} \text{runs}]]) \\
 & = \\
 & O_{M.Clause} (O_{NP}(O_D(\lambda X.\lambda X_1.\forall x[X(x) \rightarrow X_1(x)])) \\
 & (O_N(\mathbf{dog}))) \\
 & (O_{VP}(O_{IV}(\lambda x.\exists e[\mathbf{run}(e) \wedge agent(e, x)]))))
 \end{aligned}$$

The translation is generated straightforwardly by the application of modulation variables to the lowest nodes of the trees and then one modulation variable for each syntactic operation. This allows for massive modulation, in the sense that every constituent in the phrase structure tree could potentially have a modulated meaning. However, the phenomenon of interest for us in this section is quantifier domain restriction. Modulation of every constituent is hardly needed for that phenomenon; indeed, such an analysis seems wrong. The truth-conditional pragmaticist is not bound to the (absurd) view that every constituent (in every sentence) always has a meaning that differs from its standard meaning (i.e. the meaning assigned by the model and the variable assignment). The trick is to allow every modulation variable to be assigned the identity function, as suggested by Recanati (2010b, p. 43-46). In other words, the compositional semantics leaves room for modulation at every constituent in every phrase structure tree, but this doesn’t mean that every constituent always has a different meaning from the standard one. This assumption warrants elimination of modulation functions that do not have effects on interpretation as a last step in the analysis.

In a case where Robin and Kim talks about their dogs, and Robin uses ‘dog’ exclusively for his dogs (and not Kim’s), the truth-conditional pragmaticist could provide the following simplified translation of ‘every dog runs’:

$$\lambda X.\lambda X_1.\forall x[X(x) \rightarrow X_1(x)](O_N(\mathbf{dog})) \\ (\lambda x.\exists e[\mathbf{run}(e) \wedge agent(e, x)])$$

Applying beta-reduction, the following equivalent and simplified formula results:

$$\forall x[O_N(\mathbf{dog})(x) \rightarrow \exists e[\mathbf{run}(e) \wedge agent(e, x)]]$$

But how does truth-conditional pragmatics account for (25) and (25b)? As I argued on page 46, the indexicalist could use different variables in different occurrences of the same noun phrase. The same kind of strategy is open for the contextualist: different occurrences of noun phrases could be translated differently: just use a different modulation variable for the same category.

### 2.2.3 Truth conditions and empirical equivalence

The indexicalist and truth-conditional pragmaticist frameworks ended up with two different formal semantic accounts of quantifier domain restriction above. We noted that the sentence ‘every dog runs’ is translated into two different  $L_{type}$ -formulas, repeated below:

- (ind):  $\forall x[[X(x) \wedge \mathbf{dog}(x)] \rightarrow \exists e[\mathbf{run}(e) \wedge agent(e, x)]]$
- (tcp):  $\forall x[O_N(\mathbf{dog})(x) \rightarrow \exists e[\mathbf{run}(e) \wedge agent(e, x)]]$

In this section, I present a detailed account of the truth conditions of (ind) and (tcp), using the given semantics for  $L_{type}$ . This will allow us to see in which sense the two translations are *empirically* equivalent (even though they are not *logically* equivalent). In the sections below, where other linguistic phenomena are discussed, this step of the argument is left implicit, since the idea should be clear from this first example.

Let  $\mathcal{M} = \langle M, E, F \rangle$  be any model and  $g$  any variable assignment over  $\mathcal{M}$ . For ease of exposition, I will write the interpretation in  $\mathcal{M}$  of the constant **dog** as a set (the subset of  $M$  of which it is the characteristic function):  $\mathbf{dog}^{\mathcal{M}}$ . Similarly, the interpretation of **run** is written as the subset  $\mathbf{run}^{\mathcal{M}}$  of  $E$ , and  $agent^{\mathcal{M}}$  will be a relation (a subset of  $E \times M$ ).

Then, following the definition of truth and denotation in  $L_{type}$  on page 34, we obtain:<sup>17</sup>

1.  $\llbracket \text{ind} \rrbracket^{\mathcal{M},g} = 1$
2. iff for all entities  $a \in \mathcal{M}$ ,  $\llbracket \llbracket [X(x) \wedge \mathbf{dog}(x)] \rightarrow \exists e[\mathbf{run}(e) \wedge \mathit{agent}(e, x)] \rrbracket \rrbracket^{\mathcal{M},g(a/x)} = 1$
3. iff for all  $a \in g(X) \cap \mathbf{dog}^{\mathcal{M}}$ , there is an event  $i \in E$  such that  $\llbracket \llbracket [\mathbf{run}(e) \wedge \mathit{agent}(e, x)] \rrbracket \rrbracket^{\mathcal{M},g(a/x, i/e)} = 1$
4. iff for all  $a \in g(X) \cap \mathbf{dog}^{\mathcal{M}}$  there is  $i \in \mathbf{run}^{\mathcal{M}}$  s.t.  $\mathit{agent}^{\mathcal{M}}(a, i)$

Similarly, for truth-conditional pragmatics:

1.  $\llbracket \text{tcp} \rrbracket^{\mathcal{M},g} = 1$
2. iff for all entities  $a \in \mathcal{M}$ ,  $\llbracket \llbracket [O_N(\mathbf{dog})(x)] \rightarrow \exists e[\mathbf{run}(e) \wedge \mathit{agent}(e, x)] \rrbracket \rrbracket^{\mathcal{M},g(a/x)} = 1$
3. iff for all  $a \in g(O_N)(\mathbf{dog}^{\mathcal{M}})$ , there is an event  $i \in E$  such that  $\llbracket \llbracket [\mathbf{run}(e) \wedge \mathit{agent}(e, x)] \rrbracket \rrbracket^{\mathcal{M},g(a/x, i/e)} = 1$
4. iff for all  $a \in g(O_N)(\mathbf{dog}^{\mathcal{M}})$ , there is  $i \in \mathbf{run}^{\mathcal{M}}$  s.t.  $\mathit{agent}^{\mathcal{M}}(a, i)$

It can be concluded that, for all  $\mathcal{M}$  and all  $g$ , the following holds:

1. If  $g(X) \cap \mathbf{dog}^{\mathcal{M}} = g(O_N)(\mathbf{dog}^{\mathcal{M}})$ , then (ind) and (tcp) are equivalent.

To give an example, consider a model where  $\mathcal{M}$  consists of the household-members of my house,  $\mathbf{dog}^{\mathcal{M}}$  the dogs in  $\mathcal{M}$ , and  $\mathbf{run}^{\mathcal{M}}$  is a set of running events, each of which has a unique dog as agent. Suppose that ‘every dog runs’ is uttered in a situation where  $g(X)$  is the subset of things in  $\mathcal{M}$  that are in the backyard. Then (int) could be true, under this assignment, but false if, for instance,  $g(X) = \mathcal{M}$  (the sentence would, in that case, be false if there is a dog not in the backyard and with no associated running event).

<sup>17</sup>Note that  $g(a/x)$  is the assignment that is just like  $g$  except that the entity  $a$  is assigned to the variable  $x$ . Similarly,  $g(a/x, i/e)$  assigns the event  $i$  to the variable  $e$ , etc. Thus,  $g(a/x)(X) = g(X)$ , and  $g(a/x)(O_N) = g(O_N)$ .



Now we would get the same result from (tcp), provided that  $g(O_N)(\mathbf{dog}^{\mathcal{M}})$  is precisely the set of dogs in the backyard.

I assume that every utterance situation comes with a model  $\mathcal{M}$  and an assignment  $g$  over  $\mathcal{M}$ . If  $g$  satisfies the antecedent of (1) above, we have equivalence, since the resulting truth conditions are the same. Similar requirements of  $g$  are easy to formulate for the other examples discussed in what follows. In general, the claim about equivalence of the two semantic accounts of the English sentences  $S$  discussed in this dissertation may be expressed as follows:

### Empirical Equivalence Claim

If the indexicalist translation of  $S$  is  $\phi$  and the truth-conditional pragmaticist translation is  $\psi$  — i.e. if  $\phi$  and  $\psi$  are  $L_{type}$ -formulas obtained by our translation functions applied to the logical form of  $S$  in the respective fragments — then for all models  $\mathcal{M}$ , there is an assignment  $g$  such that  $\llbracket \phi \rrbracket^{\mathcal{M},g} = \llbracket \psi \rrbracket^{\mathcal{M},g}$ .

A fragment consists of the set of analyzed expressions, that is, of logical forms, generated by the relevant syntax rules. But  $L_{type}$  is the full type-theoretic language, with all the basic types needed (entity and event are introduced above, but a basic degree type is added later), and all the constants such as *agent*, *theme*, and, as will be added later on, *location*, *instrument* and  $\geq$ .<sup>18</sup> Thus, although the fragment will differ somewhat in the indexicalist and the truth-conditional pragmaticist cases, the formal language into which the analyzed sentences of the fragments (the logical forms) are translated is the same.

The Empirical Equivalence Claim above refers to the particular English sentences whose semantic analysis has been debated in the literature (and a few more added in this thesis). It is natural to extend it to a claim about all English sentences analyzable in the fragments introduced here, and, tentatively, even to other indexicalist and contextualist fragments as well (see Chapter 4.5).

<sup>18</sup>Strictly speaking, nothing is “added” to  $L_{type}$ . The types and constants mentioned above are already there, as it were, but for pedagogical reasons, the language is presented successively, as we go along.

Finally, it should be pointed out that the truth-conditional pragmatics translation, (tcp), is, in this case, more flexible than (ind): it is not constrained by the condition of intersection, imposed by the conjunction in the indexicalist translation. This may seem like a problem for the claim about empirical equivalence, but, in fact, a similar flexibility is available for the indexicalist, as will become clear in Section 2.3 and 2.6.

#### 2.2.4 Quantified contexts: domain restriction and variable-binding

Before we leave the problem of quantifier domain restriction, I will briefly comment on Stanley & Szabó's discussion of 'quantified contexts':

Quantified contexts are cases involving sentences containing multiple quantified expressions whose intuitive readings are only possible to capture by assuming that an index representing the quantifier domain of the second quantifier expression is bound by the first quantifier expression. Since the pragmatic approach does not postulate syntactically represented, or semantically reflected quantifier domains, it cannot capture these readings. (Stanley & Szabó, 2000, p. 242)

By "pragmatic approach" Stanley & Szabó refer to the view in e.g. (Sperber & Wilson, 1995) and (Bach, 1994). Such approaches cannot explain, they claim, the natural reading of (26) above. I will not attempt to defend these pragmatic approaches here. It is more relevant for us to ask whether Stanley & Szabó's criticism applies to my variant of truth-conditional pragmatics. The answer is: no.

The example is repeated in (27) below (the most natural and intuitive reading is that exactly three Frenchmen *in John's classes* are failed by John):

(27) In most of John's classes, he fails exactly three Frenchmen.

I will not provide a full compositional analysis of (27) – it would require a detour via the semantics of 'most' and possessives. Instead, I will discuss the sentence in (28), which is similar enough for our purposes:

(28) In every class, John fails a Frenchman.

This example could in principle be accounted for by my variant of truth-conditional pragmatics, which translates expressions in the fragment into  $L_{type}$ , a language that contains variable-binding operators of the kind needed for the case at hand. The difference between how indexicalism and truth-conditional pragmatics, on my construal, account for the reading in question concerns how they implement quantifier domain restriction: given my general framework, the variable-binding in the most straightforward analysis of (27) is orthogonal to the question about indexicalism versus truth-conditional pragmatics. Consider the following indexicalist translation in (29) and the truth-conditional pragmaticist translation in (30) (I have not introduced syntax and compositional translations that yield the translations above – that would be unnecessary for the point I try to make here):

- (29)  $\forall x[[\mathbf{class}(x) \wedge X_0(x)] \rightarrow \exists e[\mathbf{fail}(e) \wedge [\mathit{agent}(e, \mathbf{j}) \wedge \exists x_0[[\mathbf{french}(x_0) \wedge X_1(x)] \wedge [\mathit{theme}(e, x_0) \wedge \mathit{participant-in}(x_0, x)]]]]]]]$
- (30)  $\forall x[O_N(\mathbf{class})(x) \rightarrow \exists e[\mathbf{fail}(e) \wedge [\mathit{agent}(e, \mathbf{j}) \wedge \exists x_0[\mathbf{french}(x_0) \wedge [\mathit{theme}(e, x_0) \wedge \mathit{participant-in}(x_0, x)]]]]]]]$

The translations could be paraphrased as follows: for all entities  $x$ , if  $x$  is a contextually salient class, there is an event of failing such that John is the agent of the event and there is an entity  $x_0$  such that  $x_0$  is French and  $x_0$  is a participant in the class  $x$ .

In (29) there are two free variables:  $X_0$  and  $X_1$ . We actually only need the first variable, for the restriction of the set of (educational) classes to the set of John's classes. The second variable does not change the interpretation in this case: intuitively, (28) is not about some contextually salient Frenchman, who attends all of John's classes. But indexicalism always lets the translation of noun phrases like 'a Frenchman' and 'every class' contain a free variable, allowing for the possibility of restriction. In the truth-conditional pragmaticist variant in (30), I have eliminated all modulation variables that do not have semantic effect.

The difference between the two translations lies in how the property of being a class is restricted to the contextually salient property of being a class of John's. Indexicalism does this by the addition of a free variable  $X_0$

(which, in a full syntactic and compositional analysis, would be reflected in the syntactic structure by a variable) whereas the truth-conditional pragmaticist lets a modulation variable  $O_N$  front the predicate **class** (with no corresponding variable in the syntactic structure). But in both cases, the predicate *participant-in* has as argument the variable  $x$ , which is bound by the first quantifier expression: the variable binding operator  $\forall x$ . The fact that *participant-in* has the bound variables  $x$  and  $x_0$  as arguments is crucial to the explanation of the reading in question. The choice between indexicalism and truth-conditional pragmatics is orthogonal to this explanation.

I conclude that the problem raised by Stanley & Szabó about quantified contexts is not a problem for the truth-conditional pragmaticist variant of my framework, at least for the kind of examples Stanley & Szabó discuss. Stanley & Szabó explain the readings of (27) and, supposedly, (28) in terms of indexicalist quantifier domain restriction. I explain the readings in terms of a combination of quantifier domain restriction, which proponents of truth-conditional pragmatics and indexicalism implement differently, and variable-binding, which is available to both indexicalists and truth-conditional pragmaticists.

Stanley & Szabó claim that “the pragmatic approach does not postulate syntactically represented, or semantically reflected quantifier domains”. But it is not made clear exactly what ‘the pragmatic approach’ is. My explication of the notions of truth-conditional pragmatics and indexicalism above handle the example, but perhaps it could be argued that modulation variables, crucial to the truth-conditional pragmaticist account, reflect quantifier domains. The heart of the matter is, I think, that questions like this only have clear answers in relation to formal semantic accounts.

### 2.3 Transfer

In ordinary talk-exchanges, expressions seem to occasionally have non-ordinary meanings. Recall the following examples, presented as (6) and (7) above, repeated here as (31) and (32):

- (31) (Pia has called the IT-support because of problems with the new computer system called ‘Dafgu’. An IT-technician opens the door

to her office.)

Pia: Hi, are you Dafgu?

IT-technician: **I am Dafgu.**

- (32) (Elevator repairman on phone:) I don't know what to do with that order. **I'll send André street over to you.**

In (31), the technician uses 'am Dafgu' of himself but does not mean, obviously, that he is a computer system. He rather means that he is the person who is responsible for the computer system (or knows a lot about it) and is there to help Pia with it. In (32), the repairman's use of the street name 'André street' denotes an order concerning an elevator on that street (and not the street itself).

Nunberg (1995) illustrates the same phenomenon by similar examples. Consider the transfer in (33):

- (33) I am parked out back.

On a natural reading of (33), 'I' is used ordinarily but 'am parked out back' is used to denote the property of having one's car parked out back, or similarly. And in the following examples, Nunberg's (34) and Recanati's variant, presented as example (8) above but repeated here as (35), 'the ham sandwich' is naturally read to denote the orderer of the ham sandwich (Recanati, 2004, p. 26):

- (34) The ham sandwich is at table 7.

- (35) The ham sandwich left without paying.

These examples illustrate the linguistic phenomenon of semantic transfer, where expressions temporarily take on meanings that differ from their ordinary, literal or conventional meanings.

Some different implementations of transfer have been suggested in the literature. Sag (1981) outlines a possible worlds semantics, where the operator  $S$ , which denotes a function from intensions to intensions, forms new predicates from every predicate  $P$ .<sup>19</sup> And, more recently, Pagin & Pelletier

<sup>19</sup>Abstracting from details that are not relevant for our purposes, Sag's proposal is that  $S$  denotes a function  $c_{st}$  from intensions to intensions, such that for every predicate  $P$ ,  $\llbracket SP \rrbracket^{eM,w} = c_{st}(I_P)(w)$ , where  $I_P$  is the interpretation function applied to the predicate  $P$ .

(2007) and Recanati (2010b) have suggested compositional implementations of modulation that allow for modulated meanings everywhere in a phrase structure tree built up step-wise by syntactic operations, as I have described above. Transferred meanings could be seen as instances of such modulated meanings.

In contrast to the mentioned attempts to model transfer within some format of compositional semantics, Stanley (2005, p. 226-230) argues that formal semantics is not apt to model transfer. The argument goes as follows. The subject matter of formal semantics is semantic content. Semantic content is constrained by conventional meaning. But transfer is not constrained by conventional meaning. So whatever role transfer plays, it has no effects on semantic content, and hence not for formal semantics. Stanley relates this point to Sag's implementation of transfer:

Something like Sag's semantic proposal is required to account for deferred reference. But notice what the resulting "semantic" theory has the power to do [...] The available sense-transfer functions are constrained only by pragmatics. So, the resulting semantic theory is one according to which semantic content is unconstrained by conventional meaning. (Stanley, 2005, p. 230)

I admit that the argument points to a potential problem with modeling transfer within a formal semantic framework. It is not the job of a formal semantics to theorize about the nature and the scope of linguistic conventions, but I disagree with Stanley about the claim that formal semantics only concerns conventional meaning. One could reasonably require that a formal semantic theory accommodates a distinction that corresponds to the intuitive distinction between 'conventional meaning', 'ordinary meaning', 'literal meaning' on the one hand and 'occasional meaning' or 'non-conventional' meaning on the other hand. This is a reasonable requirement, since the phenomenon of transfer is illustrated by this intuitive distinction in the first place.

I will argue that this is not a problem for truth-conditional pragmatics, as we think of that position here. Truth-conditional pragmatics does in fact accommodate such a distinction. The frameworks in Sag (1981), Recanati (2010b) and Pagin & Pelletier (2007), where modulation functions

(or something like modulation functions) operate on the outputs of the ‘normal’ interpretation function, are naturally understood as follows: there is an interpretation mapping expressions to meanings, and this function corresponds to our notion of ‘ordinary’ or ‘literal’ meaning. Modulation functions change the meaning of expressions, and this corresponds to our intuitive notion of ‘occasional’ or ‘non-conventional’ meaning.

Where does the discussion above leave us, dialectically speaking? Should we draw the conclusion that the phenomenon of transfer is better modelled by truth-conditional pragmatics than indexicalism? No, that conclusion would be far too quick. As I will show below, the indexicalist does have the theoretical resources to model transfer (even if this hasn’t previously been realized by the indexicalists themselves). The solution is in fact quite simple: the indexicalist could postulate hidden variables of suitable types in the phrase structure tree to capture the relevant readings. Before showing an implementation of this proposal, I will, however, present a possible objection on behalf of the indexicalist, and I will show why this objection in fact needn’t worry indexicalists.

The indexicalist could claim, following the reasoning in Stanley (2005, p. 225), that the strategy is unsound because it would over-generate readings. Stanley makes this point in relation to the following example:

(36) Every Frenchman is seated.

Stanley claims that this sentence could not get the reading *every Frenchman and Dutchman is seated*, and uses this point to criticise truth-conditional pragmatics: truth-conditional pragmaticists do not explain why modulation *does not* allow for the mentioned reading. Recanati (2010b, p. 11) admits that truth-conditional pragmaticists should develop explanations of why some modulations occur while others don’t, but tries to show that this is rather a research question to be addressed by truth-conditional pragmaticists than a serious objection to their research program.<sup>20</sup> Now the indexi-

<sup>20</sup>Recanati objects, however, to Stanley’s specific example. In this particular case, a similar reading is in fact available:

When Hercule Poirot says ‘Strictly speaking, I am not French’, he concedes that loosely speaking, he *is* French; and in the latter use ‘French’ means something like ‘French or Belgian’. (Recanati, 2010b, p. 11)

Hall (2009, p. 356-361) discusses this problem from a relevance-theoretic perspective.

calist could try to argue that my proposed strategy of implementing transfer by postulating hidden variables of suitable types in the logical form would suffer from the same problem: if we are allowed to postulate hidden variables in order to account for transfer, we allow for sentences with readings that are in fact not available for competent speakers.

But I think the over-generation argument is misplaced. In fact, I would like to point out, on the indexicalist's behalf, that this objection to my suggestion would be incoherent with other assumptions already accepted by indexicalists. As was shown in Section 2.2.1, indexicalists implement quantifier domain restriction by variables at sister-nodes to the noun-nodes.<sup>21</sup> In the interpretation of the variable, the variable assignment plays a key role (c.f. Section 2.2.3). But indexicalism puts no constraints on the choice of variable assignment.

It is assumed by all parties that, in any given utterance situation, a variable assignment and a model are available, but a given model can allow for a large number of different assignments (possibly an infinite number). Therefore, it seems natural to deal with questions of over-generation within a separate pragmatic theory. As far as I know, indexicalists have offered no alternative account of this fact. Accordingly, the indexicalist does not seem to have the over-generation objection available.

Below, I will show how indexicalism and truth-conditional pragmatics can model transfer formally.

### 2.3.1 Indexicalism and transfer

Consider the following noun phrase:

(37) The ham sandwich

The reading in question is *the orderer of the ham sandwich*. There is a discussion in the literature about the proper syntactic treatment of 'the'. In Barwise & Cooper (1981), it is treated as a determiner, but Westerståhl (1985) argues against that treatment, primarily on the basis that the singular-plural distinction is essential to 'the' but inessential to other expressions classified as determiners, and suggests an alternative analysis. The framework in

<sup>21</sup>This holds in my implementation of indexicalism, but the point I am making is not dependent on my specific formulation of the view.

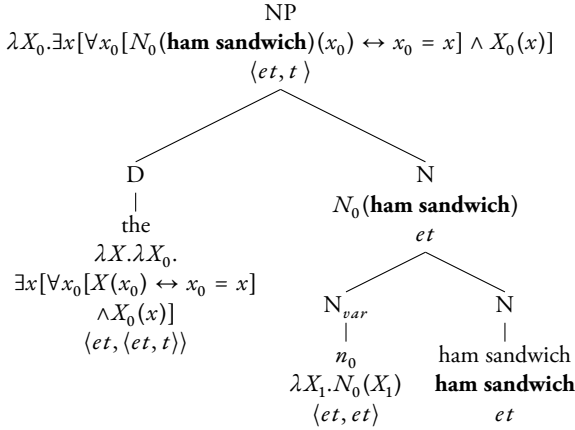


Heim (2011/1982) also does not treat ‘the’ as a determiner. I will not take a stand on the issue of the best classification of ‘the’ here. For simplicity, I will, however, assume a somewhat more conservative approach than the ones in Westerståhl (1985) or Heim (2011/1982) and adopt a Montague-style, Russellian analysis of the definite article.

### Translations of basic expressions

$$1. \text{the}_{tr} = \lambda X.\lambda X_0.\exists x[\forall x_0[X(x_0) \leftrightarrow x_0 = x] \wedge X_0(x)]$$

Given this minor addition to the framework, we have the following tree in  $P_{NP}$  (with translations and type information provided):



Now if we let  $g(N_0)$  be a function taking meals available at a restaurant to the orders of such meals,  $\llbracket \lambda X_0.\exists x[\forall x_0[N_0(\mathbf{ham\ sandwich})(x_0) \leftrightarrow x_0 = x] \wedge X_0(x)] \rrbracket^{eM, g}$  is precisely the transferred meaning of (37).

### 2.3.2 Truth-conditional pragmatics and transfer

Truth-conditional pragmatics is apt for modelling transfer, as Recanati (2010b) and Pagin & Pelletier (2007) show. Their formats are, however, different from my format of compositional event semantics. I will therefore show how transfer could be modelled within the formal semantic account presented here.

For the truth-conditional pragmaticist, the variables  $n, n_0, n_1$  etc. are not lexical items in the lexicon. And the truth-conditional pragmaticist

will have no use of the syntactic rules combining N and  $N_{var}$ , in the indexicalist extension. The syntactic rules used below were already introduced in earlier sections. The relevant information about the translations of basic expressions is provided below:

### Translations of basic expressions

1.  $the_{tr_c} = the_{tr}$
2.  $ham\ sandwich_{tr_c} = ham\ sandwich_{tr}$

Given this extension, as well as the definitions in Section 2.2.2, it is evident that the truth-conditional pragmaticist extension contains the following expression and translation:

$$\begin{aligned} & tr_c([\text{NP } [\text{D } the][\text{N } ham\ sandwich]]) \\ &= O_{NP}(O_D(\lambda X.\lambda X_0.\exists x[\forall x_0[X(x_0) \leftrightarrow x_0 = x] \wedge X_0(x)]) \\ & (O_N(\mathbf{ham\ sandwich}))) \end{aligned}$$

In this translation, there are as many modulation variables as possible: one for each syntactic operation. But the reading in question is a reading where only the noun meaning is modulated. On page 49 above, I mentioned that modulation variables can have the identity function as value. We could accordingly let the identity function be the value of all modulation function variables in the translation, apart from  $O_N$ , which is assigned a function from meals available at a restaurant to their orderers. The translation could accordingly be simplified as follows:

$$\begin{aligned} & tr_c([\text{NP } [\text{D } the][\text{N } ham\ sandwich]]) \\ &= \lambda X.\lambda X_0.\exists x[\forall x_0[X(x_0) \leftrightarrow x_0 = x] \wedge X_0(x)] \\ & (O_N(\mathbf{ham\ sandwich})) \end{aligned}$$

By beta-reduction, we get:

$$\lambda X_0.\exists x[\forall x_0[O_N(\mathbf{ham\ sandwich})(x_0) \leftrightarrow x_0 = x] \wedge X_0(x)]$$

I have now shown how both indexicalist and truth-conditional pragmaticist extensions of the basic formal account model the linguistic phenomenon of transfer. Clearly, the Empirical Equivalence Claim holds, again (see page 51). In the next section, we will discuss the phenomenon of binding.

## 2.4 Binding

In Stanley (2000, p. 409-418), it is argued that all contextual effects on truth conditions are traceable to logical form. Stanley distinguishes between two cases: phonologically overt expressions with context dependent meanings, e.g. indexicals, and phonologically covert variables. Contextual effects on truth conditions depend on these two kinds of expressions (Stanley, 2000, p. 400). A motivation for postulating covert variables is that there are sentences, where the contextual effects seem to be dependent on variable-binding operators, i.e. natural language expressions that correspond to the quantifiers of predicate logic, binding variables.

To make this reasoning vivid, consider (38) below:

(38) It rains.

The intuitive reading of (38) (but perhaps not the only reading) is that it is raining at some contextually salient place. One might wish to argue that this contextual effect is not due to a syntactic constituent but rather depends on modulation or some similar pragmatic process. But consider the following example:

(39) Every time John lights a cigarette, it rains.

In this example, the most natural reading (but not the only one) is that every time John lights a cigarette at a particular location, it rains at that location at the time when John lights a cigarette. This is a case where the variable-binding operator 'every time' seems to bind variables for location or time in the logical forms of 'John lights a cigarette' and 'it rains'.

Stanley outlines two proposals of logical forms of (39). According to the first proposal, there are function variables and variables over times in the logical form, which, schematically, would be as follows:

(40) Every time  $t$  John lights a cigarette  $t$ , it rains  $f(t)$   $g(t)$ .

The semantics, which is only preliminarily sketched by Stanley, assigns an identity function from times to times to  $f$ , and a function from times to locations to  $g$ . The variable  $t$  ranges over times. The idea is, as I understand it, that for every value of  $t$ , if it is true that John lights a cigarette at  $t$ , it is true that it rains at time  $f(t)$ , at location  $g(t)$ . According to the second

proposal, outlined in (Stanley, 2007, p. 257-258), the logical form of (39) is couched in event semantic terms:

$$(41) \quad \forall e[\textit{John lights a cigarette at}(e) \rightarrow \textit{rains}(e)]$$

In contrast to the first proposal, there is only an event variable present, and the material implication is made explicit by the arrow.

Unfortunately, Stanley presents no syntactic tree structures that explicitly show us the syntax of the analysed sentences. This is problematic for many reasons. For instance, it is not clear whether the variables are parts of the lexical items or if they occur in separate nodes. Moreover, in Stanley's event semantic proposal, it is said that the event of John lighting a cigarette and the raining event is the same event. But this can't be right, since the agent of the lighting event is not agent of the raining event (which does not have an agent). The indexicalist could, however, overcome these technical problems, which I will demonstrate below in Section 3.4.

Recanati has, in numerous publications, challenged Stanley's binding argument, with the aim to avoid Stanley's conclusion that all truth-conditional contextual effects are traceable to logical form, in the sense outlined above (see Recanati 2002, p. 224-230 and Recanati 2004, p. 98-111, discussed in Zeman 2011b and Bourmayan & Recanati 2013). Recanati (2004) uses variadic functions for this purpose. Such functions can increase the number of thematic roles associated with a verb and thus narrow the interpretation.<sup>22</sup> Applied to the examples at hand, the idea of Recanati (2004) is that (38) does not contain a variable or thematic role for location on any level of representation: 'rain' denotes a zero-place relation or, in event semantic terms, the verb's translation does not contain any thematic roles. But the expression 'every time John lights a cigarette' somehow introduces a variadic function and thus changes the verbal meaning of 'rain' by adding

<sup>22</sup>Recanati mentions Quine's *derelativization*-operator (DER), defined in Quine (1960, p. 344), as a predecessor to variadic functions. The DER-operator plays an important role in Quine's proposal of a logical language without variables. In a related paper, focusing on natural language semantics, Jacobson (1999) eliminates free variables from the translations of expressions, in the fragment she considers. A contrast between Jacobson's proposal, on the one hand, and indexicalism and truth-conditional pragmatics, on the other, is that both indexicalism and truth-conditional pragmatics accept free variables in the (type-theoretic) translations: the main conflict between the latter two concerns whether there are, in addition, variables in logical form.

a thematic role of location, which takes a variable as argument (in addition to the event variable). This variable is bound by the variable-binding operator translating ‘every time John lights a cigarette’.<sup>23</sup>

In the development of a formal semantic account below, it will be suggested that the case of binding should not be regarded as an area of conflict between the frameworks of indexicalism and truth-conditional pragmatics. The compositional semantics below, which, to my knowledge, is the first of its kind, with an explicit syntax, translations into  $L_{type}$  and truth conditions, is available to both frameworks.<sup>24</sup>

The discussion will, however, not focus on (39), since it contains a *o*-place predicate and a semantically vacuous pronoun. A discussion of the semantics of these expressions would distract from the questions under consideration. Instead, I will discuss the following example, which, furthermore, makes it clear that two events are involved:

(42) Every time Kim laughs, Robin cries.

The contextual effects to be accounted for are the implicit locational and temporal relations between the two events. The most salient reading is that Kim and Robin are at the same place, when the two events occur. But one could also interpret the relation between the events as solely temporal. These two readings will be accounted for below.

#### 2.4.1 Binding: extending the accounts

The lexicon contains the following additional expressions:

<sup>23</sup>Other theoretical accounts of these examples have been provided in the literature. Pagin (2005) provides a contextualist semantics for (39) and similar examples without using variadic functions. Pagin’s compositional semantics employs quantifiers that bind variables over contexts in the meta-language, and leaves the object-language without hidden variables. But it is not formulated in event semantic terms. I will therefore not discuss it further below. See Stanley (2005, p. 239-241) and Zeman (2011a, p. 71-75) for discussions of Pagin’s account.

<sup>24</sup>See, however, (Pagin, 2005) for a semantic formalization of examples like (39). One (of many) differences between Pagin’s and my proposal is that explicit syntactic rules, and compositional operations related to them, are provided below.

**Lexicon**

1. every time  $\in B_{Adv}$ <sup>25</sup>
2. Robin, Kim, Pluto, Allsvenskan, IFK Norrköping,  
 $P, P_0, P_1$ , etc.  $\in B_{P_n}$

We have the following syntactic rules:

**Syntax**

1. If  $\alpha \in B_{Adv}$ ,  $[_{Adv} \alpha] \in P_{Adv}$ .
2. If  $\alpha \in B_{IV}$ ,  $[_{IV_e} \alpha] \in P_{IV_e}$ .
3. If  $\alpha \in B_{P_n}$ ,  $[_{P_n} \alpha] \in P_{P_n}$ .
4. If  $\beta \in P_{P_n}$  and  $\gamma \in P_{IV_e}$ , then  $[_{V_e} \beta \gamma] \in P_{V_e}$ .
5. If  $\beta \in P_{Adv}$  and  $\gamma \in P_{V_e}$ , then  $[_{AdvP} \beta \gamma] \in P_{AdvP}$ .
6. If  $\beta \in P_{AdvP}$  and  $\gamma \in P_{V_e}$ , then  $[_{M.Clause} \beta \gamma] \in P_{M.Clause}$ .

I use the phrase labels  $IV_e, V_e$ , and not the more standard  $IV, V$ , because the types I will associate with expressions of this kind will be non-standard for verbs. This modification of the semantics has the consequence that some of the trees presented above, the ones that contain intransitive verbs, would have to be rewritten, if we followed the development of the framework. However, there are problems pertaining to syntactic structure that would arise, if the trees were rewritten according to the suggestions here (cf. Landman, 2000; Champollion, 2015). These problems are irrelevant for the main claims of the thesis. Therefore, I will continue to use the simpler translations of intransitive verbs below, when the relevant claims under discussion are not related to the precise structure and translation of intransitive verbs (in contrast to the section here, where the precise syntax and semantics of intransitive verbs matter for the problem at hand).

As before, I use  $Q, Q_0, Q_1$  etc. as variables over quantifiers of type  $\langle et, t \rangle$ . The adverb phrase  $[_{Adv} \text{every time}]$  will have as denotation a quantifier taking two arguments, just like the determiner phrase  $[_D \text{every}]$ . The two

<sup>25</sup>I will treat ‘every time’ as a primitive expression (compare with ‘whenever’). One could, of course, explore the prospects of a compositional analysis of this expression, but this would not affect any of the points made below.

phrases differ, however, in the respect that their translations have types constructed from different basic types. Whereas the translation of the former is of type  $\langle vt, \langle vt, t \rangle \rangle$ , the translation of the latter is of type  $\langle et, \langle et, t \rangle \rangle$ . Intuitively, the former expression denotes a relation between sets of events, whereas the latter denotes a relation between sets of entities.

### Translations of basic expressions

1.  $\text{Robin}_{tr} = \mathbf{r}$ ,  $\text{Kim}_{tr} = \mathbf{k}$ , etc.
2.  $P_{tr} = x$ ,  $P_{0tr} = x_0$  etc.
3. every time  $_{tr} = \lambda f. \lambda f_0. \forall e [f(e) \rightarrow \exists e_0 [f_0(e_0) \wedge C_{COH}(e, e_0)]]$

The expression ‘every time’ will have as its translation an expression containing  $C_{COH}$ , a constant of type  $\langle v, vt \rangle$  (*COH* abbreviates ‘coherence’). This expression is an indexical, in the sense that its denotation is always determined by context. We have not introduced the formal notion of context yet, since it is not needed for most examples in this chapter. The formal notion of context, which should not be conflated with the variable assignment used for modulation, is introduced on page 135. Informally, the role of the indexical is to provide a contextual coherence relation between the events related by ‘every time’. It is, consequently, assumed that every context has a salient coherence relation, picked out by  $C_{COH}$ .

The translation of phrasal expressions is as follows:

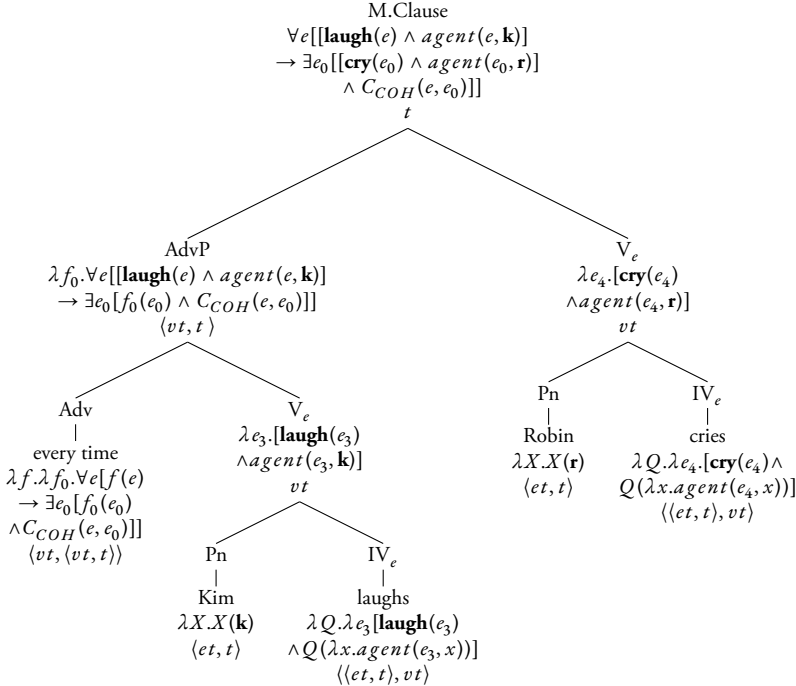
### Translations of phrasal expressions

1.  $[\text{Pn } \alpha]_{tr} = \lambda X. X(\alpha_{tr})$  (type  $\langle et, t \rangle$ )
2.  $[\text{IV}_e \alpha]_{tr} = \lambda Q. \lambda e. [\alpha_{tr}(e) \wedge Q(\lambda x. \text{agent}(e, x))]$   
(type  $\langle \langle et, t \rangle, vt \rangle$ )<sup>26</sup>
3.  $[\text{V}_e \beta \gamma]_{tr} = \gamma_{tr}(\beta_{tr})$  (type  $vt$ )
4.  $[\text{AdvP } \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $\langle vt, t \rangle$ )

<sup>26</sup>Landman (2000) assigns a similar semantics to intransitive verbs generally: “*walk* is a function that maps an individual onto the set of walking events with that individual as agent” (Landman, 2000, p. 46). A difference between Landman’s semantics and mine is that I translate proper noun phrases to quantifiers, which has effects on the translation of  $\text{IV}_e$  (cf. Barwise & Cooper, 1981, p. 166-168).

$$5. [\text{Adv } \alpha]_{tr} = \alpha_{tr} \text{ (type } \langle vt, \langle vt, t \rangle \rangle)$$

We accordingly have the following tree structure, with translations into the typed lambda-calculus specified at each step:



This proposal, which appears to be the first of its kind for sentences like (42), lets the indexical  $C_{COH}$  play a crucial role. The indexical denotes the contextually salient coherence relation, for instance, a relation of co-location or co-temporality. In order to work through the truth conditions, as we did for cases of quantifier domain restriction in Section 2.2.3, a semantics for indexicals is needed. That will be provided in Chapter 3.4.

#### 2.4.2 Binding for indexicalists *and* truth-conditional pragmaticists?

I have only provided a definition of the indexicalist's translation function  $tr$  above (I have not used the truth-conditional pragmaticist's  $tr_c$ ). But, in this case, there is really no need for indexicalists and truth-conditional

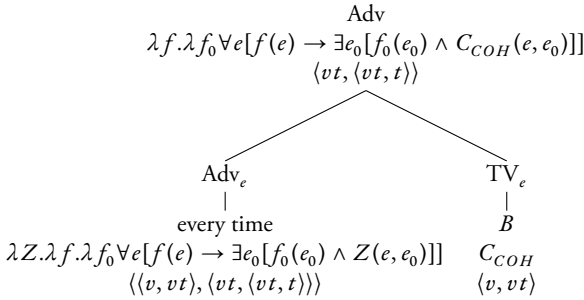


pragmaticists to give relevantly different semantic accounts. The difference between the truth-conditional pragmaticist and indexicalist account, in this case, would be that the truth-conditional pragmaticist would have modulation variables at each step in the translation. However, these variables would not do any work for the contextual effect under discussion; they could modify what ‘Robin’, ‘cries’, ‘Kim’, ‘laughs’, and plausibly ‘every time’ mean but they would not, in my truth-conditional pragmaticist variant, do any job for the temporal and locational effects under consideration.

The context dependence involved in (42) is not optional. Therefore, the mechanism in play is saturation and not modulation (cf. Chapter 1.3.1). Some coherence relation between the events has to be specified contextually. It is difficult to get a reading with no temporal connection between the events, but the semantics only requires some coherence relation. This stands in contrast to cases of quantifier domain restriction and transfer, where the role of context (formally implemented in terms of variable assignments) is optional. The crucial theoretical difference between indexicalism and truth-conditional pragmatics lies in their views and implementations of modulation and not saturation; on the face of it, the two frameworks can agree on a common semantic account of binding.

Even so, the indexicalist may be unhappy with the proposal. Stanley (2000, p. 411) advances the hypothesis that sentences like (39) and (42) do not contain (phonologically overt) indexical expressions in logical form. The proposal here may be taken to contradict that idea: the meaning of ‘every time’ is partly dependent on the indexical ‘ $C_{COH}$ ’. An alternative to the proposal above, would, in that case, be to develop the indexicalist approach to binding by introducing ‘ $C_{COH}$ ’ via a (phonologically covert) variable in logical form.

In spelling out this idea, we can let  $Z, Z_0, Z_1 \dots$  be variables of type  $\langle v, vt \rangle$  and  $B_{tr} = C_{COH}$ . Furthermore, the translation of ‘every time’ is modified: every time<sub>tr</sub> =  $\lambda Z. \lambda f. \lambda f_0. \forall e [f(e) \rightarrow \exists e_0 [f_0(e_0) \wedge Z(e, e_0)]]$ . The translation is thereby of a different type from the one suggested above. If suitable definitions of further syntactic and translational rules were specified (left implicit in the tree structure below), the following would be an indexicalist proposal:



The tree could then be developed along the lines suggested earlier in the section.

### 2.4.3 Further notes on binding and domain restriction

Several readings of constructions containing intransitive uses of transitive verbs, which have been discussed in relation to binding constructions in the literature, could be accounted for by the mechanism of quantifier domain restriction, rather than by the mechanism of binding, in contrast to what is often suggested, as I will illustrate with some final remarks. Consider the following example:

- (43) John is anorexic. But whenever his father cooks mushrooms, he eats.

The transitive verb ‘eat’ is here used intransitively, in the sense that the theme of the eating event is not denoted by a linguistic expression. Two readings of (43) have been discussed in the literature. Recanati (2004, p. 106-107) and Bourmayan & Recanati (2013, p. 124) claim that the sentence has a definite reading and could mean that whenever John’s father cooks mushrooms, John eats the mushrooms cooked by his father. Martí (2006, p. 154-159) and Stanley (2005, p. 249) claim that (43) has an indefinite existential reading: when John’s father cooks mushrooms, John eats something.

There is an empirical question concerning which readings the sentence has. The following example has been used by Martí against the claim that the sentence could be read definitely:

- (44) #Whenever Sally cooks mushrooms, John never eats. Instead, he eats pasta with tomato sauce.

Bourmayer & Recanati try to account for the negation data by locating the source of infelicity in the semantics of ‘instead’, and they outline a situation semantic analysis in order to account for the alleged definite reading (Bourmayer & Recanati, 2013, 134-138). I will, however, not discuss the empirical issue here. My point is that the formal accounts I have developed so far could be straightforwardly extended to account for both readings, if that would be empirically motivated. But the difference between indexicalist and truth-conditional pragmaticist explanations of these readings boils down to a difference in how quantifier domain restriction is implemented, rather than a difference in the explanation of binding.

The indefinite reading is captured by the following translation (in a suitable extension of the fragment):

- $$(45) \quad \forall e[[[\mathbf{cook}(e) \wedge \mathit{agent}(e, \mathbf{father-of-John})] \wedge \mathit{theme}(e, \mathbf{mushrooms})] \rightarrow \exists e' \exists y[[\mathbf{eat}(e') \wedge \mathit{agent}(e', \mathbf{John})] \wedge \mathit{theme}(e', y)]]]$$

The definite reading could be accounted for by the mechanisms of quantifier domain restriction. The indexicalist version would then have the following translation:

- $$(46) \quad \forall e[[[\mathbf{cook}(e) \wedge \mathit{agent}(e, \mathbf{father-of-John})] \wedge \mathit{theme}(e, \mathbf{mushrooms})] \rightarrow \exists e' \exists y[[[\mathbf{eat}(e') \wedge f(e')] \wedge \mathit{agent}(e', \mathbf{John})] \wedge \mathit{theme}(e', y)]]]$$

The conjunct, “ $f(e')$ ” leaves it to context to determine the value of  $f$ ; a possible value is a predicate of events of mushroom eating, which accounts for the definite reading. The truth-conditional pragmaticist version would let the modulation function  $O_{IV_e}$  take the semantic value of **eat** and yield some other, possibly narrower, meaning:

- $$(47) \quad \forall e[[[\mathbf{cook}(e) \wedge \mathit{agent}(e, \mathbf{father-of-John})] \wedge \mathit{theme}(e, \mathbf{mushrooms})] \rightarrow \exists e' \exists y[[O_{IV_e}(\mathbf{eat})(e') \wedge \mathit{agent}(e', \mathbf{John})] \wedge \mathit{theme}(e', y)]]]$$

This only serves as a quick illustration of how the present framework could be used for these much discussed examples.<sup>27</sup>

## 2.5 Colour adjectives

In this section, I will first present the linguistic phenomena to account for, and then review two theories of the semantics of colour adjectives: Kennedy & McNally (2010) and Hansen (2011). Neither of these is clearly truth-conditional pragmaticist nor clearly indexicalist. But they have quite recently been put forward in the literature as alternatives to indexicalism. Therefore, they deserve our attention. After presenting these two alternatives, I will illustrate and discuss the truth-conditional pragmaticist proposal concerning colour adjectives in Recanati (2010a) and the indexicalist proposal in Szabó (2001). Finally, I will show how both indexicalism and truth-conditional pragmatics could be developed in order to explain the relevant phenomena.

### 2.5.1 Scenarios and semantic explanations

The discussion about colour adjectives has to a large extent been centered around scenarios<sup>28</sup> containing contrasting uses of colour terms. In the following scenario, we find two stories where ‘black’ is used. The expression is predicated of the same kettle in the two stories, and there is no change in the the common sense properties of the object in question. Despite that, truth-values differ in ways that do not follow if there is no context dependence of ‘black’.

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<sup>27</sup> Binding constructions could also be analyzed within a situation-semantic framework (see Barwise & Perry 1983). The analysis of in examples similar to (42) in Bourmayan & Recanati (2013) is couched in situation-semantic terminology. The key notion for them is that of a ‘minimal situation’ and extensions thereof. Applied to the example at hand, the analysis would be that every situation containing precisely Kim and the property of laughing could be extended to a situation that also contains Robin and the property of crying. A formal situation-semantic implementation would, however, lead us away from the main issues. See Kratzer (2017) and Stojanovic (2012) for overviews and discussions of situation-semantic programs, frameworks and implementations.

<sup>28</sup> A ‘scenario’ is a contrasting pair of ‘stories’ in the terminology of Hansen & Chemla (2013) that I use here.

- (48) A. Max fills his shiny new aluminum kettle with the makings of a stew, and sets it over the campfire. An hour later, he informs Sam that he has done this. ‘*That* was pretty stupid’, Sam replies, and rushes out to the fire. He returns holding a soot-blackened pot and says (speaking truly), ‘Look. The kettle is black.’

B. Everard and Clothilde are acquiring their first common batterie de cuisine. For many reasons, including tradition and presumed heat-retaining properties, they want only black pots. (Though what sort of black pot happens not to matter much.) Coincidentally, Max’s soot-blackened pot has come to rest precisely in the shopwindow into which they are now staring. Everard says, ‘Look. There’s a nice black pot.’ But Clothilde is more observant. ‘No it isn’t black’, she replies, ‘it’s only covered with soot. How careless of them to let *that* get in their window.’ And off they go elsewhere, with, to all appearances, Clothilde having spoken the truth. (Travis, 2008/1985a, p. 26)

Travis’s famous ‘maple leaves’-example illustrates the same linguistic phenomenon. In the following scenario, there is a contrast in truth-value between two predications of ‘green’ to the same painted leaf:

- (49) A story. Pia’s Japanese maple is full of russet leaves. Believing that green is the colour of leaves, she paints them. Returning, she reports, ‘That’s better. The leaves are green now.’ She speaks truth. A botanist friend then phones, seeking green leaves for a study of green-leaf chemistry. ‘The leaves (on my tree) are green,’ Pia says. ‘You can have those.’ But now Pia speaks falsehood. (Travis, 2008/1985b, p. 111)

As a final example, consider the following scenario, which appears in its original formulation in Bezuidenhout (2002), and in a modified version in Hansen & Chemla (2013), where the last sentence in each ‘apple-story’ is true (which would be contradictory if ‘red’ had the same meaning in the two final sentences).

- (50) Anne and her son are sorting through a barrel of assorted apples to find those that have been afflicted with a horrible fungal disease.

This fungus grows out from the core and stains the flesh of the apple red. Anne's son slices each apple open and puts the good ones in a cooking pot. The bad ones he hands to Anne. He cuts open a Granny Smith apple (with green skin) that has the disease. Anne asks, 'Is that one red?' and he says 'Yes, this one is red'.

Anne and her son are investigating a horrible fungal disease that afflicts apples. This fungus grows out from the core and stains the flesh of the apple red. So far, all of the apples that have been discovered with the disease have been Granny Smiths (with green skin), and they're interested in whether any apples with red skin have the disease. Anne's son cuts open another Granny Smith apple that has the fungal disease. Anne asks, 'Is that one red?' and he says 'No, this one isn't red'. (cf. Hansen & Chemla, 2013, p. 318)

There are several suggestions in the literature of how to develop truth-conditional frameworks in order to insure that two seemingly contradictory sentences containing colour adjectives in fact may have the same truth-value (as in 48 or 50), or that the same sentence containing a colour adjective may differ in truth-value although there is no change of the denotation of the subject noun phrase (as in 49).

In Kennedy & McNally (2010) an ambiguity thesis is put forward. According to the thesis, colour adjectives are ambiguous between non-gradable meanings and gradable meanings. Non-gradable meanings have a classifying function. The colour of an object, in this sense, is associated with some stable property of the object such as its species or its normal function. Accordingly, a leaf may be said to have the colour 'green', if it is the leaf of an oak tree, and a pen may be said to be 'green', if it produces green ink, regardless of how the leaf or the pen appear to the speaker on some specific occasion. In contrast, gradable meanings concern the appearance of some object. An oak tree painted black could be said to be 'black', in this sense of the expression. The latter kind, but not the former, allows for quantity and quality variation, on Kennedy and McNally's account. A smaller or larger part of an object may be 'green', and factors like the values of the dimensions of hue, brightness and saturation may result in more or less typical instances of colours of which the expression 'green' may be correctly used.

In addition to this ambiguity, ‘green’ could also occur as a noun, as in the following example:

- (51) Green was a surprising choice for the colour of the dining room  
(Kennedy & McNally, 2010, p. 94).

In the semantic framework of Kennedy and McNally, the noun ‘green’ is of a basic type (type  $e$ ) and the adjectival variants are defined in terms of the noun’s meaning:

- (52)  $\text{green}_{N_{tr}} = \mathbf{green}$  (type  $e$ )

The classificatory adjective meaning is as follows (‘nongr’ means non-gradable):

- (53)  $\text{green}_{A_{nongr_{tr}}} = \lambda x.P_i(x) \wedge \mathbf{cor}(P_i, \mathbf{green})$  (type  $et$ ).

It states that the translation of ‘green’ is a function from entities to true, for all entities that have a property denoted by  $P_i$ , a property correlated with the green entity (the value of the free variable  $P_i$  is determined by context). Moving on, the gradable adjectives are not of type  $et$  but  $ed$ , i.e. functions from entities to degrees. There is one quantity variant and one quality variant:

- (54)  $\text{green}_{A_{quant_{tr}}} = \lambda x.\text{quant}(\text{green})(x)$

- (55)  $\text{green}_{A_{qual_{tr}}} = \lambda x.\text{qual}(\text{green})(x)$

In a full compositional analysis of a sentence containing the quantity or quality variant of ‘green’, implementing Kennedy & McNally’s proposal, the function in (54) or (55) will be taken as argument by a function associated with a phonologically covert morpheme *pos* (this holds for the positive form) or adjuncts such as ‘very’, ‘completely’ etc. In the case of a positive form, which is the only case we will consider, the function associated with the morpheme or adjunct introduces a minimal value (a cut-off point) and a linear order relation, which relates the degree given by the colour adjective applied to some entity and the minimal value by the relation of ‘greater than or equal to’.

The truth-values of the relevant sentences in the scenarios above, (48), (49) and (50), could be explained by Kennedy and McNally’s distinction

between the non-gradable meaning and the gradable one. They do not apply it to (48), but it is unproblematic to do so. In the first story of the scenario in (48), the expression ‘black’ is not used for classifying aluminum kettles but the kettle looks black; in the second story the expression is used with a non-gradable meaning. Similarly, in (49), which they explicitly address, the leaf in the scenario in (49) looks perfectly ‘green’, but the leaf does not have the property of belonging to a certain species conventionally associated with being ‘green’. The same explanation fits (50), as I believe is obvious to the reader.

I will discuss the proposals of Kennedy and McNally below. But first, I will introduce two earlier accounts: the indexicalist analysis in Szabó (2001) and the truth-conditional pragmaticist analysis in Recanati (2010a). Szabó (2001) discusses the principle of compositionality and potential problems of context dependence for the principle.<sup>29</sup> Adjectives are chosen as linguistic phenomena illustrating context dependence, since they are context-dependent along different dimensions. The meaning of evaluative adjectives like ‘good’ differ with respect to “ways of being good”: to be a ‘good dancer’ is different from being a ‘good pianist’. Adjectives like ‘lucky’ require a perspective from which an event is lucky, and e.g. ‘tall’ requires a contextual standard of comparison. Szabó (2001) suggests that such dimensions of context dependence for adjectives could be semantically accounted for by postulating variables in logical form. When it comes to colour adjectives, Szabó argues that those expressions are context-dependent along two dimensions: a part dimension (cf. Hansen’s and Kennedy & McNally’s quantity dimension above) and a dimension of comparison. The proposal of logical form of ‘green’ is accordingly:

$$(56) \quad (\text{Green}(C, P))(x)$$

The variable  $C$  ranges over comparison classes and  $P$  ranges over parts. Szabó intends in this way to account for the variation in scenarios like the ones above, explicitly for the scenario in (49). But the specific proposal in (56) above is not fully empirically adequate. As Kennedy and McNally argue, the full variation of the meaning of colour adjectives is not accounted for, if

<sup>29</sup>Cf. Westerståhl & Pagin (2010a,b) for an introduction to definitions of ‘compositionality’, and discussions of arguments for the thesis that natural languages are compositional.



we only pay attention to the dimensions of parthood or context-dependent standards of comparison:

[This] is shown by the fact that the judgments about [(49)] remain the same if, instead of merely painting her leaves, Pia immerses them in a dye that has the effect of rendering them green throughout, or at least green in all the parts of that are green in naturally green leaves. (Kennedy & McNally, 2010, p. 83).

As Kennedy and McNally correctly claim, the botanist would still deny that the leaves are ‘green’ in the sense relevant to botanists. Accordingly, parthood is not the relevant dimension of contextual variation. However, as I will argue below, this only shows that Szabó’s *specific implementation* of indexicalism is insufficient – not that any indexicalist account of colour adjectives is refuted. But first, consider Recanati’s truth-conditional pragmaticist variant.

Recanati (2010a) suggests that ‘green’ denotes a property of greenness, but the core denotation can be modulated freely when the adjective is attributed to or predicated of nouns in various conversational contexts.<sup>30</sup> Recanati does not provide a detailed formal analysis of the context dependence of colour adjectives, but the reader is by now familiar with my explication of truth-conditional pragmatics above and I will provide a detailed development of my version of the truth-conditional pragmaticist account below. For now it suffices to say that Recanati accounts for (48), (49) and (50) by modulations operating on a core meaning of the colour adjective.

### 2.5.2 Indexicalism and truth-conditional pragmatics: live options

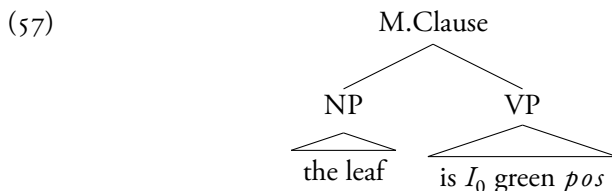
In this section, I will discuss Kennedy & McNally’s criticism of Szabó’s theoretical proposal. I will first argue that, despite the fact that the criticism does target Szabó’s specific proposal about colour adjectives, the more general thesis in Szabó (2001), that context dependence could be handled compositionally by indexicalism, does not necessitate Szabó’s specific implementation but is perfectly compatible with a modified indexicalist analysis,

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<sup>30</sup>Cf. Recanati (2004, p. 23-27).

which is compatible with Kennedy & McNally's data and their criticism of Szabó's specific proposal.

A successful defense of (Szabó, 2001) would therefore provide an indexicalist theory of colour adjectives that is not falsified by Kennedy & McNally's criticism. Such an analysis is indeed possible. Simplifying a bit, the logical form I will suggest, on behalf of the indexicalist, is as follows:



I will provide the details of the analysis in Section 2.5.4. But in short, 'green' denotes a function from entities to degrees and the phonologically covert variable  $I_0$  denotes a function that takes that function and yields another one of the same type. The morpheme *pos*, which is also phonologically covert, introduces a cut-off point and the relation of being higher or equal to (which is crucial for positive forms of adjectives). The proposal is not vulnerable to the criticism of Kennedy & McNally (2010), since it does not, in contrast to Szabó's proposal, build the notion of parthood into the logical form of colour adjectives.

Moving back to Kennedy & McNally, a key aspect of their attempt to explain (49) is the claim that there is a non-gradable sense of 'green' (and all other colour adjectives): the biologist uses 'green' in a non-gradable sense whereas Pia (in Travis's story) uses 'green' in a gradable sense. In contrast, I will not postulate that 'green' is ambiguous. The reason for this choice is that it is unclear to me why the sense of the biologist's use of the expression is non-gradable. Kennedy & McNally (2010) supports this claim by a modification of Travis's story in (49), where Pia has a pile of painted leaves and a pile of naturally green leaves. Pia's artist friend walks in and asks for green leaves. In sorting through the piles, the artist could then utter any of the following sentences:

- (58) These leaves are green  
 (59) These leaves are greener than those.  
 (60) These leaves are not green enough.

- (61) These leaves are not so green.  
 (62) These leaves are perfectly green.

The botanist could not, according to Kennedy & McNally (2010), use language in the same way:

The situation is different for the botanist. She is perfectly justified in continuing to reject (the words in) [(58)] as a false description of the painted leaves, while accepting it as true of the natural leaves. However, if these are her judgments about [(58)], then none of the examples in [(59)-(62)] are acceptable as descriptions of any of the leaves. (p. 87)

But it seems false that ‘green’ couldn’t be used in the botanist’s sense with a gradable meaning. Consider a case where two botanists compare the leaves of two trees, with the intention to collect leaves for an experiment involving chlorophyll:

- (63) Botanist 1 (pointing at a tree): Let’s pick the leaves of this tree.  
 Botanist 2 (pointing at another tree): No, let’s take these instead.  
 They are greener, so they must have more chlorophyll.

And consider other cases of ‘classificatory’ uses of colour adjectives. In the case of ‘blue pens’, it is acceptable to use (64) below, even if one is interested in the pen’s function to produce blue ink:

- (64) This pen is not blue enough.

Of course, one is not always interested in comparing the blueness of one object with the blueness of another object. I might, for instance, intend to buy a blue T-shirt and not a red one. But this is consistent with assuming that ‘blue’ is gradable; what matters in the just mentioned situation is that the T-shirt to be bought is blue to some degree, i.e. that the blueness passes some cut-off point for counting as blue.

It is, however, not my ambition here to show that any variant of an ambiguity approach would be impossible: it is sufficient for my purposes to show that Kennedy and McNally do not show that one *has to* assume that ‘green’ has a non-gradable meaning in addition to the gradable one.

### 2.5.3 Recanati on Szabó's proposal

The discussion above concerned Kennedy & McNally's proposal and criticism of indexicalism. I responded to their criticism of Szabó's indexicalist analysis and explained why it is not a disadvantage on the indexicalist's part not to assume that 'green' is ambiguous. In this section, I will discuss Recanati's criticism of Szabó's proposal (Recanati, 2010a, p. 54-59).

Recanati's criticism partly parallels the criticism just discussed and could therefore be met by the same reply: it targets Szabó's specific proposal but not the modified indexicalist analysis I sketched above. However, Recanati also provides other reasons for preferring his truth-conditional pragmatics over Szabó's analysis. A reason, which according to Recanati gives "prima facie support" to truth-conditional pragmatics over indexicalism, is the following. We could imagine a language where colour adjectives do not have context-dependent meanings. If a colour adjective in that language were used in ordinary conversations about common-sense objects, questions of contextual adjustments of the meanings of colour ascriptions would arise:

And the context will often answer the question implicitly, in such a way that a simple ascription, '*a* is red', will be understood as ascribing redness to *a* with respect to some contextually salient part *P*. So whether or not there is a covert variable, there will be tacit reference to the relevant parts of the object; it follows that positing a covert variable to account for the tacit reference in question is a superfluous move which complicates the semantics without buying us anything. (Recanati, 2010b, p. 57)

I partly agree and partly disagree with Recanati's remark. If the notions of truth-conditional pragmatics and indexicalism are understood as they are in this chapter, I grant that we don't *have to* adopt indexicalism in order to explain that meanings of colour adjectives are adjusted to concern parts of objects. But it doesn't follow that we *couldn't* adopt an indexicalist approach. Recanati claims that such a move would complicate the semantics. I grant that too, if the comparison point is a semantics without context dependence. However, Recanati's truth-conditional pragmatics, which is the variant of truth-conditional pragmatics I have modified and developed

in this chapter, complicates the semantics as well (compared to the same point of comparison). Therefore, I do not agree with Recanati's claim that the thought experiment gives *prima facie* support to truth-conditional pragmatics over indexicalism. But note that I have not argued against Recanati's truth-conditional pragmaticist proposal and I will not do so; in fact, I find his account plausible.

*Digression: Observer relativity or indexicality?*

Before we move on to the development of my variants of indexicalism and truth-conditional pragmatics, I will briefly motivate why I have made some theoretical choices that differ from the accounts in Hansen (2011), where observer relativity is built into the analysis of colour adjectives, and Rothschild & Segal (2009), which assumes that colour adjectives are indexicals, in the sense of Kaplan (1989a).

Hansen (2011) discusses the scientific fact that different light stimuli may appear as identical colours to an observer (in a certain condition of light and perspective). It is also a scientific fact that there is individual variation in the perception of light stimuli: two different light stimuli may appear as the same colour to one observer but not to another. Different light stimuli that appear identical to an observer are called "metamers" for that observer. In his proposal for a semantic analysis, Hansen motivates a modification of the proposal of Kennedy and McNally on the basis of such facts. A main difference between the accounts is that in Hansen's analysis, the basic noun translation of 'green' is subscripted with a variable for observer (*o*) (cf. Hansen, 2011, p. 215).

I grant that individual variation in the perception of light stimuli explains some disagreements. For instance, consider the recent survey I found on the social media site BuzzFeed, where visitors were asked to report their judgment about the colours of a dress (a picture of the dress appeared on the site). On the 1st of December 2016, 'White and Gold' had 2.4 million votes (67%) and 'Blue and Black' had 1.2 million votes (33%).<sup>31</sup>

This seems to be a case where there is individual variation in how light stimuli appear to observers, and the scientific concept of metamers could

<sup>31</sup> See [https://www.buzzfeed.com/catesish/help-am-i-going-insane-its-definitely-blue?ask\\_me\\_for\\_a\\_downloaded\\_version\\_of\\_the\\_webpage](https://www.buzzfeed.com/catesish/help-am-i-going-insane-its-definitely-blue?ask_me_for_a_downloaded_version_of_the_webpage).

straightforwardly be used in an explanation of the mentioned disagreement.

Interestingly, the phenomenon of metamers suggests that different individuals have different common sense conceptions of what properties there are in the world. However, this kind of disagreement is not a disagreement about what property some colour expression denotes. It rather concerns the question about what the facts are in the world, than questions about the meaning of expressions. But the variants of indexicalism and truth-conditional pragmatics under development in this chapter are explanations of contextual adjustments of meaning and not explanations of differences in conceptions of common sense facts. The phenomena of metamers, and Hansen's implementation, therefore fall outside of the empirical and theoretical scope of the present investigation.

Turning to indexicality, Rothschild & Segal (2009) argues that 'red' and other colour adjectives are indexical expressions like 'I' and 'here'. I will not provide a full treatment of pronouns in this dissertation, but an initial problem with subsuming colour adjectives under the same semantic category as such expressions, is that the content of 'I' and 'here' cannot be shifted by operators, but 'green' and other colour adjectives do not exhibit the same behavior. Consider (65) and (66) below (cf. Kaplan 1989a, p. 510-512):

- (65) In some contexts, it is true that I am not tired now.  
 (66) In some contexts, these leaves are green.

It is impossible for (65) to have the reading that someone other than the speaker would be tired at some other time than the time of utterance. In contrast, it is not impossible to hear 'green' as denoting some other property than the one operative in the context of utterance. Suppose that only naturally green leaves are of interest in a given context. (66) could then mean that the leaves would be counted as green in some context, since they are painted green. This is my reason for avoiding the analogy between colour adjectives and indexicals.<sup>32</sup>

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<sup>32</sup>Kennedy & McNally (2010, p. 83-86) and Clapp (2012, p. 86-92) provide other critical remarks on Rothschild and Segal's account.

### 2.5.4 Colour adjectives and indexicalism

I will discuss the example *the leaf is green* below. In order to provide an analysis of that example, some novel lexical items and syntactic rules are provided below:

#### Lexicon

1.  $\text{leaf} \in B_N$
2.  $\text{is} \in B_{Cop}$
3.  $\text{green, red} \in B_A$
4.  $I, I_0, I_1, I_2 \dots \in B_{Adv}$
5.  $\text{pos} \in B_{Deg}$

The indexicalist analysis adds the following syntactic rules to the framework already developed:

#### Syntax

1. If  $\alpha \in B_A$ ,  $[_A \alpha] \in P_A$ .
2. If  $\alpha \in B_{Adv}$ ,  $[_{Adv} \alpha] \in P_{Adv}$ .
3. If  $\alpha \in B_{Deg}$ ,  $[_{Deg} \alpha] \in P_{Deg}$ .
4. If  $\alpha \in B_{Cop}$ ,  $[_{Cop} \alpha] \in P_{Cop}$ .
5. If  $\beta \in P_{Adv}$  and  $\gamma \in P_A$ , then  $[_A \beta \gamma] \in P_A$ .
6. If  $\beta \in P_{Deg}$  and  $\gamma \in P_A$ , then  $[_{Predicative} \beta \gamma] \in P_{Predicative}$ .
7. If  $\beta \in P_{Cop}$  and  $\gamma \in P_{Predicative}$ , then  $[_{VP} \beta \gamma] \in P_{VP}$ .

The set of types is revised as follows (cf. page 33 and 37): we have a set of types  $Y$  such that  $e$  (entity),  $v$  (event),  $d$  (degree) and  $t$  (truth-value) belong to  $Y$ . As before, for every type  $a$  and  $b \in Y$ , there is a function of type  $\langle a, b \rangle \in Y$ . The model  $\mathcal{M}$  is now a tuple  $\langle \mathcal{M}, E, D, F \rangle$  such that  $F$  is an interpretation function,  $\mathcal{M}$  is a set of entities,  $E$  is a set of events disjoint from  $\mathcal{M}$  (as before), and  $D$  is the set of real numbers, which will have its

standard order  $\geq$ . A ‘scale’ will from now on be any function of type  $ed$ , i.e. any function that maps entities to real numbers.<sup>33</sup>

Functions in  $ME_{ed}$  from entities to degrees are called ‘degree functions’. The variables  $G, G_0, G_1, G_2 \dots$  are of this type. I use  $H, H_0, H_1, H_2 \dots$  as variables of type  $\langle ed, ed \rangle$ , i.e. for functions from degree functions to degree functions. And  $S, S_0, S_1, S_2 \dots$  are variables for functions from degree functions to degrees (type  $\langle ed, d \rangle$ ). To the definition of meaningful expressions of  $L_{type}$  a symbol for an ordering relation is added:

**Meaningful expressions in  $L_{type}$**

- $\geq \in ME_{\langle d, dt \rangle}$

The new symbol above is defined in  $L_{type}$  as follows:

**Truth and denotation in  $L_{type}$**

- If  $\alpha$  and  $\beta \in ME_d$ ,  $\llbracket \alpha \geq \beta \rrbracket^{\mathcal{M},g} = 1$  iff  $\llbracket \alpha \rrbracket^{\mathcal{M},g} \geq \llbracket \beta \rrbracket^{\mathcal{M},g}$ .<sup>34</sup>

Furthermore, I will add these translations:

**Translations of basic expressions**

- $I_{0tr} = \lambda G.H_0(G)$
- $green_{tr} = \mathbf{green}$ ,  $red_{tr} = \mathbf{red}$
- $pos_{tr} = \lambda G.\lambda x.G(x) \geq S(G)$

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<sup>33</sup>Kennedy (2007, p. 32) defines a ‘scale’ as a triple  $\langle D, <, \delta \rangle$ , where  $D$  is a set of points,  $<$  is a total ordering on  $D$  and  $\delta$  is a dimension that “indicates the kind of measurement that the scale represents”. In my analysis, there is no such dimension in the model, and  $D$  is the set of real numbers not points. This difference spares us the problem of explicating what it means to say that there is a dimension of measurement in the model (in contrast to letting the dimension of measurement be an intuitive description of what a given function from entities to degrees, a ‘scale’ in my terminology, represents). Moreover, given my framework, there is no need to make precise the idea that  $D$  is a set of points, providing the denotations of expressions of type  $d$ . However, Kennedy (2007, p. 32-36) uses these aspects of his framework in a discussion of “scale structure” and antonymic relationships between absolute adjectives. I will leave it open if and how the formal semantic accounts developed here potentially could explain such phenomena.

<sup>34</sup>For ease of exposition, I write ‘ $\alpha \geq \beta$ ’ instead of ‘ $\geq(\alpha)(\beta)$ ’.



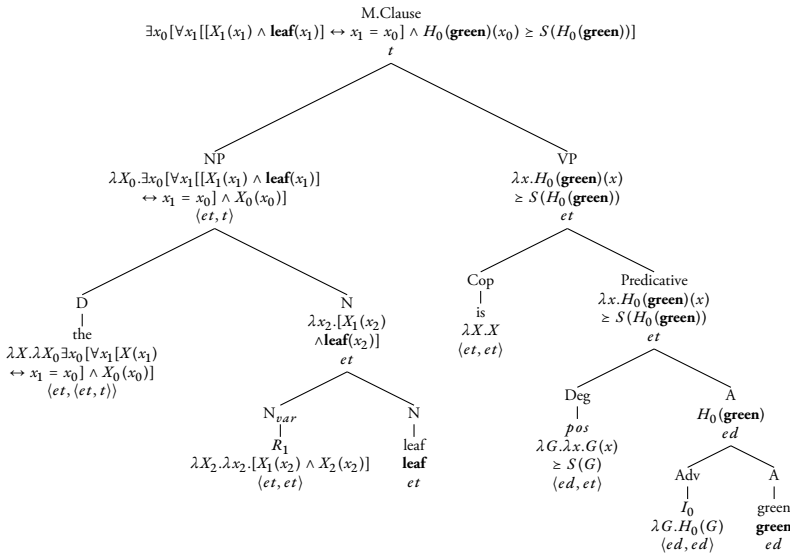
- $is_{tr} = \lambda X.X$

Next, some additional specifications of translations are in order:

**Translations of phrasal expressions**

1.  $[_{Adv} \alpha]_{tr} = \alpha_{tr}$  (type  $\langle ed, ed \rangle$ )
2.  $[_A \alpha]_{tr} = \alpha_{tr}$  (type  $ed$ )
3.  $[_{Deg} \alpha]_{tr} = \alpha_{tr}$  (type  $\langle ed, et \rangle$ )
4.  $[_{Cop} \alpha]_{tr} = \alpha_{tr}$  (type  $\langle et, et \rangle$ )
5.  $[_A \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $ed$ )
6.  $[_{Predicative} \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $et$ )
7.  $[_{VP} \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $et$ )

The following tree structure with translations and type information is an indexicalist analysis of ‘the leaf is green’:



This compositional analysis is a development of the account of gradable adjectives in Kennedy (2007) and Kennedy & McNally (2010). It has both

similarities and differences with those accounts. I will discuss three similarities/differences below.

First, the notion of covert morphological suffix for the positive form, *pos*, is adopted without significant revision. On my construal, this is not a difference between indexicalism and truth-conditional pragmatics, but an aspect of the analysis that both formal semantic accounts have in common. The translation of *pos* introduces a cut-off point by the function denoted by  $S$ : a function of type  $\langle ed, d \rangle$  mapping scales to real numbers. The translation of *pos* also introduces how degrees are to be compared in the final translation. If an entity falls under the concept expressed by the positive form of the adjective, the degree to which the entity has the property is higher or equal to the cut-off point. Comparative and superlative constructions require other relations between degrees, but we will not discuss such constructions here.

Second, I have eliminated two functions and added one function. The two functions **quality** and **quantity** in Kennedy and McNally's framework are not present in my analysis (see 54 and 55 above); context dependence with regards to these dimensions will instead be handled by the adverbial variable  $I_0$  and its translation, which applied to the translation of 'green' yields a new scale.

Third, my syntax is somewhat different from Kennedy's, who postulates a so-called 'Degree phrase' of which adjectives and adjective morphemes constitute parts (Kennedy, 2007, p. 5). Kennedy's choice is motivated by reasons of coherence with syntactic theory, more specifically X-bar theory broadly understood. But the syntax I postulate is not intended to be formulated within X-bar theory; it is intended to be as simple as possible for showing the semantic facts under discussion.

Let us now turn to the translation of  $I_0$ :  $\lambda G.H_0(G)$ . By functional application, we obtain  $H_0(\mathbf{green})$  one step up in the tree.  $H_0$  is a variable of the same type as adverbs like 'slowly' presumably will be in developments of the semantic accounts (cf. Montague, 1974a). Intuitively, the function associated with the adverbial variable  $I_0$ , by the variable assignment, takes a scale (the one associated with 'green') and yields a new scale. The differences between having a green surface, being naturally green, being green under normal circumstances, looking green in a certain light, etc., etc., are

here explicated in terms of differences between scales. The choice of scale depends on context, formally modelled as the variable assignment. To make the idea more vivid, compare with accounts of adjectives in terms of functions from entities to truth values. On such accounts, different meanings between adjectives are modelled as different functions of type *et*. If we let adjectives denote such functions, modulation could result in a change of the denotation of a given adjective, in a given context (informally, it could denote another function of type *et*, after modulation). On the approach here, (gradable) adjectives are associated with different scales or functions of type *ed*. The denotation of an adjective can be modulated: accordingly, the precise function of type *ed* denoted in context may vary.<sup>35</sup>

The indexicalist proposal laid out above is intended as a modification and development of the indexicalist analysis in (Szabó, 2001), presented as example (56) above but repeated as (67) below for convenience:

(67)  $(\text{Green}(C, P))(x)$

As I have described above, Szabó argues that (67) is the logical form of the expression 'green'. *C* is a variable for comparison class and *P* is a variable for part. We saw on page 75 that this specific proposal is not empirically adequate, but as I made plausible in Section 2.5.2, and as I have shown in this section, there are empirically adequate modified indexicalist accounts of colour adjectives. In the specific proposal I have put forward, there is no variable for part and no variable for comparison class (the latter is not needed for the examples discussed in this section). Nevertheless, the analysis straightforwardly explains the linguistic phenomena presented in Section 2.5.1.

#### *Colour adjectives in attributive position*

In the fragment above, adjectives only appear in the verb phrase as predicatives. But adjectives could also appear in attributive position in the noun phrase, intuitively modifying the meaning of the noun. Given the context dependence of colour adjectives established above, we should also expect that some sentences that might seem to be contradictory at first sight, in

<sup>35</sup> See Kennedy (2007) for a discussion and elaboration of the idea that (gradable) adjectives denote functions of type *ed*.

fact do not necessarily have contradictory truth conditions, and that some sentences that might seem tautological at first sight, in fact do not necessarily have tautological truth conditions. Consider the following sentences:

(68) The green leaf is red.

(69) The green leaf is green.

An utterance of (68) might seem contradictory, but the meaning could be that precisely one contextually salient leaf that looks green has some red parts.<sup>36</sup> And (69) could mean that some unique contextually salient leaf that is naturally green also looks green, which could be false (if it is, say, painted red).

In order to account for cases where colour adjectives are in attributive positions, and to account for the truth conditions of (68) and (69), some minor additions to the indexicalist framework above are needed. A syntactic rule allowing combinations of attributive adjectives and nouns is postulated:

### Syntax

1. If  $\beta \in P_{Deg}$  and  $\gamma \in P_A$ , then  $[_{Attributive} \beta \gamma] \in P_{Attributive}$ .
2. If  $\beta \in P_{Attributive}$  and  $\gamma \in P_N$ , then  $[_{N_{attr}} \beta \gamma] \in P_{N_{attr}}$ .
3. If  $\beta \in P_D$  and  $\gamma \in P_{N_{attr}}$ , then  $[_{NP} \beta \gamma] \in P_{NP}$ .

The translations are extended as follows:

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<sup>36</sup>This is the intuitive meaning of the following sentence found on a webpage about cake toppers:

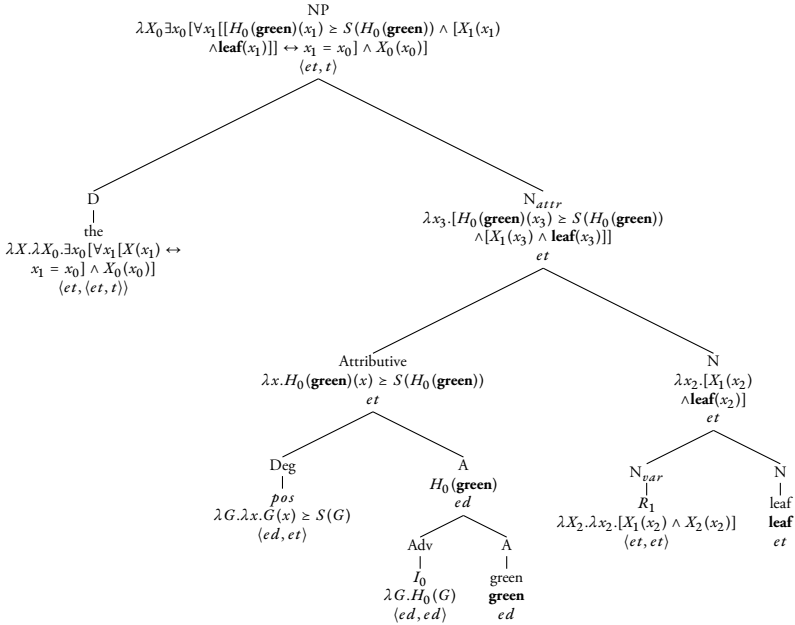
(68b) Made of heavy glitter card stock, attached to a wooden stick, it is the same on both side [*sic*], except the green leaf is red on the back.  
([www.etsy.com/listing/478690507/cake-topper-big-apple-nyc-party](http://www.etsy.com/listing/478690507/cake-topper-big-apple-nyc-party))

In the observed example, the locative ‘on the back’ specifies the intuitive meaning, but it is quite easy to imagine a context where the location is not explicit.

**Translations of phrasal expressions**

1.  $[\text{Attributive } \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type *et*)
2.  $[\text{N}_{attr} \beta \gamma]_{tr} = \lambda x. [\beta_{tr}(x) \wedge \gamma_{tr}(x)]$  (type *et*)

The following tree illustrates the noun phrase ‘the green leaf’:



The translations of the attributive and the noun yield a translation one step up in the tree, at  $N_{attr}$ , according to the translation rules consisting of two subphrases stated above. If the noun phrase above were combined with the verb phrase ‘is green’, the full translation could be:

$$(70) \quad \exists x_0 [\forall x_1 [[H_0(\mathbf{green})(x_1) \geq S(H_0(\mathbf{green})) \wedge [X_1(x_1) \wedge \mathbf{leaf}(x_1)]] \leftrightarrow x_1 = x_0] \wedge H_1(\mathbf{green})(x_0) \geq S(H_1(\mathbf{green}))]]$$

This could be, but does not have to be, the translation of ‘The green leaf is green’, on the indexicalist account. I say ‘could’, because the choice of variables  $H_0$  and  $H_1$  depends on which covert variables ( $I, I_0, I_1, \dots$ ) are chosen in the logical form (i.e. in the phrase structure tree). If the translation is as above, however, the truth conditions are not necessarily tauto-

logical:  $H_0(\mathbf{green})$  and  $H_1(\mathbf{green})$  could denote different properties (the property of being green on the inside, say, or being naturally green). And ‘the green leaf is red’ is not necessarily contradictory, even if it is stipulated in the semantics that no object could be both (totally) green and (totally) red:  $H_0(\mathbf{green})$  could denote the property of being naturally green whereas  $H_0(\mathbf{red})$  could denote the property of being painted red.

Kennedy & McNally do not discuss attributive adjectives, but disregarding the indexicalist aspect of my analysis, what I have said here about attributive adjectives is closely related to a natural development of the proposal of Kennedy & McNally (2010). They let adjectives be of type *ed*, but combined with the silent morpheme *pos*, an expression of type *et* results (ibid., p. 95). This sketch of a compositional analysis could naturally be made more precise by adding the syntactic rules combining a Deg-phrase with an Adjective-phrase to an Attributive-phrase above, and the rule combining an N-phrase and an Attributive-phrase to an  $N_{attr}$ -phrase, and the associated translations, which I employ above. Kennedy (2007, p. 5), however, sketches a syntactic/semantic account in terms of X-bar theory, and uses the syntactic label “DegP” and not “Attributive”, as in my proposal.

### 2.5.5 Colour adjectives and truth-conditional pragmatics

Recanati elaborates on his truth-conditional pragmaticist proposal (referred to as “contextualist position” in the quote below) about ‘green’ as follows:

[T]he standard contextualist position regarding colour predicates is that an adjective like ‘green’ or ‘red’ denotes a determinate property or contributes a determinate predicate: the predicate GREEN or HAVING THE COLOUR GREEN. This is a complete predicate, not something that stands in need of contextual completion; but in context the property that is ascribed is made more specific through specification of (inter alia) the parts or dimension under which the property applies to the object talked about. (Recanati, 2010b, p. 56)

Recanati’s discussion above is intended to point to a difference between Szabó’s specific variant of indexicalism and Recanati’s proposal. Whereas

Recanati's truth-conditional pragmatics lets 'green' denote a property, Szabó's 'green' has a more incomplete meaning and denotes a property only after saturation of the variables  $P$  and  $C$ , or so Recanati understands the proposal. Let's grant that this is a reasonable reading of (Szabó, 2001). But this is *not* a difference between my modified indexicalism and the truth-conditional pragmaticist analysis to be stated below. Both the indexicalist and the truth-conditional pragmaticist formal approach contain the expression **green**, which denotes a function from entities to degrees (real numbers). Intuitively, one might think of the scale denoted by **green** as letting every object that is green in some sense or other be associated with a degree above the cut-off point introduced by the phonologically silent morpheme *pos*. By adverbial variables in the logical form or by modulation variables in the translation (as below) the indexicalist or truth-conditional pragmaticist analysis allows for other scales to be denoted when 'green' occurs in the context of a sentence.

The truth-conditional pragmaticist extension is identical to the indexicalist, except for the implementation of context dependence. I will therefore describe the truth-conditional pragmaticist variant briefly, but bear in mind that it contains all complexities above that do not pertain to context dependence.

In the truth-conditional pragmaticist extension of the framework, the lexicon and syntax are similar to its indexicalist counterparts but somewhat sparser. The truth-conditional pragmaticist has no need for the adverbial variables  $I, I_0$  etc. and doesn't need the syntactic rules 5 and 2 on page 81 (at least not for the phenomena at hand).

The truth-conditional pragmaticist's translation function  $tr_c$  is identical to  $tr$  in its translation of basic expressions:

### Translations of basic expressions

- $\text{leaf}_{tr_c} = \text{leaf}_{tr}$
- $\text{is}_{tr_c} = \text{is}_{tr}$
- $\text{green}_{tr_c} = \text{green}_{tr}$
- $\text{pos}_{tr_c} = \text{pos}_{tr}$

As in earlier truth-conditional pragmaticist extensions of the semantics, every syntactic operation adds a new modulation variable in the translation:

### Translations of phrasal expressions

1.  $[_A \alpha]_{tr_c} = O_A(\alpha_{tr_c})$  (type  $ed$ )
2.  $[_{Deg} \alpha]_{tr} = O_{Deg}(\alpha_{tr_c})$  (type  $\langle ed, et \rangle$ )
3.  $[_{Cop} \alpha]_{tr} = O_{Cop}(\alpha_{tr_c})$  (type  $\langle et, et \rangle$ )
4.  $[_{Predicative} \beta \gamma]_{tr} = O_{Predicative}(\gamma_{tr_c}(\beta_{tr_c}))$  (type  $et$ )
5.  $[_{VP} \beta \gamma]_{tr} = O_{VP}(\beta_{tr_c}(\gamma_{tr_c}))$  (type  $et$ )

The expression under consideration accordingly receives the following translation:

$$\begin{aligned}
 &tr_c([\text{.M.Clause } [_{\text{NP}} [_{\text{D}} \text{The } ] [_{\text{N}} \text{leaf}]] [_{\text{VP}} [_{\text{Cop}} \text{is} ] [_{\text{Predicative}} [_{\text{Deg}} \text{pos} ] [_{\text{A}} \text{green} ] ]]]) = \\
 &O_{M.Clause}(O_{NP}(O_D(\lambda X.\lambda X_0.\exists x_0[\forall x_1[X(x_1) \leftrightarrow \\
 &x_1 = (x_0)] \wedge X_0(x_0)])) \\
 &(O_N(\mathbf{leaf})) (O_{VP}(O_{Cop}(\lambda X.X) \\
 &(O_{Predicative}(O_{Deg}(\lambda G.\lambda x.G(x) \geq S(G)) \\
 &(O_A(\mathbf{green}))))))))
 \end{aligned}$$

If the only modified meaning is that of ‘green’, the translation simplifies to the following:

$$\begin{aligned}
 &tr_c([\text{.M.Clause } [_{\text{NP}} [_{\text{D}} \text{The } ] [_{\text{N}} \text{leaf}]] [_{\text{VP}} [_{\text{Cop}} \text{is} ] [_{\text{AP}} \\
 &[_{\text{A}} \text{green} ] [_{\text{Deg}} \text{pos}]]]]) = \\
 &\lambda X.\lambda X_0.\exists x_0[\forall x_1[X(x_1) \leftrightarrow x_1 = (x_0)] \wedge X_0(x_0)] \\
 &(\mathbf{leaf}) (\lambda G.\lambda x.G(x) \geq S(G))(O_A(\mathbf{green}))
 \end{aligned}$$

In the case of attributive constructions, truth-conditional pragmatics can adopt the syntax rules and translations operative in the tree on page 87, except for the ones introducing the indexicalist’s covert variable.

Summing up Section 2.5, I began by illustrating ways in which colour adjectives have context-dependent meanings. I continued to present three suggestions of how to implement this fact in compositional semantic analyses: Kennedy & McNally (2010), Szabó (2001) and Recanati (2010b). I argued that, even if Kennedy and McNally, who aim to refute the indexicalist account in Szabó (2001), succeed in their criticism of Szabó’s specific proposal, there are other indexicalist analyses available that avoid their criticism. I then extended indexicalism and truth-conditional pragmatics to accommodate colour adjectives.



## 2.6 Meaning Litigation

Some disagreements concern what a given expression *should* mean. Following Ludlow (2014), I will call such discussions ‘meaning litigations’. The discussion of the expression ‘planet’, which took place in scientific communities and in public debates in the beginning of this century, is a case in point. Ludlow (2014) also reports on a number of naturally occurring examples of meaning litigations – I will focus on one about ‘athlete’ below.<sup>37</sup>

The plan for the section is as follows. I begin by describing the data to account for: the ‘planet’-case and the ‘athlete’-case. After this, I present Ludlow’s suggestion that these examples are straightforwardly explained by (his variant of) *radical contextualism*. I will argue that meaning litigation could also be explained by truth-conditional pragmatics and indexicalism. As before, the section ends by an extension of indexicalism that explains the mentioned cases, and a truth-conditional pragmaticist extension explaining the same examples.

### 2.6.1 The ‘planet’-case and the ‘athlete’-case

It has been recognized for a long time that Pluto differs in several respects from other celestial bodies traditionally classified as ‘planets of our solar system’: its orbit and its material properties differ significantly. Modern astronomy nevertheless classified Pluto as ‘planet’ until August 24 2006, when the general assembly of the International Astronomical Union (IAU) made the decision to adopt a definition of ‘planet’ that leaves Pluto outside of the term’s extension. The decision was a rejection of the association’s Planetary Definition Committee’s proposal, which would have left Pluto in the extension of ‘planet’ (Ludlow, 2014, p. 42-45). It is accordingly natural to suppose that disagreements of the following sort occurred:

<sup>37</sup>In early analytic philosophy, Waismann pursued a related discussion in (MacKinnon et al., 1945) about concept development in scientific language. Waismann did not use the term ‘meaning litigation’ but referred to more or less the same phenomenon as the ‘open texture’ of empirical concepts. Earlier on, the German term ‘Porosität der Begriffe’ was used by Waismann (according to a footnote in MacKinnon et al. 1945). Kasà (2017, p. 1-52) discusses these notions in relation to the notion of convergent concepts, which he explicates in terms of ‘trial-and-error classifiers’.

- (71) Astronomer 1: Pluto is a planet.  
 Astronomer 2: Pluto is not a planet.

Bearing in mind that the disagreement in (71) is not factual but rather linguistic or conceptual, it would be odd to suggest that one of the astronomers says something true and one says something false. But before I present a formal modelling, I will describe another case of meaning litigation.

Ludlow (2014) reports an observation of meaning litigation:

Consider the dispute I heard on WFAN (a sports talk radio station in New York) when *Sports Illustrated* announced its “50 greatest athletes of the 20th Century.” Some listeners called in complaining that a horse–Secretariat–had made the list, while Chris Russo defended the choice. Clearly this is a dispute about what should be in the extension of ‘athlete’, and the callers wanted to argue that a horse had no place here. (Ludlow, 2014, p. 78)

Regimenting the observation to some extent, the case could be formulated as follows:

- (72) Chris Russo: Secretariat is an athlete.  
 Listener: Secretariat is not an athlete.

A semantic explanation should account for the intuition that Chris Russo and Listener are not contradicting each other, in a semantic sense, even though it might seem so at first sight.<sup>38</sup>

### 2.6.2 Ludlow’s explanation

According to Ludlow’s radical contextualist explanation, the utterances in (71) and (72) are meta-linguistic utterances used with the purpose of decreasing the semantic underdetermination of ‘planet’ or ‘athlete’ by pointing out an object that falls outside or inside the extension of the term on the proposed sharpening (see Chapter 1.5.2). Astronomer 1 and Astronomer 2

<sup>38</sup>The examples discussed here resemble cases of so-called ‘faultless disagreement’, discussed in the debate about semantic relativism (e.g. Lasersohn 2005). But the discussion here is not intended to be related to the theoretical issues raised in that debate.

are debating how their micro-language should be constructed (and similarly for Chris Russo and Listener). They are not contradicting each other, since the standards for the micro-language are under discussion: truth/falsity applies to communicated utterances in a micro-language only when the interlocutors agree on the meaning of the used expressions (Ludlow, 2014, p. 1-7, 72-89, 112-113).

### 2.6.3 Indexicalism and meaning litigation

The indexicalist strategy will be to adopt an explanation similar to the one provided for domain restriction and transfer (see Sections 2.2 and 2.3). Briefly and informally put, the idea is that the noun ‘planet’, which will have a translation of type *et*, is combined with a phonologically covert variable, which denotes a contextually determined function of type  $\langle et, et \rangle$ . But precisely which function that is denoted is determined by context. In (71), the meaning of Astronomer 1’s utterance of ‘Pluto is a planet’ is true, because ‘planet’, in that context, denotes a function taking Pluto to 1. The context of Astronomer 2’s utterance is different: here the function takes Pluto to 0. How modulation operates in determining the intuitively correct semantic value for the variable is a question left to pragmatic theory (see Chapter 4.4).

Almost all lexical items needed for the phenomenon under discussion are already in place (see e.g. Section 2.2). For good measure, we make the following minor additions:

#### Lexicon

1.  $a \in B_{ID}$ <sup>39</sup>

#### Syntax

1. If  $\alpha \in B_{ID}$ ,  $[_{ID} \alpha] \in P_{ID}$ .

<sup>39</sup>The use of ‘a’ in the relevant example does not seem to have any significant semantic effect and will denote the identity function mapping functions of type *et* to functions of type *et* (the expression *a*, as it occurs in the examples relevant to this section, is not a determiner). Lacking a better label for ‘a’ as it occurs in predicatives, I will call the set of basic expressions of which it is a member ‘ID’ (relating the label to the notion of identity).

2. If  $\beta \in P_{ID}$  and  $\gamma \in P_N$ , then  $[\text{Predicative } \beta \gamma] \in P_{\text{Predicative}}$ .
3. If  $\beta \in P_{Pn}$ , then  $[\text{NP } \beta] \in P_{NP}$ .

**Translations of basic expressions**

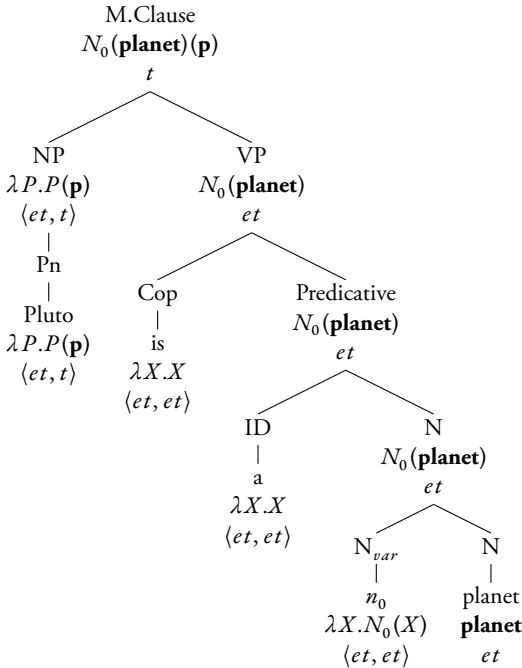
- $a_{tr} = \lambda X.X$

The translations of phrasal expressions are extended as follows:

**Translations of phrasal expressions**

1.  $[\text{ID } \alpha]_{tr} = \alpha_{tr}$  (type  $\langle et, et \rangle$ )
2.  $[\text{NP } \beta]_{tr} = \beta_{tr}$  (type  $\langle et, t \rangle$ )

Accordingly, the following phrase structure tree, with translations at each step, is a part of the indexicalist variant of  $L$ :



In (71) the two interlocutors assign different values to  $N_0$ . Thereby, different functions are denoted. The function denoted by  $[_N N_0(\mathbf{planet})]$  in the sentence used by Astronomer 1, who claims that Pluto is a planet, takes Pluto to 1, whereas the function denoted by  $[_N N_0(\mathbf{planet})]$  in the context of Astronomer 2's utterance, denotes a function that takes Pluto to 0.<sup>40</sup>

As before, the semantics shows that the readings in question are possible, but pragmatic theory will have to restrict the likely choices of variable assignments. The later task is, however, beyond the scope of this dissertation.

I will discuss differences between my proposals and Ludlow's below, but the truth-conditional pragmaticist extension will be considered first.

#### 2.6.4 Truth-conditional pragmatics and meaning litigation

The truth-conditional pragmaticist has no need for the lexical category  $N_{var}$  and its syntactic counterpart. But the other lexical items and syntactic rules stated above, in the indexicalist extension concerning meaning litigation, will be used by the truth-conditional pragmaticist as well. The truth-conditional pragmaticist's translation function  $tr_c$  is, as usual, identical to  $tr$  in its translation of basic expressions.

This is, accordingly, the full truth-conditional pragmaticist translation of 'Pluto is a planet':

$$\begin{aligned} tr_c([\text{.M.Clause } [\text{.NP } [\text{.Pn Pluto}]] [\text{.VP } [\text{.Cop is}]] [\text{.Predicative} \\ [\text{.ID a}]] [\text{.N planet}]]]) = \\ O_{M.Clause}(O_{NP}(O_{Pn}(\lambda P.P(\mathbf{p}))) (O_{VP}(O_{Cop}(\lambda X.X) \\ (O_{Predicative}(O_{ID}(\lambda X.X) \\ (O_N(\mathbf{planet})))))))) \end{aligned}$$

If every vacuous modulation variable is eliminated, we obtain the following translation:

$$tr_c([\text{.M.Clause } [\text{.NP } [\text{.Pn Pluto}]] [\text{.VP } [\text{.Cop is}]] [\text{.Predicative} \\ [\text{.ID a}]] [\text{.N planet}]]]) = O_N(\mathbf{planet})(\mathbf{p})$$

<sup>40</sup>Alternatively, indexicalism can account for Astronomer 1 and 2's utterances by supposing that Astronomer 1 and 2 are using different sentences, where different variables, for instance  $n_0$  and  $n_1$ , appear under  $N_{var}$ . The difference is not audible, since the variables are phonologically covert.

For the truth-conditional pragmaticist, the account of meaning litigation is, accordingly, essentially the same as the explanation of quantifier domain restrictions and transfer put forward in Sections 2.2 and 2.3.

### 2.6.5 Meaning litigation: comparisons and conclusions

There is a crucial difference between Ludlow's radical contextualist proposal, on the one hand, and my indexicalist and truth-conditional pragmaticist proposals, on the other. The difference is that the former proposal lets *semantic underdetermination*, and the process of *sharpening*, which decreases underdetermination, play a significant role, whereas the latter proposals let the distinction between the denotation of 'planet' in the model available in the utterance situation and the modulated meaning, which depends on the variable assignment, play a key role.

As should be clear by now, the phenomenon of meaning litigation could neither be used for refuting indexicalism or truth-conditional pragmatics nor for showing that indexicalism or truth-conditional pragmatics lead to help hypotheses of the *ad hoc* variety in attempts to model the phenomenon. It is rather the case that the theorist's choice of explanation of this phenomena will be dependent on theoretical commitments already adopted.

In conclusion: my purpose in this section has been to show that it is possible to explain the phenomenon of meaning litigation within the framework of indexicalism, and to show how truth-conditional pragmatics could account for it. The indexicalist proposal posits a variable in the syntactic structure, whose value is pragmatically determined, the truth-conditional pragmaticist operates, as usual, with modulation variables in the type theoretic language used for translations. I have not claimed that these explanations are *better* than the radical contextualist proposal. A theory comparison between radical contextualism and indexicalism/truth-conditional pragmatics would in principle be interesting and probably worthwhile, but it would require that radical contextualism is made more precise. In this dissertation, I focus on indexicalism and truth-conditional pragmatics.<sup>41</sup>

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<sup>41</sup>A further topic for research could be to formulate a framework for the pragmatics of meaning litigation. A possible result of a meaning litigation is that one proposal wins, and that a new convention is formed. This was clearly the case in the astronomers'

## 2.7 Enrichments of thematic roles

The intuitive truth conditions of the following two sentences seem to involve thematic roles that do not correspond to any part of the sentences' surface structure:

(73) Mary took out the key and opened the door.

(74) It's raining.

Intuitively, (73) means that Mary took out a contextually salient key and opened a contextually salient door *with the key that she took out*. And when (74) is used, the speaker and hearer normally have a contextually salient location in mind.

However, it is *possible* to use (73) without conveying that Mary used the key as instrument for opening the door. And, as Recanati has argued, (74) could be used indefinitely, i.e. without reference to a particular location:

I can imagine a situation in which rain has become extremely rare and important, and rain detectors have been disposed all over the territory (whatever the territory – possibly the whole Earth). In the imagined scenario, each detector triggers an alarm bell in the Monitoring Room when it detects rain. There is a single bell; the location of the triggering detector is indicated by a light on a board in the Monitoring Room. After weeks of total drought, the bell eventually rings in the Monitoring Room. Hearing it, the weatherman on duty in the adjacent room shouts: 'It's raining!' His utterance is true, iff it is raining (at the time of utterance) in some place or other. (Recanati, 2010b, p. 81)

Below, I will review Recanati's truth-conditional pragmaticist explanation of these intuitive readings (focusing on the case of weather reports). I will also consider two indexicalist alternative explanations of weather reports and their semantics: one that construes location in a broad sense, sketched by Martí (2006), and one that distinguishes between free and existentially bound readings of weather reports, discussed and criticized by Recanati

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debate about 'Pluto'.

(2010b). I will consider Recanati’s criticism of the latter proposal and end up rejecting his criticism. One indexicalist and one truth-conditional pragmaticist extension of the formal semantic accounts are then put forward.

But before we start, a few words about ‘unarticulated constituents’ are in order. Perry (1986) introduced this notion in a theoretical account of weather reports and other expressions where there seems to be a component in the proposition that is not the denotation of any expression of the sentence. Recanati (2010b, p. 23-24) points out that modulation and free enrichment are not the same theoretical notions as that of unarticulated constituents. Free enrichment operates on the meaning of parts of sentences by changing it, Recanati explains, and could therefore not really be said to add anything to them. He continues, however, by saying that free enrichment could also operate on the meaning of the top-node of a sentence, and in that case free enrichment functions like unarticulated constituents. In general, however, the proposal in (Perry, 1986) is, just like the proposal in (Korta & Perry, 2011), difficult to compare with frameworks in formal semantics, given the relatively high level of semantic and syntactic precision of the contemporary debate, as proponents of unarticulated constituents seem to acknowledge (see Korta & Perry, 2011, p. 111).

### 2.7.1 Recanati’s truth-conditional pragmaticist proposal and two variants of indexicalism

In Recanati’s theoretical proposal, there is a distinction between the “bare logical form” of (74) and the “modified logical form”. The bare logical form, which reveals the underlying logical structure of the sentence type and its conventional meaning, does not have a thematic role for location:

$$(75) \quad \exists e[\mathbf{rain}(e)]$$

However, the modified logical forms, which are typically associated with uses of (74), and accordingly could be appealed to in an explanation of the intuitive truth conditions of the sentence, contain the thematic role of location as well as references to particular locations. A use of (74) could, for instance, mean that it is raining in Paris. The modified logical form would, in that case, be as follows:

$$(76) \quad \exists e[\mathbf{rain}(e) \wedge \mathit{location}(e, \mathbf{Paris})]$$



Recanati (2010b) considers two alternative explanations of the linguistic intuition that a particular location could be, but does not necessarily have to be, a part of the intuitive truth conditions. First, Martí (2006) has argued that the weatherman case above does not show that there are indefinite readings of weather reports. In the case at hand, the earth is the location for the raining event, she claims. The floor is therefore open for an indexicalist analysis, where a free variable for location is present in the logical form, according to Martí. Recanati admits that this line of response is possible, on the indexicalist's behalf. It presupposes, however, that the indexicalist's variable ranges over locations in a broad sense, and that an event could be said to occur at a location  $l$ , if it occurs at sub-location  $l'$  of  $l$ , as Recanati points out (Recanati, 2010b, p. 108-109) (this point will be relevant below). Second, as Recanati conjectures, in contrast to Martí, indexicalists could argue that there is a free variable for location in the cases where a narrow location is intuitively salient, and that this variable is bound by an existential quantifier in the weatherman case (Recanati, 2010b, p. 98-102).

Recanati argues against the viability of the latter indexicalist proposal (while accepting the former one as a theoretical alternative). The main consideration against that alternative, is that it is committed to a problematic view about negation. Consider the following variation of the weatherman case:

Imagine a situation where the absence of rain has become extremely rare and important (it rains almost everywhere and everytime). All over the territory detectors have been disposed, which trigger an alarm bell in the Monitoring Room when they detect absence of rain. There is a single bell; the location of the triggering detector is indicated by a light on a board in the Monitoring Room. After weeks of flood, the bell eventually rings in the Monitoring Room. Hearing it, the weatherman on duty in the adjacent room shouts: 'It's not raining!'. (Recanati, 2010b, p. 103)

Recanati claims that the use of 'It's not raining' in a context like the one described is *infelicitous*: it is difficult and unnatural to assign the truth conditions that the sentence is true iff it is not raining at some place or other.

This is deeply problematic for the latter indexicalist proposal, according to Recanati, who elaborates the complaint as follows:

[The latter indexicalist proposal] has trouble accounting for the unavailability of the indefinite reading of [(74)]. According to that theory, ‘rain’ carries a location variable, which is optional and can be bound by a covert existential quantifier. That is what happens in the weatherman example. In the negative variant of the example, therefore, the existential quantifier is expected to interact with negation, in such a way that two readings ought to be generated, depending on the scope of negation: the sentence will say either that at some location *l*, there is no rain, or that it is not the case that, at some location *l*, there is rain. But the first reading is not actually available. (Recanati, 2010b, p. 104-105)

I disagree with Recanati’s claims about the latter indexicalist variant, which I take to be the most promising one to develop in an indexicalist direction. I will now provide my reasons for choosing the latter indexicalist variant over the former variant (defended by Martí).

The reason I choose to develop the latter indexicalist variant is that it marks a contrast between a clearly definite, specific reading of (74), where a narrow location is intuitively salient, and a clearly indefinite, unspecific, existential reading where no location in the domain is more salient than any other. If the indexicalist just treats these two readings as a difference in contextual variable assignment, the contrast is lost. A further complication for the proposal of Martí (2006) is the context-dependent sub-part relation one thereby has to account for: in some cases, for instance in the weatherman case, raining events are taking place at some but not all sub-parts of the broad location, whereas in other cases, the intuitive meaning is that the raining event is located at every sub-part of the location (if I, for instance, look out through the kitchen window an early morning, after weeks of drought and sunshine, and say to my 5 year old daughter ‘Look! It’s raining’).

In the event semantics literature, the claim that one should not let the event quantifier have scope over (truth-functional) negation has been stressed in various places (cf. Champollion 2015, p. 37, and Parsons 1990).

However, it is not clear that readings that could be accounted for by letting the event quantifier have scope over negation in fact are infelicitous to competent speakers. The empirical facts are not completely clear in this case. It is not obvious, at least not to me, that the use of ‘It’s not raining’ in the story above is infelicitous: my account therefore makes room for the possibility that such a reading exists. In the fragment below, I will provide rules and translations that allow the event quantifier to have scope over negation (and the other way around). The extension will thus not follow Champollion’s *Scope domain principle*, which was discussed in Section 2.1.2. However, the rules allowing the event quantifier to have scope over negation could be eliminated without much loss.

### 2.7.2 Extending the fragment: indexicalism

In this section, I will provide an indexicalist explanation of the following sentences/readings:

1. The definite reading of (74), where one location is intuitively salient.
2. The indefinite reading of (74), where no specific location is salient (where the reading is paraphrasable as ‘It is raining somewhere’).
3. The sentence ‘It is raining in Paris’.
4. The sentence ‘It is not raining’, understood definitely (about one salient location).
5. The same sentence, ‘It is not raining’, understood indefinitely (paraphrasable as ‘It is not raining anywhere’).
6. The same sentence, again, but now with the reading ‘there is an event that is not a raining event taking place at some location’.
7. The sentence ‘Kim opens the door’ with the intuitive reading that Kim opens the door *with the key* (or some other contextually salient instrument).
8. The sentence ‘Kim opens the door with the key’.

The analysis of the sentence ‘Kim opens the door’ explains the reading of (73). I have chosen to provide a compositional analysis of a sentence slightly different from the one in (73), since the original one also exhibits the phenomenon of ellipsis, a phenomenon not immediately relevant to the present discussion. The reason for providing a compositional analysis of ‘It is raining in Paris’ and ‘Kim opens the door with the key’ is that it is thereby shown how the analysis of sentences where the location or the instrument is explicit are related to the analysis of the implicit/definite readings.

I will also provide syntactic rules and translations that could be used by an indexicalist theorist, if she wishes to account for readings by letting the event quantifier have scope over negation (as in reading 6 above). This is to allow for the possibility that the sentence ‘it is not raining’, as it is used in the story on page 99, is felicitous to some speakers. If one finds Recanati’s empirical claim correct, however, it is easy to eliminate these rules and translations.

The fragment is extended as follows. In the lexicon, there are some new categories. The main verb in the construction under consideration, ‘raining’, differs from verbs treated previously in the dissertation, in that it is not associated with the thematic role of agent. I will follow the literature and treat it as a predicate of events; lexically it is a verb variant of category  $V_e$ . The variables  $W, W_0, W_1, \dots$  and  $Y, Y_0, Y_1, \dots$  will be combined with the verb in the syntactic analysis: lexically they are labelled ‘locatives’.  $U, U_0, U_1, \dots$  will be of the lexical category called ‘instrumental’. These are the added items to the lexicon:

### Lexicon

1. raining  $\in B_{V_e}$
2. opens  $\in B_{TV_{Instr}}$
3. it is  $\in B_{PH}$
4. in\_Paris  $\in B_{Locative}$
5. with\_the\_key etc.  $\in B_{Instrumental}$
6. not  $\in B_{Neg}$
7.  $Y, Y_0, Y_1, \dots, W, W_0, W_1, \dots \in B_{Locative}$
8.  $U, U_0, U_1, U_2$  etc.  $\in B_{Instrumental}$

The verb ‘opens’, intuitively speaking, requires three thematic roles: an agent (the entity opening something), a theme (the entity that is opened) and an instrument (the entity used for opening). Syntactically, I will let ‘open’ be a transitive verb associated with a noun phrase, intuitively denoting the theme of the event, an instrumental phrase, intuitively denoting the instrument used in the event of opening, and a (subject) noun phrase intuitively denoting the agent of the event. I will use the syntactic label  $TV_{Instr}$  for verbs like ‘opens’.

I have chosen to let ‘it is’ belong to a class of ‘placeholders’ and denote an identity function. In a more fine-grained syntactic theory, or in a discussion focusing on other questions, these expressions would perhaps have been given a different syntactic treatment. For instance, it may be appropriate to distinguish between different temporal expressions, marking different tenses. This is, however, not in our focus now, and by preliminarily treating ‘it is’ in this manner, several complex questions that are not relevant for our purpose in this chapter are avoided.

We have the following syntactic rules. ‘S.Clause’ is an abbreviation for ‘Subordinated Clause’.

### Syntax

1. If  $\alpha \in B_{Neg}$ ,  $[_{Neg} \alpha] \in P_{Neg}$ .
2. If  $\alpha \in B_{Neg_e}$ ,  $[_{Neg_e} \alpha] \in P_{Neg_e}$ .
3. If  $\alpha \in B_{TV_{Instr}}$ ,  $[_{TV_{Instr}} \alpha] \in P_{TV_{Instr}}$ .
4. If  $\alpha \in B_{PH}$ ,  $[_{PH} \alpha] \in P_{PH}$ .
5. If  $\beta \in P_{Neg_e}$  and  $\gamma \in P_{V_e}$ , then  $[_{NegP_e} \beta \gamma] \in P_{NegP_e}$ .
6. If  $\alpha \in B_{Locative}$ ,  $[_{Locative} \alpha] \in P_{Locative}$ .
7. If  $\alpha \in B_{Instrumental}$ ,  $[_{Instrumental} \alpha] \in P_{Instrumental}$ .
8. If  $\beta \in P_{V_e}$  and  $\gamma \in P_{Locative}$ , then  $[_{S.Clause} \beta \gamma] \in P_{S.Clause}$ .
9. If  $\beta \in P_{NegP_e}$  and  $\gamma \in P_{Locative}$ , then  $[_{S.Clause} \beta \gamma] \in P_{S.Clause}$ .
10. If  $\beta \in P_{PH}$  and  $\gamma \in P_{S.Clause}$ , then  $[_{M.Clause} \beta \gamma] \in P_{M.Clause}$ .

11. If  $\beta \in P_{PH}$  and  $\gamma \in P_{NegP}$ , then  $[_{M.Clause} \beta \gamma] \in P_{M.Clause}$ .
12. If  $\beta \in P_{Neg}$  and  $\gamma \in P_{S.Clause}$ , then  $[_{NegP} \beta \gamma] \in P_{NegP}$ .
13. If  $\beta \in P_{TV_{Instr}}$  and  $\gamma \in P_{NP}$ , then  $[_{TV} \beta \gamma] \in P_{TV}$ .
14. If  $\beta \in P_{TV}$  and  $\gamma \in P_{Instrumental}$ , then  $[_{VP} \beta \gamma] \in P_{VP}$ .

In  $L_{type}$ , I will use  $L, L_0, \dots$  as variables of type  $\langle v, et \rangle$ , and  $T, T_0, \dots$  as variables over expressions of type  $t$ . Some new symbols are added to  $L_{type}$ :

### Meaningful expressions in $L_{type}$

- *location, instrument*  $\in ME_{\langle v, et \rangle}$
- **open**  $\in ME_{vt}$
- **Paris**  $\in ME_e$
- **key, door**  $\in ME_{et}$

Translations of basic expressions are as follows:

### Translations of basic expressions

1.  $raining_{tr} = \mathbf{rain}$ ,  $opens_{tr} = \mathbf{open}$
2.  $in\_Paris_{tr} = \lambda f. \exists e [f(e) \wedge location(e, \mathbf{Paris})]$
3.  $not_{tr} = \neg^{42}$
4.  $with\_the\_key_{tr} = \lambda X. \exists x [\forall x_0 [\mathbf{key}(x_0) \wedge X_0(x_0) \leftrightarrow x = x_0] \wedge X(x)]$
5.  $Y_{tr} = \lambda f. \exists e \exists L \exists x [f(e) \wedge L(e, x)]^{43}$
6.  $W_{tr} = \lambda f. \exists e [f(e) \wedge L(e, x)]$ ,  $W_{0tr} = \lambda f. \exists e [f(e) \wedge L_0(e, x)]$ , etc.
7.  $U_{tr} = \lambda X. \exists x [\forall x_0 [X_0(x_0) \leftrightarrow x_0 = x] \wedge X(x)]$ ,  $U_{0tr} = \lambda X. \exists x [\forall x_0 [X_1(x_0) \leftrightarrow x_0 = x] \wedge X(x)]$ , etc.

<sup>42</sup>Negated propositions,  $p$ , will, informally, be written  $\neg p$  and not  $\neg(p)$ .

<sup>43</sup>As before,  $L(e, x)$ , and similar formulations, are informal variants of the correct notation:  $L(e)(x)$ , etc.

$$8. \text{ it is}_{tr} = \lambda T.T$$

The translation of ‘with\_the\_key’ above is of the same type as noun phrases. In this case, the contextual domain restriction is built into the translation of ‘with\_the\_key’ (the variable  $X_0$  will do that job) and is not the result of a separate restriction phrase (cf. page 44). In the variable case, where  $U$  is translated into an expression that will, intuitively speaking, fill in the role of instrument in the compositional analysis, there is only a free variable  $X_0$  providing the contextually salient property (the property of being a key of mine, for example). A more developed syntactic and semantic theory about instrumentals could provide more details, but these translations are sufficient for our purposes.

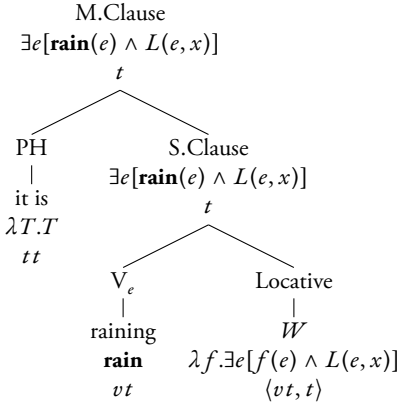
The translation of phrasal expressions will be as follows:

### Translations of phrasal expressions

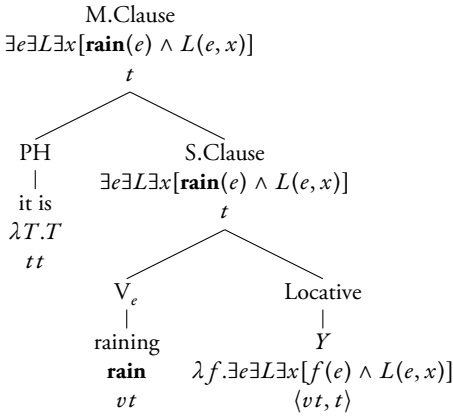
1.  $[\text{Neg } \alpha]_{tr} = \alpha_{tr}$  (type  $tt$ )
2.  $[\text{Neg}_c \alpha]_{tr} = \lambda f.\lambda e.\alpha_{tr}(f(e))$  (type  $\langle vt, vt \rangle$ )
3.  $[\text{TV}_{instr} \alpha]_{tr} = \lambda Q.\lambda Q_0.\lambda x.\exists e[\text{agent}(e, x) \wedge \alpha_{tr}(e) \wedge Q(\lambda x_0.\text{theme}(e, x_0)) \wedge Q_0(\lambda x_1.\text{instrument}(e, x_1))]$   
(type  $\langle \langle et, t \rangle, \langle \langle et, t \rangle, et \rangle \rangle$ )
4.  $[\text{Locative } \alpha]_{tr} = \alpha_{tr}$  (type  $\langle vt, t \rangle$ )
5.  $[\text{Instrumental } \alpha]_{tr} = \alpha_{tr}$  (type  $\langle et, t \rangle$ )
6.  $[\text{S.Clause } \beta \gamma]_{tr} = \gamma_{tr}(\beta_{tr})$  (type  $t$ )
7.  $[\text{NegP } \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $t$ )
8.  $[\text{Neg}_c \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $vt$ )
9.  $[\text{TV } \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $\langle \langle et, t \rangle, et \rangle$ )
10.  $[\text{PH } \alpha]_{tr} = \alpha_{tr}$  (type  $tt$ )
11.  $[\text{M.Clause } \beta \gamma]_{tr} = \beta_{tr}(\gamma_{tr})$  (type  $t$ )

The definite reading (reading 1 on page 102) is accounted for by the following tree structure, where translations are written under each node. The semantics lets the variables  $L$  and  $x$  be free, and thus leaves it open what

relation between an entity and an event that  $L$  denotes, and what entity  $x$  denotes. The semantics makes it possible for this relation to be the relation of being located at some place, and the entity could be a place (like a city, a street etc.),

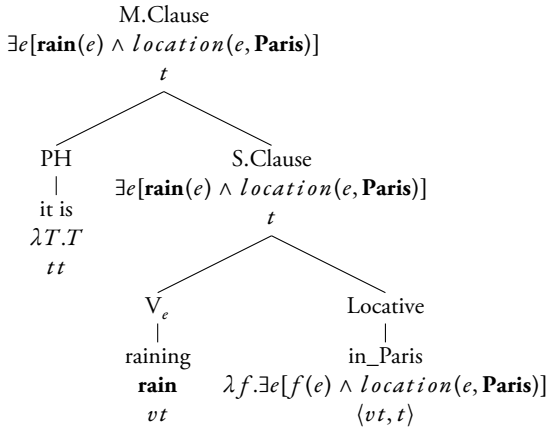


The indefinite reading is accounted for in the following analysis, where quantifiers bind the variables  $L$  and  $x$ :

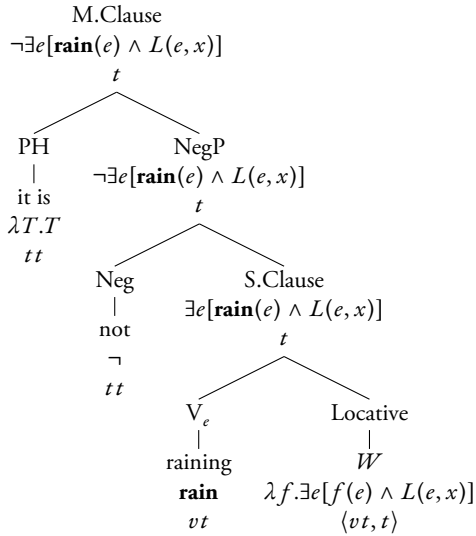


In the following compositional analysis, it is seen how ‘it is raining in Paris’ parallels ‘it is raining’ on its definite reading:



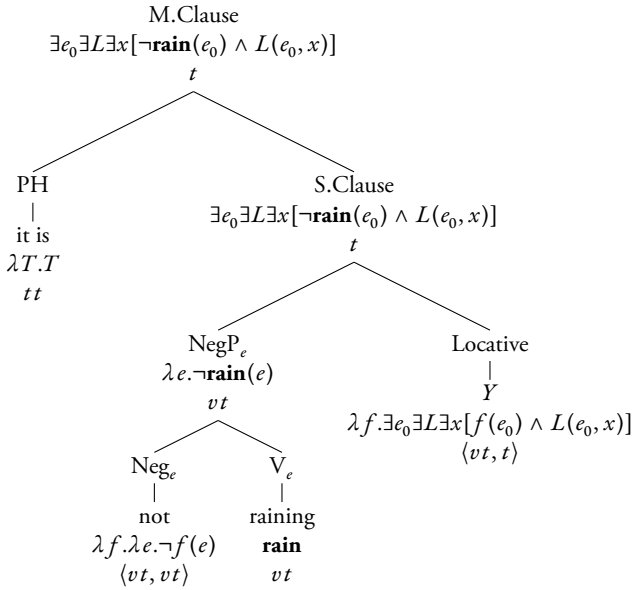


Turning to negations of the sentence in question, the following analysis shows a negation of the definite reading:

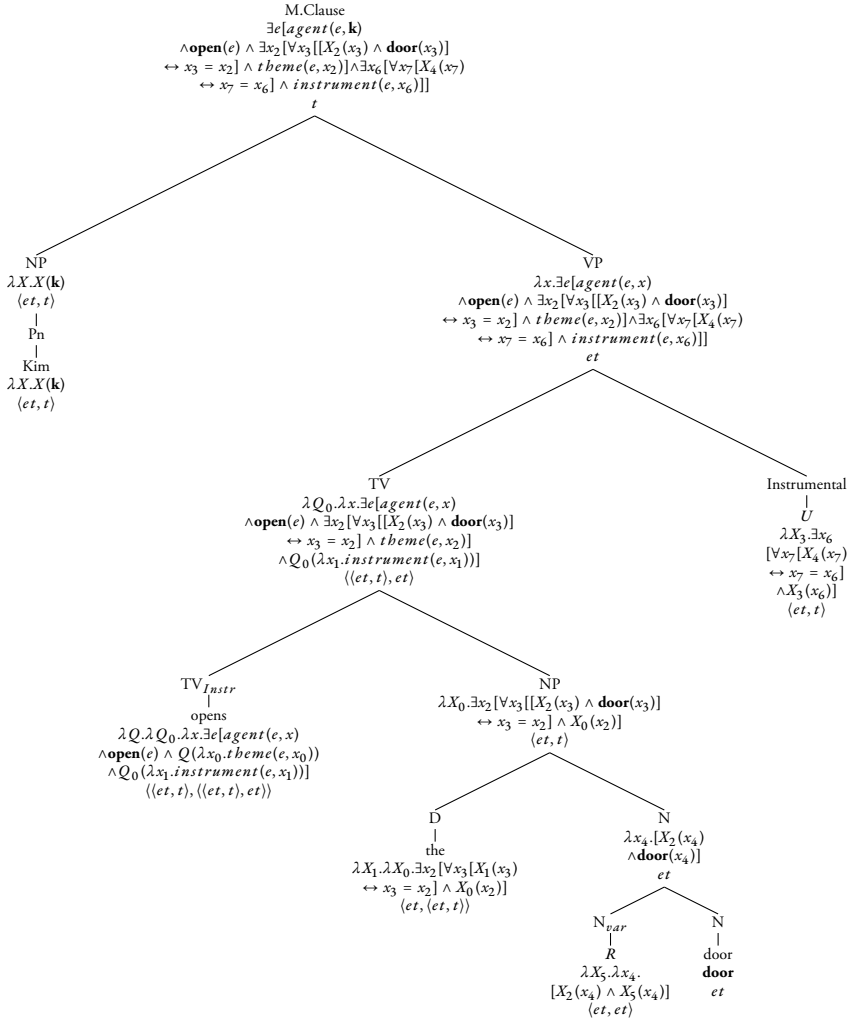


And the negation of the indefinite reading:

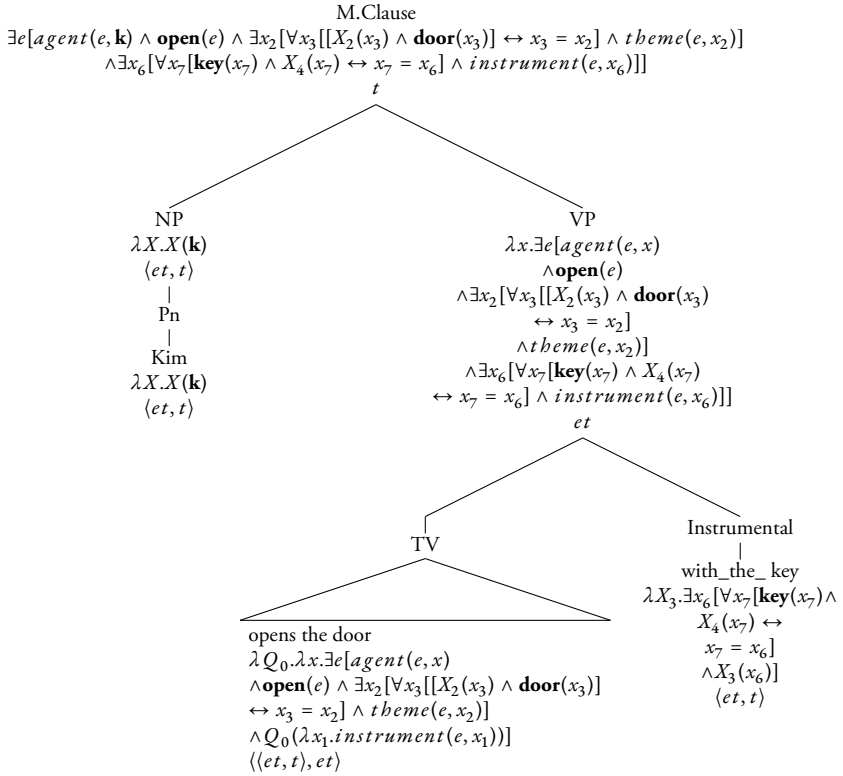




Consider next the sentence ‘Kim opens the door’. In the following analysis, there is a free variable  $X_4$  whose meaning specifies the instrument for the event in question. It is thus left to pragmatic mechanisms to determine what instrument is relevant, coherent etc. for a given use of the sentence. Furthermore, there is another free variable,  $X_2$ , in the translation of the noun phrase, whose meaning restricts ‘the door’ to contextually salient doors (as in Section 2.2.1).



The instrument could be explicit, as in the following sentence:



I have now shown how the indexicalist could explain enrichments of the thematic roles. In what follows, I will turn to the truth-conditional pragmaticist extension.

### 2.7.3 Extending the fragment: truth-conditional pragmatics

In Recanati's truth-conditional pragmaticist proposal there is a distinction between 'the bare logical form' and 'the modified logical form'. In my explication of the concepts under consideration here, I will not talk about logical forms, however, but about equivalences between formulas. This will be a clarification and an adjustment to the formal semantic account under construction. A 'logical form', as I use the expression in this dissertation, is a phrase structure tree, which represents a syntactic structure associated with a sentence. And the truth-conditional pragmaticist strategy is precisely

to not account for contextual effects on truth conditions by modifications of syntactic structure. It could therefore be misleading to talk about logical forms, when the aim is to provide an alternative to indexicalism.

In the formal proposal below, I will develop and modify Recanati's explanation in terms of so-called *variadic functions*, which are the denotations of *variadic operators*. In short, Recanati's idea is that variadic operators are applied to predicates, yielding predicates with increased or decreased numbers of thematic roles. The verb 'sing' could illustrate the idea. The verb is intuitively associated with an agent performing the activity of singing and a theme: the song that the singer is singing. By applying a variadic function, the adicity of the verb could be increased or decreased. The thematic role of theme could be cancelled ('sing' could in that case only be associated with an agent performing an activity). The adicity could also be increased by the addition of, for example, location ('sing' would then intuitively denote some event of singing where a singer performs a song at some particular location).

Turning to Recanati's examples, he claims that 'raining' has no thematic role of location in the translation of that expression, but if a locational variadic operator is applied to the expression, the thematic role of location results as a part of the translation. But, Recanati argues, to have merely the location role is not enough. A specific location has to be specified in order to capture the intuitive location-specific meaning of 'It's raining'. Consider the following equation, which Recanati has used to illustrate the idea:

$$(77) \quad Loc_{Paris}(RAIN) = \lambda e.[RAIN(e) \wedge LOCATION(e, Paris)]$$

(Recanati, 2010b, p. 121)

On one understanding of Recanati's proposal,  $Loc_{Paris}$  denotes a specific function restricting the location of events to events in Paris. Then, the equation above should be read as follows. The variadic operator  $Loc_{Paris}$  is applied to the predicate constant  $RAIN$ , yielding an expression whose denotation is a function taking an event  $e$  to True iff  $e$  is a raining event and the location of  $e$  is Paris. It follows that  $Loc_{Paris}$  denotes one function,  $Loc_{Gothenburg}$  denotes another one, etc. In other words, we would have to postulate one variadic function for every location, if we accepted the proposal (on this understanding). Alternatively, one could understand Recanati's

nati's proposal as follows. There is one function denoted by *Loc*, which applied to the expression 'Paris' yields a new function that restricts the events in question to Paris. In my account below, I will develop and modify this latter alternative, which avoids the proliferation of variadic functions that otherwise seems inevitable.

Drawing on previous work by McConnell-Ginet (1982), Recanati postulates that variadic functions are the denotations of locatives like 'in Paris'. I will not make that assumption here. Locatives will have other denotations. Furthermore, I do not use variadic functions in my compositional analysis of binding constructions, in contrast to Recanati (2004, p. 98-111). As we saw in Section 2.4, such constructions can be handled by other means in the accounts developed here.

In the variant of truth-conditional pragmatics below, variadic functions are closely related to modulation variables. They are introduced by the translation function but, in contrast to modulation variables, they are not free variables, possibly taking whatever semantic value of the right type, but have a more restricted denotation. The choice to relate variadic functions to modulation variables differs from Recanati's specific proposal. But it is compatible with his overall research program, where the notion of modulation is central.

In my implementation, the variadic function denoted by *Loc* takes an entity of type *e*, as usual denoted by  $x, x_0, x_1, \dots$ , and has a function of type  $\langle vt, vt \rangle$  as result. This function, in turn, takes the translation of the verb in question (e.g. **rain**) as argument, and has a function of type *vt* as result. This function is the same as the one denoted by the translation of the verb, except that it is now restricted to the events taking place at the entity (the location) denoted by  $x$ . I will here assume that cities are entities, but the entity denoted does not necessarily have to be a city: it may be a mountain or a forest seen from an apartment window, a street, etc. The entity denoted by  $x$  will vary and will be specified contextually: it could be any entity but pragmatic theory will have to specify the more likely choices and how they are made. Accordingly, the following holds:

$$(78) \quad Loc(x)(\mathbf{rain}) = \lambda e. [\mathbf{rain}(e) \wedge location(e, x)]$$

Here is a compositional event semantic implementation of this proposal. First, the lexicon and the syntax are somewhat different from the indexicalist

variant:<sup>44</sup>

### Lexicon

1. raining  $\in B_{V_e}$
2. it  $\in B_{PH}$
3. is  $\in B_{Cope}$
4. is not  $\in B_{Cope}$
5. in Paris  $\in B_{Locative}$

The main difference between this lexicon and the indexicalist one above is that ‘is’ and ‘is not’ belong to a new lexical category  $B_{Cope}$ . The choice to treat ‘is not’ as a lexical item is unorthodox. The reason will become clear in what follows, but in short, there is no better option if we wish to avoid all sorts of covert linguistic material in logical form. It is an open question if a more developed syntactic theory, combined with truth-conditional pragmatics, would construe the lexicon differently. Furthermore, ‘it’ will now be a placeholder on its own, in contrast to the indexicalist variant, where ‘it is’ was treated as a basic expression.

I propose the following extension of the syntax, on the truth-conditional pragmaticist’s behalf:

### Syntax

1. If  $\alpha \in B_{Cope}$ ,  $[_{Cope} \alpha] \in P_{Cope}$ .
2. If  $\alpha \in B_{Locative}$ ,  $[_{Locative} \alpha] \in P_{Locative}$ .
3. If  $\alpha \in B_{PH}$ ,  $[_{PH} \alpha] \in P_{PH}$ .
4. If  $\beta \in P_{V_e}$  and  $\gamma \in P_{Locative}$ , then  $[_{V_e} \beta \gamma] \in P_{V_e}$ .
5. If  $\beta \in P_{Cope}$  and  $\gamma \in P_{V_e}$ , then  $[_{S.Clause} \beta \gamma] \in P_{S.Clause}$ .
6. If  $\beta \in P_{PH}$  and  $\gamma \in P_{S.Clause}$ , then  $[_{M.Clause} \beta \gamma] \in P_{M.Clause}$ .

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<sup>44</sup>I will only focus on weather reports here. It is fairly obvious how to generalize the proposal to the key-example.



The relevant constants of  $L_{type}$  have already been introduced. For the variadic function adding the thematic role of location, a new translation function is needed. A further translation function would be needed for variadic functions that add thematic roles of instruments; that is, for instance, necessary in order to explain the intuitive reading of example (73) above in the present variant of the formal account. But since I will not focus on that example here, I will only define the variadic function for location.

In order to insert a variadic function in the compositional process, the truth-conditional pragmaticist will have to postulate one extra translation function for every new kind of variadic function. So there will be one translation function for locational variadic functions, called  $tr_{c_{Loc}}$ , and another one for instrumental variadic functions, etc.

Locational variadic functions are only a part of the translation when  $tr_{c_{Loc}}$  is applied to expressions of type  $V_e$  (with no branching nodes). This expression is of type  $vt$ . The rest of the expressions is translated as usual, i.e. as it is when taken as argument by the truth-conditional pragmaticist's ordinary translation function  $tr_c$ .

Below we find the translation of basic expressions, when  $tr_{c_{Loc}}$  is applied to them.

### Translations of basic expressions

1.  $\text{raining}_{tr_{c_{Loc}}} = \mathbf{rain}$
2.  $\text{it}_{tr_{c_{Loc}}} = \lambda T.T$
3.  $\text{in\_Paris}_{tr_{c_{Loc}}} = \lambda f_0.\lambda e_0.[f_0(e) \wedge \text{location}(e_0, \mathbf{Paris})]$
4.  $\text{is}_{tr_{c_{Loc}}} = \lambda f.\exists e f(e)$
5.  $\text{is not}_{tr_{c_{Loc}}} = \lambda f.\neg \exists e f(e)$

I will come back to the choices of these translations below. But first, I will provide the translations of phrasal expressions, since they are more relevant for the discussion about variadic functions that we initiated above.

### Translations of phrasal expressions

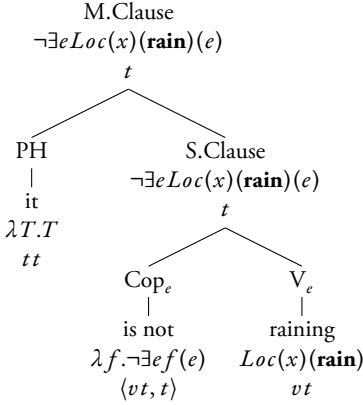
1.  $[\mathbf{V}_e \alpha]_{tr_{c_{Loc}}} = \text{Loc}(x)(\alpha_{tr_{c_{Loc}}})$  (type  $vt$ )
2.  $[\mathbf{V}_e \beta \gamma]_{tr_{c_{Loc}}} = O_{V_e}(\gamma_{tr_{c_{Loc}}}(\beta_{tr_{c_{Loc}}}))$  (type  $vt$ )





for pragmatic theory.

Negations of location definite readings are accounted for as follows (using  $tr_{c_{Loc}}$ ):



In this case, the following equivalence holds (again by the equation in 78 above:)

- $\neg \exists e Loc(x)(\mathbf{rain})(e) = 1$  iff  $\neg \exists e [(\mathbf{rain})(e) \wedge location(e, x)] = 1$

This is how the truth-conditional pragmaticist could account for cases where the intuitive meaning of ‘It’s not raining’ is that it is not raining in Paris or some other contextually salient location.

An aspect not pertaining to variadic functions is the translation of basic expressions above. One could discuss the choice to introduce the existential quantifier over events in the translation of ‘raining’. For instance, the existential quantifier over events could have been present in the translation of ‘raining’ instead of in the translation of ‘is’. That would have resulted in a less unorthodox analysis of negation. But then the analysis of ‘in Paris’ would have had to be much less straightforward than it is now. In fact, it is difficult to see how the truth-conditional pragmaticist would account for ‘in Paris’ in that case. In contrast to the indexicalist analysis, the truth-conditional pragmaticist will not posit a variable  $L$  in the translation of ‘raining’. The most straightforward analysis of the locative is therefore to let it take the translation of ‘rain’ as argument. But then that translation can’t be of type  $t$ , but will have to be of type  $vt$ . Considerations like these

have lead to the translation of ‘is’ and ‘is not’ above.

Moving on, the analysis of ‘It’s not raining’, on its indefinite reading (meaning that it is not raining anywhere), is accounted for straightforwardly by truth-conditional pragmatics: the logical form above receives this translation, if we skip the locational variadic function (use  $tr_c$ ).

Finally, it can be noted that the truth-conditional pragmaticist would have to add some extra machinery to account for the inverse scope reading, where the event quantifier has scope over negation (i.e. where ‘It’s not raining’ means that there is an event that is not a raining event). Recanati claims that ‘It’s not raining’ does not have this reading, as we noted on page 100, but there may be other views on this matter. Be that as it may, if the truth-conditional pragmatics theorist wishes to account for that reading, she could adopt some syntax rules and translations operative in the indexicalist’s tree on page 109, in particular syntax rule 5 on 103, and translation 8, on 105 above. That subtree could then be combined with  $[\text{Cop}_e \text{ is}]$ , and form a main clause, if we add the obvious rules and translations. There is no conflict between this possible extension and the key tenets and assumptions of truth-conditional pragmatics.

## 2.8 Conclusion

In this chapter, I have explored the hypothesis that truth-conditional pragmatics and indexicalism are two empirically equivalent frameworks, in the sense made precise in Section 2.2.3, at least when the main examples in the debate are considered. The result is that this hypothesis is correct. A premise for this conclusion is the detailed formalizations of indexicalist and truth-conditional pragmaticist accounts put forward in the chapter. But the formalizations do not only constitute a premise for the conclusion about equivalence: a purpose of the chapter has been to increase the level of precision in the discussion, and to provide formal, model-theoretic semantic accounts of various context dependent phenomena.

I began the chapter by outlining a basic formal semantic account available for both indexicalism and truth-conditional pragmatics. I continued by developing truth-conditional pragmaticist and indexicalist extensions of the framework, applying them to quantifier domain restriction, transfer, binding, colour adjectives, meaning litigation, and enrichments of thematic

roles. In all these cases, the indexicalist variant and the truth-conditional pragmaticist variant could account for the relevant linguistic intuitions about readings and truth associated with the linguistic phenomena in question.

It has not been my ambition to provide a theory of how the right variable assignment is chosen. That question, I have claimed, belongs to pragmatic theory. And I have not attempted to give a proof of empirical equivalence between indexicalism and truth-conditional pragmatics. It has not been my ambition to show that every possible indexicalist account could be translated into a truth-conditional pragmaticist account, or vice versa. In contrast, I have argued on a case-by-case basis.

A consequence is that truth-conditional pragmatics is not the only option for theorists who wish to account for modulation within formal semantic theory; in contrast to the negative conclusions about the prospects of indexicalism in Recanati (2010b), Pagin (2005) and Pagin & Pelletier (2007), indexicalist approaches are still an option.

## 3 Tense, the Present Perfect and Saturation

### 3.1 Introduction

Consider the following sentence (presented as (9) in Chapter 1.1):

(79) IFK Norrköping has won Allsvenskan.

Now suppose that (79) is uttered in two different contexts:

Context 1: It's 2016. Robin and Kim are interested in football, especially the Swedish premier league (Allsvenskan). Today, they have decided to make a list of all premier league winners. Robin starts by enumerating the winners and says: "Malmö FF has won Allsvenskan, IFK Norrköping has won Allsvenskan...".

Intuitively, Robin's utterance is true. IFK Norrköping won Allsvenskan 2015 (and has won it several times in the past).

Context 2: It's 2016. Robin wants to know who won the premier league final the day before and therefore opens the football app. Robin shouts: "IFK Norrköping has won Allsvenskan!". Unfortunately, there is something wrong with Robin's football app. Malmö FF is the winner this year.

Robin's utterance is, in this case, false.

The contrast between the two cases could be described as a difference between an 'existential' reading, in context 1, and a 'resultative' reading, in context 2 (cf. Portner 2003 and Mittwoch 2008) or, in the terminology of Higginbotham (2009), a 'resultant' reading (context 1) or a 'result state' reading (context 2). In this chapter, I will show that developments of the formal semantic accounts presented in Chapter 2 can capture the distinction between the intuitive meanings in the scenario. Consequently, the empirical coverage of the accounts put forward in Chapter 2 is extended.

However, in this case, the notion of ‘saturation’ plays a key role, in contrast to Chapter 2, where ‘modulation’ was in focus (cf. Chapter 1.3.1).

Moreover, consider the following sentence (sentence (10) in Chapter 1.1), discussed by Recanati (2010b, p. 123-125):

(80) I have eaten.

Suppose that (80) is uttered as an answer to the question *Would you like to have dinner?*, or a similar enquiry. As we noted in Chapter 1.1, there are then, intuitively, two implicit contextual adjustments: 1) the utterance concerns the evening when it is uttered. It is irrelevant whether the speaker had dinner the evening before, two evenings before, etc., 2) the intuitive truth conditions contain a theme: intuitively, the speaker asserts that she has had a proper meal, say dinner, and not just some nuts or a fruit.

Below, I will argue that the context dependence of (80) just illustrated can be handled by both indexicalists and truth-conditional pragmaticists. I will thus further extend the empirical coverage of the indexicalist and truth-conditional pragmaticist formal semantic accounts in Chapter 2. This will also give further support to the thesis that indexicalism and truth-conditional pragmatics are empirically equivalent. This is the main purpose of this chapter. However, I also intend to show that a combination of ideas regarding the present perfect, the Reichenbachian approach and the result state approach, is fruitful. This combination of ideas has not been developed in detail before, as far as I know, although it is not completely unexplored; see: Steedman ms, p. 17-24).

## 3.2 Background

In my proposal, which will be presented later on, I will combine two well-known theoretical alternatives. First, I will describe the core ideas of the two alternatives and the differences between them. I call them the ‘Reichenbachian approach’ and the ‘result state approach’. The section closes with a brief overview of accounts that do not fall under either of these two labels.



### 3.2.1 The ‘Reichenbachian approach’

The Reichenbachian approach stems from Hans Reichenbach’s highly influential proposal in *Elements of symbolic logic* (Reichenbach, 1947). In the contemporary literature, it is found in e.g. Meyer-Viol & Jones (2011), where it is adjusted to a dynamic semantic framework, Portner (2003), where it is combined with a theory of presupposition, and in the textbook (Gamut, 1991), where it is compared to other treatments of tense. In this section, I will describe the core ideas of Reichenbach’s original account.

In Reichenbach (1947), there is a chapter entitled ‘The analysis of conversational language’, within which one can find a section about tense. Reichenbach’s main thesis is that it is insufficient to distinguish only between the past, the present and the future, if one aims to account for the complex nature of tenses in natural languages like English, Turkish and French<sup>1</sup>. He shows how the meanings, and the differences between the meanings, of the present tense (81), the present perfect (82), the preterite perfect (83), the future perfect (84), the future tense (85), and the preterite (86), can be described by the means of three points (and relations between them): the point of the event, the point of speech and the point of reference:<sup>2</sup>

- (81) Hilary sees Kim.
- (82) Hilary has seen Kim.
- (83) Hilary had seen Kim.
- (84) Hilary will have seen Kim.
- (85) Hilary will see Kim.
- (86) Hilary saw Kim.

The intuition behind positing a point of reference is clear when one considers the distinction between the preterite and the preterite perfect. This

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<sup>1</sup>Reichenbach discusses examples and contrasts between these three languages, which he used in teaching in exile during World War II.

<sup>2</sup>Reichenbach himself uses the terminology of ‘point of speech’ etc. adopted here. (Gamut, 1991) uses the same terminology, and Steedman (ms) does so as well. It is, however, also common to let the expressions ‘speech time’, ‘reference time’ and ‘event time’ replace the original terminology. E.g. Portner (2003) describes Reichenbach’s ideas in the latter terminology.

is illustrated by Reichenbach (1947, p. 288), who discusses the following passage from W. Somerset Maugham's *Of Human Bondage*:

But Philip ceased to think of her a moment after he had settled down in his carriage. He thought only of the future. He had written to Mrs. Otter, the *massière* to whom Hayward had given him an introduction, and had in his pocket an invitation to tea on the following day.

The event where Philip writes to Mrs. Otter is clearly located before the event where Philip is thinking of the future in the carriage. But neither of these two events are intuitively located at the time of speech: the story is set in the past relative to the point of reading it. Between the point of the event of reading the story, the speech event, and the point where Philip writes to Mrs. Otter, there is the point where Philip is thinking of the future. This is the point of reference, i.e. the time point that the story primarily is concerned with (the time point the narrator of the story intuitively talks about).

Reichenbach uses *E* for the point of the event, *S* for the point of speech, and *R* for the point of reference. The comma (,) means temporal identity and the stroke (–) is used for temporal separation. The tenses distinguished above in example (81-86) are illustrated as follows:

- (87) The present:  $E, R, S$
- (88) The present perfect:  $E - R, S$
- (89) The preterite perfect:  $E - R - S$
- (90) The future perfect:  $S - E - R$
- (91) The future tense:  $S - E, R$
- (92) The preterite:  $E, R - S$

A sentence in the present tense (81, 87) describes an event that co-occurs with the point of speech, which co-occurs with the point of reference. A sentence in the present perfect (82, 88) describes an event in the past, but has as point of reference a temporal point identical to the point of speech. This contrasts with the preterite (86, 92), where the point of the event is in the past, but the point of reference is in the past as well.

### 3.2.2 The ‘Result-State Approach’

The second type of account to be presented is the ‘result state-approach’. This approach takes its starting point from the observation that there is a result-state meaning associated with the present perfect. In the following example, taken from (Mittwoch, 2008, p. 335), a negation or uncertainty with regard to the contextually salient result state is infelicitous:

- (93) I’ve put the book back on the shelf  
 (i) #but it’s not there anymore.  
 (ii) #and perhaps it’s still there.  
 (iii)?so it should still be there.

Proponents of the result state-approach argue that the assumption that the sentence, or an utterance of it, somehow expresses the result state that the book is on the shelf plays a key role in explaining this infelicity.

This way of thinking about the perfect shows up already in Otto Jespersen’s *The philosophy of grammar*. In contrast to Reichenbach’s idea, the present perfect is a variant of the present tense, according to Jespersen:

[B]esides the purely temporal element it contains the element of result. It is a present, but a permansive present: it represents the present state as the outcome of past events, and may therefore be called a retrospective variety of the present. That it is a variety of the present and not of the past is seen by the fact that the adverb *now* can stand with it: “Now I have eaten enough.” (Jespersen, 1924, p. 269)<sup>3</sup>

That we can use *now* with the present perfect contrasts with the infelicity that arises when the moment of speech is characterized by the preterite. This fact is not stated by Jespersen, but is implicit in his discussion:

- (94) #Now I ate enough.

Jespersen does not acknowledge, however, that sentences like the one in (94) are not fully ungrammatical: there are contexts in where they are acceptable. If ‘now’ denotes a wider period of time, and not the moment of speech, the preterite could occur in a contrast:

<sup>3</sup>The quite rare description ‘permansive present’ means that the form denotes a permanent or continuing state.

(95) Yesterday, I didn't eat enough, but now I ate enough.

Jespersen's point, illustrated in the quote and in (94), still holds, however, if 'now' denotes the moment of speech. (94) is odd, indeed, if 'now' is assigned that meaning.

Furthermore, Jespersen mentions that *He has become mad* means that the referent of the pronoun 'he' is mad now, and that *Have you written the letter?* is a question that intuitively concerns the present. Moreover, he acknowledges that the present tense and the present perfect can be combined in the same sentence:

(96) He **has given** orders that all spies **are** to be shot at once.

We can strengthen this point by considering the following alternative sentence, where the preterite is substituted for the present in the second, subordinated, clause:

(97) ?He **has given** orders that all spies **were** to be shot at once.

The sentence in (97), where the preterite expression 'were' is substituted for the present 'are', is unacceptable, or at least a much worse alternative than (96). This is in accordance with what seems to be Jespersen's point: in sequences of tense, a clause in the present perfect is naturally followed by a clause in the present tense, where the finite verb is in its present form (e.g. 'are'), but not by a clause in the preterite, where the finite verb is in its preterite form (e.g. 'were').

Moens & Steedman (1988) propose an account of the present perfect along the same lines. A first step in their proposal is that propositions can be classified into aspectual types. First, there is the aspectual type of *culmination*, which is an intuitively instantaneous event in which there is a transition from one state to another, as in (98) below:

(98) Kim reached the top.

The event of reaching a top contains, intuitively speaking, a state of being very near some top and a state of being at the top. The state of being at the top is called a *consequent state*, in Moens & Steedman's terminology. Secondly, we have the aspectual type of *point*, where the event is also instantaneous but, in contrast to a culmination, does not contain a transition

from one state to another (points are, in other words, not associated with consequent states):

(99) Kim hiccupped.

Moens & Steedman also postulate two other aspectual types, *processes* and *culminated processes*, but it is not important for our purposes to describe their nature here.

The second step in Moens & Steedman's account is the following idea. The present perfect is, or denotes, a function that takes propositions of the aspectual type of culmination, and yields the consequent state associated with the culmination. The sentence in (100) obeys these constraints: the proposition is of the right aspectual type and it intuitively refers to the consequent state of Kim being at the top.

(100) Kim has reached the top.

Now if the present perfect takes as argument a proposition with the wrong aspectual type, e.g. a point, the aspectual type of the proposition will be "coerced", i.e. changed, in order to enable an intuitive consequent state, on the account of Moens & Steedman (1988). Alternatively, the sentence (or an utterance of it) will be infelicitous:

(101) The clock has struck.<sup>4</sup>

(102) ?The star has twinkled.

Regarding (101), special circumstances or expectations may enable an interpretation where the striking of the clock has some salient consequent state associated with it. It is more difficult to imagine a context where (102) is associated with a consequent state, Moens and Steedman claim. I agree with their assessment of these cases, but we can note that a difficulty in imagining a context does not rule out the possibility that there might nevertheless be contexts where (102) is acceptable and is associated with a consequent state of some sort. To elaborate this point, consider the following example:

(103) He has blinked.

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<sup>4</sup>Moens&Steedman actually discusses the example *The clock has ticked*, but their point is more clearly illustrated with this closely related example.

This sentence may sound a bit odd at first sight. But imagine a competition where the person who blinks first loses. The sentence is then acceptable. It is acceptable because, as proponents of the result state-approach would argue, a contextually salient result state becomes evident in that story (the person who blinked is the loser of the game).

Higginbotham (2009, p. 174) presents another variant of the ‘result state-approach’. He suggests (105) as translation of (104), where  $u$  denotes the time of the speaker’s utterance and  $\approx$  is a symbol for temporal overlap:<sup>5</sup>

(104) Mary has solved the problem.

(105)  $[\exists e' \approx u][\exists e][R(e, e') \ \& \ \text{solve}(\text{Mary, the problem, } e)]$

The translation states that there is an event  $e'$  that overlaps with the time of utterance, and that there is an event  $e$  such that the relation of result holds between  $e$  and  $e'$ , and that *solve* is a relation that holds between Mary, the problem and  $e$ .

The two-place predicate  $R$  stands for the relation of result, but according to Higginbotham’s proposal, there is, furthermore, a distinction between two such relations: a relation of *result state* and a relation of *resultant* (they both correspond to the notion of consequent state in Moens & Steedman’s account). The relation of result state holds between events and their intuitively natural sequels. The resultant relation holds between each event and the state that begins as soon as an event is completed and continues to exist forever (the state that there is an event of the relevant kind in the past). Consider the following two sentences:

(106) I have been to Japan.

(107) I have spilled my coffee.

This is how I understand Higginbotham’s distinction. Imagine a conversation where the interlocutors compare their travel experiences, and (106) is uttered. The most salient reading is then associated with the resultant relation. When a person visits Japan, it will always be true that she has been to Japan. The state that she has been to Japan will exist forever. The resultant

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<sup>5</sup>In the semantic literature, it is common to use the symbol  $\circ$  for overlap. However, I will try to stay close to Higginbotham’s formalism in what follows. I will therefore use  $\approx$  for temporal overlap below.

relation holds, in this case, between the event of the speaker being in Japan, and the state/event that there is an event in the past where the speaker is in Japan. In contrast, imagine a context where the speaker has just dropped her cup of coffee by accident. In such a case, the most salient reading of (107) is associated with a result state: there is spilled coffee on the table or on the floor that needs to be wiped up.<sup>6</sup>

### 3.2.3 Alternative accounts

There are also other kinds of approaches. One approach found in various places in the literature is the ‘extended now-approach’. The basic idea is put forward in McCoard (1978). In short, the account assumes that the present perfect locates the event described in an interval that contains the intuitive present, or ‘now’. In contrast, the preterite locates the event described outside of the ‘now’-period. A variant of this account is found in Mittwoch (2008), where it is proposed in conjunction with an explanation in terms of implicature, and in Portner (2003), according to whom an extended now is presupposed, when the present perfect is used.

In my discussion below, I will put forward an account that combines the Reichenbachian approach with the result state-approach. My account is designed to keep the merits of both approaches: the clear-cut differences between the tenses offered by the Reichenbachian account, and the insight that the choice of using a present perfect sentence bears on how a situation is conceived of aspectually, which is offered by the result state-approach.

The account is closely related to the ideas put forward by Steedman (ms, p. 17-24). A difference between our proposals is, however, that Steedman treats the Reichenbachian points of reference as time points, which is, I believe, close to what Reichenbach himself had in mind, whereas I will eschew points and propose a treatment of the points of reference, speech and event in terms of relations between events and factors pertaining to the context of

<sup>6</sup>Parsons (1990, p. 229-256) offers a theory similar to that of Higginbotham (2009). In addition, Parsons attempts to show how his favoured event semantic translation of *I have bound him* can be derived from *I have him bound*, given certain stipulated axioms. The two sentences, or more precisely, their forms, are historically related, according to a well-known thesis in historical linguistics (c.f. Parsons, 1990, p. 239-241). He thereby shows how logical relations can be used in explanations of historical stages of linguistic developments.

utterance. In the context of our discussion, where the formal semantic accounts in Chapter 2 are developed, my alternative is the simpler one (since events, in contrast to points, are already available for other purposes).

### 3.3 The plan

In Section 3.4 below, the accounts developed in Chapter 2 are extended in order to account for the following temporal phenomena: the present perfect (108), the preterite perfect (109), the future perfect (110), the preterite (111), the future tense (112), and the past futurate (113).

- (108) IFK Norrköping **has won** Allsvenskan.
- (109) IFK Norrköping **had won** Allsvenskan.
- (110) IFK Norrköping **will have won** Allsvenskan.
- (111) IFK Norrköping **won** Allsvenskan.
- (112) IFK Norrköping **will win** Allsvenskan.
- (113) IFK Norrköping **would win** Allsvenskan.

The extension will not be specifically indexicalist or truth-conditional pragmaticist and is, accordingly, available for both sides of the debate. I will then turn to a discussion of contextual adjustments, or context dependence, of result states (Section 3.5), and enrichments of thematic roles, in relation to the present perfect (Section 3.6).

As I mentioned, this chapter has several purposes. The extension of the formal semantic accounts developed in Chapter 2 offers a previously underdeveloped combination of core ideas from the Reichenbachian approach and central insights from the result state approach. Furthermore, I intend to show that both indexicalist and truth-conditional pragmaticist extensions, including the tense part, are readily available. This will give further support to the dissertation's main claim that indexicalism and truth-conditional pragmatics are empirically equivalent.

### 3.4 Perfect, preterite, future

The lexicon contains the following additional expressions:



**Lexicon**

1. eaten, won  $\in B_{Participle}$
2. has, had, will\_have  $\in B_{Aux}$
3. won<sub>pret</sub>  $\in B_{Preterite}$
4. will\_win  $\in B_{Future}$
5. would\_win  $\in B_{P.Future}$

Both the past participle and the preterite of ‘win’ are spelled ‘won’. I have subscripted the preterite variant, in order to distinguish the two. The expressions ‘will\_win’ and ‘would\_win’ are intuitively composed of ‘will’ and ‘win’, and of ‘would’ and ‘win’, but a discussion of the precise semantic values of the parts is unnecessary here. The point of including these expressions in the fragment is to show that the formal accounts can model the differences between the main tenses of English. This is important for any proposal pertaining to tense phenomena. However, our main focus is the present perfect, or, more specifically, context-dependent properties of the present perfect, and not the details of the compositional semantics of the other tenses.

We have the following syntactic rules. I use the phrase label TP, for the longer, but more informative, Temporal Phrase.

**Syntax**

1. If  $\alpha \in B_{Participle}$ ,  $[_{Participle} \alpha] \in P_{Participle}$ .
2. If  $\alpha \in B_{Preterite}$ ,  $[_{Preterite} \alpha] \in P_{Preterite}$ ,
3. and similarly if  $\alpha \in B_{Aux}$ ,  $B_{Future}$ , or  $B_{P.Future}$ .
4. If  $\beta \in P_{Aux}$  and  $\gamma \in P_{Participle}$ , then  $[_{TP} \beta \gamma] \in P_{TP}$ .
5. If  $\beta \in P_{Preterite}$ ,  $[_{TP} \beta] \in P_{TP}$ ,
6. and similarly if  $\beta \in P_{Future}$ , or  $P_{P.Future}$ .
7. If  $\beta \in P_{TP}$  and  $\gamma \in P_{NP}$ , then  $[_{VP} \beta \gamma] \in P_{VP}$ .

There are also new constants in  $L_{type}$ , introduced below.  $C_{se}$  and  $\mathcal{R}$  are used to locate the event talked about temporally. I use the indexical  $C_{se}$  for

the speech event of the context.<sup>7</sup> This expression's semantic value varies with context (the notion of context is introduced to the semantics below).  $\mathcal{R}$  is a predicate of events (type  $vt$ ).  $\mathcal{R}$  is not an indexical expression but is related to the contextually specified speech event in ways to be elaborated. In the translations below,  $\mathcal{R}$  takes a free variable  $e_0$ , whose value is determined pragmatically.  $C_{se}$  and  $\mathcal{R}(e_0)$  thus determine the temporal location of the event talked about in different ways (cf. Section 3.4.1).

In the framework developed here,  $C_{se}$  and  $\mathcal{R}$  correspond to Reichenbach's notions of *point of speech* and *point of reference* (Reichenbach, 1947, p. 287-299). But in contrast to Reichenbach, and to standard Reichenbachian approaches, the semantics here is not formulated in terms of time points (or closely related notions such as time intervals). The theoretical intuition is that events are related to one another by the relations of precedence and overlap. This holds for all events, including speech events, i.e. contextual denotations of  $C_{se}$ , and reference events, denoted by the free variable  $e_0$ , which appear as argument of  $\mathcal{R}$  in the translations. In what follows, the symbol  $<$  denotes the relation of anteriority and the symbol  $\approx$  denotes temporal overlap. Accordingly,  $e < e_0$  means that  $e$  is before  $e_0$ , and  $e \approx e_0$  means the the two events overlap.

The translation of 'has' below also includes the predicate 'result'. The result state approach discussed above, and implemented here, treats the result as a relation between two events: one in the past described by the participle ('won', 'eaten', etc.), and one contextually salient event denoted by the indexical expression  $C_{cse}$ .<sup>8</sup>

The following expressions are thus included in  $L_{type}$ :

- $C_{se}, C_{cse}$  are constants of type  $v$ .<sup>9</sup>
- $\mathcal{R}$  is a constant of type  $vt$ .
- $<, \approx$  and *result* are constants of type  $\langle v, vt \rangle$ .

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<sup>7</sup>I will not elaborate on the nature or characteristics of speech events here: it is sufficient for my purposes that there is one for each context. I will thus remain neutral on the question whether all speech events are sentential utterances or not.

<sup>8</sup>The abbreviation 'cse' stands for Contextually Salient Event.

<sup>9</sup>Note that indexicals are constants.

Let us now turn to the translations. I have assumed that states are events and not a basic type on its own. This assumption is made by Higginbotham (2009) as well. In contrast, Parsons (1990) treats states as a basic type.

### Translations of basic expressions<sup>10</sup>

1.  $\text{won}_{tr} = \lambda f. \lambda Q. \lambda x. \exists e [\text{agent}(x, e) \wedge \mathbf{win}(e) \wedge Q(\lambda x_0. \text{theme}(x_0, e)) \wedge f(e)]$ ,  
and similarly for  $\text{eaten}_{tr}$
2.  $\text{has}_{tr} = \lambda e. [C_{se} \approx e_0 \wedge \mathcal{R}(e_0) \wedge e < e_0 \wedge \text{result}(e, C_{cse}) \wedge C_{cse} \approx C_{se}]$
3.  $\text{had}_{tr} = \lambda e. [e_0 < C_{se} \wedge \mathcal{R}(e_0) \wedge e < e_0]$
4.  $\text{will\_have}_{tr} = \lambda e. [C_{se} < e_0 \wedge \mathcal{R}(e_0) \wedge e < e_0]$
5.  $(\text{won}_{pret})_{tr} = \lambda Q. \lambda x. \exists e [\text{agent}(x, e) \wedge \mathbf{win}(e) \wedge Q(\lambda x_0. \text{theme}(x_0, e)) \wedge e_0 < C_{se} \wedge \mathcal{R}(e_0) \wedge e \approx e_0]$
6.  $\text{would\_win}_{tr} = \lambda Q. \lambda x. \exists e [\text{agent}(x, e) \wedge \mathbf{win}(e) \wedge Q(\lambda x_0. \text{theme}(x_0, e)) \wedge e_0 < C_{se} \wedge \mathcal{R}(e_0) \wedge e_0 < e]$
7.  $\text{will\_win}_{tr} = \lambda Q. \lambda x. \exists e [\text{agent}(x, e) \wedge \mathbf{win}(e) \wedge Q(\lambda x_0. \text{theme}(x_0, e)) \wedge C_{se} < e_0 \wedge \mathcal{R}(e_0) \wedge e \approx e_0]$

In the translations of basic expressions above, one can catch a glimpse of the contrasts between the tenses (but the differences are more clearly seen later on). The translation of ‘has’ both contains the Reichenbachian relations between the speech event and reference event, as well as the conjunct  $\text{result}(e, C_{cse})$  and the specification that the result state/event (denoted by  $C_{cse}$ ) overlaps with the speech event. In the translation of ‘had’ and ‘will have’, there is no result predicate or indexical denoting a contextually salient event. I take this to be consistent with the data, but it would be easy to stick in extra conjuncts for the result predicate and its arguments if that was empirically justified. In the translations of ‘won<sub>pret</sub>’, and the other expressions, there is no result predicate, and no indexical denoting a contextually salient event, which is as it should be.

In my proposal, there are events talked about, temporally located to speech and reference events. But in contrast to Reichenbach’s original idea,

<sup>10</sup>In order to simplify the exposition, I omit brackets when not needed for clarity.

there are no points of events. The event talked about (e.g. the event of winning, eating, etc.) is, in this approach, always existentially quantified. This is the main approach to translations of intransitive and transitive verbs put forward in Chapter 2. I have seen no reason to revise that approach, for the linguistic phenomena at hand. The event talked about is temporally related to the (pragmatically determined) reference event by the relation of precedence or overlap. The reference event, in turn, is related by precedence or overlap to the speech event, which is determined contextually by the indexical  $C_{se}$ .

The translations of phrasal expressions are as follows:

### Translations of phrasal expressions

1.  $[\text{Participle } \alpha]_{tr} = \alpha_{tr}$  (type  $\langle vt, \langle \langle et, t \rangle, et \rangle \rangle$ )
2.  $[\text{Aux } \alpha]_{tr} = \alpha_{tr}$  (type  $vt$ )
3.  $[\text{Preterite } \alpha]_{tr} = \alpha_{tr}$  (type  $\langle \langle et, t \rangle, et \rangle$ )
4.  $[\text{Future } \alpha]_{tr} = \alpha_{tr}$  (type  $\langle \langle et, t \rangle, et \rangle$ )
5.  $[\text{P.Futurate } \alpha]_{tr} = \alpha_{tr}$  (type  $\langle \langle et, t \rangle, et \rangle$ )
6.  $[\text{TP } \beta \gamma]_{tr} = \gamma_{tr}(\beta_{tr})$  (type  $\langle \langle et, t \rangle, et \rangle$ )
7.  $[\text{TP } \beta]_{tr} = \beta_{tr}$  (type  $\langle \langle et, t \rangle, et \rangle$ )

The indexicals  $C_{se}$  and  $C_{cse}$  denote different events in different contexts. However, we have not yet discussed the formal notion of context above. In order to incorporate that notion, I will now revise the basic definitions of truth and denotation.

In addition to what is already presented, we assume that a set of contexts of utterance CU is given. Each context in CU is associated with a speech event: the speech event of the context. Every context also has one contextually salient event. We could add more salient events if needed, but for present purposes it is enough to just postulate one salient event per context. Speakers, addressees, and salient males and females could also be easily added to the contexts, in order to account for ‘I’, ‘he’, ‘you’ and ‘she’.<sup>11</sup>

<sup>11</sup>Each context in CU is also associated with a coherence relation, e.g. a temporal or a locational one. This is crucial for the formal account of binding in Chapter 2.4, where the indexical  $C_{COH}$  is appealed to.

But these expressions are not under discussion here; I will therefore leave them aside for now. Furthermore, instead of the earlier function  $F$  from constants to extensions, we will now have a function  $F_0$  from constants to functions from contexts to extensions.

The format developed here is closely related to what Westerståhl (2012) calls a ‘Kaplan style semantics’: a set of contexts and an interpretation function assigning to expressions functions from contexts as value. There is a major difference though between Kaplan style semantics and my proposal: there is no set of circumstances in the semantics proposed here. Furthermore, the interpretation function assigns to each expression a function from contexts to extensions and not, as is common in semantics of the Kaplan style variety, a function from contexts to contents. My reason for not having a set of circumstances is that I do not need them for the phenomena under discussion. It seems, however, quite possible to add a set of circumstances to the semantics I propose, and redefine the interpretation function in terms of it, if one wished to do so.

Combined with the set-up from page 34 and 81, a model  $\mathcal{M}$  is a tuple  $\langle \mathcal{M}, E, D, F_0, CU \rangle$  such that  $F_0$  is an interpretation function as above,  $\mathcal{M}$  is a set of entities,  $E$  is a set of events,  $D$  is the set of real numbers, which has its standard order  $\geq$ , and  $CU$  is a set of contexts such that each context is associated with a speech event (the speech event of the context) and a contextually salient event. The sets are assumed to be pairwise disjoint.

The extensions are either primitive elements of  $\mathcal{M}$ ,  $E$  or  $D$ , the True, the False, or functions constructed from these basic types. The set  $Y$  of types is as before (built from basic types  $e$ ,  $v$ ,  $d$  and  $t$ ).

### Truth and denotation in $L_{type}$

1. If  $\chi$  is a constant, then  $\llbracket \chi \rrbracket^{\mathcal{M}, g, c}$  is  $F_0(\chi)(c)$ .
2. If  $\chi$  is a variable, then  $\llbracket \chi \rrbracket^{\mathcal{M}, g, c}$  is  $g(\chi)$ .
3.  $\llbracket C_{se} \rrbracket^{\mathcal{M}, g, c}$  is  $F_0(C_{se})(c)$ , i.e. the speech event of  $c$ .
4.  $\llbracket C_{cse} \rrbracket^{\mathcal{M}, g, c}$  is  $F_0(C_{cse})(c)$ , i.e. the contextually salient event of  $c$ .
5.  $\llbracket \lambda \chi. \chi_0 \rrbracket^{\mathcal{M}, g, c}$ ,  $\llbracket \chi(\chi_0) \rrbracket^{\mathcal{M}, g, c}$ ,  $\llbracket \forall \chi \chi_0 \rrbracket^{\mathcal{M}, g, c}$ ,  $\llbracket \exists \chi \chi_0 \rrbracket^{\mathcal{M}, g, c}$ ,  $\llbracket \chi \rightarrow \chi_0 \rrbracket^{\mathcal{M}, g, c}$  and  $\llbracket \neg \chi \rrbracket^{\mathcal{M}, g, c}$  are defined as usual (see page 34).

When the new interpretation function  $F_0$  is combined with a constant  $\chi$  and a context argument  $(c, c_0, c_1, \dots)$ , the only difference to the original set-up on page 34 lies in the denotation of indexicals. In such cases, the denotation of the indexical expression varies with context argument. Therefore, the novel definitions of truth and denotations are not elaborated in detail. The relevant difference is, however, stated above.

The introduction of contexts leads to the following updated version of the Empirical Equivalence Claim (page 51).

**Empirical Equivalence Claim (revised version)**

If the indexicalist translation of  $S$  is  $\phi$  and the truth-conditional pragmaticist translation is  $\psi$  — i.e. if  $\phi$  and  $\psi$  are  $L_{type}$ -formulas obtained by our translation functions applied to the logical forms of  $S$  in the respective fragments — then for all models  $\mathcal{M}$ , there is an assignment  $g$  and a context  $c$  such that  $\llbracket \phi \rrbracket^{\mathcal{M}, g, c} = \llbracket \psi \rrbracket^{\mathcal{M}, g, c}$ .

Turning back to the examples of our interest, the following tree structure with translations illustrates the meaning of a sentence in the present perfect — more specifically the sentence ‘IFK Norrköping has won Allsvenskan’:



fying the conditions of the participle would precede the reference event as well. Moreover, there is no relation of result in these cases, and no contextually salient event (but see the comment on page 133).

The differences between the present perfect and other perfects, i.e. the preterite perfect and the future perfect, are seen in the following translations. I have chosen not to write out the tree structure and the compositional translations for each expression, but that could easily be done by following the rules and translations above.

(114) IFK had won Allsvenskan.  
 $\exists e[\text{agent}(\mathbf{i}, e) \wedge \mathbf{win}(e) \wedge \text{theme}(\mathbf{a}, e) \wedge e_0 < C_{se} \wedge \mathcal{R}(e_0) \wedge e < e_0]$

(115) IFK will\_have won Allsvenskan.  
 $\exists e[\text{agent}(\mathbf{i}, e) \wedge \mathbf{win}(e) \wedge \text{theme}(\mathbf{a}, e) \wedge C_{se} < e_0 \wedge \mathcal{R}(e_0) \wedge e < e_0]$

Finally, the perfects are distinguished from the preterite (116), the past futurate (117), and the future tense (118) below. As is seen in the translations, the preterite locates the reference event anterior to the speech event, but the event of winning overlaps with the reference event. In the past futurate, the reference event is located anterior to the speech event as well, but the event of winning is located after the reference event. In the future tense example below, the reference event is located after the speech event, and the event of winning overlaps with the reference event.

(116) IFK won<sub>pret</sub> Allsvenskan.  
 $\exists e[\text{agent}(\mathbf{i}, e) \wedge \mathbf{win}(e) \wedge \text{theme}(\mathbf{a}, e) \wedge e_0 < C_{se} \wedge \mathcal{R}(e_0) \wedge e \approx e_0]$

(117) IFK would\_win Allsvenskan.  
 $\exists e[\text{agent}(\mathbf{i}, e) \wedge \mathbf{win}(e) \wedge \text{theme}(\mathbf{a}, e) \wedge e_0 < C_{se} \wedge \mathcal{R}(e_0) \wedge e_0 < e]$

(118) IFK will\_win Allsvenskan.  
 $\exists e[\text{agent}(\mathbf{i}, e) \wedge \mathbf{win}(e) \wedge \text{theme}(\mathbf{a}, e) \wedge C_{se} < e_0 \wedge \mathcal{R}(e_0) \wedge e \approx e_0]$

In the tree structures for these sentences, ‘won<sub>pret</sub>’, ‘would\_win’ and ‘will\_win’ occur under the phrase labels Preterite, P.Futurate and Future respectively. The phrase labels occur, in turn, under TP. The type of the translation of both the preterite, P.Futurate and Future phrases, on the one side, and the TP phrase, on the other side, is  $\langle\langle et, t \rangle, et \rangle$ . In other words, the translations of Preterite, P.Futurate and Future phrases, containing ‘won<sub>pret</sub>’, ‘would\_win’, ‘will win’ or possibly other expressions, have



the same type as the translations of ‘has won’, ‘have won’ and ‘will\_have won’, when these expressions occur as TP phrases.

### 3.4.1 Saturation, modulation and the present perfect

It is instructive to discuss the distinction between saturation and modulation in relation to the meaning of the present perfect, and the tenses generally. Recall that the distinction between saturation and modulation, central to Recanati’s truth-conditional pragmatics, was introduced in Chapter 1.3.1. In short, saturation is mandatory, dependent on the meaning of words, whereas modulation is optional, dependent on pragmatic factors. In Chapter 2, we considered quantifier domain restriction, transfer, colour adjectives, etc. In these cases, modulation was the relevant pragmatic process.

The following question now arises: is the pragmatic process involved in the intuitive truth conditions of sentences in the present perfect (and tenses generally) modulation or saturation?

In the case of the present perfect, and tenses generally, the exploitation of context seems, indeed, to be highly conventional. It is not the case that we can distinguish between two kinds of case: one where temporal expressions are used conventionally without contextual adjustment and one where they are contextually adjusted on pragmatic grounds. Reichenbach’s points of speech are inherently context-dependent, and so are the result states of Jespersen, Moens & Steedman and Higginbotham. This reflects the inherent context dependence of tense.

Thus, in contrast to cases of modulation, where there is a distinction between the conventional and the pragmatically modulated contributions to truth conditions, contributions to truth conditions of temporal expressions have their context dependence by convention. This motivates my choice to anchor the truth conditions to the speech event by the mechanism of saturation, more specifically by using the indexical  $C_{se}$  in the translations. It also motivates the indexical treatment of result events: the relation of result has an argument whose value is determined by saturation (the expression  $C_{cse}$  is used for that purpose).<sup>12</sup>

<sup>12</sup>Recanati (2010b, p. 181–218) discusses the phenomena of *context-shift*, i.e. when the context assigning meaning to indexicals is not the context in which the speech act is

### 3.4.2 Consequent states, meaning postulates, and lexical denotation

Moens & Steedman (1988, p. 17) distinguish between events on a two-dimensional scale. One axis concerns the presence or absence of result state (“consequent state” in their terminology), one axis concerns extension in time. Four event types are thus distinguished on the basis of these dimensions: *points/culminations*, which are both punctual and not extended but differ with respect to the presence of result state, and *processes/culminated processes*, which are both extended in time but also differ from one another with regards to result.<sup>13</sup>

According to their account, events of reaching are culminations containing a transition from the event of trying to reach some location or object to the state of having the object or being at the location. The same holds of events of winning: they contain a transition between the event of being about to win and being a winner (think about a runner passing the finishing-line). In contrast, events of hiccupping are points that do not contain a change. The same is true of events of tapping.

On the account of Moens & Steedman (1988), the present perfect is a function that yields the consequent state. As we noted above, on one way of understanding the proposal, sentences in the present perfect have consequent states, and only consequent states, as their reference. There are two potential problems with this view. First, a sentence like ‘IFK Norrköping has won Allsvenskan’ does not seem to only have a consequent state as its meaning. Intuitively, it concerns the event of IFK Norrköping winning Allsvenskan as well. Secondly, it shares several logical properties with ‘IFK Norrköping won<sub>pret</sub> Allsvenskan’. For instance, we can draw the conclusion that IFK Norrköping has won a competition and that some team has won Allsvenskan from both sentences. The account of Moens & Steedman

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performed. This is relevant for cases of historical present. In such examples, the present tense is used for describing an event in the past. Theoretically speaking, the context, in a technical sense, seems to be shifted to a context where the past event is present. The present perfect then relates to the speech event of the past context (e.g. ‘Olof Palme is shot. His wife, Lisbet Palme, has just arrived at the hospital, when she is interviewed about the murder.’). But note that the phenomenon of context-shift does not imply that there are cases where the context is irrelevant for the truth-conditional contribution of tense.

<sup>13</sup>Cf. Ryle (1949) and Vendler (1967).

(1988) is, accordingly, not an obviously better candidate than my proposal. In particular, their idea does not show that the suggestion I have put forward is mistaken.

Their suggestion highlights, however, an important question and a distinction important for our inquiry. It may be warranted to distinguish between two semantic mechanisms where the question of consequent states (i.e. result states or result events) can arise. First, the lexical elements ‘win’, ‘reach’ etc. may be associated with a lexically internal event structure, along the lines of (Moens & Steedman, 1988) above. In this structure, there may well be a transition from the event of being about to win to the state of being a winner, or whatever transition is natural for the verb in question. This idea about lexical elements could be made more precise by incorporating the notion of ‘meaning-postulates’, introduced by Carnap (1952). A meaning postulate states a logical relation between nonlogical expressions (i.e. expressions that are not in the category of logical constants). Adapted to our problem, one meaning postulate could state something along the following lines:  $\forall e \forall x \forall x_0 [agent(x, e) \wedge \mathbf{win}(e) \wedge theme(x_0, e) \rightarrow \exists e_0 [agent(x, e_0) \wedge \mathbf{being-winner}(e_0) \wedge e < e_0]]$ .<sup>14</sup>

But, in my proposal, the contribution of the result state meaning comes from the lexical denotation of ‘has’. ‘Has’ contributes a meaning containing the indexical  $C_{ese}$ , denoting the contextually salient event. Now, importantly, the contextually salient event denoted could be, *but does not have to be*, the same as in the internal event structure of the participle (in the case of ‘won’: the event of being a winner). It could be any event that the speaker reasonably could intend to connect to the event of winning. Pragmatic theory will have to map out the various constraints regarding this matter. But just to make my point more concrete: it could be an event of being happy, an event of being tired, an event of being angry (if the wrong team won), etc.

There is thus a contrast between the consequent state (result state/event) in the lexically internal event structure, associated with ‘won’, ‘reach’, etc., and the the consequent state (result state/event) of ‘has’, which is a contri-

<sup>14</sup>See also Dowty (1979, p. 37-132), where the lexicon, verb aspect in particular, and its relation to syntactic constraints, is discussed in the context of Montague grammar and the research program ‘generative semantics’.

bution from the lexical denotation of the auxiliary.

### 3.5 Context dependence I: Result States

The difference in meaning between the two utterances of “IFK Norrköping has won Allsvenskan”, illustrated in the beginning of this chapter, on page 121, is accounted for by the translation on page 136 above. More specifically the fact that the predicate *result* takes two event arguments,  $e$  and  $C_{cse}$ , where  $e$  is bound by an event quantifier and  $C_{cse}$  is an indexical denoting the contextually salient event of the context, provides a semantic account compatible with the empirical facts. How the right context is chosen is, however, a question for pragmatic theory and beyond the scope of the present investigation.

Higginbotham (2009) treats this context dependence differently. As we noted on page 128, he proposes a translation of present perfect sentences where the result event  $e'$  is bound by an existential quantifier and related to the event described by the participle (‘solved’ in example 104) by the relation  $R$ . Furthermore, he assumes that there are two kinds of results associated with the present perfect: resultants and result states, as we also saw on page 128. It is not fully clear in (Higginbotham, 2009) how this distinction is related to the translation, where the relation of result is expressed by  $R$ . A natural and quite simple way of developing Higginbotham’s proposal would be to postulate an ambiguity: either  $R$  appears in the translation, standing for the relation of being a result state, or  $Res$ , standing for the relation of being a resultant, appears.

A possible pragmatic explanation, which could be combined with Higginbotham’s translation and truth conditions, could be put in terms of implicatures (Grice, 1975). Mittwoch (2008) suggests that result state-readings could be explained in that way, but argues against the alternative to account for them in terms of Grice’s *conversational* implicatures. The example in (93) is crucial to this conclusion: conversational implicatures are cancellable but the result state-meaning is not always possible to cancel. Mittwoch’s alternative is that the result state-meaning is a *conventional* implicature. She admits, however, that a treatment of the result state-meaning in terms of conventional implicature is at odds with common taxonomies of such implicatures. Standardly, expressions associated with implicatures

of the conventional variety are either individual lexical and morphological items, like ‘but’ and gender distinctions, or so-called ‘supplements’, e.g. non-restrictive relative-clauses loosely attached to the main structure of the sentence (often marked by a comma) (Mittwoch, 2008, p. 338). Mittwoch concludes that the result state-meaning poses a challenge to existing theories of conventional implicatures. An alternative conclusion is to look for other explanations.

Another possible pragmatic approach, which also would be coherent with Higginbotham’s account, could be put in terms of presupposition. Portner (2003) proposes that result state-meanings be accounted for in those terms. The semantic account in (Portner, 2003) is not a result state-account; it is not consistent with Higginbotham’s semantics or the approach I have adopted in this chapter. But it is in principle possible to combine Portner’s pragmatic suggestion about result state-meanings with the account of Higginbotham.

According to Portner’s proposal, result state-meanings are yielded by a presupposition that the event described by the participle has a relation that somehow resembles causality to an answer to a question under discussion. It is not clear in Portner’s paper, however, what relation he postulates between the event described by the participle and the result state. Consider the following example, discussed by Portner but here somewhat abbreviated:

(119) A: We need to get an explanation of George Eliot’s style. Who can we ask?

B: Mary has read *Middlemarch*.

Portner’s proposal seems to be as follows. The proposition that there is an event in the past where Mary reads *Middlemarch* is here related to the answer that Mary can be asked about George Eliot’s style. The result state-meaning is, accordingly, that Mary can be asked about the author in question. These two propositions are related by a relation closely related to causality but not really causality. Portner states the precise formulation of the presupposition as follows:

A sentence *S* of the form *PERFECT*( $\phi$ ) presupposes:

$$\exists q[ANS(q) \wedge \mathbf{P}(p, q)]$$

(Portner, 2003, p. 499)

The relation between the answer, in our case that Mary can be asked about George Eliot's style, and the proposition that Mary read *Middlemarch* in the past, which is explicitly referred to in (119), is denoted by **P**. Portner provides the following elaboration:

The treatment doesn't exactly say that reading *Middlemarch* caused Mary to understand Eliot's style; rather, it says that, given what we know about the relation between reading and understanding, the fact that she read *Middlemarch* provides evidence that she understands the style. Since the relation between reading and understanding is one of causation, however, in fact the latter state is a result of her reading the novel. (Portner, 2003, p. 500)

This passage is a bit puzzling. It is clear that Portner doesn't intend to say that 'Mary has read *Middlemarch*' in (119) presupposes that Mary's reading *Middlemarch* *caused* her understanding Eliot's style. This seems true enough. It is common knowledge that reading a book of some author or other does not necessitate an understanding of the style of the chosen author. Portner then moves on to claim that the relation between Mary's reading *Middlemarch* and understanding Eliot's style is evidential. But the passage ends with the conclusion that there is a causal relation between reading and understanding and that understanding the style therefore is a result of reading the novel. This sounds inconsistent or not sufficiently elaborated. What relation Portner intends as denotation of **P** is unclear to me.

Let's take stock. It is not my intention to argue that Mittwoch's or Portner's accounts are impossible to develop or that it would be unreasonable to do so. I claim, however, that the accounts are underdeveloped as they stand. It is not the case that pragmatic accounts in terms of conventional implicature and presupposition, together with Higginbotham's translation and truth-conditional account, constitute an obviously correct and simple explanation. These possible combinations of accounts do not constitute clear reasons against trying out alternative routes. In particular, they give no reasons against developing an explanation in terms of contextual effects on truth conditions.

My suggestion above is that the result state (or result event, since I don't make the distinction between events and states) is the contextually salient

event, denoted by the indexical expression  $C_{ese}$ . The proposal is in terms of truth-conditional effects and does not assume that non-truth-conditional meaning plays a key role for the intuitions under discussion. This suggestion is at least equally reasonable as a combination of Higginbotham's proposal and pragmatic proposals in terms of conventional implicature or presupposition.

### 3.6 Context dependence II: Thematic Roles

Let us now turn to the sentence in (80), repeated as (120) below, and its intuitive truth conditions (taken as an answer to the question stated on page 122):

(120) I have eaten.

Recanati attempts to capture the intuitive truth conditions by the following translation (Recanati, 2010b, p. 124):

(121)  $(\exists e: \text{THIS EVENING})(\exists t)[\text{PAST}(t) \wedge \text{TIME}(e, t) \wedge$   
 $\text{EATING}(e) \wedge \text{AGENT}(\text{the speaker}, e) \wedge$   
 $\text{THEME}(\text{dinner}, e)]$

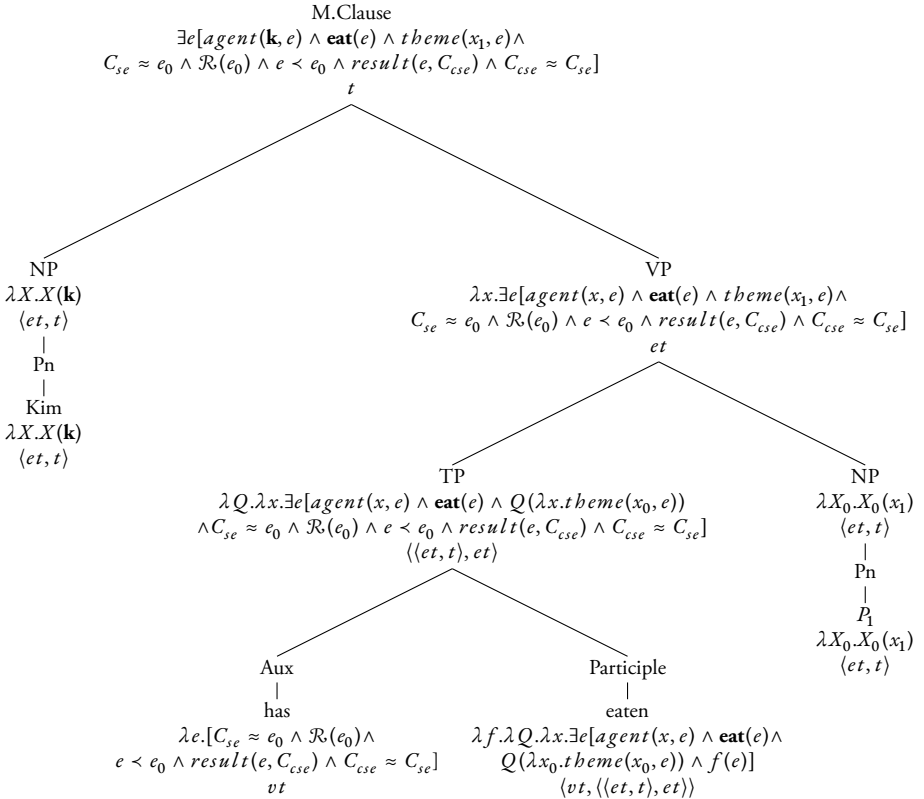
Two semantic mechanisms are appealed to in Recanati's proposal. First, there is contextual domain restriction. The event quantifier does not quantify over every event in the domain but over a restricted set of events: the events temporally located to the evening of the utterance. Secondly, the literal meaning of 'eat', which on Recanati's account does not have a lexical meaning that includes a thematic role of theme, is enriched to mean 'eat dinner'. Technically, variadic operators denoting variadic functions are doing this job. In the case of 'eat', they operate as follows. The event of eating has the thematic role of agent but no further thematic roles. A thematic variadic function is applied to the event of eating, yielding an event with a richer thematic structure, where there is also a thematic role of theme. The thematic role of theme takes, moreover, 'dinner' as argument. (This is the same kind of implementation as the one for 'It's raining', cf. Chapter 2.7.)

Below, I will first extend the indexicalist formal account, in order to account for example (80) and its intuitive truth conditions. This possibility

has not been discussed by Recanati or, as far as I know, by indexicalists. Secondly, I will extend the truth-conditional pragmaticist semantic account. The purpose of that is to modify and develop Recanati’s sketch reviewed above.

### 3.6.1 Indexicalist extension

We already have the lexical items, syntactic rules, and translations needed in order to spell out an indexicalist version of (80), if we substitute ‘Kim’ for ‘I’ in that sentence (see the previous sections in this chapter and Chapter 2, especially page 64):



The indexicalist lets the variable  $P_1$  appear in the tree structure, and gives it



a translation according to the definitions (see page 64). In contrast to Recanati's truth-conditional pragmaticist proposal, there is no modification of the participle 'eaten' and its meaning. In the translation at the top node (i.e. the translation of the whole expression), there is a free variable  $x_1$  that can take any semantic value of the right type (i.e. any entity). Assuming that dinners are entities, the sentence could thereby have the intuitive truth conditions that Kim has eaten dinner, but it could also mean that Kim has eaten some other meal.<sup>15</sup>

A reading additional to the one accounted for in the tree above is also readily available. An utterance of (80) could also mean that the speaker has eaten *something*. Suppose that Kim has been ill and hasn't eaten for two days. The following dialogue occurs:

- (122) Robin: Are you better today?  
Kim: Much better. I have eaten.

A natural reading in this case is that Kim has eaten something. How can it be accounted for by the indexicalist? The answer is straightforward. The indexicalist can postulate further object language variables available for logical forms. Let  $J, J_0, J_1, \dots$  be these variables, and  $J \in B_N$ . Now let  $J_{tr} = \lambda X. \exists x X(x)$ . In a tree like the one above,  $J_1$  can then occur instead of  $P_1$ . If that were the case, the translation of the NP would be  $\lambda X. \exists x_1 X(x_1)$ . Then the variable  $x_1$  would be bound by an existential quantifier in the translation at the top node:

- (123)  $\exists e [agent(\mathbf{k}, e) \wedge eat(e) \wedge \exists x_1 theme(x_1, e) \wedge C_{se} \approx e_0 \wedge \mathcal{R}(e_0) \wedge e < e_0 \wedge result(e, C_{cse}) \wedge C_{cse} \approx C_{se}]$

Paraphrased, this means that there is an event  $e$  such that  $\mathbf{k}$  is the agent of  $e$ ,  $e$  is an event of eating, *there is an object  $x_1$  with the role of theme of  $e$* , the speech event of the context overlaps with the reference event  $e_0$ ,  $e$  is anterior to  $e_0$ , the contextually salient event is a result of  $e$ , and the contextually

<sup>15</sup>One could argue that, in the case at hand, there is no reference to any particular entity but rather to a *kind* of meal. A possible theoretical approach is to introduce a new basic type: kinds. But I will not discuss this possibility any further here, since the question does not seem relevant to the claims here. I will thus assume that dinners are entities, even in cases where there intuitively is reference to kinds.

salient event overlaps with the speech event of the context. The truth conditions do, accordingly, not state that a particular object is the theme, but that some object has that thematic role.

### 3.6.2 Extension: truth-conditional pragmatics

In Chapter 2.7.3 I developed and modified Recanati's account of weather reports. I provided a compositional implementation of the idea of variadic functions, and made the translation more general, in order to avoid a proliferation of such functions. In this section, I will elaborate on the ideas in Chapter 2.7.3 and adapt them to the linguistic phenomena under discussion.

A difference between 'It's raining', intuitively meaning that it is raining in Paris, and 'I have eaten', intuitively meaning that the speaker has eaten dinner, is that whereas 'rain' is not associated with the thematic role of location in the lexicon, according to our discussion above, 'eat' is plausibly lexically associated with the thematic role of theme. Intuitively, eating events have agents, i.e. participants that perform the eating such as humans, as well as themes, i.e. objects of eating such as apples or tofu (or meals like dinners). This intuition about the thematic roles associated with the expression in question is related to the fact that 'eats', 'has eaten' and 'ate' could be used transitively, as in (124) below:

(124) Kim eats/has eaten/ate tofu.

The mentioned lexical intuition and syntactic fact give us a reason for translating 'eaten' to an expression containing the thematic role of theme, as will be done below.

The choice of letting the thematic role of theme be a part of the translation may differ from Recanati's intended analysis. I say 'may', because this aspect of the proposal in Recanati (2010b, p. 123-125) is not explicit. In a discussion of (80), Recanati writes:

In this context 'eat' means *eat dinner*, just as, in certain contexts, 'to drink' means *to drink alcohol*. Again, this is conventionalized, at least in the 'drink' case, but what has got conventionalized is a meaning shift that makes the sense conveyed by

the expression more specific than the literal sense. (Recanati, 2010b, p. 124)

On one way of understanding Recanati, the thematic role of theme is not lexically associated with ‘eat’. According to this understanding, ‘eat’ somehow acquires the thematic role of theme, and fills it with the value *dinner*, in the compositional process. Alternatively, ‘eat’ is lexically associated with the thematic role of theme, but the value could be specified implicitly by some contextual mechanism, or explicitly by a noun like ‘tofu’. The former alternative is more coherent with Recanati’s discussion of ‘It’s raining’, and with my implementation and modification of Recanati’s proposal in 2.7.3. It suffers, however, from the problem that it is not consistent with my conclusions regarding lexical intuitions and syntax facts relating to ‘eat’ discussed above. Therefore, I will choose the second alternative.

It should be mentioned that this second alternative, just like the first one, provides a theoretical alternative to analyses in terms of “unarticulated constituents” (Perry, 1986), which Recanati intends to avoid. In the implementation below, every part of the meaning corresponds to an expression in the sentence (cf. page 98).

Recall that we postulated a locational variadic function *Loc* in Chapter 2.7.3. Here, we will have a thematic function *Thm*, whose impact in the compositional process is related to but different from the locational variadic function. The similarity between *Loc* and *Thm* is that both are introduced by separate translation functions accounting for the optionality of the meaning shifts, or contextual adjustments, in question. Furthermore, they are formally similar, in ways that will become apparent below; for instance, they both take a variable of type  $e$  and a translated expression as arguments. The difference consists in the changes of adicity. Whereas the change of adicity is central to *Loc* (it adds the thematic role of location), *Thm* does not yield a difference in adicity. Its primary purpose is rather to provide a free variable – not in the logical form but in the translation – that could have dinners as its contextual value.

The following holds of  $L_{type}$ :

- *Thm* is a constant of type  $\langle e, \langle \langle et, t \rangle, et \rangle, et \rangle$

Nothing will be added to the translations of basic expressions in Section 3.4

above. But there is need for one extra syntactic rule and some additional clauses regarding the translations of phrasal expressions.

### Syntax

- If  $\beta \in P_{TP}$ ,  $[_{VP} \beta] \in P_{VP}$ .

The following postulate holds by stipulation:

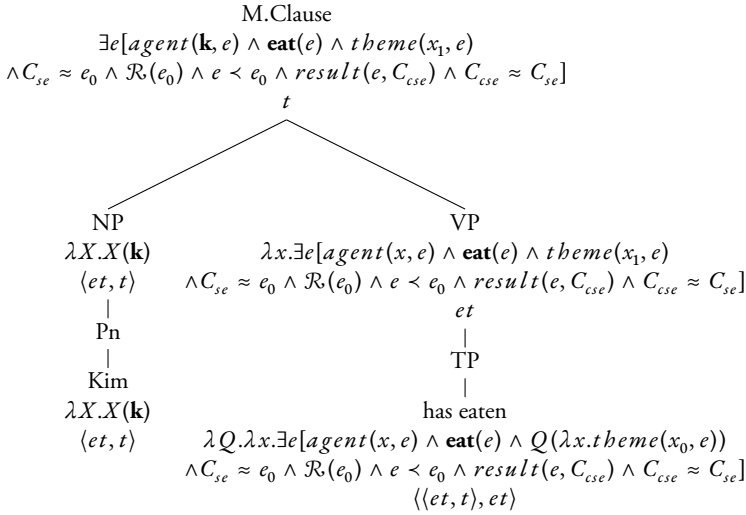
$$(125) \quad Thm(x)([_{TP} \beta \gamma]_{tr_{c_{Tbm}}}) = [_{TP} \beta \gamma]_{tr_{c_{Tbm}}} (\lambda X_1.X_1(x))$$

Now the ordinary truth-conditional pragmaticist translation function  $tr_c$  is just like  $tr$  for the translations presented in Section 3.4, except that the truth-conditional pragmaticist translation provides a modulation variable at each step, allowing for, but not necessitating, massive modulation. The procedure is familiar from Chapter 2, and I will not repeat the basic truth-conditional pragmaticist strategy here. In the case at hand, however, the truth-conditional pragmaticist employs a separate translation function, allowing for the implicit supplementation of themes. This translation function is called  $tr_{c_{Tbm}}$  and is introduced below:

### Translations of phrasal expressions

- For almost all cases:  $tr_{c_{Tbm}} = tr_c$
- The only exception:  $[_{VP} \beta]_{tr_{c_{Tbm}}} = Thm(x)(\beta_{tr_{c_{Tbm}}})$   
(type *et*)

Accordingly, the following part of a tree structure and translations are available to the truth-conditional pragmaticist account of (80) (I only show the part where there is a difference from the indexicalist account of the same sentence):



I have eliminated all modulation variables, since they are not having any semantic effect in the case at hand. The implicit theme is added in the step from the translation of the TP to the translation of the VP. Following the added clause on translations above, as well as the postulate in (125), the translation of the TP will take  $\lambda X_1.X_1(x_1)$  as argument on the VP level. By beta-reduction, the translation stated in the tree under the VP node is then given. Accordingly, we have the same translation as the indexicalist arrived at in Section (3.6.1) at the top node.

The truth-conditional pragmaticist should also account for the alternative existential reading discussed on page 147 (that Kim has eaten something). The following line of reasoning is available. In addition to the variadic function  $Tbm$ , a function adding specific themes, there is another variadic function  $Tbm_{\exists}$ , which adds existentially quantified themes.  $Tbm_{\exists}$  is introduced in the compositional process by the translation function  $tr_{c_{Tbm_{\exists}}}$  (which could be used instead of  $tr_c$ ,  $tr_{c_{Tbm}}$  or  $tr_{c_{Loc}}$ , on pragmatic grounds).

$Tbm_{\exists}$  has a different type from  $Tbm$ :

- $Tbm_{\exists}$  is a constant of type  $\langle \langle et, t \rangle, et \rangle, et$ .

The following holds by stipulation:

$$(126) \quad Tbm_{\exists}([_{\text{TP}} \beta \gamma]_{tr_{c_{Tbm_{\exists}}}}) = [_{\text{TP}} \beta \gamma]_{tr_{c_{Tbm_{\exists}}}} (\lambda X_1.\exists x_1 X_1(x_1))$$

In this case,  $tr_{t_{thm_3}} = tr_c$ , with the following exception:

### Translations of phrasal expressions

$$1. [\text{VP } \beta]_{tr_{t_{thm_3}}} = Thm_3(\beta_{tr_{t_{thm_3}}}) \text{ (type } et\text{)}$$

The variadic function  $Thm_3$  thus introduces an existential quantifier that will end up binding the object argument of *theme* in the translation. The reading that some object has the role of theme of the event of eating is thereby yielded, without postulating variables in logical form but by the use of variadic functions.

### 3.6.3 Temporal restriction

Recanati's translation on page 145 contains a restriction to the evening of the utterance. In my proposal, the adjustment of the temporal dimension is carried out differently. The predicate *result* relates the event of eating talked about to some contextually salient event. The semantics does not constrain which event, but it could be, for instance, that Kim is full and satisfied. That event is only plausibly related to events of eating closely located in time. The relation *result* therefore only holds between events/states where a given agent is full and satisfied and events where that agent eats closely located in time. This solution is not specifically indexicalist or truth-conditional pragmaticist, but consistent with both accounts.

### 3.6.4 The present perfect and negation

The sentence in (80) could be negated:

(127) I have not eaten.

A parallel discourse to the one discussed in relation to example (80), where the question *Would you like to have dinner?* preceded the imagined utterance of (80), could proceed along the following lines. Suppose that Kim shows up at Robin's apartment one evening, and this dialogue occurs:

(128) Robin: Would you like to have dinner?

Kim: Thanks, that would be great. I have not eaten.

In a discourse context like the one in (128), the intuitive and natural reading is that B has not eaten dinner, or a meal relevantly similar to dinner, during the evening of the utterance. It is neither intuitive nor natural to give the paraphrase that the speaker has never eaten dinner or, *a fortiori*, that the speaker has never eaten anything at all.

In the dialogue below, another reading is intuitive. Here, the natural reading is not that Kim has not eaten dinner but that Kim has not eaten anything, on the day of the utterance:

- (129) Robin: Are you better today?  
Kim: No. I have not eaten.

In this section, I will show that the natural readings of (128) and (129) can be accounted for by a minor development of the formal semantic accounts presented above. This development does not involve variadic functions or covert expressions in logical form. In other words, the development is available for both indexicalism and truth-conditional pragmatics.

Some minor syntactic developments are stated below. In the formal semantic accounts presented so far, the lexical element ‘not’ occurs in two separate phrasal expressions (see page 103). Here, it will occur in yet another phrasal expression, used for participle negation. And as is seen below, the concatenated form of a participle phrase and a participle negation in combination forms a participle phrase. Therefore, the syntax already shown is not in need of modification. We have the following syntactic rules:

### Syntax

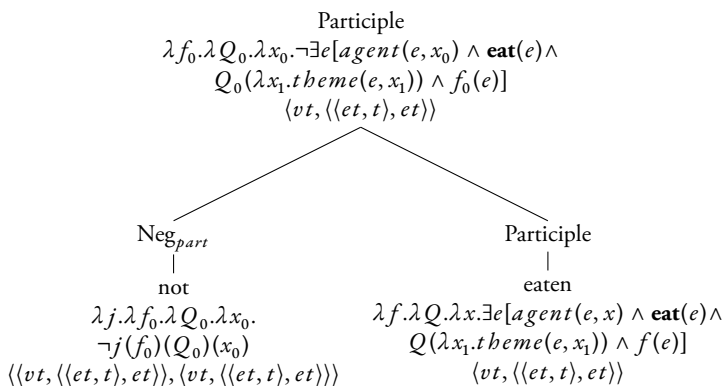
1. If  $\alpha \in B_{Neg}$ , then  $[_{Neg_{part}} \alpha] \in P_{Neg_{part}}$ .
2. If  $\beta \in P_{Neg_{part}}$  and  $\gamma \in P_{Participle}$ , then  $[_{Participle} \beta \gamma] \in P_{Participle}$ .

Furthermore, we have the following translation (the variables  $j, j_0, j_1, \dots$  are used for functions of type  $\langle vt, \langle et, t \rangle, et \rangle$  from now on).

### Translations of phrasal expressions

1.  $[_{Neg_{part}} \text{not}]_{tr} = \lambda j. \lambda f. \lambda Q. \lambda x. \neg j(f)(Q)(x)$   
(type  $\langle vt, \langle et, t \rangle, et \rangle, vt, \langle et, t \rangle, et \rangle$ )

Accordingly, the following subpart of a full tree structure for ‘I have not eaten’ is available:



We end up with either the reading that there is not an event of eating where, say, Kim is agent, and the theme is dinner (etc.), or the reading that there is not an event of eating where Kim is agent and there is some entity with the role of theme (etc.). The difference between these two readings is not, however, yielded by the syntax or translation of negation but depends on the covert variable chosen at the object noun phrase node, in the indexicalist case (cf. Section 3.6.1), or the thematic variadic function chosen, in the truth-conditional pragmaticist case (cf. Section 3.6.2).

### 3.7 Conclusion Chapter 3

In this chapter, I have presented a development of the formal semantic accounts introduced in Chapter 2. The development accounts for tense. In particular, it accounts for the (English) present perfect. It does so by a combination of Reichenbach’s ideas about tense and the result-state approach, associated with e.g. Jespersen, adapted to compositional event semantics.

The meanings of utterances of sentences including the present perfect are contextually adjusted. The parameters of contextual adjustment with regards to the present perfect have been explored in the chapter. In particular, I have focused on the context dependence of result states and enrichments of thematic roles. Furthermore, I developed both truth-conditional pragmaticist and indexicalist approaches to the latter phenomenon, and have



thereby provided further support of the claim that there is an empirical equivalence between these two accounts.



## 4 Discussion

The main conclusion from the previous chapters is that indexicalism and truth-conditional pragmatics are empirically equivalent, at least for the main examples that have been discussed in the literature. In this final chapter, I will elaborate further on this claim. We begin by a discussion about the difference between non-linguistic acts and assertions, focusing on whether the choice between indexicalism or truth-conditional pragmatics bears on this matter (as proponents of indexicalism have previously assumed). We continue by discussing the notion of simplicity: if the conclusion is accepted, it can still be asked whether or not one alternative is simpler than the other. The chapter continues with a discussion about consequences for alternative accounts of context dependence in philosophy, notably relevance theory, radical contextualism and semantic minimalism. It is suggested that there are central aspects of these alternatives that are not in conflict with the tenets of indexicalism or the main ideas of truth-conditional pragmatics. We also discuss pragmatic constraints on modulation and review relevance theoretic, coherence theoretic and frame theoretic accounts. Several earlier discussions in this area assume that indexicalism and semantic minimalism are incompatible with these theories of pragmatic constraints, but I will draw a different conclusion. In the end of the chapter, it is suggested that an interesting topic of further research would be to develop accounts of semantic context dependence and modulation in relation to recent developments in linguistics.

### 4.1 Non-linguistic and linguistic acts; saturation and modulation

In Chapter 1.2.1, we observed that the notion of indexicalism is associated with three claims in the literature:

- Contextual effects on truth conditions are traceable to logical form.

- There is a truth-conditionally relevant pragmatic process of saturation, but there is no truth-conditionally relevant pragmatic process of modulation.
- There is a fundamental difference between the interpretation of linguistic and the interpretation of non-linguistic acts.

From the results of Chapter 2 and Chapter 3, we can draw the conclusion that it does not follow from the indexicalist formalism that there is a fundamental difference between the processes involved in understanding acts of assertion and the processes involved in understanding non-linguistic acts, such as taps on the shoulder or kicks under the table (cf. Chapter 1.2.1 and Stanley 2000, p. 396). We can draw this conclusion, since indexicalism, given an empirically informed and theoretically reasonable explication of the notion, postulates phonologically covert free variables, in some sentences, which could be semantically vacuous. For indexicalism, there is, accordingly, a contrast between indexical expressions, on the one hand, and contextual effects dependent on free variables in logical form, on the other hand. This distinction corresponds to the truth-conditional pragmaticist distinction between saturation, a mandatory process driven by the linguistic material, and modulation, an optional process not dependent on linguistic expressions and their context-dependent meaning but rather on pragmatic factors. And these pragmatic factors could be the same factors as the ones involved in understanding non-linguistic acts: e.g. coherence, relevance, maxims of cooperation, etc.; in fact, it is reasonable to assume that they are (cf. Section 4.4 below). Thus, the second claim above, that there is no legitimate and reasonable distinction between saturation and modulation, does not follow from the first about the indexicalist formalism. And once we have accepted that there is a distinction between modulation and saturation, the determinants of modulation are in need of explanation. To assume that the third tenet is false, and to seek explanations in similarities and overlaps in linguistic and non-linguistic interpretation processes, seem to be natural initial hypotheses.

A proponent of Stanley's dictum that there is a fundamental difference between understanding non-linguistic acts and understanding ordinary verbal assertions, and that truth-conditional interpretation is relevant for the latter kind of understanding but not to the former one, could, however,

grant that my criticism of Stanley's conclusion is correct (it does not follow from the formalism that there is a fundamental difference), but try to argue that it does not follow from the indexicalist formalism that there is *not* a fundamental difference either. The proponent of a fundamental difference could argue that other considerations than the choice of formalism are more likely to be relevant for issues of this kind.

I would partly agree with this view, and partly disagree with it. It seems reasonable to say that other considerations than the chosen formalism could potentially be relevant for the question of whether there is a fundamental difference between the processes involved in understanding non-linguistic acts and the processes involved in understanding ordinary verbal assertions. But it is also reasonable to hold that the choice of formalism is also relevant.

Recall the explication of the notion of indexicalism with respect to quantifier domain restriction (Chapter 2.2) and colour adjectives (2.5). The examples are paradigm cases of indexicalist data, and a detailed review and discussion of previous indexicalist analyses of these phenomena, warranted the formal suggestion in terms of free variables in logical form, on the one hand, and free variables in the translation into the simply typed lambda calculus, on the other. Given this explication, the free variables are only semantically constrained with respect to type. They could, accordingly, denote functions that render them semantically vacuous. In the case of quantifier domain restriction, the free variable could be assigned  $\mathcal{M}$ , i.e. the set of entities in the model, or rather its characteristic function (cf. Chapter 2.2.3). And then we have a distinction between mandatory and optional contextual effects. The optional effects are constrained or determined somehow. It seems to be a natural hypothesis that they are constrained by pragmatic factors pertaining to understanding or interaction generally: such mechanisms are already needed for other aspects of communication (cf. 4.4).

I do not mean to say, of course, that it is impossible to block this line of reasoning. But the proponent of Stanley's dictum owes us an account of why free variables cannot be assigned values that render them vacuous in the semantics, without postulating constraints in an ad hoc manner, or, alternatively, an account of optional contextual effects that are neither determined semantically nor by pragmatic factors pertaining to communication generally.

But do I read the indexicalist's texts like the devil reads the bible? Couldn't they replace the specific implementation using variables in logical form by letting instead phonologically covert indexicals, i.e. a kind of constants, appear in logical forms? Perhaps the indexical expression  $C_{DOM}$ , where 'DOM' stands for domain restriction, could be added, and  $F_0(C_{DOM})$  could be the domain of the context, just like  $F_0(C_{cse})$  is the contextually salient event of the context (see page 135). Although such a maneuver is possible, it is not obvious how it would help. Because, even if  $C_{DOM}$  technically would be an indexical, with a denotation depending on the formal notion of context  $c$ , the indexical could still pick out  $\mathcal{M}$ , the set of entities in the model, and thereby be rendered vacuous.<sup>1</sup>

#### 4.1.1 Optional variables and modulation

Finally, consider the indexicalist account in Martí (2006), which was put aside in the introductory discussion (see Chapter 1.7.2).<sup>2</sup> In that account, there is a distinction between mandatory and optional variables in logical form. Martí's proposal was not the point of departure for the dissertation, but it is, however, interesting to discuss how the three claims, formulated in the beginning of this section, fit Martí's specific variant of indexicalism. In contrast to Martí's concluding remarks about modulation, where it is claimed that "there is no reason to assume that there are pragmatic processes like free enrichment" (p.164), it seems to me that she, by accepting optional variables, which may or may not be generated in the logical form associated with a sentence, does not provide an alternative to modulation, but rather a possible alternative route to the one taken in this dissertation: the contours of an indexicalist formal account of modulation are outlined (cf. Recanati

<sup>1</sup>In the case of colour adjectives, this maneuver is not available for empirical reasons. As we saw in Chapter 2.5, Szabó presents the following logical form of 'green':

- $(\text{Green}(C, P))(x)$

Perhaps  $C$  and  $P$  are not variables but indexicals? Theoretically, that is a possibility, but empirically, the account is not viable and fruitful: there are several scenarios where the intuitive truth conditions are not accounted for, if this proposal is accepted (see the discussion in Chapter 2.5.2).

<sup>2</sup>As was pointed out there, we thereby avoid a discussion of how to disambiguate between several different logical forms for each sentence, a problem noted by Carston & Hall (2017).

2010b, p. 141). The main claim of the dissertation, that there is an empirical equivalence between indexicalism and truth-conditional pragmatics, is therefore not challenged by Marti's ideas: on the contrary, they seem to support the equivalence claim.

## 4.2 Context dependence and simplicity

It could be argued that indexicalism is less simple than truth-conditional pragmatics. In many cases, indexicalism posits extra syntactic structure in the logical form of sentences, whereas the truth-conditional pragmatist uses a simpler syntax. In Chapter 2, this is clearly true in the case of quantifier domain restriction, transfer, colour adjectives and meaning litigation. In all these cases, the indexicalist and the truth-conditional pragmatist offer similar translations, but the indexicalist's syntax contains more rules and phonologically covert variables. One could thus argue that truth-conditional pragmatics provides a simpler syntax and is therefore simpler than indexicalism.

However, the truth-conditional pragmatist's proposal is more complicated than the indexicalist's, in other respects. Remember that the former posits one modulation variable, which technically could take the value of any function of the right type, for every syntactic operation. As we have noted, this allows for massive modulation. But it does not necessitate that the translation of every syntactic constituent is assigned a meaning that differs from its literal meaning. The trick is to allow that the modulation variable is assigned the identity function as value. In that case, it can be eliminated (cf. page 49). Now this is, indeed, a possible and viable truth-conditional pragmatist solution. But in this respect, the truth-conditional pragmatist's machinery is intuitively less simple than the indexicalist's.

The notion of variadic functions is relevant here as well. One could argue that the indexicalist's toolkit is simpler, because it employs one theoretical notion, the notion of covert variables in logical form, whereas the truth-conditional pragmatist makes use of two notions: modulation functions and variadic functions. But, it could be answered, the notions of modulation functions and variadic functions are not as different as it may seem at first sight. In fact, modulation functions can, in principle, do the job of variadic functions. But the latter notion allows for a more precise char-

acterization of common modulations. Another, related point, is that the distinction between modulation functions and variadic functions allows for a more flexible treatment of context dependent phenomena.<sup>3</sup>

I therefore conclude that there are aspects of the indexicalist explanation that are more complex than the truth-conditional pragmaticist, but there are other aspects of the truth-conditional pragmaticist explanation that are more complicated than the indexicalist. This conclusion about simplicity seems to hold, regardless of the choice of a theoretical or a practical notion of simplicity. Informally explained, theoretical simplicity concerns the number and complexity of the concepts and hypotheses involved, whereas practical simplicity concerns a framework's usefulness for researchers in calculations, predictions, discussions, etc., over an extended period of time (cf. Ludlow 2011, p. 152-173). If the notion is used theoretically, it is not the case, as we just saw, that indexicalism is clearly simpler than truth-conditional pragmatics, or vice versa. And if the notion is used practically, it does not at present seem to be the case that indexicalism is easier to use or learn for researchers in formal semantics. The processes of working out the truth conditions do not, at present, seem to differ in practical complexity, and it is not clearly the case that the two notions of modulation function and variadic function result in a less useable account: on the contrary, there may be an increase in flexibility that researchers will find convenient.<sup>4</sup>

### 4.3 Alternative variants

I have been arguing for the claim that indexicalism and truth-conditional pragmatics are empirically equivalent. Below, it will be suggested that the same basic techniques can be applied to the alternative accounts mentioned in Chapter 1, i.e. relevance theory, radical contextualism and semantic minimalism.

The alternatives will be set in the event semantic framework developed earlier. I will try to make plausible that central aspects of the alternatives are compatible with indexicalism and truth-conditional pragmatics. A con-

<sup>3</sup>I owe the last point about flexibility to Paul Kindvall Gorbow (p.c.).

<sup>4</sup>On Ludlow's explication of the notion of practical simplicity, which we use here, a framework will survive over time, if it is practically simple. But we cannot know beforehand what researchers will find convenient and useful (cf. Ludlow 2011, p. 158-159).



sequence of that claim is that well-known taxonomies of philosophical accounts of context dependence are oversimplified.

#### 4.3.1 A relevance theoretic variant

In Chapter 1.5.1, we noted that relevance theory postulates a conceptual representation over and above the logical form of a sentence. This conceptual representation is called  $lf^*$ . As was explained in 1.5.1, the input to truth-conditional semantics is not, for relevance theorists, the logical form but  $lf^*$ .

A natural implementation of the idea within the general framework of compositional event semantics, presented in Chapter 2, is in terms of two translation functions. Instead of directly translating the logical form into the simply typed lambda calculus, the logical form is translated into  $lf^*$ , which, in turn, is translated into the calculus. However, the  $lf^*$  of a sentence in context is supposed to depend on context. The translation function will therefore take two arguments: a logical form and a context. For illustration, consider the following (simplified) logical form:

(130)  $[_{M.Clause} \text{ Let's stop in } [_{NP} \text{ every bar}]]$

Let  $tr_{lf^*}$  be a function from logical forms and contexts to  $lf^*$ s such that e.g.:

- $tr_{lf^*}([_{M.Clause} \text{ Let's stop in } [_{NP} \text{ every bar}]], c)$   
 $=[_{M.Clause} \text{ Let's stop in } [_{NP} \text{ every bar in Ireland}]]$

Suppose furthermore that a different  $lf^*$  is the value, if  $c_0$  is substituted for  $c$ :

- $tr_{lf^*}([_{M.Cause} \text{ Let's stop in } [_{NP} \text{ every bar}]], c_0)$   
 $=[_{M.Cause} \text{ Let's stop in } [_{NP} \text{ every bar in Gothenburg}]]$

Then we can proceed as usual, and translate the  $lf^*$  into the simply typed lambda calculus, as we did in the previous chapters.

We can put relevance theory to work by considering example (1)-(3) again, repeated below as (131)-(133).

(131) Let's go to Ireland. We'll stop in **every bar** and have a drink.

(132) The leaf is **green**.

(133) She took out the key and **opened the door**.

The approach has the resources for (131)-(133). In these cases, the intuitive pieces of information acquired when hearing or reading the sentences can be made explicit by, as it were, filling in some missing linguistic material. In a sense, the role of  $lf^*$ s is to fill in material, although we have tried to formulate that intuition in more precise terms above.

Relevance theory, on this understanding of the view, has, however, alternative ways of accounting for (131)-(133). One possibility is to let  $tr_{lf^*}$  map logical forms onto conceptual structures ( $lf^*$ s) that possibly contain free variables. The conceptual structures could then be translated like the indexicalist's logical forms. Relevance theory would thereby account for modulation in the same way as indexicalism, except for the further level of conceptual representation. Alternatively, relevance theory could assume that the conceptual structures are interpreted along the lines of truth-conditional pragmatics. Modulation variables would then be added in the simply typed lambda calculus, which translates the conceptual representations.

Because of the possibility of combining relevance theory with indexicalism or truth-conditional pragmatics, the relevance theoretic machinery does not have the unwanted consequence that only those modulations that can be easily paraphrased (without changing the syntactic structure of the sentence) are accounted for. That unwanted consequence would leave out the meaning litigation in (11), repeated as (134) below, where it is difficult to find suitable paraphrases that make the differences in modulation (between A's intended meaning of 'planet' and B's intended meaning) explicit:

(134) Astronomer 1: Pluto is a planet.  
Astronomer 2: Pluto is not a planet.

Furthermore, the assumption that the approach does not have the unwanted consequence is in line with some formulations of relevance theory. In the relevance literature, a star notation often marks expressions used with a modulated meaning. Consider (135) below, discussed by Sperber & Wilson (2012, p. 109-115):

(135) This surgeon is a butcher.

In their discussion of the example, Sperber & Wilson claim that an understanding of the intuitive meaning of (135) “involves an evocation of the way butchers treat flesh, and the construction on that basis of an *ad hoc* concept BUTCHER\*, denoting people who treat flesh in the way butchers do” (Sperber & Wilson, 2012, p. 115). As I understand Sperber & Wilson, BUTCHER\* has a modulated meaning, which is not easily paraphrasable (without changing the syntactic structure of the sentence).

It would be a minor adjustment of the theory to substitute the star for a variable in the conceptual structure, in line with indexicalism, or an interpretation function that maps ‘butcher’ to a predicate in the simply typed lambda calculus fronted by a modulation variable of suitable type, as truth-conditional pragmaticists prefer.

#### 4.3.2 A radical contextualist development

We saw in Chapter 1.5.2 that radical contextualism (in Ludlow’s version) is the view that speakers interactively construct local micro-languages on the fly in conversation. A first approximation of a formal account could be to allow for a variation in the choice of interpretation function. Recall that we ended up with the following formulation of truth conditions in Chapter 3 (page 135) ( $F_0$  is an interpretation function from constants in  $L_{type}$  to functions from contexts to extensions):

##### Truth and denotation in $L_{type}$

1. If  $\chi$  is a constant then  $\llbracket \chi \rrbracket^{cM, g, c}$  is  $F_0(\chi)(c)$ .

A preliminary formal version of the radical contextualist proposal can let the symbol  $\llbracket \ ]$  be superscripted with not only a symbol for model, variable assignment and context, but also a symbol displaying which interpretation function for constants that is subsumed. Then,  $\llbracket \chi \rrbracket^{cM, g, c, F_0}$  is the same denotation as above, but  $\llbracket \chi \rrbracket^{cM, g, c, F_1}$  is possibly different:<sup>5</sup>

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<sup>5</sup>In the radical contextualist development, a model  $\mathcal{M}$  is a tuple  $\langle M, E, D, CU \rangle$ , i.e. as defined on page 135 except for  $F_0$ .

**Truth and denotation in  $L_{type}$  for radical contextualists**

1. If  $\chi$  is a constant then  $\llbracket \chi \rrbracket^{M,g,c,F_0}$  is  $F_0(\chi)(c)$ ,  
 $\llbracket \chi \rrbracket^{M,g,c,F_1}$  is  $F_1(\chi)(c)$ , etc.

This implementation would do justice to the radical contextualist dictum that interpretations are highly context-dependent and, furthermore, that there is no privileged or more central meaning of any word.

The radical contextualist's semantics could, however, preserve the contrast between saturation and modulation. The meanings of indexicals could still depend on  $c$ . Saturation would then be implemented as in the account of Chapter 3 (see 3.4). And modulation could be accounted for by postulating phonologically covert variables in logical form, like the indexicalists do, or by allowing for modulation variables in  $L_{type}$ , in accordance with the proposal of truth-conditional pragmatics.<sup>6</sup>

To illustrate, consider examples (131) and (134) above. In the case of (131), the radical contextualist could choose to employ the basic techniques from truth-conditional pragmatics or indexicalism. In this case, it could be argued, there is a variable for domain restriction in the logical form of the noun phrase 'every bar' (cf. Chapter 2.2.1) or, alternatively, a modulation variable in the translation (cf. Chapter 2.2.2). The radical contextualist might choose to keep the interpretation function fixed in this case, and account for the intuitive truth conditions by other components of the available semantic machinery. The radical contextualists do not have to deal with the examples in this way: it is within the scope of their approach to let changes of interpretation function account for these cases. But they also have the choice to keep the interpretation function fixed, if they find that intuitive or motivated.

In the case of (134), however, the radical contextualist might prefer to use the notion of a change of interpretation function between contexts. That would, in a sense, preserve the intuition that there is no privileged meaning in the litigation: A and B use different interpretation functions and none

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<sup>6</sup>Ludlow (2014, p. 87-95) discusses closely related issues. What I say here is, however, different from his remarks. Ludlow claims that the question of variables in logical form is *a different question* from the question about meaning underdetermination (cf. 1.5.2 above) and that relevance theory could in principle subsume his radical contextualism.

of the functions is more basic or privileged than the other.<sup>7</sup>

### 4.3.3 A semantic minimalist modification

In the semantic minimalist literature, we find proponents of scepticism towards the possibility of a systematic account of modulation, notably Capelen & Lepore (2005). Borg (2004, 2012, 2017) has a more constructive perspective and attempts to develop an alternative to indexicalism, truth-conditional pragmatics, relevance theory and radical contextualism. In this section, we will discuss Borg's approach.

Borg suggests that there are cases where a sentence can be uttered in a context to convey a cluster of propositions (Borg, 2017, p. 9). When some expression is uttered with a metonymical meaning, as in example (132), repeated below as (136), the minimal proposition, without the semantic transfer, is expressed in addition to the intuitive one.

(136) (Elevator repairman on phone:) I don't know what to do with that order. **I'll send André street over to you.**

How can this semantic minimalist idea be formulated in the framework of compositional event semantics? It is commonly assumed that the speech act notion of utterance is closely related to, although clearly distinct from, the semantic notion of a sentence in context (cf. Kaplan, 1979, p. 91). But on the way of understanding Borg's minimalist account that I will suggest, the speech act notion of utterance should rather be thought of as related to an n-tuple of sentences, or logical forms of sentences, taken in context, relative to a variable assignment. Thereby, a single utterance can be associated with several distinct truth conditions.

But note that this setup does not impose constraints on logical forms. It is compatible with the minimalist approach, understood as above, to allow for phonologically covert variables in some logical forms. Moreover, this minimalist machinery provides no restrictions on translations or interpretations of logical forms. It is, accordingly, possible to adopt the minimalist approach and to claim that modulation variables can appear in the translations at suitable places, for some logical forms, contexts and variable

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<sup>7</sup>Proponents of radical contextualism have put a lot of emphasis on cases of meaning litigation (e.g. Ludlow 2014, p. 1-71), which they consider a motivation for their approach.

assignments. In other words, there are aspects of semantic minimalism, which could be combined with indexicalism or truth-conditional pragmatics. (This is probably not what Borg wants, since she clearly opposes truth-conditional pragmatics and indexicalism; but it is, it seems, a theoretical option.)

The minimalist claims, according to the proposed explication, that utterances are associated with tuples of pairs of logical forms and variable assignments. An indexicalist development of minimalism can argue that it might be the case that some, but not all, logical forms associated with a given utterance contain phonologically covert variables. A modification in the the direction of truth-conditional pragmatics will let the logical forms be identical to one another, since context dependence is not determined syntactically, but let some utterances be associated with pairs of logical forms and variable assignments, where the variable assignments are not identical.

To illustrate the idea, consider (136). The intuitive reading is that ‘André street’ denotes an order concerning an elevator in a house located on André street. The first logical form contains no modulation whatsoever. This logical form is associated with the so-called ‘minimal proposition’ (cf. Borg, 2017). It expresses the absurd proposition that the speaker will send the actual street to the addressee. In addition to this first logical form, there is a second logical form, which contains phonologically covert variables, like the indexicalist’s logical forms. Alternatively, the second logical form does not contain such variables, but the variable assignments differ, so that its constituents may be interpreted with modulation, as in the truth-conditional pragmaticist’s approach. The second logical form thereby has the intuitive truth conditions about an order concerning an elevator in a house located on André street.

An implementation along these lines would do justice to the minimalist dictum that several distinct propositions can be expressed simultaneously.<sup>8</sup>

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<sup>8</sup>See Borg (2004, 2012, 2017), Cappelen & Lepore (2005) and Lepore & Sennet (2010) for arguments and motivations for the thesis that minimal propositions (i.e. non-modulated truth conditions) are expressed by utterances in addition to the intuitive ones. It is not my intention to criticize, defend or elaborate on that claim here. It should be noted, however, as a preliminary remark, that the notion of a minimal proposition, and the implementation suggested here, at present seem to result in a less simple account, both from a theoretical and a practical viewpoint, compared to indexicalism

*Digression: further notes on minimalism*

Elaborating on a line of thought from Cappelen & Lepore (2005, p. 17-52), discussed and developed by Lepore & Sennet (2010), Borg (2012, p. 16-47) argues that truth-conditional pragmatics and relevance theory lead to a regress of context dependence.<sup>9</sup> The idea is as follows. Take the sentence *The apple is red* (cf. Chapter 2.5 and page 72). The truth-conditional pragmaticist, relevance theorist and indexicalist argue that this sentence is semantically context-dependent. The reason for this thesis is that we can find two contexts where the truth conditions intuitively differ. In context 1, an utterance of the sentence intuitively means that a given apple is red on the inside (suppose that it has a disease that colours the pip red). In context 2, an utterance of the same sentence intuitively means that the apple is red on the outside (it has a red skin). In minimalist terminology, the method is called ‘context shifting arguments’ (abbreviated CSA).

Now the minimalist’s objection is as follows: the claims that *the apple is red on the inside* and that *the apple is red on the outside* are context-dependent as well, given the methodology just appealed to, where we considered two contexts and the sentence’s intuitive meanings in these two contexts. We could consider further pairs of contexts, where these sentences, e.g. *the apple is red on the inside*, have intuitively different truth conditions. We can make these truth conditions explicit by more elaborated sentences, but these will in turn have context-dependent truth conditions, if the same method is pursued. And so on. Accordingly, truth-conditional pragmatics, relevance theory and indexicalism lead to a regress and are therefore theoretically problematic accounts.

The proponent of truth-conditional pragmatics, relevance theory or indexicalism can answer this argument, however. Truth conditions state the conditions under which a sentence is true by reference to e.g. basic entities, events, truth values, and functions constructed from these basic types in a model. When the proponents of truth-conditional pragmatics, relevance theory and indexicalism claim that some expression is context-dependent, this should be understood as a claim pertaining to the entities, events and

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or truth-conditional pragmatics without multiple logical forms (cf. Section 4.2).

<sup>9</sup>This holds for indexicalism as well, according to Cappelen & Lepore, as I understand their criticism.

functions referred to: they differ between contexts.

To make the point more concrete: suppose that ‘the apple’, taken in context 1, denotes a function that we, for the sake of exposition, label *function*<sub>1</sub> and that ‘is red’, taken in the same context, denotes a function that we label *function*<sub>2</sub>. In context 2, ‘the apple’ denotes the same function as it does in the first, but ‘is red’ does not denote the same function as it does in context 1: in context 2, the expression denotes *function*<sub>3</sub>. It is difficult to see that there is a regress here. The objection from Borg and the semantic minimalists seems to presuppose that the thesis that ‘the apple is red’ is associated with different truth conditions in different contexts somehow implies that there is a representation appealed to that can be further interpreted. But in the case of truth-conditional pragmatics and indexicalism, this is not the case. It is, of course, not meaningful to say that the different functions associated with ‘is red’ are somehow further interpretable.

Relevance theory might seem to be in trouble, because it does, in fact, postulate an intermediate level of representation in addition to the logical form: *lf*<sup>\*</sup> (cf. Chapters 1.5.1 and 4.3.1). But the problem is a chimera. In a given context, each logical form has exactly one translation into an *lf*<sup>\*</sup>. And each *lf*<sup>\*</sup> will have exact truth conditions, given a context and a variable assignment.<sup>10</sup>

#### 4.3.4 A discussion of taxonomies

In Section 4.3, I have pursued the claim that there are central aspects of relevance theory, radical contextualism and semantic minimalism, which are not in conflict with either indexicalism or truth-conditional pragmatics. In fact, the aspects of the accounts elaborated on above, are perfectly compatible with the indexicalist’s or the truth-conditional pragmaticist’s approach. It does not follow, of course, that all aspects of relevance theory, radical contextualism and minimalism are compatible with the views in question. But a consequence is that previous taxonomies of the debate over semantic context dependence, notably the ones in (Borg, 2012) and (Recanati, 2010b, p. 12-14), ought to be somewhat modified.

<sup>10</sup>The minimalist could argue that it is always unclear which function to choose, but that is not an obvious consequence of the reviewed criticism of context shifting arguments.



Borg (2012, 18-29) distinguishes between the following accounts of semantics and context dependence:<sup>11</sup>

- Minimalism
- Indexicalism
- Contextualism
- Occasionalism

“Minimalism” is, of course, the view I call ‘semantic minimalism’. “Contextualism”, for Borg, seems to refer to both truth-conditional pragmatics and relevance theory. “Occasionalism”, finally, is the view labelled ‘radical contextualism’ here.

According to the survey of the theoretical landscape in Borg (2012, 18-29), minimalism, indexicalism, contextualism and occasionalism offer sharply distinct and deeply incompatible accounts of examples like (131)-(133) (see page 163). First we have the (semantic) minimalist proposal, according to which there is a clear distinction between semantic content, on the one hand, and pragmatic meaning, on the other. For the minimalist, the syntactic structure is as simple as possible, and phonologically covert variables are avoided, in these cases. Secondly, on Borg’s picture of the landscape, we have the indexicalist, who attempts to account for the examples by positing extra syntactic structure. Thirdly, we have the contextualist (the truth-conditional pragmaticist and relevance theorist), who supposes that pragmatic factors can influence the truth-conditions of the uttered sentence, but holds that such influences are optional. And finally, we have occasionalism (radical contextualism), according to which it is impossible to abstract or idealize from context; according to occasionalism, “there is simply no such thing as determinate content outside of a context” (Borg, 2012, p. 26).

As I have argued in Chapters 2 and 3, the distinction between indexicalism, on the one hand, and truth-conditional pragmatics (one of the views labelled ‘contextualism’ by Borg), on the other, is sharp but empirically insignificant. In addition, in Section 4.3, I have tried to make it plausible that

<sup>11</sup>In addition to the approaches mentioned above, Borg also discusses “semantic relativism”. I leave it aside here, since relativism is not a topic of this dissertation.

central aspects of (semantic) minimalism and radical contextualism ('occasionalism') should not be seen as deeply incompatible with indexicalism and what Borg labels 'contextualism'. These conclusions are not accounted for by Borg's taxonomy.

Recanati (2010b, 1-26) distinguishes between the following accounts of semantic context dependence:

- S\*-Minimalism
- I-Minimalism
- Truth-conditional pragmatics
- Radical contextualism

"S\*-Minimalism" refers to, as I understand Recanati's description, the view I label 'semantic minimalism'. "I-Minimalism" is the same view as 'indexicalism'.

Recanati notes that there are aspects of S\*-Minimalism (semantic minimalism) that in principle could be combined with truth-conditional pragmatics ("TCP"):

Though it conflicts with some forms of Contextualism, S\*-Minimalism is still compatible with TCP: for the level of meaning it posits [...] need not be the same level of meaning as that which concerns TCP, namely the intuitive truth-conditions of the utterance [...] (Recanati, 2010b, p. 13)

This is similar to the view I have presented. On the other hand, Recanati sharply distinguishes between I-Minimalism (indexicalism) and truth-conditional pragmatics: "[t]he disagreement here is genuine empirical disagreement" (Recanati, 2010b, p. 14). As I have argued, the disagreement is in fact not empirical.

Furthermore, he is quite explicit about the allegedly clear difference between truth-conditional pragmatics and radical contextualism. The distinction between saturation and modulation is central to truth-conditional pragmatics, but for radical contextualism, Recanati claims, "the distinction between saturation and modulation collapses" (Recanati, 2010b, p. 22). I

have tried to show, in Section 4.3, that this is not necessarily so: radical contextualism can be formulated in terms that allow for a difference between these two pragmatic processes.

In the introductory overview of (Recanati, 2010b), where the theoretical landscape is presented, relevance theory is not mentioned. But the account is discussed later on (Recanati, 2010b, p. 127-142). I take this to mean that relevance theory is not considered to be a view clearly opposed to truth-conditional pragmatics. This is, accordingly, a further point of agreement between us.

To take stock, Borg's taxonomy does not do justice to the possible empirical and theoretical overlap, which becomes evident when the frameworks are developed formally (albeit with different degrees of detail). Recanati's taxonomy is, in this sense, more viable, since it recognizes possible overlaps between truth-conditional pragmatics and semantic minimalism, and, indirectly, between truth-conditional pragmatics and relevance theory. Still, his taxonomy does not go far enough: there are also possible overlaps between truth-conditional pragmatics and radical contextualism, and, most importantly, truth-conditional pragmatics and indexicalism are empirically equivalent accounts, or so I have argued.

#### 4.4 Pragmatic constraints

In the dissertation, I have been concerned with properties of sentences, or their logical forms, and their interpretations. We have seen that interpretations are often, in subtle and complex ways, context-dependent. But we have not discussed in detail how modulation and saturation are constrained, i.e. how the right context and variable assignment are chosen, but only touched upon the subject indirectly. In contrast to our perspective on sentences and their syntactic and semantic properties, a focus on constraints on modulation and saturation would be concerned with broader notions of communication and understanding, including non-linguistic aspects of interaction, cooperation, perception, associations, etc.

But there are accounts of constraints on modulation in the literature. These views do not add anything to semantic theory but are formulated as separate pragmatic approaches. There is, however, a tendency in the literature to think of well-known accounts of constraints, described below,

as somehow more compatible with truth-conditional pragmatics, radical contextualism and relevance theory than with indexicalism and semantic minimalism.

In the subsection below, I review three kinds of accounts of pragmatic constraints: relevance theoretic, coherence theoretic and frame theoretic approaches. I then discuss the compatibility between these accounts and truth-conditional pragmatics, indexicalism, relevance theory, radical contextualism and minimalism.

#### 4.4.1 Relevance, coherence and frames

For relevance theorists, modulation is constrained by expectations of maximal relevance (Sperber & Wilson, 2012, p. 103).<sup>12</sup> The notion of relevance is, in turn, spelled out in terms of cognitive effects and processing effort: 1) the greater the *cognitive effects* achieved by processing an input, the greater its relevance, and 2) the smaller the *processing effort* required to achieve these effects, the greater the relevance. As we noted in Chapter 1.5.1, examples of cognitive effects are, for instance, an answer to a question, the raising of a doubt, a confirmation or refutation of a hypothesis, and a suggestion of a course of action. This was illustrated by the intuitive interpretation of (1), repeated above as (131) and provided again as (137) below, in a context where the speaker addresses a potential fellow traveller: the intuitive interpretation suggests a course of action, in contrast to many other possible modulations:

(137) Let's go to Ireland. We'll stop in **every bar** and have a drink.

Hall (2009, 2014) develops the framework of Sperber & Wilson (1995, 2012) in an attempt to provide further pragmatic constraints on how the intuitive truth conditions are constrained. The proposal is, in short, that in hearing an utterance, the hearer constructs an argument pattern, where contextual assumptions, the utterance, and implicatures form an argument. The implicatures function as conclusions and the contextual assumptions and utterance as premises, in the argument pattern. The utterance, in our

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<sup>12</sup>In Section 4.3.1, we discussed the assumptions about semantics and context dependence apparent in relevance theory. Those assumptions should be separated from their account(s) of pragmatic constraints on modulation.

terminology the logical form of the uttered sentence, is interpreted with pragmatic constraints that eliminate all possible contextual modulations that do not fit in the argument schema.

To exemplify, take the following dialogue:

- (138) Peter: What do you think of Martin's latest novel?  
 Mary: It puts me to sleep.

On Hall's relevance theoretic line of explanation, the concept of 'being put to sleep' is modulated to mean something like 'being bored'. This modulation is constrained by the expected implicature, which is an evaluative judgment of some sort. The concept of being bored is more relevant than being asleep, with regards to this expectation, and the modulation is constrained accordingly.

Another proposal of how modulation is constrained is put forward by Pagin (2013), who appeals to a mechanism of coherence raising. In relation to conversational topic, previous discourse or perceptual focus, some modulations raise the level of coherence more than others, Pagin argues, and provides a hierarchy of coherence relations.<sup>13</sup> Closeness in time or space raises coherence, but resemblance relations raise it even more, and necessity relations like causation and logical entailment constitute the highest form of coherence.

The idea of coherence relations as constraints on modulation can be illustrated by the following example, discussed in previous chapters as example (73) but repeated as (139) below.

- (139) Mary took out the key and opened the door.

The intuitive modulation, that Mary opened the door *with the key*, is yielded by the coherence relation of possibility, on Pagin's account. The first proposition, that Mary took out the key, enables or makes possible the second one, that the door is opened.

Yet another idea about constraints is found in Recanati (2004, p. 23-37), where it is argued that frames, intuitively abstract schemas of typical situations, associated with the concepts referred to by the use of a sentence,

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<sup>13</sup>Pagin develops the ideas about coherence in e.g. Hobbs (1985) and applies them to the current debate.

constrain the likely modulation.<sup>14</sup> Consider the following case, discussed on page 55 as example (35), but repeated here as (140):

(140) The ham sandwich left without paying.

In this case, the verb phrase ‘left without paying’ evokes a frame of a typical situation of leaving without paying. The noun phrase is therefore expected to refer to an animate agent; the transferred interpretation where ‘the ham sandwich’ refers to the ham sandwich orderer is thereby more accessible than the alternative literal interpretation of the subject noun phrase.

#### 4.4.2 Pragmatic constraints and the semantics of context dependence

A formal approach to modulation, and the choice of context or variable assignment generally, which also matters for saturation, could take as its starting point one of the accounts of pragmatic constraints mentioned above (the relevance theoretic, coherence theoretic or frame theoretic approach) or a combination of them. But, importantly, if the theory of pragmatic constraints is intended as a complement to a compositional event semantic approach, an indexicalist or truth-conditional pragmaticist formal semantic account could be chosen, and the chosen account could be combined with central aspects of relevance theory, radical contextualism or semantic minimalism. Crucially, the choice of semantic variant does not bear on the compatibility with accounts of pragmatic constraints: all mentioned proposals, understood as above, are compatible with relevance theoretic, coherence theoretic and frame theoretic approaches to pragmatic constraints. This is the case, since the notions of variable assignment and context are crucial and central to all mentioned variants of compositional event semantics. Somehow, the right variable assignment and context are chosen: a theory of pragmatic constraints attempts to provide adequate pictures or explanations of that kind of processes.

This conclusion can be compared to the different outlook of e.g. Hall (2009, 2014), where the relevance theoretic approach to pragmatic constraints is elaborated in an attempt to provide alternatives to indexicalism,

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<sup>14</sup>Cf. Atkins & Fillmore (1992).

and to Pagin (2013, p. 66, footnote 6), where the coherence theoretic approach is contrasted to the indexicalist approach of Stanley (2000).

#### 4.5 Empirical equivalence: how far can we go?

A central purpose of the dissertation has been to discuss whether indexicalism and truth-conditional pragmatics are empirically equivalent frameworks. I have attempted to show that this is the case for the main examples discussed in the debate, in particular examples (I)-(II), on pages 1-4. More specifically, I have defended the empirical equivalence claim, preliminarily formulated on page 51, and in its final form on page 136. A further, stronger hypothesis, is that the equivalence also holds for all sentences analyzable in the same fragments. Are there cases where context dependence is best explained in terms of idiosyncratic properties of individual lexical items or syntactic rules? Is indexicalism better suited to account for the idiosyncratic aspects, in that case, or vice versa? If not, the following claim seems to be supported:

##### **Empirical Equivalence Claim (hypothesis)**

For all sentences  $S$ , analyzable in the respective fragments, if the indexicalist translation of  $S$  is  $\phi$  and the truth-conditional pragmaticist translation is  $\psi$  — i.e. if  $\phi$  and  $\psi$  are *L<sub>type</sub>*-formulas obtained by our translation functions applied to the analysis of  $S$  in the respective fragments — then for all models  $\mathcal{M}$ , there is an assignment  $g$  and a context  $c$  such that  $\llbracket \phi \rrbracket^{\mathcal{M},g,c} = \llbracket \psi \rrbracket^{\mathcal{M},g,c}$ .

The next question is whether extensions or variants of the fragments could yield examples where the two frameworks differ in their predictions: are there linguistic phenomena that are better accounted for by truth-conditional pragmaticists than indexicalists, or the other way around? The diversity and disparate quality of the data that support the weaker hypothesis is a reason to assume that the Empirical Equivalence Claim holds for all reasonable fragments of English. A pertinent question, at this stage, is whether the burden of proof lies with the proponent or the opponent of the stronger hypothesis. For the opponent, the challenge would be to find

linguistic counter-examples. My belief is that this would be difficult, since the choice to postulate a variable in logical form or to let it appear elsewhere in the system, e.g. in the  $L_{type}$ -translation, appears not to be an empirical issue but a theoretical one.

## 4.6 Further topics for research

The determinants of modulation are difficult to define. This is noted by Pagin & Pelletier (2007, p. 53), who claim that modulation depends on “general pragmatic skill, taking into account the topic of conversation, the current focus, the established conversational score, and perhaps further features of speaker psychology”.

An interesting topic of future research would be to develop this remark, and the accounts of pragmatic constraints above, in relation to the framework of conversation-oriented semantics, KoS, put forward by Jonathan Ginzburg in Ginzburg (2012). Ginzburg develops ideas from among others Stalnaker (1978) and Lewis (1979), but also draws on more data-oriented research in informal sociolinguistics (e.g. Schegloff, 2007), with the aim to provide a formal semantics suitable for dialogue and linguistic interaction. Accordingly, an important desideratum for Ginzburg is to account for clarification requests, misunderstandings, conversational repair, and meta-communication generally.

The aspect of Ginzburg’s proposal most relevant to us here is the idea of a *dialogue gameboard*, which is a development of Lewis’s notions of *conversational score* and *scoreboard*, which in turn generalize Stalnaker’s well-known account of assertion and common ground (in terms of eliminations of presupposed possible worlds) to a multitude of conversationally important phenomena, such as definite descriptions, vagueness and performatives.<sup>15</sup> For Ginzburg, conversational gameboards have components for speaker and addressee, and, importantly, an ordered set of questions under discussion. At a given stage of a conversation, there will be one question that is most rel-

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<sup>15</sup>Lewis’s metaphor relates conversation to baseball, whereas Ginzburg, alluding to the later Wittgenstein, relates conversation to games generally. For a Scandinavian, Ginzburg’s choice is perhaps easier to understand. At a given stage of a game, e.g. football/soccer, there is a score, but also constraints, on varying degrees of strictness and laxity, pertaining to the players’ admissible actions.



evant, and several other questions that are salient and thereby available to the participants of the conversation.

The speaker/addressee-component can be extended to include speech and reference event, and other salient events. Thereby, indexicals crucial to the approach to tense, and the present perfect in particular, presented in Chapter 3, can be assigned a contextual meaning. The component for questions under discussion is apt for the (first) relevance theoretic pragmatic constraint, discussed above in Section 4.4.<sup>16</sup> A further component of the dialogue gameboard could be a set of frames, associated with the expressions used, the conversational topic, etc. Moreover, one could postulate a component for salient coherence relations.

The variable assignment operative in the context, could then be thought of as a result of several components on the dialogue gameboard. Preliminary, a function taking three arguments – a frame, a question and a coherence relation – yields a variable assignment, which is then used for truth conditions. A question worth further attention is how to think of these arguments semantically. One could think of them in terms of basic types: like entities, events, and numbers. Questions could quite naturally be basic types as well, and, as a first approximation, so could frames and coherence relations.<sup>17</sup>

One further reason for why semantic context dependence would be interesting to account for in the framework of KoS is that meta-communication is central to this framework, as mentioned above. On Ginzburg's account, each speaker in a conversation somehow represents a private and a public aspect of the gameboard; but a conversational participant's take on the public aspect may differ from her interlocutor's conception of the publicly available gameboard. The mechanisms of meta-communication, e.g. clarification requests, are thereby expected to be used frequently, and careful and detailed data analysis of naturally occurring speech shows that such phenomena are ubiquitous in conversation (Ginzburg, 2012, chap. 4). Now

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<sup>16</sup>The relevance-theoretic approach to pragmatic constraints is not explicitly formulated in terms of questions, but it involves the notion of 'cognitive effects' (see page 18), which in turn is elaborated in terms of answers to questions, raising of doubts, and suggestions of courses of actions. The latter two cognitive effects could quite naturally be reformulated in terms of questions or answers.

<sup>17</sup>Cf. the discussion of frames and formal semantics in (Cooper, 2015).

meta-communication is also expected to occur frequently, if modulation is a common phenomenon. Even though the dialogue gameboard has components that determine the right modulation, according to the preliminary hypothesis mentioned above, two interlocutors may differ in their conception of frames, coherence or relevant questions. This point holds for all variants of compositional event semantics mentioned in the dissertation (truth-conditional pragmatics and indexicalism, which could be combined with central aspects of relevance theory, radical contextualism and semantic minimalism). And if we pursued the project of radical contextualism, which was illustrated above in terms of contextual shifts in the interpretation function, the theoretical point of expecting ubiquitous meta-communication would become even clearer. This is because the context dependence of meaning is, for radical contextualism, potentially more prevalent than the alternatives suggest.<sup>18</sup>

It seems worthwhile to try to map these ideas out in more detail. That would be interesting not only because of the more fine-grained notion of context that would then hopefully emerge, but also because of the interdisciplinarity of the suggested approach. The perspective in Ginzburg's methodology and theory is that of a linguist rather than that of a philosopher. Further investigations in this area could, accordingly, have an impact on theory construction and methodological choices in philosophy and linguistics.

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<sup>18</sup>Recanati (2010b, p. 6-9) discusses the semantic minimalists' worry that contextual effects on truth conditions, in particular modulation or similar notions, make communication a miracle. As a response, Recanati refers to the interactive nature of conversation, which include mechanisms for negative and positive feedback, and, typically, "a tolerance for misunderstanding" (see Recanati 2010b, p. 6-9). This is very much in line with the outlook on conversation in Ginzburg's approach.

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## Sammanfattning

I debatten om semantiskt kontextberoende har ett flertal ramverk utvecklats. Bland de ramverk som antar att en central aspekt av mening är sanningsvillkor, finner vi exempelvis indexikalism och sanningsvillkorspragmatik. Det första ramverket, som brukar förknippas med Jason Stanley, redogör för kontextuella effekter genom en rik, fonologiskt ohörbar, syntax. Det andra ramverket, där François Recanati är tongivande, antar inte att mekanismerna har med ohörbar syntax att göra, utan utvecklar istället en mer komplicerad semantik. I denna avhandling utforskas hypotesen att indexikalism och sanningsvillkorspragmatik är empiriskt ekvivalenta. Konklusionen att denna hypotes är hållbar ter sig klar, när påståenden och argument i debatten görs formellt precisa med modellteoretisk semantik. Slutsatsen står i bjärt kontrast till välkända påståenden i debatten, där oenigheten antas vara just empirisk.

Avhandlingen inleds med en systematisk översikt över indexikalism och sanningsvillkorspragmatik. Därefter utforskas hypotesen. Ramverken tillåter utvecklingen av två liknande, men klart åtskilda, formella semantiker för en uppsättning språkliga exempel som är centrala i debatten. De formella semantikerna, som är modellteoretiska, i den händelsesemantiska traditionen, tillämpas på följande lingvistiska fenomen: domänrestriktion hos kvantifikatorer, överförda betydelser (metonymi), bindning, färgadjektiv, meningsförhandling, och berikning av tematiska roller. Varje fenomen behandlas på följande sätt: först diskuteras forskningsbakgrunden, och huvudidéerna i den relevanta litteraturen summeras, kritiseras eller utvecklas. Därefter presenteras en indexikalistisk formell semantik och en sanningsvillkorspragmatisk formell semantik. Slutsatsen är att indexikalism och sanningsvillkorspragmatik är empiriskt ekvivalenta ramverk (i en precis mening).

De formella semantikerna utvecklas även för att hantera andra lingvistiska fenomen. Mer precist utforskas de kontextberoende dimensionerna hos engelskans presens perfekt. Återigen ges både en indexikalistisk och

en sanningsvillkorspragmatisk formalisering. Avhandlingen utvecklar även en tidigare svagt utforskad kombination av Reichenbachs och Jespersens tidiga redogörelser för presens perfekt. Analyserna som läggs fram ger ytterligare evidens för att indexikalism och sanningsvillkorspragmatik är empiriskt ekvivalenta, men de fördjupar även vår förståelse av presens perfekt samt testar fruktbarheten hos de modellteoretiska, händelsesemantiska formaliseringarna.

I den avslutande diskussionen argumenteras det för att centrala aspekter av andra ramverk som utvecklats för att hantera kontextberoende, t.ex. relevanteori, radikal kontextualism och semantisk minimalism, faktiskt är kompatibla med indexikalism och sanningsvillkorspragmatik. Diskussionen tar även upp frågor kring enkelhet och hur långt hypotesen om empirisk ekvivalens kan generaliseras.

Ett övergripande syfte med avhandlingen är att omstrukturera och vitalisera debatten om semantiskt kontextberoende. Som kontrast till den språkfilosofiska diskussionen inom detta område, där lingvistiska fenomen nästan aldrig ges detaljerade formella (kompositionella) syntaktiska och semantiska formaliseringar, har avhandlingen som målsättning att visa hur detaljerade formaliseringar, som inte alltid är uppenbara eller självklara, kan ge nya insikter.

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